DELEGATED DECISION BY THE CABINET MEMBER FOR FUTURE ECONOMY & INNOVATION

05 SEPT 2025

Mobile Digital Twin –

Report by The Director of Economy and Place

RECOMMENDATION

1. **The Cabinet Member is RECOMMENDED to:**

   a) **approve a G-Cloud call off contract for a total contract value of up to £5m; and**
   b) **approve the Council's contribution of £500k toward the total cost of the contract to go alongside contributions from other programme partners.**

Executive Summary:

2. The council will lead on developing and delivering a mobile digital twin for use by the public sector and owned by the public sector. The council will commit up to £500k to develop the platform based on Oxfordshire data. Several other Local Authorities have expressed interest in co-investing and the potential scope could reach £5m as the toolset is developed via a Local Authority partnership model. The council would be the accounting body and would own the IP under license with the rights to sub-licence this.. The platform will be procured as goods and services via G-Cloud. The council is in full control of cashflow and liabilities by means of the termination for convenience clause in the contract.

3. The Digital Twin creates the platform which provides robust evidence for intervention requirements and proposes solution architectures. In some cases, the evidence will enable evidence-based discussions with individual Mobile Network Operators such that they can (at their cost) amend the parameters of their 4G/5G radios on macro or micro cell sites. In many cases there will need to be physical new mobile infrastructure installed and funding for this will need to be separately sourced.

4. The total contract value of the programme will be up to £3m with the ability to increase this up to £5m, of which £500k will be initially met by OCC and £2.50m (or £4.5m in the event of the increase detailed above) will be funded by other programme partners. The run rate of the programme will be managed so that the Council's contribution never exceeds £500k, and if the Council is unable to secure the additional funding from the other programme partners the contract will be terminated early before the £500k commitment is reached.

The Proposition

5. At the centre of the proposed solution is a powerful digital twin of the public mobile networks.

6. A digital twin is a virtual representation of a system (or network) designed to reflect the operation of the physical system accurately. It spans the network's lifecycle, is updated from real-world data that it uses to simulate the model to provide insights into the end experiences of using the network, namely areas and times where the network can deliver a good service and where and when the network delivers a poor service. The "Mobile Twin" proposed differs from other solutions that only offer non-temporal insights and cannot model network congestion and other capacity impairments.

Why build a Digital Twin?

7. Network augmentation to improve coverage and capacity can only be done if the existing / underlying network is well understood. There are many potential ways to enhance existing networks and/or build extensions, which might be integrated with public networks or operate on a standalone basis. At the heart of the problem that the Council is trying to solve are the economics of any deployment and what "bang for the buck" can be delivered using different deployment strategies. The "bang" is basically a coverage footprint and the mobile broadband capacity it can deliver. This in turn is dimensioned by the spectrum deployed on the cell site and generation of Mobile technology. To make good investment decisions using public monies a clear and independent understanding of what mobile network infrastructure can and does deliver must be created in other to run a variety of "What if" scenarios, that may trigger / justify market subvention.

8. The twin will be a digital representation of a network of real world mobile cell sites. End user demand will be simulated and calibrated using real-world crowdsourced measurements, in both the RF and Data traffic domains, matching its operation to the real cell site. This provides the basis for "What if" queries, which would include.
   - What network improvements can be obtained by adding additional spectrum to a public MNO site?
   - What improvement can be delivered by adding additional public network sites in a target area?
   - What is the improvement that can be delivered by an independent "neutral" capable of extending multiple public 4G and 5G Mobile Operator networks?
   - What improvement can be delivered by a 5G standalone, non-integrated private network?

9. Different "What if" scenarios can be considered, and each one can costed. Once the improvement outcome to coverage and capacity is determined, it is then possible to determine answers to second-order questions that relate to the networks ability to support specific use cases. Business and consumer mobile services, ranging from "what Smartphone apps will work", can the network support a FWA service, can the network support IoT, Sensors or CCTV etc… A

key part of this analysis will be to load the digital twin with extra demand, relating to these use cases to determine if the existing or an augmented network can support them and at what quality (or specification) they can be supported.

Basic Visualisation and Insights

10. The initial model (Digital Twin) would enable the end users to get a series of insights into MNO coverage and whether the target use cases can be supported, on a location-by-location basis. Initially this would be for outdoor services only. The first insight would be the ability to profile a specify area, for example a business park, a rural village, or a specific macro cell (based on its serving area). The "digital twin" can be tested to see if certain use cases can be supported, by loading additional traffic (from the use case) across the target location (in addition to the simulated current demand).

11. The visualisation / user interface concept is to define a polygon, that bounds the area of interest. This will call-out the mobile infrastructure that currently exists in that area for all Mobile Operators. It would show operational footprints. The representation would be based on a visualisation of layers, each layer relating to a specific service / use case, and colour coding for the quality of the service, including no coverage boundaries. Missing capacity and coverage will show up as a separate set of distinct polygons for each use case, which can be exported.

12. The real value of the digital twin is the ability to run "What-if" scenarios, which ultimately could be automated (via Machine Learning). The network of cell sites can be manipulated via a user interface. The user can select one, or a cluster of cells and perform transforms to modify the configuration of existing sites or add new sites into a defined area. As the user manipulates the target area, the impact will be calculated in real time (or as fast as possible).

Real-world Field Testing and Validation

13. Finally, a digital twin is only useful if it provides an accurate virtualisation of the real-world network infrastructure. A significant amount of effort does need to be expended testing and validating the twin to ensure the answers it provides are useful (and insightful). The project will develop a methodology for ensuring alignment over time, as a one-time snapshot can age quickly. The goal is to get good correlation between the twin and a real network, and this can be done using simple methods for example off-the-shelf Smartphone and MNO SIMs deliberately loading the network in key locations to determine the impact.

Corporate Policies and Priorities

14. This project aligns with several key OCC strategies and aims:
    - **Digital Strategy** – mobile connectivity is a key element of the strategy.
    - **Digital Inclusion** – availability of mobile connectivity
    - **Partner of Choice** – by choosing the right organisations to develop purposeful relationships to deliver the best outcomes for our residents.

- **Place Shaper of Choice** – by identifying areas of poor mobile coverage and working with suppliers to bring mobile connectivity to those communities
- **Commercially aware** - The proposition aligns with OCC's ambition to be a more commercial smart organisation as it has the potential to spin out into a service or services that could be offered to other public sector bodies or at least to cover OCC's own operating costs.

Financial Implications

15. The total contract value of the programme will be up to £3m, of which £0.5m will be initially met by the Council and £2.5m will be funded by other programme partners. The programme will be managed so that Oxfordshire County Council's contribution never exceeds £0.5m. The initial call off value is £0.5m and therefore is below the key decision threshold but the total contract value will be £3m (extendable to £5m). The Council's share of the programme costs will be met from Digital Infrastructure gainshare funding, which has sufficient budget available. OCC's liability will be capped at a maximum of £0.5m with the remaining costs funded by other programme partners, up to the value of £2.5m (extendable to £5m).

Comments checked by:
Thomas James, Head of Financial Services,
thomas.james@oxfordshire.gov.uk (Finance)

Legal Implications

16. The contract is being entered into via the CCS G-Cloud 14 framework which is compliant with the Public Contracts Regulations 2015. The contract is for a total value of £3m with the option to increase this to £5m and it is intended that the Council will only finance £500k of the total value with the remainder being financed by other councils which will be confirmed via legally binding contracts with those councils (to be put into place post signing of the contract). In the event of not being able to secure such commitments the Council will be liable for the full contract cost unless the contract is terminated early, the Council has the ability to terminate the contract without cause with 30 days' notice.

Comments checked by:
Donna Creffield, Contracts Lawyer,
Donna.Creffield@oxfordshire.gov.uk (Legal)

Staff Implications

17. The project will be delivered by a small team of highly experienced consultants from Spirit Public Sector working alongside the Council's Digital Infrastructure Programme Team. The Digital Infrastructure Programme Team staff costs are already funded from the Digital Infrastructure Gainshare Fund.

Equality & Inclusion Implications

18. There are no E & I implications considered relevant to the project.

Sustainability Implications

19. There are no sustainability implications attached to this project.

Risk Management

20. The Digital infrastructure programme has a detailed risk log which is continually assessed. The service outputs of this work are external and do not impact on any services directly delivered by the council. The risks will primarily be concerned with diligent contract, budget, and project delivery management. The contract has been drafted to enable these activities to be executed.

Consultations

21. There are no consultations required for this project.

Robin Rogers, Director of Economy and Place

Annex:	Nil.
Background papers:	Nil.
Other Documents:	Nil.
Contact Officer:	Craig Bower, Digital Infrastructure Programme Director, craig.bower@oxfordshire.gov.uk,

August 2025