

Administration Committee

7 October 2021



Title	<i>ICT Storage and Backup hardware refresh</i>
Purpose of the report	To make a decision
Report Author	<i>Christopher Layte – ICT Infrastructure Manager</i>
Ward(s) Affected	All Wards
Exempt	No
Exemption Reason	
Corporate Priority	Financial Sustainability
Recommendations	Committee is asked to: <i>Approve the replacement of the ICT Storage as per the preferred option and backup target infrastructure and give delegated power to the Group Head of Commissioning and Transformation to appoint a supplier once all the prices have been returned.</i>
Reason for Recommendation	The Storage Area Network (SAN) and backup target devices are approaching 6 years old. The support and maintenance has already been extended for 12 months until April 2022. The devices are past end of life.

1. Key issues

- 1.1 The Storage Area Network (SAN) is critical core ICT infrastructure. This is the hardware where all data for the Council is stored. All ICT services and all Council services depend on its operation. Any failure or downtime results in a complete shutdown of all ICT functions and most Council services.
- 1.2 Associated with this is the backup device, which is where all Council data is backed up to. This is essential for disaster recovery purposes, both in terms of incidents in the Council (ranging from users accidentally deleting data, to complete loss of access, due to, for example, fire or terrorism) and attacks from outside (e.g. ransomware). If the Council were victims of a disaster, such as a fire or cyberattack, without a backup, the Council would lose all historic data for all hosted systems.
- 1.3 The current SAN Storage array and backup repositories were purchased and installed April 2016. At the time they had 5 years support and maintenance from the vendor (DellEMC).
- 1.4 The useful life of any hardware of this nature is 5 years, so they were due for replacement April 2021 although replacement was agreed to be

deferred for 12 months to allow a full assessment of need, especially in relation to immutable storage and storage capacity. This assessment was also pushed back due to staff ensuring we could adapt to new ways of working when the pandemic started in April 2020. The support contract was, therefore, extended for an additional 12 months until April 2022 at a cost of £32,538.87. To make it affordable, this extension period has come with a lower level of support (which could potentially result in greater downtime, if it was required). Both hardware devices reach end of service life within the financial year 22/23. End of service life means that the manufacturer will no longer offer any type of support on the product (21 Jan 2023 for the SAN and 30 July 2022 for the backup targets). Any further extensions of support up to these end-of-life dates are likely to be considerably more expensive as, due to their age, the devices will be deemed to be more vulnerable and prone to failure by the vendors.

- 1.5 Our current SAN is a Dell EMC VNX2. ICT have 2 backup target devices, one at Knowle Green and one at the Depot. Both are Data Domain DD2500 models. The one at Knowle Green has additional capacity. The Council additionally have a Dell PowerEdge server which allows for significantly faster recoveries to improve business continuity. This can only store 3-4 previous days' backups but does not need replacing until 2025.
- 1.6 Since purchasing these devices the amount of storage the Council requires for our secondary backup has increased as the organisation increasingly becomes paperless. Irrespective of a final option agreed we would require more storage capacity to future proof the Council's ongoing requirements. This trend is likely to continue as nearly all business transactions now have an electronic footprint and systems tend to keep more types of information for each transaction (such as images, correspondence etc.)
- 1.7 A significant number of councils have been hit by ransomware attacks. These have been known to target backup repositories. As a result, councils are adding immutable storage for backup storage. Immutable storage is a backup that cannot be hacked as it can never be tampered with, modified, or removed.
- 1.8 No other Surrey authorities have moved their datacentres to the cloud. Two authorities have now moved their own equipment into offsite third party datacentres to free up space. When asked why they had not chosen a full cloud offering, the reason in all cases was solely down to price.

2. Options analysis and proposal

- 2.1 **Option 1:** The Council does nothing.

Benefits: None

Disadvantages: ICT would need to extend support on the existing units. The cost of the support would be greater than one year of depreciated life on new units.

It would also result in the Council being exposed to the risk of having no serviceable storage and no reliable backups in the event of disaster, due to hardware failure.

This is therefore not a viable option

- 2.2 **Option 2:** (Recommended) ICT replace the hardware as now but with increased storage capacity and updated versions of SANs etc with an additional immutable store. Indicative prices from vendors are in the table below.
- 2.3 **Benefits** From the assessments ICT have been able to undertake, this represents the most cost-effective solution. It needs to be borne in mind that Spelthorne would need to maintain a server room even if the SAN and backups were delivered via other means (e.g., a cloud solution). In Spelthorne, applications and services are delivered to end users through VDI (virtual desktop infrastructure), so the server room would be needed for this, and for the CCTV (which has its own SAN), and the core network infrastructure (plus a number of standalone PCs used for remote connections for specialist software). With virtualisation, the server room is now only a fraction of its former size and is serviced by a single aircon unit. (There is a backup unit also installed in case of failure of the primary aircon).
- 2.4 With on-premise infrastructure, end users will get the best available performance on VDI, as ICT have a 10GB link to the SAN (in the case of a cloud solution links would be via the internet).
- 2.5 The inhouse SAN option means ICT would not require any additional internet feeds at Knowle Green (approx. £20K pa for a 1GB leased line with guaranteed service levels (x2 for redundancy)), nor would ICT require an increase to our existing bandwidth (currently 500MB for £15K). Upgrades would be required to the incoming lines if a cloud solution was put in place. Even with a redundant internet line, the Council would be susceptible to localised issues that could cause internet outages. Such an outage would not stop the Council's operations continuing (albeit at a reduced level) on premise.
- 2.6 **Cloud Offerings:** - With some cloud offerings the Council would lose the integrations that currently exist between applications/databases. In local government, Councils have a very wide array of systems and ICT have created many efficiencies and automation by getting these systems talking to each other. Some of these integrations could be replicated via Application Programming Interfaces (henceforth referred to as APIs).
- 2.7 APIs act as connectors between systems, but each type of transaction tends to need its own API and vendors typically charge large sums for creating and maintaining them (typically in the thousands). As an example, our forms system alone has some 30 to 40 integrations to other applications for automatically retrieving and populating data, which have no associated cost, due to having direct connections to on- premise databases.

When compared to IaaS (Infrastructure as a Service) (see Option 4), in the event of hardware issues, maintenance would be faster on site as getting physical access to the kit would be much quicker.

The implementation of onsite replacements would more straight forward. Existing hosts (servers) could remain connected to the old SAN and new SAN simultaneously with no downtime and higher transfer speeds.

Disadvantages: In the event of a full disaster (such as loss of building as a result of fire or terrorism) recovery time is likely to be faster from a cloud-based solution (Option 3). The time difference is difficult to quantify as it would depend on the type of disaster, but at least a day faster would be expected.

- 2.8 **Option 3:** Move the Council's backend infrastructure into the cloud, onto a platform such as Azure or AWS. Sizing a solution on the VMware Cloud on AWS calculator indicates a revenue cost of £376,871 over 3 years (therefore, approx. £625K over 5 years). This is before any other additional costs (such as increased bandwidth, resilient internet lines, ingress and egress charges, APIs for integrations, growth etc).
- 2.9 **Benefits:** There would be no maintenance on the hardware itself – both in terms of physical maintenance and firmware patching. (This currently constitutes approximately 1-2% of the Infrastructure Manager's time).
- 2.10 Data is replicated automatically to secondary sites, so in the event of a disaster, at the providers primary site, staff would instantly be able to connect to the secondary site and continue working. Therefore, there would be less vulnerability to physical attacks or loss of access at Knowle Green
- However, additional back up solutions would still be required if we wanted to provide end users with the ability to restore anything that they had deleted by mistake (e.g if a user deleted a file in error or a file became corrupted)
- 2.11 **Disadvantages:** Primarily, the significant cost difference when compared to an on-premises solution (see above). The other financial issue is that costs are not fixed and vary depending on storage use and the amount of data flow. (Many providers charge for data ingress and egress i.e., sending data to and from the cloud). Although these types of cloud solutions are scalable, it would require a lot of staff time to ensure that ICT are not over provisioning the Council's server estate. Even with the cloud there are still maintenance requirements for the ICT team.
- 2.12 Cloud offerings do create a point of failure with either the internet or the service provider themselves but there would be less vulnerability to physical attacks or loss of access at Knowle Green.
- 2.13 There can be performance issues both with applications and potential latency on telephony as data has to travel out across the internet and back, and simultaneously for most staff at peak times of day.
- 2.14 **Option 4** IaaS (Infrastructure as a service). This is where ICT relocate the Council's hardware estate to a third-party data centre (as done by two of the Surrey authorities) but would still require that ICT replace our existing SAN and back up devices.
- 2.15 **Benefits** As for Option 3 there would be less vulnerability to physical attacks or loss of access at Knowle Green
- 2.16 **Disadvantages:** With IaaS, you are paying for exactly what you have onsite in someone else's data warehouse. Because our inhouse datacentre has such a small physical footprint, there are no real benefits to paying a third party for hosting fees beyond the costs ICT already incur for

hardware. Also, as for cloud, the internet provision would need strengthening.

- 2.17 **Option 5** Citrix have recently launched a cloud offering for VDI, but as this is not yet commercially available prices have not yet been released. It is only being mentioned as a potential forthcoming offering. This would need to be done in addition to Option 3 for a full cloud experience.
- 2.18 **Option 6** Individual application vendors offer SaaS (Software as a Service). In this model, each vendor would host their own application in their own datacentre, but because of the number of applications that the Council run, this would be an unaffordable approach. It would also remove all staffing efficiencies that have been gained from automating processes via on premise integrations between applications/systems. The main suppliers that we have discussed this option with are typically charging in the region of 40% extra per year for hosting. Over the past 3 years, the council has spent just over £750K per year, on average, on software support and maintenance. Very little of this is currently cloud based. Moving to a SaaS solution across the entire estate could therefore cost an additional £300K per year (approximately).

3. Financial implications

- 3.1 ICT are currently working with several cloud providers to look at a range of alternative options, but to date none have been able to provide any favourable indicative costs. The prices that ICT have received so far are in the table below. ICT have not been able to obtain full details on all the cloud alternatives due to account manager changes and leave, but from research to date it is estimated costs would be 300-400% more than on-premise infrastructure. Additionally, the costs would be revenue based not capital.
- 3.2 A budget to cover hardware replacement was agreed as part of the ICT capital budget for 21/22. The approved budget for this project for 21/22 is £250,000. Indicative pricing has shown that the cost for the recommended option will be within that budget. (Final figures cannot be provided until ICT undertake a formal procurement and select a vendor). Figures are provided in Table 1 including cloud storage costs where known.

Table 1 – Costs of options

OPTION 2			
Hardware element	Options	Costs of options	Option number
1 Storage	San storage estimated costs	£88,100	2
2 Backup	Costings received to date	91,250 - £159,116	2
3 Immutable storage		£87,069	2
Total Capital Cost Cheapest on-	Estimated total	303,610	

premise options (A)	costs		
OPTION 3			
Revenue costs of equivalent cloud based (B)	e.g AWS	£628,118 – 1,080,000	3
OPTION 4			
Likely costs		TBC	4
COST COMPARISON			
Difference Cloud vs. suggested option (B-A)		£324,508	

Table 2 Detailed costs received to date

Storage	Capital Spend (note SANs purchased for a 5-year life)
Dell SAN (1)	£88,100
HP SAN (2)	<i>Awaiting prices from HP</i>
Backup	
Dell Backup (DataDomain) - On site primary and secondary (3)	£159,116
Dell Backup (DataDomain) - On site primary and virtual secondary (4)	£128,441 (plus storage costs)
HP Backup (StoreOnce) (5)	£91,250
Final costs expected to be within budget	
Immutable Storage	
Dell CyberVault (6)	<i>Awaiting prices expected end of Sept – but can be done on a basic level as part of the DataDomain solution</i>
HP Immutable Storage (7)	<i>Awaiting prices from HP – but can be done on a basic level as part of the StoreOnce solution</i>
Centerprise Cloud Only Immutable Storage (8)	£87,069
Suppliers Note this is Revenue Spend	Cloud prices for infrastructure over 5 years (before adding associated costs – e.g. internet, APIs etc)
AWS (not inclusive of egress charges)	£628,118
Rackspace – VMWare in Azure	£1,080,000
Centerprise	Awaiting prices
Potential API integrations	<i>Cost dependent on cloud service and no of APIs required</i>

Need to upgrade internet supply to provide resilience and allow for increased traffic requirements with cloud option, as current “traffic” is mostly internal..	Approx £30-35k per year
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4. Other considerations

4.1 No other considerations.

5. Equality and Diversity

5.1 There are no issues as accessibility to the systems should be equally available for all

6. Sustainability/Climate Change Implications

6.1 With on-site provision of SAN and back up targets ICT are fully aware of the energy consumption issues and can look to make efficiencies in our electricity consumption across the estate

7. Timetable for implementation

7.1 ICT would seek to have the new solution in place before the current support expires in April 2022 depending on outcome of procurement process.

Background papers: *(These are unpublished papers upon which you have relied in preparing this report). If none state, There are none.*

Appendices: None