Description of the Requirement: Scientific Computing Department Data Management System Replacement

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The Scientific Computing Department (SCD) at the Rutherford Appleton Laboratory (RAL) intends to purchase replacement Data Management software to support its function of providing an active archive for scientific data. The majority of the data is for the worldwide Large Hadron Collider Computing Grid (wLCG) Tier-1 archive of physics data, from the LHC (Large Hadron Collider) at CERN, managed as part of the UK GridPP project. In addition, there are also significant holdings of climate modelling data from the Centre for Environmental Data Analysis (CEDA), data from Diamond Light Source Ltd. (DLS) and data from STFC's (Science and Technology Facilities Council's) own facilities. Much of this data must be stored indefinitely and for some use cases SCD hold the primary copy, therefore its security and integrity are paramount.

The data stores include approximately 96PB of tape-backed storage, with optionally 1, 2, or 3 copies on tape – with additional copies, where required, stored off site. There are currently two Oracle StorageTek SL8500 tape libraries in operation at RAL; one for the LHC data funded by the GridPP project and one for the STFC facilities' use including CEDA climate modelling data, ISIS neutron and muon source, the Central Laser Facility (CLF) and the Diamond Light Source Ltd. The tape media in use in the SL8500 tape libraries is StorageTek T10K format, with the LHC tape library populated with T10KD. The STFC Facilities library currently has a mix of T10KC and D. An additional tape library has also recently been purchased, a Spectra TFinity, populated with a mixture of LTO tape drives and IBM TS1160 enterprise tape drives. There is sufficient capacity available in both StorageTek SL8500 libraries until after 2020, and the department intends to continue using these tape libraries, therefore any data management system deployed in SCD must be compatible with all of these technologies.

The majority of the tape store capacity is based on Castor (the CERN Advanced STORage manager) which is data management software currently also run at CERN. Each of the user communities who store their data via Castor have their own means of storing, archiving, managing and recalling their data on tape. For example, the LHC data is stored using bespoke interfaces (SRM https://sdm.lbl.gov/srm/, XrootD http://xrootd.org/, GridFTP http://toolkit.globus.org/toolkit/docs/latest-stable/gridftp/) provided specifically for the High Energy Physics (HEP) community, CEDA uses SCD developed packages, StorageD and DLS also use SCD developed packages, Icat (https://icatproject.org/)and StorageD. StorageD provides an interface between Icat and Castor, aggregating data into sets related to experiment visits and providing a catalogue of files uploaded which may be used for recalling the data at a later date.

The version of Castor used by SCD at RAL will not be supported long term and, therefore, alternative data management system software is required to replace Castor and this replacement software must be integrated with any mandatory interfaces required by existing user communities and, in

particular where SCD developed software is used, alternative data archive, recall and management functionality could be provided by the solution. Any proposed solution will be expected to run on a supported Linux operating system.

There are, in addition, two other systems currently in use and supported in SCD. One is HPE DMF version 6, a hierarchical storage management (HSM) solution to migrate files between online, near line and offline storage based on defined criteria. The DMF system at RAL provides an HSM solution for the Technology, ISIS and CLF departments within STFC. The other is SCD's own in-house service, ADS, which also includes tape-backed storage. An alternative data management system to replace all three systems (Castor, DMF and ADS) would be ideal. The solution must be highly scalable to meet potential future growth to approximately 300PB and any proposed solution is expected to be in use at least until 2030.