ARCHER and ARCHER2 Quarterly Report

July – September 2020

EPCC

The University of Edinburgh

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1. Document Information and Version History

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Reviewer(s)	Alan Simpson

Version	Date	Comments, Changes, Status	Authors, contributors, reviewers
0.1	2020-09-01	Initial draft	Lorna Smith
0.2	2020-10-06	Complete training section	Juan Rodriguez Herrera
0.3	2020-10-12	Sections added by function leads	George Beckett, Chris Johnson, Xu Guo
0.4	2020-10-12	First full draft completed	Lorna Smith
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1.0	2020-10-14	Version for UKRI	Alan Simpson, Lorna Smith

ARCHER Quarterly Report

This section of the report covers the period July 2020, August 2020 and September 2020 for the ARCHER2 service.

2. ARCHER Executive Summary

- The vast majority of CSE activities have transitioned to the ARCHER2 service and these are summarised in the ARCHER2 part of this report.
- However ARCHER continues to run smoothly and the CSE team continue to support users with their queries on this service. 3 query feedback responses were received for In-depth queries all of which provided a score of “Excellent”.

3. ARCHER Forward Look

- The ARCHER service is currently scheduled for decommission during Q4 2020, and the CSE team will focus on ensuring users are supported during the closure of projects and / or the transition of projects to the ARCHER2 service.

4. ARCHER Performance Report

This is the performance report for the ARCHER CSE Service for the Reporting Periods: July 2020, August 2020 and September 2020.

The metrics are specified in Schedule 2.2 of ARCHER CSE Service Contract.

CSE Query Metrics

- **QE1:** The percentage of all queries notified to the Contractor by the Help Desk in a Quarter that the Contractor responds to, and agrees a work plan with, the relevant End User within 3 working hours of receiving the notification from the Help Desk. *Service Threshold: 97%; Operating Service Level: 98%.*
- **QE2:** The percentage of all queries notified by the Help Desk to the Contractor that have been satisfactorily resolved or otherwise completed by the Contractor within a 4-month period from the date it was first notified to the Contractor. *Service Threshold: 80%; Operating Service Level: 90%.*
- **TA1:** The percentage of all technical assessments of software proposals provided to the Contractor by the Help Desk in any Service Period that are successfully completed by the Contractor within 10 days of the technical assessment being provided to the Contractor by the Help Desk. *Service Threshold: 85%; Operating Service Level: 90%.*
- **FB1:** The percentage of End User satisfaction surveys for CSE queries carried out in accordance with the Performance Monitoring System by the Contractor showing the level of End User satisfaction to be "satisfactory", "good" or "excellent". *Service Threshold: 30%; Operating Service Level: 50%.*

Period	July 2020		August 2020		September 2020		Q3 2020	
Metric	Perf	SP	Perf	SP	Perf	SP	Perf	Total
QE1	100%	-2	100%	-2	100%	-2	100%	-6
QE2	100%	-2	100%	-2	100%	-2	100%	-6
TA1	100%	-1	100%	-1	100%	-1	100%	-3
FB1	100%	-2	100%	-2	-		100%	-2
Total		-7		-7		-5		-17

Service Credits

Period	July 2020	August 2020	September 2020
Total Service Points	-7	-7	-5

5. ARCHER CSE Queries

This section provides details of ARCHER CSE queries during the period July – Sept 2020.

Queries Resolved in Reporting Period

Metric Descriptions

In-Depth	All technical queries passed to ARCHER CSE team
Technical Assessment: <Category>	Request for Technical Assessments of applications for ARCHER time
Course Registration	Requests for registration on ARCHER training courses
Course Enquiry	Enquiries about courses
eCSE Application	Queries relating to eCSE applications include Technical Evaluations

A total of 28 ARCHER CSE queries were resolved by the CSE service in the reporting period.

Metric	July-20	Aug-20	Sep-20	Total
In-depth	6	1	8	15
Technical Assessment: Instant	2	1	3	6
Technical Assessment: Grant	3	1	2	6
Course Enquiry	0	0	1	1
Total	11	3	14	28

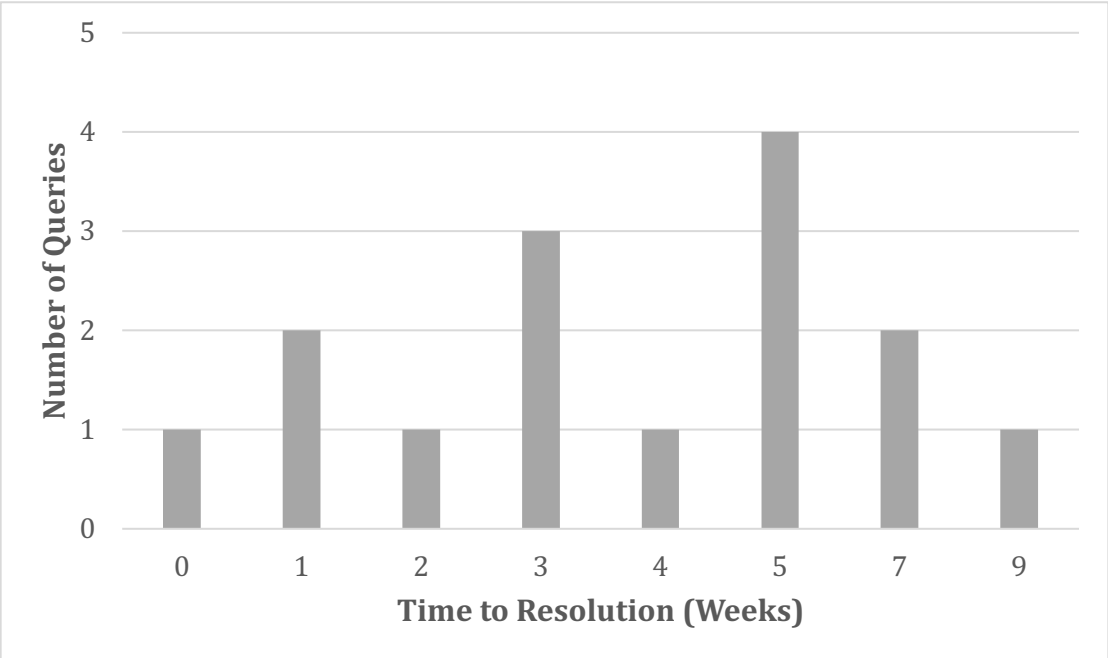
3 query feedback responses were received for In-depth queries in the reporting period. All responses gave a score of “Excellent”.

Resolved In-Depth queries fell into the following categories:

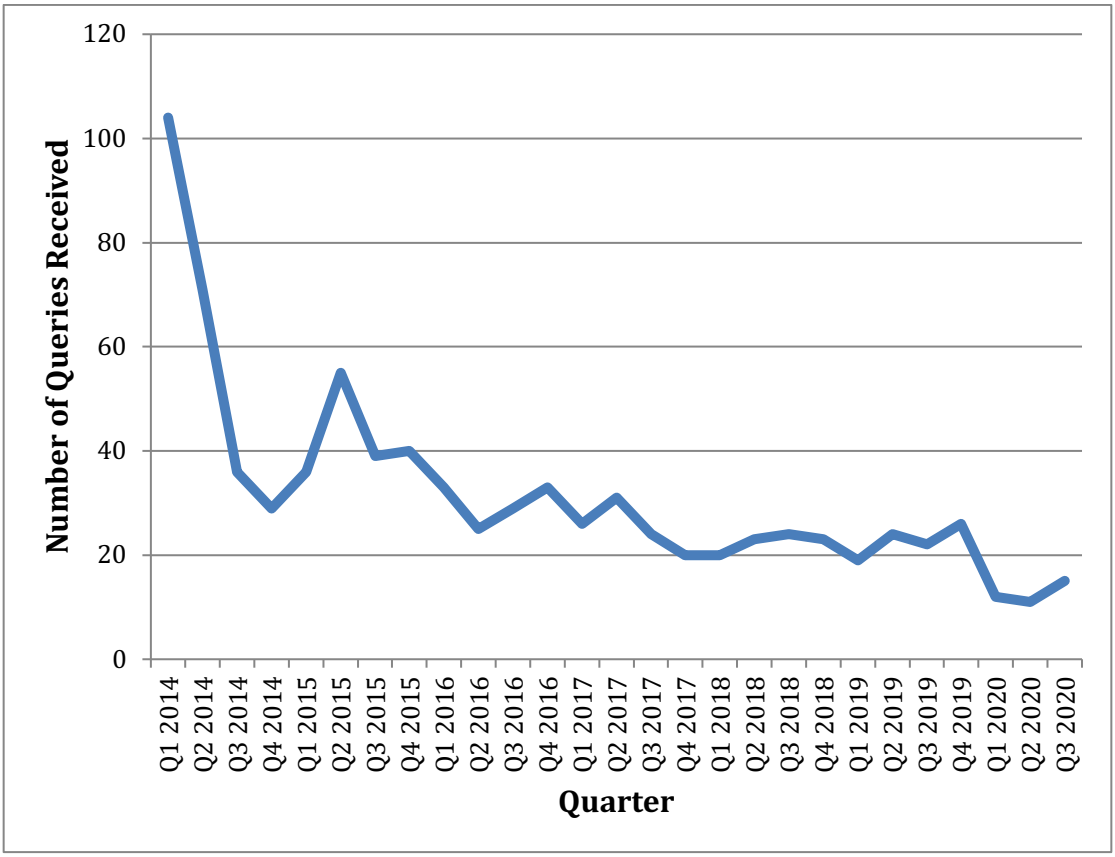
Category	Number of Queries	% Queries
3rd party software	14	93.3%
Performance and scaling	1	6.7%

In-depth Query Analysis

The histogram below shows the time to resolution for In-Depth queries in the current reporting period.

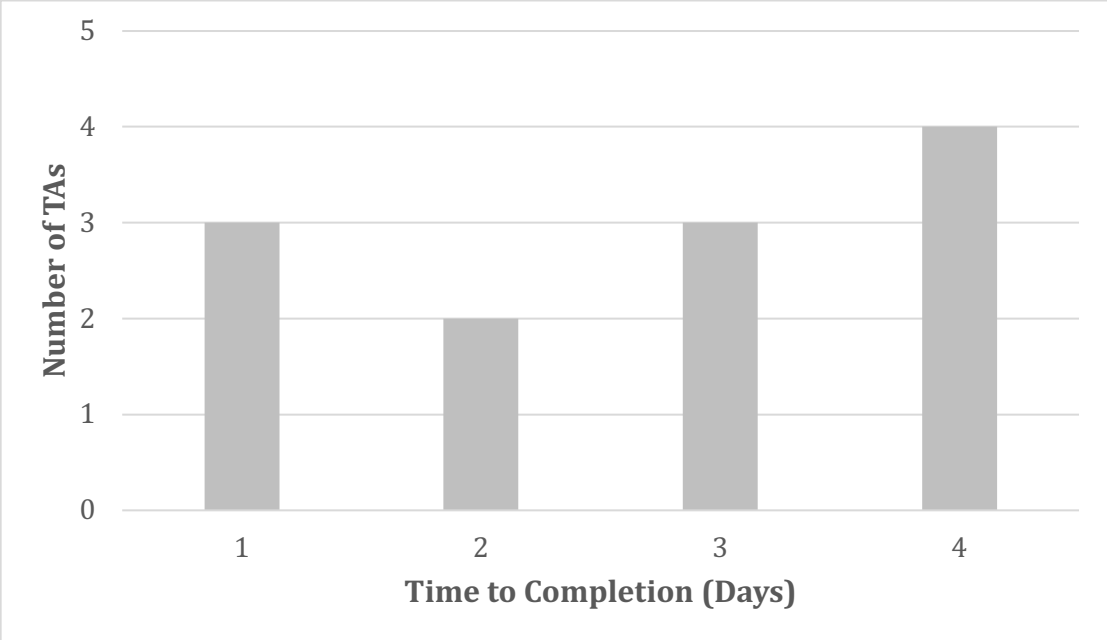


Plot of numbers of ARCHER In-Depth queries received per quarter:

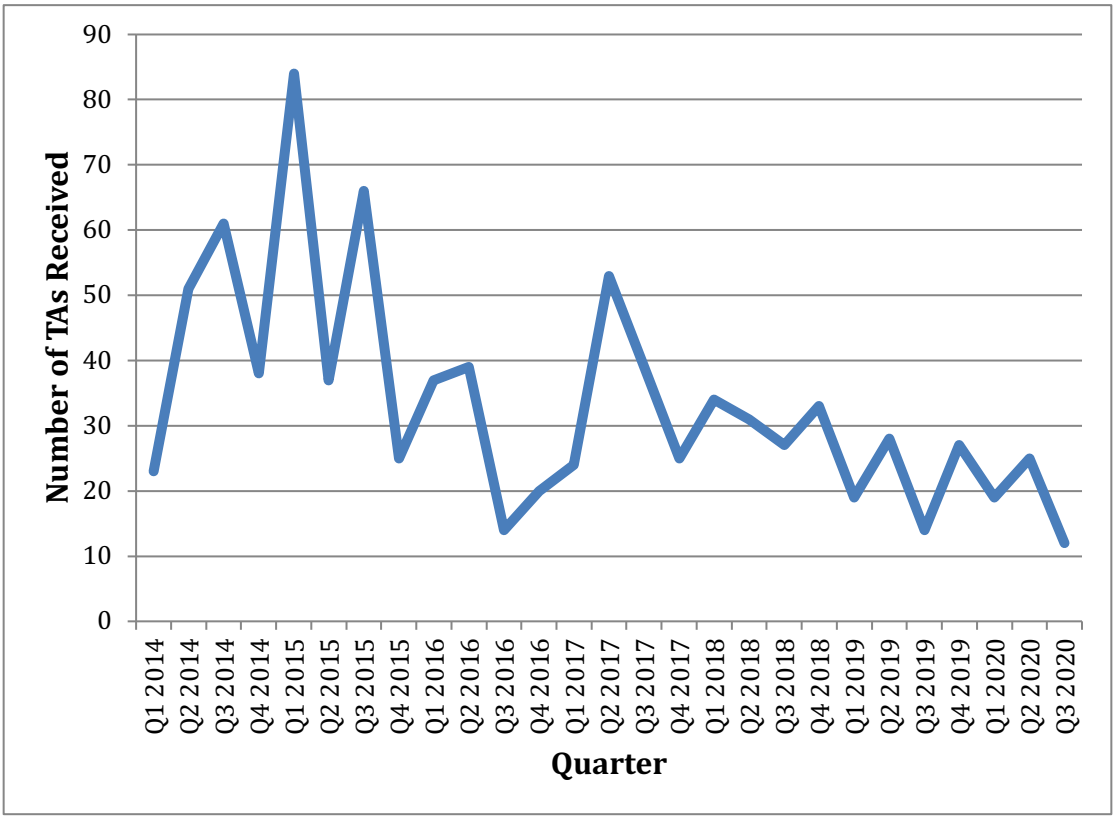


Technical Assessment Analysis

A histogram of the time to completion for ARCHER Technical Assessments is shown below.



Plot of numbers of ARCHER Technical Assessments received per quarter:



ARCHER 2 Quarterly Report

This section of the report covers the period July 2020, August 2020 and September 2020 for the ARCHER2 service.

6. ARCHER2 Executive Summary

- During the period, the focus of the CSE activity has been on preparation for the ARCHER2 4-cabinet system. The CSE team gained access to the 4-cabinet system on 28 September (with some limited access for the CSE Architect from 22 September) and have focused on porting applications, updating documentation, bug fixing and assessment against the system metrics.
- Prior to having access to the 4-cabinet system, the team have utilised the Test and Development System (TDS) to complete the publication of user documentation, first run of user- and developer-orientated training courses, and implementation of the Access to HPC Technical Assessment process.
- A total of 7.5 days of online training courses has been delivered over the Summer; more than 20 days of training are planned for the upcoming Quarter as the initial ARCHER2 hardware comes into service. In July, we also had internal runs of ARCHER2-specific courses, such as “ARCHER2 for software package users” and “Introduction to ARCHER2 for software developers. These new courses are designed around package users and developers, respectively, and we anticipate they will be popular with the user community.
- The first eCSE call was opened for EPSRC proposals with 25 proposals being received. This is the highest number received since the programme began under ARCHER. From this call, 13 projects were selected.
- The second eCSE call is now open for both EPSRC and NERC proposals alongside an Early Career Researchers Observers call, giving RSEs in the early stages of their careers the opportunity to attend the associated panel meeting as observers.
- The ARCHER2 team ran a table-top BCDR (Business Continuity and Disaster Recovery) session in September focused on the threat of a widespread failure of home-broadband services, as well as an analysis of the effects of a major failure of the University of Edinburgh's network services. The aim was to help prepare for major incidents that put the ARCHER2 team’s ability to perform CSE and SP commitments at risk.

7. ARCHER2 Forward Look

- Early users are due to gain access to the 4-cabinet system during October and the CSE team will be focused on supporting these users. A slack channel has been setup for these users and two sessions have been held with the consortium PIs to provide information on the access process and the new hardware.
- Shortly after the early users have completed their initial investigations, all users will gain access to the 4-cabinet system. The CSE team will be focused on supporting transition to the new service and we anticipate an increased number of queries over this period, as is normal for a new service.
- We plan to run a set of ARCHER2 specific courses, such as “ARCHER2 for software package users” and “Introduction to ARCHER2 for software developers” over this period. These are scheduled at the end of October and second runs are planned before the end of 2020.
- We will continue to deliver a rich and full programme of courses online, due to the current COVID-19 restrictions.
- The second eCSE call closes during this period and the focus will be on selection of new projects. We anticipate some of the projects selected during the first call will start during this period and we will be looking to ensure a positive start for these projects.

8. ARCHER2 Centralised CSE Team

During the period, the focus of CSE activity has been on preparation of the ARCHER2 4-cabinet system for Early Access from mid-October.

The CSE team gained access to the 4-cabinet system on 28 September (with some limited access for the CSE Architect from 22 September). This was later than planned and was due to a delay in the Hardware Provider installing the production version of the 4-cabinet operating system (that is, Cray Linux Environment Version 1.3).

Prior to having access to the 4-cabinet system, the CSE team continued to prepare for the start of ARCHER2 service, on the Test and Development System (TDS). Using the TDS, the CSE team were able to complete the second phase of the CSE Implementation Plan on time, at the end of July, including publication of user documentation, first runs of user- and developer-orientated training courses, and implementation of the Access to HPC Technical Assessment process.

At the time of writing, work to update user documentation and CSE-supported software, to accommodate differences in the 4-cabinet-system configuration (compared to the TDS) are progressing well, in preparation for Early Access.

CSI Projects

Software management on ARCHER2 — Spack and EasyBuild

In the previous quarterly report (June 2020), we noted that the CSE Project to evaluate the Spack and EasyBuild software-management tools had concluded that, while both Spack and EasyBuild were worthwhile options for ARCHER2, EasyBuild was the better choice and should be taken forward. However, subsequent developments in the community have led the CSE team to revisit their previous conclusion and to re-run the key steps of their evaluation on both the TDS and the 4-cabinet system.

At the time of writing, neither software-management tool can be easily deployed onto ARCHER2, because of changes in the way software modules are managed in the Cray Linux Environment Version 1.3. However, going forward we anticipate that Spack will be a suitable technology, once the Spack development team have chance to address the module-related issues.

The CSE team has therefore changed their conclusion. In the short term, the CSE team will monitor developments within Spack (as well as any subsequent changes to CLE), anticipating adopting Spack to support the majority of supported science software within the coming months.

OpenFOAM New I/O Model

The OpenFOAM mini-project is investigating at the I/O performance of a recent feature added to OpenFOAM — the in-run data collation protocol. With this, it is now possible to run a simulation and have the data be output in a collated fashion, rather than the tradition file-per-processor-per-variable. In this project, CSE looked at how this new I/O feature scales and performs at high core counts. We found that, while the collated output performs similarly to the normal, uncollated method at low node-counts, this does not hold as the number of nodes is increased. However, the time lost in using the collated format may be more than made up for by time gained in not having to collate post-simulation. Of particular note: the OpenFOAM developers have been in touch to say that we are the first to carry out this study, and that they are very interested in the results. This project is nearly concluded, and a report for it should be out by the end of October 2020.

Vampire I/O Study

The Vampire IO mini-project is a follow-up to the ARCHER eCSE07-09 project. In this project, the developers of Vampire were able to improve the IO performance of Vampire for high node counts. However, their results for the performance of MPI-IO seemed unusually low (most likely as a result of their not changing the Lustre striping configuration). In this project, CSE revisited this aspect of the work and have found that increasing the Lustre stripe-count has a large effect on the IO performance of MPI-IO. This project is nearing completion and a report for it should also be out by the end of October 2020.

9. ARCHER2 Performance Report

This is the performance report for the ARCHER2 CSE Service for the Reporting Periods of July – Sept 2020.

The metrics are specified in Schedule 2.2 of ARCHER2 CSE Service Contract.

CSE Query Metrics

- **ARCHER2_CSE_Level1 (MTR)**: The Median Time to Resolution, as measured by Working Days (WDs), of all CSE queries falling within Level 1 resolved by the Contractor in the Reporting Period. *Initial MTR applicable to OY1: Service Threshold: >4.4 WD; Operating Service Level: >1.4 WD, ≤2.4 WD.*
- **ARCHER2_CSE_Level2 (MTR)**: The Median Time to Resolution, as measured by Working Days (WD), of all CSE queries falling within Level 2 resolved by the Contractor in the Reporting Period. *Initial MTR applicable to OY1: Service Threshold: >27 Working Days (WD); Operating Service Level: >12 WD, ≤17 WD.*
- **ARCHER2_CSE_Level3 (MTR)**: The Median Time to Resolution, as measured by Working Days (WD), of all CSE queries falling within Level 3 resolved by the Contractor in the Reporting Period. *Initial MTR applicable to OY1: Service Threshold: >59 Working Days (WD); Operating Service Level: >29 WD, ≤39 WD.*
- **ARCHER2_CSE_TA (%):** The percentage of the total number of Technical Assessments (TAs) assigned to the Contractor in the Reporting Period completed prior to the commencement of the applicable TA Target Completion Date after the assignment of such Technical Assessment to the Contractor. *TA Target Completion Date in OY1: 8 WD; Service Threshold: <90.00%; Operating Service Level: 95.00-97.49%.*
- **Initial Response to Queries (%):** The percentage of the total number of CSE queries assigned to the Contractor in the Reporting Period responded to within 3 Working Hours. *Service Threshold: <96.00%; Operating Service Level: 98.00 – 98.99%.*
- **Query User Satisfaction (%):** The percentage of the total number of query satisfaction surveys completed in each Reporting Period, rating the quality of the resolution of Queries by the Contractor as "Good", "Very Good" or "Excellent". *Operating Service Level: 82.00 – 87.99%.*
- **Training User Satisfaction (%):** The percentage of all training satisfaction surveys completed in each Service Period, rating the Contractor as "Good", "Very Good" or "Excellent". *Operating Service Level: 88.00%-92.99%.*

Metric	July-2020		Aug-2020		Sep-2020		Q3 2020	
	Perf	Points	Perf	Points	Perf	Points	Perf	Points
ARCHER2_CSE_Level1 (MTR)	0.1 WD	-2	-		0.1 WD	-2	0.1 WD	-4
ARCHER2_CSE_Level2 (MTR)	0.5 WD	-2	2.1 WD	-2	0.2 WD	-2	0.4 WD	-6
ARCHER2_CSE_Level3 (MTR)	-		-		-		-	
ARCHER2_CSE_TA (%)	-		100%	-1	100%	-1	100%	-2
Initial Response to Queries (%)	98%	0	100%	-1	100%	-1	99.6%	-2
Query User Satisfaction (%)	100%	-2	100%	-2	100%	-2	100%	-6
Training Satisfaction (%)								
Total		-6		-6		-8		-20

33 query feedback responses were received on query resolution in the Reporting Period. 100% of responses had a score of "Good", "Very Good" or "Excellent".

39 training satisfaction responses were received in the Reporting Period. 97.4% of responses had a score of "Good", "Very Good" or Excellent". There was a single "Bad" response.

10. ARCHER2 CSE Queries

This section provides details on ARCHER2 CSE queries during the Reporting Period of July – Sep 2020.

CSE Query Statistics

The metrics were specified by UKRI in Schedule 2.2 of ARCHER2 CSE Service Contract.

- **Assigned:** The number of CSE queries assigned to the Contractor within each query resolution category in the Reporting Period.
- **Resolved:** The number of CSE queries resolved by the Contractor within each query resolution category in the Reporting Period.
- **Backlog:** The number of CSE queries assigned to the Contractor that remained unsolved within each query resolution category in the Reporting Period
- **Correspondence:** The average number of pieces of correspondence generated for CSE queries in each query resolution category.
- **First Response:** The average time taken for the Contractor to first respond to the Originator of the CSE query.

A total of 227 CSE queries were resolved by the ARCHER2 CSE service in the Reporting Period.

July 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
ARCHER2_CSE_Level1	31	32	0	5	0.5 hrs
ARCHER2_CSE_Level2	12	17	1	12	0.5 hrs
ARCHER2_CSE_Level3	-	-	-	-	-
ARCHER2_CSE_TA	1	0	1	0	0
August 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
ARCHER2_CSE_Level1	1	0	1	0	-
ARCHER2_CSE_Level2	2	2	1	15	0.6 hrs
ARCHER2_CSE_Level3	-	-	-	-	-
ARCHER2_CSE_TA	31	30	2	14	0.6 hrs
September 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
ARCHER2_CSE_Level1	115	111	5	4	0.4 hrs
ARCHER2_CSE_Level2	13	10	4	8	0.3 hrs
ARCHER2_CSE_Level3	-	-	-	-	-
ARCHER2_CSE_TA	24	25	1	11	0.2 hrs
Q3 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
ARCHER2_CSE_Level1	147	143	5	4	0.4 hrs
ARCHER2_CSE_Level2	27	29	4	11	0.4 hrs
ARCHER2_CSE_Level3	-	-	-	-	-
ARCHER2_CSE_TA	56	55	1	13	0.4 hrs

CSE Query Categories

Resolved CSE queries in the Reporting Period fell into the following categories:

Service Level	Category	Number of Queries	% Queries
ARCHER2_CSE_Level1	Courses	143	63.0%
ARCHER2_CSE_Level2	eCSE Applications/Calls	27	11.9%
	Access to HPC	1	0.4%
	Courses	1	0.4%
ARCHER2_CSE_TA	Access to HPC	30	13.2%
	Pioneer Projects	19	8.4%
	Top Up	3	1.3%
	Grant	3	1.3%
Total		227	100.0%

11. ARCHER2 Training

As part of ARCHER2, the service has been developing and delivering a training programme for the ARCHER2 community. The training plan for the upcoming year (May 2020 – April 2021) was approved by an external Training Panel on 12 May.

Over the last Quarter, the CSE service has provided a total of 7.5 days of online training, see the table below; more than 20 days of training are planned for the upcoming Quarter as the initial ARCHER2 hardware comes into service.

Dates	Course	Days	Attend
13-14 Jul 2020	Reproducible computational environments using containers	2	13
15 Jul 2020	Cirrus Phase II - using the new Cirrus system	0.5	43
22 Jul 2020	The HPC Certification Forum - Classifying and Certifying HPC Competences	0.5	25
28-30 Jul 2020	34th VI-HPS Tuning Workshop	3	18
26 Aug 2020	The State of Containers	0.5	69
2 Sep 2020	ARCHER2 - EPCC early experiences from the test and development platform	0.5	37
30 Sep 2020	HPC-Europa3 - Funding for collaborative research visits to use HPC	0.5	23

On the feedback for online courses, attendees rate the course on a scale of 1-5 (“Very Bad”, “Bad”, “Good”, “Very Good” and “Excellent”). The average feedback using this metric was 4.33, i.e. better than “Very Good”. Users provided 12 feedback forms, a response rate of 42%.

12. ARCHER2 Embedded CSE Programme (eCSE)

As part of ARCHER2, the CSE service will deliver an eCSE programme to provide distributed CSE support across the UK. The service will deliver an average of 12 FTEs over its lifetime. In order to enhance support for researchers in the early stages of their careers, we are also offering the opportunity for a small number of early career researchers to attend the eCSE panel meeting as observers.

1st ARCHER2 eCSE call

- The first eCSE call opened on 19 May 2020 and closed on 7 Jul 2020 receiving 25 proposals from a broad range of subject areas with PIs from 15 different UK Institutions. Overall a total of 235 Person-Months of effort was requested from 13 different UK institutions.
- The associated panel meeting was held virtually on 19 August 2020. A panel of 12 experts (8 men and 4 women) from the range of subject areas represented in the proposals, along with general software development expertise, met and decided to award 13 projects starting over the next 6 months with 132 PMs being awarded overall. All candidates have received notification of the decisions and any conditions on the award, or reasons for being unsuccessful with advice for any future submission.

2nd ARCHER2 eCSE call

- The second eCSE opened on 8 Sep 2020 and will close for technical evaluations on 6 Oct 2020 with the final submission deadline being 27 Oct 2020. This call includes both EPSRC and NERC areas.
- A number of enhancements to the application process and associated forms were made for this call to assist with both application and review process.

Early Career Observers call

- The Early Career Observers call opened together with the second eCSE call on 8 Sep 2020 with the same deadline as the eCSE technical evaluation (6 Oct 2020).
- Successful candidates will be given the opportunity to attend the second eCSE panel meeting taking place between mid-November and early December 2020 and will be subject to the same conflicts of interest policies as regular panel members.

13. ARCHER2 Community Engagement, Outreach, Collaboration and Impact

This section summaries activities carried out by the ARCHER2 CSE service to help increase community engagement, impact and outreach to the wider public.

Community Engagement and Impact

As the impact of COVID-19 continues to be felt across the country, all the physical events and meetings that the ARCHER2 CSE team usually attend to help promote collaboration and community engagement have been cancelled.

We were however pleased that the HPC Champions workshop was held on the 17th and 18th September as a virtual workshop and the CSE team contributed a significant number of talks to this event; these talks are listed below. HPC Champions increases coordination between different tiers of HPC in the UK. This helps facilitate collaboration on projects related to training, outreach, reference materials and more.

Outreach Activities and Events

We took part in the Bayes Virtual Open Day. Previously this has been a physical event, held to allow the wider community to see the work going on within the Bayes Centre. As this was not possible, the event was moved online. This provided an opportunity for the ARCHER CSE team to test and explore how best to provide outreach activities in virtual events such as this. A virtual Minecraft Bayes building has proven to be popular.

See: https://www.ed.ac.uk/bayes/upcoming-events/doors-open-2020/doors-open-epcc

Presentations, Publications and Outputs

- Alan Simpson, “HPC Champions -- purpose and background”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- Andy Turner, “ARCHER 2 Update”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- Andy Turner, “HPC Benchmarking and performance analysis”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- William Lucas, “EasyBuild/Spack”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- Chris Johnson, “eCSE”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- David Henty, “Online Training”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- Adrian Jackson, “Investigating application performance on the A64FX”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- Michael Bareford, “Containers on ARCHER2”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.
- Lorna Smith, “EuroCC”, HPC Champions (Virtual Meeting), 17th-18th Sept, 2020.

14. Additional Activities

BCDR: Table-top Review of Topical Threats

To help EPCC to prepare for major incidents that put the Centre's ability to perform CSE and SP commitments at risk, the joint CSE and SP teams undertake a range of activities focused on BCDR (Business Continuity and Disaster Recovery), including—from time to time—a 'table-top' exercise, where a representative group meet to analyse identified, possible major incidents, their implications, and measures that can be put in place to minimise their impact on the ARCHER and ARCHER2 service.

On 9th September 2020, the team ran a table-top session focused on the topical threat of a widespread failure of home-broadband services, which would inhibit EPCC staff from progressing their work while at home.

Also considered, as part of the analysis was the effects of a major failure of the University of Edinburgh's network services, which are required to access various critical ARCHER, ARCHER2 and ACF services.

The team reviewed likely scenarios and the required responses to those scenarios, as documented in the Quality Management System. The team identified several potential resiliency improvements to the ARCHER/ ARCHER2 Service Desk, which are prudent to act on (especially, given the expectation of extended home-working for many in the team). Key findings are summarised, as follows:

- Service Desk processes should be updated to address the course of action to take in the event of a loss of Internet services.
- Additional monitoring should be implemented, to detect an issue with Service Desk operation, and potentially integrated into other ARCHER2 monitoring system.
- The ACF provides an independent, resilient Internet connection that could be used in the event of widespread or extended home-broadband-related activities.
- Simple smartphone-friendly procedures should be introduced to support template user communications, in the event of significant Internet problems.

These findings will be implemented over the coming weeks, in preparation for the introduction of the full ARCHER2 service at the beginning of 2021.