

Review of Data Collection System for RAE 2008

**Higher Education Funding Council for England
(HEFCE)**

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1 Executive Summary

This review was commissioned by the 2008 Research Assessment Exercise (RAE) Data Collection Steering Group (DCSG) to provide an external and independent assessment of the processes and systems used for the collection of research data from Higher Education Institutions (HEIs) for the RAE2008. The scope of the review was set out in our engagement letter, dated 29 July 2008.

A data collection system was developed to capture research data from the HEIs across the UK. The solution was designed to support the needs of the wide range of HEIs who submit research data for assessment by panels in the RAE 2008.

The initial analysis and requirements work of the Data Collection System commenced in 2004 and the system went live in January 2007 in line with initial expectations. The majority of the project team (and the DCSG) were experienced in undertaking previous research exercises (the last exercise having been completed in 2001). The learning points from that exercise were a key input into the initial design requirements for the development of the 2008 system.

We have completed this assessment to cover three key areas:

- System design, development and deployment; tested by:
 - Reviewing key documentation used during the RAE.
 - Interviewing members of the DCSG.
 - Interviewing members of the Data Collection System project team.
- User Experience; tested by:
 - Conducting an on-line survey, sent to 169 HEIs.
 - Validating the responses by conducting follow up interviews with selected HEIs who completed the survey.
- To estimate the full costs to HEFCE of developing and running the Data Collection System.

Our detailed findings are included within the main body of this report, with the key findings summarised within this Executive Summary. It is important to note that the system was developed in the knowledge that it offered a bespoke solution to a one-off requirement and as such the recommendations in this report should be considered with this in mind.

1.1 Overview

Our findings from this review indicate that the Data Collection System supported the RAE2008 effectively and resulted in a 'fit for purpose' system for the HEIs.

In addition this review has not identified any critical or fundamental issues which impacted the operation of the wider RAE process. We believe that this supports the view that the Data Collection System project should be considered a success.

Although the key message from this review is positive, it remains important for management to be aware that the review has also identified a number of issues and improvements which should be considered and acted upon before undertaking a similar future exercise.

The financial estimate of the costs of delivering and supporting the Data Collection System from 2004 through to 2007 has been calculated at £735,000. The detail of this estimation is included within Section 5.

We have summarised the key strengths, issues and potential improvements below:

1.2 Key Strengths

There were a number of elements of the project which should be considered as key contributors to its successful delivery, including:

- The functionality delivered by the system matched the material requirements of the RAE together with the needs of HEIs of many different sizes.
- The performance and reliability of the system was sufficient to ensure the HEIs were able to complete the RAE within the required timescales.
- The technology decisions made at the outset of the project proved to be appropriate for the deployment of the system.
- The team had significant experience of undertaking previous RAE projects and team members interviewed were enthusiastic and committed to delivering a successful system.
- Key project risks were identified and discussed by the project team and the DCSG and decisions taken to respond to those risks appropriately. The DCSG was also supported by the Data Collection Working Group (DCWG) which met on a monthly basis and this group monitored progress and discussed the issues raised at an operational project level.
- Communication, both internally and externally, appeared timely and informative.

1.3 Key Issues

The issues and improvements, which should be considered and acted upon before undertaking a similar exercise, include:

- The controls for a project of this size were relatively informal. This placed the project at greater risk of failure than necessary. Although key governance meetings provided a level of control and assurance further control could have been developed. The informality may have been due to the relatively low level of experience in delivering a systems project of this size (possibly the largest HEFCE has undertaken).
- There was significant reliance placed on one development resource. This person undertook significant elements of the development and was the only individual with certain of the key system skills.
- The management of the project scope was not as rigorous as we would expect to see in a project of this size.
- Some functionality (for a web based application) did not perform as would be expected. Feedback from the HEIs suggests that some of this functionality did not work when the system was released.

The HEIs raised a wide range of additional observations within the questionnaire which related to specific aspects of functionality. In particular there were concerns raised relating to reporting and the completion of the RA5. These observations are set out within the body of the report, but have not been considered as key issues within this summary. We believe that they are symptoms of the issues noted above.

1.4 Potential improvements for consideration for future exercises

Based on the issues we have identified during the review we believe the following would enhance the development of future exercises, such as the Research Excellence Framework (REF).

- Greater emphasis should be placed on the Project Initiation phase. This will help focus the team to develop more detailed and rigorous requirements, plans and budgets at the outset.
- Define scope in detail and closely monitor requests to change the scope. By defining the scope in more detail the project manager will be able to monitor progress at a more granular level and manage changes by assessing the impact on the baseline.
- Focus on core functionality and develop and test the system in phases. We believe this type of system development project should follow a phased approach with the highest priority functionality being developed and tested before being released to the User Community.
- Utilise the RAE2008 Data Collection System as a basis for future systems moving forward. The Data Collection System was effective for the majority of HEIs and given that the HEIs are familiar with the system it would be sensible to develop this existing system further or design any new system using that same familiar functionality.

2 Objectives and Scope

2.1 Objectives of this review

This review was commissioned by the 2008 RAE (Research Assessment Exercise) Data Collection Steering Group (DCSG), to provide an external review of the processes and systems used for the collection of data from HEIs for the RAE2008.

The objective of this review was to perform an assessment of the data collection processes and systems which supported the RAE (Research Assessment Exercise) 2008. The scope of the review was outlined in our engagement letter, dated 29 July 2008.

The terms of reference for this review are:

- To review the processes for data collection in support of the 2008 RAE.
- To review the role and effectiveness of the DCSG in determining the design and operational parameters of the RAE data collection software.
- To review the processes governing the development, testing and implementation of the software.
- To gather the views and opinions of the DCSG and suggest revisions to the DCSG terms of reference for future related exercises.
- To review the arrangements for user and software support.
- To consider how institutions viewed the data collection process – particularly those that reported difficulties in preparing their submission.
- To make recommendations for possible future related exercises.
- To make an estimate of the full costs to HEFCE of developing and running the data collection system.

2.2 Scope and approach

To achieve the objectives of this review we undertook a number of interviews with the DCSG and project team members. These were complemented with an on-line questionnaire sent to all HEIs undertaking the RAE and seven follow up meetings with selected HEIs to further analyse answers provided and to validate the survey findings. The full list of interviewees has been included in Appendix A.

As agreed, we have not attributed comments directly relating to any individual HEI and have consolidated our findings, where appropriate, in order to achieve this.

Our approach is documented in Table 1.

Table 1 - Approach

Review Area	Approach Undertaken and Status
DCSG Review / Processes Review	All planned interviews (11) with the DCSG and RAE project team members were completed. All planned interviews (2) with the IT development team were completed. The results are included within Section 3.
On-Line Survey	The survey was open for 3 weeks and closed at 5:00pm on 5 September 2008. Our target for achieving an effective survey was to receive 50% of Institutional responses. When the survey closed we received responses from 130 Institutions, being 77% of the HEIs surveyed.

	<p>66% were provided by the HEI representatives with an additional 200 responses from end-users of the system (which covered an additional 11% of the HEIs).</p> <p>The results are included within Section 4.</p>
HEI follow up interviews	<p>We completed 7 follow up interviews with a cross section of HEIs. These HEIs were selected on several criteria:</p> <ul style="list-style-type: none"> • Those who confirmed they would be happy to be contacted for a follow up interview. • Where possible, representation of HEIs across geography, size and the extent of research undertaken. • Those who provided feedback from the survey where we believed the review would benefit from further understanding of their responses. <p>The results are included within Section 4.</p> <p>The list of Institutions who participated in the follow up interviews has been included in Appendix C.</p>
Estimate of Full Costs to HEFCE	<p>Following interviews with the RAE project team we have estimated the costs of the project based on our experience and knowledge of this type of project.</p> <p>The results are included within Section 5.</p>

3 System Design, Development and Deployment

We have provided our detailed findings within this section and have structured the section in line with the scope of the work outlined in Section 2.1, being:

- The processes for data collection in support of the 2008 RAE.
- The role and effectiveness of the DCSG.
- The processes governing the development, testing and implementation of the software.
- The arrangements for user and software support.

3.1 The Processes for Data Collection in support of the 2008 RAE

Understanding and defining the core process for collecting data was a key element of the project and underpinned the development and implementation of the Data Collection System. During our review we have identified examples of good practice and other observations which we have documented below.

Good Practice

- A project team was assembled with significant experience of research assessment exercises together with a solid understanding of the Data Collection processes. This was a key element in being able to design a system which matched the requirements of the vast majority of the HEIs.
- The functionality put in place, including allowing HEIs to both upload data into the system and also input information directly into the system, provided a comprehensive solution which met the core needs of different HEIs.
- There were a number of functional issues and problems which occurred when the system was live but none of these appeared to result in a major operational issue due to the responsiveness of the project team and the DCSG.
- The DCSG provided direction to enable the alignment of the system and processes in working together.

Observations

- The controls for a project of this size were relatively informal and placed the project at greater risk of failure than necessary. The lack of formality may have been due to the relatively low level of experience in delivering a systems project of this size (possibly the largest HEFCE has undertaken).
- The initial requirements and activity estimates were undertaken at a relatively high level and not documented in detail. We would expect to see more detail and more rigour in the project initiation phase to define in detail realistic project activities, resource requirements and financial budgets.
- The management of the project scope was not as rigorous as we would expect to see in a project of this size. Effective scope management is driven from the level of detail developed during the initiation phase. Given the relatively high level requirements, plans and budgets the project accepted the majority of changes put forward without being able to undertake impact assessments (which would have increased the workload of existing resources) and this impacted both development and testing activity. For example:
 - The joint submissions functionality took a long time to develop despite this functionality relating to a relatively small number of actual submissions (approximately 20). It is possible that these submissions could have been handled manually.
 - The Text Editor solution (for RA5) resulted in a large number of problems for the HEIs and given this was a key element of functionality we would have expected a more fully tested solution to have been developed and tested prior to release.
- Feedback from the HEIs suggests that some functionality used in Web based applications did not work as would be expected. For example:

- There could have been greater levels of field validation on input screens.
- A number of HEIs provided feedback which suggested that there were data integrity issues when uploading data or when patch upgrades were released, for example information in certain fields was not always overwritten during the upload process.
- The operation of the 'back' function within the RAE2008 system was sometimes inconsistently applied across screens. This then led to end users trying to use the Internet Explorer (IE) 'Back button'. When the IE 'Back Button' was then selected this sometimes caused the system to freeze which was frustrating for users. NB: we are aware this was designed to act in this way and communication to users was made explaining that the 'Back' button should not be used. We would normally expect these types of issues to be identified and fixed during testing.
- The overall implementation was impacted by a 6 month period early on in the project (January 05 to June 05) when there was relatively little progress from a development perspective. This was due to resource not being focused on development. If this had not occurred, then the project may have been able to deliver a more complete solution.

Potential Improvements

- Define scope in greater detail and closely monitor requests to change the scope. By defining the scope in more detail the project manager will be able to monitor progress at a more granular level and manage changes by assessing the impact on the baseline.
- Greater emphasis should be placed on the Project Initiation phase. This will allow the team to focus on developing more detailed requirements, rigorous plans and more realistic budgets. Estimating accurately during initiation is an important activity and underpins the creation of realistic baselines with which to monitor progress against plan during the entire project. Having formal development and testing approaches (defined at initiation) which are enforced, also provides structure and guidance to the development and testing teams which should lead to greater control.
- Utilise the RAE2008 Data Collection System as a basis for future systems moving forward. We would propose that in developing any future application the RAE2008 Data Collection System should be considered as a starting point. The Data Collection System was effective for the majority of HEIs and given that the HEIs are familiar with the system it would be sensible to develop this existing system further or design any new system with familiar functionality. As part of this process it would remain important to address a number of the specific (and basic) functional issues raised within this report as this will significantly reduce the number of HEI concerns.

3.2 The Role and Effectiveness of the DCSG

The DCSG was formally established in late 2004. A chairman was appointed in early 2005 and the meetings were subsequently undertaken on a regular 2-3 monthly basis. The group ceased meeting face to face following go-live of the system in January 2007: subsequent consultation with the Group was then conducted remotely.

Good Practice

The DCSG consisted of an invited mix of user, process and technically experienced individuals from HEFCE, HEIs and other Funding Councils. This is in line with a number of areas of good practice:

- The members had different backgrounds and experience which covered the key elements of the project being undertaken. In particular the members had significant experience of the RAE2001 system.
- There were two key technical (IT experienced) HEI members of the DCSG who were able to provide significant IT development input to the Steering Group. The Group was also supplemented by several technical project team members who attended the meetings.
- A Terms of Reference was defined and minutes from each meeting documented and discussed at the subsequent meeting.
- Feedback from Group members suggested the Group worked well together and it was well chaired.
- Key project risks were identified and discussed by the DCSG.
- High level milestones were defined and progress against them monitored.
- The DCSG adopted a flexible approach in considering requests for change.

Observations and Potential Improvements

On the whole there was positive feedback from the group members that the meetings were well organised, effective and structured effectively. Often we would expect to see a smaller steering group for this type of project but given the importance of engaging with a variety of stakeholders we believe it was appropriate to have a larger number of attendees.

In addition, however, there are a number of elements which we believe should have been undertaken which would enable it to be more effective for future projects:

- Given the duration of the project a number of Group members needed to be replaced and there was no clear induction process for the new members. Such a process would have helped integrate these new Group members.
- Although a broad cross section of experience was included in the DCSG given that this was an IT orientated project there was opportunity to have additional IT experience on the Group which would have provided further IT development advice. This was supported by a number of DCSG members interviewed.
- The DCSG was supported by the Data Collection Working Group (DCWG) which met on a monthly basis and this group monitored progress and discussed the issues raised at an operational project level.
- The system was using new technology and this was a significant project for HEFCE. As such, greater involvement of experienced and knowledgeable IT project orientated team members would have provided greater input and challenge.
- A terms of reference was defined but at a fairly high level. We would expect to see greater clarity on:
 - The roles and responsibilities of the Group's members;
 - The Group's decision making responsibilities; and
 - The process to monitor and track budget and benefits during the project.
- There was no independent project assurance over the project to challenge the processes and controls being followed. Given the importance of the project and that new technologies

were being used we believe it would have been appropriate for HEFCE to secure an independent third party to provide both critical challenge to the project and also offer appropriate advice and support to the project management.

3.3 Processes governing the development, testing and implementation of the software

Although the system supported the RAE process with few significant issues to the operation of the RAE, we believe there was a relatively informal approach taken to development, testing and implementation which added risk to the overall project. We have documented below the areas of good practice, additional observations and opportunities for improvement.

Good Practice

- Lessons learned from the RAE2001 exercise were drawn out and used in the design of RAE2008 and the technology decisions made at the outset of the project proved to be appropriate for the development of the system.
- Piloting of the look and feel of key screens was performed with the User based focus groups. This led to fewer changes in screens at a later stage.
- There was a highly committed development team working on the project.
- Code was clearly documented.
- Stress and Volume Testing was performed to ensure the system would perform at the required level.
- A review of the availability and robustness of the system was completed in June 2007.
- Formal approval to go-live was provided by the DCSG.

Observations

- There was significant reliance placed on one development resource who undertook significant elements of the development and was the only individual with certain skills. Detailed design documentation or skills transfer which would have mitigated this risk did not occur. This key developer was also intended to be the technical project manager, but as the project progressed the technical development requirements took priority and no individual acted in the technical project manager role.
- This was one of the most complex developments HEFCE has undertaken and the development team were not experienced in using the chosen development tools. The most experienced developer therefore spent a significant amount of time trying to solve development problems identified by members of the team, as well as performing his allocated role.
- The functional specification relating to the system was too high level and did not fully define the functional elements of each screen. However, a detailed document, 'RAE 2008 guidance on submissions', stated specifically the data which needed to be collected. Although some process flows and designs were documented this did not include the detailed design of the full system. Whilst the layout of the key screens had been piloted, this still left much of the design to the developers.
- There were no formally defined programming standards followed by the developers.
- There was an impact on business as usual support as the key developer used on the project was a key member of the IT development team.
- Whilst the team were aware of the need to perform Unit, System, Regression and User Acceptance Testing, there was no formal testing strategy or testing procedures adopted for this project. It was recognised in June 2006 that more time was needed to be spent on testing. This was evident during the pilot release when a number of bugs were identified. Although a number of team members were involved in testing, this was not always as formally controlled as we would expect. We would expect to see defined scripts and formal test logs with consistent levels of documentation for all process scenarios.
- The User Acceptance Testing participation of HEIs was voluntary and there could have been more control and structure over this process. The HEIs could have played a greater part in the testing of the system (covering all scenarios, rather than those they chose to perform and feedback on). For example, there were issues identified after go-live, including 'Edit Live' and formatting of uploaded documents. Formal user acceptance testing would have identified such issues earlier.

- There were a number of late identifications of requirements e.g.: the inter-disciplinary field and the Digital Object Identifier (DOI) inclusion and shared submission changes. These distracted the development team from their original development schedule.

Potential Improvements

- Focus on core functionality and develop and test the system in phases. We believe this type of system development project should be supported by a phased release schedule with highest priority functionality being developed, tested and released first. This approach would help to build the confidence of end-users and importantly allow (in this instance) HEI in-house development teams more time to develop their local processes and systems to align to the central solution.
- Formal functional and design documentation should be created in future exercises which is signed off and is sufficient for a programmer to review and then subsequently undertake development work. In addition, development standards should be clearly defined to ensure quality of code development and support other developers to understand the code.
- Future exercises should ensure that an appropriate dedicated progress reporting structure is in place for the development team. In addition, there should be a number of skilled developers within the team with experience of similar assignments and the likely estimates for planning purposes.
- A formal testing strategy and process should be in place for this size of project, with clearly defined roles and responsibilities for each activity including unit testing, system and user acceptance testing. This will help to ensure that the majority of potential issues be identified at an early stage.
- A formal change control procedure should be adopted which would manage changes to the requirements and system. This would include a formal impact assessment of the change on the existing and future development, a costs benefit analysis and an assessment of the impact on testing.

3.4 Review of the arrangements for user and software support

The project team put in place a number of different elements to provide both user and technical software support and the majority of these documents related to supporting the user. The observations within this section have been gathered from the interviews undertaken with the HEIs and the project team together with comments from the survey.

3.4.1 User Support

From a user support perspective the RAE web site (www.rae.ac.uk) was the central repository for support information and documentation. This included:

- The 'RAE 2008 Data Collection User Guide'.
- The 'Data Collection System Release Guide'.
- News updates.
- Frequently asked questions (FAQs).
- Background information on the RAE2008.
- Policies and procedures.
- Help line contact numbers.

The information on the web site together with the documentation was updated and refreshed during the course of the project.

In addition the web-site information was complemented during the project with additional user support information, in particular:

- User Roadshows (May 2006 and September 2006).
- On-Line Help (including error messages).
- Central Helpline.

A significant majority of HEIs were very complimentary of the RAE2008 Data Collection System team's knowledge and support as outlined in Section 4.1 - Question 12. In addition there was positive feedback regarding the User Guide, eg: 'The User Guide generally was of good quality (exhaustive) and workarounds were helpful.'

The roadshows also received good feedback and several survey responses commented that they wished there had been additional user roadshows.

As also outlined in Section 4.1 there were a number of issues associated with the support and help provided, which included:

- The Help text didn't necessarily reflect the needs of the novice user. A number of institutions created their own simpler User Guides for their end users.
- The User Guide quickly became out of date, in particular regarding the RA2 field requirements.
- Help built into the system generally referred back to the User Guide and didn't always provide additional information which might have been helpful.
- The FAQ section was sometimes updated too late to provide benefit to the more proactive institutions.

Although it is important for lessons to be learned from this feedback, we believe the User Support arrangements were received well by the majority of HEIs.

3.4.2 Technical Support

There was less technical support documentation than we would normally expect to see for this size of project. In particular we would expect to see technical support documentation produced during the course of the project.

We believe this is primarily due to the resource constraints of the project where a significant amount of knowledge was held by one key developer. Without this detailed documentation there was significant reliance placed on one individual which added risk to the project, particularly as this developer was working significant overtime hours to achieve the implementation dates.

One of the key documents, 'The Technical Development Guide' was not created during the project but towards its end. Ideally such a guide should be developed as the application is developed and this will enable other developers to join the project (if needed) and support the key aspects of the system if required. Therefore a key learning point is to ensure there is enough resource to complete this technical documentation.

4 Higher Education Institution views on the Data Collection Process

We have provided our detailed findings within this section and have structured the section in line with the scope of the work outlined in Section 2.1, being:

- Higher Education Institution views on the Data Collection Process.
- The key recommendations for future related exercises (from the survey).

To obtain feedback from the users of the RAE system, we asked 169 HEIs, who had made RAE2008 submissions, to complete an on-line survey to provide feedback on their use and operation of the Data Collection System. The survey questions were based on our knowledge of the Data Collection System together with our experience of systems implementation projects. Feedback from HEFCE was received in generating the questions to help validate they were appropriate.

The requests were sent to the HEI system representatives, allowing them to respond on behalf of their institution. These representatives were typically one of the co-ordinators of the RAE process or administrators of the system.

In addition, we asked each of those HEIs to make the survey available to its users to supplement the HEI representative responses.

We received an excellent response rate from both institutions and end users as shown in Table 2.

Table 2 – Survey Responses

Description	Number	Percentage
Total Institutions invited to participate in the survey	169	100%
HEIs with responses (administrators and users)	130	77%
HEI Representative responses	113	66%
Institutions with no response at all	39	23%
HEI User responses	200	

The on-line survey provided the opportunity for respondents to answer questions on a sliding scale of 1 to 5. The ranking of '1' was defined as 'Totally Agree' with the statement being made and '5' was defined as 'Totally Disagree' with the statement being made.

In addition the survey included a number of 'Free Text' fields to add further information to support the rankings.

4.1 Summary of Responses

Table 3 provides a summary of the institution responses received to the ranking questions. These were completed by the individual representing each HEI and it can be seen that the respondents were generally very positive to the questions we asked about the RAE2008 Data Collection System.

It should be noted that there was a fairly even distribution between the HEIs in terms of whether the RAE2008 system was used as their primary assessment collection system (54 institutions) and those who stated they used a combination of their own system and the RAE system (59 institutions).

Table 3 - Summary of Institutional Responses Completed by HEI Representatives

Ref	Question Text	Number of responses by rating						Percentage by rating				
		1	2	3	4	5	N/A	1%	2%	3%	4%	5%
1	Communications relating to the RAE2008 Data Collection System received from HEFCE were sent in a timely manner	34	59	12	5	0	1	31	54	11	4.6	0
2	Did the upload functionality of the RAE2008 Data Collection System support your requirements (if utilised)	22	39	17	8	0	25	26	45	20	9.3	0
3	All of your key reporting requirements were met	28	40	20	16	5	2	26	37	18	15	4.6
4	The login and access to the RAE2008 Data Collection System was straightforward and secure	59	36	9	5	0	2	54	33	8.3	4.6	0
5	The RAE2008 Data Collection System helped us to improve the consolidation of submission data	21	49	22	5	4	10	21	49	22	5	4
6	The RAE2008 Data Collection System met your requirements as expected	19	49	26	12	2	2	18	45	24	11	1.9
7	Did you find the RAE2008 Data Collection System was reliable and available as expected	26	55	19	6	2	0	24	51	18	5.6	1.9
8	The RAE2008 Data Collection System was intuitive and easy to use	13	46	29	14	5	0	12	43	27	13	4.7
9	The speed and performance of the Data Collection System was acceptable	16	55	28	6	4	0	15	50	26	5.5	3.7
10	Receiving an Error Message while trying to use the RAE2008 Data Collection System was a rare occurrence	22	38	24	17	8	0	20	35	22	16	7.3
11	If you attended the briefing events - were they at the appropriate level and did they target the right people	17	49	15	5	1	20	20	56	17	5.8	1.2
12	Were the RAE2008 Data Collection System Support team knowledgeable and able to answer your questions in a timely manner (eg: password resets, process questions)	52	41	10	1	2	2	49	39	9.4	0.9	1.9
13	The administration of the RAE2008 Data Collection System for your institution was straightforward	42	51	8	2	3	2	40	48	7.6	1.9	2.8
14	The guidance we received was sufficient to make your submission(s)	34	54	12	6	1	1	32	50	11	5.6	0.9
15	The help materials for using the RAE2008 Data Collection System were clear and concise	11	51	24	15	7	0	10	47	22	14	6.5

1 Totally Agree
5 Totally Disagree

We have provided a summary on the feedback relating to the each of the questions below, this consists of a combination of common themes and direct quotes. We have structured this question by question and have included a description of the key issues raised from:

- The Institution responses completed by the HEI representatives.
- The follow up meetings with the HEIs.

We have not attributed feedback received to specific HEIs as all feedback has been kept confidential.

A summary of the ranking based user responses received in the survey can be found in Appendix B. We have reviewed the 'Free Text' responses from the end users and they support and complement the findings from the institutional representative responses.

Question 1: Communications relating to the RAE2008 Data Collection System received from HEFCE were sent in a timely manner

The survey responses highlighted that 85% of institutions believed that communications were sent in a timely manner (rated 1 or 2) with '2' being the most popular answer. The feedback received in support of this included:

- There were clear Data Definitions with a simple and robust upload process.
- The briefing events were extremely informative.
- The frequent update to the FAQ section was good.
- Communications from HEFCE were generally good.
- I found the FAQ's most useful in explaining the nuances of how we should be entering data.

However, there were also a number of issues and therefore opportunities for improvement.

- The FAQs were sometimes ambiguous and it would have been helpful to have received notification when advice changed as the release guide was often updated but it was not made clear which sections had been changed.

- Clearer signposting of changes might have been helpful.
- Would have liked to have seen an additional workshop communication / training event to have helped embed the knowledge of the processes and systems.

Question 2: Did the upload functionality of the RAE2008 Data Collection System support your requirements (if utilised)

The survey responses highlighted that 71% of institutions believed that the upload functionality supported their requirements (rated 1 or 2), with '2' being the most popular answer. The feedback received in support of this included:

- The provision of multiple types of data upload was very useful.
- The Data Import facility worked well. The upload and reporting facilities were very straightforward to use.
- Once the HEI understood the mappings the upload functionality was flawless. Although, working out the mappings from the user guide was not possible without support from help desk.

However, there were also a number of issues and therefore opportunities for improvement.

- It would have been useful to have had clearer guidance on upload compatible files earlier in the system release process to facilitate internal data collection planning.
- The RA5 uploaded files' formatting looked different from the originals and the word counts were different. When the 'pdf' files were introduced both 'pdf' and MS Word versions needed to be uploaded. This impacted the administrators who needed to ensure word counts were valid.
- When importing files a blank field did not overwrite a field that was already populated. This became an issue primarily with the RA2 form and having to ensure that each individual record was cleared prior to import – a problem which was exacerbated for joint submissions.
- The loading of output and HR information (at the start of the process) was the most difficult aspect of the system to use as there was a high probability of errors and it was difficult to understand those errors. The HEI stopped using the upload functionality as it wasn't trusted after initial issues.

It should also be noted that those Institutions who used the RAE system as their primary collection system gave a 7% lower rating (67% of responses were rated 1 or 2) for this question than those who used a combination of their own system and the RAE system.

Question 3: All of your key reporting requirements were met

The survey responses highlighted that 62% of institutions agreed that all their key reporting requirements were met (rated 1 or 2), with '2' being the most popular answer. In comparison with the other questions within this survey this is a relatively low score and we believe this is an area which should be assessed in greater detail for future projects. The feedback received in support of this included:

- The generation of validation reports was straightforward.

However, there were also a number of issues and therefore opportunities for improvement.

- Reporting functionality was not flexible enough, it would have been useful to have the option of exporting to Excel or other formats. However, the impact of this was relatively low as the HEI developed reporting functionality in their own system.
- No report appeared to be available for the 'Status of DOIs' and it would have been helpful to get more immediate feedback on this status.
- It would have been beneficial to have an 'All' option when printing reports rather than having to run them individually. Allowing Departments to run their own reports

would also have been beneficial and this would have reduced time being spent by the administrators.

- Reporting would have been better if it had been more flexible e.g.: being able to group in unusual ways (eg: showing all RA2s or RA4s). There was no way of seeing on the screen what the final printout (ie: a print preview function) would look like.
- Reporting was too complicated and did not meet the full requirements of the system. One specific issue was that the reports were not able to provide all the information as Excel truncated the text entered into free text fields.
- Excel or comma delimited file outputs could be included as alternatives for exporting data so that sorting / bespoke reporting can be done.

Those Institutions who used the RAE system as their primary collection system gave a 22% higher rating (74% of responses were rated 1 or 2) for this question than those who used a combination of their own system and the RAE system.

Question 4: The login and access to the RAE2008 Data Collection System was straightforward and secure

The survey responses highlighted that 87% of institutions agreed the system was straightforward and secure (rated 1 or 2), with '1' being the most popular answer. The feedback received in support of this included:

- The 2008 system was much more robust and reliable and while there were some issues (eg: with uploading RA5a) the underlying system was pretty stable.
- Having full control over the users access reduced the amount of administration and saved a lot of time for the HEI.
- The administrator functionality was good.

However, there were also a number of issues and therefore opportunities for improvement.

- Data Integrity Issue: Incorrect data was emailed back to this HEI during the Intentions Phase – this was identified and corrected immediately but this was potentially a significant concern and controls / processes over this issue should have been more rigorous.
- The locking of the system when passwords were in error was problematic.
- A facility to 'lock-down' screens once all information was signed off would have been a great benefit.
- Auto sending of passwords to users, once set up, would have been nice to have.
- Improved version control would help control updates every time an element is saved on the system.

Question 5: The RAE2008 Data Collection System helped us to improve the consolidation of submission data

The survey responses highlighted that 69% of institutions agreed that the RAE system helped to improve the consolidation of submission data (rated 1 or 2), with '2' being the most popular answer. The feedback received in support of this included:

- The University used it as the main data collection method and it provided a good way for both Schools and the Administrative Centre to work together to maximise the quality of the data.
- Overall the system was considered very useful and helped the data collection process.
- The system enabled the RAE administrators to ensure the Schools took responsibility for inputting data rather than acting as a intermediary in the process.

- The move to a web-based system was a significant benefit as data was held off-site and there was no need to install software and patches on local PCs.

However, there were also a number of issues and therefore opportunities for improvement.

- The system kept on losing data and you had to keep proofing to check that the data had been saved correctly.
- The RA5 was very disappointing and the inability to fix the problems with this was noteworthy.
- The system required far too much navigation.
- The system frequently did not save inputted data, especially any changes to data in RA2 forms. It kept on losing data which had to be continuously re-entered, periodically it would freeze and data would be lost or sometimes you would save something only to find the next time you accessed it - it had gone!

58 institutions stated they found the RAE2008 system better than the 2001 system. Only 2 institutions thought it was worse (50 Institutions responded 'N/A' as the institution Representative was unable to provide feedback on the 2001 system, and 3 did not respond to this question).

Those Institutions who used the RAE system as their primary collection system gave a 27% higher rating (83% of responses were rated 1 or 2) than those who used a combination of their own system and the RAE system.

Question 6: The RAE2008 Data Collection System met your requirements as expected

The survey responses highlighted that 63% of institutions agreed the system met their requirements as expected (rated 1 or 2), with '2' being the most popular answer. The feedback received in support of this included:

- We considered the RAE2008 system to be an excellent tool and a significant improvement on the RAE01 tool.
- The system did what is what meant to do.
- The system was considered 'fine' and was at the 'upper-end' of tools used by this HEI.
- The system delivered was 'pretty good' and the team did really well, however there were improvements that could be made.

However, there were also a few issues and therefore opportunities for improvement.

- The RAE2008 system was considered to be worse than the RAE2001 system. This was primarily as a result of the system losing data which occurred quite frequently.
- The HEI had little confidence in the integrity of the data and as such all entries were being checked and printed before being entered on the system.

A wide number of functional issues were raised by the HEIs and although these were not material to the operation of the system they did impact the on the perception of how effective the system was.

Question 7: Did you find the RAE2008 Data Collection System was reliable and available as expected

The survey responses highlighted that 75% of institutions agreed the system was reliable and available as expected (rated 1 or 2), with '2' being the most popular answer. The feedback received in support of this included:

- Crashes were rare and issues quickly resolved with a phone call.
- Although there was downtime with the system the project team were generally good at informing the HEI about the downtime.
- The system was robust and rarely went down.
- The system was robust and reliable.

However, there were also a few issues and therefore opportunities for improvement.

- There was screen freezing and we had concerns over the reliability / speed of the system.

Question 8: The RAE2008 Data Collection System was intuitive and easy to use

The survey responses highlighted that 55% of institutions agreed that the RAE2008 Data Collection System was intuitive and easy to use (rated 1 or 2), with '2' being the most popular answer. In comparison with the other questions within this survey this is a relatively low score and we believe this is an area which should be assessed in greater detail for future projects. The feedback received in support of this included:

- The system was more user-friendly and easier to use and navigate than previous systems.
- Generally, we found the system led users through all processes in a logical, intuitive and well-explained manner.
- Errors were easily detected.
- The options menus were okay.
- The search functionality was very good although perhaps consideration could be given for presented search results by form.

However, there were also a number of issues and therefore opportunities for improvement.

- Not being able to use the 'Back' button on the browser (to return to the previous web page) was frustrating and although users became familiar with this over time it still caused problems.
- The system was too complicated and not intuitive. It needed a simpler way of getting data into it.
- The users often clicked on the Internet Explorer back button which would often lock the users out of the system for at least 2 hours irrespective of requests in their administrative screens to unlock the person. There was often a need to contact the support desk repeatedly to unlock the user which was very frustrating.
- Navigation around the screens was frustrating and at times when bulk changes needed to be made it was a long winded process to move from screen to screen.
- The system was generally easy to learn, however not being able to use the 'Enter' key was counter-intuitive.

Question 9: The speed and performance of the Data Collection System was acceptable

The survey responses highlighted that 65% of institutions agreed the speed and performance of the system was acceptable (rated 1 or 2), with '2' being the most popular answer. The feedback received in support of this included:

- There were fewer bugs in the system and it was easier to administer than in 2001.
- The reliability of the system was very high and was considered excellent – only one noted occasion where there was downtime and this was early in the programme.

However, there was also an issue raised and therefore an opportunity for improvement.

- Speed and performance of the system was dependent on time of day and browsers, computer systems etc. The system was initially quite unstable and it only got marginally better over the last six months of use.

Question 10: Receiving an Error Message while trying to use the RAE2008 Data Collection System was a rare occurrence

The survey responses highlighted that 55% of institutions agreed that receiving an error message was a rare occurrence (rated 1 or 2), with '2' being the most popular answer. Although this was a relatively low score this is mitigated in that many error messages were built into the system as standard, as such a lower response was anticipated for this question. The feedback received in support of this included:

- The validation tool was of great benefit during the latter stages in assisting eliminating the errors.
- The direct entry to the RA2-4 screen was very simple with the RA2 screen in particular providing very clear error messages and instructions to users to ensure that data was entered in the correct fields.
- Validation reporting was excellent. Although error messages were relatively common, they were always resolved quickly and efficiently
- In RAE2008 we found the 'error' message system extremely helpful as a check list, to remind us of what we had omitted.

However, there were also a number of issues and therefore opportunities for improvement.

- The error messages encountered were often unhelpful.
- The user guide was not always clear, and had errors in it, and the error messages on the system often said to refer to a particular paragraph in the guidance which was still unclear and unhelpful.

Question 11: If you attended the briefing events - were they at the appropriate level and did they target the right people

The survey responses highlighted that 76% of institutions agreed the briefing events were at the appropriate level and targeted the right people (rated 1 or 2), with '2' being the most popular answer. The feedback received in support of this included:

- The briefing events were extremely informative.
- We would have liked to have seen an additional workshop communication / training event to have helped embed the knowledge of the processes and systems.

Question 12: Were the RAE2008 Data Collection System Support team knowledgeable and able to answer your questions in a timely manner (eg: password resets, process questions)

The survey responses highlighted that 88% of institutions agreed the support team was knowledgeable and able to answer questions in a timely manner (rated 1 or 2), with '1' being the most popular answer. The feedback received in support of this included:

- The Data Collection team provided excellent support.
- The project team tried to respond promptly to any issues and problems raised.
- The support team were knowledgeable.

However, there were also a number of issues and therefore opportunities for improvement.

- The people designing the Help text (and the system as a whole) needed to think about it from the perspective of different types of users, ranging from complete novices to relative RAE experts.
- The support available for those institutions using the web services functionality was limited, and the fact that the Bristol test site was not up-to-date was very unhelpful and created extra work for our development team.

Question 13: The administration of the RAE2008 Data Collection System for your institution was straightforward

88% of institutions agreed the administration of the system was straightforward (rated 1 or 2), with '2' being the most popular answer.

There were no specific comments relating to the administration of the system in the free text fields, however we believe the comments outlined in response to Question 5 and Question 8 support the high percentage and ranking in response to this question.

Question 14: The guidance we received was sufficient to make your submission(s)

The survey responses highlighted that 82% of institutions agreed the guidance was sufficient to make the submission(s) (rated 1 or 2), with '2' being the most popular answer.

From our review we believe no HEIs suffered significant issues associated with the Data Collection System and as such the guidance provided by the RAE team would appear to have been sufficient.

Question 15: The help materials for using the RAE2008 Data Collection System were clear and concise

The survey responses highlighted that 57% of institutions agreed the help materials were clear and concise (rated 1 or 2), with '2' being the most popular answer. In comparison with the other questions within this survey this is a relatively low score and we believe this is an area which should be addressed in future projects. The feedback received in support of this included:

- The User Guide generally was of good quality (exhaustive) and workarounds were helpful.

However, there were also a number of issues and therefore opportunities for improvement.

- The User Guide quickly became out of date, in particular regarding the RA2 field requirements.
- Help built into the system generally referred back to the User Guide and didn't always provide additional information which might have been helpful.
- The User Guide was written for technical people rather than the requirements of academics at a University.
- It was not clear from looking at the user guide which fields needed to be completed for which publication types and what needed to go where.

4.2 The key recommendations for future related exercises (from the survey)

This section provides a summary of the key recommendations for improvement to the RAE2008 system for future related exercises which were proposed by the HEIs who responded to the survey.

- More clarity regarding DOIs would have been helpful. It was not clear from the outset what an invalid DOI actually meant.
- The formatting of the RA5a sections (as mentioned earlier) was really the most problematic area for us. Include a full editor in the output statements which allows highlighting and formatting.
- Can you include some version control in to the system so that you can revert to a previously saved version also including an automatic save option would be helpful.
- Customise the fields used to enter the data for different types of publications rather than using generic fields.
- Make reporting for RAs 5b and 5c separate from that for RA5a.
- Integration with University systems is increasingly important if the quantity of data is to increase at all.
- Having invested in and developed the system to its current level, it would be sensible for the Funding Councils to adapt/utilise it for future data collection exercises, particularly given the level of familiarity now established at HEIs among users.
- Build in some way to manually unlock records rather than have to wait for the automatic release.
- Greater clarity in error messages would be advantageous to make it easier for the user to establish the exact source of a problem. In many cases an error message alerted the user to a problem but not the exact cause of the error and/or where it was located in the text.
- Definitely make the reporting functions more tailored. Align on-screen appearance with the printed versions.

5 Estimate of the costs to HEFCE of developing and running the Data Collection System

We have provided our detailed findings within this section and have structured the section in line with the scope of the work outlined in Section 2.1, being:

- Estimate of the full costs to HEFCE of developing and running the Data Collection System

We have provided below an estimation of the project costs to HEFCE in developing and implementing the Data Collection System between 2004 and 2007. This estimate being £735,000 and the detailed breakdown of this estimation is shown in Tables 4 and 5

As time was not tracked specifically against individuals during the project we have estimated the full costs of the project based on:

- Estimated time spent by internal resources on project activities.
- A daily charge rate based on 2008 salaries together with employment on-costs.

We have not considered the additional costs of overtime nor the opportunity cost of key team members not being able to spend time on other projects.

Table 4 – Expenditure Summary by Year.

Expenditure Group	2004	2005	2006	2007	Total
Internal Resources					
Days	106	450	1203	808	2567
Costs	£27,834	£113,405	£277,647	£182,024	£600,910
External Resources			£27,500	£27,500	£55,000
Other (inc software)					
Penetration test				£4,000	
Changes to Firewall software				£2,500	
New network switch				£2,500	
Additional Janet link				£2,500	
Servers and other hardware				£10,000	
Software including SQL licences & editlive				£2,500	
Publications (user guide)				£10,000 (est)	
Travel and Subsistence (pilot launch DCSG mtgs etc)				£5,000 (est)	
Post Implementation Review				£40,000	
Sub Total				£79,000	£79,000
Total RAE DCS Cost					£734,910

Table 5 – Resource Expenditure Summary (excluding 'Other' costs)

Resource Costs by Activity	Cost
Management / Steering	£99,380
Development	
Applications	£354,222
Technical Infrastructure	£2,974
Testing	£95,944
Support	£48,390
Development Backfill	£55,000
Total	£655,910

There was no detailed budget established at the outset of the project which was subsequently maintained during the project lifecycle. As such it is not possible to provide a detailed assessment of budgeted against actual expenditure.

Our interviews identified that direct expenditure on developing the RAE Data Collection System was estimated to be approximately £350,000 - £400,000. It can be seen that there was less additional direct expenditure than originally anticipated. This is primarily as a result of the project utilising greater than anticipated (and additional) internal HEFCE resources to undertake development and testing activities.

Internal resources were planned to be used on the project from initiation but as the project became larger than initially anticipated the level of internal resource increased to be significantly greater than expected at the start of the project.

We believe that for future projects it is important for initial project budgets to define both the external and internal expenditure in greater detail and to be allocated at an activity level. These budgets provide the opportunity to monitor the performance of the project against an agreed baseline and will then allow management to make more informed decisions when changes to that baseline are proposed.

6 Observations for Future Exercises

We believe there are a number of important learning points / recommendations which management should consider for future exercises. Many potential improvements have been identified within the body of the report, however we have also summarised what we consider to be the key recommendations or future exercises within this section.

By adopting these recommendations we believe that HEFCE will be able to continue the improvements seen since the 2001 exercise and also reduce a number of the issues observed from the review.

6.1 Project Management

- Greater emphasis should be placed on the Project Initiation phase. This will allow the team to focus on developing more detailed requirements, rigorous plans and more realistic budgets.
- Define scope in detail and closely monitor requests to change the scope. By defining the scope in more detail the project manager will be able to monitor progress at a more granular level and manage changes by assessing the impact on the baseline.
- Estimating and budgeting should be undertaken in greater detail. Both time and resource should be allocated to undertake these activities.

6.2 Development Methodology

- Focus on core functionality and release in phases. We believe this type of system development project should be supported by a phased release schedule with the highest priority functionality being developed, tested and released first.
- Utilise the RAE2008 Data Collection System as a basis for future systems moving forward. The Data Collection System was effective for the majority of HEIs and given that the HEIs are familiar with the system it would be sensible to develop this existing system further or design any new system with familiar functionality.

6.3 Testing

- A formal testing strategy and process should be in place for this size of project, with clearly defined roles and responsibilities for each activity including unit testing, system and user acceptance testing. This will help to ensure that the majority of potential issues be identified at an early stage in future exercises.

6.4 Reporting Functionality

- Reporting was highlighted in the HEI 'free text' responses as an area where improvement could be made and reporting is often an area which is de-prioritised during application development projects. Any future projects should consider reporting requirements early in the development process and resource allocated to ensure users are closely involved in the design process.

Appendix A - List of Interviewees

Name	Department / Role
Ed Hughes	RAE2008 Manager
Mario Ferelli	DCSG – Chair (HEFCE)
David Spencer	DCSG Member (Bristol University)
Ann Salbaach	DCSG Member (Cardiff University)
Simon Marsden	DCSG Member (University of Edinburgh)
Mary Fridlington	DCSG Member (University of Oxford)
Rita Dugan	DCSG Member (Bournemouth University)
Greg McClure	DCSG Member (Queens University Belfast)
Hannah Falvey	DCSG Member (HEFCW)
Richard Puttock	DCSG Member (HEFCE)
Raegan Hiles	DCSG Member / RAE2008 Project Team / Review Co-ordinator
Jennifer Crook	RAE2008 DCS developer
Gareth Edwards	RAE2008 DCS developer

Appendix B – Summary of User Responses to the Survey

We received 200 user responses to the survey and the table within this Appendix summarises the responses. NB: The total number of responses by question will not total 200 as not all users provided answers to all questions.

Ref	Question Text	Number of Responses by Rating						Percentage by Rating				
		1	2	3	4	5	N/A	1%	2%	3%	4%	5%
1	The login and access to the RAE2008 Data Collection System was straightforward and secure	83	42	14	16	5	4	52	26	8.8	10	3.1
2	The RAE2008 Data Collection System helped us to improve the consolidation of submission data	27	55	43	24	8	4	17	35	27	15	5.1
3	The RAE2008 Data Collection System met your requirements as expected	16	56	39	38	7	4	10	36	25	24	4.5
4	Did you find the RAE2008 Data Collection System was reliable and available as required	35	52	35	22	1	1	24	36	24	15	0.7
5	The RAE2008 Data Collection System was intuitive and easy to use	14	53	41	26	10	1	9.7	37	28	18	6.9
6	The speed and performance of the Data Collection System was acceptable	28	56	35	19	5	3	20	39	24	13	3.5
7	Receiving an Error Message while trying to use the RAE2008 Data Collection System was a rare occurrence	21	45	35	25	16	2	15	32	25	18	11
8	If you attended the briefing events - were they at the appropriate level and did they target the right people	16	17	14	4	2	88	30	32	26	7.6	3.8
9	Were the RAE2008 Data Collection System Support team knowledgeable and able to answer your questions in a timely manner(eg: password resets, process questions)	39	34	13	9	5	41	39	34	13	9	5
10	The guidance we received was sufficient to make your submission(s)	38	49	18	11	4	20	32	41	15	9.2	3.3
11	The help materials for using the RAE2008 Data Collection System were clear and concise	18	48	41	15	5	13	14	38	32	12	3.9

1 Totally Agree
5 Totally Disagree

Appendix C – HEIs who undertook follow up interviews

Following the on-line survey the 7 HEIs who completed a follow-up interview were:

HEI
Brunel University
Coventry University
Manchester Metropolitan University
University of Edinburgh
University of Leicester
University of Manchester
University of Sheffield

We would like to thank all the Institutions for their time in completing the on-line survey and in particular the Institutions above who gave additional time in completing the follow up interviews.