Synthesys IA WP5 activity 3.10 - Usability of Specimen access system for taxonomists

Report on, recommendations for, and detailed behavioral specification for an updated BioCASE portal interface.

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Table of Contents

Introduction

As part of the Synthesys I project a web interface designed to facilitate access to specimen information housed in European collections was developed. A follow up project, Synthesys II has secured funding for enhancing the usability of the portal. This document was developed during the design phase of the portal enhancement exercise as part of Synthesys II and provides a detailed high level specification of the suggested behaviour for the redesigned interface. The primary goals of the re-design exercise have been

1) Provide a specification of the tasks to be supported by the interface
2) Increase the efficiency with which the tasks to be supported can be achieved.
3) Provide a greater uniformity of behaviour than displayed in the current interface
4) Provide a more intuitive basis for user customisation of the interface

General recommendations

The following section gives general recommendations for the development of the site broken down in to sections according to the primary goals of the design exercise.

Tasks supported by the interface

There are two primary tasks to be supported by the interface:

- Download data relating to specimens/observations of interest
- Browse through data relating to specimens/observations of interest

Both these tasks require mediation via a data query/search facility allowing relevant specimens/observations to be selected.

Data query

The existing interface provides two modes of query: simple and advanced. It is our understanding that the simple query is intended to provide a 'Google style' single entry field functionality hiding the user from the complexity of the advanced query. This approach is problematic for a number of reasons.

1) The single search field in the simple search interface is constrained to the single context of taxon name whereas a Google style search places no such constraint on the semantics of the field. The single search field in its current incarnation does not therefore provide a 'Google style' search. Such functionality could be provided if one of the following were implemented:

   a. The single search field is implemented to utilise full text indexing of the concatenated data in each row of the BioCase cache. Just as in a Google search a relatively non-specific result set would be returned in which any or all of the search terms matched regardless of the reason for the match and would probably not provide the user experience required.

   b. The user is allowed to enter any search terms into the single basic field and the back-end parses the input to allow querying against the appropriate fields in the data base. That is, the parser would have to be able to recognise taxon names, country names, collector names etc within the query terms then construct an appropriate query. This is likely to be difficult to implement within the development time available in the project, and any implementation is likely to be of limited robustness in the face of highly variable user input. This option can not therefore be recommended.

2) The limited semantics provided by the current single search forces the interface to insert an intermediate stage (the preview stage) in the results return process allowing the user to filter the initial results on other criteria. Given the current restrictions on the number of records that will be returned by the interface in most cases it will be necessary for the user to apply filters to their initial result. The net effect of this is that the complexity of the Advanced query is merely deferred to the intermediate phase and delays the user in getting to the data they want without providing any additional functionality. Moreover the intermediate interface does not provide an efficient means of defining filters on the data, especially when specifying the filters would require visiting multiple tabs in the interface.

Conversely since the intermediate/preview interface gives no extra functionality to the advanced query form there is little point in returning the intermediate/preview interface to the user after an advanced query has been submitted. Again the user is delayed in accessing the information they are really after and therefore the user experience is degraded.

3) The name 'Advanced Query' is potentially off putting to inexperienced users even though the interface provided for the Advanced Query is relatively uncomplicated compared to navigating the intermediate/preview pane resulting from a query. If it is desired that a simple/advanced query option be maintained we would strongly recommend renaming the Advanced Query. We suggest Detailed Query as an alternative.

Our recommendation and that which is described in the use case descriptions to follow is that a single query interface be provided which is configurable by the user to only display those elements of the form which are useful to them. The default configuration of the interface should be as simple as possible with increasing levels of complexity being exposed as the user reveals more elements of the interface.

The configuration process should be as transparent, unobtrusive and automatic as possible. By default the interface should remember the selected setting for each screen of the interface (not just the query screen) and return the screen in the same state whenever the screen is revisited. In this way no explicit configuration interface need be defined and the existing configuration interface can be eliminated. For similar reasons we also recommend removing the Thesaurus configuration option from the top line menu of the interface. Options to specify the thesaurus options can be displayed as and when the user opts for query expansion on taxon names.

Because a multi-field query screen approach allows the user to select all filter/sorting criteria before a query is run the intermediate/preview stage of the existing results return process can be eliminated. The results of a query should immediately display an appropriate list of specimens/observation matching the query values.

Multi-language support

Support for multiple languages in the current interface is somewhat patchy and should be reviewed. For example when the language is changed many but not all (is there really no German equivalent to Thesaurus configuration?) of the menu items change language but the associated tool tips do not. Since the tool tips are often more informative than the text to which they are attached this is an important shortcoming in the current implementation.

Data browsing

Since there are a considerable and growing number of digital images available within the data providers offerings we consider that two modes of data browsing should be supported; List view and Image gallery view.

List view

List view allows users to preview and examine the data matching their query on screen, possibly with a view to manually selecting a subset of the returned records for download. The current interface operates in this manner displaying a list of matches with checkboxes allowing users to select a subset of the returned result. Currently the content list of matches is configurable in the preferences pane where the user can select the data columns to display in the output. However, the on screen real estate available for displaying multiple columns of data in this manner is limited and we do not consider this to be a workable solution. We therefore propose that the contents of the list of matches be fixed; displaying taxon name, country of collection, data provider, basis of record and a flag indicating the availability of multimedia content for each record. In addition a simple preview mechanism should be implemented in which the full cached record for each match can be viewed without requiring the user to navigate away from the page. We also recommend that options for auto-scrolling through the result set be implemented.

Gallery view

One of the primary purposes for an interface to specimen data in the manner described in this document is to reduce the requirement for physical access to specimens. However, for a great deal of taxonomic work it is necessary to look at and take measurements from the specimens, usually this involves specimens being passed out on loan or visitors to a host institution physically interacting with the material, both of which incur risks of physical damage to the specimens.

Digital images provide a potential means for providing visual access to the specimens in a non-destructive, non-hazardous way.

In addition to this many modern observational records are accompanied by digital images of the organism being observed. These images are useful both as an identification aid and as a means of verifying the identity of the organism being observed.

There will therefore be a considerable user group whose primary focus is on access to the digital image material available via the portal. An interface will be required to support this. For this we recommend an image gallery approach in which thumbnails of matching images are arranged in an array on screen. Coupled with the preview mechanism described in the List View section we believe this will provide a very powerful and useful mechanism for browsing the results.

N.B. Support for image gallery style behavior can only be achieved if rapid access to thumbnail images can be gained via the cache. We are currently uncertain as to whether this behaviour is supported in the BioCASE protocol.

Data sorting

The current interface provides a single field for specifying the sort order of the returned results set. Additional facilities for sorting the data are provided in the final results set after the intermediate/preview page has been dealt with by the user. This we consider to be problematic for the following reasons.

1) It is unclear as to whether the sort option selected in the query definition form applies only the preview pane or to the preview pane and the subsequently listed results.

2) If the selected sort option and the default pane in the preview pane do not coincide the resulting preview display will be confusing. For example the user opts to sort on collection but has the taxon pane as their default preview result viewer. The resulting result set will appear to be unsorted until the collection pane is revealed.

3) More often than not multiple sort criteria will be desirable – e.g. collector name and number, or collector name and date, or taxon name and country. This is not supported at any point in the current interface.

4) Allowing the user to re-sort the data by toggling the heading of the results list is problematic in an environment where the results are paged. Bear in mind that the user's expectation will probably have been obtained from environments like spreadsheets where all records are displayed on a single page. In these circumstances sensible behaviour can be determined. In a multiple page result sets this is not so.

Imagine the user has navigated away from the first page of the result set then opts to resort the data by clicking on the column heading, the question now is where should the user be positioned in the result set after the sort has occurred? There are several possibilities:

    a. The same page in the result set is displayed but completely different subset of the data is displayed on the page as a result of the entire result set being re-sorted – probably confusing.

    b. The user is returned to the first page of the results set and sees a completely different subset of the data – probably confusing

c. If the user has highlighted an entry in the result list the data set could be reordered and then the results are redisplayed with the selected record highlighted. Very difficult to implement and what happens if nothing in the interface is highlighted – fall back to a. or b.

d. The results of the current page only are re-ordered - this would be completely nonsensical even though it may conform closest to the user's expectation – what would happen when the user navigated to the next page of results after such a sort action had occurred?

For the above reasons we would recommend that multiple search fields be selectable in the query form and in order to change the search order the query form has to be revisited.

Return links

In the current interface the user often has to resort to using the browsers back button to return to the previous page – examples of this are found when the full details of a record from the provider is displayed and the user wishes to return to the list of results. Often this works fine, but consider what happens if the user visits the preferences page while viewing the full details. Saving the preferences takes the user back to the full details screen. The user now wishes to return to the results list, the only option is to use the browser back button but instead of returning to the list this action now takes the user back to the preferences screen!

Similarly after running a successful query one can either use the browser back button to return to the search form (which suffers from the same problem as above) or one can click on one of the query links in the side navigation bar. However when doing this a new user will be uncertain as to whether the query values they entered to run the query will be preserved. It turns out they are but one is given an initial feeling of uncertainty, admittedly followed by a feeling relief but all the same with a degraded user experience.

We recommend that all pages should have full and explicit return buttons built into them. Similarly the crumb trail if implemented should permit navigation back through the execution pathway, currently it does not.

Taxonomy versus specimen browsing

A number of features in the current interface appear to be tailored more to browsing taxonomic hierarchies and not directly providing access to specimen data. Notable examples of this are the display of higher taxa in the tabbed pane in the preview results of the current interface, and the extra query facility provided as part of the search options. We believe these are problematic for the following reasons.

1) It is not clear whose hierarchy is being browsed, is it that in the cache, that in the thesaurus or that of the data provider whose record is being viewed.

2) The ability to browse taxonomic hierarchies interferes with the operation of the interface and unnecessarily complicates the interface without adding greatly to the functionality of the interface.

We recommend that these aspects of the interface be removed from the redesigned interface. Facilities for taxonomic browsing should be provided in a separate interface in which is specifically designed for this purpose and in which the semantics of the browsing are clearly defined.

Data download

In order to maximise the efficiency of the interface in relation to users interested solely in obtaining a local copy of the data, it should be possible to go directly to data download from the search without passing through a data browsing stage.

Whenever a user opts to download a result set they should be presented with a consistent interface to manage this process. The response to a download request in the current interface is quite variable depending on where in the interface a download option is selected, this is very off putting for the user.

Via the current data browser screen there are two routes to downloading data, either the user can opt to download all the results matching their query or only those they have manually selected during the browse process. The user should be able to switch between these options from within the data download form (see below).

Control of the selection of the download source should be placed in the single data download form. In this form if the user to opts to download only from the cache they should also be able to select which fields in the cache they want to include in the download. When a user has selected to download from the cache it should also be possible to estimate the download file size and the download time for their data. This increased level of consistency, flexibility and informativness will greatly enhance the user experience.

It will probably not be possible to provide this level of information for data downloaded from providers.

When downloading data from the providers, offline download should be mandatory as should the provision of an email address for notification when the data compilation process is complete. Currently provision of an email address is optional. The notification email should not only provide a link to the collated data but should provide a summary of the data contents of the downloadable file including, File size, details of which providers where not contactable and a count of the records returned from each provider. If the collated file has a limited lifetime the user should be informed of the expiry date and warned that the data will be erased after that time.

When downloading using the offline mechanism it should be possible to submit multiple simultaneous requests (maybe up to a maximum to prevent abuse). Currently a second request will result in the collated file being overwritten even if the results of the first query had not been downloaded. This appears to be a result of linking a session ID to the download file name.

Recommended interface behaviour

The following sections of this document lay out in detail the suggested behaviour of the improved interface. Accompanying this is a mock-up/simulation of the interface available from http://elmer.rbge.org.uk/BioCaseMockup demonstrating as far as possible the behaviour described in the following text. The following omissions and limitations will be found in the simulation when compared with the use case description.

1) Data sorting is not supported.

2) Proper session handling is not supported. The simulation is constructed as a single HTML page to allow limited simulation of the preservation session data. However if the page is reloaded all session information will lost. This should not occur in the full implementation.

3) Support for presenting the interface in multiple languages is not implemented even though there are interface options that suggest that it is.

4) No query expansion is supported even though there are interface options that suggest that it is.

5) No suggestion facility has been implemented on the search form text fields.

6) The summary of results displayed in the left hand navigation bar in the current interface has not been implemented although we would like to see this retained in the new version.

7) The simulation is presented merely to demonstrate interface behaviour and except for the broad layout of components little attention has been given to page layout and styling. It should be possible to design more effective screen layouts.

8) The help text presented as one hovers over input elements in the mock-up search form is not intended to be the final form of words merely to provide a suggested mechanism for displaying context sensitive help. All help messages including the main help pages accessed via the help link in the existing interface will have to be rewritten to conform to the new functionality.

9) The underlying data set consists of 9 records for *Capella gallinago* – results will be returned for any wild card combination of this name but no other results will be returned. The common name "Common snipe" is recorded for each result and can be queried as can the country of collection. Countries in the data set are United Kingdom and Germany. No specimen details (e.g. collector name) are included in the mock-up data set.

N.B. The use case descriptions and not the simulation are intended to provide the definitive behaviour of the interface. The following documentation should provide a framework to guide implementation and for final testing of the interface for functional completeness.

The following actors are included in the use case descriptions. Actors are presented in bold through out the text.

Browser User (BU)	This actor represents the human client desiring access to the BioCASE data.
Browser	The web client software employed by the **BU**.
Interface	This actor represents the web pages displayed to the **BU** via the **Browser**. This actor also includes and any client side scripts run by the **Browser**.
Server	The actor represents the web server presenting the interface to the **Browser** and any associated server side scripts.
Database	This actor represents the data base holding the BioCASE cache data and the session data for each **BU.**
Data Provider	This actor represents a data base holding the primary data from which BioCASE cache data has been obtained and from which full details of a record can be obtained.
Off-line data collation service	This actor represents the service responsible for collating request for data downloaded from the **data providers**.
Data provider status service[*]	This actor represents a service responsible for tracking the availability of individual **Data providers**. The service maintains a data base of currently active **Data providers** by polling each provider at a specified

[*] This service does not yet exist but we highly recommend that it is implemented

	frequency. The data base maintained by this service is used by the **Server** to control the visibility of certain controls in the **Interface** depending upon whether or not **Data providers** are available.

The following behavioral description is divided into Packages, each Package describes a distinct functional aspect of the interface. Each package is subdivided into actions designated by bold italic headings. Within each action is a description of the Primary action. This contains a description of the sequence of events and actor interactions which will occur during the action when all goes according to expectation. Each action may also contain a description of the alternative actions which occur in the event of an exceptional occurrence in the primary action.

Package – Build Query

In text fields you may use one or more asterisks (*) as a wildcard. Examples: [...]

Restrict results on organism names assigned to specimens/observations [Hide]

Taxon name [   ]   Include synonyms
Common name [*snipe*   ]   No ⦿ Yes ○

Restrict results on details of specimens/observations [Show]

Restrict results on geographical details of specimens/observations [Show]

Output options [Show] Change interface language: [English ▾]

[Submit query]

Figure 1 Search form in its default configuration

In text fields you may use one or more asterisks (*) as a wildcard. Examples: [...]

Restrict results on organism names assigned to specimens/observations [Hide] ①

④ Taxon name [   ]   Include synonyms
Common name [*snipe*   ]   No ⦿ Yes ○

Restrict results on details of specimens/observations [Hide] ①

Collector name [   ]
Collection number [   ]
⑤ Collection date [   ]
Barcode number [   ]
Accession number [   ]
Source institution [   ]

Restrict results on geographical details of specimens/observations [Hide] ①

⑥ Country of origin [Any   ▾]
Country of storage [Any   ▾]
Locality name [   ]

Output options ① [Hide] Change interface language: [English ▾] ②   ⑪

Download data without browsing: Sort results by: [Taxon name ▾]
⑦ No ⦿ Yes ○   Then by: [None ▾]
Record types: Then by: [None ▾]
Both specimens and observations ⦿   ⑩ Results per page [   ]
⑧ Specimen data only ○
Observation data only ○
Content types
Only return records with multimedia ☑
⑨ Only return records for type specimens ☐
Only return records with geographical coordinates ☐

[Submit query] ③

Figure 2 Search for with all elements fully expanded

Key to figure 2

1) Hide/show buttons allowing elements of the form to be hidden/revealed on demand.
2) Interface language selection control
3) Submit query control
4) Taxon name fieldset
5) Specimen details fieldset
6) Geographical details fieldset
7) Primary query response selector
8) Record type selector
9) Record content filter
10) Results per page selection control
11) Result sort options selector

Action: Display search form

Primary Action

The (**Browser User**) **BU** enters the BioCASE portal. Upon receipt of the page request the **Server** examines the session details for the current **BU** and determines that the terms and conditions relating to site usage have been accepted by that person.
After the T&C checks are complete the **Server** retrieves the saved search form display options for the current **BU** and the form is returned to the **BU/Browser** in the same state as the last time it was accessed. The **Interface** then waits for further input from the **BU**.

Alternative action 1

No connection to the **Database** can be established. A message is displayed in the **Interface** indicating the nature of the problem, apologising that the service is currently unavailable. No further action is required.

Alternative action 2

The **BU** decides not to conduct a search the user navigates away from the search page no further action is required

Alternative action 3

The **Server** determines that the current **BU** has not yet accepted the Terms and Conditions Control is handed over to the *Display terms and Conditions* action of the *Terms & Conditions* package.

Alternative action 4

The **Server** determines that there are no saved user settings for the current **BU**. The **Interface** is returned to the **Browser** in the default state:

  All search field groups except taxon names are hidden
  The default data return mode is set to browse data
  All data return type restrictions are set to false (i.e. the results are not restricted to images only, specimens only etc.)

Action: Hide field sets

Primary action

The **BU** activates a 'hide/show' control in the query **Interface**. If the fieldset associated with the button is currently hidden the **Interface** reveals the fieldset. The text associated with the hide/show control is changed from "Show" to "Hide" and the tool tip text associated with the control is updated to reflect the reversal of behaviour.

If the fieldset associated with the 'hide/show' control is currently revealed the **Interface** checks the fields in the associated field set. If all fields are empty, the **Interface** hides the field set. The text associated with the 'hide/show' control is changed from "Hide" to "Show" and the tool tip text associated with the control is updated to reflect the reversal of behaviour.

Alternative action 1

Upon checking the contents of the field in the field set the **Interface** determines that one or more of the data entry fields are non empty. A message is displayed indicating that the field set cannot be hidden when there are values in the field set. No further action is taken

Action: Change language selection

Primary action

The **BU** activates the 'language selection control' and changes the selected language. The new language setting is stored in the current session and the search form is refreshed so as to honour the change in language.

Alternative action

No connection to the **Database** can be established and the current interface options cannot be stored. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Create query

Primary Action

The **BU** sets focus onto one of the search form fields. An appropriate help message is displayed indicating the nature of the data to be entered into the currently focussed field.

The **BU** keys their query values into the field and as the **BU** is entering text into a search field a list of suggestions based on the entered text will be displayed. The **BU** can either select one of the proffered suggestions or submit their text as entered. Text entered as is may contain wildcard characters. The help for data entry in a 'suggestions enabled' field should make it clear to the **BU** that either free text or a suggested option can be input.

E.g. the **BU** enters text into the 'Taxon name' search field resulting in list of names matching the entered text being displayed. The contents of the suggestion lists are dynamically updated as more text is entered. In order to maintain responsiveness it may be necessary to constrain this behaviour such that a list of possible matches is only returned after a set number of characters have been entered into a field. For example if the threshold is set to 4 characters no suggestions will be displayed until the 4th character has been entered. Thus if the **BU** enters the text BELL into the taxon name field no matches will be displayed until the 4th character is entered whereupon all taxon names starting with BELL (using a case insensitive search) will be listed. The list will shorten as more characters are entered. If a character number threshold before the presentation of suggestions is triggered has been set an appropriate on screen message should be displayed.

Alternative action 1

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the suggestion BioCASE service is currently unavailable.

Alternative action 2

No help text can be found for the current field –The **Interface** clears any existing help text in the dynamic help display to prevent confusion.

Action: Mouse over input field

Primary Action

The **BU** moves the mouse of a query input field. The **Interface** identifies the field in question and displays a context sensitive help message.

Alternative action 2

No help text can be found for the current field –The **Interface** clears any existing help text in the dynamic help display to prevent confusion.

Action: Mouse out of input field

Primary Action

The **BU** moves the mouse out of a query input field. The **Interface** clears any context sensitive help message.

Action: Change query response type

Primary Action

The **BU** changes the selection of query response type by selecting one of the query response selector controls. The **interface** takes no further action. Only one type of query response (data browsing or direct download) can be selected.

Action: Change record type

Primary Action

The **BU** changes the selection of record type by selecting one of the record type selector controls. The **interface** takes no further action. Only one record type can be selected.

Action: Include synonyms option activated

Primary Action

The **BU** changes the selection of include synonyms option to 'Yes'. This indicates that the **BU** wishes the **Server** to expand their query terms to included related concepts based on their selected Thesaurus options. The selected option is saved in the session data.

Upon changing the selection a new set of controls is displayed allowing the **BU** to select which data sources they wish to use then the query is expanded.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Include synonyms option de-activated

Primary Action

The **BU** changes the selection of the 'include synonyms' option to 'No'. This indicates that the **BU** does not require query expansion to take place. The thesaurus selection controls are hidden by the Interface. The selected option is saved in the session data.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Initiate query

Primary Action

The **BU** activates the Submit query control. The **Interface** checks that some query values have been entered. The entered query values along with information detailing the current output options and display disposition are submitted to the **Server**. Control now passes to the *Process Query* action of the *Execute Query package*.

Alternative action 1

No search criteria have been supplied. A message advising the user of the issue indicating that without the search criteria a query is not possible. No further action is taken.

Alternative action 2

No connection to the database can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Package – Execute query

Action: Process query request

Primary Action

The **Server** receives a query request from the **Browser**. The **Server** parses the content of the request in order to save the current interface disposition in the session data and to construct an appropriate query string honouring all output filter options (e.g. specimens only, multimedia only etc), any 'AND/OR' clauses embedded in the query values, any sort options and any wildcards. During the parsing of the query values all values should be appropriately escaped and verified to militate against the submission of malicious code.

After constructing the query string the **Server** stores the query in the current session data.

The **Server** retrieves the number of results per page and the current page of the results from the session data and modifies the query to return only the results required to display on the current page.

After constructing the query string the **Server** submits the query to the **Database** and awaits a response from the **Database**.

Alternative action 1

No connection to the **Database** can be established. The query request is aborted and an appropriate message is returned to the **BU** via the **Browser**.

Alternative action 2

The query string resulting from the parsing of the query values is invalid causing the **Database** to be unable to process the query. An appropriate message is returned to the **BU** via the **Browser**.

Alternative action 3

One or more of the submitted query values fails the malicious code security checks. The query request is aborted and an appropriate message is returned to the **BU** via the **Browser**.

Alternative action 4

No results page number can be read from the current session data, the page number defaults to 1.

Alternative action 5

No results per page value can be read from the current session data, the page number defaults to 20.

Alternative action 6

No query values are is specified in the query request the **Server** retrieves last query submitted from the current session data. If no query can be read from the current session data a message to this effect is displayed and control is passed to the *Display search form* action of the *Build Query Package.*

Action: Process query result

Primary Action

The **Server** receives a result set from the **Database** in response to a query. The **Sever** determines the style of output to be returned by examining the current session details/query parameters.

If the direct download has been selected by the **BU**, then control passes to the *Display download summary* action of the *Initialize download data* package.

If the browse results option has been selected the **Server** determines if gallery or list view has been selected by the **BU.**

If gallery view is selected control is passed to *Display image gallery* action of the *Image gallery package*

If list view is selected control is passed to *Display query results* action of the *Browse data* package

Package – Initialise download data

Figure 3 The download preview screen after cache download has been selected and with the field selection options revealed.

Figure 4 The download preview screen after download from data providers has been selected.

Action: Display preview screen

Primary Action

The **Server** receives a download data request and returns a download summary/preview screen to the **Browser.** The preview screen details the number of records selected for download, the download formats available, and allows the **BU** to opt for downloading only data held in the BioCASE index or to download full data records from the **Data provider(s)**. The **BU** can also select between direct download of the data onto their local machine and deferred download using offline data collation with email notification.

Based on the number of records selected for download and the download fields selected an estimated file size and download time is displayed for the BioCASE index data source.

Upon receipt of the request the **Server** loads the session data for the current **BU/Browser** and returns the download preview screen in the state it was in when it was last visited.
The number of records selected for download, the total number of records in the result set and the number of items in the 'shopping basket' are displayed in the **Interface**.

The **Server** determines if a request has been made to download all data from a query result or only manually selected records. If a request to download all records in a result set has been

received, and there are currently items manually selected for download a control allowing the **BU** to switch to only downloading selected records is displayed.

If a request to download selected records has been received a control allowing the **BU** to switch to downloading all records in a results set is displayed.

Prior to returning the form to the **Browser** the **Server** constructs an appropriate anti-spam image and ensures that the image will be displayed in the form.

Alternative action 1

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Alternative action 2

No session data is available for the current **Browser/BU** – the download summary page is displayed in the default configuration:
Download format: Comma separated values
Download source: BioCase cache/index
Cache fields: All selected – cache fields selection button visible
Email address field: hidden
Download buttons and spam prevention controls: visible

Action: Change download format

Primary action

The **BU** changes the download format; the **Interface** displays a revised estimate of the download file size, and download time for the BioCASE index download The new download format selection is stored in the session data for the current **BU/Browser.**

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Change download source to BioCASE cache

Primary action

The **BU** changes the download source from data provider to BioCASE cache. The **Interface** hides the email address fieldset. The 'Select cache fields' fieldset is revealed in the state in which it was last displayed.

The new download source selection is stored in the session data for the current **BU/Browser.**

Action: Change download source to Data Provider

Primary action

The **BU** changes the download source from BioCASE cache to data provider. The **Interface** reveals the email address fieldset displaying it in the same state as it was when last revealed.

The 'Select cache fields' field set is hidden since there is no practical way of selecting the fields to download from the providers.

The new download source selection is stored in the session data for the current **BU**/**Browser**.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Change cache field selection

Primary action

The **BU** changes the selection of a download field – either selecting or deselecting it. The estimated download size and time for the cache data option are updated accordingly. The display of the number of fields selected for download is updated.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Select cache fields 'Hide/Show' button activated

Primary action

The **BU** activates the 'hide/show' control in the select cache fields fieldset. The **Interface** determines that the subordinate field selection fieldsets are currently hidden and displays them. The text associated with the 'hide/show' control is changed to 'Hide" and any tool tip text is modified accordingly.

The new interface settings are stored in the current session data.

Alternative action 1

When the 'hide/show' control is activated the **Interface** determines that the subordinate field selection fieldsets are currently visible and hides them. The text associated with the 'hide/show' control is changed to 'Show" and any tool tip text is modified accordingly.

The new interface settings are stored in the current session data.

Alternative action 2

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: The 'Select all' control of the main cache field selection fieldset is activated

Primary action

The **BU** activates the 'select all' control in the main select cache fields fieldset. The **Interface** sets all the controls in the subordinate cache selection fieldsets to the selected state (even if the subordinate field sets are not visible).

The file size and download time estimates for the cache download are updated accordingly.

The new set of selections is saved in the session data

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: The 'Select all' control of a subordinate cache field selection fieldset is activated

Primary action

The **BU** activates the select all control in a subordinate select cache fields fieldset. The **Interface** sets all the controls in the associated subordinate cache selection fieldset to the selected state.

The file size and download time estimates for the cache download are updated accordingly.

The new set of selections is saved in the session data

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: The De-Select all control of a subordinate cache field selection fieldset is activated

Primary action

The **BU** activates the 'de-select all' control in the select cache fields field set. The **Interface** clears all the current selections (even if the controls are not visible) and saves the changes in the session data.
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Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: 'Begin download' control activated – download from cache

Primary action

The **BU** activates the 'Begin download' control. The **Interface** checks that the spam prevention field has been completed. The data request is passed onto the **Server** for processing and control passes to the *Download results* action of *Online data collation package.*

The **Browser** should receive a standard response from the server with an appropriate MIME type causing the default **Browser** action to occur for the specified MIME type.

Alternative action 1

No entry had been made in the spam prevention field. A message to this effect is displayed to the **BU** via the **Browser** and the download request is aborted.

Alternative action 2

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: 'Begin download' control activated – offline download from providers

Primary action

The **BU** activates the 'Begin download' control. The **Interface** checks that the spam prevention field has been filled in and that a valid email address has been entered. The data request is passed onto the **Server** for processing. Control then passes to the *Display download results* action of *Offline data collation package.*

Alternative action 1

No entry had been made in the spam prevention field. A message to this effect is displayed to the **BU** and the download request is aborted.

Alternative action 2

No entry had been made in the email field. A message to this effect is displayed to the **BU** and the download request is aborted.

Alternative action 3

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Browse results control activated

Primary action

The **BU** activates the browse results control. The **Interface** passes a query request without query values to the **Server**. Control is passed to the *Process query request* action of the *Execute Query* Package

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Edit query control activated

Primary action

The **BU** activates the edit query control. The **Interface** requests the **Server** to return the Query form page. Control then passes to the *Display Query form* action of the *Build Query Package*

Package –Offline data collation

Action: Display download results

Primary action

The **Server** receives a request for data download with data to be obtained from the **Data providers**. The **Server** immediately returns an information page to the **Browser** indicating successful receipt of the request and reminding the **BU** that an email will be sent to them upon completion of the data collation process.

The server sends a request to the offline data collation service passing it the session id of the **BU** and control passes on to that service. It is the responsibility of the offline data collation service to multiplex the query among the relevant data providers based on the query parameters and output options specified in the current session details, to transform the data returned from the individual **Data providers** into the format requested by the **BU** and to notify the **BU** by email upon completion of the data collation process.

Alternative action 1

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Alternative action 1

No connection to the **Offline data collation service** can be established. A message is displayed indicating the nature of the problem, apologising that the offline service is currently unavailable and suggesting that the **BU** may wish to consider direct download of the cache data.

Action: Email notification

Primary action

The **Offline data collation service** completes the compilation of the results from the requested data providers and retrieves the email address of the **BU** from their session data and then compiles an email message to be sent to the **BU**.

The contents of the message should contain the following:
A URL from which the data file can downloaded,
A summary of the success/failure of downloading results from each provider.

Alternative action

The session data for the current **BU** cannot be retrieved. A log of the failure is recorded and no further action is taken.

Package –Online data collation
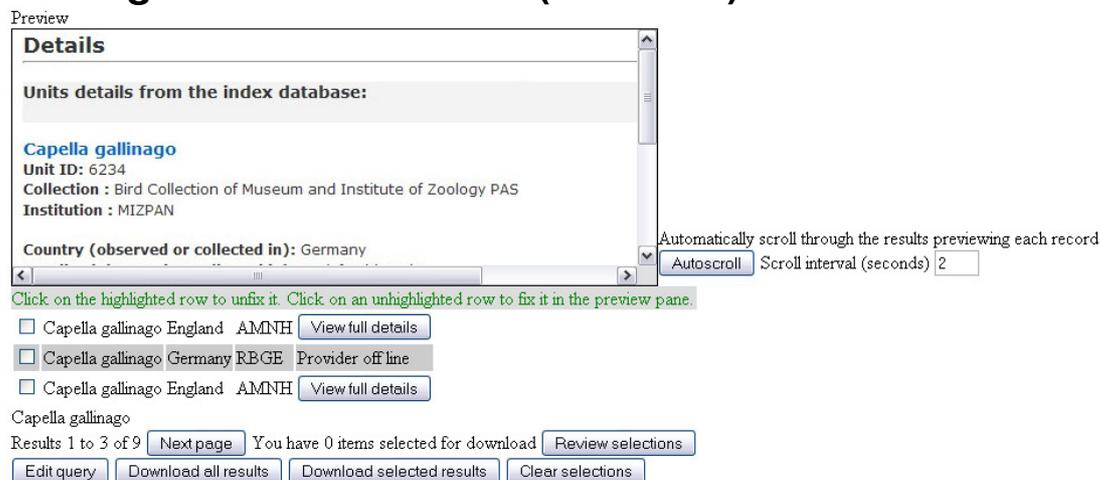
Action: Get results

Primary action

The **Server** receives a request for data download with data to be obtained from the BioCASE cache. The **Server** constructs an appropriate query string based on the query values in the session data and whether or not a request for all data from a query is to be returned or only manually selected records should be returned. The **Server** submits the query to the server and awaits a response.

The **Server** transforms the data set returned from the **Database** into the data format requested by the BU and sets the MIME type of the response accordingly. The transformed data set is returned to the **Browser**.

Alternative action 1

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Package - Browse Results (List view)

Preview

Figure 5 Details of the list view screen showing the preview panel at the top of the screen and the list of records matching the query at the bottom.

Action: Display query results

Primary Action

The **Server** has successfully retrieved a data set as the result of a query and determines from the current session data that the **BU** wishes to view the results of their query as a list. The **Server** now formats the data in the result set accordingly and returns the browser page to the **BU/Browser** data.

The page returned by the **Server** displaying a list of records matching the query in the bottom half of the page above which is displayed a preview area.

Before returning the results to the **Browser** the **Server** determines the current settings for the number of results per page and the current results page to display. The display is updated to indicate the current location in the result set.

If the current location is not at the start of the result set and the result set spans more than one page a control is provided allowing the **BU** to navigate to the previous page of results.

If the current location is not at the end of the result set and the result set spans more than one page a control is provided allowing the **BU** to navigate to the next page.

If the result set spans more than one page a control is provided allowing the **BU** to navigate to any page in the result set (NOT IMPLEMENTED IN THE MOCK-UP).

The interface examines the current session data and determines if any of the records in the current results page have been selected for download. If so the selection control for that record is set appropriately.

For each record the results list displays only a limited set of data; the taxon name for the current identification, the name of the country in which the collection/observation was made, the name of the data provider, an icon when Multimedia content is available for the record and an indicator of the basis of record.

For each record in the results list the **Server** determines the on-line availability of the **Data provider** by querying the **Data provider status service**. If a data provider is found to be available a control is displayed allowing the **BU** to access the full record details from the **Data provider**. If the **Data provider** is not available a message is displayed informing the **BU** of this.

The preview area allows the full cache data to be viewed without requiring the **BU** to navigate away from the page.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Hover over row in record list

Primary Action

The **BU** hovers the mouse over a row in the results lists the **Interface** determines that the current preview is not fixed (see click on row action). The **Interface** updates the review pane to display the full cached details of the current record.

Alternative action

There is a record fixed in the preview pane therefore no action is taken.

Action: Click on row in record list

Primary Action

The **BU** clicks on the text in a row of the results list. The **Interface** highlights the selected row in the results list. The full cache data for the selected record is displayed in the preview pane. The selection if fixed by disabling the 'Hover over row in record list' action.

Alternative action 1

The selected result is already highlighted and fixed. The highlight is removed from the selected item and the 'Hover over row in record list action' is restored.

Alternative action 2

Another result in the list has already been 'fixed' in the preview pane. The old selection is removed and the current record is highlighted and 'fixed' in the preview the 'Hover over row in record list action' remains disabled.

Action: Select record for download

Primary action

The **BU** activates the select control associated with a record in the result set. The id of the selected record is recorded in the current session data. The **Interface** updates the display incrementing the count of currently selected records.

Alternative action 1

The record associated with the selection control is already selected. The id of the selected record is removed from the list of selections in the current session data. The **Interface** updates the display decrementing the count of currently selected records.

Alternative action 2

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologizing that the BioCASE service is currently unavailable.

Action: Edit Query
Primary Action

The **BU** activates the Edit query button, the current state of the browse data display is saved in the session data, the **Interface** sends a request to the **Server** to display the search form and control passes to the *Display search form* action of the *Build Query* package.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Download all data
Primary action

The **BU** activates the 'Download all data' control, the current state of the display is saved in the session data, the **Interface** sends as download data request to the **Server** and control passes to the *Display preview form* action of the *Initialise download data package*.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Download selected data
Primary action

The **BU** activates the 'Download selected data' control. The **Interface** determines if that some records have been manually selected for download, the current state of display is saved in the session data, the **Interface** sends as download data request to the **Server** and control passes to the *Display preview form* action of the *Initialise download data* package.

Alternative action 1

No records have been manually selected in the current record set. The **Interface** displays a message informing the **BU** that at least one selection must be made.

Alternative action 2

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Display Full details

Primary action

The **BU** activates the view full details control for a data record. The **Interface** sends a view full details request to the **Server** and control passes to the *Display full details* action of the *Full Details* package.

Action: Next page

Primary action

The **BU** activates the 'Next page' button, the **Interface** sends and *Execute Query* request to the **Server** indicating the page in the result set to be displayed. Control passes to the *Process Query* action of the *Execute Query* Package

Action: Previous page

Primary action

The **BU** activates the 'Previous page' button, the **Interface** sends and *Execute Query* request to the **Server** indicating the page in the result set to be displayed. Control passes to the *Process Query* action of the *Execute Query* Package

Action: Clear selections

Primary Action

The **BU** activates the 'Clear selections' control. The **Interface** determines if any records have been selected in the current record set by examining the current session details. The **Interface** ensures all selections are removed from the session data and that any selected entries currently displayed are deselected.

Alternative action 1

No records have been manually selected in the current record set. The **Interface** takes no action.

Action: Auto scroll

Primary Action

The **BU** activates the auto scroll control from the preview results page, the **Interface** checks the scroll interval setting and uses this to set the scrolling interval. The **Browser** automatically scrolls through the result set on the current page highlighting each result in turn and displaying the full cache data for the result in the preview pane.

The **interface** updates the text associated with the auto scroll controls to read 'Stop Scrolling'.

Alternative action

No time interval set – a default time interval of 2 seconds is used.

Action: Stop auto scroll

Primary Action

The **BU** activates the auto scroll control after auto scrolling has been initiated. The scroll timer is deactivated and scrolling of the results stops. The record selected at the time scrolling was stopped remains highlighted and the full cache details for that result are fixed in the preview pane.
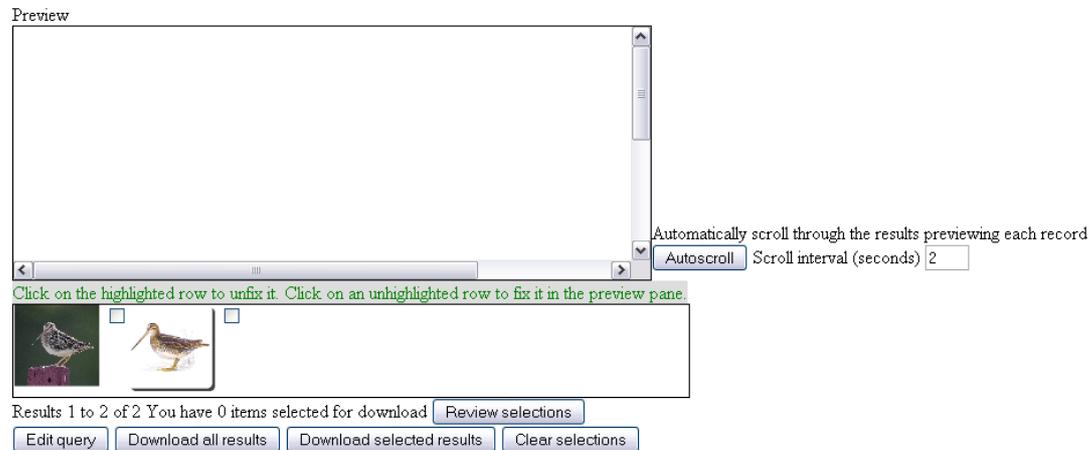
Package - Image Gallery

Figure 6 Details of the gallery view screen showing the preview panel at the top of the screen and the array of thumbnails from records matching the query at the bottom.

Action: Display image gallery

Primary action

The **Server** has successfully retrieved a data set as the result of a query and determines from the current session data that the **BU** wishes to view the results of their query as an image gallery. The Server now formats the data in the result set accordingly and returns the browser page to the **BU/Browser** data.

The page returned by the **Server** displaying an array if thumbnails for the matching records bottom half of the page above this is displayed a preview area.

Before returning the results to the **Browser** the **Server** determines the current settings for the number of results per page and the current results page to display. The display is updated to indicate the current location in the result set.

If the current location is not at the start of the result set and the result set spans more than one page a control is provided allowing the **BU** to navigate to the previous page of results.

If the current location is not at the end of the result set and the result set spans more than one page a control is provided allowing the **BU** to navigate to the next page.

If the result set spans more than one page a control is provided allowing the **BU** to navigate to any page in the result set (NOT IMPLEMENTED IN THE MOCK-UP).

The interface examines the current session data and determines if any of the records in the current results page have been selected for download. If so the selection control for that record is set appropriately.

The array of thumbnails is grouped by taxon name

The preview area allows the full cache data to be viewed without requiring the **BU** to navigate away from the page.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Hover over image

Primary action

The **BU** hovers the mouse over a thumbnail in the results lists the **Interface** determines that the current preview is not fixed (see click on row action). The **Interface** updates the review pane to display the full cached details of the current record.

Alternative action

There is a record fixed in the preview pane therefore no action is taken.

Action: Click on image

Primary action

The **BU** clicks on a thumbnail image. The **Interface** highlights the selected thumbnail. The full cache data is for the selected record is displayed in the preview pane. The selection if fixed by disabling the 'Hover over image' action.

Alternative action 1

The selected result is already highlighted and fixed. The highlight is removed from the selected item and the 'Hover over image' action is restored.

Alternative action 2

Another result in the list has already been 'fixed' in the preview pane. The old selection is removed and the current thumbnail is highlighted and 'fixed' in the preview the 'Hover over image' action remains disabled.

Action: Select record for download

Primary action

The **BU** activates the select control associated with a record in the result set. The id of the selected record is recorded in the current session data. The **Interface** updates the display incrementing the count of currently selected records.

Alternative action 1

The record associated with the selection control is already selected. The id of the selected record is removed from the list of selections in the current session data. The **Interface** updates the display decrementing the count of currently selected records.

Action: Edit Query

Primary Action

The **BU** activates the Edit query button, the current state of the browse data display is saved in the session data,, the **Interface** sends a request to the **Server** to display the search form and control passes to the *Display search form* action of the *Build Query* package.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Download all data

Primary action

The **BU** activates the 'Download all data' control, the current state of the display is saved in the session data, the **Interface** sends a download data request to the **Server** and control passes to the *Display preview form* action of the *Initialise download data package*.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Download selected data

Primary action

The **BU** activates the 'Download selected data' control. The **Interface** determines if that some records have been manually selected for download, the current state of display is saved in the session data, the **Interface** sends a download data request to the **Server** and control passes to the *Display preview form* action of the *Initialise download data* package.

Alternative action 1

No records have been manually selected in the current record set. The **Interface** displays a message informing the **BU** that at least one selection must be made.

Alternative action 2

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Display Full details

Primary action

The **BU** activates the view full details control for a data record. The **Interface** sends a view full details request to the **Server** and control passes to the *Display full details* action of the *Full Details* package.

Action: Next page

Primary action

The **BU** activates the 'Next page' button, the **Interface** sends and *Execute Query* request to the **Server** indicating the page in the result set to be displayed. Control passes to the *Process Query* action of the *Execute Query* Package

Action: Previous page

Primary action

The **BU** activates the 'Previous page' button, the **Interface** sends an *Execute Query* request to the **Server** indicating the page in the result set to be displayed. Control passes to the *Process Query* action of the *Execute Query* Package

Action: Clear selections

Primary Action

The **BU** activates the 'Clear selections' control. The **Interface** determines if any records have been selected in the current record set by examining the current session details. The **Interface** ensures all selections are removed from the session data and that any selected entries currently displayed are deselected.

Alternative action 1

No records have been manually selected in the current record set. The **Interface** takes no action.

Action: Auto scroll

Primary Action

The **BU** activates the auto scroll control from the preview results page, the **Interface** checks the scroll interval setting and uses this to set the scrolling interval. The **Browser** automatically scrolls through the result set on the current page highlighting each result in turn and displaying the full cache data for the result in the preview pane.

The **interface** updates the text associated with the auto scroll controls to read 'Stop Scrolling'.

Alternative action

No time interval set – a default time interval of 2 seconds is used

Action: Stop auto scroll

Primary Action

The **BU** activates the auto scroll control after auto scrolling has been initiated. The scroll timer is deactivated and scrolling of the results stops. The record selected at the time scrolling was stopped remains highlighted and the full cache details for that result are fixed in the preview pane.

Package – Full Details

Figure 7 Image of the full details of a record downloaded from a data provider

Action: Display full details

Primary action

The **Server** receives a display full details request. The **Server** obtains the id of the record to be displayed from the request. The **Server** contacts the **Database** and obtains the contact details for the **Data provider** and constructs a URL with which to contact the **Data provider** in order to retrieve the requested data. The **Server** sends the data request to the **Data provider** and waits for a response.

Upon receipt of the response from the **Data provider** the **Server** formats the data received into the desired layout and returns the results to the **Browser.**

Alternative action 1

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Alternative action 2

No connection to the **Data provider** can be established within a specified time out period. The data request is abandoned and a message is displayed indicating the nature of the problem with a link back to the appropriate results browser page.

Action: Return button activated

Primary action

The **BU** activates the 'return' control after the full details have been displayed. The **Interface** determines the current page of the results and sends a query request specifying the page to the **Server.** Control then passes to the *Process query* action of the *Execute Query* Package.

Alternative action

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.

Action: Annotate

Primary action

The **BU** activates the 'Annotate' control after the full details have been displayed. The **Interface** spawns a new **browser** window passes control of the new window to the BioCASE annotation application. Details of the annotation process are outside the scope of this document.

Package - Help

Display General Help

Primary action

The **BU** activates the Help button on the top navigational bar of the BioCASE site. The **interface** spawns a new window in which static help pages for the interface are displayed relating to the currently displayed form in the **interface.**

Package - Terms & Conditions

Action: Display terms and conditions

Primary action

The **Server** receives a display terms and conditions request and returns a page displaying the site usage terms and conditions along with an option to accept or reject these terms.

Action: Accept terms and conditions

After reviewing the terms and conditions the **BU** activates the accept conditions control. The **Interface** sends and accept terms and conditions request to the **Server**. Upon receipt of the request the **Server** records the acceptance of the terms in the current session data and control passes to the *Display search form* action of the *Build Query* Package

Alternative action 1

The **BU** declines to accept the Terms and conditions. No further action is taken

Alternative action 2

No connection to the **Database** can be established. A message is displayed indicating the nature of the problem, apologising that the BioCASE service is currently unavailable.