Usability of the Swinburne University of Technology institutional repository: An expert review of the VITAL software

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**Executive Summary**

This report documents and explains the findings of an expert review (also known as heuristic analysis) of the Swinburne ARROW installation, also known as the Swinburne Research Bank. This review focused solely on the usability aspects of the software; though at this early stage there are many technical issues still to be resolved with the software these are not addressed here.

This report represents the expert opinions of its authors, and is not an exhaustive list of all the usability problems there may be in the VITAL software. This report should be used as a guideline for advancing better usability of the software until such time as users can be observed using the software.

While the VITAL interface was analysed to usability standards, the results are reported here under four main web usability criteria: Navigability, consistency, clarity, and simplicity.

**Navigability**
For the most part the VITAL interface provided excellent navigational cues to the user; including a link path and highlighting page selections in some cases. While some small improvements could be made, such as making the link path deeper in some places, and adding some extra highlighting, VITAL is reasonably usable in this area.

**Consistency**
There are a few inconsistencies in the presentation of information to the user that need to be addressed. Examples include the number of search results displayed by default, and the behaviour of the two buttons marked ‘Search’ in the advanced search page.

**Clarity**
For the most part the VITAL interface is very clear. With the search results lists though, the status of the system is not clear and could be tidied up. The advanced search page and the ‘Show All’ button could also be made clearer.

**Simplicity**
While the VITAL interface is very simple for the most part, there is quite a bit of language that is not simple, and will not be well suited to non-librarian users. There are also ways the item display page and the advanced search page could be made simpler.
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1. **Background**

In 2007 Swinburne University of Technology has received funding to assess and improve the usability of software related to the ARROW project. Usability, while important in any software product or website, is even more important in institutional repositories if they are to fulfil the stated goal of providing *easy* access to information.¹

The users of repository software can be divided into three groups, which are unlikely to be distinct, but which nonetheless have separate needs and usability concerns. The groups are:

- **Depositors**
  Depositors are the people who add documents or bibliographic information to the repository. This group’s usability needs are focused on how to get the information (documents and metadata) into the repository and change existing information (in the case of, for example, typographical errors). Depending on the workflow models, depositors may also approve or deny deposits that others have made. People likely to be in this group include librarians and authors.

- **Authors**
  Authors, while they may be in both of the other groups of users, have a specific set of needs of their own. Authors’ usability needs will centre on viewing and correcting their own publications, ensuring that publications are entered into the repository correctly, and controlling access to their work. In the age of the Research Quality Framework authors may also be interested in generating personal CVs and publication lists.

- **Information seekers**
  Information seekers’ usability needs are focused on searching and browsing the institutional repository, and boil down, essentially, to “how easy is it to find what I want?” Information seekers may not know exactly what they are looking for when they come to a repository, which is why browsing is an important function of a repository. There is no specific educational background or level of computing or information experience we can assume for information seekers; they may be anyone from a librarian tracking down a specific requested article, to a member of the public looking for information about some current affair.

While the needs of both authors and depositors are important, this study has been undertaken from the perspective of information seekers.

This study examined the current Swinburne University of Technology installation of VITAL, version 2.1.2.

2. **Methodology**

The analysis presented in this report is an expert review, also known as a heuristic analysis. An expert review involves a usability expert (or experts) evaluating software or web sites against known usability principles. In this case the site was stepped through in a structured manner and each kind of page was evaluated according to existing usability heuristics². Results here are reported under four

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¹ See the ARROW website – www.arrow.edu.au – for goals of the project.
² See for example http://www.useit.com/papers/heuristic/heuristic_list.html
headings (which cover most of the issues discovered in VITAL): Navigability, consistency, clarity and simplicity.

Expert review is particularly useful at this stage of VITAL’s development for two reasons:

1. The software is still under development, so there is scope to improve the usability of the site from a software perspective.
2. There are still significant technical problems with the VITAL software. While we recognise these problems are being resolved, at present they would be significant barriers to successful user evaluation of the software.

This review is not an attempt to address technical problems with the software, it is focused on usability. We realise that some of the issues raised here may not be software problems, but rather related to the information that is entered into the repository; nonetheless they are raised in this report because they affect the end users of this system; that is the information seekers.

3. Navigability

The first usability standard against which the VITAL software was evaluated is navigability. For a web based application navigability means that at all times the user knows where they are in the site, and knows how to get there they want to go. By and large, the VITAL software had excellent navigability, providing the user with lots of cues as to where they were.

3.1 Positive aspects of VITAL’s navigability

Particular things that VITAL has done well include:

- The link path (also known as breadcrumbs) (see Figure 1) on each and every page – this gives the user context as to where they are in the site, and helps them navigate backwards if they need to.
- Navigation tabs (see Figure 1) on each and every page. This allows the user to jump quickly between searching and browsing (which is common in information seeking), or to jump quickly to any area in the site.

Figure 1: Navigational aspects of VITAL
• The search box (see Figure 1) on every page – this acknowledges that one of the user’s primary tasks will be searching, and allows them to do so with ease. The ‘Show All’ button next to the search button is also an excellent idea, though the wording could be clearer (see section 4.2)
• The side navigation menu (see Figure 1) provided on every browsing page is useful as the highlighting allows users to see where they are within the browsing structures that are available to them.
• VITAL allows the ‘back’ button to function normally – this is very important in web navigability, as users are more likely to use the back button than any other approach.

3.2 Suggestions for improving VITAL’s navigability
Each of the features noted above could be improved slightly to make VITAL repositories in general and Swinburne’s repository in particular more usable.

The specific areas identified for improvement are:

1. Search box
   Many applications (web and non web) have the search box on the far right hand side of their pages. Examples of this include iTunes, ebay.com.au, Mozilla Firefox, and Microsoft Internet Explorer. Users are used to looking right for the search functionality, so perhaps this box would be better positioned to the far right of the navigation tabs.

2. Navigation tabs
   The navigation tabs are presently playing only one role in the VITAL interface, which is to allow users to navigate from place to place. These tabs could play another role as well, which is to act as an additional cue to tell users where they are within the site. The appropriate approach to this would be to highlight the tab for the page the user is currently using, such as the approach used in eBay (see figure 2 below):

   ![eBay navigation tabs](image)

   Figure 2: eBay is a good example of shaded tabs

   As this approach is familiar to users it would be a strong navigational cue and very likely to improve the usability of the site.

3. Link path
   While the link path provides some excellent cues to the user, there are two things that could be done to improve it:
   1. Moving it to the left and making it more accurately reflect where the user is in the site. Most web applications that use a link path do so on the left; examples include eBay, Wikipedia and the Australian Yellow Pages.

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4 See Jakob Nielsen’s top ten web design mistakes of 1999 for more comment on this: http://www.useit.com/alertbox/990530.html
5 For reasons why adhering to standards is a good idea, see Jakob Nielsen’s rules on good web design: http://www.useit.com/alertbox/9605.html
2. When browsing, the link path reflects Home>Browsing, but does not reflect the
category by which a person is browsing – this could be misleading to the user.

4. Side navigation menu
The side navigation menu is a standard feature of many websites, and the only
failing of the Swinburne VITAL install (and this is specific to the Swinburne site)
is that the highlight on mouseover is the same colour as the highlight to show
where in the site a person is. Ideally these colours should be different.

3. Consistency
It is important for usability of any application for the layout and the functionality to
be both internally consistent and externally consistent. Internal consistency means
that different areas of a system have similar layouts and icons, and behave in similar
ways. External consistency means that a program behaves in a way users would
expect based on their dealings with similar programs.

In this report most concerns with external consistency have been addressed in section
3.2, on navigability, because this is the way in which the user is most affected by less-
than-perfect external consistency within the VITAL software. This section deals with the internal consistency of the site

3.1 Positive aspects of VITAL’s internal consistency
For the most part vital handles internal consistency very well. Good features include
(but are not limited to):
- The inclusion of a search box on every page
- Similar page layout and colouring on every page
- For the most part words in the interface mean the same thing from one page to the
  next

3.2 Suggested improvements to VITAL’s consistency
VITAL has three main consistency problems. Two of these problems are to do with
the way advanced search results are displayed, and the last is to do with the advanced
search page. These problems are:

1. Default number of results displayed
The default number of search results to display from a basic search using the
search box at the top of the page is 25. The default number of results to display
using the advanced search facility is 10. Studies have shown that users rarely
change defaults when using search interfaces, so advanced searchers are likely to
leave the default number of results per page at 10. Studies have also shown that
users often do not read interfaces, so users may well not read the text that says
“results 1-10 of...”. This could potentially cause the user to believe there are
fewer results than there are if they are particularly used to the basic search.

6 See for example S. Jones, S. Cunningham, and R. McNab ‘An Analysis of Usage of a Digital Library’
ECDL 98, where users changed the number of results to appear on a page in only 2.5% of cases
7 See Steve Krug ‘Don’t Make Me Think: A Common Sense approach to Web Usability’ p45 “when I
look at most web pages, I am struck by the fact that most of the words I see are taking up space,
because no-one is ever going to read them...”
To resolve this issue, the default number of results for searches should be set to be the same number in advanced and basic search.

2. **Sort order of search results**
   The advanced search offers two options for ordering search results: A-z0-9 and 9-0z-A. This is inconsistent with the browsing areas of the site (they place numbers before ‘A’ in the alphabet). Sort order needs to be consistent within the site so that users will know whether they need to go the end of the alphabet for titles beginning with numbers, or whether they will be found at the beginning.

There were few popular, readily available examples of how things are sorted in other systems, though Amazon and Fishpond.com.au both sort with numbers first. To resolve this problem, one approach as to where to put the numbers in lexicographical order needs to be chosen and adhered to VITAL-wide.

3. **Different behaviour of two search buttons on the advanced search page**
   Many ‘advanced search’ pages have more than one search button, one near the top and one at the bottom. Examples include eBay and AltaVista. The concern here is that the Search at the top of VITAL’s interface, and the search at the bottom (see Figure 3) do different things – The search at the bottom does not search based on the criteria given by the user, despite traditional workflow being top to bottom.

This inconsistency is both internal (two buttons with the same text do different things) and external (not the same as other popular interfaces). This is a critical usability problem; it may lead the user to believe that the repository does not contain the information they need and thus abandon the system.

![Figure 3: Present advanced search](image)
While there is text explaining the search button at the top is the correct one to use, this text is unlikely to be read by users. There are boxes to separate areas on the screen, but three of those boxes are attached to search button 1, and only bottom-most box to button 2.

Suggested changes are diagrammed in Figure 4, below:

Figure 4: Suggested improvements to the search interface

The changes suggested are primarily for the purpose of distinguishing between the standard advanced search, and the collections search at the bottom. The changes are:

- Clearly separating the boxes around the advanced search and the collections search
- Changing the collections search button to read ‘Search Collections’
- Duplicating the ‘Search’ button in the advanced search section of the interface to accommodate user workflow (if they want a “simple” advanced search they will use the first button, if they want to get really specific the work through the whole for to the second button).

These changes make the advanced search both internally consistent (buttons marked ‘search’ now all do the same thing) and externally consistent (the two button advanced search is found in many other web applications, including eBay and Amazon).
4. Clarity

Clarity, in a usability sense, means that the user can tell what the system is doing and what it might be asking them for without looking too hard. Most of the time it is very easy for a user to tell what the system is doing and how they got the results they got. This is one of the VITAL interface’s strongest points.

There are only three areas in the site where a lack of clarity may confuse users: The advanced search page, the search results page, and the ‘Show All’ button. There are two clarity concerns on the advanced search page: The first is the duplication of the search button (see section 3.2 for an in depth discussion of this) and the second is the ‘Return Results Between’ section. The search results page does not clearly show that it is interactive, nor is search order clearly marked. The ‘Show All’ button does not reflect what it might be used for.

4.1 Positive aspects of VITAL’s clarity

- Retaining the search text in the search box after the user has performed their search – this helps the user know how they got the results they did, and is also a memory aid for what they have already searched.
- When the user is browsing showing them at all times what they are browsing by highlighting the side navigation menu
- Showing the user where they are in a set of search results or in a browsing structure by changing the font colour and removing the hyperlink of the page they are on.

This list just contains a few highlights; generally speaking this is not an area where VITAL needs much work.

4.2 Suggestions for improving VITAL’s clarity

There are only three areas that need clarification in the VITAL interface. The first is the advanced search interface, for which most of the problems have been discussed at length in section 3.2, so only one small issue will be touched on here. The second issue is the way search results are displayed, in particular the interactive elements of the search results table. The third is the ‘Show All’ button. These issues are discussed at more length below:

1. Improvement for advanced search

In the advanced search interface one of the options users have is to limit the results returned by a timeframe. This is done by entering dates into a section of the interface shown in figure 5 below:

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Return Results Between   And
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**Figure 5: Limit search by date**

It may be unclear to users what they are being asked for in this case; to improve this we could make the text boxes drop down boxes with a list of years to select from, or even change the text to ‘Return results between the years __________ and __________’.
2. Improvement of the search results table

The search results table is excellent in that it uses positive transfer (where people can ‘know’ things about a system based in its similarity to another system) from email. Headings in the search results table are highlighted and clickable in much the same way as, for example, ‘From’, ‘Date’ and ‘Subject’ fields are in many email clients.

There are two problems with this table (see Figure 6 below): The first issue is that it is not immediately obvious that the headings are interactive. The second issue is that the indication of sort attribute is very subtle (the grey shading was noticed by neither expert in initial testing) and there is no indication as to which direction items are being sorted in (ascending or descending). Users rarely look beyond the first couple of pages of search results. This means that not knowing how search results are sorted could mean users miss relevant search results simply because they are not where the user expects to find them. Not knowing the search results can be easily reordered could cause users to miss search results because they do not want to have to browse many pages of results to find the thing they are looking for.

This is a relatively simple problem to fix, however – it can be fixed by extending the email metaphor and adding a small “arrow” or triangle next to the metadata, pointing up for searching in ascending order, and down for descending order. This would mean, for example that a descending search by title would look something like Figure 7 below:

Figure 6: Present search results table

<table>
<thead>
<tr>
<th>Title</th>
<th>Author/Creator</th>
<th>Date</th>
<th>Type</th>
<th>Full Text</th>
<th>Peer Reviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanics</td>
<td>Clarke, Stephen R.; and others...</td>
<td>1972</td>
<td>Book</td>
<td>—</td>
<td>✓</td>
</tr>
<tr>
<td>Another look at the 1985/86 Sheffield Shield competition cricket results</td>
<td>Clarke, Stephen R.</td>
<td>1986</td>
<td>Journal article</td>
<td>—</td>
<td>✓</td>
</tr>
</tbody>
</table>

Figure 7: Suggested improvement for search results table

The small arrow to the right of the title column shows that this set of results is sorted in descending order, by title, and clearly lets the user know they can click on the column headers to search by other attributes.

3. The ‘Show All’ button

It is unclear what the ‘Show All’ button does. Neither the position of the button nor the text on it implies the useful function that it performs.

There are a few ways to resolve this issue:

- Clarify the text to something along the lines of ‘Show All Documents’
- Clarify the text and make this button a navigation tab rather than a button.
- Remove the button altogether, and simply rely on the user to use the browse function when they want to see all the documents.

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Removing the button altogether is probably the simplest option, but it would reduce the flexibility of the interface which is generally not good for usability. Making this a navigation tab rather than a button would reduce its prominence and mean that it was less likely to be used. While some user testing would be required to specify exactly what the best option is, the first recommendation is easy to implement and would certainly provide some benefit.

5. Simplicity

Simplicity, in usability terms is about how easy it is for the user to do what they need to do. Common tasks should easy to get to and easy to do, and interfaces should follow the user’s workflows. Text should be in the user’s language, and well written for reading online.

5.1 Positive aspects of VITAL’s simplicity

- Presenting the search box on every page supports the user in a common task.
- Basic search from the search box defaults to searching all fields; this supports the user in a common task.
- VITAL presents little unnecessary text, and where text is presented in large chunks (for example search results) it is well formatted for readability.

5.2 Suggestions for improving VITAL’s simplicity

There are a couple of areas where VITAL fails the user on the simplicity front. The first area, and this is fairly pervasive, is that VITAL does not use the language of the average user. Areas where this is particularly true include:

1. The item display page

Figure 8: The Item Display Page
In the document view page, metadata is presented using the native Dublin Core metadata tags. Most users do not know what the tags mean, and are unlikely to understand the idea of a creator or a record ID. Library terminology, which is a technical terminology, should not be used in a non-librarian specific user interface. 

Suggested text replacements include ‘Resource Type’ with ‘Kind of document (e.g. book)’, removing the internal record ID altogether, and changing the name of the other record ID to be something like ‘Identifying URL’.

To really get to the heart of this, usability testing would be needed with a fairly sizeable population of likely users to see what their preference would be.

Another area where the document view page is not as good as it could be is the layout. Quite a bit of screen real estate is wasted at the top of the page providing a link to the full text of a document, if it is available, and there is a table entry for “full text” which merely displays a tick or a cross. The table at the top may well be missed by users as a “banner” or form of advertising, and then when they found the entry in the table they may well not be able to find the link to the full text. In this case it would be best to remove the full text banner and place a link to the full text in the table (see Figure 9 below).

Figure 9: Suggested changes for the Item Display page

2. The advanced search page
On the advanced search page, users have the option of searching by keyword, and combining keywords using binary operators AND, OR and NOT. These are listed simply as ‘And’, ‘Or’ and ‘Not’. Studies have consistently shown that

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9 Chris Jasek of Elsevier’s User Centred Design Group comments on this in the Library Connect Publication ‘How to Design Library Websites to Maximise Usability’.

10 Nielsen comments on “banner blindness” in Alertbox: http://www.useit.com/alertbox/20030428.html
users generally do not understand Boolean operators\textsuperscript{11}, and that a little help can go a long way. Replacing ‘Not’ with ‘And not’ would make this part of the interface much clearer.

3. Some items in the navigation tabs
Two of the navigation tabs are labelled in a way that a majority of users would find misleading. The help link leads to something that is more of a ‘Contact’ page, and the ‘About’ page leads to a frequently asked questions page. Testing user to see what their preferred terminology is, and renaming those pages would improve the simplicity of the VITAL interface.

4. The Subject browsing index
The subject browsing index is an excellent inclusion; however there is a lot of material in it that users will neither understand nor be able to find readily—that is all the material that is listed with a leading subject number (perhaps Dewey decimal numbers?). These subject headings are not relisted under their alphabetical titles. This may mean users without the library background to know the Dewey numbers of the subject they are investigating may miss useful subject classifications and not find the information they are looking for. Suggested solutions include simply not including the leading numbers, or alternatively including these subject headings a second time under their alphabetical listings.

I realise that this may be a data entry issue, or an institutional concern, but nonetheless from a user perspective it should be addressed.

6. Other Issues
The VITAL interface has a couple of other issues that do not fit into the categories addressed above. These issues are page load time, and cross browser testing.

6.1 Page load time
While browsing the entire collection of 4376 documents in the Swinburne repository, it takes approximately 21 seconds for each page to load over a broadband internet connection (meaning that from a slow connection the pages will take a very long time to load). While the underlying problem here is a technical problem, this is a very strong user concern as well; research as shown users are very impatient and do not like to wait for pages to load\textsuperscript{12}.

There are two suggestions for ameliorating this problem. The gold standard would be to reduce the wait time to within acceptable levels, however, it is understood that this simply may not be feasible. The second option is to introduce some indication to let users know how long they are likely to have to wait, as it has been shown that this can hold users attention longer without frustration or page abandonment\textsuperscript{13}.

\textsuperscript{12} Users’ navigation is interrupted by more than a one second wait for a page (http://www.useit.com/alertbox/personal_t1.html), and users become significantly frustrated after only six seconds (http://www.redgate.com/products/ants_load/technical_papers/understanding_testing_results.htm).
6.2 Cross browser testing

It was noticed during testing of the website that the advanced search page, while appearing neat and tidy in Internet Explorer, looked fairly untidy and unappealing in Mozilla Firefox (see Figure 10).

Figure 10: The advanced search page as it appears in Mozilla Firefox 2.0.0.1 (left) and Microsoft Internet Explorer 6.0 (right)

Insofar as is reasonably possible, web applications should provide the same experience to users regardless of their browser. However, it is recognised that there are many browsers, and that perhaps it is unrealistic to provide the best possible experience to everybody. Nonetheless, given that Firefox usage statistics range from a minimum of 11% to a maximum of 29% it is perhaps worth testing on at least Firefox, and possibly Opera and Safari as well (both report around 1-3% usage).

7. Conclusions

This report describes the result of an expert review of the VITAL software from a usability perspective. VITAL is reviewed from the perspective of information seekers, whose main goal is to find information.

It was discovered that VITAL has some problems in the areas of speed, navigability, simplicity and clarity, which, if they were resolved, could make for a more enjoyable and more successful user experience of VITAL.

That said, however, VITAL is generally quite good, and offers users many useful features. The work suggested here for the most part would be improving the user experience, rather than fixing things that are likely to cause the user to fail in their task (the one exception being the search buttons on the advanced search page).

15 http://www.w3schools.com/browsers/browsers_stats.asp Browser statistics for November 2006 from w3schools, who recognise that their numbers may be skewed.