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OUTCOME EVALUATION SURVEY FOR e-SOCIETY DEVELOPMENT INITIATIVE

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SURVEY FINAL REPORT (ORIGINAL) VOLUME III - ASSESSMENT OF CONTENT OF SELECTED E-SDI PROJECTS

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Table of Content

Volume III: Assessment of Content of Selected e-SDI Projects

List of Tables and Figures

1. Background

Among several initiatives taken by the Information and Communication Agency (ICTA) of Sri Lanka the "e-Society Development Initiative (ESDI)" is one of the key components belonging to the e-Sri Lanka Development Programme. The programme is presently implemented with financial support from the World Bank. The overall goals of the e-Society Development Initiative include facilitation of access to ICT amongst the most vulnerable groups in the country, assisting in closing the development divide between urban and rural areas and helping the integration of post conflict regions, promotion of greater local content in Sinhalese and Tamil languages, and the piloting of innovative applications of ICT to improve the quality of life.

The expected results and outcomes of the eSDI initiatives includes provision of ICT services to meet priority needs of specific communities, enabling local content local language support and radio programmes, facilitating training opportunities for women, youth and the provision of a communication platform for cultural dialog. Further to these the project also expects to develop social entrepreneurship opportunities for local communities and to utilize community capacity to implement projects that meet the local needs. Through the above outcomes the ESDI project aims to provide the following benefits.

- Increased awareness among disadvantaged groups on how ICT can benefit lives;
- Increased participation at the grassroots level in developing villages and rural localities;
- Development of partnerships between communities, civil society, public and private sectors;
- Increased economic opportunity and equity through wide use of ICT in agriculture, health, education ;
- Empowerment of women and youth;
- Sustainability and potential for scaling-up and replication.

2. Results of the assessment

Conceptual Framework

The Internet and World Wide Web (WEB) has undoubtedly changed the common ways that information is conveyed and disseminated to the masses. The WEB today has become a tool where most of the people can get up to date information easily from Internet from anywhere and anytime irrespective of age, gender, cultural and language barriers. It is also determined as a source of information without borders as most of the contents are accessible beyond the geographical barriers that other traditional information delivery mechanisms are faced with. These Web sites also become an important tool that the various organizations use to market their institution to prospective customers and, to provide their information and services available on-line. The use of the Web for these purposes have become such popular in the recent past that some analysis claims it to be far effective reaching the masses compared to other types of print and electronic media. In addition to being online and geographically non-constrained, the web also facilitates the integration of multiple medium and modes of communication. Unlike most other types of electronic communication mediums that concentrate only on one direction of information flows and activities (i.e. passive dissemination of information) the web facilitates two way interaction as well as integration with other interactive tools such the social networking real-time forums etc. However make these tools more functional, they must be accessible and usable to all users irrespective of their cultural, language, physical abilities and other differences.

During early days web was a passive platform that facilitated mostly the text based content with few graphics and limited interactivity. However some of the modern technological developments such as the popularity in Graphical User Interface (GUI) based operating

systems, availability of higher connectivity speeds including broadband access, development in the device user interfaces have resulted the web platform to be more interactive and rich in media support. This has lead to the standardization of Web version 2.0 (commonly referred to as Web 2.0) that provide the path for newer generation of web sites that are referred to as "Rich Internet Applications (RIA)".

A Rich Internet Application (RIA) is a Web application that has many of the characteristics of desktop application software. These applications in general extend the normal capabilities of a standard web browser and therefore often require a site-specific browser, via browser plug-in, independent sandboxes, extensive use of JavaScript, or virtual machines. Adobe Flash, JavaFX, and Microsoft Silverlight are currently the three most common platforms. In order to use full capabilities of a RIA uses generally need to install a software framework using the computer's operating system before launching the application, which typically downloads, updates, verifies and executes the RIA. This is the main differentiator from other techniques such as JavaScript-based alternatives like Ajax that use built-in browser functionality to implement comparable interfaces.

Web site usability

For many authors, the term "web site usability" refers to the assessment of features that makes a website accessible and usable to people with disabilities. This in general include the use of alternate delivery media for the same content (i.e. text annotations, close captions etc.,) use of scalable fonts and less dependency on colour for information delivery. These assessments however are not concerned on the practical usability of the website to general users which is more dependent on the accuracy, relevance, accessibility and presentation of the information content included in the website.

There are also guidelines and frameworks that attempt to define web site usability from a more general perspective that is applicable to all types of users. The most generic and commonly used form of such guidelines includes the "Web Content Accessibility Guidelines (WCAG)" (Version 2.0, published on December 2008) of the World Wide Web Consortium (W3C). This framework describes guidelines to improve web accessibility based on the following four principles.

Sri Lankan Context

Sri Lanka had a relatively slow growth in the penetration on the Internet till the beginning of the new millennium. By early 2000 there were only few locally registered domain names with most of them being the local registrations of international brands. Content of local nature were hardly available and especially content on local languages were almost nonexistent except for few websites maintained by some enthusiastic users. Among several contributory factors the non availability of local content one important reason was the absence of standards and support for local languages in common software platforms, operating systems and web browsers. Even the few websites that were supporting local languages were based on non-standard fonts which limited their usage on technical grounds to few operating systems and web browsers. The non availability of local language support also affected the penetration of Internet and computers among the society, especially in less privileged areas. The contributory factors include the low computer ownership among middle and low income families and the higher cost of data communication charges.

During the early years of the new millennium the country had a rapid expansion of its Internet infrastructure and support services. Several telecommunication operators started to offer broadband and wireless connectivity at affordable prices. The cost of personal computers and related mobile devices went down making the more affordable society. However, in-spite of these development, the availability of local and localized content.

Reasons behind this were the technical difficulties described in the previous chapter and the absence of a critical mass to support such development at commercial levels.

Since its establishment in early years of the new millennium, the Information and Communication Agency (ICTA) has become the catalyst for making the Internet and multimedia content more close and affordable to the society, especially the people at grass root levels and less privileged. It took the initiative to bring standard local language support by scandalizing the Unicode based local language fonts and by building such support to operating systems, browsers and common applications. Initiatives such as Nanasala took the Internet to remote areas and grass root levels. All these made a demand for the local language content which too were supported by the same agency through various grant schemes.

The efforts placed by the ICTA and other agencies towards making localized content on Internet and other multimedia platforms have only a very short history. Most of the initiative are still in their early stages and will take several more years to reach their maturity. As such the results presented in this evaluation must also consider this background in comparing them with the general situation in the rest of the world.

1 **Perceivable** - Information and user interface components must be presentable to users in ways they can be perceived irrespective of the differences and capabilities of the viewing platforms. These include provision of text alternatives to non text based content (such as images, videos etc.), Provisioning of time based afterlives such as closed captions and sign language interpretations for video and audio content, making the content layouts adaptable and displayed on different viewing platforms without losing their embedded information structure and making it easier for users to separate the information content from other decorative elements such as the background and colour.

2 **Operable** - User interface components and navigation must be operable. The operable principles include guidelines to make information retrieval and navigation of the website independent of devices and capabilities of the users. In general this includes providing keyboard alternatives for navigation, allowing the users to retrieve information at their own phase and speed and supporting graceful and seamless navigation throughout the website.

3 **Understandable** - Information and the operation of user interface must be understandable for all users. The understandable principle says that the web content, language and writing style must be understandable to all users irrespective of their education and cultural backgrounds and describes guidelines for provisioning of localized content, Making the web pages operate in a predictable manner and assisting users to correct mistakes in interactive web sites.

4 **Robust** - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies. The robustness of a website is described in terms of its capability in seamlessly operating across different types of user agents (both human and machine based) for retrieval if information integration with other services including assistive technologies for users with different capabilities.

Compared to general web content, websites that are society oriented (i.e. website that are aimed at providing information and knowledge to the society and masses opposed to those aimed at making a profit by conducting online business) require a more streamlined and focused approach in defining their usability frameworks and guidelines. In general these websites are focused more on providing accurate and timely valid information to the masses,

providing government services as e-transactions to the citizens and getting the user involvement through e-feedback channels. These services must be accessible to all irrespective of their capability, education levels and cultural / language background and essentially must contribute towards bridging the digital divide rather than widening. For developing countries technical aspects such as the low speed of connectivity to Internet, lower capabilities and capacity of the access devices and the low IT literacy levels of the users must also be accounted. In general the overall usability of the website must be evaluated from different dimensions as follows.

1 **Page layouts and consistency**
An assessment on the design and layout structure of pages to determine how the content would appear in manner that it will be easy to read and act upon. This dimension also covers the degree of consistency in presentation of information throughout the website and typically is based on the use of a master template that defines the location and layout of the key components such as navigation bars, link to home page, help and assistance, use of proper styles for headings, sub headings and typefaces etc.

2 Site navigation
An assessment on how site's navigation bars provide users with the information they need to understand, where they are and where they can go to. Measures how the links stand out and are understood by the users. Include assessment of basic design considerations in common navigational elements like "breadcrumb trails", tabs and "in-page contents lists".

3 Content writing and presentation
Assessment of the style used in writing content so that it becomes appropriate for the Web and can be read and understood quickly and easily by your audience. Additional concerns of this dimension are the accuracy and relevance of the content to the site, use of multi-lingual options and the use of non-text based content such as images, graphics and animation in appropriately for the effective presentation of information.

4 Content elements and supportive tools
Asses the appropriate use of elements such as portable documents, images, audio, video and animations, in the correct format for viewing through different platforms / audiences and their ability to communicate site's intended message quickly, clearly and with good accessibility.

5 Forms and interactive content
Asses on the design and layout of basic forms (if used in the website) so that they are easy to understand and fill out. In addition the measures taken to minimize the potential errors made by the users in filling out such forms and the tools used to assist in fixing such errors as quick and easy as possible are also considered.

6 Information search facilities
Asses the way that search facilities are provided within the site and the presentation of search results to the user.

Guidelines for Sri Lankan e-government websites are specified in the document titled ***"Web Standards for Developing Government Website of Sri Lanka" published by the Information and Communication Technology Agency (ICTA)of Sri Lanka***. This is the only localized document available in the country for publishing on the Internet and provides a series of broad based guidelines for the web layout and content design that are parallel to the W3C Web Accessibility Guidelines. In addition the document also specifies the local

standards for several other dimensions such as the proper use of domain names, contact information, multiple language support etc.

3. Methodology

3.1 Population and sample selection

The population of web content forwarded for the evaluation included a list of 35 separate websites under 13 different categories. However initial evaluation showed that not all websites were operational / accessible (as at 20th Dec 2011). A summary of the websites under different categories and their availability is presented in Table 1 below.

Table 1: List of websites forwarded for evaluation and site availability

Category	Number of listed web sites	Number of available websites
Agriculture	3	3
Agriculture Trade	2	2
General Trade	3	1
Dairy industry	1	1
Archaeological/ Traditional content	4	3
District information	1	1
Communications /IT	2	2
Educational	9	5
Health	5	4
Job bank	2	1
SME industry	1	1
Elderly / Disable support	1	1
Women	1	1
Total	**35**	**26**

Out of the 35 web sites considered for evaluation only 74% were available and accessible through the URLs provided. Non available sites (9 in total) included two sites with a valid URL but re-directed to a site having content with no relevance to the stated category or objectives. The final evaluation therefore was carried on 26 different websites under 10 different categories. Furthermore, due to the limited number of websites available the entire population was considered during the evaluation rather than a selected sample of web sites. These projects have been supported under four different grant schemes by the Information and Communication Agency of Sri Lanka (ICTA). These schemes include the following.

- Community Assistant Program (CAP)
- Partnership Assistant Programme (PAP)
- Replication Assistant Programme (RAP)
- Sustainability Grants (sCAP)

Each grant scheme has different objectives ranging from facilitating ICT initiative to extending or supporting previously completed successful projects. The CAP scheme is intended to help rural and disadvantaged communities by means of financing and implementing projects aimed at improving their daily lives through the use of ICT. The PAP on the other hand seeks to encourage and facilitate the development and deployment of innovative ICT applications that would impact on disadvantaged communities. Originating from a recommendation of eSDI Evaluation Study - 2007, RAP is being implemented from end of 2008 to replicate successful initiatives under CAP and PAP beyond the communities in which they were piloted. Under sCAP, the deserving CAP projects are being provided with support to guide them to achieve sustainability. A summary of projects that were forwarded

for evaluation in the study and their availability under different categories is presented below in Table 2.

Table 2: Summary of projects under different grant schemes

Category	Number of listed web sites	Number of available websites
CAP	11	6
PAP	16	15
RAP	1	1
sCAP	4	4
Un specified (No category given)	3	0
Total	**35**	**26**

Content were also available in two different modes as online (web based and hosted on Internet) and offline (CD/DVD based). Due to the differences in the nature and presentation of this material from the view point of assessing usability in Rich Media Content, the two types are addresses under different schemes in this report.

3.2 Dimensions of usability measurements

The initial framework for the website assessment was developed using the guidelines provided in the "W3C Web Accessibility Guidelines", the "COI Usability Toolkit" and the "Web Developer Standards" of the Information and Communication Agency of Sri Lanka. Initial framework of then tested, further developed and validated using a pilot study involving a set of 30 local e-government websites selected on a random basis. The final framework used forth evaluation consisted 18 parameter measurements that spread over 5 major dimensions. A description of these dimensions and measurements is illustrated below in Table 3.

Table 3 : Major dimensions and measurement parameters used in assessment framework

Primary Dimension	Measurement and Description
M1 Layout and appearance	**M1.a Layout consistency** *Measurement of overall consistency in page layout across multiple pages including the presence of important components (navigation bars, home page links, help links etc.) within the page layout.*
	M1.b Page utilization *Measurement on the extent of space utilization within the page layout for presentation of informative content.*
	M1.c Layout optimization *Optimal use of page space within the bounds of the display resolution.*
	M1.d Non-interfering decorative elements *Measurement of the extent of interference caused by decorative elements (such as backgrounds, borders, banners etc.) in the effective presentation of content elements.*
M2 Site Navigation	**M2.a Navigation bars**

Primary Dimension	Measurement and Description
	Measurement in the effectiveness, appropriateness and consistency in the use of navigational components (such as menu bars, navigation icon / image maps, breadcrumb bars, popup menus etc.) within the website.
	M2.b Home page link Availability of direct navigation to the root page from different locations / pages with the website.
	M2.c Current page position *Display of current page position within the navigation structure of the website relative to the root page, allowing the user to determine where he is and where he needs to go.*
	M2.d Vertical and lateral navigation *Measurement of the extent of easiness to the user in navigating vertically (to a different page / topic) and horizontally (different topic / section on the same page) within the website.*
	M2.e Active link visibility *Measurement of the display prominence given and to active hyperlinks and their display differentiation from content and inactive links.*
M3 Content and accuracy	**M3.a Content availability** *Measurement of the availability in appropriate content within the specified content areas of the web page across the site*
	M3.b Localization *Extent of the availability of page content, navigational components and other structural elements in all three languages, English, Sinhala and Tamil.*
	M3.c Last update date *Display of the last update date of the website.*
	M3.d Relevance *Measurement of the relevance of the content to the title and expectations of the web site / page.*
	M3.e Non textual elements

Primary Dimension	Measurement and Description
	Extent in the use of appropriate non-textual elements such as graphs, images, animations etc to present page content.
M4 Content Elements	**M4.a Use of content elements** *Measurement of the appropriate use of layout element (tables, tab sheets, bulleted lists etc) and media content (video, audio and animations) and portable formatted documents (PDF files) within the website for presentation of data and information.*
	M4.b Page performance *Measurement on the negative effect of content elements (compared to HTML /TEXT) on the loading and transition time of the web page.*
	M4.c Page Loading Time *Time taken to download and display all elements and contents of a selected web page. Test carried with respect to average connection speed of 64kbps bandwidth.*
M5 Other factors	**M5.a Email addresses** *Availability of contact email addresses within the web site and the use of official domain names in the email addresses.*
	M5.b External links *Extents of appropriate and relevant offsite (external) hyperlinks provided to the user from the website.*

3.3 Measurement and assessment criteria

All measurements except item M3.c and item M5.a described in Table 3 above, required a qualitative assessment criteria. Therefore a five point Likert scale was used to asses these measurements. For item M3.c which required a binary assessment a two point approximate of the Likert scale assessment was used in order to maintain uniformity with the other parameters. Similarly for item M5.a a 3 point approximate of the Likert scale was deployed.

Assessment of individual measurement scores according to the Likert scale was performed by five different evaluators working independently. Thereafter the measurements were grouped horizontally (i.e. on the basis of same parameter across all websites) to compute the assessment distribution and the related statistics. Additionally the measurements were also averaged vertically (i.e. different parameters of the same website) based on their major dimension in order to compute the Dimension score and thereafter were groped horizontally compute the distribution and statistics across the websites. For vertical averaging only those measurement parameters assessed on a 5 point Likert scale were used.

3.4 Presentation of Survey Findings

Due to the small and limited number of web sites available in each of the categories as presented in Table 1 , different website categories were not considered for presentation of the survey results. Instead, the entire population was considered a single group with 20 web sites. Measurements are summarized horizontally for each of the parameter measured. Findings are presented separately for each measurement parameter. A vertical score for each dimension based on the parameters belonging to the dimension is also computed and presented as an overall scale for the dimension of usability.

4. Survey Findings

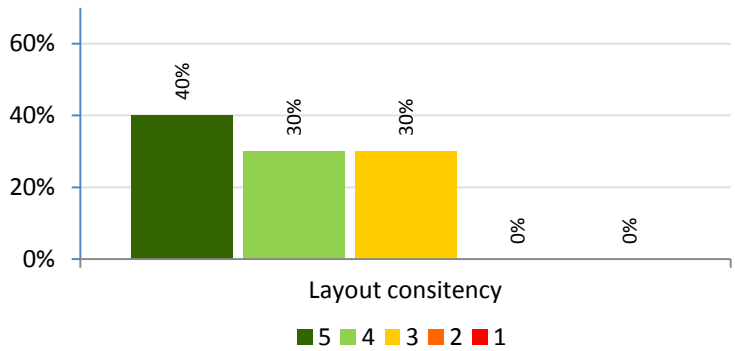
4.1. Layout and Appearance of the Website

Assessment was made on the design and layout structure of pages to determine how the content would appear in manner that it will be easy to read and act upon. Measurements were included to cover the degree of consistency in presentation of information and major page components throughout the website.

4.1.1 Layout consistency

Measurement of overall consistency in page layout across multiple pages including the presence of important components (navigation bars, home page links, help links etc.) within the page layout. The following Likert Scale was used in the assessment.

Score	Description
5	The layout is consistent through all the pages in the website. Typically based on a master page template that determine the appearance and placement of major page components
4	Major components of the website such as navigational aids, help, search links and the primary layout are consistent but the content areas has some degree of variability
3	All pages have a uniform overall structure but theme components such as backgrounds, colour schemes and font styles are not consistent
2	Significant inconstancies are observed on major components across the pages of the website
1	Different pages of the website do not show any consistency



Indicator	Mean	Std. Div
Layout Consistency	4.1	0.85

Figure 1 : Assessment of layout consistency in websites

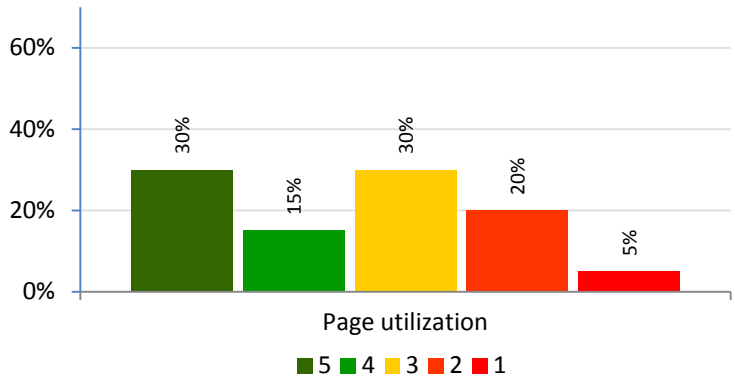
It was observed that majority on the website that maintain significant level of consistency in page layout and appearance used a common master template that determined the location, presentation and attributes of major page components through the site. Most of these sites

were using either a common layout template or a content management system for dissemination and presentation of information. Some websites consisted of multiple popup browser windows having different layout templates. However within such popup windows a generally consistency on the layout was observed. On the other hand those scored poorly was based on ad-hoc pages and most of them included pages developed at different times and even some opening on separate browser window. The following Likert Scale was used for the assessment.

4.1.2 Page utilization

Measurement on the extent of space utilization within the page layout for presentation of informative content. Asses based on the extent of page space under common screen resolution of 1024 x768 pixels being used for presentation of page content compared to the space allocated for non-content based elements and decorative components. The following Likert Scale was used in the assessment.

Score	Description
5	Page space is optimally utilized for content with minimum space allocated for non-informative and decorative elements
4	Most of the [age space is consumed by informative content and rest of the page is allocated for important structural elements such as page links, navigational components etc.
3	Moderate amount of page space is allocated for informative content. Among the non informative space, a significant portion include structural components such as navigation aids, menus, image maps etc.
2	A significant portion of the page is consumed by the background and non informative components
1	Page on loading is almost utilized by the background, decorative and non-informative content



Indicator	Mean	Std. Div
Page utilization	3.45	1.28

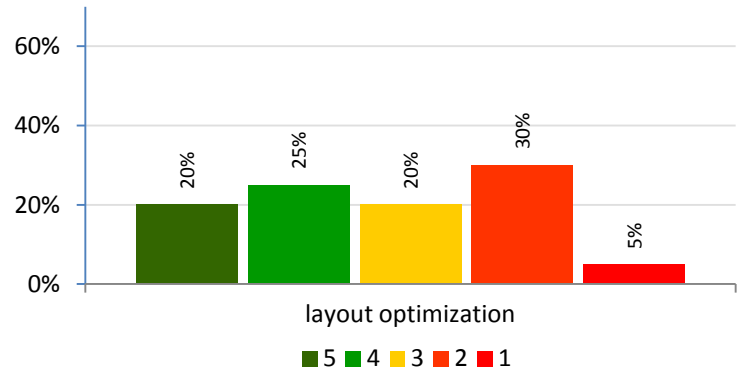
Figure 2: Assessment of page utilization in websites

Most of the web sites evaluated had more than 50% of the screen space occupied by a decorative banner or with non-functional content. In some sites additional space on the left column was allocated for a navigational menu leaving only less than 40% of the page space for useful content. Consequently the page content extended beyond the bottom scroll margin thereby affecting the extent of useful content present within the first loading of the web page. Many websites had the opportunity to further improve their layout optimization while retaining all the elements, including non functional decorative elements within the page.

4.1.3 Layout optimization

The optimal use of page space within the bounds of the common display resolution of 1024x768 pixels. Measurement was primarily based on the use of appropriate layout elements to maximize the utilization of horizontal space and extent that the user had to scroll 9in horizontal and vertical direction) retrieve the required information once the page is loaded with its initial configuration. The following Likert Scale was used for the assessment.

Score	Description
5	All most all required information is included within the page boundaries. User can retrieve all required information without using horizontal and vertical scroll bars.
4	Majority of required information is available within the screen boundaries. Information may continue beyond the vertical boundary requiring a minor extent of scrolling on vertical direction.
3	All required information can be retrieved within vertical scrolling of one page distance. Intra-page hyperlinks are provided to facilitate into navigation into content that are below the vertical page boundary.
2	Significant extent of scrolling (horizontal / vertical) is required to retrieve important information. No navigational aids are provided to support intra-page navigation.
1	Majority of the required information is placed beyond the page boundaries. User is always required to use scroll in order to retrieve required information



Indicator	Mean	Std. Div
Ministries	3.25	1.25

Figure 3 : Assessment of layout optimization in websites

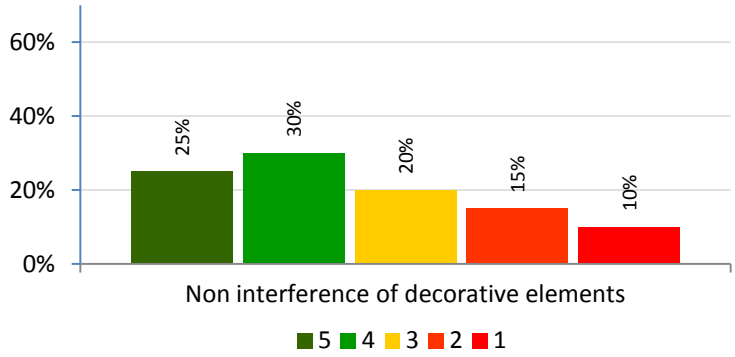
It must be noted that all websites except one evaluated required some level of scrolling on the vertical direction. However some of these sites still scored high for the measurement since the content below the bottom boundary of the web page consisted of decorative elements such as non-informative footers and boundary elements. In some websites, un-used space was available within the displayed space which could have been used to re-organize the information below the scroll margin into initially visible page space.

4.1.4 Non-interfering decorative elements

Measurement of the extent of interference caused by decorative elements in the effective presentation of content elements. Assessed based on the extent and appropriate use of decorative elements such as borders, background fills and images, contrast elements, page banners and menu components etc. using the Likert Scale described below.

Score	Description
5	Decorative elements are used only in appropriate situation and do not interfere with the presentation of informative content.

Score	Description
4	Minimum amount of decorative elements are present and do not interfere with content to any noticeable extent.
3	Moderate extent of decorative elements are present and interfere only in minor portion of the pages in the website
2	Decorative elements are present on all pages with considerable interference with informative content.
1	Decorative elements are used extensively and interfere to an extent such the retrieval information is extremely difficult



Indicator	Mean	Std. Div
Use of non interfering decorative elements	3.45	1.32

Figure 4 : Assessment of non interference of decorative elements in websites

Several websites scored relatively low in this measurement due to the improper selection of colour schemes. These websites had either dark coloured characters on darker backgrounds or light colored text in brighter backgrounds. This significantly reduced the text contrast and as a result affects the readability of the page due to interference from decorative elements. While the most prominent interfering element being the page background, a considerable interference was also observed due to other functional components such as menus, text boxes etc.

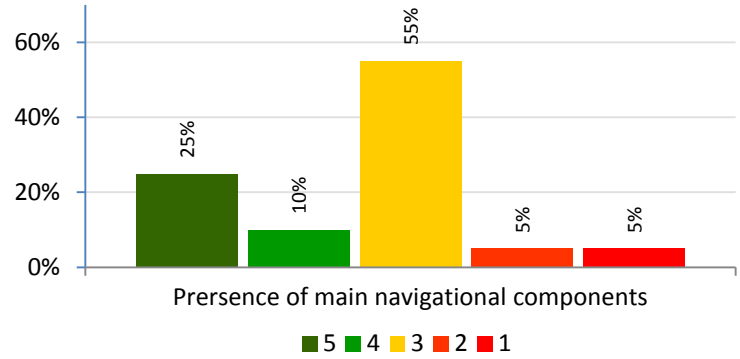
4.2. Website Navigation

An assessment was made on how site's navigation components provide links to users with the information they can understand, where they are and where they can go to. Measurements were made on the use of appropriate types of navigational components, how the links stand out and are understood by the users.

4.2.1 Navigation bars

Measure the effectiveness, appropriateness and consistency in the use of navigational components (such as menu bars, navigation icon / image maps, breadcrumb bars, popup menus etc.) within the website. Scores were assigned based on the following Likert Scale.

Score	Description
5	Proper navigational components are used such a way that users find it convenient to locate or navigate to the required information within the web page.
4	Proper navigational structure is present in majority of the web pages.
3	Home page provides easy navigation to other pages. Some difficulties exist in subsequent pages.
2	Navigational components are present in pages but finding appropriate link to required information is difficult for the user
1	Site navigation is extremely difficult



Indicator	Mean	Std. Div
Main navigational component	3.45	1.09

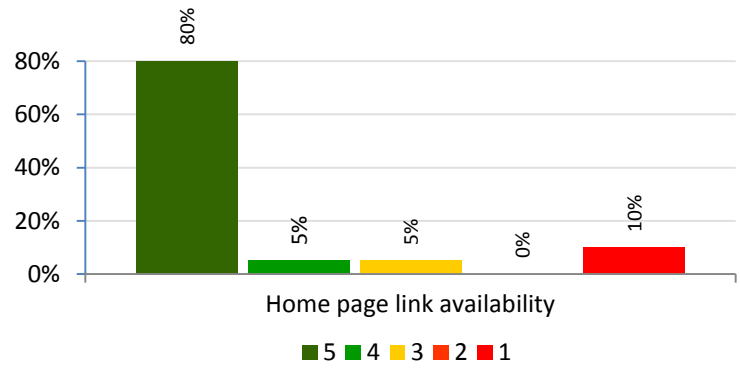
Figure 5 : Assessment on the presence of main navigational components in websites

In several websites evaluated although the main navigational elements were present they lacked the required prominence among the other page elements present. Several sites also supported only forward navigation and lateral and reverse navigation was difficult. On sites that were significantly based on multiple pop ups, reverse navigation was not possible and the lateral navigation too was limited to partial support.

4.2.2 Home page link

Availability of direct navigation to the root page from different locations / pages with the website. Evaluated based on the presence of a hyperlink to the root (home) page at a prominent and consistent location on each web page of the site. Scores were assigned based on the following Likert Scale.

Score	Description
5	A direct hyperlink to the home page is present on a prominent and consistent all pages of the website.
4	A direct link to the root page is present but not in a prominent nor consistent location of the web page.
3	An indirect link (through a menu button or back button) is present from subsequent pages to the home page
2	Hyperlink (direct or indirect) is present only in few pages.
1	Hyperlink to home page is not present on subsequent pages.



Indicator	Mean	Std. Div
Home Page link availability	4.45	1.28

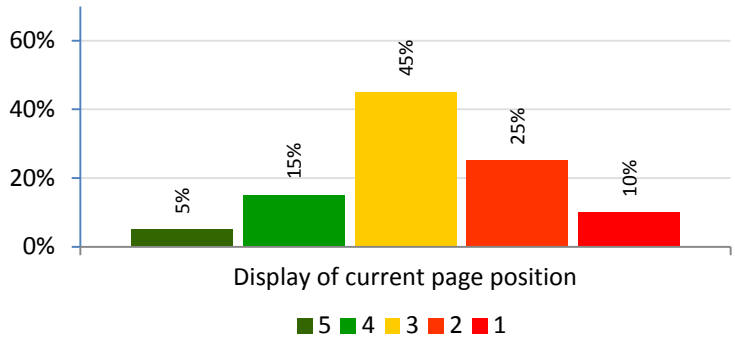
Figure 6 : Assessment of the availability of Home Page link in websites

A significant portion of the websites had a consistent link to the home page from the subsequent pages. However on sites based on popup windows the link's functionality was limited to the sub-section root page rather than the site root. Where was also a single website that had only a single page.

4.2.3 Current page position

Assessment on the display of current page position based on the navigation structure of the website relative to the root page and the easiness for the user to determine where he is and where he needs to go. Scores were assigned based on the following Likert Scale.

Score	Description
5	Current page position and the path to the current page is displayed on all pages and the user can navigate directly to any intermediate position on the path (e.g. use of hyperlinked breadcrumb trails).
4	Current page position and the path to current page are displayed on all pages without the ability to navigate directly to an intermediate position in the path.
3	Current page is displayed on all pages but without the path information to the current page
2	Current position is displayed only in some of the web pages
1	Current page is not indicated



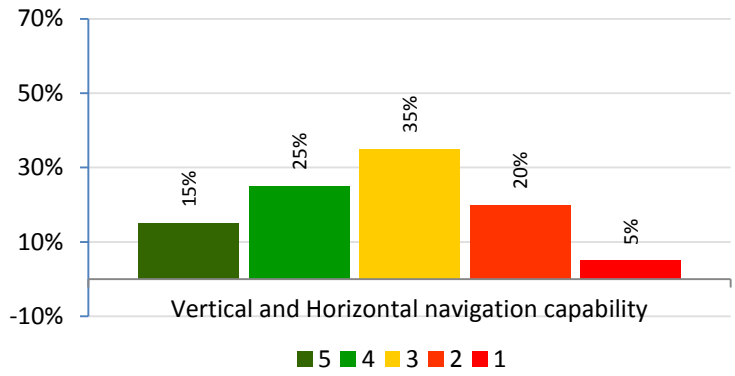
Indicator	Mean	Std. Div
Display of current page position	2.8	1.01

Figure 7 : Assessment on the display of current page position in websites

4.2.4 Vertical and lateral navigation

Measurement of the extent of easiness to the user in navigating vertically (to a different page / topic) and horizontally (different topic / section on the same page) within the website. Evaluated using the following Likert Scale based on easiness in finding links to information in different pages as well as within the same page (when the vertical page size is larger than the screen height).

Score	Description
5	Appropriate navigational components are present and prominently displayed to facilitate users to find information easily within and outside the web page
4	Appropriate navigational components are present to facilitate users to find information easily within and outside the web page but not prominently displayed
3	Prominently displayed navigational components facilitates only the vertical navigation
2	Only vertical navigation is facilitated
1	Users find it difficult to find links to information that they searching for



Indicator	Mean	Std. Div
Availability of horizontal and vertical navigation aids	3.25	1.12

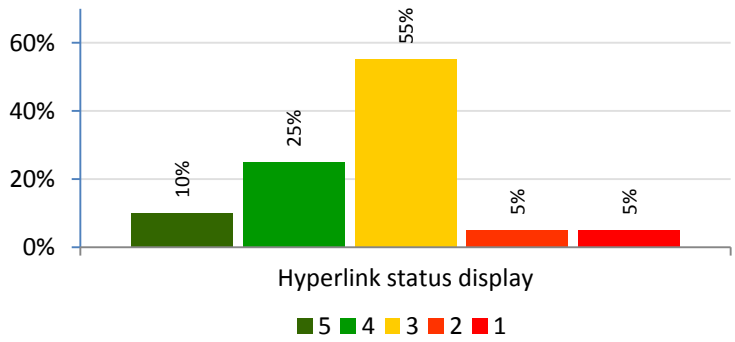
Figure 8: Assessment of the use of horizontal and vertical navigation

It was observed that in some websites the vertical navigational capabilities were limited due to the use of pop-up browser windows for display of different categories of information. In this site the navigational capabilities were mostly limited to pages and topics within the scope of the information category in the popup window.

4.2.5 Active link visibility

Prominence given to hyperlinks those appear on a page so that users can find them and navigate without difficulty. Evaluated based on two factors; measurement of the display prominence given and to active hyperlinks and their display differentiation from content and inactive links and the discrimination between active, inactive and visited hyperlinks. The following Likert Scale was used.

Score	Description
5	Active, Inactive and visited links are differentiated and presented clearly through all web pages
4	Differentiation is only available in main vertical links. Intra-page links are not clearly differentiated
3	Active and inactive hyperlinks are clearly discriminated but visited hyper links are difficult to differentiate from others.
2	Differentiation is clear on main navigational components but difficult in other type of hyperlinks
1	Difficult to separate active / inactive links in main navigational components as well as within content areas



Indicator	Mean	Std. Div
Display of link status	3.3	0.92

Figure 9: Assessment on the display of active, inactive and visited hyperlinks

It was observed that in a significant portion of the website the native highlighting of hyperlink status was hindered by the selected colour schemes and the page layouts. These layouts in general used the same colour scheme for active, inactive and visited hyperlinks limiting their differentiation for the user.

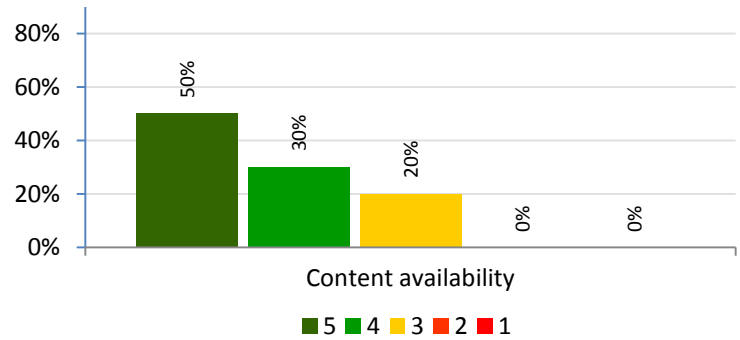
4.3 Content writing and presentation

Assessment of the style, relevance and the way that content is presented within the website. The measurements used in the evaluation included the general availability of contents under hyperlinks provided, availability of local language support, display of time accuracy in content, general relevance of the contents to objectives of the site and the use of appropriate non-textual presentation tools for display of content in a way the users can understand easily.

4.3.1Content availability

Measurement of the general availability in appropriate content within the specified content areas of web page across the site. Evaluation included the structural, decorative and informative areas of the website were based on the following Likert Scale.

Score	Description
5	Website has significant extent of content and all most all pages / hyperlinks within the site are active and informative
4	Website has significant extent of content and is generally available except for few pages were informative areas are not completed / not present
3	Website has a moderate extent of content which is generally available
2	Website has moderate extent but significant portion of the pages are not informative / lack of content
1	Website is limited to few pages which are not provided with useful information



Indicator	Mean	Std. Div
Content availability	4.3	0.80

Figure 10 : Assessment on general availability of content in websites

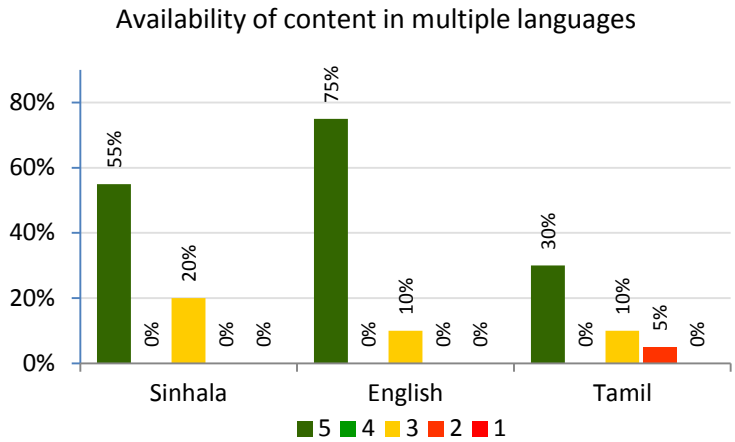
All the websites evaluated showed a higher degree of content availability. Errors such as missing embedded content and links were not usually observed. In some cases delays in loading embedded information was apparent due to the use of external hosting sites especially in the event of streaming multimedia content. However in general the overall content availability was at a satisfactory level.

4.3.2 Localization

Measurement on the general availability of the website in local languages of Sinhala and Tamil. Assessment was based on the availability in different areas such as content, navigational components and decorative elements and the availability of content in all pages

of the website. Scoring was carried using the following Likert Scale relatively to the general content availability of the website.

Score	Description
5	Significant portion of the site content of the website available in the specified local language
4	Considerable extent of content, navigational and decorative elements are available in the specified local language
3	Moderate amount local language content is available. Navigational and decorative elements are available in the local language.
2	Local language support is limited to decorative and navigational components in the homepage
1	Website does not support the specified local language



Content availability	Mean	Std. Div
Sinhala	3.35	2.134
English	4.05	1.84
Tamil	1.9	2.29

Figure 11: Assessment on general availability of content in local languages

Local language support was available through two main mechanisms. In some website the multilingual content were present within the same web page while some other sites used different versions of the same page to display content in different languages. Where ever deployed the multi-lingual support in general was available for majority of the content. In general the multi-lingual capability of the websites was at a satisfactory level.

4.3.3 Last update date

Evaluation of the display of the "last update date" of the website as an indicator to the users on the time validity of the information provided. Evaluated as a binary variable on whether the last update date was indicated or not.

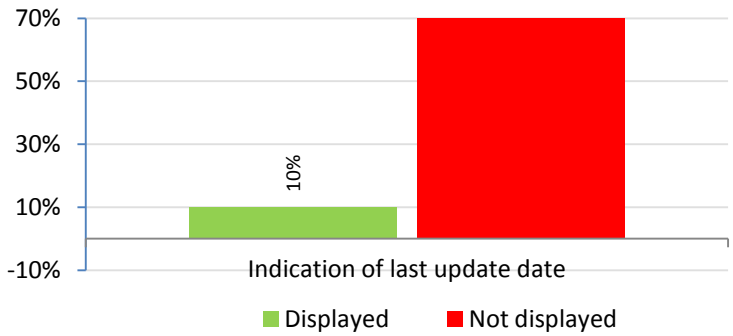


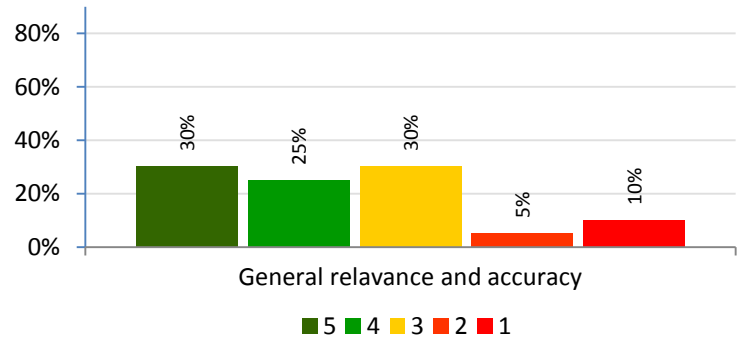
Figure 12: Display of last updated date in websites

Majority of the websites did not show the last date at which the site was updated. This affected the confidence on the user that the site contents were accurate and up to date. Only a single website based on the Sinhala Wikipedia was showing complete information on the update date information.

4.3.4 Relevance

Evaluation of the relevance in the content included with site to the objectives, work, scope and the purpose of the agency to which the site belongs to. Assessment was based on the following Likert Scale.

Score	Description
5	Almost all the content available in the site is directly relevant to the work, objective and scope of the site owning agency
4	In general the site has a significant extent of relevant content in the home page as well as the subsequent pages
3	Most of the home page content is relevant. But subsequent links are directing to content that are less related to the work, scope and the objectives of the site owning agency
2	Moderate extent of relevant content is available in the home page and the subsequent pages of the site
1	Only a small portion of the content is relevant.



Indicator	Mean	Std. Div
Content: relevance & accuracy	3.6	1.27

Figure 13: Assessment on general relevance of content in websites

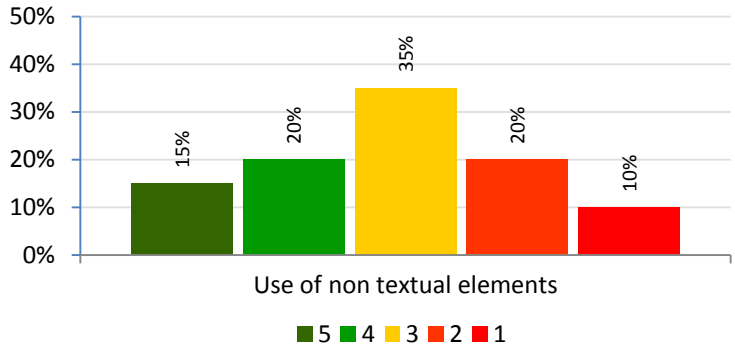
In general the evaluated websites provided accurate and relatively time relevant information except in few occasions. Some websites were of the nature that their content were fundamentally static and not mandated any updates. However still there sites have opportunity to include updated and additions and therefore were not categorized as totally up to date.

4.3.5 Non textual elements

Measurement of extent in the use of appropriate non-textual elements such as graphs, images, animations etc to present page content. Evaluated using the following Likert Scale based on the appropriate use of suitable non-textual components to display data to enhance the information retrieval by the user.

Score	Description
5	Non-textual components are used on all most all appropriate locations for the presentation of data and information. The site displays properties of a rich user interface
4	Moderate use of non-textual components and only in few of the content areas.

3	Non-textual components are limited to static and portable documents
2	Non-textual components are used only on instances where they cannot be represented accurately using text elements
1	Non textual components are almost not used to present data and information



Indicator	Mean	Std. Div
Use of non-textual elements	3.1	1.21

Figure 14: Assessment on the use of non-textual components in websites

The use of non-textual elements in most cases was limited to streaming videos and images. Streaming videos were hosted externally (e.g. in YouTube etc) which affected the download performance as well as the availability in some cases. Use of still images and graphics was commonly seen but their requirement and applicability under the context such information was presented was questionable in some cases.

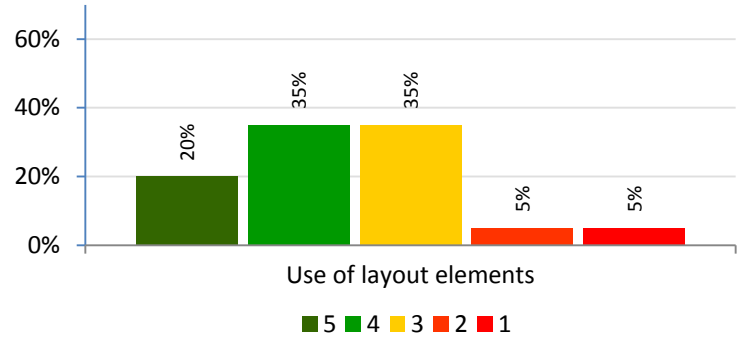
4.4 Content elements and supportive tools

Assessed the appropriate use of presentation elements such as portable documents, images, audio, video and animations, in the correct format for viewing through different platforms / audiences and their ability to communicate site's intended message quickly, clearly and with good accessibility. Additionally compatibility of such components in different web browsers / operating systems and their effect on the loading time of the web page was also considered.

4.4.1 Use of content elements

Measurement was made on the appropriate use of common layout element (tables, tab sheets, bulleted lists etc) and media content (video, audio and animations) and portable formatted documents (PDF files) within the website for presentation of data and information. Evaluation was based on the following Likert Scale.

Score	Description
5	Correct appropriate layout elements and media file formats are used through the website and the configuration parameters of the elements are set to reflect correct presentation and display of the element.
4	Correct appropriate layout elements and media file formats are used to a considerable extent
3	Moderate use of layout elements, mostly restricted to text formatting components
2	Layout elements are used but not optimized for the browser compatibilities
1	Layout elements are not used properly and the presentation varies with display parameters and the web browsers



Indicator	Mean	Std. Div
Ministries	3.6	1.05

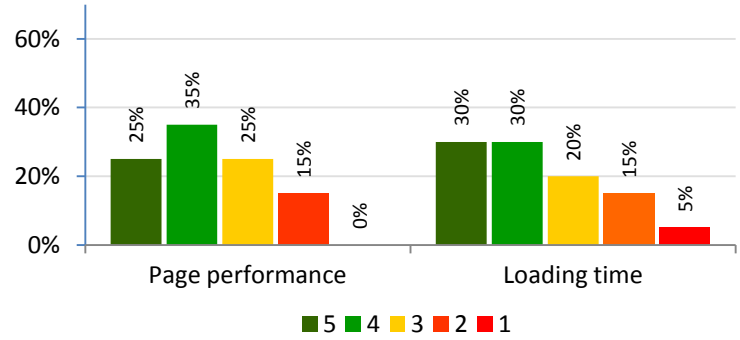
Figure 15: Assessment on the layout elements in websites

The use of layout elements was mainly seen in page formatting rather than content presentation. Presentation of information in tabular or graphical forms was not frequently seen or if not was present at all. The only exceptions ware few sites that were based on structure content management systems where some information were enforced in to such structures by the application itself.

4.4.2 Page performance

Measurement on any negative effect of content elements (other than text based elements) on the loading and transition time of the web site and how long the user has to wait until the initial view of the page appear on the screen. Measurements were made using a home ADSL connection from Sri Lanka Telecom during day time and the scores were allocated based on the Likert Scale presented below.

Score	Description
5	Content elements do not have any noticeable effect on the page loading time. Loading time is compatible with the normal text based page
4	Slight delay is noticeable. Text areas get filled before the other content elements. Page loading takes more than 5 seconds
3	Moderate impact on the loading time of the web page. User has to wait more than 10 seconds for the initial view.
2	A considerable delay is observed in the loading and initial display of the web site (over 15 seconds)
1	Page loading and display is significantly delayed due to the use of content elements



Indicator	Mean	Std. Div
Page performance	3.7	1.03
Loading time	3.65	1.23

Figure 16: Assessment on the page performance and loading time

Majority of the pages performed efficiently over the available bandwidth and were capable of loading within a reasonable time. The few exceptions were instances where multimedia

contents being heavily deployed in the same page thus affecting the loading time significantly. The situation was more critical on instances where such content were hosted externally and the information validity of the page itself depended on the externally hosted content.

4.5. Other factors

Websites were also evaluated based on two other factors, the use of proper domain names for contact information and appropriateness / relevance of offsite (external) hyper links provided from web pages.

4.5.1 Email addresses

Availability of a contact email addresses within the web site and the use of official domain names (in gov.lk domain) in the email addresses as per the development guidelines of the ICTA.

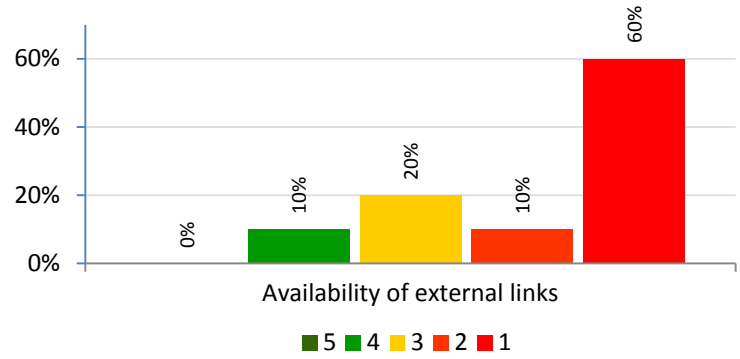
Figure 17: Assessment on use of proper domain names and provisioning of email contacts

It was observed that a significant numbers of contact emails provided in the evaluated websites for personal emails in “Gmail and Hotmail” providers and in some instances from the hosting company of the website.

4.5.2 External links

Evaluation of was based on the extent of offsite (external) hyperlinks provided in the website and the appropriateness and relevance of such links to the user with respect to the objectives, work and scope of the site owning agency. Scores were allocated based on the following Likert Scale.

Score	Description
5	Website is linked to all relevant external agencies through appropriate external links provided form the home page and subsequent pages
4	Most of the external links provided are appropriate for the site and the user
3	Some of the external links are appropriate, relevant and useful to the user
2	Few external links are provided but mostly to sites that are not relevant to the scope of the website
1	No external links are provided



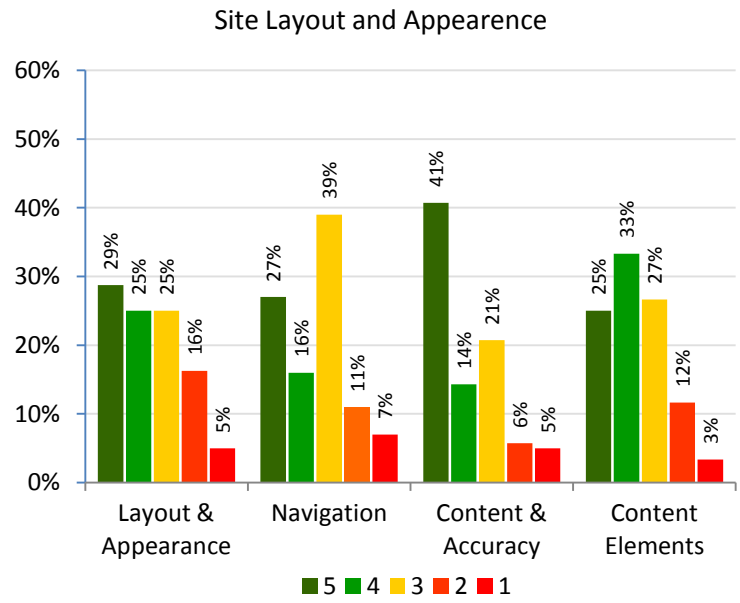
Indicator	Mean	Std. Div
Use of relevant external links	1.8	1.11

Figure 18: Assessment on external links from provided in websites

It was observed that many sites evaluated tend to show content within their own location even through links to other sites would have benefitted their users. Some of the sites did have some external links display but their relevance on the context of the main site objectives were questionable.

4.7. Overall evaluation of websites on major dimensions of usability

Provided below are the overall evaluation results of websites in each category based on the vertical average of responses received for measurement parameters belonging to major dimensions of usability as described in Table 3.



Dimension	Mean	Std. Div
Layout & appearance	3.56	1.21
Navigation	3.45	1.20
Content & Accuracy	3.39	1.77
Content elements	3.65	1.09

Figure 19: Assessment of overall site layout and appearance in websites

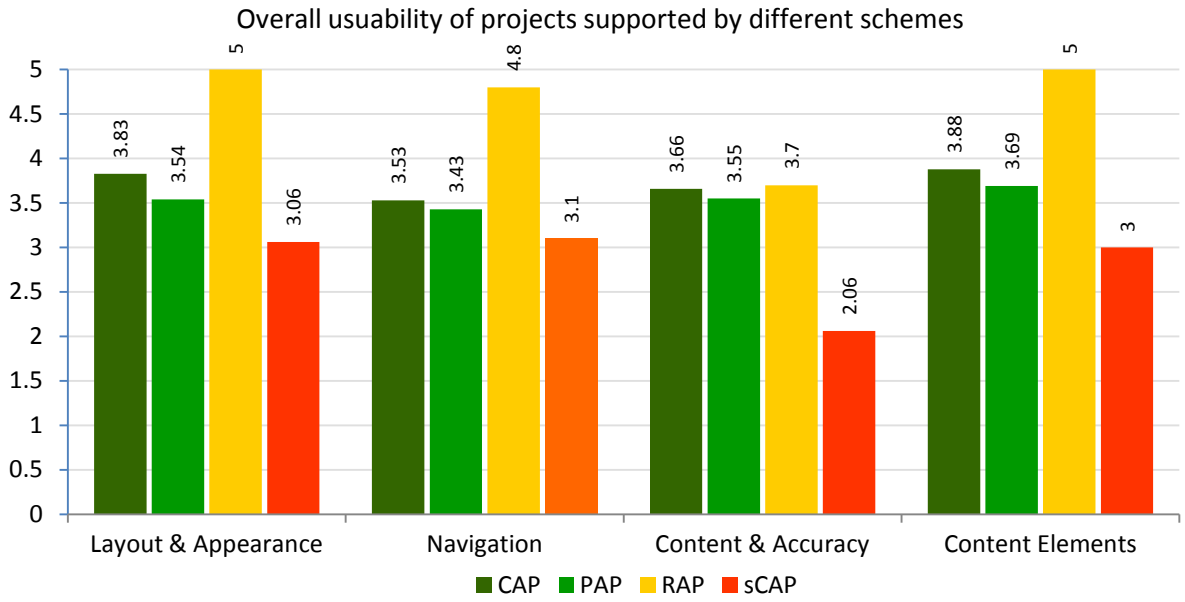


Figure 20: Average score on overall usability dimensions for websites maintained under different grant schemes

4.7.1 Interpretation of survey findings

In general the 20 websites evaluated scored reasonably in all indicators. Some of the scores were slightly biased depending on the nature and the technologies used to present information. For instance the use of a content management system imposed certain restrictions on the way that the information is organized and presented on some of the websites. However at the same time, the use of such technology also ensured the consistency and proper layout of the content elements across all sections of the website.

It was observed that common cause for the relatively lower scores in the websites was mostly due to the presence of large decorative elements that provided little information nor functionality. These elements in most instances occupied a larger portion of the usable space thereby leaving less screen space for functional elements and the useful content. There were also instances where technology and animation was used in decorative element without paying any attention their appropriateness of the usability. These elements often clutter the user's visible space and make it difficult to separate the useful information from the decorative content.

Some sites depended extensively on multimedia content, especially video based material in presenting their information. These videos were hosted outside the site domain and as a result were not within the total control of the website. The delay in loading and previewing such content affected the overall usability of the site and often required to keep the user waiting until multiple video previews are loaded into o the page. A better approach for this would be to include a static content with basic information and refer to the off-site media on the request from the user.

A good navigational structure is one of the primary requirements that make a website more usable to visitors, especially for those with lower levels of computer literacy. Use of proper navigational aids will allow the user to determine where he is at present and then to seamlessly navigate vertically to different areas of the current topic as well as horizontally to different topics in the site without using the browsers' navigational buttons (i.e. back / forward buttons). Web usability guidelines recommend to achieve this by having a common set of elements (e.g. menus, navigation bars etc.) across all pages of the site placed in a prominent and consistent location within each page. Display of the current page position of

within the site structure and having a direct link to the root (home) page are also recommended as best usability practices. While majority of the websites examined during the study were seen complying to the basic navigational requirements a significant portion lacked some of the detailed compliance. Few sites have chosen to use popup browser windows to display different content areas. However such approach significantly limits the sites navigational capabilities since the popup window would only support navigation within its own sub category. A frame based approach on the other hand would have provided better navigational capabilities and would also be more Browser friendly against tools such as "popup blockers" which are commonly used.

Evaluation of the CD based (offline) content

The content provided included number of compact disks developed under 8 different projects. These content were aimed for offline usages were no Internet connectivity is available or required. It was also noted that the at the initiation the developers of these content were not required to follow any standard template for presentation platforms. Thus the content included in the CDs were in diverse formats and were aimed at different application areas. A general evaluation on the nature/type and application area of the content is illustrated in Table 4 below.

Table 4: General description of offline material made available for evaluation

Project Ref	Organization / developer	Nature of content
PAP 001	Daisy Lanka Foundation	**Objective**: To provide accessibility for visually impaired through electronic reading books (DAISY books). **Content**: Two sample DVDs included a large collection of audio files in mp3 format related to the audio reading of the printed books. Content is organized according to the chapter / page indexes of the printed book. The DVD format is playable on computers only.
PAP 003	eFusion	**Objective:** Development of interactive educational content with illustrations, photos, audio and video related to the school curriculum to facilitate self learning. Includes content for the visually impaired. Content: Content of the CD include a number of commonly available content viewing applications, manuals and tutorials on PDF format, digital audio recordings and some web based content. The CD does not provide any installation instructions nor a setup programme. This prevents a non technical user from installing and using the contents.
PAP 004	Gateway Educational Service	**Content:** Number of DVDs in video format providing skills development in general English language. Intended to be used on domestic DVD players or similar devices. Excellent presentation and content layout with DVD menu based interactivity.
PAP 009	Plantation Human Development Trust (PHDT)	Objective: To improve health conditions of estate women and children through local language content creation & participatory capacity building Content: A set of 15 compact disks each addressing one of the following topics. • Waste management in the estate • Nutrition of pregnant and breast feeding mother

Project Ref	Organization / developer	Nature of content
		• Acceptable things with pregnancy • Nutrition of children • Toilet and sanitation • Nutrition problems in the estate • Vaccination for preventable disease • First aid • Importance of home gardening • Indoor air pollution • Food and nutrition • Pure drinking water • Unprotected bottle lamp • Home gardening • Happy family All material follows a uniform layout and format that consist of a series of topic wise picture slides. In some instances the slides are supported with basic animations and text information. The content is organized as a reference rather than an active formation delivery platform. Most topics feature content obtained from Internet that has less relevance to the target audience. The CDs are designed to be viewed in a PC platform. It is also noted that the nature of the content be better presented in documentary format on a video based delivery platform.
PAP 022	RNH Info Tech (Pvt) Ltd	Objective: Develop and disseminate e-learning material to support Small and Medium scale Enterprises on areas of corporate law, accounting and business English. Content: Text based presentation of general information on taxation, legal accounting and business English. Topics can be selected from a subject wise index. Formatted and presented as a CBT reference material.
CAP 109	Sanka Foundation	Objective: To provide training to students on 2-D animations and link them with advertising companies. History and society related topics will be used to create animations. Content: Contained media files (in MPEG movie format) portraying locally developed 2-D cartoon based short films. No tutorials or training materials on development of animations are included. The disc contains only the output exported into movie format.
CAP 147	Nenasala Thanamalvila	Objective: Create localized handbooks for GNU CASH accounting package and provision of training to SMEs. Handbook is developed in Sinhala and Tamil. Content: The CD contains GNU CASH software application and manuals in local languages. Provides an excellent source to learn and use the software application for those who are less literate in English language.
sCAP 03	Human Rights Community	Objective: Establishing an e-learning centre for low

Project Ref	Organization / developer	Nature of content
	Education Centre	skilled children Content: Contains animated Computer Based Training material that assist in the enhancement of basic reading skills in the Sinhala language. Format of the content supports instructor guided learning. Content have been formatted to suit slow learning audiences and are supported with instructor material.

Due to the diverse nature of the content and their presentation formats & techniques it was not possible to define a uniform assessment criterion for the evaluation of the off-line material. Therefore, the analysis was carried using generic properties of rich multimedia content; that included the type of content, linearity, interactivity, nature of information and the appropriate use of audio and visual material. The basis for this evaluation criterion is presented below in Table 5.

Table 5: Feature measurements used in the evaluation of offline material

	Feature Parameter	Description
1	Type of content	The nature of material presentation such as video clips, animations, documentary, interactive multimedia content, passive linear content etc.
2	Linearity	A measure on how flexible for the user to access required material on the content. A linear content does provide any indexing and therefore the user is forced to retrieve the information on a pre-determined sequence (such as a TV broadcast). An truly non-linear material on the other hand allow the user to access the media content randomly and quickly navigate to the required information using some indexing mechanism.
3	Interactivity	A measure on the degree of interaction between the user and the material. A rich interactive material gets the user involved in the dissemination process and thereby allows the user to interact with the material through different tools such as indexes, information search and feedback channels (e.g. automated questions etc.). A non interactive material on the other hand pushes the user into a passive listening mode.
4	Appropriate use of audio and video material	The appropriateness in using audio and video components based on the nature of the content and its organization.

The evaluation results of the material belonging to the five different projects are summarized in Table 6 below. A Higher rating indicates a rich and interactive multimedia material while a lower score indicate a passive, non interactive content.

Table 6: Summary of content evaluation in offline multimedia material

Project Ref	Type of content	Linearity	Interactivity	Appropriate use of audio and video formats
PAP 001	Audio file in MP3 format	Non-linear (index by topic/page)	Moderate	Moderate
PAP 003	Audio files / Text and manuals in PDF format	Non-linear	Moderate	Moderate
PAP 004	Video based training material	Non-linear (DVD menu based)	Not applicable	Excellent
PAP 009	CBT Material on different topics	Non-linear	Moderate	Moderate
PAP 022	Text based CBT material	Non-linear	Moderate	Low
CAP 109	2-D animated cartoons	Highly linear	Not required	High
CAP 147	Manuals for software application	Not applicable		
sCAP 03	Narrated / animated slide show	Non-linear	Moderately present	Moderate

Conclusions

A summary of the qualitative assessment in overall usability in the online content supported by different grant schemes is illustrated below in Table 7.

Table 7: Overall qualitative assessment of usability in websites supported by different grant schemes

Parameter	Financial grant scheme			
	CAP	PAP	RAP	sCAP
Site availability*	3 / 11	12 / 17	1 / 1	4 / 4
Layout & Appearance	High	High	Excellent	Average
Navigation	High	Average	Excellent	Average
Content & Accuracy	High	High	High	Below average
Use of content elements	High	High	Excellent	Average

Site availability is presented as (number of websites available on-line) / (number of web sites forwarded for evaluation).

In general it can be concluded that the websites created and supported under ESDI project have paid their expected dividends to a greater extent. This was commendable with respect to the generation and localization of local and community base information. Almost all the sites met their expectation in relation to the localization and multilingual support of the content. The use of new media tools and modes of information delivery were within the acceptable norms. Multimedia have been used effectively even though in certain instances their effectiveness has been affected due to technical issues such as lower bandwidth availability and longer loading times.

A successful website that achieves its intended objective of information dissemination and provision of an active platform for community interaction is always characterized by the active participation of its users. The active participation in general is indicated by the regular number of visits (hits), repeated visits by the same user, time spent on the website and the level of networking via the website. In order to facilitate these features and measure their effectiveness the site's technical and presentation architecture too must incorporate certain features such as hit counters, user tracking mechanisms and user interaction / feedback channels such as memberships, forums etc. However, among the sample of websites evaluated in this investigation such features were not commonly available. This to a greater degree prevented an accurate measurement on the usefulness and user participation on the website because there were no means of tracking the users and their visits.

It was observed that a significant portion of the websites have not been updated during the past 12- 18 months. This was observed in sites with relatively static content (i.e. websites providing stationary / static information that does not require frequent updates to existing content (e.g. www.shanthikarma.org) as well as for some websites that are almost totally based on dynamic content (e.g. e-commerce sites related to the general and agricultural trade sectors). It was observed that e-commerce websites were offering products that were not updated for more than 12 months appearing in the initial page and thus creates serious doubts on the users regarding the trustworthiness of the items offered. On the other hand few websites on the "Job Bank" category were updated with recent information.

From the survey findings it is visible that issues related to financial sustainability has contributed negatively to regular content updates and maintenance most of the websites. This was mostly seen for sites that were not of commercial nature nor were generating income for sustainability. A mechanism through which these websites be support on a continuous basis would definitely help in maintaining these sites alive with more accurate information and regular updates. This conclusion is also supported by the site availability presented in Table 7 under different financial support schemes. For instance the sites that were supported under RAP and sCAP, the schemes that were intended to replicate pilot studies and provide maintenance support for successful projects under previous grants showed 100% availability compared to other two types of grant schemes which were more towards new initiatives.

Lessons learnt

In general it is non disputable that the eSDI project has contributed positively to the e-Sri Lanka development objectives. The project has resulted a considerable extent of localized web content and material that are of important to the local society, culture and economies. Moreover it has captured localized knowledge on diverse subject areas such as cultural traditions, agricultural methods and techniques etc into digital formats that can be shared and disseminated across the society in modern effective information technologies. These projects have also created great opportunities for cross cultural knowledge sharing and interaction while providing opportunities for younger generations to participate actively in such activities. However in spite of these benefits, this analysis also found few instances

where the outcome would have even better if the following improvements and modifications were made.

In terms of the content presentation, many of the websites were not following common accepted norms for improved usability of the site. In some of the sites the graphics such as backgrounds and animations have been used as since "they were available" rather than based on the context or the appropriateness of such components. Some websites featured animation based menus that were hardly readable due to the inappropriate use of colour and fonts. These drawbacks cold be avoided if the following are provided as part of the project implementation parameters.

- Provide detailed design guidelines to the developers. The guidelines must include appropriate templates for static page contents (such as page headers, contact information etc), guidelines on appropriate use of colour, graphic and other decorative elements and related norms guidelines for usability of the web content. The guidelines must also be customized based on eth expected user group considering the age, demography and ICT skill levels that required for the effective use of the site.
- Wherever possible provide training for the developers on the expected outcome of the end product in terms of the community usability. The training should cover the usability standards of content presentation and the requirements of the target user communities.

In any project the monitoring of the expected outcomes throughout the implementation and post implementation periods play a major role towards the overall success of the initiative. In terms of content development projects such monitoring can be facilitated by adhering to certain technical features and standards. For instance, in a web development having a visitor counter and a mechanism to monitor repeated visits can provide use full information on the community acceptance and usefulness of the site. The same technique can also be extended to monitor the types of information within the web site that are frequently accessed indicating their demand by the users. Additional tools such formation of user groups, memberships, discussion forums etc can assist in networking among the users. Such networks are bound to enhance the objectives of these social initiatives such providing a platform for dialog and sharing of opinions and information. However in the websites investigated during this study these features were rarely found to be deployed. It will be beneficial if the guidelines on using such features to be provided to the developers at the time of initiating the projects.

It was also observed that some of the websites supported by the eSDI project were no longer in operation while some others have not been updated for a longer period of time. In contrast to these were the Replicated Projects for which have been continuously updated with new information. The lack of maintenance was more clearly visible on projects that were not oriented towards generating revenue for their own sustainability of providing valuable information to the society and helps in building links across different communities. It would be useful of the eSDI project could provide some mechanism to support the sustainability of these good initiatives on a longer term basis.

Recommendations

Based on the findings and the observations made during the study the following recommendations are made.

1. It is recommended that a comprehensive follow up study to be carried on the web-based projects that have been completed but found to be not available or in active (i.e. not been updated) at present. The study should focus on identifying the major

contributing factors to the current state of these projects and the remedial actions required to re-activate them and to prevent similar situations on future projects.

2. It is recommended that a continuous monitoring mechanism to be implemented to ensure post completion activeness of the eSDI projects. The monitoring scheme must collect data on the key parameters such availability, updates and usage of the project outputs on a regular basis so that early corrective action can be taken for projects showing decreasing values for such parameters. The monitoring scheme can also implemented as partly and automated solution with necessary technical additions to the web sites.
3. It recommended for the ICTA to develop standard guidelines for usability aspects of websites developed under the eSDI projects. These guidelines can be based on common standards for usability assessments and customized to the local requirements on technical and localization aspects. The developers of new project can thereafter be provided with such guidelines for their interfaces.
4. It is recommended that the developers of eSDI projects to be provided with guidelines to ensure the support of monitoring and assessment tools (visitor counters, user registration and tracking etc.) within their website.
5. It is recommended that a long term plan to support the sustainability fo service projects (i.e. projects that are not oriented for revenue generation), especially those related to the dissemination of localized and traditional information. This support can also be provided in non-monitory forms such as provision of hosting server space, access bandwidth etc to any additional support on the maintenance of their content.

Best Practices for Usability Enhancement

As indicated in the introductory section of this document, a highly usable website must attempt achieve its standards in four different directions as follows.

1 **Perceivability** - Information and user interface components must be presentable to users in ways they can be perceived irrespective of the differences and capabilities of the viewing platforms. These include provision of text alternatives to non text based content (such as images, videos etc.), Provisioning of time based afterlives such as closed captions and sign language interpretations for video and audio content, making the content layouts adaptable and displayed on different viewing platforms without losing their embedded information structure and making it easier for users to separate the information content from other decorative elements such as the background and colour.

2 **Operability** - User interface components and navigation must be operable. The operable principles include guidelines to make information retrieval and navigation of the website independent of devices and capabilities of the users. In general this includes providing keyboard alternatives for navigation, allowing the users to retrieve information at their own phase and speed and supporting graceful and seamless navigation throughout the website.

3 **Understandability** - Information and the operation of user interface must be understandable for all users. The understandable principle says that the web content, language and writing style must be understandable to all users irrespective of their education and cultural backgrounds and describes guidelines for provisioning of localized content, Making the web pages operate in a predictable manner and assisting users to correct mistakes in interactive web sites.

4 **Robustness** - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies. The robustness of a website is described in terms of its capability in seamlessly operating across different

types of user agents (both human and machine based) for retrieval if information integration with other services including assistive technologies for users with different capabilities.

In addition to the above, a highly useful and usable website is described by the following features as well.

1 Adherence to the common standards on usability as per the nature of the website and the information contained.

2 Support given in building a relationship between the users, content provider and peer contributors through the website. This includes building of membership, subscriptions, email notification list, forums etc that allow users to interact with each other and to support and encourage re-visits to the same site.

3 Use of consistent intuitive navigation and search feature present on each page to facilitate the information search by the users. Provision of a Home page link in every sub-page to enable users to navigate to the root of the site in a single click from anywhere and the use of cookie crumbs to show the current page position and horizontal navigation within the website.

4 Provision of a sitemap to describe the overall structure of the website.

5 Use of correct writing style combined with layout elements, non textual elements and colour schemes to facilitate readability, information skimming of the website.

6 Appropriate use of multimedia content to enhance the information presentation without causing delays in loading and presentation fo the content.

Annexure 1: List of websites selected as the sample for assessment

Category	Description	Project No. & Name	Web address (URL)	Project Type
Agriculture	Agriculture Wikipedia and agriculture e-learning content –Dept of Agriculture	Audio Visual Center, Department of Agriculture – (PAP 23)	www.goviya.lk	PAP
	e-Learning and digital content of new techniques and technologies in agricultural sector.	CIC Agribusinesses Pvt Ltd. (PAP 26)	www.navagoviya.org	PAP
	Information on tea, cinnamon, paddy and coconut.	Cap -53 Lelwala Tea Small Holdings Development Society	http://lelwalaagro.com/	CAP
Trade-Agriculture	Organic agriculture information	Sarraketha Pvt Ltd (PAP 29)	http://saaraketha.com	PAP
	Mobile Phone and online trading platform for agricultural marketing	Teams Pvt Ltd (PAP 16)	http://www.farmer.lk/	PAP
Trade-General	Trading platform for small businesses	sCAP -10 Rajarata Nenasala	http://www.smallbizlanka.com/	sCAP
	Trading platform for small businesses – specializing in handcrafts by women	CAP – 100 Nenasala e-Savi Samaja Sanwadana Ayathanaya (Godakawela Nenasala)	www.handicraftlanka.com	CAP
	Web catalogue on SMEs in Eastern province	CAP -142 Supporters Dot Com	www.eastbiz.org/index.php	CAP
Dairy	Information and e-learning content relating to the dairy industry	Dambadeniya Development Foundation (PAP 31)	www.edairylanka.lk	PAP
	Dairy industry – information database			
Archeological/ Traditional content	Information on historical sites-Tantrimale	sCAP -02 "PrajaSwashakthi Wardana Padanama e-SDI Project"	http://www.tantirimale.net	sCAP
	Information on historical sites- Yudaganawa ,Maligawila, Buduruwagala, Dematamal Temple, yatiyallathota, Katugahagalage	CAP – 75 - Unawatuna (Kavidu IT Center)		CAP
	Pansiya panas jathaka stories	CAP – 112 - Vicit Innovative	www.jathakakatha.org	CAP
	Information on shanthikarma	sCAP -15 - Sanskruthika Kala Nirmana Sansadaya	www.shanthikarma.org	sCAP
District information	Information on trincomalee	CA -124 High Information Technology Education and Social	www.trinconet.info	CAP

Category	Description	Project No. & Name	Web address (URL)	Project Type
		Development Organization (HITESDO)		
Communi-cations/IT	Online radio station	Microimage Pvt Ltd (PAP 2)	www.ransara.lk	PAP
	Localized applications (eg: firefox,mozila	Uni- consultancy Services (PAP 11)	www.lakapps.lk (*Note: This is project web site that facilitate the download of applications localized under the project. The site also features information about the project itself*.)	PAP
Educational	Interactive educational content related to school curriculum	eFussion (PAP 3)	www.shilpasayura.org (*Note: Site is also available as a standalone web based application*)	PAP
	Sinhala translation of Wikipedia articles	Practical Action (PAP 17)	http://si.wikipedia.org	PAP
	Advanced level science syllabus-content	Felidae (PAP 18)	www.vidunena.lk	PAP
	English language-e-learning		www.lankaenglishforum.com	
	English language-e-learning -for children		www.punchipanchi.org	
	Past paper and model papers on Buddhism	CAP -103 - Nenoda IT Society (Sooriyakanda Nenasala)	www.dahamdanuma.org	CAP
	Content related to grade 6 to O/L- Buddhism syllabus	CAP -134 - Kandiyapitawewa Nenasala	http://www.dahamsayura.lk/	CAP
	Information on environment related governance	CAP -137 - Institute of Studies for Local Government Affairs	www.locgovonline.org	CAP
	Past Papers and model papers on government exams	sCAP – 19 Nenasala IT Institute (Meegahajedura Nenasala)	www.lankaexamhelp.com	Scap
Health	Articles related to health (medical fac. Colombo)	Dept of Anatomy,Medical Faculty, University of Colombo (PAP 20)	www.wedananesala.org	PAP
	Information related to family planning(family planning association)	Family Planning Association of Sri Lanka (PAP 25)	www.happylife.lk	PAP
	Information on first aid	Enigma Pvt Ltd (PAP 33)	www.firstaider.org	PAP
	Medical portal for medical students		www.mednet.lk	
	Website on indigenous medicine	CAP -143 Bodhiraja Foundation		CAP

Category	Description	Project No. & Name	Web address (URL)	Project Type
			http://www.danuma.lk/sites/helawedakama/	
Job Bank	Website on jobs in sri Lanka	RAP Sri Lanka Job Bank (Sevanagala nenasala)	http://www.srilankajobs.net/	RAP
		CAP -55 Janasahana Corporate Foundation	http://www.janasahanajcf.com/	CAP
SME content	Business management content in local language(Tax, Legal, accounting, business English)	RNH Infotec Pvt Ltd (PAP 22)	www.smeguide.lk	PAP
Disabled/ Elderly	Audio books-fiction books and other topics	Daisy Lanka Foundation (PAP 001)	www.dlf.org.lk *(Note: Content is also available in CD form and evaluated under offline content)*	PAP
	Sing language reference/dictionary	Infolume Pvt Ltd (PAP 008)	www.lankasing.lk	PAP
Women	Website on women development	Center for Women & Development (PAP 005)	www.vawjaffna.org	PAP