

## **Acknowledgments**

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## **Abstract**

This project follows the investigation and implementation of a Content Management System for the Sheffield Hallam University American football team in order for them to maintain their online presence. The most important factor in new system is for the people responsible for running the site should not require skills in web technologies. The project will investigate websites of other teams as well as several possible systems in order to develop a system to best meet the client requirements.

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## **Glossary**

**Back-end** – refers to processes performed by the system which are not apparent to the user.

**Breadcrumbs** – refers to the links displayed across the top of a web page typically displaying the hierarchical structure of the pages above the current page.

**Content Management System (CMS)** – refers to either manual or computer based processes used to manage work flow within a collaborative environment.

**E-Business** – simply refers to business carried out electronically, most often being over the internet.

**File Transfer Protocol (FTP)** – allows a user on one computer to transfer files to another computer over a network connection.

**Hooks** - parts of a Wordpress theme which allow for content to be inserted dynamically through the back-end.

**Mark-up** – refers to a method of adding information to the text indicating the logical components of a document, or instructions for layout of the text on the page or other information which can be interpreted by some automatic system

**Metadata** – refers to data which helps to define the data, or information, which it is linked to such as context and characteristics.

**MySQL** – is the most popular open source relational database management system.

**phpMyAdmin** – is the web application most commonly used in the administration of MySQL databases.

**Plug-in** – refers to a file containing data intended to alter, enhance or extend the operation of the application it is attached to.

**Search Engine Optimisation** (SEO) – refers to the process of improving the volume of traffic to a website from a search engine.

**WYSIWIG** (What You See Is What You Get) – refers to a user interface which shows the user creating content a similar view to that of the end result.

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## **1. Introduction**

This project was founded following the past and present situation surrounding the Internet presence of the Sheffield Hallam Warriors. In order for them to operate effectively both internally and externally they need to be able to provide information on their web site easily and efficiently. For the 2009/2010 season a new position on the club's committee was created with the foresight to improve the website and the future of the club online. The author of this project was elected to this position, formally known as Media & Marketing, responsible for; updating the website with weekly news and statistics from games, arrangements for photography and video footage for games and/or training sessions to promote the club. This is where the requirements for this project were first realised and the necessity was established.

### **1.1 History**

The team was started in 2002 following the separation of a multi-institution team that included Sheffield Hallam and Sheffield University. Using the web archive service (<http://archive.org>) it is possible to find versions of the site at various parts of each year since then showing the development from a vast amount of animated images, HTML tables and such techniques typical of website design at the beginning of the decade and late 1990s. In later times a content management system has been installed although not properly utilised.

### **1.2 Aims & Objectives**

The domain is for use by people within the club as well as supporters or rival teams externally which creates a broad range of aims and objectives for the website and system. The main aim of the system comes from the primary reason for this project coming to be, making a site which can be easily maintained and updated without the prerequisite of any technical knowledge in website programming. In order to fulfil this aim a content management system (CMS) will be implemented which itself will have a

set of objectives to meet the site requirements. The scope of this project covers the front-end of the system to be implemented but may touch on the back end where necessary.

### **1.3 Methodologies**

Avison and Fitzgerald (2003, p20) define methodologies as:

A collection of procedures, techniques, tools and documentation aids which will help the systems developers in their efforts to implement a new information system.

Therefore methodologies provide projects with a framework from which to complete tasks and manage time that makes them essential to their success. The framework acts like a road map from which to follow through the stages of the project that increases efficiency through time management and minimises the possibilities for problems occurring and finally more effectively meet the requirements of the system. In software and systems development there are many different methodologies and frameworks, now this report will identify the most common.

#### **Waterfall model**

An early structured model for software development from which the software development life cycle evolves through the following phases:

- System feasibility*** – identify requirements to see whether the proposed system is viable
- Requirements analysis*** – attain system specific requirements that can be transformed into use case scenarios for the proposed system.
- System design*** – determine the components that make up the new system and ensure they meet the requirements.
- Coding & unit testing*** – write the code for the elements of the system and test their functionality.

**Integration & systems testing** – test the system as a whole against the requirements

**Deployment and maintenance** – deploy the system into a live environment and make changes based on updated requirements

Advantages:

- Processes are clearly broken down which helps in planning and resource allocation
- Continued testing and reviews against the requirements increases efficiency and minimises the possibility of problems occurring.
- Gives clear expectations of the state of the deliverables through each phase.

Disadvantages:

- A working version of software isn't available until the later phases that lead to unforeseen problems arising at those late stages.
- In order for the process to move to the next phase it must have completed the phase before it, this limits the progress in the event of unexpected delays to a phase.
- Changes cannot be made during the testing phase that would lengthen the time required to make subtle changes to the system.

### **Incremental or Iterative Development**

This development model is derived from the waterfall model in order to break up the structure into smaller parts with each part containing iterations of the waterfall model.

In this model the end of every reiteration allows for elements of the system to have either been completed or improved upon before being put forward for full system testing. This allows for the same level of continued testing and requirements review as the waterfall model, but allows for changes to be made much more frequently.

## **Prototyping model**

The prototyping model works from a basis that there are objectives that the system should address rather than specific requirements at the beginning. Simplified versions of the system are developed and then feedback gained from those parties with a stake in the project. Each version builds on the previous iteration based on the feedback gained in order to better meet the requirements specification.

## **Agile methodology**

Previous models were all derived essentially from the waterfall model and are iterative or follow a strict sequence. The Agile methodology was developed for the need to respond quickly and efficiently to the problems that can occur in complex systems. This methodology is a collection of values, principals and practices that incorporate the development, testing and feedback styles of previous models in to an improved development model (Microsoft 2005).

## **Chosen Methodologies**

No single methodology model can completely meet the needs of a system therefore this project will use a combination of models, primarily the prototyping model. The current system acts as a prototype from which to begin and base test systems on during the investigation, from which further prototyping and iterative development techniques will follow.

## 2. Current Website Analysis

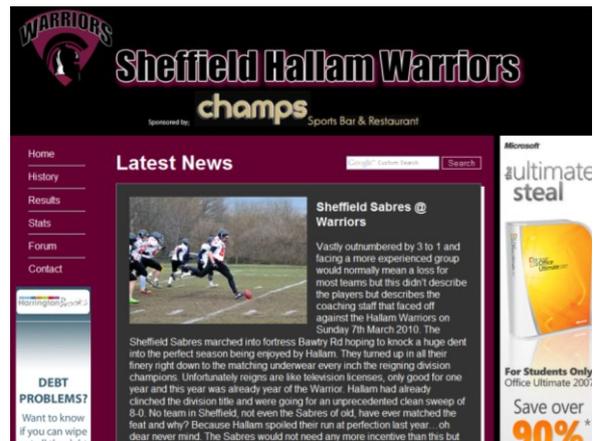


Figure 1 – Warriors current website

### 2.1 Introduction

The current web site (Figure 1 – Warriors current website **Error!** **Reference source not found.**) was developed during the 2008/2009 seasons to replace an old, poorly utilised content management system with a modern site using simple and accessible code until a robust system capable of catering for the future needs of the team could be implemented. The site was developed using Adobe Dreamweaver CS4 and coded and validated using XHTML 1.0 CSS 2.1. The Warriors (from here to be known as the client) also rely on a forum powered by vBulletin (Appendix ) to enable players, coaches and anyone else that registers with ability to communicate and share information. Due to the recent rise in social networking the forum also integrates a member’s account with their Facebook account and also the team’s Twitter account. This integration enables users to post their latest activity on the forum to their news feed on Facebook and the recent threads to Twitter. The website also provides a small amount of revenue for the club through Google Adsense adverts located on the main site and also in the forum pages.

The site has a very simple, single level structure (Appendix ) to ensure that users will be able to find the information they require simply and efficiently.

## 2.2 Hosting

SHUWarriors.net is currently hosted with a UK based company called Streamline (streamline.net) providing the website with a copious amount of storage space, unlimited bandwidth and several MySQL databases. This is akin to the majority of hosting packages available from both UK based companies and those globally. The client has however found that the support offered by Streamline is often lacking effectiveness both in the quality of responses to support tickets and also in the software support of the hosting packages. Specifically the setup of the servers doesn't support Drupal because of limitations with the PHP installation which Streamline do not allow customers to alter, this limits the viable options for systems to be deployed during the testing phase of this project. Streamline database systems, powered by the industry standard phpMyAdmin and MySQL have also proved to be unreliable as a base for the team's vBulletin community forum due to its speed and downtime. Having already relocated the forum's database the team are looking to relocate the entire site when the Streamline package is due for renewal. Being responsible for this, the system developer has used social media website Twitter.com to establish and test a new reliable host, Vidahost, who will be the most likely new host for the client in the near future.

## 2.3 Development

The current web site has been designed and developed since late 2008 by the system developer primarily through Adobe Dreamweaver CS4 although all content is hand coded and therefore it can be maintained from anywhere with a text editor and internet connection to ensure that changes can be made without the prerequisites for certain applications. The site is coded using XHTML with PHP in areas where it can make processes more efficient using *include* statements which enable the contents of a separate file to be displayed at the location of the *include*. This method to improve efficiency of maintaining the content takes principals from an object orientated programming paradigm and also the

modular design of content management systems. Despite attempts to improve efficiency of the site maintenance it is clear from the current site map (Appendix 3) that because all content is written by hand, some page titles have been incorrectly named which poses potential problems for users navigating the site, but more importantly search engines which index the pages as they would store incorrect page names. This problem could be avoided with dynamically generated content although this would require a much more complex system than is currently in use.

All updates to the site have to be made using alterations to the files off-line and then uploaded via FTP to the server. This process imposes limits on both who can update the site and those people's ability to make updates because they would have to be at a computer with the software installed to obtain the files from the website, if they weren't downloaded already, and also then FTP software to upload the updated files.

## **2.4 Problems identified with the current approach**

The primary and most crucial problem with the current method of development is the requirement for knowledge of website programming languages and applications. This is the key issue which must be eradicated with the introduction of a new system so that future administrators of the website can make changes to content without the need for website programming knowledge. Furthermore the current approach requires off-line files to be edited and uploaded in order to update content that in a web culture of dynamic and accessible content is an out-dated process. The new system should alleviate the requirement of specific software and enable files and content to be edited, if possible, only with an Internet browser.

## **2.5 Understanding the Users**

Using data sourced using the Google Analytics tracking software which the client has installed on their website. The service provides in-depth data analysis of all traffic to the domain which when analysed will provide

important information about the people who visit the website. The first set of data provides an overview of site usage which suggests that most visits are to find information located on the first page of the site which is where the news stories and match reports are located. This can be seen primarily in the bounce rate of 56% which comprises of users which go no further than the first page of the site but also the average time spent on the site is less than 3 minutes, with 3 page views. This suggests that users are able to find what they are looking for efficiently because the number of page views is so low and therefore the current navigation structure works. Beyond this it is possible to see how these users get to the site, including keyword searches, using the top traffic sources (Appendix ) data. Users who navigate directly to the site (Appendix ) appear to use more content with 7 page views in the average visit although they do also increase the bounce rate to 85%, which is likely influenced by users of the Warrior's forum which is on a sub domain of shuwarriors.net. Clicking straight through to the forum would increase the bounce rate because that visit would only load a single page on the primary domain that collects this data.

The most important data collected is the top web browsers used by visitors to the site (Appendix ) because of the varied support for web technologies across each browser, specifically Internet Explorer 6 which has little to no support for the majority of modern styling techniques. Internet Explorer has 40% of the visits to the site, Firefox with 30%, Google Chrome and Safari making up around 20%. The majority of corporations and academic institutions use Internet Explorer as their primary browser although the data suggests these are kept to the latest versions because version 6 only represents 7% of visits. The minimum requirements for the new system are identified as needing to support Internet Explorer 6 (Appendix ) at a screen resolution of 1024x768 pixels (Appendix ). However these requirements are only to ensure support for those users of older technologies, the primary requirements should still

meet the needs of the majority of users with higher screen resolutions, broadband connections and browsers supporting modern web technologies.

It is possible to gain an understanding of the kind of visitors to the website through location data collected (Appendix ) which lists the top ten cities associated with visits. The majority of visits come from Sheffield that is expected with the primary users of the site being Sheffield Hallam University Students. Other users of the website are likely to be mainly from competitors and BUAFL supporters because the other locations include many of the cities which the client has competed against in the 2009/2010 season. Therefore content in the new system should be available to all users as it is under the current website configuration.

## **2.6 The Competition**

All teams competing against the client has a website, the majority of which are based on a managed system whether that is a CMS or a section of their institution's website. Some teams however still use an off-line development approach akin to the current site of the client like the Manchester Tyrants (Appendix ) and Hull Sharks (Appendix ). The Manchester Tyrants website is designed to look much like the modular form of a CMS although from looking at the source code of the site it is clear that the site has been created using a WYSIWIG editor because of the excessive mark-up language which is typical of this development method. This highlights the typical differences between hand-coded and WYSIWIG development which often uses HTML tables to arrange information like how the Tyrants have used it and neglect to separate the style and design using CSS from the raw content. This use of excessive mark-up is referred to as 'divitus' and 'classitus' (Calhoun 2009) and it can often be seen in the code of developers who are used to using tables to display content divs can be used to replace tables.

An example of this style of code;

```
1. <style>
2.   .header {}
3.   .image {}
4.   .text {}
5.   .inner {}
6.   .title {}
7. </style>
8. <div class="header">
9. <div class="image"></div>
10. <div class="text"><div class="inner">
11. <div class="title">Example of excessive code</div>
12. </div></div>
13. </div>
```

With a greater understanding of how mark-up can be styled using CSS the code can be written with a single instance of the div and class tags reducing the amount of code and therefore the overall file size.

```
1. <style>
2.   .header {}
3.   .header img {}      /* previously its own div - image */
4.   h2 {}              /* previously its own div - title */
5. </style>
6. <div class="header">
7.   
8.   <h2>Example of excessive code</h2>
9. </div>
```

Using code with excessive mark-up increases the opportunity for errors associated with accessibility and specialist software such as screen readers. These applications read the code that makes up a web page and outputs it to the user in audio form similar to the way which a web browser reads the code and outputs it visually. However for the site content to achieve the same meaning when in audio form the code must be well formatted and this is where HTML table structured pages encounter problems.

The Tyrants & Sharks both use the off-line development method that shares the problems that have been identified by the analysis of the current development approach taken by the client as well as the problems associated with the quality of code.

Those teams who currently use a CMS, Sheffield Sabres (Appendix ) and Leeds Carnegie (Appendix ) both use the Wordpress platform, which

despite being completely different in appearance both offer the exact same functionality to the site administrators. Using a CMS enables the teams to select a template that contains the mark-up and CSS for their site but allows them to only ever have to interact with the actual content and information of the site.

It is clear that the best way to ensure the success of the client's presence online will be through the development of a CMS. Although not necessarily Wordpress, several systems will be investigated in order to ascertain which best meets the client's requirements.

### **3. Change Management**

When developing and deploying a new system it is important to consider the impact of change upon the organisation or individuals. For this project the system developer will focus on human issues around change management.

Marchewka (2003) developed a plan for implementing change comprised of the following phases:

1. Assess willingness, readiness, and ability to change

The client has expressed the fact that it is ready to accept a new system. They have also adopted a CMS in the past and therefore are willing to accept a system that is correctly configured for them again.

2. Develop or adopt a strategy for change

The strategy for changing the current system ensures zero impact on the client during the testing a development phases. The only impact upon the client would be a short period of downtime during off-peak times if they choose to accept the new system.

3. Implement change management plan and track progress

This report will act as a means by which to track progress of development should such details be required. Progress on testing and development could also be tracked at any point as each testing system will be deployed to a separate domain making them all accessible at any one time. Final template development will also be tracked through version control of separate themes.

4. Evaluate experiences and develop lessons learned

## **4. New System Specification**

The future administrators of the system will be the team's head coach & committee members, which currently is 7 users. These are users of a varied skill set and technical background so should not need the prerequisite of any technical skills or specialist software knowledge in order to maintain the website. They will however be familiar with typical word processing software and web browsers therefore to deploy a web based content management system would relieve the problems identified with the current approach and ensure a basic familiarity with a web based graphical user interface (GUI). By providing an online system it should also be accessible for users whether they require specialist software such as screen readers or magnification software and devices regardless of whether it is a high end PC or a mobile phone. By using well-structured code that adheres where possible to web standards set by The World Wide Web Consortium.

The system should facilitate the need to provide details of training sessions, matches and results each week as well as display all of the current information which details the history of the club and its results over the years. Information on the site should be easily located, likely through a search function and well-categorised content paired with simple a logical navigation.

The creation of a knowledgebase on the new system where each year new committee members could find all the information relating to their role within the team and what they are responsible for. This would include a list of contact details for everything required to arrange matches each week as well as important contact details within Sheffield Hallam Union along with any forms that need to be filled out and information with regards to processes that need to be followed. This area of the system should be hidden from public view and also the view of everyone within the team other than coaching staff and committee members. This can be achieved through the login access restrictions assigned to user accounts

on the chosen CMS or through a plug-in installed specifically for the purpose of providing protected content without having to visit the forum.

Future maintenance and upgrades should include minimum risk of data loss and where possible avoid the requirement to upload files from an off-line system via file transfer protocol (FTP). Also the backup process should be just as straightforward and avoid any potential risks, akin to the current backup process of the vBulletin forum used by the team which runs automated backups to a specified directory on the server.

The essential deliverable will be a content management system configured with all the team's details and containing as much relevant and up to date content as possible, ready to be deployed on their domain with little, to no downtime. The system should be pre-installed with all plug-ins necessary to ensure that the system meets the requirements as closely as possible and possibly goes beyond what has been asked for. Outside of what is essential it would also be a custom theme or template built specifically for the team specific to what they need along with training material/user documentation tailored to the system that is developed along with extra information and video tutorials online.

The benefits of deploying a CMS identified by Smashing Magazine (2010, p19) include:

- Reducing the technical issues of creating content
- Allowing more people to contribute to content
- Allowing for rapid content updates
- Facilitating a greater level of control

Furthermore the reliability problems which have been experienced in the past due to the issues with the hosting company's database servers may well lead to a recommendation for a move to a more reliable hosting company to suit the new system and ensure the smooth running of the website and forums in the future.

## 4.1 Requirements

### ***Essential non-functional system requirements:***

- CMS must be simple to navigate around and use for authors and users
  - Simple navigation with few levels of depth
- CMS must be secure
  - Login required to authenticate authors and administrators
- CMS must be simple to install
  - To minimise any downtime when deploying the system and configuring it
- CMS must be simple to maintain and backup
  - Using automated processes where possible to allow unskilled users to perform core duties.

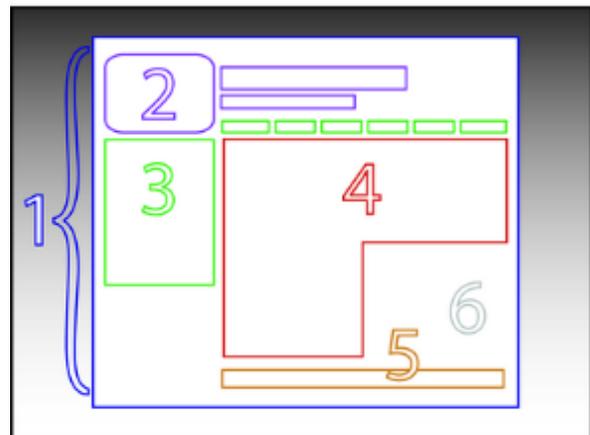
### ***Essential functional system requirements:***

- CMS must contain a WYSIWIG editor
  - Allowing for simple content creation without the need to understand code in order to format posts or pages
- CMS must allow control over the site's navigation and pages
  - If site content changes users should have the ability to reflect these with the menu structure and page layouts
- CMS must allow for the upload and/or attachment of media items
  - A key requirement is for the use of photo and video in the new system, these should be easily linked to content.
- CMS must be cross-browser compatible
  - The system should be functional and useable without specific software or hardware requirements

### ***Desirable system requirements:***

- CMS should be standards compliant
  - To ensure maximum usability for able and disabled users alike
- CMS should offer statistics tracking

## 5. Website Structure



**Figure 2 – Anatomy of a web page**

Crucial to a successful website is a simple structure which users can understand instinctively. Almost all websites follow the same structural blueprint (Figure 2 – Anatomy of a web page), which now will be discussed in greater detail.

**Container** – The container (identified in Figure 2 as #1) is the element of a page which forms the boundary for all content and can be found on all websites whether it is an element styled specifically by the designer or a fluid layout which leads to the container being controlled by the size of the browser window. When designing the layout of a page it is important to consider a minimum screen resolution that the container should fit within. For this system the Google Analytics data (Appendix ) determines the minimum screen resolution for the container to measure 1024 pixels in width.

**Page Branding** – The area of a page where the brand image is located (identified in Figure 2 – Anatomy of a web page as #2) typically includes the site logo and the name which makes the site unique and identifiable to visitors, consequently it is the most important area for consistency within the design.

**Navigation** – Visitors expect to see navigation (identified in Figure 2 – Anatomy of a web page as #3) at the top of a page before any other

content areas. It is essential that it is simple to use and easily identifiable (Beaird 2007).

The importance of navigation can be summarised by Krug (2000, p51)

People won't use your Web site if they can't find their way around it.

*Content* – Content should occupy the largest area of the page and it is said that “content is king” (Beaird 2007, p8). It is imperative that page content (identified in Figure 2 – Anatomy of a web page as #4) is clear and simple for visitors to understand.

*Footer* – The footer (identified in Figure 2 – Anatomy of a web page as #5) lets the visitors know that they have reached the end of the page, usually containing details about the author of the site and general copyright information.

*Whitespace* – Whitespace, or negative space (identified in Figure 2 – Anatomy of a web page as #6) is the areas of a web page with no content. Designers can use whitespace to guide the eye around content and create balance on a page.

## 6. Content Management Systems

The concept of management content on the web has been around for a long time and originates from the 1990s when *e-business* was the popular term and companies started to do business online and required some way to effectively manage their content. Nowadays *e-business* is seldom spoken of since it is commonplace to deliver products over the Internet, but *content management* has become a key term because relates to more of the web. It was once the case that content could be published and thought of and a single element with no relation or link to anything else although this has been replaced by content which has connections. The rise of social media – Twitter, Facebook etc. – has led to information on the web which is linked together and integrated within applications and these links make the ability to manage content so important. Content is created so that it can be used, shared and used again by others that can only happen if content has these links that can be interpreted by search engines and users. Therefore the best websites are those which make full use of connections to other sites and services (Boiko 2005) to better expose their content to potential users. The problem is that there are no established models on how to create these connections or to get anything, other than greater exposure, in return.

### 6.1 Open Source

The content management systems in this project are all open source, defined by UK Orbit (2005, p1) as:

Software that is free to use and which provides the original source code used to create it so that advanced users can modify it to make it work better for them

Using open source software means that the system can be tailored to meet the requirements of the client. Each of the systems investigated fall under the General Public License (GPL) that is OSI certified and provided by The Free Software Foundation (FSF). This type of license is most

common amongst open source software because it allows users the right to copy, modify and redistribute software providing that the source code is provided when it is redistributed. It is crucial that the system developer complies to the terms of the GPL when a CMS is identified for this project so that the project does not encounter any professional or legal issues.

## 6.2 What is Content?

Content is information that has been thought out, planned and manipulated into words, sounds or images in order to teach or inform the user. According to Boiko (2005, p54) the, now-non-operational, ContentWatch organization gave content the following definition,

Raw information becomes content when it is given a usable form intended for one or more purposes. Increasingly, the value of content is based upon the combination of its primary usable form, along with its application, accessibility, usage, usefulness, brand recognition, and uniqueness.

Therefore the aforementioned notion that in order to build content of value and use it must contain connections to services and websites, this definition supports this, as it would make the content accessible and useful.

## 6.3 What is Data?

Data is what computers process and thus relates to content but data is not content or information in the sense that people would generally understand it. It is made up of small snippets of *computer information* – numbers, words, images, sounds – which alone would convey little meaning but can be interpreted by a computer (Boiko 2005). Data is the medium in which content is delivered, *computer data* makes up video content and images, developers write data in the form of CSS to display and style written content but data is always hidden from the user so that they only need to interact with the content. Data creates the links which give content the connections to websites and services online, this data is known as *metadata* and gives content meaning which can be interpreted

by computers. Metadata typically assigns the following to the associated content for which it is linked; title, keywords, content author and contact information. An example of how this data is used would be from Google, which copies content from websites and indexes it using the metadata to sort it and order it based on algorithms created by the programmers at Google. The process of creating the data for this particular process is known as Search Engine Optimisation (SEO) but it alone is not the key to achieving a well ranked website in the eyes of a search engine. Metadata tags are not the used alone however, because according to Goodman (2002) that would make it possible for there to be a certain tag which would result in a greater page rank. However processes by which pages are ranked have not been disclosed, there is no better model on which to base metadata.

#### **6.4 Testing Criteria**

The system developer has deployed and tested 4 CMS's, Joomla, Drupal, MODx and Wordpress. These have been tested against the following criteria in order to assess them against the requirements:

1. General ease of use
2. Simplicity of the user interface
3. Simplicity of content creation
4. Simplicity for visitors
5. Range of features and plug-ins
6. Quality of support for the system

## 6.5 Joomla

<http://joomla.SHUWarriors.net>

User Name: admin  
Password: izdouj4

Joomla is a popular open source content management system with corporate clients including Harvard University and MTV and provides a huge amount by default to create a content rich website. It features the typical modular design, separating page elements into modules like building blocks, which when all put together make up a page. These modules are broken into such concise parts such as; banners, breadcrumbs, login, menu, latest news, images, polls footer, and more all of which enables developers to achieve greater control over the style and structure of pages.



**Figure 3 – Joomla test site with prototype design**

To assess feasibility of Joomla against the requirements of the system a test site has been created (details listed above) with a simple template and the back-end reviewed. Creating a template based on the existing CSS of the current website proved to be straightforward (Figure 3 – Joomla test site with prototype design) however the administration back-end is complex due to the amount of features which the application provides. The initial page of the administration area (Appendix ) offers a series of icons to select different actions to take such as create content, manage articles, media or users. Beyond this performing these tasks can become fairly complicated and likely be confusing for unskilled users – this doesn't meet the main requirement of the new system. For example when creating a new article for the site (Appendix ) the user is faced with a lot of potential options they are able to control, specifically with the advanced parameters which although aren't required, do add chances of an unskilled user becoming unsure of what they are doing. Also the media

manager (Appendix ) within Joomla which would be used to upload photos and videos for use on the site establishes an FTP connection within the browser window allowing for folder navigation options, management of the files within the media directory and finally the ability to upload files of many formats for use on the site. This is further evidence of the potential for Joomla to provide a vast amount of content to its users, although to do that it requires familiarity with file management and potentially the available parameters and metadata associated with the content. The ideal media manager to meet the requirements of the new system would feature a very simple interface with no options for where the files are to be stored and an upload form; possibly offering multiple uploads, to store local files on the system's server.

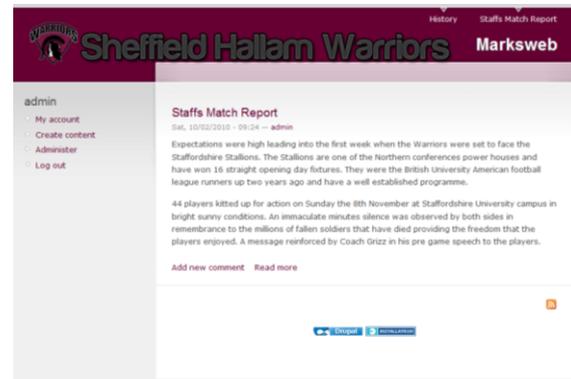
The community of developers for Joomla does create a good quality means by which to gain support through help forums and also extend the functionality of the application through plug-ins. However because the primary criteria during testing is for a simple administration area is not met Joomla cannot continue to be considered as a potential CMS for the new system.

## 6.6 Drupal

<http://marksweb.co.uk/drupal>

Username: admin  
Password: izdouj4

Despite not being supported under the current hosting package Drupal has been tested because of the potential recommendation following this project to change where the website is hosted to a company offering greater support and reliability.



**Figure 4 – Drupal test site with prototype design**

Drupal has many of the features which the majority of content management systems have, it has a lightweight back-end with a template system used to provide the design and style of each individual site, user authentication with a role based permissions (Appendix ) providing access to different content and visual styles. This permissions feature is far more advanced than other CMS's offer with the ability for administrators to select very specifically what content is accessible and what levels of access users have. This feature goes beyond the essential requirements of the system although with this system the team would be capable of grouping users beyond just 'players' or 'coaches' in order to better provide content such as position specific information. Content could also be tailored to unregistered users who visit the site for match reports and scores by providing access to that information until the user is authenticated.

One feature which Drupal has which is more advanced than most CMS's is what they call *collaborative book* which allows you to authorize certain users to be able to contribute to content and provides version control to show changes made and who made them. Drupal also makes adding page elements, which it calls *blocks*, incredibly simple by overlaying the

sections of the page with their name (header, left sidebar, footer etc.) and allowing the user to select from a drop down menu, in which section the block should appear. In Wordpress this is achieved using JavaScript to enable a *'drag and drop'* method that is less accessible but more engaging for the user.

Unfortunately the majority of functionality beyond posting of news and simple articles comes from the installation of modules, which although are in abundance would add to the difficulty level for an unskilled administrator of the site to upgrade or install new features. Although modules could be pre-installed when the system is deployed unforeseeable future scenarios could result in modules failing to function that might prove beyond the skill set of site administrators at that point in time.

Drupal causes concerns with the usability of the administration of the site initially because although it is possible to assign a different template to the front end and the administration back-end system each is effectively the same. Whereas Joomla had very different front-end and back-end pages (**Error! Reference source not found.** & Appendix ) Drupal has very similar pages essentially displaying the same menu structure for administrators from the front and back-end (Appendix & Appendix ). The interface for content creation doesn't offer a graphical rich text editor like the other systems being tested as standard and instead requires a plug-in for such functionality. In the event of plug-ins ceasing to function problems might occur with regards to content authoring.

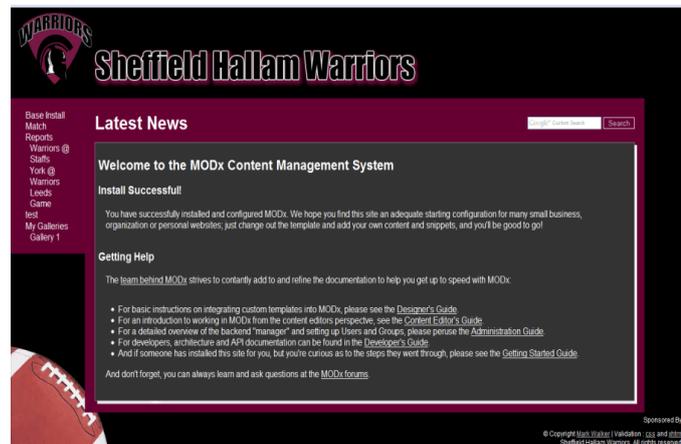
Drupal is a strong contender for the new system because despite the potential issues raised the user interface for administrators and site visitors is very straightforward and simple to understand. The quality of the support forums is also very good and the platform is the system of choice for the Open Source Initiative's website.

## 6.7 MODx

<http://marksweb.co.uk/modx/>

Username: admin  
Password: izdouj4

MODx is another open source CMS although it is much more flexible than Drupal & Joomla. It was the easiest system to create a template for (Figure 5 – MODx test site with prototype design) because the



**Figure 5 – MODx test site with prototype design**

system fits the theme opposed to the others where the theme is built to fit the system. The benefit of this was that the code for the current site could be used without any need for editing apart from those areas in which content created by the system should appear.

This simplicity for the system developer in setting up the site relates to the fact that MODx is a system that has been developed by a team of developers specifically as a CMS for people who like to write code.

However because of this focus around developers the back-end of the system (Appendix ) as usability implications for unskilled users due to usability issues experienced by the system developer during testing. Whereas the other systems refer to content by posts, pages or simply content, MODx refers to resources and elements. The management of content within the system is also complex in the way in which child and parent relationships are established between pieces of content. Therefore this platform is not suited to the client because it doesn't meet the basic ease of use requirements.

## 7. Chosen Platform

Following the implementation and testing of Joomla, Drupal, MODx and Wordpress the most suited platform for the new system is Wordpress. Originally developed in 2003, Wordpress is now the largest self-hosted blogging tool and has a huge community of developers continually improving the system. Because people who simply want to keep a blog without any worry for technical details regarding their site most often use it this system is perfectly suited to the client. Wordpress offers all the functionality expected from a CMS with vast additional functionality available through the use of plug-ins (Appendix ). This enables the system developer to deploy the Wordpress client and then install plug-ins that will add the functionality needed in order to meet the client requirements without providing so much functionality that the system becomes confusing for the client.

Wordpress is incredibly modular in its design, a basic framework that is built upon with themes and plug-ins to enable greater functionality. Frameworks of Wordpress also extend to complex template, which enable designers to be able to apply their style sheet to a well-established template.

Wordpress allows system administrators the ability to perform all actions through the administration interface, completely removing the need to transfer files between the user's computer and the web server. It is possible to install updates to Wordpress, plug-ins and themes all automatically within a web browser.

Wordpress offers fantastic support for mobile devices and smart phones with the iPhone OS and Blackberry both having specific software developed for visitors and site administrators that optimise the site experience for those device platforms. Both devices are popular amongst the client's coaching staff so they would be able to add content to the website conveniently and from almost anywhere.

## **7.1 Hosting**

Throughout the investigation, testing and development of this project the content management systems have been based on database servers provided by VidaHost. During which time each system has experienced zero downtime and rapid response times when performing tasks linked with databases. VidaHost also offer a user interface that better meets the requirement for this project to be suitable for unskilled users through the use of cPanel to administer hosting packages. Through cPanel users are able to access software called softaculous enabling "one click software" (Vidahost, 2010) installation popular applications including Wordpress, through a very simple graphical interface that is capable of setting up databases and other technical details automatically. These features make VidaHost perfectly suited to the requirements of the client and therefore will be recommended as a future hosting provider.

## **7.2 Development**

The underlying factor for deploying a CMS is to relieve where possible the requirement for the need by the client to undergo any development processes after the system has been deployed. In order to achieve this the system developer will be required to customise the system and template to best fit the client. This development work has used the same processes as the current system with Windows based text editors as well as the inclusion of Coda for OSX which enables the editing of files live on web servers because it simplifies the process by removing the need to transfer files.

In understanding more about the way in which Wordpress works the system developer created a plug-in (Appendix ) for the new system which would enable a visitor to the site with a Twitter account to be able to share the page they were reading with their Twitter followers. This is only a simple function using a basic call to the Twitter API but it enabled a deeper understanding of how the system works during the development phase.

## **7.3 Usability**

Usability focuses on a users experience whilst using a website and how easily they can perform tasks. Good usability directly relates to good design and organisation, and a principle rule of usability is that in order to any feature or piece of content within an application or website

## **7.4 Accessibility**

Defined by Slatin and Rush (2002, p3):

Web sites are accessible when individuals with disabilities can access and use them as effectively as people who don't have disabilities.

Making a website accessible must therefore include the study of disabled users who might require specialist software such as screen readers or magnification applications in order to access a website. The needs of disabled users cannot be overlooked in the designing of a website and although not the primary user base for the client site they should still be able to use the system. This project has used a screen reader application called Jaws to test the systems developed are accessible.

The importance of accessibility lead to the formation of a new set of standards by which website could be checked known as '*section 508*' a name which comes from the United States law from which the standards were developed. Government resources online must meet these standards by law and therefore form a procedural check which should ideally be performed by all website developers.

## **7.5 Developing a Theme**

### **7.5.1 Introduction**

Theme development in Wordpress can be a repetitive process because at code level every theme contains the exact same data to function with Wordpress' back-end. In order to prevent the need to repeat the same coding elements theme frameworks exist which enable designers to focus on the style and layout of their websites. Theme frameworks are to a web

designer what a canvas is to an artist – they provide something on which to create art for the web.

Using a framework as a basis on which to start a customised site style is what is known as a parent template that is mirrored by the new template known as the child template. Using a child template enables a designer to completely avoid having to write any HTML as it is inherited from the parent and they are able to use their own style sheet and functions to make the style their own. The most basic child template simply requires a cascading style sheet (CSS) file containing the following code;

```
/*
Theme Name: Warriors do K2
Theme URI: SHUWarriors.net
Description: K2 Child theme for SHUWarriors.net
Author: Mark Walker
Author URI: markswb.co.uk
Template: k2
*/
```

This would display as a separate template in Wordpress by the name of *Warriors do K2* and with the line *Template: k2* would look for the K2 template and inherit all of its content. As new page templates and/or CSS become available for the child theme it is used in place of the parent template.

Andrew (2009) suggests that using theme frameworks should not be about finding which is the best, but instead should be about finding the framework that suits the project. Therefore several frameworks will be developed to identify which best suits the requirements of the system.

### **7.5.2 Theme Generator**

The first theme created by the system developer (Appendix ) was the most basic theme created using a 'theme generator' online to specify basic style elements. This service then generated the files for the theme that could be studied by the system developer to understand how Wordpress themes are developed. This initial theme was typical of a blog style website with a feed of information to make up the content, a sidebar for some external links and login features and a navigation bar beneath

the header. This theme was successful in increasing the system developer's understanding of the system and process by which a theme is developed which lead to a further investigation into theme frameworks.

### **7.5.3 Thematic Framework**

The Thematic framework identified by Andrew (2009) as powerful and feature rich, was the starting point for the system developer using a tutorial that provided guidance on the creation of a theme from scratch. The second theme developed from this framework attempted to move away from the typical appearance of a Wordpress site and move towards a site that could be styled for the client. This framework proved to be more suited to news or literature based sites (Appendix ) in its default style which lead to further investigation into a more suited starting point.

### **7.5.4 K2 framework**

The K2 framework was developed as a collaborative project including the developer behind the default Wordpress theme that makes this well respected amongst the Wordpress community. The system developer became eager to investigate this framework following the comment from Russell (2010):

I had no idea I'd be so happy with this thing... that I would be so impressed that I'd put away everything I'd been working on for my new Wordpress theme for this site and instead base it on K2, making it a child theme of this amazing new framework

This framework excels in its use of modern technology, most noticeably the use of JavaScript for searching. The search function displays search results dynamically in the page completely removing the need for a user to navigate through content providing they make a successful search. This is a great tool for usability and accessibility whilst using JavaScript enabled software as it completely removes the requirement for the user to interact with the page beyond the search field and thus saving time navigating through search results.

K2 also features dynamic image capabilities, specifically with the header of a page displaying a random image from a directory of the system each time a page is loaded. This feature appeals to the requirements of the system because all that would be required from the client is that they prepare images to a pre-defined pixel dimension and upload those to the necessary directory using the media manager within Wordpress.

Therefore the system could be kept up to date with images simply by making sure that the latest photos were uploaded each week and the system would deal with the technical aspect of displaying them. A key feature is the theme's various style sheets which enable browser detection to select from the correct style and cause the browser to display exactly the same whether being viewed in the latest version of Firefox with the latest CSS and JavaScript support or Internet Explorer 6 with very limited support for these technologies.

The framework maintains a column-based layout with a user controlled variable for 2 or 3 columns. The system developer identified this as the best-suited theme for the system due to its advanced features, cross-browser compatibility and aesthetic appeal (Appendix ). Through specific K2 plug-ins additional functionality could be added to the theme to enable unskilled users to add to the theme. Contained within the framework are sections of the code called "*hooks*" which when combined with a plug-in allowed for code to be inserted into the hooks. This would enable the client to add adverts or important announcements to the site in pre-defined areas.

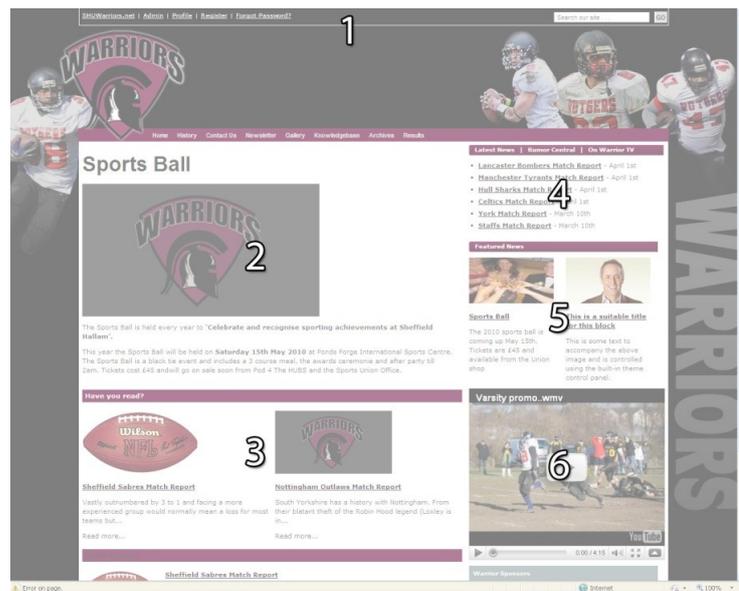
At this point in system development user testing and feedback was started in order to give specific direction for the path in which to take the system.

### **7.5.5 Premium Themes**

Theme frameworks failed to effectively meet the requirements of the client. The system developer then discovered premium Wordpress themes inclusive of several specific to sports teams. The first premium theme investigated was Builder from iThemes who described it as "a theme that's more like web design software" (iThemes Media LLC, 2010). This theme is incredibly complex and uses the parent, child theme concept along with a vast array of options for the user within the administration area of Wordpress. This enables users of any skill level to create a theme based upon the design they create using the options from the system back-end. The system developer found this method to be simple from a user's perspective but because it didn't allow for the editing of code it was not an efficient process. Furthermore the theme caused usability issues relating to the increased amount of options potentially creating the possibility for confusion when used by the client.

Following the potential success of a sports orientated premium theme the system developer identified a theme by the name of WPSN. This theme simplified the concepts introduced by Builder, maintaining an element of control over the theme with extra options added to the administration panel. This control allows for content to be added to areas of the sidebar such as news stories, a featured video and also sponsor links. This theme received unanimous support from the client's coaching staff and players alike and was developed following their feedback (Appendix ).

## 7.6 Elements



**Figure 6 - elements of the theme**

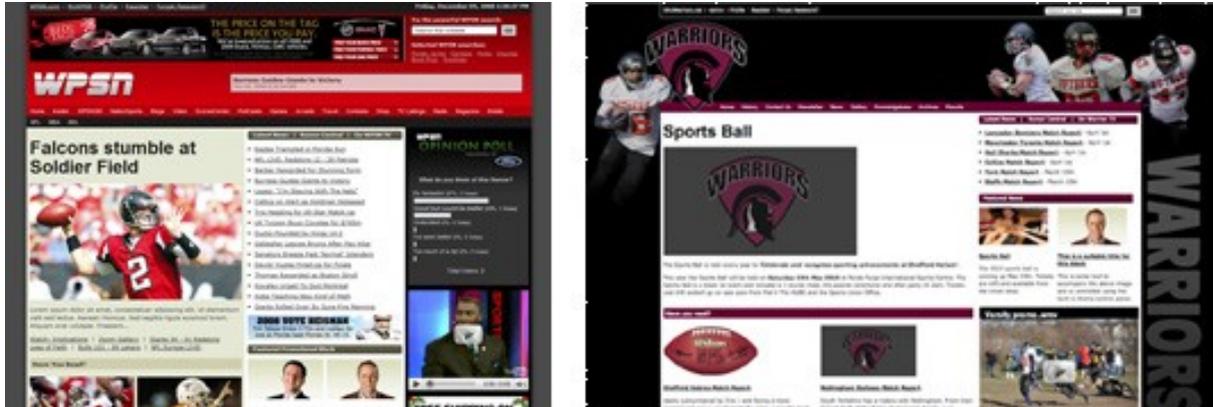
The above image (Figure 6) highlights the elements that make up the home page of the system. These elements will now be discussed in detail:

1. The header - the theme header includes the links to login to the back-end (for both general users and administrators) and site search feature. The navigation is the last element of the header, formed as an accessible list of links. These are two elements of the page that users expect to be able to identify and find quickly and easily (Beaird, 2007).
2. Latest News - located in this area of the page is the latest post to have been made along with the image attached to that post and a link to continue to read should the content be greater than this area of the page allows.
3. Older News - this secondary news area contains the two stories prior to the latest to ensure that news is kept accessible for as long as possible for visitors. Beneath this section is a similar section that outputs latest posts from a variety of categories.

4. Sidebar latest - the sidebar begins with several 'hooks' which can be links or static text, as defined in the style options section of the back-end. A list of links to the latest posts follows on from this area.
5. Featured news - this element is separated in to two sections which is again controlled by 'hooks' although this time allowing for the inclusion of an image which could be used as a place for the client to keep content which is relevant for a long period of time.
6. Featured video - a major requirement fro the client is for the inclusion of multimedia. This element allows for this to be met with the inclusion of a video file from a video-sharing site such as YouTube. Beneath this section is the section for the client's sponsor links that can be inserted as images or text links.

## 7.7 Style Sheet

The style for the WPSN theme that has been edited for the system started out as a 3-column layout with an incredible quantity of advertising space.

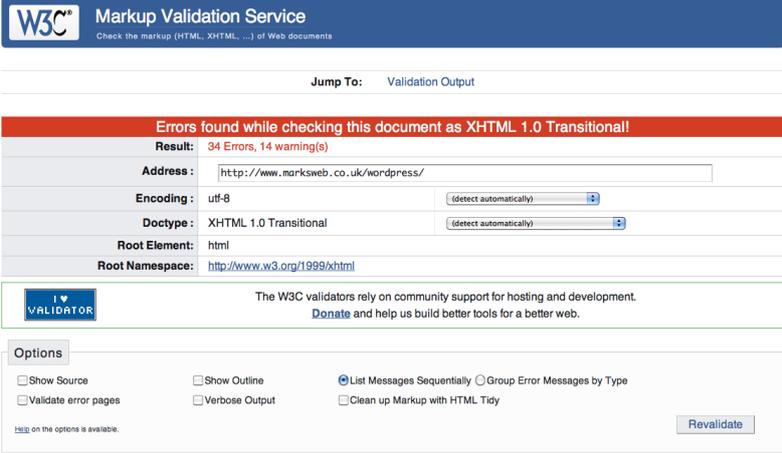


**Figure 7 – Before and After WPSN theme development**

The structure of the original theme was incredibly busy with very limited whitespace. When a user visits a site like this it can overwhelm the user because there is just so much happening on the page it is difficult to decide where to look. The system developer key idea with the new system was to simplify the design and bring in whitespace and balance. The difference between the two can be seen in Figure 7.

## 7.8 Validation

Website validation is an important part to making a site accessible to all users and device platforms. Validation refers to the mark-up of the theme meeting a set of standards according to its doctype. The doctype is the code that identifies the language and version that the mark-up is written in.



The screenshot shows the W3C Markup Validation Service interface. At the top, it says "W3C Markup Validation Service" and "Check the markup (HTML, XHTML, ...) of Web documents". Below that, there is a "Jump To:" dropdown menu set to "Validation Output". A red banner indicates "Errors found while checking this document as XHTML 1.0 Transitional!". The main content area shows the following details:

<b>Result:</b>	34 Errors, 14 warning(s)
<b>Address:</b>	<input type="text" value="http://www.marksworld.co.uk/wordpress/"/>
<b>Encoding:</b>	utf-8 <input type="button" value="(detect automatically)"/>
<b>Doctype:</b>	XHTML 1.0 Transitional <input type="button" value="(detect automatically)"/>
<b>Root Element:</b>	html
<b>Root Namespace:</b>	<a href="http://www.w3.org/1999/xhtml">http://www.w3.org/1999/xhtml</a>

Below the details, there is a section for "Options" with several checkboxes:

- Show Source
- Show Outline
- List Messages Sequentially
- Group Error Messages by Type
- Validate error pages
- Verbose Output
- Clean up Markup with HTML Tidy

At the bottom right, there is a "Revalidate" button. A small "I ♥ VALIDATOR" logo is also visible.

**Figure 8 – system validation results**

Unfortunately the theme that was selected by the team fails to pass a validation test with 34 errors and 14 warnings. Some of these are caused by the system only containing test data at the time of validation, others are due to technical faults in the way the theme is configured.

Unfortunately these errors are beyond the skill set of the system developer but do not directly effect a users ability to view the site so is not major problems for the implementation of the system.

## 8. Implementation

The system has been selected for its general ease of use and this extends to the implementation phase. Using existing database information from the testing system the client's domain could be updated to the new system quickly and efficiently. The main concern for the client during this phase is to minimise the time the site is offline and also the user's exposure to any incorrect or general test data. With correct change

management procedures and data consistency checking before moving any data between the testing system and the client's server any potential problems will be easily avoided.

## 10. New System Overview

### 10.1 Front-End

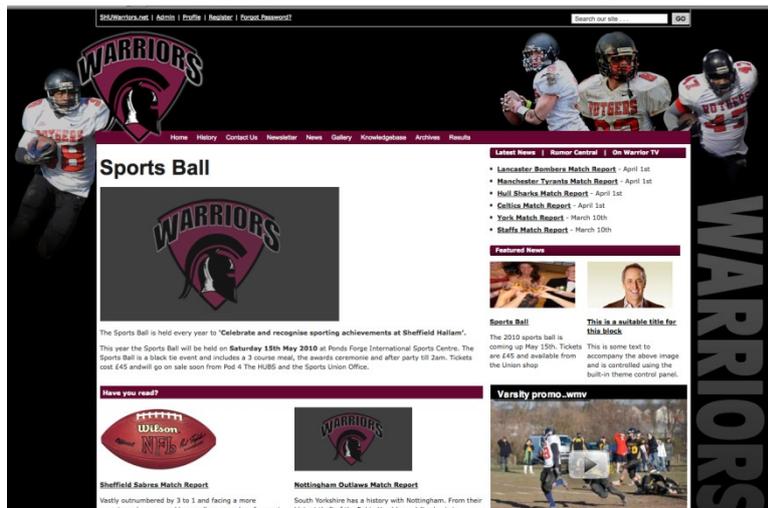
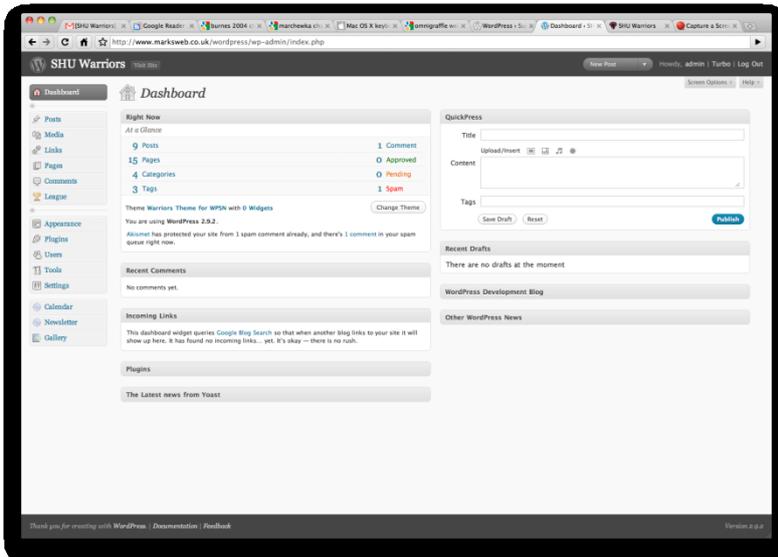


Figure 9 – New system front-end

The new system presents the user with clear content that meets the system requirements. The site is simple to navigate around by maintaining the same level of depth to the page structure as is present in the current system (Appendix ). This aids usability for users who are used to where content is located in the current system because they will be able to find it straight away in the new system. Feedback during the creation of this finished design inspired the final layout and aesthetics after one of the client's captains commented on an earlier design, "It should look like the Raider's website" (SHU Warriors, 2010) and this view was supported by others. The Raider's website can be seen in Appendix . The new system continues the ability for integration between a user's Wordpress account and their Facebook account as is currently possible with the vBulletin forum. Unfortunately however accounts cannot be linked between the forum and Wordpress system for a single sign-in.

## 10.2 Back-End



**Figure 10 – Wordpress back-end**

The back-end is where everything is happening with the new system and where the requirements' being met becomes clear.

- CMS must be secure
  - Login is required and existing administrators must give permissions to enable other users to access authoring.
- CMS must be simple to install
  - The system developer will deploy the system, as well as a backup to provide a 'clean' install for backup purposes in case any problems occur.
- CMS must be simple to maintain and backup
  - The system automatically sends a database backup to the team email account on a weekly basis.
- CMS must contain a WYSIWIG editor
  - The system uses WYSIWIG
- CMS must allow control over the site's navigation and pages
  - The back-end of the system gives control over all aspects of the site

- CMS must allow for the upload and/or attachment of media items
  - The system has a built in media manager but also a plug-in installed to manage image galleries for improved organisation
- CMS must be cross-browser compatible
  - The system has been tested to work in Safari, Firefox, Chrome, and Internet Explorer version 6. All of which are functional.
- CMS should be standards compliant
  - Unfortunately the theme is not currently standards compliant.
- CMS should offer statistics tracking
  - The system does offer statistics tracking from Google Analytics with a user variable input for this feature.

## **11. System Evaluation**

Overall the system that has been developed is the best possible CMS for the client's requirements out of all those investigated for this project. The system provides the client with the ability to be able to add content from almost anywhere with an Internet connection through the inclusion of support for mobile devices and smart phones in content authoring. The system also allows for all maintenance tasks to be performed within an Internet browser, from backing up the system, to updating or installing new features. The level of automation that Wordpress provides will be of great benefit to the client. There are areas of the system which will require future work such as potential changes to the plug-in currently setup to track the progress of the team's within the same league as the client but at the time of writing the team is out of season so such features cannot be fully tested.

In it's current state the system could undergo some minor changes mainly cosmetic. The base theme from which the final system was developed lacked a dynamic sidebar from which the client could take advantage of plug-ins that they could install and activate through the

back-end of the system. This feature has been added although not completely configured, this would be the first area in which additional work would be completed.

## **11. Project Reflection**

### **11.1 Introduction**

The main aims and objectives of the project author at the beginning of this were to create a system for the client that would enable them to thrive in future without having to worry about recruiting players or coaches with technical skills in web design. Also to provide the team with a system that was on a par, hopefully better than that of competitors.

It is the feeling of the project author that these aims have been met although not exceeded. The system has been developed and is fully functional, ready to be used. However the system is very similar to that of other teams in BUAFL.

### **11.2 Project Selection**

Making the choice to take on this project was an obvious and easy choice for the project author having already spent a year responsible for the website of the Hallam Warriors. This time made it obvious how important the successful completion of a project like this would be to the team and also in terms of the experience gained in the investigation and development of a project of this scale. In terms of potential scale of this project, the system could potentially be deployed and used for an exponential amount of time – as long as Wordpress is developed and the system meets the requirements of the team.

### **11.3 Impact of the project**

As has been said in the previous section, this project potentially could have a massive impact on the client in becoming their web-based system for managing their online presence for the foreseeable future. The project

was based on the scenario whereby the client had no technical users, if this were the case then the system would be required to be functional and secure for the length of time it was used for. The system should provide the team with the ability to succeed in this through its usability benefits previously discussed.

#### **11.4 Future Work**

Following the completion of this project the project author has been asked by the head coach and primary user of the project's client to look at developing a similar system for another American Football team in Sheffield. This team is coached by the same staff as the Sheffield Hallam Warriors and therefore the development of a system would make for a much more straightforward process following on from this project. The requirements would be similar, if not the same and the current system could be modified slightly to adjust to the needs of the other team.

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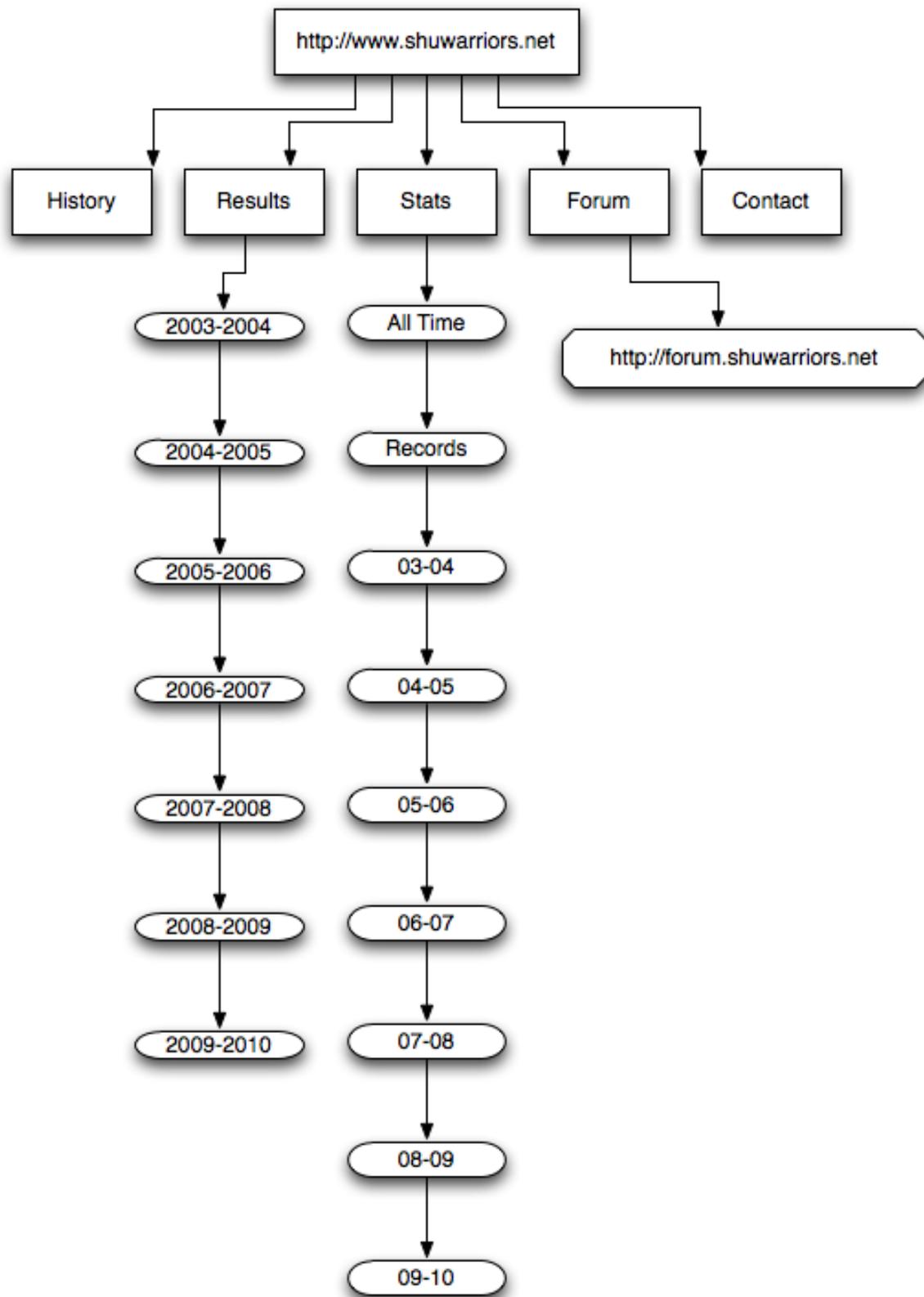
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# Appendix

## Current System



Appendix 1 – Current vBulletin forum at forum.shuwarriors.net



**Appendix 2 - Current system structure**

# Site Map

## Homepage

Last updated: 2010, April 8

<b>/ 5 pages</b>
<a href="#">SHU Warriors: Home</a> <a href="#">SHU Warriors: Home</a> <a href="#">SHU Warriors: History</a> <a href="#">SHU Warriors: Contact</a> <a href="#">SHU Warriors: Defensive Players</a>
<b>images/ 1 pages</b>
<a href="http://www.shuwarriors.net/images/sports%20fair%20-%20Warriors.pdf">http://www.shuwarriors.net/images/sports%20fair%20-%20Warriors.pdf</a>
<b>results/ 7 pages</b>
<a href="#">SHU Warriors: Results</a> <a href="#">SHU Warriors: Results - 2003/04</a> <a href="#">SHU Warriors: Results - 2004/05</a> <a href="#">SHU Warriors: Home</a> <a href="#">SHU Warriors: Home</a> <a href="#">SHU Warriors: Home</a> <a href="#">SHU Warriors: Home</a>
<b>stats/ 9 pages</b>
<a href="#">SHU Warriors: Stats - All Time</a> <a href="#">SHU Warriors: Stats - Records</a> <a href="#">SHU Warriors: Stats - 03-04 Season</a> <a href="#">SHU Warriors: Stats - 04-05 Season</a> <a href="#">SHU Warriors: Stats - 05-06 Season</a> <a href="#">SHU Warriors: Stats - 06-07 Season</a> <a href="#">SHU Warriors: Stats - 07-08 Season</a> <a href="#">SHU Warriors: Stats - 08-09 Season</a> <a href="#">SHU Warriors: Stats - 08-09 Season</a>

**Appendix 3 – Current sitemap of shuwarriors.net**

## Website Statistics

Statistics collected for April 15th 2009 - March 31st 2010



### Appendix 4 – Overview of site usage

Sources	Visits	% visits
(direct) ((none))	12,586	63.93%
google (organic)	4,403	22.37%
forum.shuwarriors.net (referral)	977	4.96%
facebook.com (referral)	880	4.47%
en.wikipedia.org (referral)	273	1.39%

Keywords	Visits	% visits
shu warriors	1,894	40.40%
sheffield hallam warriors	923	19.69%
hallam warriors	647	13.80%
shuwarriors	325	6.93%
marksweb	144	3.07%

### Appendix 5 – Traffic sources and keyword searches



DSL	671	54.20%
Cable	261	21.08%
Unknown	166	13.41%
T1	88	7.11%
Dialup	51	4.12%

### Appendix 6 – Usage data from direct site traffic

### Appendix 7 – Internet connection data (above, right)

	Browser	Visits	Visits
1.	Internet Explorer	10,532	53.50%
2.	Firefox	5,818	29.55%
3.	Safari	1,597	8.11%
4.	Chrome	1,512	7.68%
5.	Opera	177	0.90%

	Browser Version	Visits	Visits
1.	7.0	5,440	51.65%
2.	8.0	3,343	31.74%
3.	6.0	1,749	16.61%

### Appendix 8 – Internet browsers used to view the site (above)

### Appendix 9 – Versions of Internet Explorer used (above, right)

	Screen Resolution	Visits	Visits
1.	1280x800	7,589	38.55%
2.	1024x768	3,698	18.78%
3.	1440x900	2,353	11.95%
4.	1366x768	2,329	11.83%
5.	1280x1024	1,420	7.21%

### Appendix 10 – Top 5 screen resolutions used to view the site

	Detail Level: City	Visits	Pages/Visit	Avg. Time on Site
1.	Sheffield	8,826	3.12	00:02:56
2.	London	3,225	3.14	00:01:50
3.	Manchester	876	2.64	00:01:33
4.	Birmingham	458	2.71	00:02:31
5.	Oswestry	373	3.37	00:05:21
6.	Bristol	358	1.63	00:01:21
7.	Shepshed	237	4.54	00:02:27
8.	Rotherham	224	4.05	00:02:19
9.	London	210	2.10	00:01:30
10.	Liverpool	177	2.25	00:01:35

### Appendix 11 – Locations of visits to the site

## Competitors

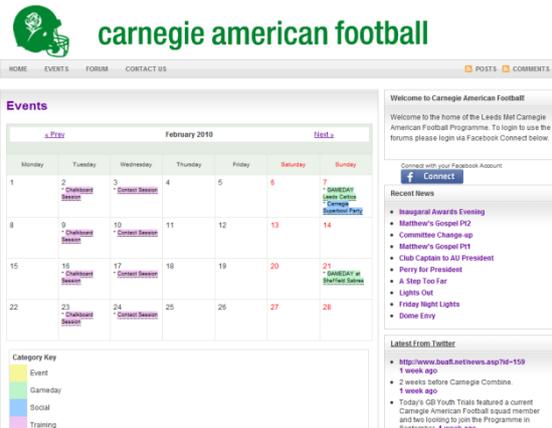


Appendix 12 - Manchester Tyrants website (above) - <http://www.manchestertyrants.com/>

Appendix 13 – Hull Sharks website (above, right) - <http://www.uchsharks.co.uk/>



Appendix 14 – Sheffield Sabres Wordpress site (above) - <http://sabres.union.shef.ac.uk/>

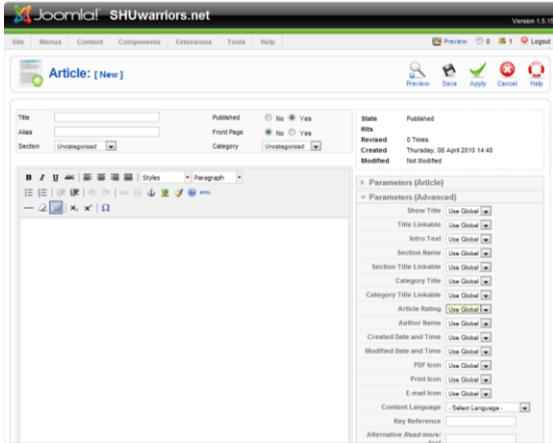


Appendix 15 – Leeds Carnegie Wordpress site (above, right) - <http://www.carnegieamericanfootball.com/>

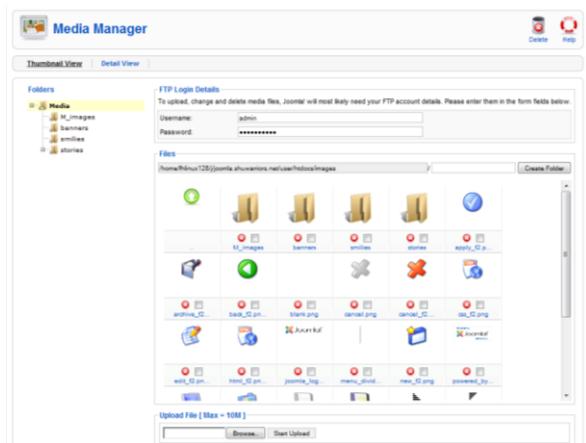
## Joomla testing



Appendix 16 – Joomla Administration Home

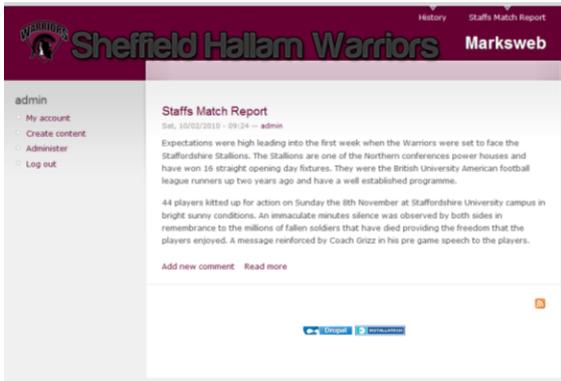


**Appendix 17 – Joomla Article Manager (above)**

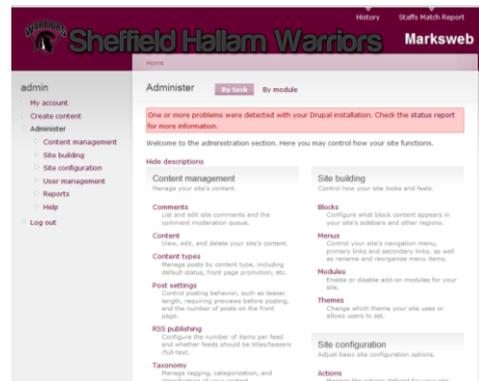


**Appendix 18 – Media Manager within Joomla (above right)**

## Drupal testing



**Appendix 19 – Drupal frontend view for logged in admin (above)**

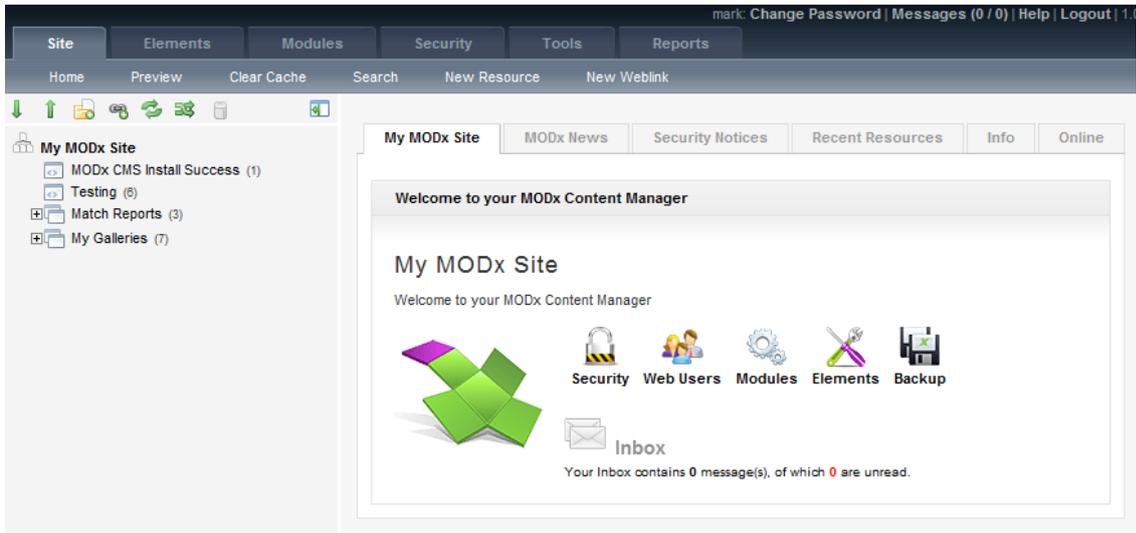


**Appendix 20 – Drupal Back-end for a logged in admin (above right)**



## Appendix 21 – Drupal role based permissions

## MODx testing



## Appendix 22 – MODx back-end admin panel

# CMS Feature Comparison

	Joomla!	Drupal	WordPress.org	Joomla!	Drupal	WordPress.org	Joomla!	Drupal	WordPress.org
<b>Ratings</b>									
<b>Built-in Applications</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Security</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Commerce</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Ease of Use</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Support</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Built-in Applications</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Blog</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Chat</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Classifieds</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Contact Management</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Data Entry</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Database Reports</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Forum/Discussion</b>	free plugin	✓	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Document Management</b>	free plugin	limited	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Events Calendar</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>FAQ Management</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Guest Book</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Link Management</b>	✓	free plugin	✓	✓	free plugin	✓	✓	free plugin	✓
<b>Mail Form</b>	✓	free plugin	free plugin	✓	free plugin	free plugin	✓	free plugin	free plugin
<b>Dashboard</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Newsletter</b>	free plugin	✓	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Photo Gallery</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Polls</b>	✓	✓	free plugin	✓	✓	free plugin	✓	✓	free plugin
<b>Product Management</b>	✓	free plugin	free plugin	✓	free plugin	free plugin	✓	free plugin	free plugin
<b>Search Engine</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Site Map</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Syndicated Content (RSS)</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Tests/Quizzes</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>User Contributions</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Wiki Capabilities</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Web Services Front End</b>	✓	limited	free plugin	✓	limited	free plugin	✓	limited	free plugin
<b>Security</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Audit Trail</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Captcha</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Content Approval</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Email Verification</b>	✓	✓	free plugin	✓	✓	free plugin	✓	✓	free plugin
<b>Security</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Audit Trail</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Captcha</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Content Approval</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Email Verification</b>	✓	✓	free plugin	✓	✓	free plugin	✓	✓	free plugin
<b>Commerce</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Affiliate Tracking</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Inventory Management</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Pluggable Payments</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Pluggable Shipping</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Pluggable Tax</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Point of Sale</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Shopping Cart</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Subscriptions</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Wish Lists</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Ease of Use</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Drag-N-Drop Content</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Email to Forum</b>	free plugin	free plugin	limited	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Friendly URLs</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Image Resizing</b>	✓	free plugin	limited	✓	free plugin	limited	✓	free plugin	limited
<b>Macro Language</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Mass Upload</b>	✓	free plugin	free plugin	✓	free plugin	free plugin	✓	free plugin	free plugin
<b>Prototyping</b>	✓	limited	limited	✓	limited	limited	✓	limited	limited
<b>Server Page Language</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Spell Check</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Style Wizard</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Subscriptions</b>	costs extra	free plugin	free plugin	costs extra	free plugin	free plugin	costs extra	free plugin	free plugin
<b>Template Language</b>	✓	limited	limited	✓	limited	limited	✓	limited	limited
<b>UI Levels</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Undo</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>WYSIWYG Editor</b>	✓	free plugin	free plugin	✓	free plugin	free plugin	✓	free plugin	free plugin
<b>Support</b>	Excellent	Very Good	Good	Excellent	Very Good	Good	Excellent	Very Good	Good
<b>Code Skeletons</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Commercial Manuals</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Commercial Support</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Commercial Training</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Developer Community</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Online Help</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Pluggable API</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Professional Hosting</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Professional Services</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Public Forum</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Mailing List</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Smoke Tests</b>	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin	free plugin
<b>Third-party Developers</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Users Conference</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓

## Appendix 23 – Comparison of CMS features between those systems tested

## Wordpress Plug-in

```
<?php
/*
Plugin Name: Share on Twitter
Plugin URI: http://www.marksweb.co.uk
Description: A simple 'Share on Twitter' widget
Author: Mark Walker
Version: 1
Author URI: http://www.marksweb.co.uk
*/

/* echo a link to twitter to show what you're reading */
function tweetthis() {
global $wp_query;
$postName = $wp_query->post->post_name;
echo '<div id="tweetthis"><a href="http://twitter.com/home?status=Currently
reading \'.$postName.\': \'.get_permalink($post->ID).\'' title="Click to
send this page to Twitter!" target="_blank">Share this page on
Twitter</a></div>';
}

/* Function to get user variable from theme */
function widget_tweetthis($args) {
extract($args);
echo $before_widget;
echo $before_title;
echo $after_title;
tweetthis();
echo $after_widget;
}

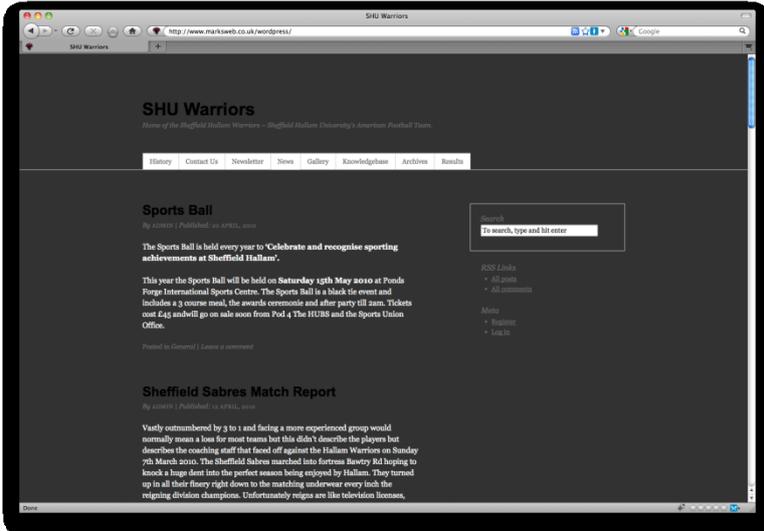
/* Initialise the widget */
function tweetthis_init() {
register_sidebar_widget(__('Share on Twitter'), 'widget_tweetthis');
}
add_action("plugins_loaded", "tweetthis_init");
?>
```

## Appendix 24 – Wordpress Plugin written by Project Author

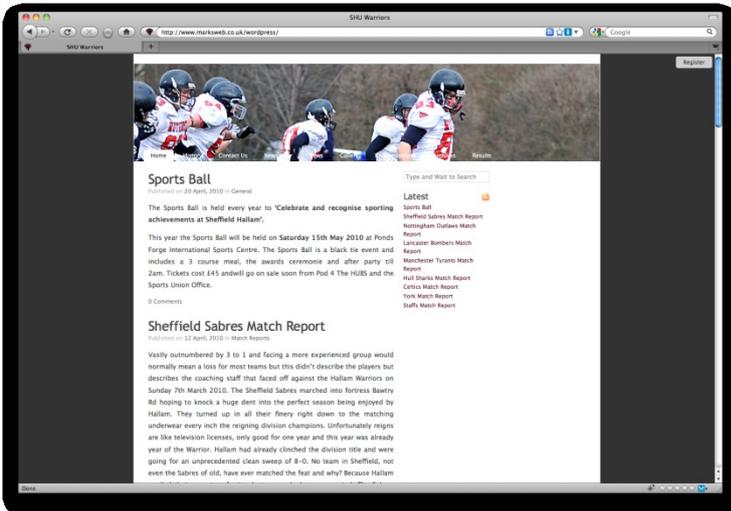
## Wordpress Theme Development



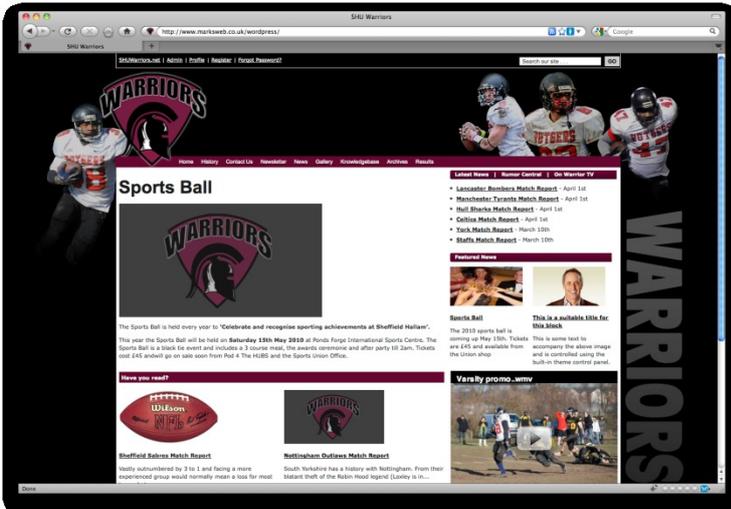
## Appendix 25 – Basic first thematic theme



Appendix 26 – Further development on thematic framework



Appendix 27 – K2 theme framework



Appendix 28 - WPSN premium Wordpress theme



**Appendix 29 – Raiders.com – final design inspiration**

**Original Project Specification**

**Sheffield Hallam University  
Faculty of Arts, Computing, Engineering and Sciences  
BSc (Hons) Interactive Media with Animation**

**Project Definition**

Student: Mark Walker  
 Date: 7 November 2009  
 Supervisor: Dr Mike Gibson  
 Level of Project: BSc (Hons) Interactive Media with Animation  
 Title of project: The investigation and development of a real-time content management system for developing and maintaining dynamic web based materials.  
 Type of project: Application based

**Elaboration**

Sheffield Hallam Warriors are the American football team of Sheffield Hallam University and play in the British Universities American Football League (BUAFL) Conference 2 against other teams in the region. Sheffield Hallam Warriors currently have an existing web presence but maintaining this can be difficult and time consuming, updates require files to be edited offline and uploaded in order for content to be changed. In terms of web site integrity and effectiveness, this can also be problematic due to variance in the experience of and the turnover of web administration staff. These are all issues that this project will aim to address.

This project will investigate the requirements of a leading edge web presence for the Warriors and will propose a structure/design to feed into the development of a prototype system to meet these requirements. The prototype will be supported by the implementation of a content management system so that content can be altered directly from an internet browser, without any technical knowledge. This

will ensure the web presence can be maintained and improved each year without the need for someone with detailed website development experience.

## Project Ethics

All ethical issues pertaining to the project have been considered and an appropriate course of action will be followed. This may include, but is not limited to, using human subjects as respondents during data collection and as testers/evaluators.

## Project Objectives and Deliverables

1. Investigate a selection of content management systems to ensure that the most suitable is implemented.
2. Understand the theory of content management systems and the reasons for their use.
3. Produce a set of requirements to ensure that the system to be implemented meets the demands of the team.
4. Analyse the websites of other teams within the same league as the Warriors.
5. Produce a structure for the new system based on the analysis of other sites and the requirements of the team.
6. Design a prototype system using the established structure ensuring that the existing site design is maintained as closely as possible to maintain consistency.
7. Test the prototype and evaluate it against the requirements.
8. Suggest possible future development and enhancements to the system.
9. Produce a report of the project.

The deliverable for this project will be a prototype of a functional content management system to be used by Sheffield Hallam Warriors to develop and maintain their website.

## Task Plan

<i>Task</i>	<i>Milestone Dates</i>
1. Research the websites of rival teams within BUAFL	November 27 <sup>th</sup>
2. Determine the requirements of the deliverable	December 4 <sup>th</sup>
3. Determine what platform best supports the requirements	December 18 <sup>th</sup>
4. Design a feasible prototype considering the scope of the project February 1 <sup>st</sup>	
5. Implement the prototype system	February 12 <sup>th</sup>
6. Undertake system testing with users	February 26 <sup>th</sup>
7. Optimise the prototype based on testing results	March 5 <sup>th</sup>
8. Release optimised system to the entire user base	March 15 <sup>th</sup>
9. Critically reflect on the system and propose future improvements April 1 <sup>st</sup>	
10. Complete the writing of the project report	April 16 <sup>th</sup>

### Appendix 1 – Original Project Specification