# Web Portal:
## Total Challenge

*Tiago Martins, University of Minho, Portugal*

*Vítor Carvalho, University of Minho & IPCA, Portugal*

*Filomena Soares, University of Minho, Portugal*

## ABSTRACT

*The Web is an extraordinary success, for its simplicity. This simplicity has brought disadvantages, because with vast amounts of information available, the search is a difficult, time-consuming and sometimes inefficient task, creating the need for a strategic information management. To overcome this need came the portals. The characteristics of portals differ from each other, which made them appear different definitions. Also arose several classifications of portals, one of which considers three dimensions to classify them: the scope of content, the aim of the portal and the range of its intended users. With this work, the authors intend to build a Web Portal to support one or more serious games. A database is shared with the Web Portal. This portal will serve to make an interface between the user and the games, for the dissemination and support of these and as a platform for managing and monitoring results.*

*Keywords: Database, Information, Information Management, Interface, Monitoring, Web Portal*

## INTRODUCTION

In recent years, the Internet, and in particular, the Web has expanded continuously, both in dimension and technology used making electronically available a large amount of information. Therefore, it is an amazing success, both in available information and at the rate of growth in the number of users. Its success is based on the simplicity it offers, allowing ease of access to new contents, to the software developers, information providers and users. However, the same simplicity that made possible the staggering Web growth also brought disadvantages which prevent it develops further. These disadvantages are in the lack of ability that the Web has to make information accessible for users in an efficient manner (Gouveia, Oliveira, & Varajão, 2007; Lausen et al., 2004).

The volumes of information in digital format have been growing an exponential form, lying scattered in various databases, what makes difficult the search and limits the profit that can be drawn from such information (Figueiredo, 2005). "Searches are imprecise, often yielding matches to many thousands of hits" (Ding & Fensel, 2001).

The need to analyze information from diverse sources makes redundant this information, which is one of the greater problems of the decision makers (Marwick, 2001).

DOI: 10.4018/jwp.2012010105

It is not possible to directly retrieve a certain piece of information, being necessary to read all the retrieved documents, and only then identify the intended information manually. The research, access, extraction, interpretation and processing of information becomes, then, a difficult and time-consuming task (Lausen et al., 2004).

Therefore, it is necessary to manage all information and the solution to these limitations lies in the implementation of Web Portals. Web Portals provide facilities for users to find interesting information, according to their personal preferences, themes, etc. (Dias, 2001; Lausen et al., 2004).

Thus, we propose as an aim for this article, building a Web Portal to support one or more serious games. These games are not built into the Web Portal; they are a standalone application that communicates with a database, which is also shared with the games Portal. The Web Portal plays no direct role in running the games. It will have two main functions, one addressed to users and other researchers. Regarding the former, the Web Portal will serve to make an interface between the user and the games and for the dissemination and support of these. The second will serve as a platform for managing and monitoring results, which are crucial for research to be undertaken.

## WEB PORTALS

It is true that the Internet has remarkably grown in recent years and, therefore, users feel lost in the midst of such complexity. In the knowledge society we live today, we must have relevant, organized, with quality and easy access information. Therefore it is necessary to make a strategic information management and develop processes to manage the informative chaos of the digital age, so that users can find a way to carry out their researches, with a greater quality, productivity, quickness and profitability. The answer to this need arose in the form of portals that are entry points to the Internet, with directories, news and links to other web sites related to their content. They present a set of important features in the interface allowing the use by people without technical expertise, thereby facilitating the understanding of the system (Warner, 1999; Carani & Nascimento, 2007).

Carani and Nascimento (2007) reported that, according to Microsoft Corporation, a portal is, in general, a web site that adds, in a contextual way, information, applications and relevant services. Through a unique interface to meet the needs and interests of the user, the portal provides a direct response to the large variety and complexity of the online world.

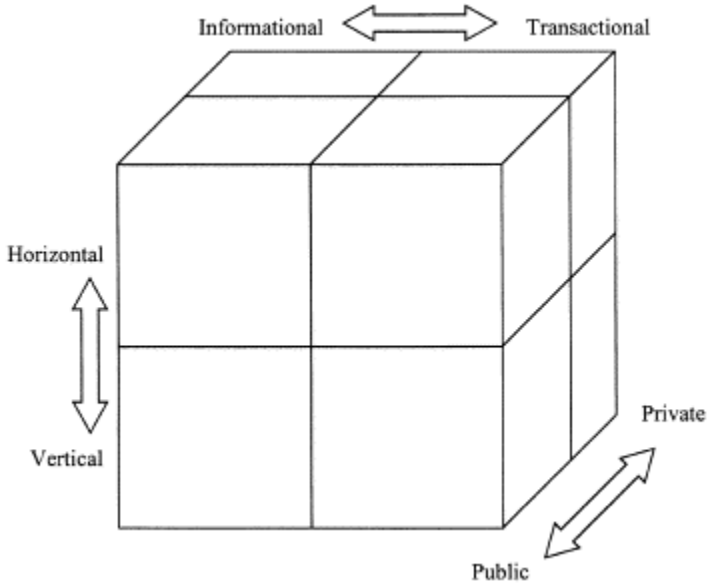
The quick evolution of technology, following the strong growth of the information, made appear in a few years, numerous portals that have, between them, very different characteristics. Therefore, several authors have presented different definitions and the terms Portal or Web Portal were used to define a very broad range of types of websites, which can vary from a simple online catalog to complex solutions of the Intranet (Zirpins, Weinreich, Bartelt, & Lamersdorf, 2001).

### Classification of Web Portals

According to Zirpins et al. (2001), taking into account the aims of the users and the information services offer, we can identify two fundamental classes of Web Portals: Horizontal Portals or Consumer Portals and Vertical Portals. Horizontal Portals or Consumer Portals are websites that act as universal entry points to the Internet. They offer search resources, web catalogs, messaging services, news, online shopping and free home pages. Most of the traditional search engines became Consumer Portals. Otherwise, the contents and services offered by Vertical Portals, also called Vortals, are intended to consumers with specific tasks, to people in certain places or to communities with individual interests.

Still according to Zirpins et al. (2001), in the class of Vortals can be considered three subclasses: Enterprise Information Portals (EIP), also called Corporate Portals, Intranet Portals and Industry Portals or B2B. EIP allow

*Figure 1. Classification of Web portals, according to three dimensions (Source: Clarke & Flaherty, 2003)*




customers and employees of a specific enterprise access to any type of data and services related to this enterprise. The Intranet Portals provide access to enterprise data and provide common business applications. The Industry Portals, latest, provide a virtual environment where private industries can share information and favor business transactions.

A new classification of portals arose as a consequence of the emergence of dynamic pages, the use of databases and the ease of access to technology. Thus, Clarke and Flaherty (2003) consider three dimensions to classify the Portals.

A first dimension these authors considered was the range of contents, which led them to classify the Portals in Horizontal or Vertical Portals. Another dimension related to the purpose of the Portal allowed them to classify Portals as Transactional or Informational Portals. Finally, a third dimension, the range of users it is intended, led them to the Public or Private Portals. Although varying the degree, all portals have features regarding each one of these three dimensions (Figure 1).

The Transactional Portals provide a platform that allows the sale of products and services online, enabling customers to gather information, compare prices, ask about products and, above all, buy online, while the Informational Portals provide contents that offer visitors a wide variety of information (Clarke & Flaherty, 2003).

Distinguishing the Public from the Private Portals, we can say that the former are available to any Internet user and have no access restrictions and the latter are often restricted to a group of users within an organization or to groups of users external to enterprises (Clarke & Flaherty, 2003).

Regarding to the difference between Horizontal and Vertical Portals Clarke and Flaherty (2003) follow the idea of Zirpins et al. (2001): The Horizontal Portals attempt to provide their users all the services they need and Vertical Portals offer contents and services geared to a specific area or community.

Some authors consider other classifications different from those presented, but they seem to be able to be included in these ones.

## Characteristics of Portals

Among other features that the portals should present we can enumerate the integration of applications, research, collaboration personalization, portability, and scalability.

The integration of applications consists of interconnecting individual systems based on the sharing data or on automated transactions. Integration through data aims to move data from different systems included or not in production, for analysis. Integration based on transactions aims to move production data between different systems (Rangel, 2009).

The ability to search is a key element in all the portals, because it is through research that users can find what they are looking for specifically, whether the resource is or not intuitively categorized within the navigation portal structure. The search functionality should also allow the use of user profiles and security settings to ensure that users who are performing research can only see results for those resources they have access (Rangel, 2009).

Collaboration is another general capacity associated with portals. The collaboration capabilities allow people to collaborate synchronously and asynchronously (Rangel, 2009).

Personalization is a feature that allows portals to adapt to the individual characteristics of the user (Rangel, 2009).

The portability should allow a portal is easily accessible through various types of hardware (Rangel, 2009).

Regarding to the scalability, the portal should include mechanisms for management and distribution of load and traffic, ensuring speed and reliability (Rangel, 2009).

# THE PROJECT OF THE WEB PORTAL

According to Clarke and Flaherty classification, the Web Portal whose development is the objective of this research is a private portal, sharing transactional and informational portals characteristics and, as we mentioned in due course, it is intended to support one or more serious games.

Defining the target audience of the Web Portal, we can say that this is intended to the institutions that house individuals to whom these games are designed.

Before starting the description of the Portal developed, it should clarify the difference between a player and user in the text which follows. Thus, it is understood as a player any individual playing a game, in a standalone application, that is, he is not a user of the Portal. The user is the person who browses the Web Portal.

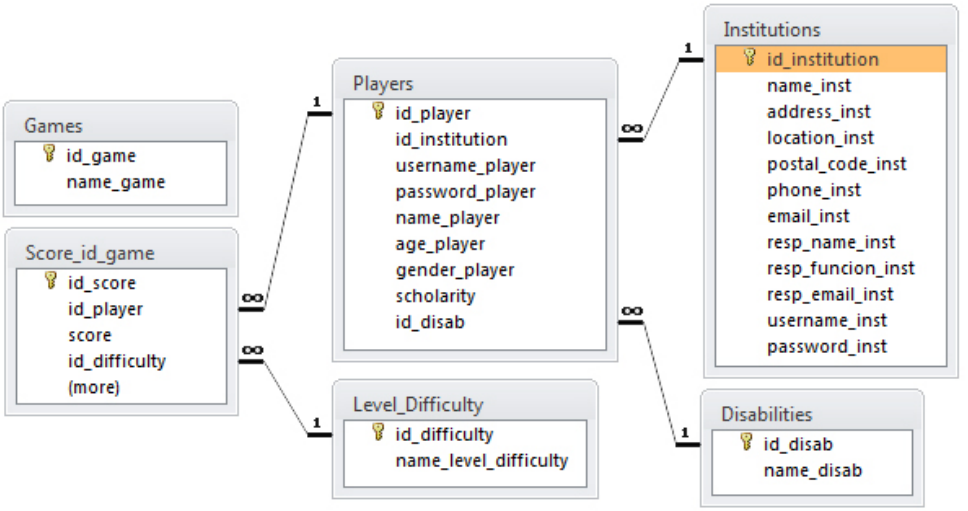
We can now admit that a Web Portal, though sober, simple and generalist, will be an experience quite complex for certain types of players for whom the games are geared (autistic, intellectually disabled, among others), that cannot perform more elaborate technical procedures. But as just mentioned, these are not the users of the Portal. So, the same is designed initially for institutions that receive this kind of individuals. To enjoy the full potential of the game (including the online mode), the responsible for the institution must register in the portal of the game. This person will undertake the management of all the players in the institution.

## Overview of the Application

As previously stated, it is intended undertake the management and monitoring of the results of the players in order to trace its evolution. In order that, it is necessary to build a system capable of monitoring this evolution, after sending the data for analysis. This system is supported by the Web Portal through a database it shares with the games, whose entity-relationship diagram is shown in Figure 2.

The games may be played in online or offline mode; however, for research they must be used online. To play the online mode the Internet connection is a requirement, but at the same time it gives the player another level of competitiveness (striving for a privileged place in the online ranking), which translates into a greater motivation, it allows the researcher to

*Figure 2. Entity-relationship diagram of the database that is the interfaces between the Web Portal and the games (standalone applications)*




check the progress of users through the results obtained using the Portal.

Besides serving as a user support and interface between the user and the games, the Portal has a nature of disclosure. It can be seen on the first page of the Web Portal that it makes a generalist approach to the game "Total Challenge" (so far, it is the only game supported by the Portal). Furthermore, it shows, by a rotating banner, some of the principal advantages and features of the use of the game in question. On this page are also highlighted the main potential of the portal itself and the updated news. The user's login section is also present on this page, being one of the most important areas of the Web Portal. It is worth mentioning that the Portal is written in Portuguese.

Even before login (we shall discuss this procedure), the user can see in detail in the "Total Challenge" section, the description, scope, characteristics, the target audience, game screenshots and other relevant information that he relates. In addition, he can access other sections: "Downloads," "Press," "Contacts," and "Register."

In the "Downloads" section there are available for download, the latest versions of "Total Challenge" for the various platforms (Windows, Macintosh and Linux). Moreover, there are available the game instructions for use.

In the "Press" section are the most relevant news media, as well as publications in newspapers, magazines and scientific papers.

The "Contacts" section contains a contact form for users to submit their questions and suggestions for the research team.

The "Register" section is currently only available to institutions. Each institution, through a responsible, will need to register at the official site of application. It is in this section that it will be required information (name of institution, address, city, postcode, telephone and email, name of person responsible, their position in the institution and email). In addition, he/she must choose a username and password. When this registration is made, it will be sent an email to the responsible in order he/she confirms it. After this procedure, the institution does not have yet privileges to log into the platform. The sent information must be processed, analyzed and approved by the research team. Achieved this approval it will be sent an email to inform that the account has been activated. From this moment, the institution can authenticate to

*Figure 3. Web portal common areas screenshots*


the platform, to access personal area. Figure 3 presents several screenshots of the common areas of the Web Portal Total Challenge.

In case the user forgets the password, the Web Portal can perform its recovery. Once all the passwords stored in the database are encrypted, there is theoretically no possibility of recovering. Thus, when a user forgets his password, he/she can generate another one, as described next. At first, the system requests the username or email. If the username or email address exists in the database, it is sent to the personal email, a link to renew the password (this step is to ensure that it is the user himself who requested the password recovery). By entering the link sent to the email, there is a regeneration of the user password, which will also be sent to his email. After this process, the user can do, again, his login in the Web Portal with his username and new password generated. If the user wants to change this password, he can do it in his personal area, when he is authenticated.

After logging into the Web Portal, the user will observe a new user menu with the sections described: the Institution's Information (Info), Add Players, View Players, Top 10, Support and Logout.

In the "Info" section, the user gets the information he entered when the institution was registered in the Web Portal that he can change at any time. It is also available an option to password change, very useful when using the password recovery application.

In the "Add Player" section, the user can add players to the game. Information is requested

as the player's name, age, gender, type of disability (some are listed), education, and related problems (e.g., motor, hearing or other).

In the "View Players" section, the user can see the username and the login password in the game, of each player, and he can also change the information of any player, eliminate him or see the statistics and the charts of his the evolution. Figure 4 presents several screenshots of the players sections of the Web Portal.

In the "Top 10" section, the user will find the ranking of the top 10 players at a certain level of difficulty. The user can also see the best players, whether at all institutions or within its own institution.

In the "Support" section, the user can take a support ticket with a certain priority level (Normal or Urgent). Upon receipt of the request for support, the team will respond to this request under the rules of screening: date of the support request and priority level. The user can see at any time, their support requests, read the exchanged messages, and observe the process status (open or closed).

Finally, the "Button Logout," allows the user logout of the portal, an essential task when he is using a public computer in order to prevent another user to improperly use the platform. Figure 5 presents several screenshots of the user areas sections of the Web Portal developed.

When the player ends the game, the score is sent to the shared database, which has two functions. The main function is to allow the researcher to access the data and make a statistical analysis of results obtained with this application, in order to understand the evolution of players at various levels through cross-checking. The second function is to allow the responsible of each institution to access to the Web Portal, logs into his account and takes notice of the progress of the players over time.

## User Interface

For the Portal interface, we chose a sober, simple and generalist design and interaction, so that the browsing experience in the Web Portal, by the user, is fluid, without difficulties in achieving a particular purpose.

The whole infrastructure of the Web Portal is based on a single page (layout), where all information to be presented is requested to the database, through SQL instructions embedded in server-side language PHP.

The navigation throughout the Web Portal is simple and intuitive based on two menus: general and user menu. The first menu is always visible to the user, horizontally at the top of the Web Portal and provides access to the several general sections, such as description of the game and contacts, among others. The second (also in a horizontal position below the previous one), which only becomes visible when the user is authenticated, it gives him access to the individual functions of each institution, how to add a player, view players, between others. The map of the Web Portal is presented in Figure 6.

No less important is the platform backoffice that supports all the management of the Web Portal, and interfaces between the research team, users and the game itself. This area is reserved for the elements of the research team. This platform supports the management of all Web Portal content such as articles, news, menus, among others.

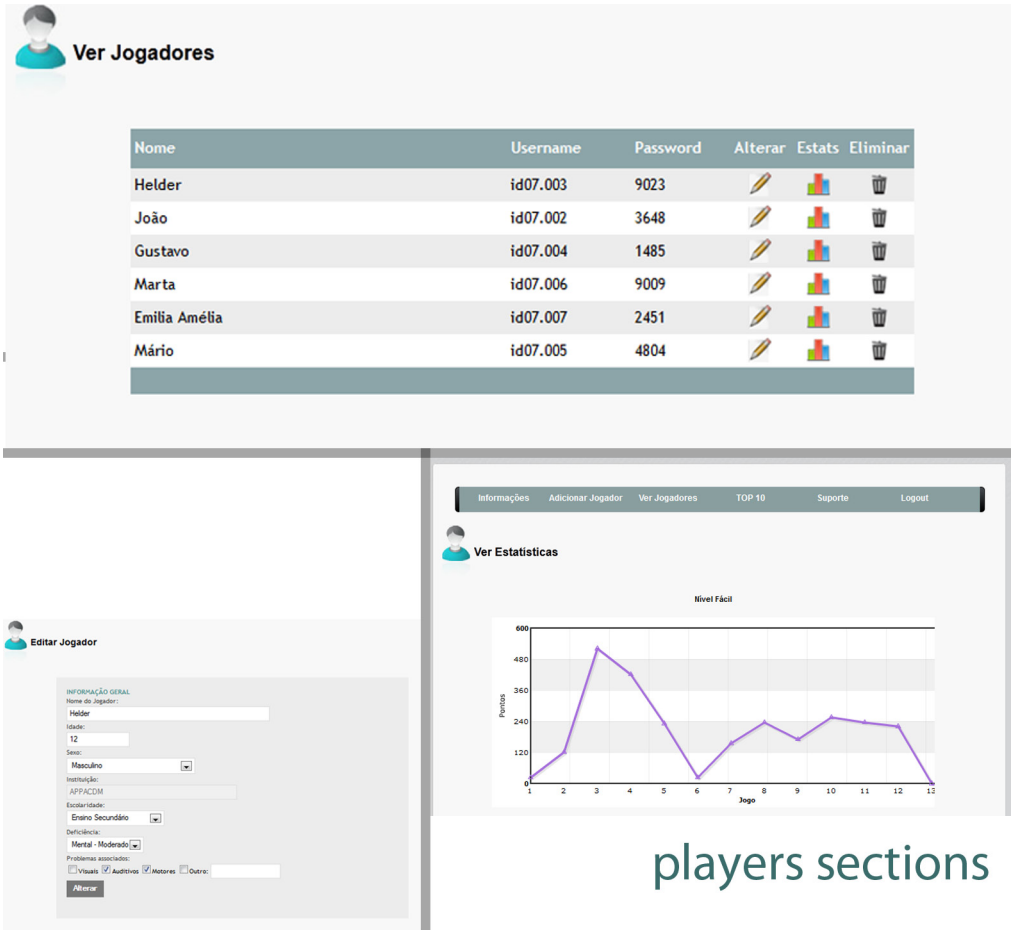
In addition it also allows the user management (institutions) and the players themselves. Since one of the main objectives of the game is monitoring the evolution of players, the platform allows cross data with the scores of some specific players, with a particular deficiency, with a certain level of play, with a certain level of difficulty, among other aspects. Or, then, it simply allows crossing generalized data.

The back office platform is still under development; however, it already performs the general functions.

## Programming

The Web Portal was built in Extensible Hypertext Markup Language (XHTML), which is a reformulation of HTML. This substitution changes the description of Web content, providing extended features, richer and more powerful

*Figure 4. Web portal players sections screenshots*




than HTML. Combining the elements of markup HyperText Markup Language (HTML) with rules of Extensible Markup Language (XML); XHTML language intends to make possible the display of web pages on various devices. This process of standardization would improve the site in terms of accessibility and in terms of interpretation by other platforms such as mobile phones, televisions and others (Malaquias & Matos, 2009; Guedes & Rizzi, 2010).

To form XHTML we used Cascading Style Sheets (CSS). We followed all the recommendations of the W3C, to ensure that the Web Portal is compatible with the browsers that follow the standards. The Web Portal was tested and it is ready to run in the browsers most used worldwide, such as Mozilla Firefox, Internet Explorer, Opera and Safari.

Concerning server-side programming for operations to perform on the server side, such as access to databases, validations, among others, the language used was PHP (Hypertext Preprocessor, originally Personal Home Page). It is one of the most used languages on the web, given the extraordinary number of sites around the world that employs it. The main difference that it manifests in relation to other languages is the ability it has to interact with the web world, completely transforming the web sites that have static pages (Niederauer, 2011).

*Figure 5. Web portal user areas screenshots*

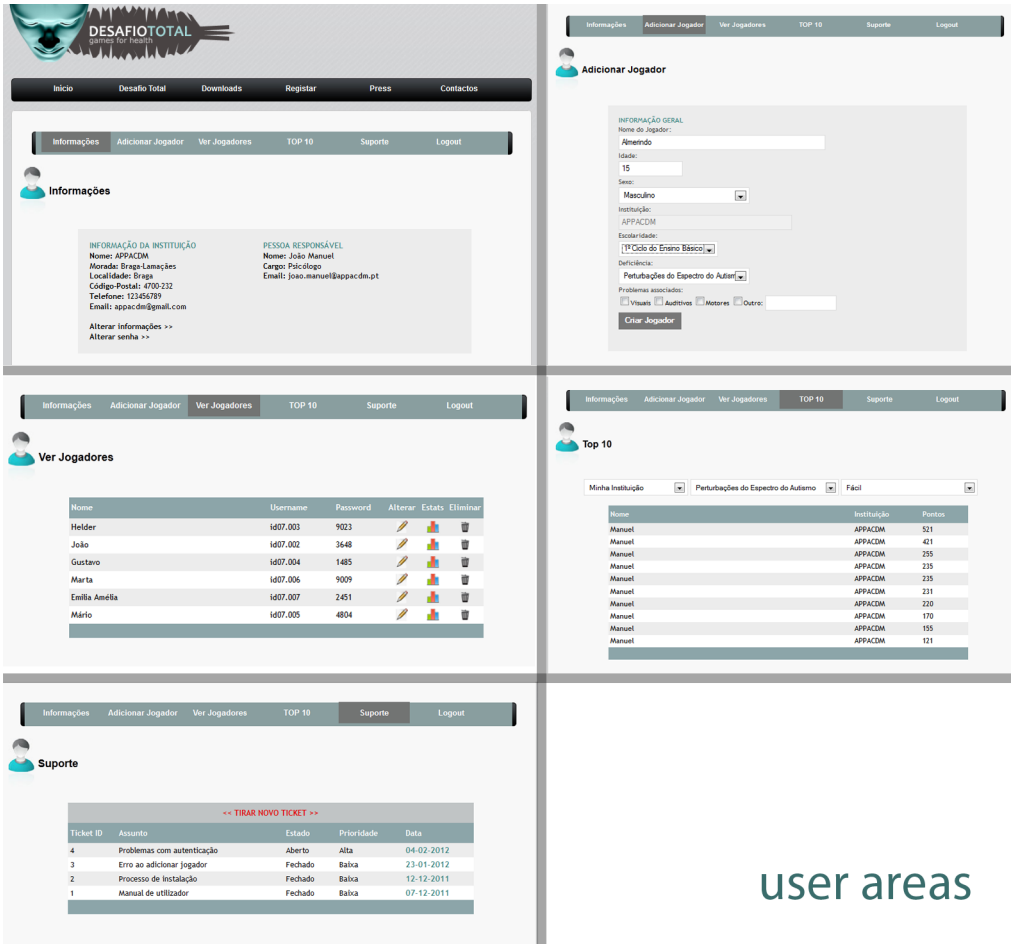
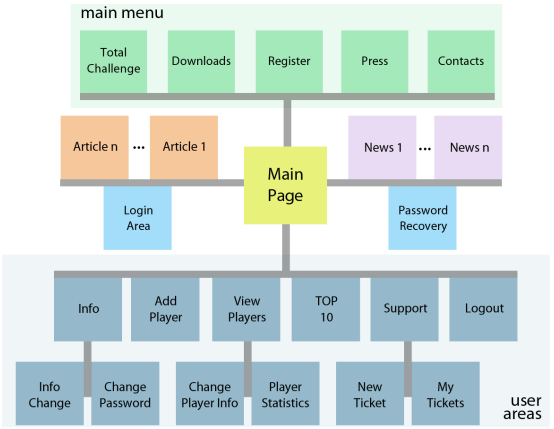



*Figure 6. Web portal map*



Some of the advantages of PHP that can be listed are: free access and use, structured and object-oriented, familiar syntax, easy connection to databases (e.g., SQL) (Vieira, 2009).

PHP is ready to perform many types of Web applications through the extensive library of functions that it is provided (Cardona & Montes, 2006).

But one of the great advantages in the use of PHP is to run in any platform where is possible to install a web server such as LAMP, a free solution, which alone makes the portal housing considerably at a good price. LAMP is the term created to describe a set of tools that stands out in the high heterogeneity that exists in the technologies used in the implementation of web applications, either because it is one of the most powerful combinations, or because it becomes one of the most affordable. That designation attributed to the open source integrated platform for web development and databases interface resulting from this combination of success is just the acronym of the set of tools that compose it: Linux (operating system), Apache (web server), MySQL server (database) and PHP (programming language) (Faceira, 2007; Reys, 2006).

A very interesting feature is the fact that these four products can operate in a wide range of hardware, with very few requirements (Cardona & Montes, 2006).

Besides the referred languages, it was also combined AJAX, to give a more dynamic and interactive experience to the user.

The response time of web server to the client is currently one of the biggest problems in Internet applications. Indeed, after the request of an event, the client must wait for the data processing by the server, waiting for a response, so that a new page is loaded. This makes navigation inefficient leading to the return of redundant information to the client. The AJAX framework, efficient and dynamic, which is not a new technology, but rather an acronym for Asynchronous JavaScript and XML helps in the building of a web authenticating for gateway, in a Linux server, creating a dynamic and improved interface for users (Silva, Oliveira, & Pivetta, 2006).

The AJAX technique allows creating automated requests, not requiring user input to update the data represented in the interface (Carvalho & Vendramin, 2008).

The Web Portal comprises, for safety reasons, two different SQL databases. The first database stores all information and content of the Web Portal itself and the second database shares information between the Web Portal and the game itself.

Regarding the security and data integrity, some directives were outlined. We followed all the recommendations for access to the database to avoid SQL inject and other problems associated to unauthorized access to the databases. Moreover, all the words to access them follow the patterns of complex passwords (numbers, symbols, capital and small letters). Before submitting any form on the Web Portal, this is validated by server-side language, to ensure as much as possible the integrity of databases. In all cases, when a field submitted by the user does not match the desired, a message is displayed for the user to correct the errors. All passwords for restricted access are encrypted by an encryption algorithm.

## CONCLUSION

As mentioned initially, with this work we intended to build a Web Portal to support one or more serious games. The Web Portal was built and it serves to make an interface between the user and the games, for the dissemination and support of these and as a platform for managing and monitoring results.

Overall in the first tests with users, they had no problem when they were asked a more general task. However, sometimes they felt some difficulty in more targeted actions. We heard their opinions about the procedure they would like to be performed and the changes have been made in accordance with their recommendations.

New tests after the changes showed efficiency, particularly in relation to data collection, analysis and processing, essential to trace the evolutionary line of each player.

The platform continues to be developed, particularly in backoffice functions, mainly in relation to the statistical treatment of several types of games because, since they are different, they require particular treatments.

The Portal provides a global access to the application, in other words, it is available to any institution, anywhere in the world.

## REFERENCES


Carani, M., & Nascimento, P. A. (2007). Library portals e subject gateways – conceitos e características. *Cadernos de Biblioteconomia Arquivística e Documentação*, *1*, 110–122.

Cardona, L. A., & Montes, J. W. (2006). Software de lectura, creación de cursos en línea para reforzar la enseñanza de la lectura en niños y niña. *Scientia et Technica*, *12*(31), 215–218.

Carvalho, M. D. L. F., & Vendramin, A. C. B. K. (2008). *Mundos virtuais e interatividade através da web: Protótipo de mundo virtual web*. Lisboa, Portugal: Quartas Jornadas de Engenharia de Eletrônica e Telecomunicações e de Computadores.

Clarke, I., & Flaherty, T. B. (2003). Web-based B2B portals. *Industrial Marketing Management*, *32*(1), 15–23.

Dias, C. A. (2001). Corporate portals: A literature review of a new concept in information management. *International Journal of Information Management*, *21*(4), 269–287.

Ding, Y., & Fensel, D. (2001). Ontology library systems. The key to successful ontology reuse. In *Proceedings of the First Semantic Web Working Symposium*, Stanford, CA (pp. 93-112).

Faceira, L. F. C. F. (2007). *Plataforma para medição da qualidade de serviço da oferta de banda larga em Portugal* (Unpublished master's thesis). Telecomunicações e Informática – Universidade de Aveiro, Aveiro, Portugal.

Figueiredo, R. M. F. (2005). *Portais escolares: Estudo de aceitação de um projecto para um portal web num contexto de ensino* (Unpublished master's thesis). Escola de Engenharia – Universidade do Minho, Braga, Portugal.

Gouveia, A. J. G., Oliveira, P. C., & Varajão, J. E. Q. (2007). Portais web: enquadramento conceptual. In *Actas da Conferência IADIS Ibero-Americana WWW* (pp. 309–314). Vila Real, Portugal: Internet.

Guedes, A. L., & Rizzi, E. (2010). Redes sociais móveis. *Unoesc & Ciência – ACET, 1*(1), 85-94.

Lausen, H., Stollberg, M., Hernández, R. L., Ding, Y., Han, S., & Fensel, D. (2004). *Semantic web portals – State of the art survey*. Innsbruck, Austria: DERI.

Malaquias, F. H., & Matos, S. N. (2009). *Aplicação de Padrões Web em framework*. Ponta Grossa, Paraná: Universidade Tecnológica Federal do Paraná.

Marwick, A. D. (2001). Knowledge management technology. *Knowledge Management*, *40*(4), 814–830.

Niederauer, J. (2011). *Desenvolvendo Web sites com PHP*. São Paulo, Brazil: Novatec Editora.

Rangel, D. A. (2009). *Fóruns virtuais de discussão como ferramenta de gestão do conhecimento: Estudo de caso de instituição financeira pública*. Brasília: Centro Universitário de Brasília.

Reys, D. G. (2006). *Bases de datos distribuidas con una solución LAMP (Linux, Apache, MySQL Y PHP)*. Pachuca de Soto Hidalgo, México: Instituto de Ciencias Básicas e Ingeniería.

Silva, C. F., Oliveira, G. P. C., & Pivetta, L. C. (2006). Ajax: um novo paradigma de aplicações web, num sistema de autenticação para gateway em Linux. *Ciência & Consciência*, *2*, 1.

Vieira, A. J. G. (2009). *Concepção, planeamento, realização e avaliação de um programa de natação adaptada numa população com deficiência intelectual com e sem síndrome de Down* (Unpublished master's thesis). Universidade do Porto, Porto, Portugal.

Warner, S. (1999). Internet portals, what they are and how to build a niche internet portal to enhance the delivery of information services. In *Proceedings of the 8th Asia-Pacific Specials, Health and Law Librarians Conference*, Hobart, Tasmania.

Zirpins, C., Weinreich, H., Bartelt, A., & Lamersdorf, W. (2001). Advanced concepts for next generation portals. In *Proceedings of the12th International Workshop on Database and Expert Systems Applications*, Munich, Germany (pp. 501-506).

*Tiago Martins, MSc, is lecturer in the Portuguese Catholic University and in the Polytechnic Institute of Cávado and Ave, Portugal. At the moment he is also attending a PhD in Electronics and Computer Engineering at University of Minho, Portugal. He has published several papers in international conference proceedings and in international leading journals. He is also a researcher in the Algoritmi Centre at University of Minho, mainly in the fields of Computer Vision, Serious Games, and Biomedical Rehabilitation.*

*Vitor Carvalho received his degree in industrial electronics engineering in the option of telecommunications and industrial informatics, in 2002 and MSc in industrial electronics, in the option of automation and robotics in 2004, both from Minho University, Portugal. He concluded his PhD in Industrial Electronics in 2008. Actually he is working as assistant professor at the Polytechnic Institute of Cávado and Ave (IPCA) and Portuguese Catholics University (UCP). His main fields of interest are serious games, data acquisition, and signal processing.*