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Patient Health Portal: user calendar perspective

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Abstract

In this paper, we do a brief literature review on portals and their stakeholders. Health portal stakeholders are identified, within their internal and external action to the system. It is also reported the results of an analysis made to a number of European, United States and Australia health portals. In this paper we propose a conceptual model of a patient health portal based on a calendar perspective. Users' needs are reflected in this conceptual model. We also describe the implementation of prototype based on the conceptual model. The prototype was built in an open source content management system (Drupal). Our study does also include a statistical analysis of the preliminary results of a survey to a group of users.

Keywords: Health Portal; calendar paradigm; conceptual model; open source; Drupal.

1. Introduction

In this present era of communication and collaboration, there is an increasing need for online services, and Governments respond to that demand by integrating their services in digital platforms to access structured and optimized information and services. New means of communicating with patients may help to create higher operational efficiency, to ensure cost reduction and to provide user satisfaction. In this context, we propose a

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model of an health portal user-centered, with integrated contents and services, structured in the form, and adapted to the user's wants and needs. In the center of the user interface, there will be a calendar view, containing all the events related with the user and his relation with the Health System.

The proposal begins by defining the research problem and goals that it aims to achieve, summarizes the methodological steps that are expected to be met, makes a brief review of the literature on the state of the art, presents a conceptual model and implements a prototype.

This paper is a continued work of a previous study on the same subject [1].

2. Methodology

The methodology consisted on a review of the literature on information management, dissemination of information and services. In a second step, we identified groups of users, using the approach of stakeholder analysis of a potential Health Portal, to reflect their interests in terms of content and features. In a third phase we defined the conceptual model to support an health portal. In the fourth phase, we developed a prototype of the most relevant areas, using a Content Management System (CMS) software tool.

3. Literature Review

Individuals in their daily life turn to numerous sources of information and various communication channels between them and the organizations. Therefore, government healthcare organizations seek to provide adequate services in health. The competitive shifts in the healthcare marketplace need adequate services that can help patients to acquire and retain information and also communicate with health organizations. Those services should inform citizens, promote patients' well-being and add efficiency to the health system. The added value will be greater if these channels and sources of information are appropriate to services demanded by various stakeholders [2]. This would help governments to respond to the changing marketplace conditions.

In this context, our main concern is to modulate an adequate e-health portal, regarding the user's needs.

The importance of corporate portals within organizations is emphasized by Detlor [3]. The author argues that corporate portals provide a single location, for various information scattered throughout the organization, functioning as a single infrastructure for content sharing, information dissemination and collaboration groups. Similarly, another study from Daniel and Ward [4] discusses the importance of that corporate portals may have to address organizational and individual information systems. They even consider them, as the next preferred platform for foundations application's organizations.

According to Strauss [5], a web portal can be seen as a gateway to access the Web or as a central point where users can search the content they need or seek. From the standpoint of structuring information, according to the author, portals can be of four different types: Vertical (covering only one subject), Horizontal (covering various topics), Intranet (restricted to the scope of the organization) and Internet (running as a gateway entry point).

Clark [6] introduces the concept of a Subject Portal, which is characterized as a central point of access to a particular topic, in the context of academic libraries. According to the author, subject portals share the features associated with other portals, such as the customization of content by user, the possibility of sharing information between users, centralized and transparent access to relevant information and easy and ubiquitous access.

According to Sullivan [7], a portal should focus on the business processes of an organization and offer its core services. Particularly since portals are assumed as natural tools for consolidation of services from multiple channels, provide quick availability and the ability to offer a single point of entry. For Sullivan, the emphasis of a portal should be in the ease of use, for which contributes a user-centered interface, the

possibility of personalized services, the use of common design patterns and the possibility of authentication only once (single sign-on).

4. Stakeholders

In a portal study, we must identify what the actions of users are carried on the portal. A stakeholder analysis will help to identify their types and characteristics.

According to Stoner and colleagues [8], stakeholders are defined as "groups or individuals directly or indirectly affected by the pursuit of goals by an organization." These authors characterize the variables of direct and indirect action that an organization may be submitted to. According to them, the direct-acting elements consist of internal and external stakeholders. The former are employees, directors and shareholders, the latter are the entities that directly influence the organization: financial institutions, competitors, customers, suppliers, labor unions, media, special interest groups and governments. The indirect action on the environment of an organization is characterized by the existence of four groups of variables: technological, social, economic and political.

According to Schmeer [1], a stakeholder analysis is a systematic process of collecting and analyzing qualitative information to determine which interests should be taken into account in the development or implementation of a policy or program. This analysis is important to help information managers to determine the key stakeholders and analyzing their interests and positions.

Another relevant matter is the identification of stakeholders designed by Mitchell and Wood [9]. The article propose a model for identifying stakeholders based on three levels of attributes: power, legitimacy and attention. Another contribution from McLeod and Clark [10], introduces a model to help identifying real users in a stakeholders analysis. Table 1 identifies the various stakeholders (and groups) and there type of direct action to the system (Health Portal).

Table 1. Health Portal Stakeholders

Stakeholders	Group	Direct Action	Internal	External
Patients	Customers	✓		✓
Physicians	Employees	✓	✓	
Nurses	Employees	✓	✓	
White-collar workers	Employees	✓	✓	
National Health Institute	Suppliers	✓		✓
Infarmed (Drugs Institute)	Suppliers	✓		✓
INEM (Emergency Institute)	Suppliers	✓		✓
Portuguese Blood Institute	Suppliers	✓		✓
Health Directorate-General	Suppliers	✓		✓
Health Ministry	Board and Shareholders	✓	✓	
Secretary-General	Board and Shareholders	✓	✓	
Primary Healthcare Centers	Suppliers	✓		✓
Hospitals	Suppliers	✓		✓
Ministry of Finance	Financial Institutions	✓		✓
Medical Association	Professional Associations	✓		✓
Nurses Association	Professional Associations	✓		✓

| Patients Commissions | Special Interest Groups | ✓ | ✓ |
| DECO | Special Interest Groups | ✓ | ✓ |

In the area of Direct External Action, the Customers group of the Portal is formed by the Patient Users. The Suppliers group is formed by the institutions of the National Health System that will provide content to the Portal: Hospitals, Primary Healthcare Centers and other organizations of the Health System. Naturally, the Portuguese Government occupies the Government place of the stakeholder analysis. The Special Interest Groups identified are the User (Patient) Commissions and Portuguese Consumer Association (DECO). The Professional Associations group is formed by the Medical Association (Ordem dos Médicos) and the Nurses Association (Ordem dos Enfermeiros). The Ministry of Finance takes the place of the Financial Institutions that will finance the Health Portal. Other health portals will be considered in the Competitors group. And, finally, the Portuguese media will occupy the Media group.

In the area of the Direct Internal Action, we identified the employees with the content management responsibility and the Health Ministry as the owner of its health portal, currently assigned to Secretariat-General. Figure 1 is the graphic representation of the stakeholders analysis of an health portal.
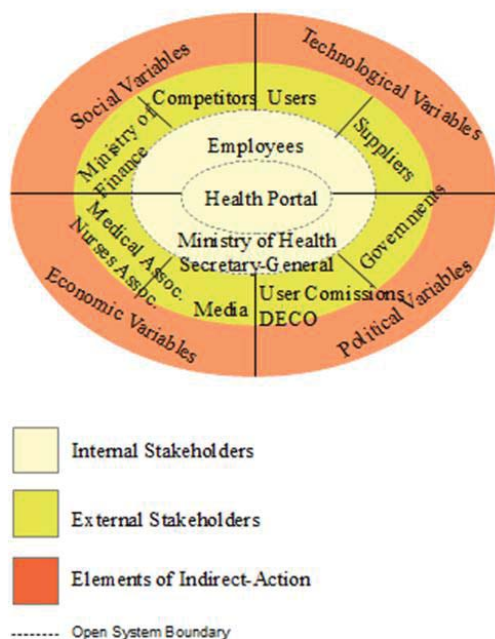

Fig. 1. Health Portal Stakeholders (adapted from Stoner [8])

5. Services Provided

It was made a study of the main health portals on the web. The reviewed portals were selected from several European countries, United States of America and Australia. One of them is a portal from the European Commission acting like a supranational public health portal.

In a health portals analysis, the EU Health Portal (http://ec.europa.eu/health-eu/index_pt.htm) emerges as the top of portals oriented to the European public health and local information. It is structured in order to present contents grouped by age, lifestyle, environment, common diseases, recommendations for health care and health public policies. It also contains areas of highlights and news updates. With a much larger range of services, the Health Portal of Denmark (https://www.sundhed.dk/) can be tagged in several media as a success. In http://www.epractice.eu/en/cases/sdk, we can discover the features that are present and the reasons for his success. It is targeted directly to the user, it shows all his medical history, it allows checking all the lab tests, it permits to schedule appointments and it offers direct communication with patient family doctor's and with the health administration. It must be emphasized that, not all portals are solely for the dissemination of contents, some contain a section of services, usually in the spotlight. Generally this section is disorganized services, but this is due to the limited number of services that portals offer and therefore (thus lacking the need to be organized). If we look at the portals that offer a substantial range of services, we notice that there was a need to organize them by subject, making it easier for the user browsing experience. In this aspect, we should highlight the NHS Choices, the Health Portal of Denmark and the Consejo de Salud of Andalusia. These last two come to organize the offer of services by user, showing an orientation focused on the interests of the user. Regarding the provided services and their interconnection with existing services, the most usually found were: appointments, browse of surgery waiting list and query MCDTs (Diagnostic and Therapeutic Services). The list of provided services can be observed in the Table 2.

Table 2. Services provided

Features:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Services section	✓				✓	✓	✓			✓			✓		O
Services organized by subject							✓			✓			✓		✓
Services organized by user							✓						✓		✓
Public services interconnection	✓					✓	✓			✓			✓		O
Appointment schedule	✓					✓	✓			✓			✓		✓
Diagnostic and therapeutic information							✓								O
Surgery waiting list information						✓	✓						✓		O
Prescription renewable															O
Personal management information					✓					✓					O
Healthcare content		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	O
Healthcare content by user		✓					✓		✓	✓	✓		✓		O
Institutional Directory			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	O
Information organized by subject		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	O
Easy Navigation	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Multiple device and browser support	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓

Legend:

✓ - Supported

O - To be developed

1 - ConsultaClick (http://pt.consultaclick.com/)
2 - Portal de Saúde Pública (http://www.saudepublica.web.pt/)
3 - Portal de Saúde da UE (http://ec.europa.eu/health-eu/)
4 - O Portal Saúde (http://www.oportalsaude.com/)
5 - Meu Sapo Saúde (https://meu.saude.sapo.pt/)
6 - Portal da Saúde (http://www.portaldasaude.pt/)
7 - Portal de Saúde da Dinamarca (https://www.sundhed.dk/)
8 - Australian Health Directory (http://www.healthdirectory.com.au/)
9 - HealthInsite (http://www.healthinsite.gov.au/)
10 - NHS Choices (http://www.nhs.uk/)
11 - health.gov (http://health.gov/)
12 - e-sante.fr (http://www.e-sante.fr/)
13 - Consejería Salud de Andaluzia (http://www.juntadeandalucia.es/salud/)
14 - MedKolleg (http://www.med-kolleg.de/)
15 - *Health portal proposal (prototype)*

In two recent studies conducted in a health portal context, from Weingart and colleagues [11] and from Adler [12], it was observed that the provided services users most frequently tend to use were (seconded by Katz and Moyer [13]):

- Secure Email with the system;
- Health Record viewing;
- Prescription request and refills;
- Appointment requests;
- View exams results;
- Sent referral request;
- Provide patient billing information;
- Provide patient satisfaction feedback.

6. Conceptual Model

Xie and colleagues [14] introduces a new interface model in a helpdesk application, using a calendar-centric interface prototype. The study showed that the (expert) users evaluated positively this calendar-centric interface, highlighting how easy was to use and its potential to change the agent's view. Some users believed this calendar-centric interface would save a considerable amount of time finding and navigating between trouble-tickets. Makinen and Jaakkola [15] introduce a concept of a calendar-centric thinking and linking. According to them, "the spirit of the age supports calendar-centric thinking". The authors propose a design of a transparent system calendar capable of integrating user's activities and linking content in a calendar-centric interface, with total adaption to portable devices and desk computers. Pratt and colleagues [16] defend the development of a Personal Health Information System (PHIM) capable of integrating patient's work schedules and clinical schedules, gathering information from all the health systems (treatments, appointments, among others) and presenting them in a set of PIM tools, like calendar and e-mail.

The model of the proposed portal is based on a patient's calendar paradigm. It was the closest to the user experience. In an everyday life, everyone has a chronological plan to address the health services; for that reason the portal is centered in a calendar-centric view that allows the interaction with the local and central health services.

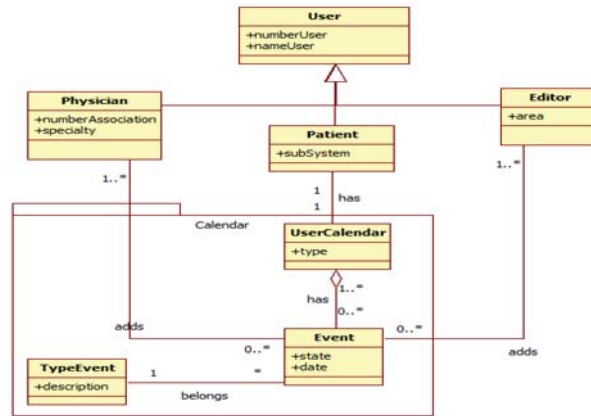The proposed conceptual model can be observed in Figure 2.

Fig. 2. Conceptual Model

The conceptual model presented here, proposes a calendar as the center of the system. Patient users should consult events on the calendar, added by the Editor users (generic events) and by Physician users (clinical events).

The prototype implemented reflects the calendar-centric view of the conceptual model. It can be seen in the Figure 3.

Fig. 3. Health Portal Prototype

On the left sidebar, there will be a Navigation block and other health related content. On the right sidebar, there will be a highlights block and other special emphasis content. In the central area, the user calendar will occupy its major place, where the user will check all the events related to him: appointments, exams, prescriptions renewable and generic health events.

7. System Implementation

To support a portal, a CMS is often used. Given the number of features supported by a CMS, Browning and colleagues [17], places all the features in a CMS Feature Onion, arranged in concentric layers, as if it was an onion. In the outer layer, there are the user-centered features, while the core features of version management, workflow and integration are in the innermost layer. In a third layer are the features related with user management, the applications and data sources. In a different perspective, Aparício and colleagues [18] classify the various types of portals on the features and functionality according to three levels: interface features, that allow interactivity on an intuitive interface; portal tools, that allow management of content and perform searches, which permits enabling its use as a gateway entry; and provision of content, such as email, chat services personnel and on-line applications. In the process of choosing a content management solution, it is important to identify and follow a set of criteria that can sustain the decision of choice. Jafari and Sheehan [19] identified the main criteria to help choosing a portal technology: ease of use, ease of maintenance, customization capability, possibility of single sign-on, easy customization, easy integration with other services, platform independence, performance, scalability, compliance with open standards, availability, favorable cost, feasibility and, at last, support for users with special needs. They identify four major steps to follow a portal delivery: define, design, develop and implement. Amsler and Nichols [20] present a case study of the selection process of a CMS tool for implementation at the University of Delaware.

For economic reasons, an open source CMS was used to implement the prototype [21]. According to Riehle, one of its main benefits is the micro-sharing development costs that came from sharing the technology platform development. The use of a common platform for development or infrastructure, will lead to sharing development costs and, consequently, to expenses reduction. Drupal was selected because of its main features: easy design administration, flexible content creation, easy administration of users and roles, and large expansibility. The community of Drupal users regularly contributes to the account of personal experiences in order to assist and guide the beginners (and others) to successful implementations. One of the contributions is condensed by Kane [22]. The publication presents a practical overview of the methods of implementing a CMS like Drupal. Its suggestions are based on years of experience of the community and known success stories. Although in a narrower scope, limited to catalog management, Rawtani and Chidambaram [23] enhances the potential of Drupal as a CMS and proposes a model for the creation of a Library 2.0, using the potential and the multiple facets of Drupal.

8. Preliminary Evaluation

In a recent survey that included a relevant number of key users, a significant number of responses showed that the option for calendar features, rather than for menu features was privileged. The inquiry asked the user to evaluate two alternatives, calendar vs. menu, and the user should evaluate both options. Most of the answers revealed that the calendar option was the preferred one: appointment schedule, medical exams, public health alerts and generic events. In two questions, there were no distinctions between the two options: surgeries and prescription renewable. The preliminary results lead to conclude that a calendar-centric interface would meet users' needs in a context of an health portal implementation. The collected answers (39) revealed a sample equally divided by gender (54% Male and 46% Female) and a distribution age between 19 and 52 years old (38,46% have 30 or more years old and 61,54% have between 19 and 29 years old). In Table 3, the result of the T Test Paired analysis of the sample allows to conclude that, for a Significance of 0,05 the null hypothesis of equality of means is rejected only to the variables 2 and 7. In what concerns to the other variables, the means of the calendar interface are higher than the means of the menu interface. But, statistically results are not conclusive as long as it is not possible to reject the equality of means.

Table 3. T Test – Comparison between Calendar and Menu Interface

	Calendar		Menu		T Test – paired variables
	Average	Standard Deviation	Average	Standard Deviation	Significance
1. Appointment schedule dates	6,26	1,02	6,08	1,18	0,09
2. Medical exams dates	6,28	0,86	6,05	1,00	**0,03**
3. Surgeries dates	6,33	0,84	6,15	0,90	0,09
4. Prescription renewable dates	6,13	0,83	6,13	0,83	1
5. Generic events dates	5,72	1,56	5,67	1,59	0,62
6. Public health alerts	5,85	1,46	5,72	1,38	0,41
7. Generic events dates (user not authenticated)	5,82	1,43	5,54	1,41	**0,01**
8. Public health alerts (user not authenticated)	5,72	1,41	5,56	1,43	0,23

9. Conclusions

Portals can be seen as an entry point of organizations in the World Wide Web field. Although acting just like a mere entry point, the presence of an organization in the Web reveals a lot about it, just like the entrance says a lot about corporate buildings and home houses. Thus, organizations seek to publish relevant content and services on their Web Portals. This paper offers a contribution to a Portuguese Health Portal, proposing a simple and easy to use interface, based on a calendar-centric paradigm. The conceptual model, and its implementation prototype, proposes a calendar as the center of the system. This calendar view will contain the entire user's relevant content, such as diagnostic exams and medical appointments.

The presented prototype was developed in Drupal, known as one of the best Content Management Systems (CMS) in the open source world. Although it could be implemented in any other CMS, Drupal was selected because of his flexibility and modularity.

The preliminary results gathered in the inquiry, shows that users preferred the calendar-centric view rather than the menu options.

10. Future Work

The developed prototype requires extra work. It needs a complete set of web services capable of interacting with existing health systems of Portuguese Health System: primary and secondary care services. These web services will populate patients users calendars with healthcare events and will enable patients users to communicate with the health system, using features like: request a new appointment, reschedule a diagnostic exam or submit a prescription renewable. In a second phase, extra work will meet the suggestions received within the answers of the conducted inquiry, mainly those related with the access to the diagnostic and therapeutic results and the patient billing information.

Acknowledgements

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