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Conceptual Framework for Unified E-Government Web Platform

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Abstract. *Technological development has an impact on various areas, and governments from all over the world search to make a smooth transition from traditional to digital, by adopting dedicated software solutions aiming to facilitate the interaction of citizens with public institutions. These platforms are designed to improve the citizens relationship with government by facilitating various processes and tasks.*
The importance of having a unified web platform is easily justified. Citizens are no longer in need of searching different platforms for their specific needs, dealing with a lot of interfaces and accounts, as all are gathered in one, maintaining a robust, complex system that is easy to use. Therefore, they would benefit from an integrated digital environment, that meet their needs and expectations, also providing security and privacy of confidential and personal information. The authors present the value of creating such an environment, that has a high technical level, that is user-centered and accessible for interactions between citizens and government.
Designing and implementing a unified e-government web platform requires the analysis of various factors and aspects such as user interface, processes, services, security measures, integration with social media platforms, collaborative environment, and many others. First, an investigation on specific literature was made to offer a context to the present research and be used as a starting point, highlighting the main factors related to e-government and the impact of this type of platforms. The model proposed by the authors encapsulates considerations on both sides: government and citizens to offer a detailed understanding on e-government platforms.

Keywords: e-government, citizen services, web platform, user-centric, interoperability

Introduction

A new age of increased accessibility, operational efficiency, and transparency is being ushered in by the unstoppable integration of digital technology into governmental processes. E-government online platforms are at the front of this dramatic shift, serving as the cornerstone for smooth citizen-

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state relations. E-government has a strong inter-ministerial component because it requires a general simplification of administrative processes at the level of all services, to respond to the needs of citizens. A key element of e-government development is represented by a complex e-government system.

More and more public institutions are implementing tools and platforms to increase their level of digitalization, which is highly important nowadays and for the future. It assures efficiency, optimization and reduces the interactions between citizens and employees of public institutions. By engaging citizens in using e-government platforms, their level of satisfaction towards tasks they may perform in this area will increase in time, due to the time gained, and many other reasons. Digitalization offers transparency and other benefits that are key factors of each smart community.

Through digitization, the entire activity of public institutions is made more efficient, on all three levels: internally, intra-institutionally and externally, in the relationship with citizens and the rest of the institutions. Through the transparency it implies, digitization increases the accountability of the authorities to the citizens. Transparency is considered to be essential for the relationship of public institutions with citizens, when it comes to a functional society.

In this paper are documented the structural elements of an e-government web platform designed especially for citizens. Also, the user experience is a center piece, along with advanced functionalities, details, and classification of services that a citizen may need on performing various tasks. It contains the possibility of payment, storing data in an organized and secured manner.

All the technical features and elements of the proposed model are defining an ecosystem for e-government that aims to improve the experience of citizens, to meet their needs and expectations.

Among the possible benefits are also inherent hazards that can jeopardies these systems' usability, security, and operation. Every suggested structural component presents possible risks and difficulties; hence a thorough risk assessment plan is required. Here, the aim is to details these possible issues, by presenting a knowledge base which may be useful in the adoption and implementation of e-government.

In this article there are taken into consideration three dimensions: technology, user experience and public administration. The aim is to provide a comprehensive overview on the link between structural elements and their implementation, along with potential risks. This paper is intended for public institutions that want to adopt e-government systems, web developers that project this type of systems and other researchers in this field. Through having a proper and stabile digital ecosystem for government, the interactions of citizens with public institutions are improved, and many of the current issues are solved. Engaging citizens in a system that is user-centric designed, having all needed features in one platform that is easy to use and efficient, has a positive impact on e-government.

Literature review

The effective use of electronic government (eGov) platforms plays a crucial role in enhancing smart city policies and good governance. Also, the information encapsulated along with technologies to create a dedicated and collaborative environment. This paper Rotta et al. (2019) introduce the Municipal eGov Platform Assessment Model (MEPA) to evaluate 903 municipal websites in Brazil. According to the results, the maturity level is still at the beginning, which may imply a low commitment and utilization, having an impact on developing and evolving of smart cities. MEPA

facilitates the access of public institutions to platforms and digital commons to enhance a better governance.

E-government open data platforms rely on metadata for efficient data consumption, enabling structured machine processing. Milić et al. (2018) examine four metadata models, presenting strengths and limitations. A proposed metadata quality assessment model aligns with open data principles. A short presentation of API for the platforms chosen in this study is valuable in the context of metadata and the relation between data sets. Authors analyze the way in which metadata structures can contribute to important assets and open data used by government institutions.

E-government enhances citizen services quantitatively and qualitatively, restructuring organizations through increased ICT and Internet utilization. The progression starts with easy access to government information, involves e-transactions, and concludes with electronic document delivery. To support these e-government layers, there are proposed a streamlined electronic system facilitating e-protocol, e-applications/e-petitions, and internal organizational functions for efficient operations (Drigas and Koukianakis, 2009).

Another paper (Meneklis and Douligeris, 2007) asserts that keen observation of e-Government evolution reveals patterns impacting the process deeply. Efficiency can be obtained also by determining patterns for modeling methodologies of information systems. Analyzing the evolution from a structuration perspective, the focus is on structuring through services and technologies, unveiling recurring modeling concepts. It is proposed to extend the ISO Reference Model for Distributed Processing Systems (ISO RM-ODP) based on these concepts and associated structuring rules derived from experiences. These extensions find application in the modeling phase of the European e-Government project (SWEB).

The research of Shao et al. (2023) Reveals the importance of integrating IoT into public digital governance and the factors that sustain this and contribute to efficiency of operations, processes and developing a sustainable bridge between citizens and government. There are certain potential risk associated with this as reticence from both sides, and also technical support and a proper infrastructure.

Another research realized by Qi and Wang (2021) introduces an intelligent E-Government platform leveraging the Internet of Things (IoT). This platform has an architecture model in three-levels, considered to be more efficient. Its aim is to provide a collaborative environment and increase the efficiency of public services. Using Big Data and IoT, the platform optimizes these services and integrates all information that are needed, being well organized and divided for their purposes. The share of data becomes easier and faster, and the automation of processes helps the requirements from both parts, the citizens, and the government. Also, in terms of decision-making, service intelligence, stability and other functionalities, the system projected is significantly improved.

To create a new and sustainable ecosystem, e-government should use latest discoveries and technologies. The platform government's core objective is to facilitate communication between civilian entities and the government, fostering collaboration and citizen participation. Also, it is based on ideas and procedures from private sector as well as citizens benefits. Effective change management methods, such as aligning basic plans with e-government budgeting, governance reform, streamlining certification systems, and enhancing public-based services, are crucial for successful implementation (Chung, 2017).

The increased volume of data and the constant development and technology are real challenges for finding methods that are efficient to manipulate information and platforms that are best fitted for digital transformation. Social networks and other technologies may add complexity when comes to integration. The adoption of all new concepts by governments and the implication of citizens are still low which can be seen as an obstacle on progress. To enhance the citizens engagement and their satisfaction, value must be added to this field, both internally and externally. The challenges brought by Big Data in public services and government digital platforms are analyzed by Al-Sai and Abualigah (2017). In their paper is presented the complexity of potential software solution. It is highlighted in recent scientific papers the growth of Big Data and the challenges agencies are facing due to this phenomen.

The paper of Klymash et al. (2020) are analyzing the interactive software solutions for government that include feedback systems from an architectural point of view. Their study approaches the key features and characteristics on the implementation of web crawlers, that are specially designed for a deeper search on the web. Additionally, a prototype web crawler architecture is presented, designed for utilization as a feedback system in interactive platforms for the distribution of electronic content.

At an international level, governments proposed and adopted a series of measures to reduce digital gaps and gain citizens trust in using platforms by promoting transparency. Electronic Government (E-government) stands out as a strategic platform to realize these objectives. Othman et al. (2020) analyses the main factors that contribute to the way in which a society can achieve sustainability. Firstly, preliminary research was made to gather insights from practical examples and studies previously taken on this theme. The authors have used content analysis for data and as a result, a number of six factors has been reached. The following factors are considered to be key factors in implementing e-government: legal frameworks, organizational structure, human resource, policy, collaboration and approaches that are centered on citizens.

The framework proposed by Malodia et al. (2021) defines e-government as multidimensional, incorporating customer, channel, and technology orientations. Based on marketing theories, citizens preferences is the main factor that contributes to the success of e-government. The study carried out by these researchers identifies as moderators the following three factors: the digital gap, the economic growth and political stability. Tangible and intangible outcomes of e-government are proposed, with perceived privacy and shared understanding as moderating conditions.

Examining the evolution of open government, the study made by De Blasio and Selva (2019) identifies typical traits of trans-national convergence, especially in e-government and open data. Conversely, participatory platforms exhibit greater fragmentation. It is presented the importance of a proper integration at all levels, by central authorities. Here, approaches that are considered heterogeneous are the ones preferred by public institutions for e-government.

Blockchain's role can also be seen on public institutions. Experts from all over the world are analyzing the impact and potential benefits of this technology to decentralize information management. The aim is to improve transparency and efficiency of digital platforms that are used by public institutions. Given the multifaceted nature of e-government, investigating where blockchain can drive innovation, automating processes, and showcasing examples of improved government efficiency becomes crucial (Kassen, 2022).

Effective strategies and technologies should be oriented towards generating public value by employing anti-corruption measures, open data initiatives, ensuring access to information, and safeguarding data privacy according to Valle-Cruz (2019). Government institutions should

promote and adopt transparency among information, easy sharing, and manipulation of data, by also assuring its confidentiality. The implementation of technology through different tools and platforms designed for public services adds value to the government fild.

Methodology

To pursuit the main objective of this research and develop a unified conceptual model of e-government web platform the authors went through the following stages of research.

Firstly, it was made a thorough examination of existing literature in the field of e-government, identifying scientific articles that discuss web platform models, their various components, architecture along with the involvement of AI technologies in their development. The articles selected were published in recent years, most of them between 2017 and 2024, since the technology is rapidly evolving, and it is important to have a complex understanding of the current discoveries.

Secondly, the authors have developed qualitative research to collect representative data from a selected group of participants. Participants of this study were selected according to their job title, web developers, and their expertise in the field of e-government, to enhance a detailed understanding of this particular type of web platforms. The session went through different areas of public services and digitalization, but the focus remained to the factors that can contribute in a positive or negative way in using e-government platforms to access services. Only these four employees—out of the company's five total—were invited to the focus group discussion because they had prior expertise creating solutions for digital public services. During the session, the moderator and an extra staff member who oversaw recording replies were present in addition to the four participants. They brainstormed the necessities of citizens when it comes to e-government platforms and activities taken on these platforms.

The last step consisted in making use of the knowledge acquired from the focus group. Therefore, the authors categorized the data obtained from the focus group on web pages of the e-government platform, inputs required for each page, risks associated with each page and the resulted outputs of each web page. It was utilized an online tool entitled Draw.io to visually represent the conclusions drawn from the discussion. The recommendations for the main e-government unified platform are shown in Figure 1.

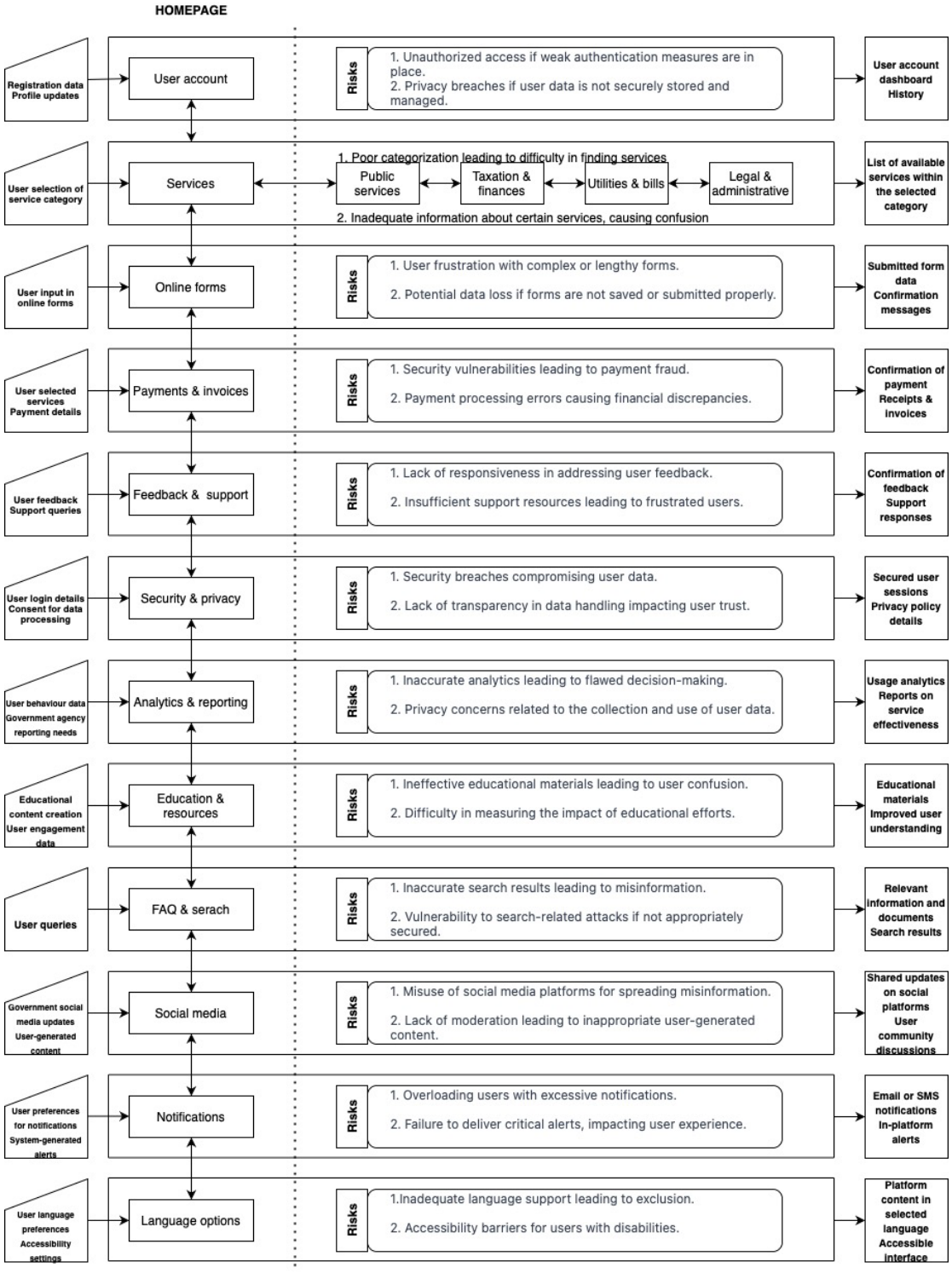

Figure 1. Conceptual model for e-government web application

Source: Authors' own research results.

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Results and discussions

This paper proposes a model of unified e-government platform which is divided in four areas as follows: the first is represented by inputs which are linked through an arrow to the main pages of the web pages. The web pages represent the second area and are linked between them also using double arrows as an end user (citizen) can go back and forth, depending on the purpose. The third area is represented by the potential risks associated to each of the e-government page application. The last area consists in the outputs of each page, usually results of actions that an end user has performed. Each of the main pages is detailed below.

Homepage (Figure 2). The Home Page is the gateway to the e-government web application, providing users with their initial interaction and navigation point. This page was projected to fulfill the different needs of citizens through a user-friendly interface. Upon visiting the platform, users are directed to this central hub, setting the tone for their interaction with government services. It is displayed a general overview of available services. Through a well-organized and visually appealing layout, users can quickly grasp the breadth and depth of services offered by the government. Quick links are strategically placed on the Home Page to streamline user navigation. Through them, citizens may access faster and easier the most common and frequently used services. Also, this functionality provides an increased level of satisfaction from users and efficiency.

User account (Figure 3). Here, new users may create in a simple manner a new account to register in the platform. This process is secured and protects the confidential information. Also, the users that already have an account may access the platform using their username and password without adding any additional information that is required as a new user.

Figure 2. Conceptual model for e-government web application – User account page

Source: Authors' own research results.

Services (Figure 3). This page is designed to encapsulate all the services that are supported by the platform. These services are divided into categories and subcategories, according to their purpose and relation with one another, which allow citizens a faster identification and access.

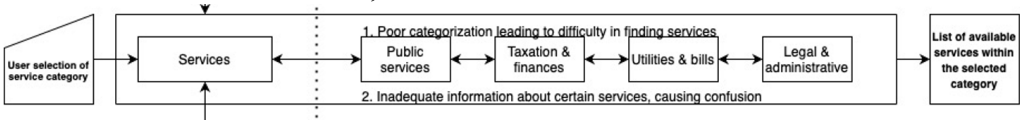

Figure 3. Conceptual model for e-government web application – Services page

Source: Authors' own research results.

Online forms (Figure 4). The Online Forms page on the e-government web application is a centralized platform that streamlines the application process for various government services. Here are kept various standard forms for services to assess citizens on their needs. Users can go over a complex list of forms that cover a wide range of administrative services. There can be remarked the dynamic forms, which change based on the input or existing data, providing the citizens a custom experience and an efficient manner to complete the forms with data. This functionality decrease the effort taken by a citizen, as the form adapts to specific requirements. The Online Forms page has an easy and friendly interface to facilitate the interaction of the users with different

elements on it, having clear and concise instructions. It can contribute to a good experience, by simplifying processes and actions that normally require a lot of time.

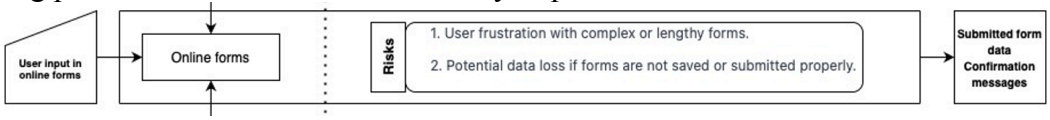

Figure 4. Conceptual model for e-government web application – Online forms page

Source: Authors' own research results.

Payments and invoices (Figure 5). With a commitment to security, the Payments and Invoices page employs robust encryption protocols to safeguard sensitive financial information. The payment process is easier, offering a satisfying experience for citizens. This provides users trust in the e-government platform, which was designed to be user-centric. Bills are securely kept in the platform, but can be downloaded and printed, as citizens may need a proof of them in the future. The financial relationship between citizens and public institutions is transparent and always available.

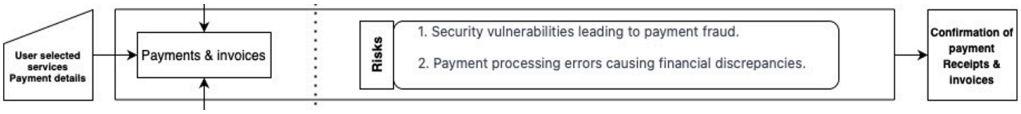

Figure 5. Conceptual model for e-government web application – Payments & invoices page

Source: Authors' own research results.

Feedback and support (Figure 6). The page is designed to display feedback forms for citizens usage. Through completing them, feedback and suggestions are provided, which are valuable information. Also, these forms allow the report of different issues encountered by citizens. The support part is represented by a helping center, which encapsulates frequently asked questions and articles on topics of interest related to governance. It is intended to be a tool to assist users and guide them on processes developed inside the platform. Also, useful contact data is present, to allow citizens to get in contact with human resources, dedicated to assist them in various tasks. The feedback and support page scope is to create an open and transparent channel of communication between public institutions and citizens to increase their satisfaction and engagement by meeting their needs and expectations.

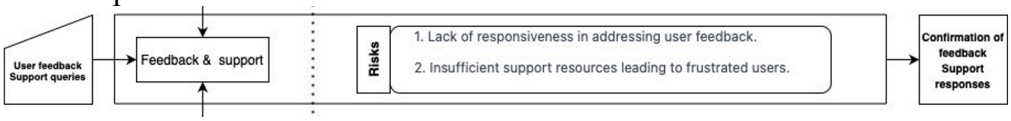

Figure 6. Conceptual model for e-government web application – Feedback & support page

Source: Authors' own research results.

Security and privacy (Figure 7). The aim of this page is to assure citizens of their private data security and privacy. Here, there are presented in detail the security measures that are currently implemented along with encryption protocols and other standards towards this that are now available. By having displayed this type of information, citizens are ensured and more willing to create accounts on e-government platform to perform the desired tasks. They are aware that their personal data introduced is carefully and securely manipulated. This page acts as an important resource for users of the platform, offering them a trustful and engaging experience. Also, the confidentiality and integrity of data is provided, which are the main pilots of security.

Figure 7. Conceptual model for e-government web application – Security & privacy page

Source: Authors' own research results.

Analytics and reporting (Figure 8). Here it is provided a powerful analytic tool that keeps and manipulates information related to user and platform in terms of different established KPIs. Government institutions could benefit from this tool to enhance a general overview on trends, evaluate efficiency and propose further measures. These decisions may impact the institution in terms of improving constantly and updating it based on citizens preferences. Also, the analysis of data and the results gained from it can conduct to a better relationship with citizens, increasing their level of satisfaction.

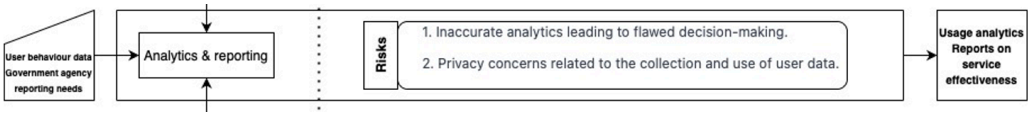

Figure 8. Conceptual model for e-government web application – Analytics & reporting page

Source: Authors' own research results.

Education and resources (Figure 9). In this web page can be found information related to legal, administrative procedures. Citizens can access, read, and apply these procedures further to perform their activities, being sure that respects all the country obligations. Through the content of this page a highly degree of transparency is allowed and a strengthen relationship between citizens and government services is provided. Here, all types of materials are supported (video, text, pictures) to keep citizens informed and engage them with their preferred content exposure.

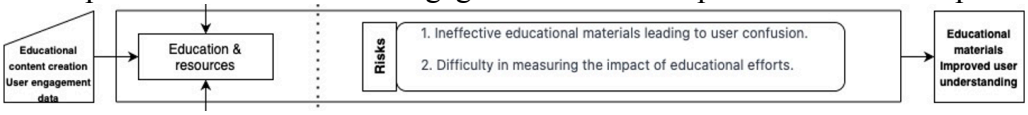

Figure 9. Conceptual model for e-government web application – Education & resources page

Source: Authors' own research results.

FAQ and search (Figure 10). Providing this page for the citizens that are currently users of the platform is an important facility. They can search different content and information through keywords and access it easier and faster. Also, they may find different answers to questions that are similar or the same to other users. Therefore, this page can be a self-help resource for citizens.

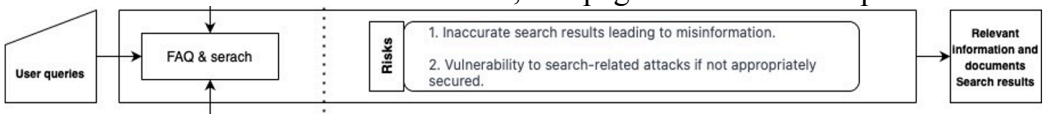

Figure 10. Conceptual model for e-government web application – FAQ & search page

Source: Authors' own research results.

Social media (Figure 11). More and more, institutions are also engaged in social media. Here, providing news, announcements, and an open to discussion environment, leads to increasing their community and engaging it by proving the feeling of commitment, implication. Having a transparent and open domain for discussions create a more reliable and lasting relation between institutions and citizens, amplifying the e-government ecosystem. Facebook, Twitter, and other

such social media platforms allow a friendly and interactive communication, which is highly embraced in today's world.

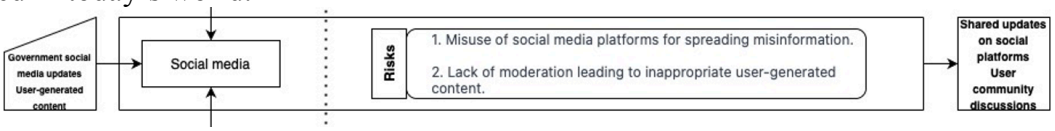

Figure 11. Conceptual model for e-government web application – Social media page

Source: Authors' own research results.

Notifications (Figure 12). Users can manage their notification preferences efficiently, choosing to receive alerts via email or SMS for upcoming deadlines, important announcements, or changes in the status of their applications or utilized services. The aim of this web page is to keep citizens engaged, up to date and provide information in real time. Whether it's a reminder of pending tasks, updates on application progress, or important announcements from government agencies, the transparency in the eyes of the citizen is improved.

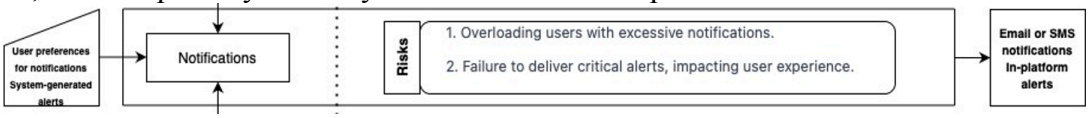

Figure 12. Conceptual model for e-government web application – Notifications page

Source: Authors' own research results.

Language options (Figure 13). An easily switch between language preferences, selecting from a range of options to navigate the platform in a language that suits their preference and comfort. By offering the citizens various languages as an option, may help them in transforming the platform in an environment that is easier to understand and use. This may help on also increasing the number of citizens that perform activity on the web platform as language barriers are no longer a concern.

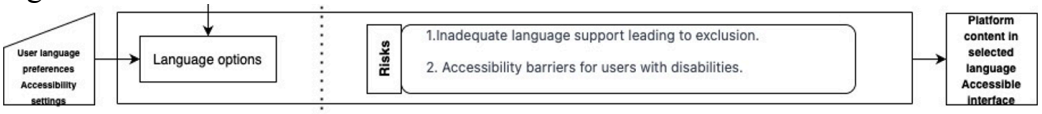

Figure 13. Conceptual model for e-government web application – Notifications page

Source: Authors' own research results.

The proposed model was designed as a result of the qualitative research as a proposal for a unified e-government web platform addressed to Romanian citizens. It is aimed to help the contributors by having a simple interface with all the actions needed grouped in pages that have intuitive names for their needs and concerns. By having in only one place all the actions a citizen requires and an organized, well-explained environment, this will come as complete web platform for the interaction between citizens and the government.

Conclusion

Institutions and companies are facing a rapid and challenging change in their processes and activity due to technology and innovations. To keep up with all this shift the implementation of digital platforms and IT software solutions is mandatory. The aim is to provide improved services, easier access to data, manipulation of data, security for private information which will improve efficiency and conduct to effective results.

The 2020 edition of the Digital Economy and Society Index2 (DESI) realized by the European Commission, shows that less than 20% of Internet users in Romania use e-Government services. While the EU average is 64%. Here, it is kept and overview of digital transformation for all the states that are members. And about the use of electronic forms, Romania has the lowest score - below 10 points, the Union average being 63 points. Therefore, Romanian public services can be improved - 44 points for services addressed to citizens (compared to the EU average of 75), respectively 49 points for those dedicated to businesses (the average being 84).

To engage citizens in an online environment where they can perform different actions in remains a challenge due to internal and external conditions, lack of resources and mind-setup. To combat this, this paper proposes a new model for an unified e-government web platform, encompassing stands as a robust framework designed to enhance citizen-state interactions and streamline government services. By focusing on elements such as user interface design, security measures, service categorization, and collaborative interoperability, the model strives to create a comprehensive, accessible, and efficient platform tailored to the specific needs of Romanian citizens.

Dividing services on categories and organized information addresses in an easier manner the range of needs that citizens may have. Online forms and a dynamic search functionality enhance user convenience, while a centralized payment gateway and detailed payment and invoice overview simplify financial transactions.

All features presented and supported together by one platform that also ensures the security and privacy of information assures citizens and provide confidence, satisfaction in using it. Sometimes raw data is hard to be followed and by having it displayied under graphs may provide an easier understanding for both citizens and institutions. The conceptual model proposed in this paper was projected to serve as a comprehensive guide for further development and analysis. Also the aim is to provide an environment, that is digital and efficient, easy to access, and engage citizens into the actual usage of it to perform activities related to the governance field.

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