

# EVALUATING EUROPEAN MINISTRIES' WEBSITES

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## Abstract

Despite the proliferation of e-government in recent years few studies evaluate the efficacy of e-government websites. The aim of this article is to investigate the state of ministries' websites in Europe. Ten types of ministries in ten European countries were selected, thus giving a total of 100 websites. In order to evaluate these 100 European ministries' websites from the citizens' perspective, an evaluation framework (eGovQual) consisting of 100 criteria was developed. The thirteen main evaluation dimensions of the eGovQual are the following: 1) Content, 2) Presentation – Media – Format, 3) User Interface, 4) Structure & Organization, 5) Navigation, 6) Orientation, 7) Interactivity & Feedback, 8) Services – Functions – Facilities – Operations – Applications, 9) Reliability & Availability, 10) Maintainability, 11) Performance, 12) Openness – Compatibility – Interoperability, 13) Security. Then seven University students evaluated these websites using eGovQual. The evaluation results revealed that most European ministries' websites achieve a satisfactory quality level. The websites of the Ministries of Foreign Affairs, National Defense, and Environment excelled. However, there are inefficiencies with respect to the dynamic interaction and communication with the citizen, the e-services, the personalization, and consideration given to those with special needs. Furthermore, the sites' administrators should continuously adopt new technological advances (e.g. mobile government, Web 2.0) in order to effectively serve the citizens.

Keywords: e-government, e-services, Europe, evaluation criteria, ministries' quality, websites, usability, website evaluation.

## 1. Introduction

As the world moves forward and technology develops at a high rate, the World Wide Web is also expanding to every corner of the earth. Millions of users around the world, every day use the Internet in order to make their life more comfortable. People take advantage of what the Web can offer to achieve this goal. Several countries around the world have also realized that the Internet is becoming a mainstream choice for people to contact the Government. As a result, a great number of public services are on offer via the Web. However, as technology is advancing the expectations of the

people are also increasing. Can governmental websites fulfill their needs and expectations? The success depends on a number of criteria that will be presented in the article below.

The Commission of the European Communities [2003] defined e-government as “the use of information and communication technologies in public administrations combined with organisational change and new skills in order to improve public services and democratic processes and strengthen support to public policies”. Thus, e-government (Electronic Government) includes all governmental actions that use electronic means. On this basis, different types of interactions can be distinguished: G2C (Government to Citizen), G2B (Government to Business), G2G (Government to Government) and recently, G2NGO (Government to Non-Governmental Organizations) and G2NPO (Government to Non-Profit Organizations) (Montagna, 2005). Kraemer and King (2003) provided the following definition: “Electronic Government refers to the use of information technologies to improve the efficiency, effectiveness, transparency and responsibility of public governments.” Another definition is the following: “E-Government means putting citizen services online” [Caldow, 2003].

This paper investigates the state of ministries’ websites in Europe. To our knowledge, no such studies have previously been attempted. In order to evaluate these ministries’ websites, an evaluation framework of relevant criteria is required. Although previous research had proposed criteria for evaluating websites, mainly in the area associated with e-commerce, there is no comprehensive evaluation framework available to evaluate e-government websites. After introducing eGovQual, which is an evaluation framework from the citizen’s point of view, seven undergraduate students in an Economics department of a University evaluated one hundred European ministries’ websites using eGovQual.

In the next section, previous research on e-government site evaluation is presented. In section 3, the research procedure and methodology are described. In section 4, the evaluation framework is presented. In section 5, the results are discussed. Finally in section 6, conclusions are drawn and future research is suggested.

## 2. Previous Research

Previous research on e-government site evaluation has adopted a variety of approaches. For the evaluation of e-government in New Zealand, Smith [2001] suggested two groups of criteria: a) *Information content* criteria, which evaluate the nature of the information and services provided by the website (orientation, content, currency, metadata, services, accuracy, privacy and external recognition), and b) *Easy of use* criteria (links, feedback, accessibility, design, navigability). For evaluating St. Petersburg e-government sites, Merkuryeva et al. [2003] suggested three categories of criteria: *functionality, accessibility and usability*. Wood et al. [2003] suggested a multidimensional approach in which web evaluation methods fall into four major classes: *Usability testing, User feedback, Usage data and Web and Internet performance data*. The evaluation results can offer website developers a very detailed and specific feedback regarding site design and functionality. However, the major drawback associated with this approach is the high costs involved. West [2003; 2005] focused on six policy issues facing the public sector: *Disability access, Readability, non-English language accessibility, Interactivity, Equity of access across the agencies, and User fees and premium sites*. Barnes and Vidgen [2003; 2004] proposed an evaluation method based on the *WebQual instrument*. The WebQual

instrument is a detailed questionnaire containing twenty topics that users are asked to rate using a seven-point scale. For the evaluation of American governmental web sites, Freed [2003], the president and CEO of ForeSee Results - an expertise web satisfaction management company – suggested the use of a survey where the sites are rated by their visitors. The rating is converted through the ACSI (American Customer Satisfaction Index) methodology into a score on a 0-100 point scale. The ACSI methodology, produced quarterly by the University of Michigan, is a national economic indicator of customer evaluations of the quality of goods and services available to household consumers in the United States. These results are used to link consumer satisfaction to measurable business results. Steyaert [2004] proposed an evaluation model, using the e-commerce model of Watson et al. [2000]. This model includes five e-commerce performance indicators: *awareness*, *popularity*, *contact*, *conversion* and *retention*. Taken together, these five marketing indicators can assist IT managers to measure the web efficiency of their sites. Top Of The Web [2003] proposed the use of questionnaires to measure the quality and usage of public services. The following three topics were measured: i) *overall evaluation*, ii) three criteria of *usability* (effectiveness, efficiency, user satisfaction), and iii) seven types of *benefits* (save time, gain flexibility, getting more and better information, receive better help, getting a faster case/reply, getting better control over the process, save money). Signore [2005] suggested five quality dimensions: *correctness*, *presentation*, *content*, *navigation and interaction*. Banerjee and Chau [2004] focused on the creation of an evaluation framework to analyze the e-government convergence capability in developing countries.

Wauters et al. [2007] examined more than 5,000 public agencies' websites in 27 European Union countries plus 4 other European countries. They evaluated 20 public services on these websites. These services include the following 12 services for citizens: Income taxes, Job search services, Social security benefits, Personal documents (passports / driver's license), Car registration, Application for building permission, Declaration to police, Public libraries, Certificates, Enrolment in higher education, Announcement of moving, and Health-related services. They also include the following 8 services for businesses: Social contributions for employees, Corporate tax, VAT, Registration of a new company, Submission of data to statistical offices, Customs declaration, Environment-related permits, and Public procurement. Specifically regarding e-taxation websites, Economides and Terzis [2008] evaluated the e-taxation websites of five European countries with respect to five quality categories: *content*, *presentation*, *usability*, *technical* and *e-services & interactivity*. Each quality category consists of several sub-categories. Chatzopoulos and Economides [2009] evaluated fifty Greek municipalities' sites. They found significant shortages related to the sites' interactivity and feedback, as well as e-services and applications. They also found differences among geographical regions.

A totally different approach is the evaluation of websites using web diagnostic tools [Choudrie et al., 2004]. These tools can produce unbiased results examining critical issues such as the accessibility, the broken links and the color schemes that have an impact upon people with various forms of color blindness. Some of these tools are: WebXact (<http://webxact.watchfire.com>), NetMechanic (<http://www.netmechanic.com>), Validator (<http://validator.w3.org>) and Vischeck (<http://www.vischeck.com>). In addition, Wulff [2007] presented a usability testing technique called "Eye Tracking". Eye tracking is a tool used to analyze human - computer interaction by registering the user's eye movements and fixation time. Using a different approach, Gardner [2007] involved evaluators to remotely perform 25

tasks on the United Nations Economic Commission for Europe (UNECE) Statistical Division website. The goal was to discover any usability inefficiencies.

However, the majority of these previous approaches involve several limitations: (a) the high implementation cost of some methods; (b) the necessity for specialized laboratories and equipment for some of the methods; (c) the criteria used by some methods are abstract and general and can mislead the evaluators (additionally, the same criteria may occasionally be considered twice); (d) some categories of citizens (e.g. people with special needs) are not taken into consideration by some methods. In an attempt to overcome these limitations, we developed eGovQual, which is an evaluation framework from the citizens' point of view tailored to e-government websites.

### 3. Research Procedure

The task procedure can be divided into four phases. During the first phase, we selected the ministries' websites. The websites of ministries that are considered as the most important in most countries were considered first. These are:

- 1) Ministry of Economy,
- 2) Ministry of Interior,
- 3) Ministry of Foreign Affairs,
- 4) Ministry of Labor,
- 5) Ministry of Health,
- 6) Ministry of National Defense,
- 7) Ministry of Culture,
- 8) Ministry of Environment,
- 9) Ministry of Justice,
- 10) Ministry of Education

Then, ten European countries across various European regions were chosen. These countries are: Belgium, Croatia, UK, Finland, Germany, Greece, Italy, Poland, and Spain. We attempted to represent different geographical and cultural areas of Europe.

During the second phase (2006-2007), we closely examined each of these one hundred websites. Thus, almost every page of every site was explored in order to discover the advantages and drawbacks associated with each site. During the third phase, we developed the evaluation framework (eGovQual) based on our experience with these ministries' websites, on our experience of using and evaluating other website types and on previous research. Finally, during the last phase, seven undergraduate University students evaluated these one hundred websites using eGovQual. In addition to their mother tongue, all students were fluent in English and some were also familiar with other languages. Furthermore, they used translation machines (e.g. Google Language Tools) to translate web pages into their mother tongue.

They gave marks for each criterion for each site depending on the degree that the site fulfilled this criterion. For each criterion, the range of marks was from 0 to 5. Thus, the marks were: 0:=non-existence, 1:=very poor, 2:= poor, 3:=moderate, 4:= good, 5:= very good. The evaluation took place during 2006-2007.

## 4. Evaluation Framework

One of the most important parts of the entire task is the definition of the criteria to be used in order to evaluate the ministries' websites from the citizens' point of view. We considered thirteen categories of criteria (Table 1):

- 1) Content,
- 2) Presentation – Media – Format,
- 3) User Interface,
- 4) Structure & Organization,
- 5) Navigation,
- 6) Orientation,
- 7) Interactivity & Feedback,
- 8) Services – Functions – Facilities – Operations – Applications,
- 9) Reliability & Availability,
- 10) Maintainability,
- 11) Performance,
- 12) Openness – Compatibility – Interoperability,
- 13) Security.

These 13 categories are further divided into subcategories consisting of about 100 different criteria. Some of these criteria were also proposed by previous researches in the field (Table 2). These many different criteria were considered in order to take as many possible aspects and details of each site from various points of view into account.

The evaluators considered all criteria in evaluating the ministries websites. Based on their personal experience and preferences, they assigned a mark for each category for each site. These websites are used by ordinary people. Thus, the evaluators were ordinary people and not e-government experts, designers and developers. However, this task involved a great deal of work for the evaluators. Since a holistic evaluation of the ministries' websites was required, many criteria were used which in turn provided a detailed picture of both the structure and offered services for each site. No other previous approach has involved so many criteria. Many previous studies have used some basic criteria but have not taken other important ones into consideration. Although many criteria were involved, it is possible for anyone with minimal experience regarding the Web to rank a site with respect to each one of these criteria. There are several aspects to be discussed with regards to this matter.

To start with the disadvantages, it is clear that anyone having to perform an evaluation using marks or points evaluates subjectively judging by his/her own taste, beliefs and experiences. This is true regarding criteria that are based on matters of taste, of convenience, of aesthetics, etc. that differ from person to person. For example, there are criteria such as colors, fonts, variety of media, the correct position of the media etc. which depend on someone's taste when it comes to making a judgment and thus different marks are to be expected. However, there are some criteria involving only two different answers (existence or not). For example, criteria

such as Special Needs Persons Consideration, Site Map, Search and FAQ (Frequently Asked Questions) are either fulfilled or not. With regards to Special Needs Persons Consideration it was specifically examined whether or not there was any consideration, even the simplest one (e.g. zooming, colors, voice). Another aspect to be considered is that good quality in a criterion could lead to low quality in another criterion. For instance, the quality of the media (pictures, slides etc.) can affect someone's marks simultaneously in the Presentation criterion and the Performance criteria. This can occur when a picture with a high resolution takes a longer time to load.

However this method does offer many advantages. First of all, the simplicity (i.e. no special knowledge and skills required) of performing the evaluation can enable the use of a big sample of "evaluators", which means that the evaluations' subjectivity could be "neutralized". Secondly, there are many evaluation criteria which can be used to capture a very detailed picture of what the ministries' websites can offer to its users. Finally, this evaluation framework can point out the strengths and inefficiencies of a website which can assist the web designers to enhance the strengths and correct the inefficiencies.

## 5. Results and Discussion

At a first glance, the results are encouraging. Most of the sites satisfy the basic requirements of the users. They contain an adequate amount of information that covers the majority of the users' requirements. The Presentation and Navigation of the sites are the key factors that affect people's opinion regarding a governmental portal and these proved to be quite good. In general, an ordinary citizen looking for some basic E-Services will probably be satisfied by the majority of sites. However, in relation to an experienced user (or an evaluator using some specific criteria) exploring the sites, there are some issues that require discussion.

First of all, it was obvious that in the majority (around 70%) of the sites there was no consideration for individuals who have visual disabilities or hearing impairments or face other physical challenges. There were no options such as the magnification of the text by changing the font size or the colors of the page or providing audio support. Thus, those with special abilities were not being provided equal treatment to others. Notable exceptions were the UK and Italian sites, German Ministries of Health and Justice, French Ministry of Education, and Finnish Ministries of Economy and Foreign Affairs.

However, this inefficiency also appears in even more advanced countries in e-government, such as the USA [West, 2003; West, 2005]. Similarly, Wauters et al. (2007) found that compliance to international accessibility standards was poor, with only 5% of 5000 European public service websites making this visible (e.g. statement; logo). This indicates very modest progress compared to the 3% of the 436 online public service websites which achieved the minimum standard under the W3C Web Content Accessibility Guidelines in 2005.

Another important issue that the authorities and web designers should focus on is the orientation of the users into the site. This can be enhanced by supplying many more tools (e.g. Search and advanced search from every page, Index and Directory, Navigation trail, Stable position of the menus in the entire site) in order to facilitate access to the citizens with regards to their search.

Also, the lack of adequate feedback options made the sites impersonal. Functions such as user login (e.g. Polish Ministry of Foreign Affairs), application forms, forums or new-special content and deadlines could be necessary for some cases. The creation



of forums into the sites could be a great advancement that could assist citizens to discuss common problems and solve them. The French and Finnish Ministries of Education were two out of a very small number of sites to host a forum.

More specifically, the evaluation results of the European ministries' sites with respect to the countries are presented in Figures 1-13, and with respect to the ministries' types in Figures 14-27.

### 5.1. Evaluation with respect to the countries

The purpose of this study was not to compare the countries but to find out the state of ministries' websites and the existence of any large deviations among the countries. Most countries' sites provided *Content* that was comprehensive and relevant to the sites' purpose, as well as multiple language support for immigrants and visitors from foreign countries (Figure 1). France leads with regards to Content because almost all of its sites were offering rich content, which was day-by-day updated and categorized in appropriate categories. This option makes the searching of the required information very easy. Greek sites (with the exception of the Ministries of Foreign Affairs and Justice) achieved the lowest scores because of the small amount of information supplied, the lack of multi-language support and the not recently updated content. Generally, there was not a large variation among the countries regarding the Content. There was a satisfactory amount of information in every site. This was expected since these sites were designed aiming to provide news and information to citizens to make their lives easier.

German sites showed a nice *Presentation-Media-Format* using the appropriate fonts and combination of colors, many pictures and media. That is why they achieved the highest average score of 4.6 (Figure 2). Presentation is a key factor to the success of a site as it makes it more approachable to the users and provides a friendly, pleasant environment with pictures and multimedia instead of merely plain text. German site designers achieved this as they used, among others, appealing colors and pictures next to each topic. Belgian sites achieved the lowest score of 3. The evaluators did not like the topics' presentation of the Belgian sites. In addition, many Belgian sites were using small fonts (e.g. Ministries of Economy, Interior, and Foreign Affairs), intense colors and color combinations, and were ignoring those with special needs.

Regarding the *User Interface* (Figure 3) and *Structure & Organization* (Figure 4), Germany, UK and Spain supported well-organized sites that could be easily accessed. In a well-organized site, the organization of its material is logical and intuitive. So, the user could easily explore the site and find what s/he is looking for. S/he should not need to access every page of the site in order to find what s/he is looking for. Furthermore, the sites presented their topics and directories in stable positions on their pages. User Interface and Structure are crucial for the satisfaction of the users and are also related to the Presentation and the Navigation. As before, Belgian sites (specially, Ministries of Foreign Affairs, Justice and Interior) achieved the lowest score. One should always bear in mind that these sites are accessed by citizens of different educational levels, computer skills, web navigation experience and abilities. Thus, it should be possible for both a novice and an experienced user to be able to easily use them.

Similar results were obtained regarding *Navigation* (Figure 5) and *Orientation* (Figure 6). German, English, and Finnish sites were offering easy and simple navigation and consistent orientation throughout the whole site.

Finnish sites proved to be most satisfactory regarding *Interactivity & Feedback* (Figure 7). For example, the Finnish Ministry of Foreign Affairs provided a variety of

forms to the users such as forms for human rights complaints and for visa applications within the Schengen area. Most Finnish sites provided a “Feedback” button that activates a short message sent to the corresponding department of the Ministry. They also offer many contact options to the user, including e-mail addresses, telephone numbers and postal addresses. These options could be available in all European governmental sites. It should be remembered that these sites were designed in order for the government to come closer to the citizens and to satisfy their requirements. In order to achieve this, they must be in close touch with the citizens in order to receive their complaints, their questions and their suggestions and thus to improve the sites and the offered services. Greek sites achieved the lowest score in terms of interactivity as they did not offer many options in order to contact the authorities, to submit online applications or download forms.

*Services* represent the most advanced features of a government site. It could be useful for a citizen to complete all of his/her transactions with the government through government sites. Thus ministry sites should offer as many services as possible to the users. German and Finnish sites were once again leading the way as they offered several useful and innovative services (Figure 8). For example, a visitor to the German Ministry of Economy could order various brochures from the site using a shopping basket. Most of the German sites offered the option of ordering brochures in paper format, plus the majority had download folders filled with multimedia (Ministries of Interior, Foreign Affairs, National Defense, and Environment). Moreover, they did take into consideration people with visual disabilities. For example, visitors could set the font size and the contrast or listen to the text (Ministries of National Defense, Justice, and Education).

This paper’s objective was not to compare the ten countries. However, these countries were ranked by a recent benchmarking of the online public services regarding online sophistication maturity as follows: UK, France, Germany, Spain, Finland, Belgium, Italy, Greece, and Poland [Wauters, 2007]. In addition, they were ranked regarding the full online availability as follows: UK, Germany, France, Italy, Spain, Finland, Belgium, Greece, and Poland [Wauters, 2007]. In our study, Germany and Finland achieved the highest score regarding the ministries’ e-services, while Greece the lowest (Figure 8).

Concerning *Reliability & Availability* (Figure 9), *Maintainability* (Figure 10), and *Performance* (Figure 11) there were not many significant variations among the sites. Almost all sites were continuously available; 24x7 availability, meaning that the government services are available 24 hours per day, 7 days per week [Criado, 2003]. However, Croatian sites fell short in this respect mainly due to many “under construction” messages observed in their pages (e.g. Ministries of Economy, and Education). Similarly, results were achieved regarding *Openness-Compatibility-Interoperability* (Figure 12). It is notable that the vast majority of the sites functioned smoothly without technical problems.

Finally, *Security*, was examined, a very sensitive issue for gaining the citizens’ trust. The most worked on sites with regards to security and privacy issues appeared to be those from UK sites as they were interested in taking care and informing the users about topics such as: privacy policy, crown copyright, freedom of information, terms and conditions of use, security policy etc at the bottom of their home page (Figure 13). On the contrary, most of the Greek sites did not inform the user about such issues.

In summation, Germany (total average score= 4 000), UK (total average score= 3 984) and Spain (total average score= 3 823) were the countries with the best



ministries' sites. On the other hand, Greece (total average score= 3 300), Belgium (total average score= 3 461), and Italy (total average score= 3 523) should place greater efforts into upgrading their ministries' sites. Several explanations have been provided within this paper regarding the underachievement of these countries. A final remark has to be made regarding the low scores of Belgian sites as these surprised the evaluators. A higher score was expected since Belgium is a technologically advanced country and this shows that being technologically advanced does not guarantee the development of satisfactory and appealing governmental websites. In order to develop effective sites, it is necessary to be continuously aware of the requirements and demands of the citizens and adopt new technologies and applications.

A final comment is made with regards to the criteria categories achieving the highest and the lowest scores. The sites achieved high scores regarding *Openness-Compatibility-Interoperability* (Figure 12), *Maintainability* (Figure 10), and *Content* (Figure 1). The sites supported users with different types of connections, operating systems and did not require any special software and Plug-ins. Also, they offered technical support and comprehensive content to the user. On the other hand, the sites did not satisfy the evaluators with respect to *Interactivity* (Figure 7), and *Services-Functions-Facilities-Operations-Applications* (Figure 8) and thus the demand was for more interactive and convenient sites to provide even more services to citizens.

## 5.2. Evaluation with respect to the ministries

In this section, the evaluation results are presented with respect to the ministry type (Figures 14-27). For example, the Content score of the Ministry of Education is the average Content score of all ten Ministries of Education. This could enable us to examine the extent to which each ministry type satisfies the citizen expectations. The purpose of this study was not to compare the ministries but to find out the state of ministries' websites and the existence of any large deviations among the ministries' types.

Regarding *Content*, the Ministries of Foreign Affairs, National Defense, and Environment provided the most comprehensive content (Figure 14). A possible explanation could be that these ministries deal with issues that attract the interest of many people; not only the citizens but also foreigners. Thus, they have to offer rich and quality Content. These three ministry types were the most advanced in the majority of their criteria categories. Ministries of Foreign Affairs could be considered as "best practice" due to their extensive and daily updated content plus the support of many language options which is an accommodation definitely required by the visitors to the Foreign Affairs Ministry. A negative surprise was triggered with regards to the scores of the Ministries of Culture sites. These sites, unexpectedly, achieved the lowest scores with respect to the Content. Someone could expect that these Ministries present the art and culture of their nation in the best possible way, not only to attract tourists but also to promote their nation's culture to the whole world. The evaluators suggested that these sites could inform the visitors about the cultural heritage of their nation by providing plenty of information about their history, civilization, tradition, culture, art, museums, etc. as well as the ability to reserve tickets and order brochures and items.

Most Ministries of Environment were impressive and leaders regarding *Presentation-Media-Format* issues (Figure 15). Of course, these ministries have an advantage due to their theme. Vivid colors (e.g., the Polish site), nice pictures and multimedia improved the presentation of these sites. Ministries of National Defense and Foreign Affairs also exhibited pleasing Presentation. On the contrary, once again

the Ministries of Culture did not achieve a high score as they appeared to fail to take advantage of their theme. These sites could show the visitors various types of multimedia (e.g. pictures, music, video, television) regarding art events and performances, monuments, landmarks, artifacts, traditional habits and customs etc. that could improve the sites' picture.

Regarding *User Interface* (Figure 16) and *Structure & Organization* (Figure 17), similar results were expected because similar issues were examined. Once again the Ministries of Foreign Affairs stood out as with regards to best practice. The Polish Ministry of Foreign Affairs offered a member's login service for their visitors and text-only version for users who only had low-speed connections. The users appeared to appreciate such services as they are able to navigate a user-friendly environment designed according to their personalized needs. Again, the worst sites were those of the Ministries of Culture. The Ministries of Foreign Affairs were the leaders regarding *Navigation* (Figure 18) and *Orientation* (Figure 19). The navigation trail, the Home button in every page, and the site map were assisting the users to explore the sites. The Ministries of Justice failed to manage and organize their website spaces in a manner that could help users to easily access the required information.

The sites achieved the lowest scores with respect to *Interactivity and Feedback*. All Ministry types did not satisfy the evaluators. In particular, the Ministries of National Defense and Culture were the most disappointing. According to the evaluators, the lack of options such as Online Applications or Newsletters and Downloading sections were the most striking omissions.

One of the most important categories is that of the offered *Services*. Ministries of Foreign Affairs lead the way. For example, the Belgian Ministry of Foreign Affairs provided services concerning nationality issues, registry, legalization and much more. The Italian site was also offering many similar services, in addition to a very innovative virtual tour option.

Finally, regarding *Security*, the Ministries of Foreign Affairs again lead the way, while the Ministries of Interior and National Defense followed closely. These types of ministries are probably the most popular governmental sites and they host many sensitive services. Thus, a security system that could guarantee the safety of the transactions, the navigation and the privacy of the users is required. Moreover, it is a significant issue (especially for the Ministries of the National Defense) to make the citizens feel safe towards any kind of electronic threats, as they reflect a robust governmental policy towards malicious invaders.

While the Ministries of Foreign Affairs and those of National Defense were the best sites, the Ministries of Culture and Labor did not achieve high scores in the majority of criteria categories. This is a surprising result if we consider the importance of Culture and Labor within the lives of most citizens. These sites had unsatisfactory structures, were not user friendly and offered the minimum feedback services. At least, the Ministries of Labor provided adequate online services but they should add even more, such as a service that could establish contact among unemployed people and those enterprises seeking staff [Terzis and Economides, 2005]. Ministries of Culture could increase their popularity by hosting forums where people could have open discussions regarding historical events and cultural issues. They could also present the art and culture of their country using advanced multimedia tools in order to attract tourists and advertise their culture.

The final results of the evaluation illustrate the fact that European governments have made a huge effort to offer services to citizens and enterprises via the Internet.

## 6. Conclusions and Future Research

This paper presented the evaluation findings of the main ministries' websites of ten European countries. Its purpose was to investigate the state of the ministries' websites from the citizens' point of view under a common framework and not to rank the websites or the countries.

The basic features (e.g. return to Home from every page, search, contact us, news) were offered by almost all sites. Also, most sites offered important services such as language selection, download sections to obtain press releases, brochures, videos or photos, or even some basic multimedia and document software. However, consideration for people with special needs (e.g. font size and color configuration) and interaction between the site and the citizen (e.g. member login, subscription to receive a newsletter, RSS service, forums) were missing in the majority of the sites. Specifically, we counted:

- Only 2 sites performed any type of polls
- Only 5 sites hosted a discussion forum
- Only 20 sites hosted the service of Newsletter
- Only 31 sites offered the RSS service
- Only 32 sites took into some consideration people with visual or hearing impairments
- Only 57 sites provided the option of language selection (English was the dominant language)
- Only 67 sites offered a download section with documents, photos or videos.

In addition, 8 sites were not updated on a detail basis. The next section describes the present stage of development for the websites of the Ministries. Let consider the following three stages:

1. Access Information stage: Site-to-citizen (e.g. read information, requirements, regulations, advices, benefits etc., download forms)
2. Communication stage (e.g. email, request information, complains, suggestions, discussion, chat, forum, conferencing, alerts, sms)
3. Secure Communication stage (e.g. filling application, receiving certificate, e-payment, voting).

All of the examined Ministries' sites successfully passed the first stage of development where the flow of information is one-way directed from the site to the citizen. The majority of the sites were in the second stage where there is interaction between the site and the citizen. Almost 20% of the Ministries reached the third stage of secure communication. These Ministries were mainly those of the Interior and Foreign Affairs. These sites provided applications for obtaining a Visa, renewing or obtaining a new passport (Ministries of Foreign Affairs), voting (e.g. Croatian Ministries of Interior and National Defense) or even depositing a tax declaration and an added value tax declaration (e.g. Ministries of Economy). It is clear that when

private personal data are exchanged between the sites and the citizen, the safety and the privacy of the transactions should be assured.

Citizens are increasingly going online rather than using the telephone or arriving in person or other traditional means and are thus saving time associated with bureaucratic procedures. The governmental sites have to continuously develop and adopt modern technologies and systems (e.g. Web 2.0, location-based services, map navigation, GPS- Global Positioning System, mobile TV, Wi-Fi, Bluetooth, RFID-Radio-frequency identification). For example, they should adopt m-Government (i.e. the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms; Ostberg, 2003), CRM (Customer Relationship Management) and ERP (Electronic Resource Planning). They should also offer their content and services in the most appealing way (e.g. virtual tours in the Italian Ministry of Foreign Affairs, streaming video and TV news). For example, French, German and Spanish sites offered printer-friendly versions. Furthermore, they have to become more sensitive towards health issues following the example of the Italian Ministry of Health which hosted a video campaign with respect to the HIV (Human immunodeficiency virus). They should also become more sensitive towards ecological issues.

The Ministries' sites should employ technological advances in order to better serve the citizens. For example, the Ministries of Labor could send job postings to the mobile devices of citizens looking for a job. The Ministries of Health could offer continuous monitoring of chronic patients using mobile devices. The Ministries of Transportation could send traffic updates on citizens' mobile devices. The Ministries of Environment could present the current environmental conditions (e.g. atmospheric pollution) in various regions. The Ministries of Economy could offer the current prices of several markets (e.g. stock, housing, food). The Ministries of Interior could send warnings (e.g. hurricane, flood, fire) using sms on citizens' mobile devices. Finally, social networking tools could foster citizen participation. E-communities, discussion forums, polls and voting could help e-democracy. Using Web 2.0 tools (e.g., blogs, wikis, media sharing, social tagging and recommendation), the citizens could communicate and interact with public servants and other citizens. They could obtain, produce and share information, views, opinions, experiences, etc. They could make suggestions to other users as well as to the officials and rate governmental services.

The above outcomes lead to the conclusion that the design of a central strategy with predetermined targets and specific time plans is required to enhance and improve e-government. However, this strategy implementation presupposes and requires the following [Tahinakis et al., 2006]:

- Political will
- Redesigning of processing procedures
- Change of the public services' way of organization
- Modification of the current legal status
- Alteration of the attitude from "public sector centric" to "customer-centric services" and
- Cooperation between the different public sector institutions for the creation of an electronic virtual government [Makrimanolakis, 2002].

The presented evaluation method was based on a wide spectrum of criteria. Some were similar to those of previous studies (Table 2). Each site was evaluated in full detail and almost every aspect of the site was highlighted. As opposed to previous studies, this paper considered a large number of criteria and attempted to incorporate many citizens' demands. Considering all these criteria, the designers of sites should continuously evaluate and redesign their sites in order to fulfill the rising expectations of the citizens and make the sites' operation more efficient and effective.

On the other hand, the limitation of this evaluation method is the small number of evaluators used to generate the final result. This limitation can obviously be overcome by using a larger number of evaluators as this should provide better statistical results. Additionally, all the evaluators were undergraduate students in an Economics department and it would be advisable to use a greater variety of evaluators taking into consideration age, citizenship, culture, educational level, discipline, economic level and occupation in order to potentially provide a more accurate average score. In addition the range of grades should be widened e.g. from 0 to 10 as this could make the evaluation more accurate and the differences between the sites could be clearer. Finally, we should mention that this research and evaluation of the ministries' sites took place during the winter of 2006 and spring of 2007 and changes in the sites' characteristics are expected to occur in the future.

Future research could repeat this evaluation considering larger numbers regarding (a) evaluators, (b) ministries' sites and (c) countries. For example, a large number of people from different countries could evaluate all ministries' sites. Furthermore, new categories of criteria could be introduced for evaluating new services (e.g. mobile services, location-based services, social networking tools) that will sooner or later appear in e-government. For example, new criteria could examine the sites with respect to semantics, to personalization, to ease of comprehension regarding the Content (e.g. by educated or illiterate people) or to examine the impact of mobile technology on citizen interaction with government. Most ministries' sites ignored people with special needs and thus further efforts should be made to facilitate equal e-government access for all people without discrimination.

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# Appendix

Table 1. Criteria used for the evaluation of the ministries' websites

## 1. CONTENT

Comprehensive, complete, valid, accurate, correct content  
Useful, relevant, simple and clear content  
Unique content  
Current and updated content  
Uniform and consistent use of terms  
Multiple languages for Immigrants  
Special Needs Persons' consideration  
Non-discrimination and Objectivity  
Variety of links to other useful Websites

## 2. PRESENTATION – MEDIA – FORMAT

Variety of Media (Text, Diagrams, Pictures, Maps, Sound, Video, Webcam, etc.)  
Quality & Fidelity of Multimedia  
Right Spelling, Grammar, Syntax, etc.  
Appropriate & Effective Titles  
Aesthetics  
Suitable and Consistent use of Style, Format, Colors and Fonts  
Right Quantity of Multimedia  
Right Mix of Media  
Right Position of Media  
Special Needs Persons' consideration (e.g. audio, zooming)

## 3. USER INTERFACE

User Profile Registration, Modification, etc.  
Simple, Useful and Effective Menus, Toolbars, Buttons and Shortcuts  
Appropriate & Useful Frames  
Ergonomic User Interface  
Right Position of Menus, Toolbars, Frames etc  
Consistent and Stable position of Menus, Toolbars, Frames, etc. in whole website  
Appropriate Background  
Input and Output for Special Needs Persons

## 4. STRUCTURE & ORGANIZATION

Simple structure & organization  
Intuitive and Rational structure and organization  
Appropriate Number of Levels and Choices per Level

## 5. NAVIGATION

Easy and Simple navigation  
Intuitive and Rational navigation  
Accurate and Consistent navigation  
Alternative paths to a page  
Shortcuts  
Return to Home from every page  
Help from every page  
Notification when transfer to another website  
No Navigation Errors  
No Broken and Missing Links

No Under Construction Pages  
Clear and Consistent Highlighting of links  
Navigation Prediction (e.g. short description of links)  
Navigation Trail and History  
Special needs persons' consideration

## 6. ORIENTATION

Variety of orientation methods  
Appropriate Quantity of orientation and accuracy of orientation in every page  
Consistent orientation through the whole website  
Simple Search from every page  
Advanced Search from every page  
Site Map  
Table of Contents  
Subject Index and Directory  
Alphabetical-Chronological-Geographical Index  
Departments Directory  
Persons-Telephone-Email-Addresses-URLs Directory

## 7. INTERACTIVITY AND FEEDBACK

Online application  
Email, Telephone, SMS, Fax, Postal Address  
Newsletter, RSS feeds, Podcasts  
Alerts for New or Special content or deadlines  
Chat, VoIP, Videoconference  
Discussion Forums, e-Communities  
Blogs, Wikis  
Polls, surveys, voting  
Downloading  
Easy use of interactivity  
Request – Applications Form  
Complaints and Suggestions Form

## 8. SERVICES – FUNCTIONS – FACILITIES – OPERATIONS – APPLICATIONS

Variety of services (e.g. application for passport, car registration, taxes declaration, birth certificate, unemployment aid)  
Easy to Find and Use the services  
Description of services procedures  
FAQ (Frequently Asked Questions)  
What's New?  
Easy Request a service  
Easy Printing Downloading and Storing  
Easy Payment

## 9. RELIABILITY & AVAILABILITY

Continuous operation  
Recoverability & Resume-ability in case of error/fault  
Asking for Confirmation  
Acknowledging Transaction

## 10. MAINTAINABILITY

User Technical Support

### **11. PERFORMANCE**

Input Speed (e.g. Application submission)

Output Speed (e.g. Multimedia downloading)

Processing Speed (e.g. Calculation, Searching, Order)

### **12. OPENNESS–COMPATIBILITY– INTEROPERABILITY**

Support various User Connections (e.g. low communication speed users, wireless users)

Support various User Operating Systems

No need for User to have special software and Plug-ins

### **13. SECURITY**

Security Certifications and Guarantees

Confidentiality and Privacy of user

Control of Personal Data and Profile by user

Non Obligatory Registration

No unauthorized user monitoring (e.g. cookies)

Table 2. Criteria used by previous approaches evaluating websites

6.1. Criteria	Previous research
<b>1.Content</b>	Withrow et al., 2000; Smith, 2001; Denfeld et al., 2002; West, 2005; Stowers, 2002; Merkuryeva et al., 2003; Huang, 2003; Top Of The Web, 2003; Wood et al., 2003; Choudrie et al., 2004; Steyaert, 2004; Australian Gov. Information Management Office, 2005; Lihua and Zheng; 2005; Montagna, 2005; Economides and Terzis,2008;
<b>2.Presentation-Media-Format</b>	McClure et al., 2000; Withrow et al., 2000; Smith, 2001; West, 2003; Huang, 2003; Merkuryeva et al., 2003; Top Of The Web, 2003; Wood et al., 2003; Economides and Terzis,2008;
<b>3.User Interface</b>	Withrow et al, 2000; Huang, 2003; Ma, 2003; Top Of The Web, 2003; Wood et al., 2003; West, 2003; Choudrie et al., 2004; Steyaert, 2004; Australian Gov.Information Management Office, 2005; Montagna, 2005; Economides and Terzis,2008;
<b>4.Structure-Organization</b>	Withrow et al., 2000; Stowers, 2002; Economides and Terzis,2008;
<b>5.Navigation</b>	Smith, 2001; Huang, 2003; Merkuryeva et al., 2003; Wood et al., 2003; Top Of The Web, 2003; Economides and Terzis,2008;
<b>6.Orientation</b>	Smith, 2001; Huang, 2003; Economides and Terzis,2008;
<b>7.Interactivity-Feedback</b>	McClure et al., 2000; Larsen and Rainie, 2002; West, 2005; Stowers, 2002; Merkuryeva et al., 2003; Wood et al., 2003; West, 2003; Steyaert, 2004; Zhou, 2004; New Zealand E-Government Strategy, 2005; Economides and Terzis,2008;
<b>8.Services-Functions-Facilities-Operations-Applications</b>	McClure et al., 2000; Smith, 2001; West, 2005; Stowers, 2002; Choudrie et al., 2004; Steyaert, 2004; Zhou, 2004; Lihua and Zheng, 2005; New Zealand E-Government Strategy, 2005; Economides and Terzis,2008;
<b>9.Reliability-Availability</b>	McClure et al., 2000; Smith, 2001; Barnes and Vidgen, 2003; Wood et al., 2003; Economides and Terzis,2008;
<b>10.Maintainability</b>	McClure et al., 2000; Economides and Terzis,2008;
<b>11.Performance</b>	Wood et al., 2003; Economides and Terzis,2008;
<b>12Openness-Compatibility-Interoperability</b>	Smith, 2001; Stowers, 2002; Merkuryeva et al., 2003; Top Of The Web, 2003; Wood et al., 2003; Economides and Terzis,2008;
<b>13.Security</b>	McClure et al., 2000; Smith, 2001; Stowers, 2002; West, 2005; Barnes and Vidgen, 2003; Economides and Terzis,2008;



Figure 1. Content average score per country

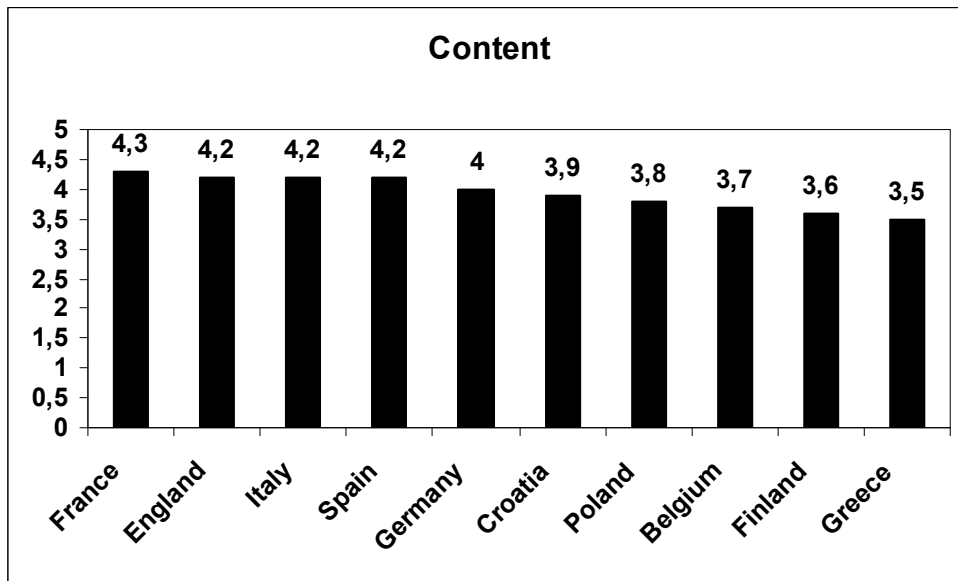


Figure 2. Presentation-Media-Format average score per country

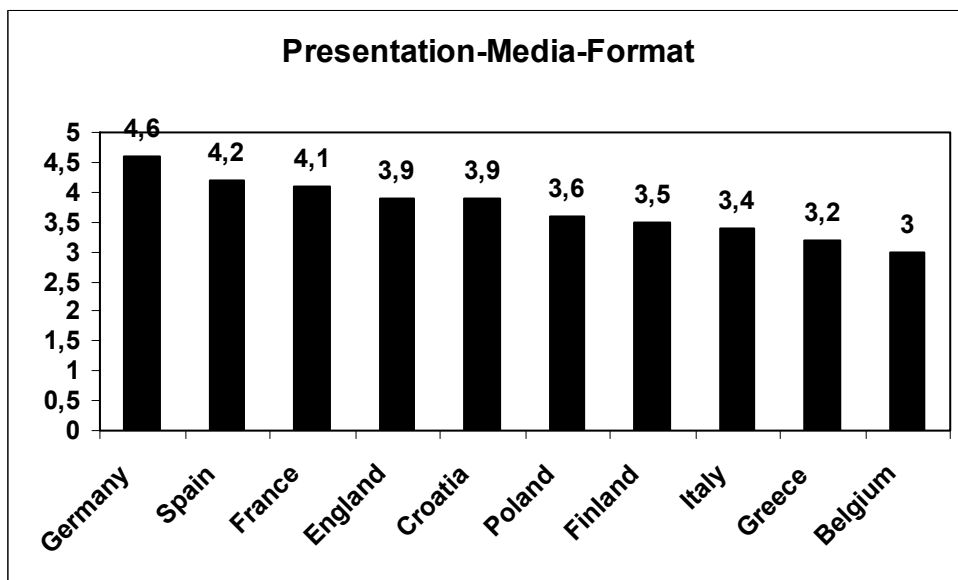


Figure 3. User Interface average score per country

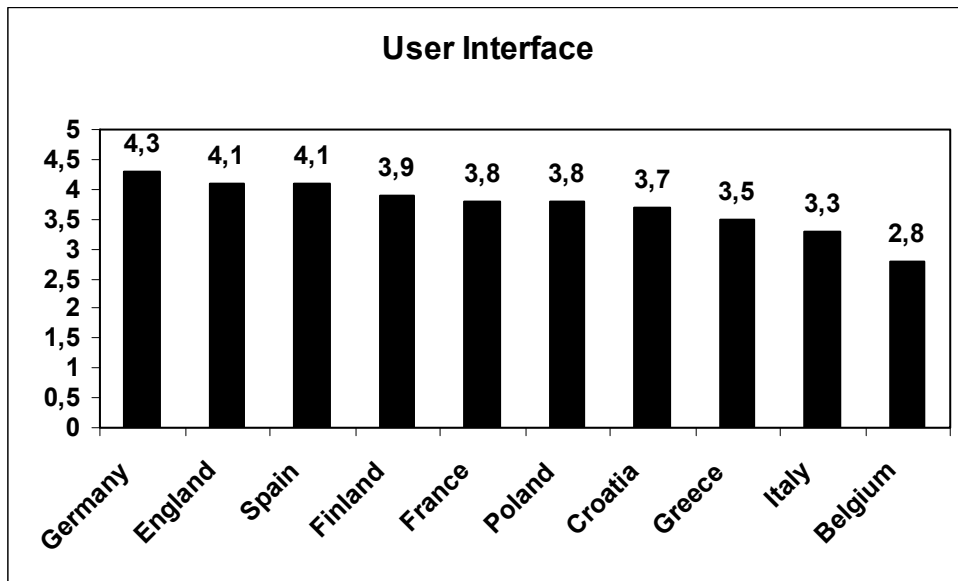


Figure 4. Structure & Organization average score per country

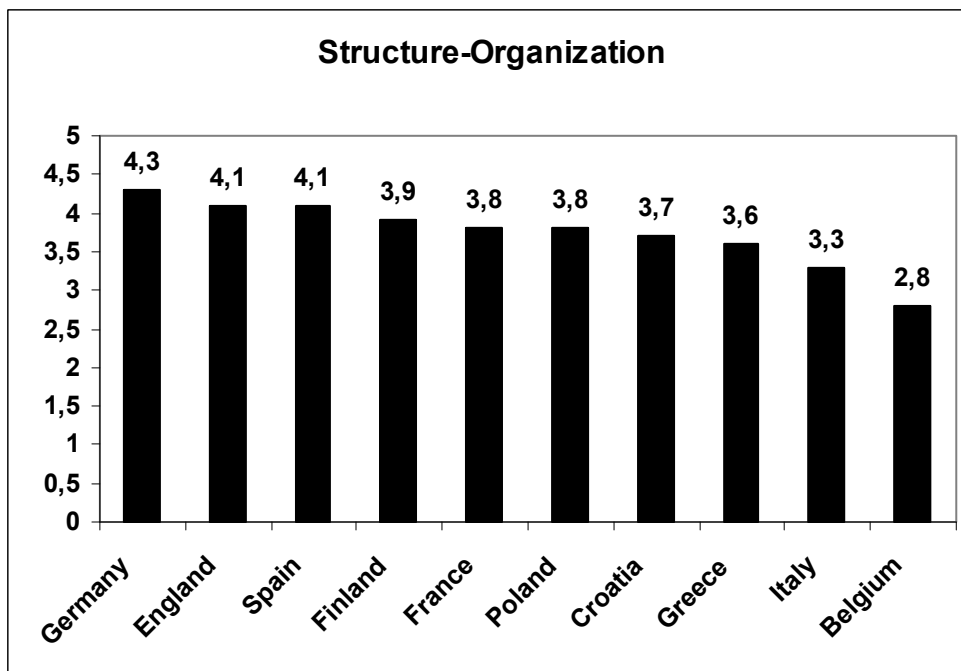


Figure 5. Navigation average score per country

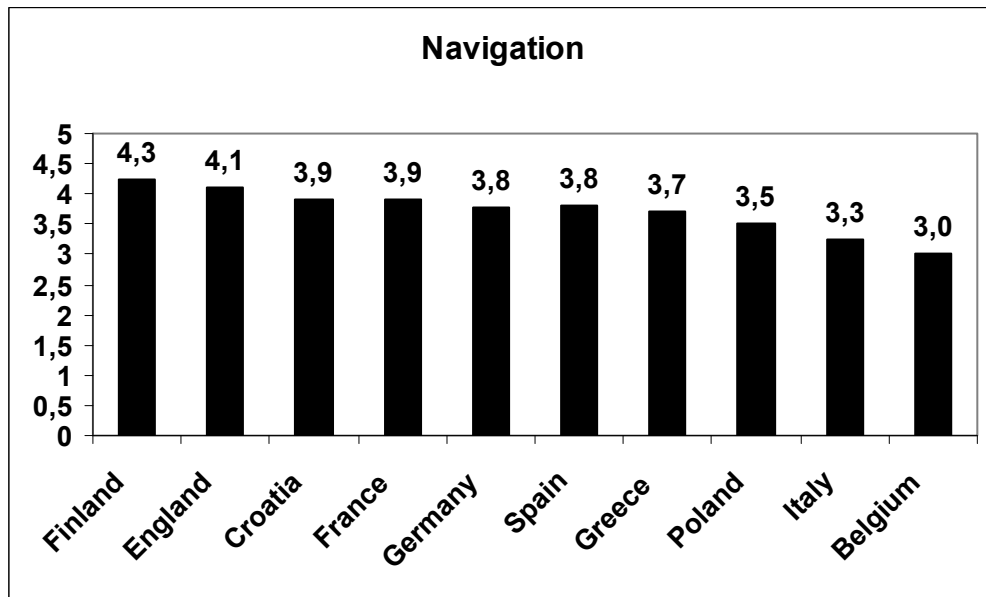


Figure 6. Orientation average score per country

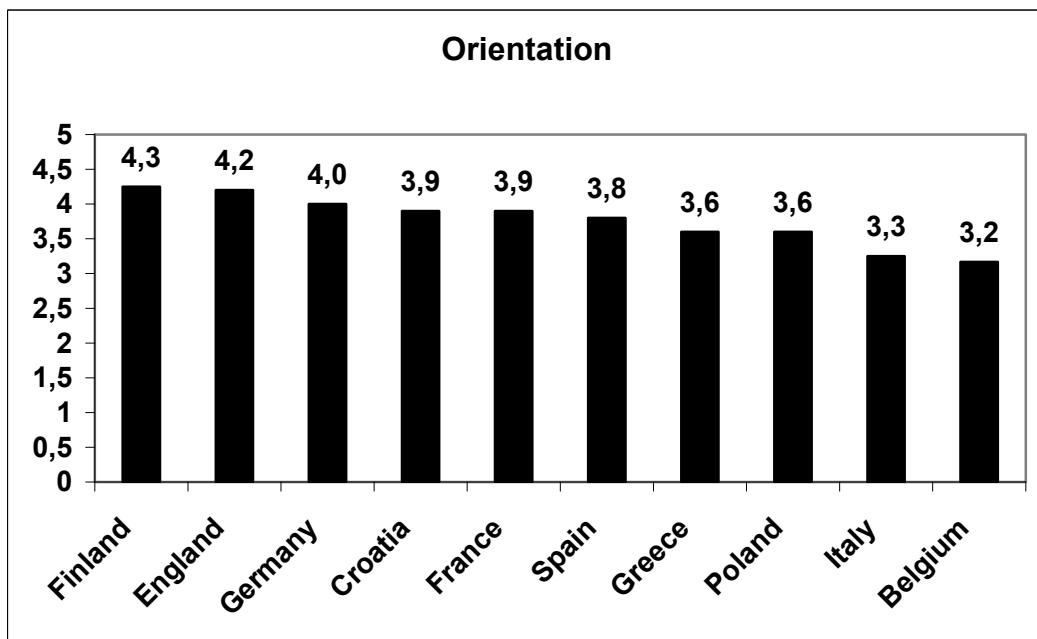


Figure 7. Interactivity & Feedback average score per country

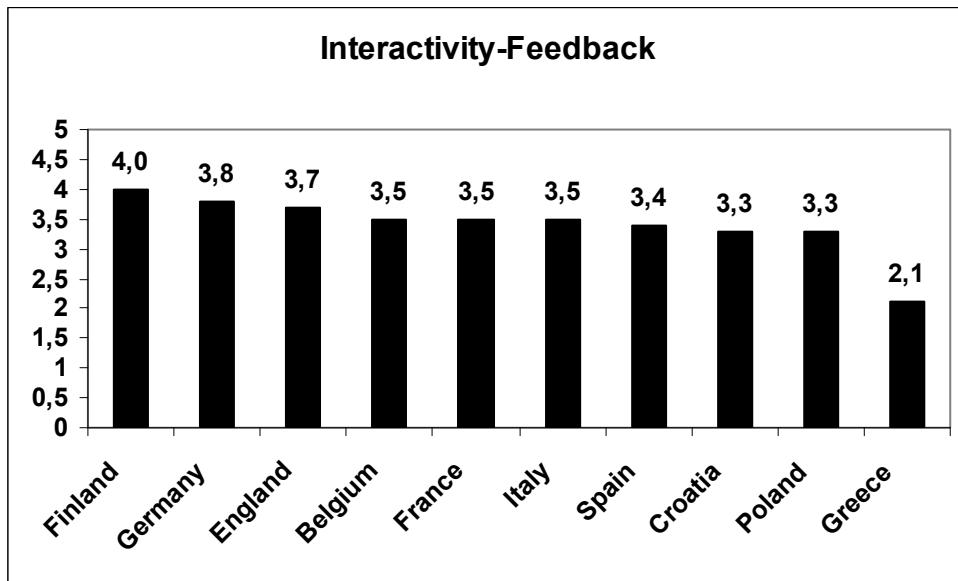


Figure 8. Services & Functions average score per country

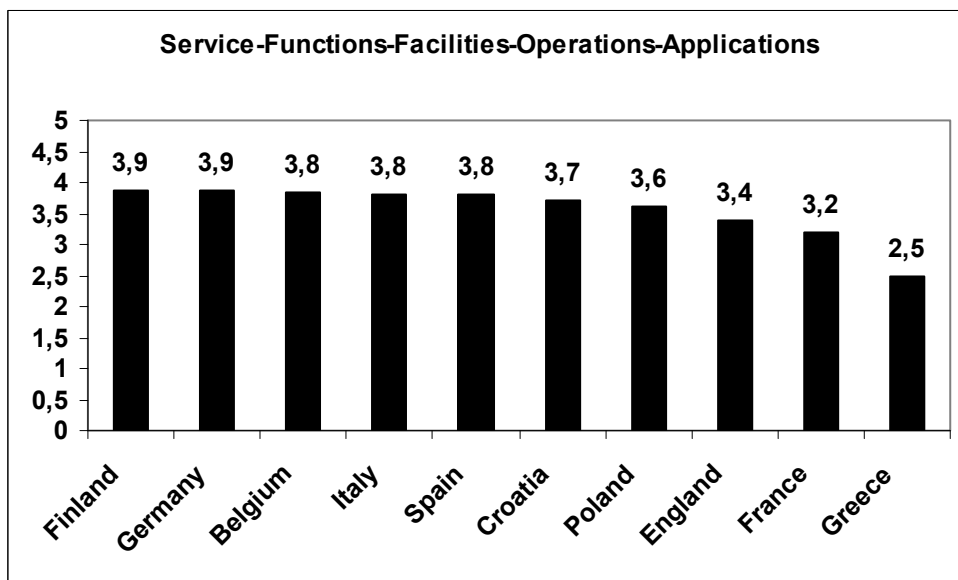


Figure 9. Reliability & Availability average score per country

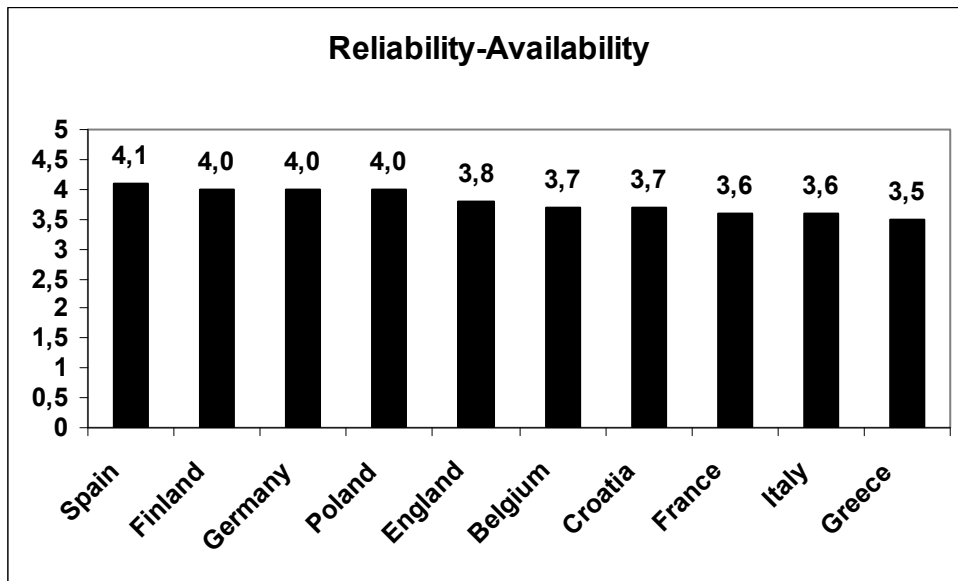


Figure 10. Maintainability average score per country

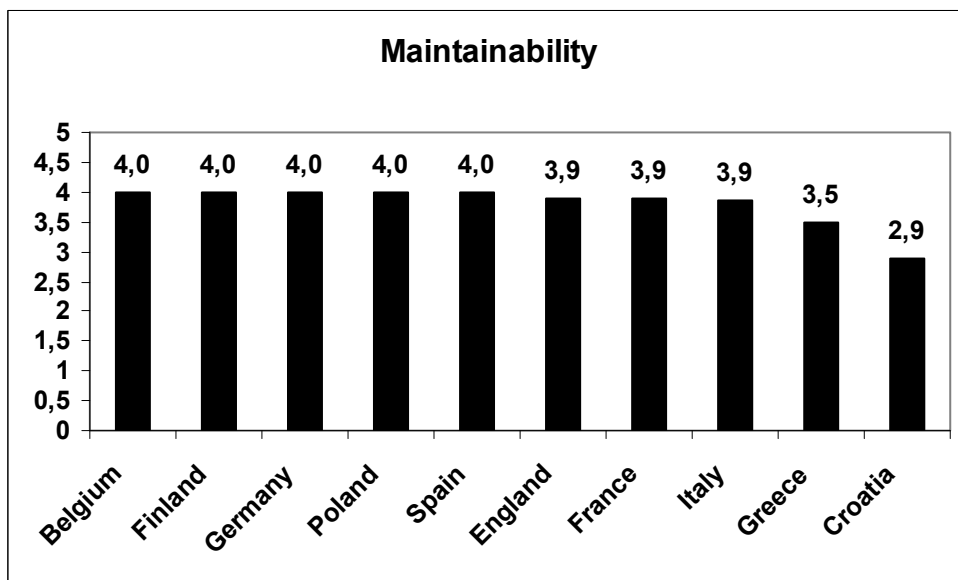




Figure 11. Performance average score per country

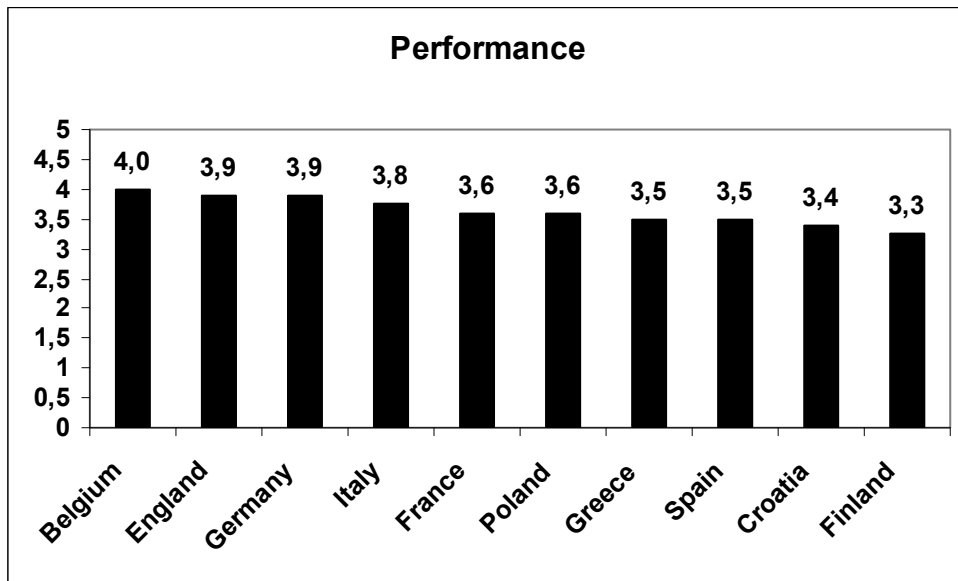


Figure 12. Openness- Compatibility- Interopability average score per country

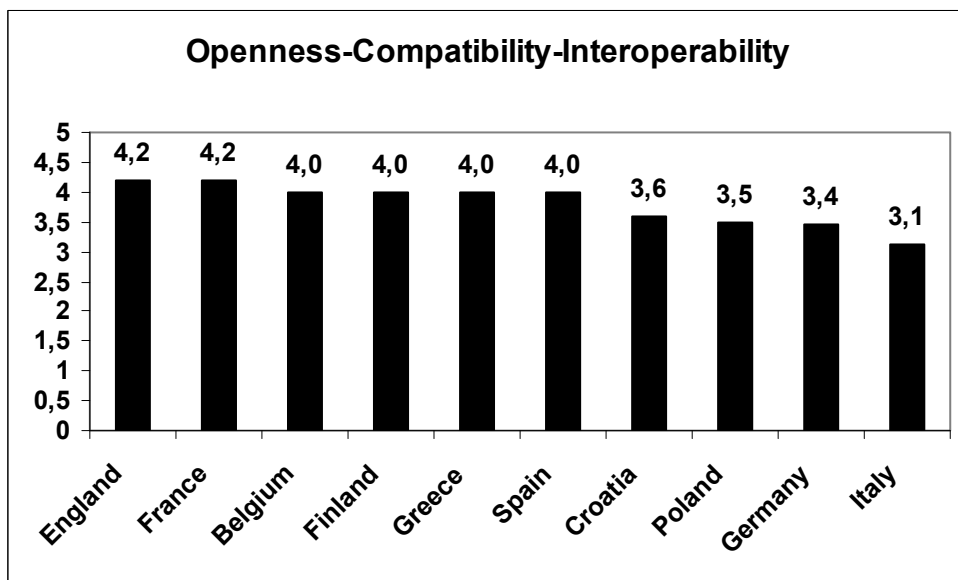


Figure 13. Security average score per country

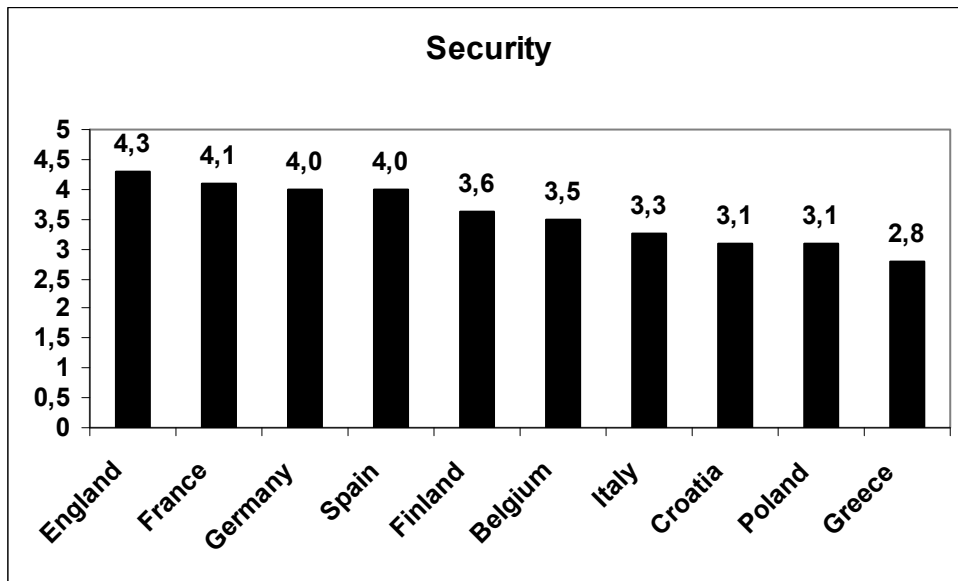


Figure 14. Content average score per ministry type

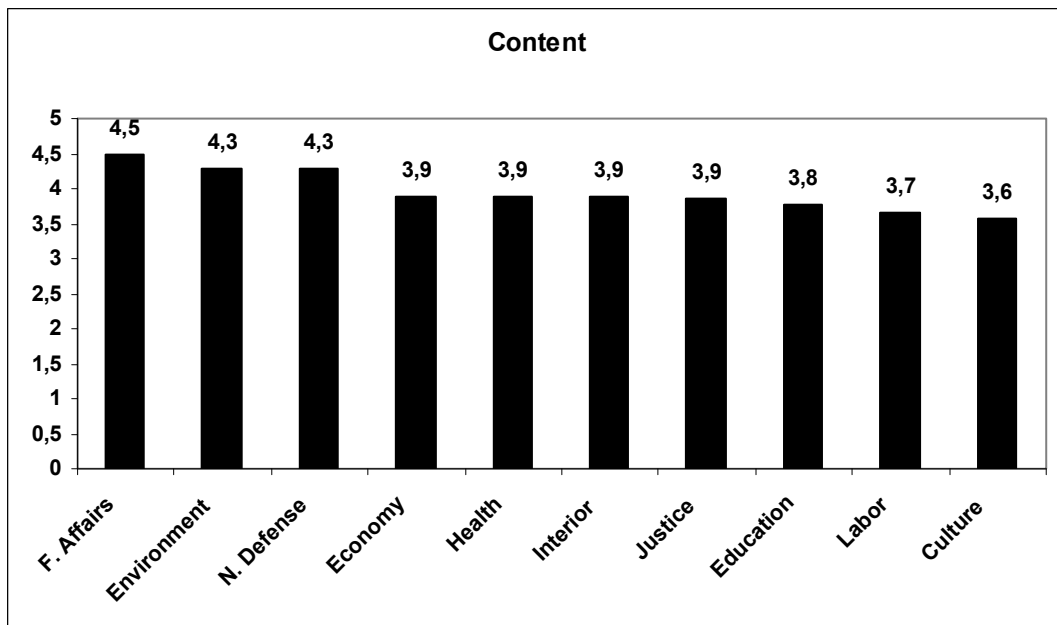


Figure 15. Presentation-Media-Format average score per ministry type

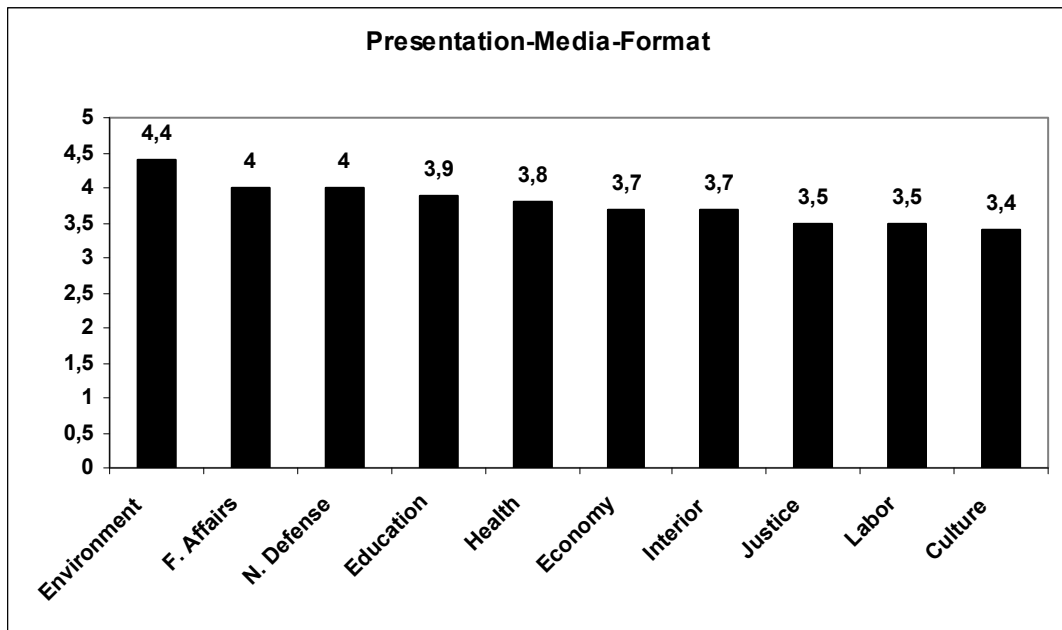


Figure 16. User Interface average score per ministry type

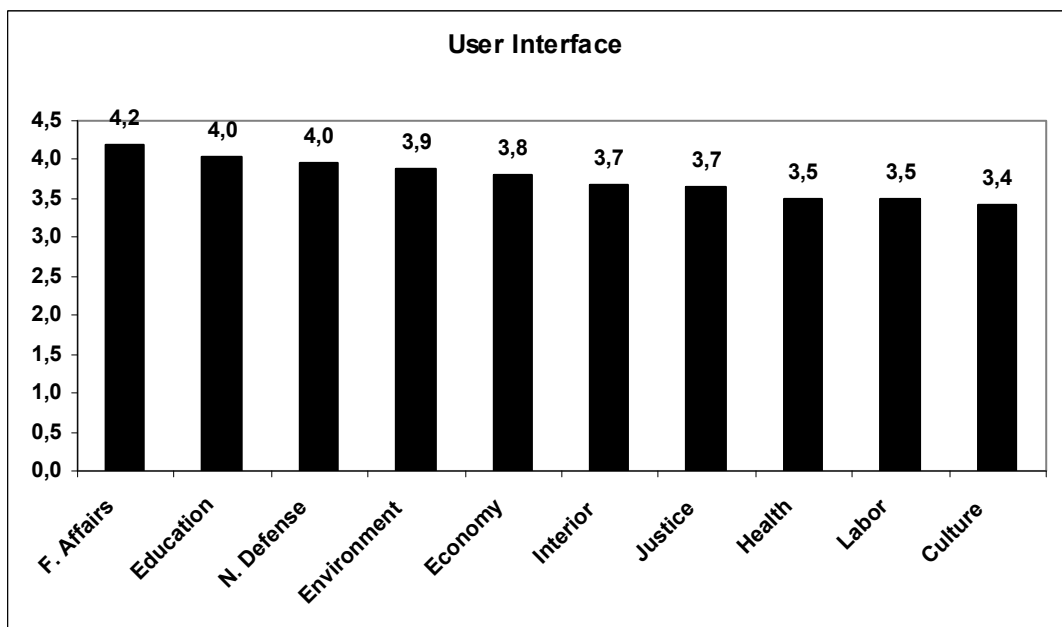


Figure 17. Structure & Organization average score per ministry type

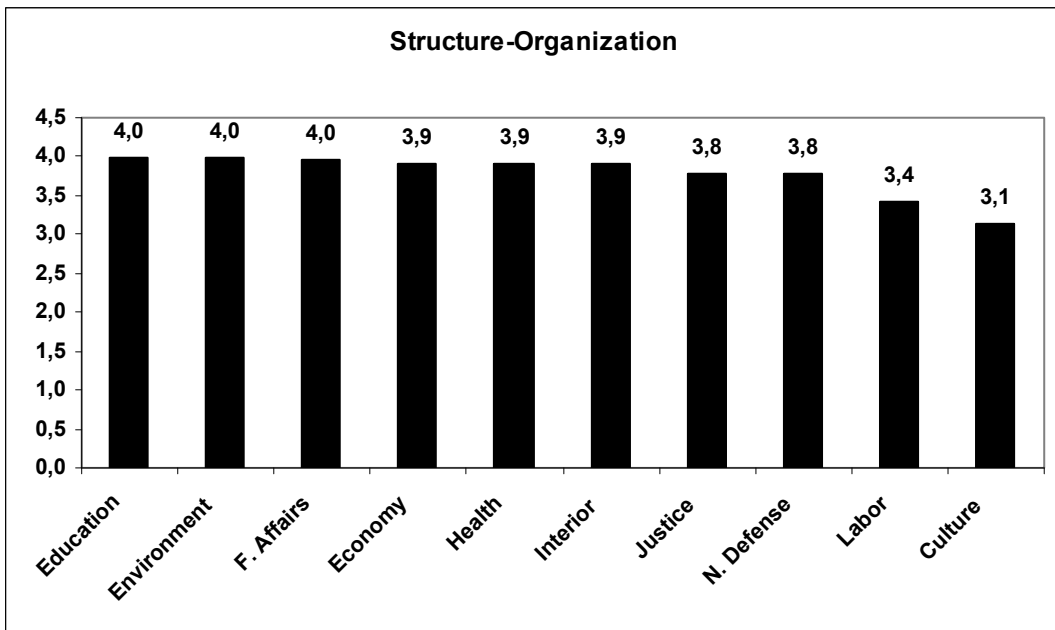


Figure 18. Navigation average score per ministry type

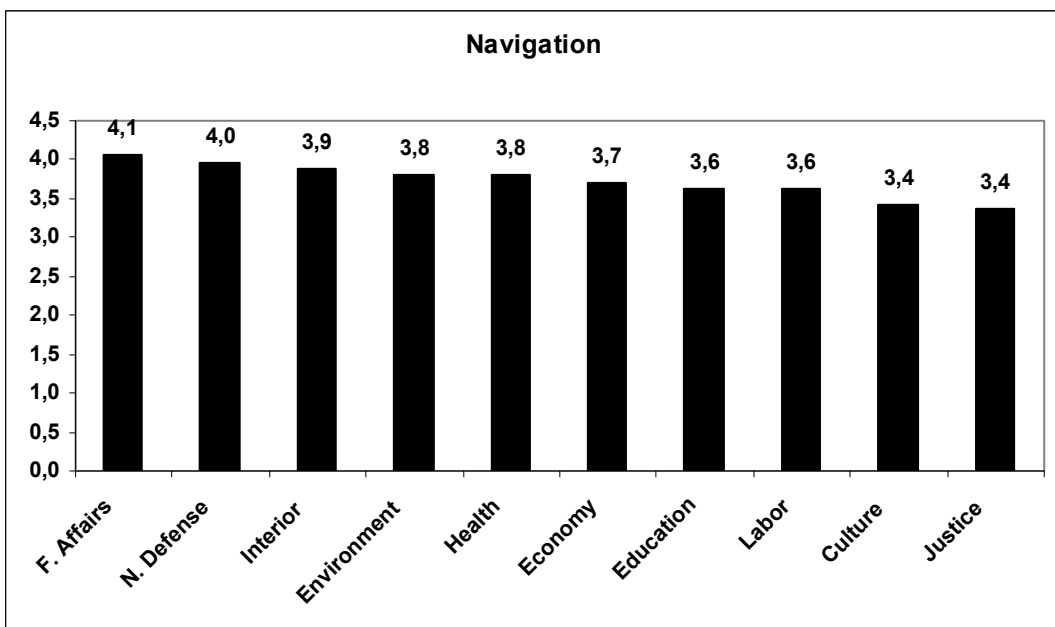


Figure 19. Orientation average score per ministry type

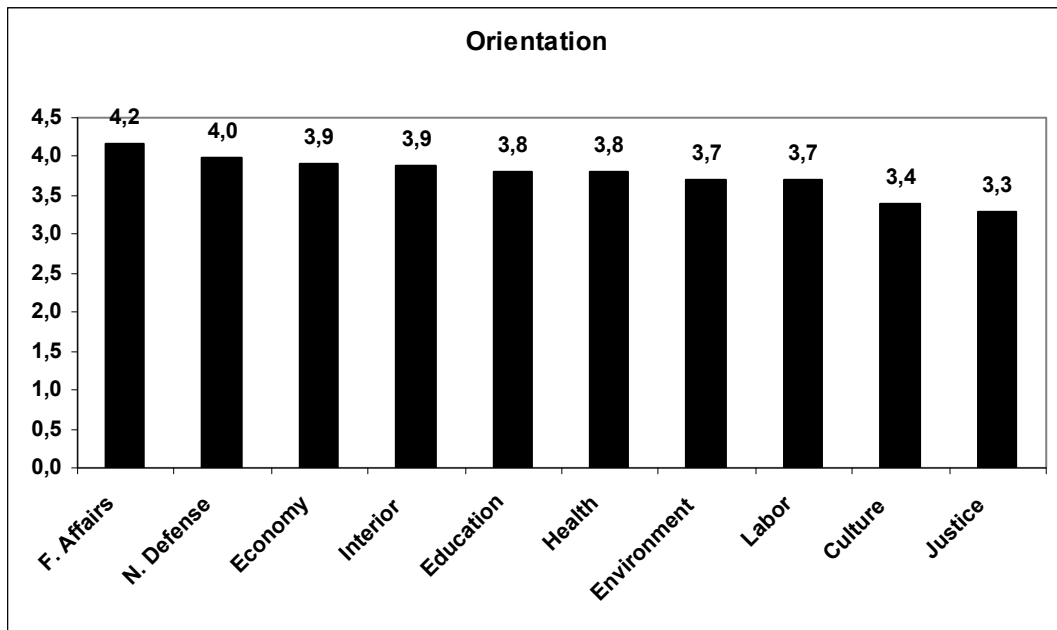


Figure 20. Interactivity & Feedback average score per ministry type

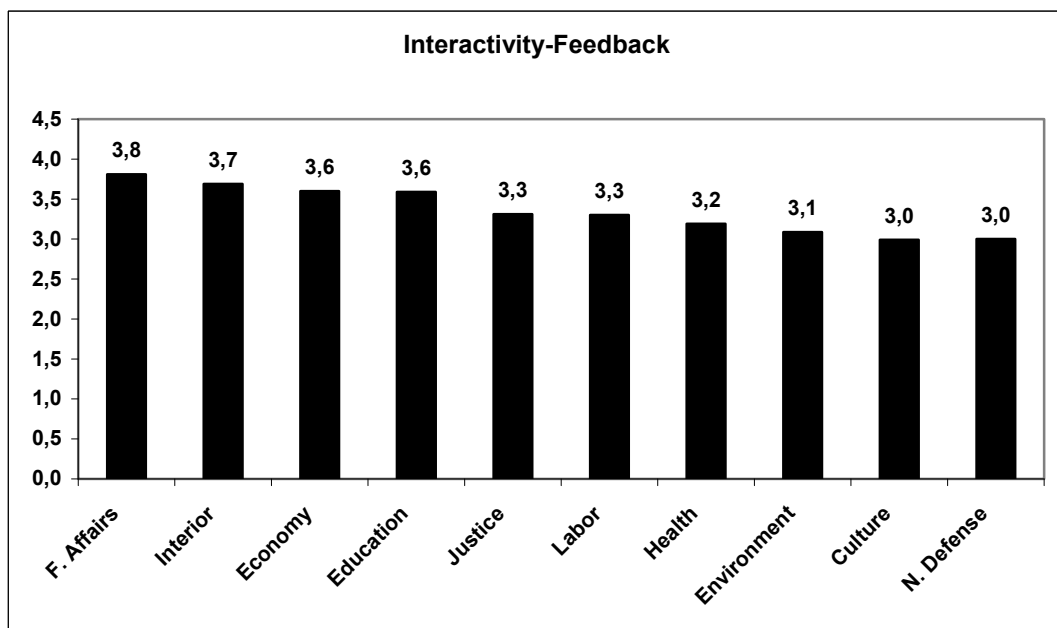


Figure 21. Services- Function-Facilities average score per ministry type

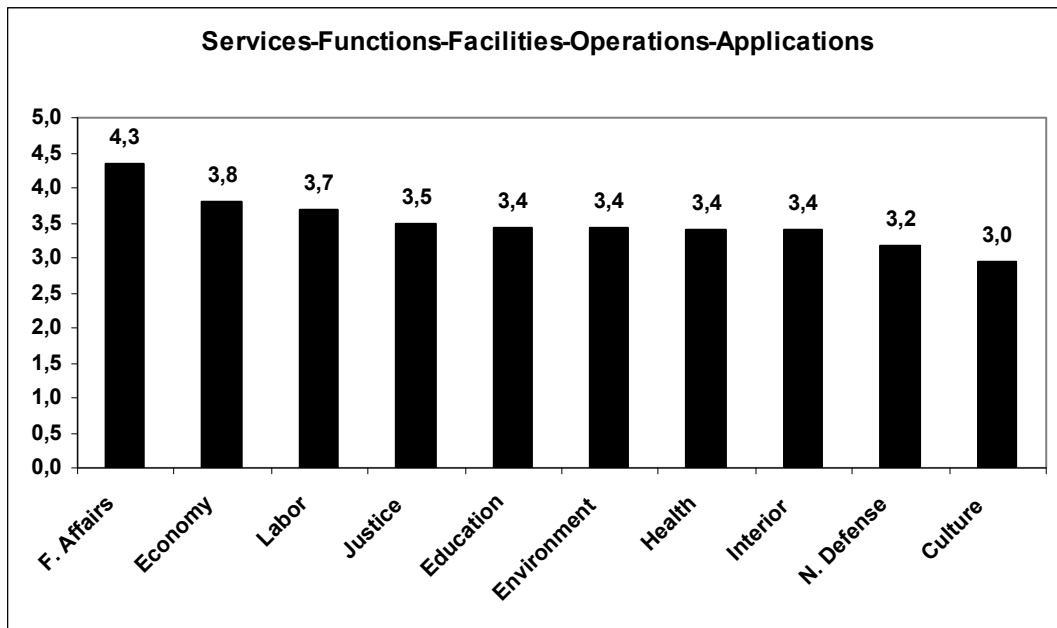


Figure 22. Reliability & Availability average score per ministry type

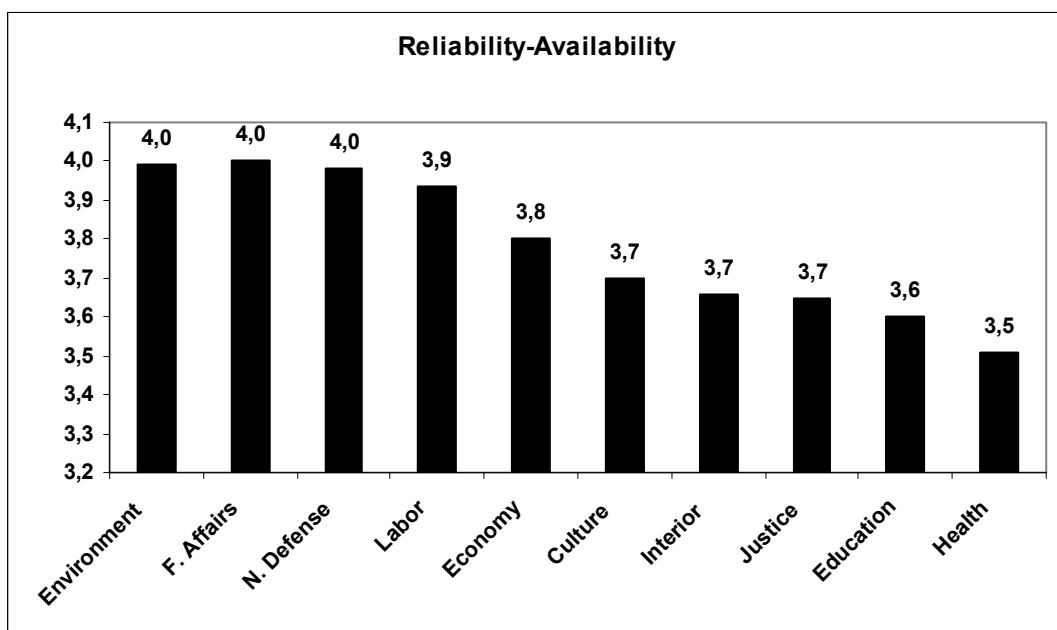


Figure 23. Maintainability average score per ministry type

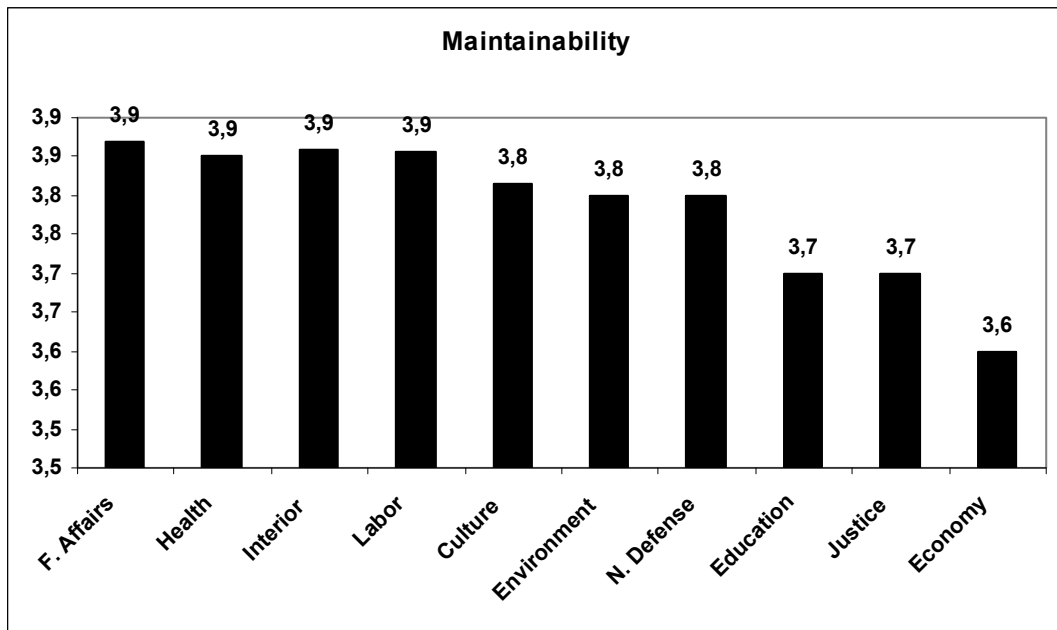


Figure 24. Performance average score per ministry type

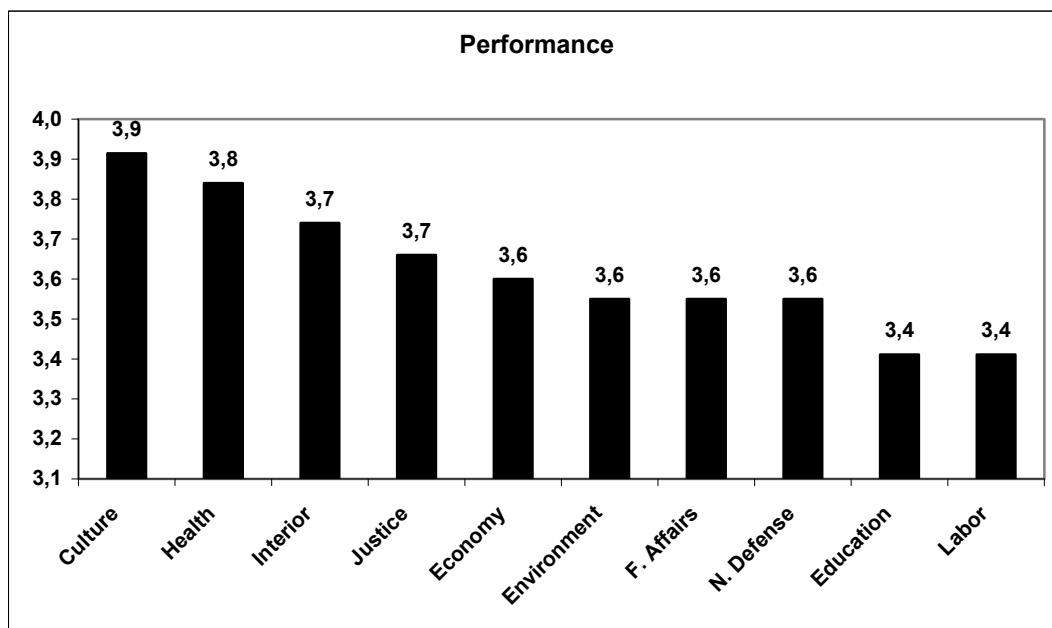




Figure 25. Openness-Compatibility-Interoperability average score per ministry type

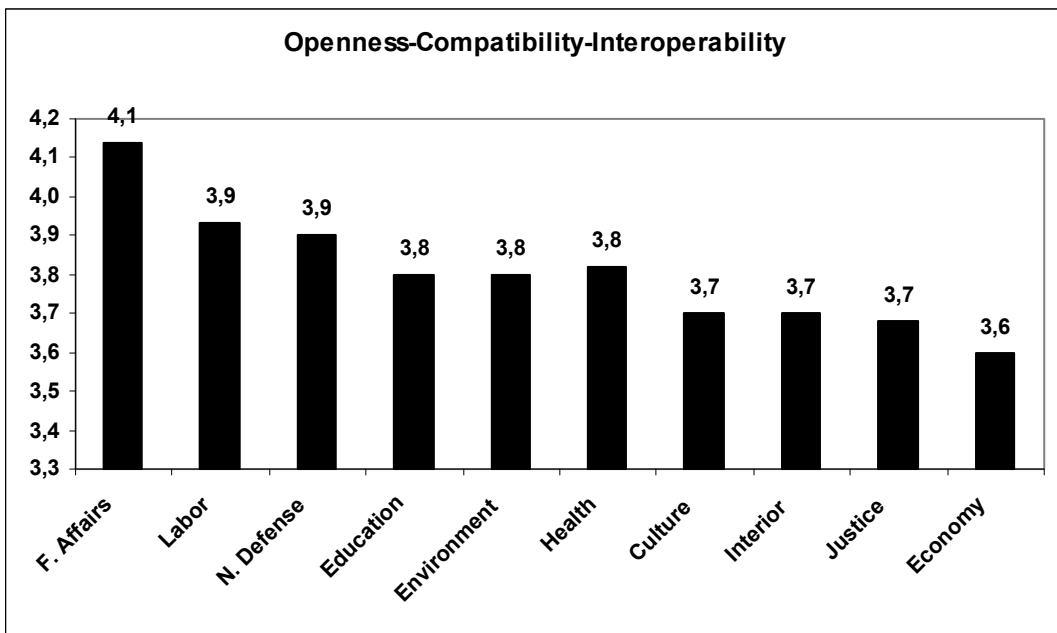


Figure 26. Security average score per ministry type

