

eGovernment: New chance or new barrier for people with disabilities?

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Abstract. Equal participation for people with disabilities is an important objective of the Information Society. The development of new technologies for eGovernment applications opens up opportunities but also bears the risk of creating new barriers. In this paper, we are looking at the different levels of eGovernment sophistication. For each level, we analyse the potential accessibility barriers. We also investigate how the problems can be identified and present some findings from a survey of Norwegian eGovernment web sites. Apart from the technical perspective, a short overview of the legal background is given.

Keywords: accessibility, people with disabilities, eGovernment, sophistication levels

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1 Introduction

The development of information and communication technologies (ICT) in the last twenty years has brought a lot of changes. The Internet and other communication networks have introduced new facilities of remote communication and interaction that used to be unthinkable previously.

The transformation affects all areas of people's personal and professional life [?], including their interaction with government and public authorities. But it has not yet reached all population groups with equal effect. The result is the so-called *digital divide*: people do not participate in the Information Society because they do not have the necessary infrastructure or equipment at their disposal; because they do not have the knowledge and training, or because missing accessibility support impedes their access to the applications.

This paper focuses on the latter group and discusses the accessibility of eGovernment services for people with disabilities. The group includes people with physical, sensory, and cognitive disabilities, but also the increasing number of elderly people who experience age-related decrease of visual, motor, and mental capacity.

It is important to be aware that very different user groups are affected by the issue of design for all of eGovernment services. Users in greatest need of ensuring universal access to these services include disabled people and elderly, representing more than a quarter of the population. For the heterogeneous group of persons with reduced mobility for instance, the needs for accessibility will include special keyboards, alternative navigation systems to mouse etc. For deaf and hard of hearing the main challenge are audio and audiovisual files without alternative text versions of the information. For visually impaired people the main challenge is that most equipment is designed with a view to visual control. Another group not often focused upon is persons with cognitive impairments who have varied needs for applications to facilitate understanding of text, like structured use of icons, use of illustrations, and presentation of information in audio or video format. The same applications are also a great help for persons with reading difficulties.

2 Political background

The European Commission recognised the importance of creating wider access for all in 2000 and defined eInclusion as part of the Lisbon strategy: "Ensure that every citizen should have the appropriate skills needed to live and work in a new Information Society for all." In the following years the eEurope action plans [1, 2] and the i2010 eGovernment action plan [3] were adopted, placing great importance on eInclusion and accessibility requirements for public procurement of ICT products and eGovernment services.

In Norway the political will to ensure eAccessibility for all has been manifested in numerous reports and white papers since 2000. In a report to the Norwegian Parliament on national Information Society policy from 2006 it was clearly stated that design for all is a basic principle for Norwegian policy in this field [4]. This has been established through a recent series of legislation, the most relevant being the Public Procurement Act implemented from January 1st 2007 and requiring design for all considerations to be part of public planning of tenders for public procurement and technical specifications annexed to the tenders. The second important law is the Discrimination and Accessibility Act of January 1st 2009 which defines lack of accessibility to ICT as discrimination of disabled people punishable by law and requires all new ICT to follow the principle of Design for All from 2011 and the same for all existing technology from 2021.

3 Accessibility of eGovernment services

Since eGovernment can increase independence and self-determination of citizens with disabilities, it's potential is huge. Properly implemented, eGovernment solutions enable citizens to carry out their government interaction from home, using their own ICT equipment, which is adjusted to their needs. This includes for instance specialised hardware such as large keyboards and other input devices, or software adjustments like high contrast settings or special screen reader applications.

In this way, the cost if the whole administrative process is reduced because face-to-face interaction is needed less often. The burden of having to travel to the public administration is relieved: either because the full transaction can be carried out electronically, or because documents can be prepared and questions clarified in advance so that only one trip is needed instead of multiple trips. Furthermore, the users are independent of office hours and can take as much time as needed to complete a task so that stressful situations are avoided.

Additionally, the widespread use of digital documents is a great improvement over traditional paper documents because digital documents often have better accessibility support. They can be searched, magnified, adjusted with regard to colour contrast, or even provide interactive help and cross-links to further explanations. Previously, users themselves needed to digitise paper documents, which provides only limited access to the document content.¹

In the following, the eGovernment sophistication stages are taken as starting point for a structured analysis of accessibility issues arising at different levels of complexity in eGovernment services. We are aware that technical availability of an eGovernment service is only one of several conditions influencing the take up of a service [?]. Nevertheless, the absence of technical barriers is an indispensable prerequisite. Otherwise the service is not usable at all.

3.1 Level 1: Information

Virtually all public administrations on national, regional, and municipal level in Europe run a web site which serves as entry point for citizens who are looking for information about public services. Basic information includes name and contact details of public officials, opening hours, maps and directions. For specific services, the documents to be provided by the citizen and other conditions, such as fees, are listed.

Accessibility at this stage is by and large equivalent to *web site accessibility*. The World Wide Web Consortium (W3C), who develops and maintains a large part of the standards used on the Internet, has established the Web Accessibility Initiative (WAI). The first version of the Web Content Accessibility Guidelines (WCAG 1.0) [5] was published in 1999. The guidelines cover amongst others alternative representations of images, audio, and video content, proper use of mark-up and web technologies, graceful degradation of pages using newer technologies, user control of time-sensitive content, device-independence, help with orientation, clear navigation, and clear language.

If these basic accessibility requirements are not met, people with disabilities will find it difficult or even impossible to access the information on the web site because they can not find the information within the complex structure, because navigation mechanism can not be controlled with the special computer setup (e.g. some elements are only usable with a mouse but not by keyboard), or because information is provided only via embedded objects and no text version is available.

¹ An implication of this is that the accessibility benefits of ICT can not tap their full potential if the digital documents provided on eGovernment web sites are only scans of the paper versions. A "truly digital" version should be provided.

Guidelines and requirement for web accessibility are referenced in the legislation of many countries. Peter Krantz [6] has compiled a good overview of the current situation. His list also mentions the evaluation methodologies that are employed to benchmark the status and progress of web accessibility.

3.2 Level 2: Interaction

The next stage beyond provision of basic information is (one-way) interaction where citizens can download official documents from a public web site. In most cases these documents are forms that are filled in and returned to the administration via another communication channel (e. g. in person, per post, by fax or by email). Application forms of legally binding nature often need to be made available in a certain layout and structure. The Portable Document Format (PDF) addresses this requirement. A preliminary survey conducted in 2008 suggests that it is the most widely used file format for downloadable documents on the Internet. Other document formats such as the file formats generated by word processing software not as suitable for official documents because the content and layout of the document are not protected from modifications. Since some file formats require a proprietary software to read them, their use is discouraged by national regulations.

The PDF standard [7] supports a number of accessibility features.² An accessible PDF document is marked up with a structure (usually visible as clickable bookmarks in the PDF-viewer). Information about the natural language of the document, a document title, and descriptions for images are provided. If a multicolumn layout is used, special care has to be taken to ensure a correct reading sequence. Forms are prepared in such a way that fields are labelled and can be filled in directly without having to print the document.

PDF accessibility is not covered by WCAG 1.0 with the consequence that the awareness of potential accessibility barriers in PDF is still very low. Tools that can support the production and verification of accessible PDF files are not widely known and not widespread.

3.3 Level 3: Two-way interaction

On the next level of sophistication, eGovernment services support both ways of interaction to enable citizens to file an application online. They enter their personal information and request details via a web interface and submit the data. This level has even higher requirements for accessibility because it has to be assured that the whole chain of events is accessible. If one link in the chain is broken (i. e. represents an accessibility barrier) the whole process becomes inaccessible because the user can not complete it: Users have to be able to find the service, register or log in, and fill in forms. The service also must provide the possibility to review and revise he entered information. The submission of the application should include a final confirmation request informing about the consequences of the step.

Since the publication of the first version of WCAG in 1999, the proportion of interactive, dynamic web content has increased considerably. New technologies have become available and existing applications, including assistive technology like screen reading software, have greatly improved. To stay abreast of these changes the W3C has revised the web content accessibility guidelines. The new version WCAG 2.0 [8] became a recommendation in December 2008. It puts

² The ISO standard 19005-1:2005 defines PDF/A-1b which guarantee a reliable reproduction of visual appearance and PDF/A-1a which additionally requires information about document structure to be present. While conformance to PDF/A-1b can be achieved with scanned documents, PDF/A-1a conformance includes accessibility features of the PDF.

more weight on interactive web content and employs a technology-independent approach, which allows new technologies beyond HTML and CSS be taken into account.

The new guidelines are grouped into four principles. Content should be perceivable, operable, understandable, and robust. The following guidelines are especially relevant for processing of online forms and requests:

Guideline 2.1 Keyboard Accessible: Make all functionality available from a keyboard.

Guideline 3.3 Input Assistance: Help users avoid and correct mistakes.

Guideline 4.1 Compatible: Maximize compatibility with current and future user agents, including assistive technologies.

The transition from one set of guidelines to the next is going to take some time. In many countries the the national legislation and / or national eAccessibility assessment methodologies are currently being updated. In the development of new web sites and interactive eGovernment services they should be taken into account right from the start.

3.4 Level 4: Transaction

On the forth level, the whole administrative process is integrated with the eGovernment application, meaning that also the reply of the administration can be received via the service and status information on the progress of the case is available from the system.

At this level, there are technical as well as political/social challenges for accessibility. On the technical part, when it comes to authentication and identification of citizens and legally binding signatures, it must be assured that ID management schemes and electronic signature equipment (e. g. smart card reader, encryption applications) are accessible. Furthermore, security and privacy measures have to take into account the situation of people with disabilities to ensure their privacy and avoid discrimination that might arise.

4 Analysis of the current situation

This section presents results from automated benchmarking of the first two stages that was carried out by the eGovernment Monitor (eGovMon) project. The accessibility at levels 3 and 4 has not been addressed by the project so far. Due to the higher complexity the testing of these levels requires more human expertise and can not be assessed with tools alone.

4.1 Web site accessibility

As mentioned in section 3.1 most European countries refer to WCAG 1.0 in their legislation. However, there is often a large gap between legal requirements and the actual situation. The “Assessment of the Status of eAccessibility in Europe” [10], commissioned by the European Commission in 2007 to follow up on previous studies and support the future development of European policy in the field of eAccessibility, found that less than 20% of the tested web sites met basic accessibility criteria.

One of the main challenges with these surveys is that although they are all targeting web accessibility in the sense of WCAG 1.0, there are subtle but important differences in the methodologies. The sampling of web sites and web pages to be part of the evaluation, the interpretation of test criteria and applicability of tests, as well as the analysis and presentation of results are different, which makes the comparison of results very difficult as shown by Bühler et al [11].

The European commission has supported the development of the Unified Web Evaluation Methodology (UWEM) [12]. UWEM was developed by European expert organisations and offers

test descriptions to evaluate WCAG 1.0 conformance covering level AA,³ a clear sampling scheme, several reporting options, including score cards and other instruments to help communicate the results of evaluations. The aim is to establish the UWEM as the basis for web accessibility evaluation, policy support and possible certification in Europe.

The Norwegian project eGovMon is an implementation of fully automatic monitoring approach of UWEM. It is a continuation of the software developed by the European Internet Accessibility Observatory (EIAO). eGovMon has conducted an accessibility evaluation of 100 public Norwegian web sites. The tool has 23 automatable tests addressing web accessibility. These tests are limited to HTML and CSS. Results from these evaluations are presented in Figure 1.

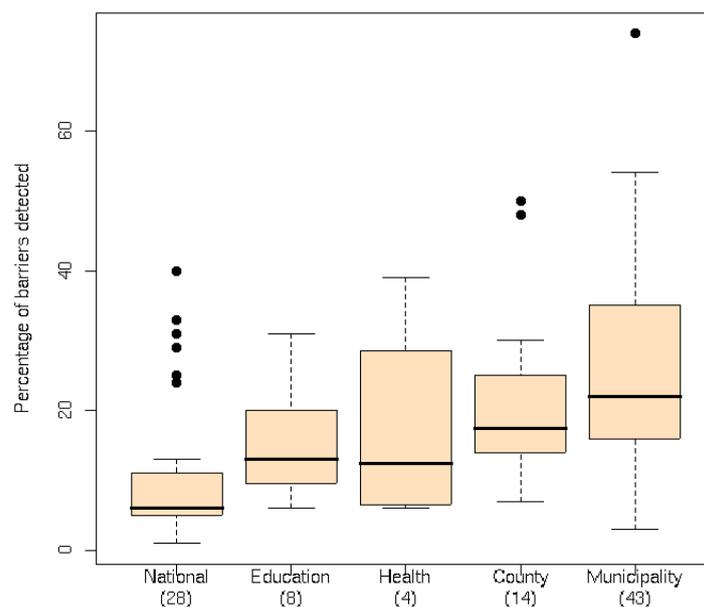


Fig. 1. Barriers detected in HTML and corresponding CSS. The number of web sites in each category is given in parentheses.

The figure indicates that national web sites are more accessible than to web sites on county and municipality level. In fact, the evaluated web sites on municipality level have the most detected barriers of all evaluated sites part of this study. A reason for this may be that there is more focus on web accessibility and more resources to address it on national level than for web sites of smaller public bodies like municipalities. Additionally, in educational and health web sites we detected more barriers than the national level but less than web sites on county and municipality level.

³ UWEM has not yet been updated to WCAG 2.0, but the migration is foreseen.

4.2 PDF accessibility

As a pilot study, we defined evaluation criteria for PDF accessibility based on the PDF-A standard and WCAG 1.0, and evaluated about 5600 PDF files from 97 Norwegian public web sites on national and local level. In the following we present the finding from three accessibility tests contained in the prototype.

Structured elements. PDF documents may contain structured elements, often also called “tags”. Similar to HTML, tags in PDF are used to denote the semantics of certain elements in the text. If headings are marked up, they can be presented to the user through a separated navigation structure, which improves the usability and accessibility in particular for larger documents. The labelling of form fields allows the software to determine which information is supposed to be entered in the field. In contrast, in an untagged PDF, headings and text can’t be distinguished programmatically and there is no information on form fields. This makes it much harder to navigate through the document and impedes the use of the form for people using screen readers.

It is sometimes assumed that a PDF is accessible if it is tagged. However, as with HTML, tags can be used improperly and semantically wrong. The presence of tags does not guarantee accessibility, but should rather be seen as a prerequisite for accessible PDF documents.

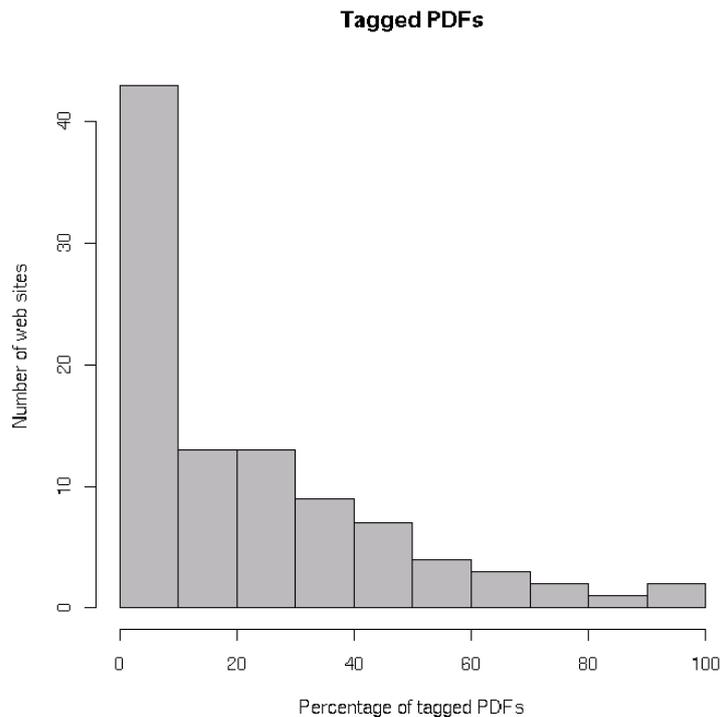


Fig. 2. Distribution of tagged PDF documents

In Figure 2 we show the distribution of tagged PDFs within the evaluated Norwegian web sites. Of these PDF files, 1250 (22.3%) had tags, the remaining 4345 (77.6%) were untagged. In

31 (32%) of the web sites, none of the evaluated PDFs was tagged. In contrast, just 6 of the web sites (6.1%) had only tagged PDFs.

Access to content. A PDF document may have restricted permission to copy text, enter data into form fields, or save the file. If this is the case, other tools, such as assistive technologies, are restricted from extracting the content. Citizens might be required to print the document because it can not be filled in electronically. Less than 1% of the evaluated PDFs had access restrictions.

Language specified. A PDF documents have the possibility to specify the natural language. This feature is particularly important for screen reading software because the pronunciation has to be adapted to the language of the text. Otherwise the resulting synthetic speech is likely to be impossible to understand. More than 99% of the inspected PDF documents missed a language specification.

The annual status report from the National Centre for Documentation on Disability Affairs [14] includes a chapter on evaluation of accessibility to public websites in Norway. The analysis proved that there remains much to be done regarding accessibility of public websites and PDF documents. These formats are the most common standard used by government agencies. The report showed that there is a lack of “tagging” of public documents in PDF formats which leads to a lack of good structural information which would have made the documents more accessible for disabled people.

5 Discussion and Conclusion

Accessibility must be taken into account at every stage of eGovernment services. In the course of *accessibility mainstreaming* it should be addressed right from the start when a new service is implemented to avoid expensive retrofitting of existing services.

In this paper, we have discussed mainly the technical aspects of eGovernment accessibility. Independent of the technical discussion, the citizens’ motivation and willingness to use an eGovernment service may also depend on expected benefits, usability, and relevance of the service. One factor is the users’ knowledge and their motivation and opportunity to improve their ICT skills. Regardless of this argumentation, accessibility barriers are understood to be caused by the product (i.e. the web site) and not by the user’s skills and abilities.

Research can contribute to improved accessibility through development of enhanced technical solutions, and also indirectly through benchmarking and objective measurements. The legal framework and political initiatives play another important role in the process. Regular benchmarking to assess the progress can help to follow up on the success of the political measures (birds eye view). At the same time more detailed evaluations of single services (on eye level) support actual improvements. The combination of both levels in the eGovMon has lead to promising results one year after the project start.

Beyond the technical solutions (how to make a single web page, document, service accessible), solutions have to be transferred to the level of administrative processes. The integration of accessibility support into the workflow reduces the efforts and thus facilitates production of documents with accessibility features.

eGovernment research needs to include all stakeholders in the process. Accessibility is a common goal that can only be effectively addressed through collaboration. In the future online presence will be increasingly important both for social and professional interaction. The ageing society will lead to an increased number of people with special needs.

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References

1. European Commission: eEurope 2002: An information society for all. Available online at: http://europa.eu.int/information_society/eeurope/2002/action_plan/pdf/actionplan_en.pdf (2002)
2. European Commission: eEurope 2005: An information society for all. Available online at: http://europa.eu.int/information_society/eeurope/2005/all_about/action_plan/index_en.htm (2005)
3. European Commission: i2010 eGovernment Action Plan: Accelerating eGovernment in Europe for the Benefit of All. Available online at: http://ec.europa.eu/information_society/activities/egovernment/docs/highlights/comm_pdf_com_2006_0173_f_en_acte.pdf (2006)
4. Ministry of Government Administration and Reform: Report no. 17 (2006-2007) to the Storting - An Information Society for All. Available online at: http://www.regjeringen.no/upload/FAD/Vedlegg/IKT-politikk/stm17_2006-2007_eng.pdf (2007)
5. World Wide Web Consortium: Web Content Accessibility Guidelines 1.0. W3C Recommendation 5 May 1999. Available online at: <http://www.w3.org/TR/WCAG10/> (1999)
6. Krantz, P.: Index of government guidelines for web sites. Available online at <http://www.standards-schmandards.com/projects/government-guidelines/> Retrieved 2009-03-12.
7. ISO 19005-1:2005: Document management: Electronic document file format for long-term preservation – Part 1: Use of PDF 1.4 (PDF/A-1). ISO, Geneva, Switzerland (2005)
8. World Wide Web Consortium (W3C): Web Content Accessibility Guidelines (WCAG) 2.0. Available online at: <http://www.w3.org/TR/REC-WCAG20-20081211/> (2008)
9. Cabinet Office: eAccessibility of public sector services in the European Union. Available online at: <http://www.cabinetoffice.gov.uk/e-government/eaccessibility> (2005)
10. Cullen, K., Kubitschke, L., Meyer, I.: Assessment of the status of eAccessibility in Europe. Available online at: http://ec.europa.eu/information_society/activities/einclusion/library/studies/meac_study/index_en.htm (2007)
11. Bühler, C., Heck, H., Nietzio, A., Olsen, M.G., Snaprud, M.: Monitoring accessibility of governmental web sites in europe. In: International Conference on Computers Helping People with Special Needs (ICCHP). (2008) 410–417
12. Web Accessibility Benchmarking Cluster: Unified Web Evaluation Methodology (UWEM 1.2). Available online at: http://www.wabcluster.org/uwem1_2/ (2007)
13. Mikael Snaprud: European Internet Accessibility Observatory. Available online at: <http://www.eiao.net> (October 2008)
14. National Centre of Documentation on Disability Affairs: Status report 2008. the development in society for persons with disabilities. Available online at: <http://www.ldo.no/no/TopMenu/Aktuelt/Rapporter/Statusrapport-2008/> (2008)