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EAGLE- EnhAnced Government LEarning

Objective ICT-2013.8.2 Technology-enhanced learning;

c) Holistic learning solutions for managing, reaching and engaging

learners in the public administrations

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Learning technologies – contextual analysis

WP 4 - LEARNING – OER Learning for e-Enabling (Critical Skill 2)
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Glossary

Authoring activities	Authoring activities are practices to create or to adapt Open Educational Resources. The terms (activities) creation and adaptation are not interchangeably used. While creation is the development of any media from scratch; adaptation implies the reuse of previously existing media which are significantly changed. Hence, the definition of authoring in the project context of EAGLE does not refer to the mere editing of web-content (it is focused on OER content). Making minor OER changes or developing web content such as the user profile on the EAGLE platform is defined as editing.
Authoring	Authoring is creating, adapting content
Autonomous Learning	As defined for the EAGLE project covers all the learning activities needed by a professional in his or her job to obtain knowledge and skills needed to fulfil his or her tasks. The learner is autonomous in searching and choosing learning offers that are appropriate to his/her problem
Community for informal learning	It is confirmed by a group of people with similar interests that share a work field and get together to exchange knowledge and experiences with the aim of improving work practices and steer their own professional development
Portlet	Portlet is a content component that is pluggable into a user interface of a web portal. A portal page is displayed as a collection of portlet windows and each portlet window displays a portlet. Portlet applications may include news, e-mail, weather forecast, discussion forums, images etc. Most of the portlets are designed based on portlet standards so that they can be plugged in any portal that supports those standards.

1   Introduction[1]

As detailed in the project's Description of Work (DoW), EAGLE's main objective is to equip employees in rural local governments with a holistic solution for professional development based on the use of Open Educational Resources (OER) and Open Source (OS) tools to support and foster autonomous learning at the workplace. The use of OERs aims to provide flexible and cost-effective learning solutions to employees in Public Administration (PA) in Rural Local Governments (RLG), supporting community based knowledge-building processes.

Considering that EAGLE is an OS project, task 4.3 is responsible for the development of selection criteria which will allow developers to know which technologies are needed to support the designed learning processes and which criteria need to be considered to choose the actual tools to be integrated to the EAGLE platform. These criteria are also important for the sustainability of the project given the dynamically changing landscape of OS tools.

The work undertaken to define which tools will support the learning processes within EAGLE was focused in specifying the activities related to three key processes:

● Community building

● Content creation

● Autonomous learning

When referring to Social and Communication Technologies (SCT) and OS tools, it gets almost impossible to establish a unique categorization of tools, due to the increasing tendency to gather multiple pieces of functionality into one tool. When combining this with the facility of skilled users who are able to adapt the technology to their needs, it can be said that almost any tool is virtually multi-purpose and its use depends mainly on the users' competences, technical infrastructure at hand and needs. Therefore in the present document some ad hoc classifications were made to facilitate the use of this information within the EAGLE project or in similar work.

When selecting tools and features to support community building and networking processes it is worth differentiating between the collaborative and social features of a tool. Collaborative features are those that enable multiple users to work simultaneously (although not necessarily synchronously) in the production of an object or artefact, e.g. a Wiki allows collaborative writing. While social features provide the option to exchange ideas, give feedback, or share opinions about or around an object, group or person, e.g. a Blog allows the individual creation of a text-based digital object, but has the social features that allow others to make comments or exchange ideas about a specific Post. EAGLE is explicitly fostering collaborative and social processes.

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[1] The informal learning practices that EAGEL aims to support have been recognized from the information collected in the elicitations' requirement process carried out by WP2. In further analysis in the task 4.2 the main motivation for this informal practices have been recognized as: solving daily work problems, exchange of experiences to improve practices, exchange of knowledge to enhance learning of professional interest topics.

This document gives inputs to tasks developed in other WPs such as WP5 and especially to Task 6.4 within WP6, which will elaborate on contextualization and localization of the OERs to be used in the EAGLE OER-LP. Tools developed within the EAGLE project such as the "Argumentation Tool" and "Automatic Item Generation" are considered when analysing the support for different users' activities.

It is well recognized in this work that the mere presence of technologies are not sufficient to enable EAGLE users to make meaningful use of them, for that users need to make use of digital and lifelong learning competences. The EAGLE project also develops strategies to support the development of those competences, but it falls outside the scope of the work presented in this document to explain them.

Due to the rapidly changing landscape of features, tools and technologies, the results of this document address considerations and determine the type of tools and features that should be integrated into the EAGLE system and thereby support EAGLE pedagogy. These results will be published in the EAGLE project wiki and the actual list of tools to be implemented will be build there, giving the option to be dynamically changed or updated when needed. The considerations of the specific tools needed may also vary with the emergence of new technologies, tools or features.

After evaluating different platforms LIFERAY was selected as the framework on which the EAGLE project will be built. For this reason, the first step in the process of selecting EAGLE tools is to evaluate the pedagogical, technical and accessibility considerations of Liferay tools. When either the tools do not exist or do not comply with the minimum required by EAGLE, then the second step is the evaluation of free and open source tools that can be integrated as portlets to EAGLE OER-LP (Liferay).

The document is structured as follows: the definition of the activities related to the three processes mentioned above and the tools that would enable EAGLE users to carry them out are described in the second section where pedagogical considerations for the selection of the tools are explained. In the third section the technical considerations for the selection of EAGLE learning technologies and tools are presented, based on inputs from WP5. In the same manner section four outlines considerations regarding accessibility that should be taken into account when selecting a tool for the EAGLE OER-LP. A summary of the pedagogical, technological and accessibility considerations are presented in section five together with conclusions of the work done in this task.

2 Selection of EAGLE learning technologies - pedagogical considerations

The term "learning technologies" refers to technologies used for supporting learning processes, so the adequate selection of these technologies is directly related with the learning concept they are meant to support. EAGLE pedagogy is framed in a socio-constructivist approach (Vygotsky, 1978) based on an understanding of 'digital' communities of practice to support informal learning among professionals (Chunngam, Chanchalor, & Murphy, 2014) and basics of connectivism (Siemens, 2005) as emergent approach that explains learning in the digital networked society using SCT.

Within this framework learning implies building connections to belong to a community that actively exchanges experiences, knowledge, ideas, etc. Dialogic and reflexive processes as well as collective construction of meanings and objects are core elements of learning. Knowledge is constructed and embedded within the connections, hence activating and reinforcing connections within a community is fundamental and EAGLE platform should provide tools to enable it. Individual and social dimensions of a person are intertwined and mutually enhanced, hereby the importance of collaborative and social features within the EAGLE learning technologies and tools.

In consequence, technologies to be included in EAGLE OER-LP should enable users to create connections so that they can **build a community**; **co-create digital artefacts** (OERs and others) thus enhancing the collective knowledge construction; and **steering their autonomous learning** process.

The rest of this section will concentrate on the description of the activities associated with the above-mentioned processes and the tools or technologies needed to enable them.

2.1 Community building

Chunngam et al. (2014) describes communities for informal learning as a group of users who learn from each other (either online or face-to-face), gathered by common interests and lead by the exchange of practices (good or bad ones), knowledge, problems and experiences with the goal of improving their work performance. They also remark the importance of the social structure as support for "knowledge flows" between members. In that concern Siemens (2005) explains that from a connectivist perspective, learning is a process of connecting specialized nodes or information sources, so making, maintaining and nurturing connections is needed to facilitate continual learning.

In order to create the EAGLE community of practice and enable users to constantly make and maintain their connections it is necessary to provide tools for **networking** and c**ontent sharing**. In the same manner, to encourage active **participation** of the users, at different levels, is crucial to building up the required social structures allowing the users to experience different roles within the community. The diversity of participation options allows users to contribute in different ways and dynamically adapt his/her role to their needs or expertise. Providing the appropriate tools is the first step towards enabling EAGLE users to perform the activities required.

To build a categorization of activities related with each of these processes is not easy, since the majority of them are multi-purpose, e.g. while co-creating a resource, one is participating and at the same time networking with the others who participate in the collaborative creation of the resource. The table 1 presents an *ad hoc* classification made with the purpose of determining technological demands of these processes, beside each activity it is highlighted if the activity requires a tool, or it requires an embedded feature either in the system or in a tool that complements the activity.

The following subsections present tables with activities and tools associated to the process of participating, networking and content sharing respectively. The construction of these tables is based on input from deliverable 4.4. Each activity is related either to a required tool or to an embedded feature of the system or tool.

After each table the tools for these processes are summarized and at the end of this section all the tools required to support the EAGLE learning concept are presented in brief.

2.1.1   Networking - activities and tools

In almost any activity where users interact with other users they are networking indirectly. However, the activities described in the table are the ones recognized explicitly to establish a connection with another EAGLE user. The text in bold highlights the minimal features expected for the tools and text in italics highlights features beyond the scope and other text is in the backlog.

TABLE 1

Goal	Activities	Tools or technology
Networking	Profile completion (Completion/ **partial**)	Embedded in the system: The profile will contain useful information for networking. The system will make suggestions of potential good connections associated with the information provided in the profile of the users.
	Connect with other members	Embedded in the system: Different types of connections can be established within the community: reciprocal, unidirectional, direct, indirect, etc.[2] indirect connection: *@Mention* another member Or tools provided if integrating twitter-like tools
	Endorse skills and expertise (recognition)	Embedded in the system: Profiles should have the option to allow others to endorse your skills or expertise
	Communicate with private messages	Tool required: Synchronous message: **text**, video, audio. Asynchronous messages: record video/audio message, send private message, **send email** (for validation 2).
	Communicate with group messages	Tool required: Synchronous **multi user** messaging system: **text**, video, audio

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[2] A more clear classification of connections typology falls out of the scope of this document, For the purpose of this document it is enough to determine if an external tool is needed for supporting this activity or not. It is to be examined by the development team the feasibility of implementing different type of connections.

	Asynchronous multi user: mailing list, **group-messaging**.
Mention other members in Posts	Embedded in the system: possibility to 'tag' a user within the message (e.g. @Name, +Name) Or tools provided if integrating twitter like tools
Use SNA to enhance personal network[3] (analytical and visualization tools)	Tool required: tools that allow the visualization of the personal network to improve community and network building

Besides the embedded features that the system should offer to better support networking processes in the users, the tools that should be considered for inclusion in the platform are:

- Tools for individual communication with the following specific features;
    - Messaging system that allows synchronous communication via **text**, audio and/or video
    - Allow recording messages in audio or video
    - Allow sending of **private messages** to other users within the system
    - Allow sending of emails to the given address of another user (when the user makes her/his address visible) or send email notifications when the users have a private message
- Tools for group communication with the following specific features:
    - Messaging system that allows **multi-users** synchronous communication via **text,** audio and/or video
    - Allow recording messages for multiple receivers in audio or video
    - Allow private messages to multiple-users simultaneously (**group message**)
    - Mailing list system or email notification when a group message is arriving.
- Twitter like tools comprising the basic features of the two previous points, with the characteristic that it is only text-based. This tool would not be a substitute for the video and audio chat features required in the previous tools.
- Social network analysis tools that allow users to find the right connections for enhancing their network[4].

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[4] These features need to be better explored in further stages of the incremental system development; it requires having already a minimum critical mass in the community and from medium to high level of user's digital competences to be implemented.

2.1.2 Participation - activities and tools

Participation is a very broad and inclusive term that embraces many roles which EAGLE users can 'play' within the platform; this diversity allows, for example, an expert in a topic to act as a novice in another. The non-hierarchical structure of the community must be reflected in the availability of all tools and functionalities for all users. This is one main difference with traditional Learning Management Systems (LMS) where teachers and students have different and pre-determined roles and thus have access to different tools with different purposes. In the EAGLE pedagogy there are no teachers or students, all members of the community are users building knowledge together.

Participation in any sense implies an act of socialization, which is why many of the activities are associated with social features of social tools.

TABLE 2

Goal	Activities	Tools or technology
Participating: (broad understanding of participation embracing any type of interaction not directly involved in sharing of networking)	**Posting in a discussion**	Tool required: Discussion board with syndication/notification features Microblogging (twitter)
	Rate a Post, comment or review	Embedded in the system or in the discussion board tool
	Reply to a post, comment or review	Embedded in the system or in the discussion board tool
	Commenting in a resource	Embedded in the system or in the tools where the resource is shared
	Reviewing a digital object	Embedded in the system or in the tools used to share the resource
	Annotating in a digital object	Tool required to allow the annotation in different types of resources
	Syndication to a digital object (Blog, web, news, post, etc.)	Embedded In the system: Users should have the possibility to syndicate to different sources of information within the EAGLE platform, for example news, activity associated to a resource, Blogs, wikis, groups. The user should receive notifications each time there is an activity associated with this resource.

	Rate a resource	Embedded in the system
	Add or modify features of the platform (Advanced feature of open source platforms)	Intrinsic part of an Open source platform. It requires advanced competences.

Tools required for supporting participation are mostly social tools:

- o Discussion or posting boards with the following specific features (http://www.discourse.org/):
    - o allow threads within threads (reply to reply)
- o **Allow rating of the posts**
    - o **allow clear distinction** between who is answering to whom
    - o **allow activation notification** when posts are entered
    - o allow tag posts
- o microblogging (https://twitter.github.io/) with the following features:
    - o syndicating to a topic of interest (e.g. via #Hashtag)
    - o replay direct messages (with the option to reply)
    - o mention other community members within a post (@mentionuser)
    - o allow activation notification when posts are entered
- o Annotation tools with the following features (http://annotatorjs.org/):
    - o allow individual (private) and collaborative (public/shared) annotation
        - ▪ for web based resources
        - ▪ for different resource formats
    - o allow use of tags in the annotation

2.1.3 Sharing - activities and tools

Sharing, as already pointed out, represents the connection with other members through objects; one connects with the community indirectly by sharing with the public and directly when sharing with one person or a selected group. The difference between the activities associated with networking is the existence of an object within the connections, understanding by objects either a digital object or a mental object such as an idea, concept, thought, etc.

In the following table activities and tools associated with sharing are presented

TABLE 3

Goal	Activities	Tools or technology
Sharing content: (it involves different types of resources that can be created and activities oriented to share and exchange with others involved in sharing or networking)	**Share resources as links** (URL)	Tool advised: Bookmarking tools with social features: tagging, rates, comments, etc.
	Sharing resources as attachments	Embedded in the tools used to share (mail, **message**, **post**, etc.)
	Create interest groups	Embedded in the system: The activity of creating a group requires an aggregation of the same tools used to build the community, but it is **the user who creates the group** and who decides which tools will be available for the group created
	Share ideas (brainstorming)	Tool required: It can be used in the forum, but also as a mind mapping tool, for example online shareable boards (Padlet, Realtimeboard). (New tools to share ideas are constantly developed.)

The tools required to support sharing activities are:

- o   bookmarking tools for sharing links with social features (http://delicious.com)
- o   Tools for brainstorming or creativity with collaborative features. There are many tools constantly emerging that support creativity and brainstorming, some examples of these are:
    - ○   Mind maps tools (http://freemind.sourceforge.net/wiki/index.php/Main_Page)
    - ○   Shareable boards (Padlet)

Tools for collecting and curating are included in the following section.

2.2   Authoring user-generated OERs

One of the core goals of the EAGLE project is to encourage users to use, collect, and share, create and adapt OERs as a cost-effective way to support their learning process. The characteristics of OER creation (tools and competences required) will depend on the definition of OER used.

There are two types of OER recognized in the literature (Camilleri, Ehlers, & Pawlowski, 2014; Weller, 2010), on the one hand is the "BIG OER" also known as Institutionally-Created OER (IC-OER), which is a high quality educational resource created with the goal of making this material accessible to people who cannot afford high quality education around the world. The quality standards are very much related to pedagogical components and specific tools are needed which can support those standards for its creation. Its production is very complex (Schuwer, Kreijns, & Vermeulen, 2014), expensive and mainly addressed educators or professionals in the field of education (trainers, instructors, etc.) (Schuwer, Wilson, van Valkenburg, & Lane, 2010). The creation or adaptation of this type of OER is not in line with the motivations and professional competences of EAGLE's target users.

On the other hand there is the "little OER" also known as User-Generated OER (Weller, 2010) (UG-OER), which is a rather low-quality digital object created by non-educators in specific contexts to explain or illustrate something to someone or to a group of people. Its creation does not imply complex pedagogical underpinning or tools. It's rather "low quality", compared with the institutionally created OER, is considered an asset since it encourages non-educators to make use of, and freely adapt them, or most interestingly aggregate them. The competences and motivation to create UG-OERs are in line with the EAGLE target users. Hence, "Authoring tools" are defined as any tool that supports the creation or adaptation of digital objects to be shared or stored.

Another characteristic of the UG-OER is that they tend to be peer-produced in contrast to the individually-authored IC-OER. UG-OERs are most likely to be crowd-sourced, since they encourage aggregation rather than adaptation[15]. In consequence, collaboration features and aggregation tools play a significant role in authoring UG-OERs.

The list of tasks associated to authoring UG-OER and the associated tools is presented in the following table.

TABLE 4

Goal	Activities	Tools or technology
Authoring UG-OER and other digital objects (with others involved in sharing of networking)	**Co/create resources**	Tools required ● **Text production: wiki, rich text editor** ● video production: video editor, screencast ● Image production ● Audio production Collaborative features are desirable in creation tools.
	co/adapt resources	Embedded in the creation tools: These tools can open a variety of formats and allows editing the digital objects and saving them in standard EAGLE formats[5].
	Aggregation	Tools required: Presentation tools ● **Presentation tools** (PowerPoint-like) ● multimedia production (Prezi-like) ● Aggregation tools (Padlet-like) ● Blogs are considered authoring tools since they allow users to create content. They can be also used as aggregation tools since they allow embedding of different media in a post. Collaborative features are highly desirable in aggregation tools

Designer tools such as the tools used to generate courses or formal educational objects, as well as for the creation of web pages, are not considered in the creation tools list presented. Further exploration is needed to determine whether the creation of these kinds of professional resources will be supported by EAGLE platform.

The tools required for supporting the creation of digital artefacts including UG-OERs are:

[5] The EAGLE formats are described in the section relating to technological considerations

- Digital objects production tools with collaborative and editing features
- **Text production: Wiki, rich text editor**
- Video production: video editor, screencast
- Image production
- Audio production

Tools for supporting aggregation of digital objects to create new ones:

- **Presentation tools (PowerPoint like)**
- Multimedia production (Prezi like)
- Aggregation tools (Pallet like)
- **Blogs.**

Technologies such as virtual and augmented reality, wearable devices or Internet of things are not considered within the scope of the EAGLE project.

Video, image and audio production can be supported through linking with suitable software.

A sample of digital objects creation tools[6]

Given the heterogeneous set of tools available for creating different digital objects. The following collection of examples shows some of the available tools in different areas:

- Audio Editing and Screen Recording
  - Audacity: Open source audio editor and computer screen recorder. It is available for Mac, Windows and Linux.
- Video and Audio Streaming
  - OpenBroadcaster: Open source system to run community radio and television. OpenBroadcaster comprises of a management software, streaming software and a player for the users side.
- Video production tools
  - VLC media player (commonly known as **VLC**) is a portable, free and open-source, cross-platform media player and streaming media server written by the VideoLAN project.
  - Blender: Free and open-source software to create animated 3D computer graphics. Created video files in standard format.
  - RecordMyDesktop is a free and open source desktop screen casting software application written for GNU/Linux.
- Image editing and drawing tools
  - IrfanView: A free software, which can tailor and convert most image file formats and covers color and compression options.
  - GIMP is an acronym for GNU Image Manipulation Program. It is a freely distributed program for such tasks as photo retouching, image composition and image authoring.
  - Inkscape: A free image editor and vector graphic tool.
- Maps creation

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[6] The complete set of proposed tools is developed in the WIKI of the project, given that tools are rapidly evolving and changing the wiki ensures up-to-date lists can be maintained helping to facilitate the sustainability of the project.

○ OpenStreetMap: An online map system. The maps have been created in a Wikipedia-like shared process and are created, augmented as well as presented in the web.

2.3 Autonomous learning management - activities and tools

Autonomous Learning as defined for the EAGLE project covers all the learning activities needed by a professional in his or her job to obtain knowledge and skills needed to fulfil his or her tasks. The learner is autonomous in searching and choosing learning offers and experiences that are appropriate to his/her problem.

The term covers the use of well-structured classes and curricular in professional development as well as *ad hoc* activities to cover short-term information needs that resolve a newly arising problem. The EAGLE platform is developed to support some of these *ad hoc* activities that scaffold the professional learning in a daily basis and it is expected to assist formal professional development experiences as well in the future.

EAGLE should provide tools that allow users to experience and evidence the knowledge creation to keep their motivation and encourage them to be active participants of the system.

A sense of progress is one of the most important elements that the EAGLE platform needs to support, since it is expected that evidencing the utility of the EAGLE platform, beyond finding specific solutions for determined problems, allowing them to experience knowledge creation, can motivate them to not only continue using the platform, but being active participants of the knowledge building process.

The table 5 presents the activities and tools associated with different processes related to autonomous learning.

TABLE 5

Goal	Task	Tools or technology
Knowledge management	**Collect digital artefacts**	Tools required (push technology): ● content collection spaces (Flipboard, Pinterest) **Syndication (RSS feed)**
	content analysis tools (semantic web)	Embedded in the system
Reflection	**Collect personal thought/ideas**	Tools required: ● **Simple text editor** (notepad)
	Personal reflection	Tools required: ● **Blog** ● Mind map
Sense of progress (Self-assessment/Self-	Set learning goals, set enquiries, problems to	Embedded in the system: The user would have the option to set a learning goal, a challenge, a

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monitoring)	solve	particular goal or problem to resolve within the profile. The system will remind the user to check whether this has been fulfilled or if it has changed.
	keep track of goals accomplished, enquiries and problems resolved	Embedded in the system: User's profile will change dynamically in reaction to his/her interaction with the different actors in the system: other users, options and functionalities of the system, other members, etc.

In further stages of the projects the option to integrate social learning analytics to support the sense of progress of the user will be explored.

The tools required to support autonomous learning are:

- Digital artefact collection tools (push technology)
  - content collection spaces (Flipboard, Pinterest)
  - **Syndication (RSS Bot)**
- Content curation tools (pull technology):
  - Digital objects storage (dashboard, Evernote)
  - scoop.it
  - curation site
- mental objects collection tool:
  - **simple text editor (Notepad)**
  - multi-format tools for notes taking (Evernote)
- Tools for supporting personal reflexion:
  - **Blogs**
  - Mindmap

Many of these activities can be perfectly carried out with simple text editor, the availability of tools created with these purposes will help EAGLE users to adopt the concepts behind the tools so that later, when they have understood the concept and develop skills to perform this activity, they will be able to make personal decisions in terms of the tools to use for steering of autonomous learning.

3   Technical considerations for tools selection

The EAGLE learning environment will be realized based on "Liferay", an Open Source content sharing platform. It was developed as an open document management system which is capable of storing digital artefacts of every well-established type. **Text content will be created directly on the platform, but other types of digital artefacts like video, audio or multimedia must be separately produced by specific tools.**

3.1   Free and Open source

The "Open Source Criterion" refers to the consideration that included tools need to be "open" in order to make the EAGLE platform an Open Source platform. The following criteria have been adopted from Hilton et al (2010) and the selection of tools shall satisfy all of these requirements.

TABLE 6: FREE AND OPEN SOURCE CRITERIA

Name/ OS criterion	Description
Re-use	The tool can be used for personal means
Re-mix	The tool can be mashed-up and used to create new tools
Re-vise	The source code of the tool can be changed.
Re-distribute	The tool can be distributed freely.
Fees	The tool can be used without fees

The most common open source license is the GNU Public License[7]. The license under which the software is provided does not indicate the utility of the tool but does provide an indication of how extensible the software is.

Another characteristic of free and open source tools selected for EAGLE is that they need to be Application Programing Interface (API) compatible with EAGLE OER-LP (Liferay). API can enable that free and open source tools can be plugged as portlets to EAGLE OER-LP (Liferay).

3.2   Frequently used media formats

As already presented in the pedagogical section, the most commonly used digital object to support an explanation or complementing an idea are: audio, image, text and video and any aggregation of them usually is displayed in a "presentation" mode. The tools that will be evaluated to be used in EAGLE should support the most common formats associated with these digital objects. Some of these formats are not open in an unrestricted manner, but viewers or office editing software are broadly available even in local governments that they can be taken as de facto open. Therefore, despite of their proprietary condition, the creation tools selected should be compatible with formats in common use by the users derived from proprietary software such an Microsoft Office (.doc, .xls, .ppt) and Acrobat (.pdf). Although they are not produced by open source software, they are integral part of the working life of EAGLE target users. To deny its use will discourage users to adapt documents they already have or to adapt them but not being able to use them out of the platform.

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[7] http://www.gnu.org/copyleft/gpl.html

Here are listed some of the most common formats (to date), which should be supported by EAGLE OER-LP:

- **Audio**
  - *MP3*: there is a large amount of software and hardware designed to use MP3, which may make it a good choice in many situations. Tools integrated in EAGLE should support this format
  - *WAV*: it is commonly used and is part of the European Broadcast Union standard. WAV files do not lose sound quality as they are edited. Although the format is not open, it is the format of choice for many audio editors. Tools integrated in EAGLE should support this format
  - *OGG Vorbis and FLAC*: Open formats that are completely free. Ogg Vorbis is a lossy format, like MP3, while FLAC is similar to WAV. These are preferred formats for IC-OERs.
- **Images**
  - *JPEG*: The most common image format on the internet. If the image is continually edited, the image quality will be reduced. It is often used as the final format for IC-OER .Tools integrated in EAGLE should support this format
  - *PNG*: Open format that is similar to TIFF, all current web browsers support PNG files. Because it is open, this is a preferred format for IC-OERs.
  - *TIFF*: A proprietary format by Adobe. TIFF files are often used when scanning documents. It is not uncommon for TIFF files to be used as a high-quality backup of OER (Library of Congress, 2006).
  - *SVG*: An open format with promising new features, including animation. Although its support by some browsers is uneven, it is suggested as preferred format for IC-OER
- **Presentation**
  - *PPTX*: XML proprietary format used by Microsoft Power Point. It is the most commonly used format for presentations in almost all fields. Many open sources text editors support this format. Tools integrated in EAGLE should support this format
  - **HTML5** is a core technology mark-up language of the internet used for structuring and presenting content for the World Wide Web: Open Document Presentation, an open standard mobile electronic office documents file format made by Sun Microsystems, supported by diverse office open source software. Preferred format for IC-OERs.
  - *SXI*: Open format for Open Office, Neo Office and StarOffice. Unlikely to be compatible with Microsoft Office (FilExt, "SXI").
- **Text**
  - *DOCX*: XML proprietary format used by Microsoft Word. Currently the most used format in text digital office documents nowadays. Tools integrated in EAGLE should support this format.
  - *RTF*: The Rich Text Format (often abbreviated RTF) is a document file format developed by Microsoft for cross-platform document interchange. Most word processors are able to read and write RTF documents.

- ○ **ODT**: Open Document format supported by many open source word processors
- ○ **TXT**: generic file format based on several standards. Almost universally compatible with any word processor or text editor.
- ○ **XML**: Open format that is very flexible. Many open formats use XML, at least in part, to make a new open format. It is usually generated by text editors or word processors.
- ○ **HTML5** is to date a core technology markup language of the Internet used for structuring and presenting content for the World Wide Web
- ○ **XHTML5** is the XML serialization of HTML5. The syntax is described by the HTML5 specification. There are several preferred formats for IC-OER: ODT, HTML, TXT, XHTML, and XML.
- ● **Video**

MPEG-2 - MPEG4 are the standard proprietary formats for DVDs and are used by the Internet Archive. These files are capable of a wider variety of resolutions and sizes, making it a very flexible format. It is the recommended format for IC-OER.

- ○ **MOV**: *QuickTime* video *d*eveloped by Apple. MOV files are based on MPEG-4, but not as widely supported.
- ○ **Ogg Theora**: Completely open lossy video format. Some players support Ogg with a free plug-in.
- ○ **WM**: Windows Media File developed by Microsoft, but is an open format. WMV files produce good quality with a small file size.
- ○ **SWF**: proprietary format from Adobe. Because SWF files can be viewed by most of the browsers and platforms, it is one of the most common formats for video and animation on the internet. Unfortunately, editing SWF files is very difficult and is not recommended for IC-OER.

3.3 Mobile Compatibility

The EAGLE learning design developed in the D4.4 considers mobility as an intrinsic characteristic of individuals in the digital age, which is also in line with the EAGLE project goal of developing critical competences for the 21st century individuals in PA workforce working in RLG. This natural characteristic is supported by mobile technologies, either devices or software applications. Thereby the EAGLE tools, in any of the pedagogical dimensions, must fulfill the criteria to be considered 'mobile friendly'.

Although the term 'mobile friendly' is currently coined by a large software company (Google) to describe a web page that has been optimized to be viewed on a mobile phone, the criteria they describe as characteristics of this type of web pages[8] also serves to characterize mobile friendly tools. Based on these criteria, a mobile friendly tool should:

- ● Be able to operate in desktop as in mobile devices.

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[8] http://googlewebmastercentral.blogspot.ch/2014/11/helping-users-find-mobile-friendly-pages.html

- Be optimized to empower the characteristic embedded functionalities of mobile devices, e.g. camera use, location awareness, use of cloud services, etc.
- Avoids use functionalities that are not common to mobile devices, e.g. upload documents storage in the device.
- Allows interoperability between web applications and mobile apps installed in the device
- Avoids software that is not common on mobile devices, e.g. Flash
- Optimizes the GUI for mobile devices
    - Places links far enough apart so that the correct one can be easily tapped
    - Resize text to be readable without zooming in the mobile version
    - Sizes content to the screen so users don't have to scroll horizontally or zoom

It is important to remark that due to the rapidly evolving technology used in the development of mobile and portable devices, the functionalities that these devices are able to contain are increasing at a very rapid pace. More and more the line which differentiates desktop, laptop and portable devices such as tablets and smartphones is blurring in terms of functionality. In this sense, the criteria listed above reflect the state of mobile technology at the time of writing.

3.4   Integration of user-generated OERs into the EAGLE platform

Content can be integrated in different ways to the Liferay platform. Some types of content can only be integrated when there are software components (plug-ins) available for Liferay. The set of those plug-ins is an open concept and can be easily adapted by the system administrator. Some content can only be held on the system on which this content was created. The reasons for this could vary from the fact that there is no plug-in for Liferay available or because restrictions of the viewing- and interaction capabilities of Liferay's environment.

Dealing with digital artefacts is related to the technical mechanism to realize its integration into the EAGLE platform. Four levels were found:

- *Level 0)* **Referential Integration of externally hosted content on an untrusted and uncontrolled system:** This can be realized by creating a hyperlink from a Liferay document to somewhere on the Internet. This is applicable for all common types of digital artefacts such as texts, images, audio files or videos. A rich text editor in the EAGLE platform will allow the editing users to store a URL to any web resource. The linked content can be reached by activating a hyperlink.
- *Level 1)* **Integration of externally hosted content/tool on a trusted system:** Outgoing from hyperlinks inside the Liferay system, the access for editors to a resource of an external system is only possible for EAGLE-editors. Technically the content could be presented in an iframe. This is a specialized HTML-tag opening an area in a webpage where the content is loaded from somewhere on the internet addressed by a URL and will be displayed seamlessly inside EAGLEs Liferay environment. The access rights to resources could be controlled in three ways:
    - Access is granted by accepting a cookie from the Liferay environment which is communicated through a **mutual web service interface** such as (for example) XMLRPC between EAGLE's Liferay and the integrated system.

- External system realizes its **authentication against an EAGLE web service**. Therefor the EAGLE's Liferay-environment should speak one of the common authentication protocols like LDAP.
- An **autonomous authentication system**: EAGLE's Liferay environment as well as all other integrated systems are authenticating against a central and autonomous user administration system speaking a common protocol like LDAP.
- *Level 2)* **Direct integration of standard digital artefacts into EAGLE's Liferay environment:** Content is uploaded into EAGLE's Liferay environment or is produced directly in Liferay's text editor.
- *Level 3)* **Direct integration of content created by external applications into Liferay:** Integration of content by uploading media objects which are supported by EAGLE's Liferay environment or by plug-ins which have been installed according to upcoming requirements.

Liferay is an open platform where an administrator can install plug-ins e.g. in order to provide visualization and/or interaction with contents from proprietary created OERs. http://www.liferay.com/marketplace is an appropriate entry point to search for plugins. As a consequence of the philosophy of an open system, a list of appropriate digital artefacts will never be complete.

4 Accessibility criteria for tools evaluation

4.1 Usability criteria for Accessible web tools

As stated in a previous project deliverable (D2.2B) the main guidelines against which the accessibility of a website are ascertained are those produced by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium. These guidelines may be viewed in their entirety at the following URL: http://www.w3.org/TR/WCAG20/

Web Content Accessibility Guidelines (WCAG) 2.0 covers a wide range of recommendations for making Web content more accessible. Following these guidelines endeavours to make content accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. Adherence to these guidelines will have the potential benefit of making content more usable for users in general.

In the discussion which follows all of those guidelines have been considered and included. The criteria described here cover visual, auditory and cognitive aspects of accessibility. They are grouped into 9 sections. The treatment here goes beyond what is found in the WCAG guidelines and is based on the evaluation techniques outlined as part of the AgeWeb project: **www.ageweb.ch** The reason for our selection of this accessibility evaluation methodology is that issues relevant to usability are included, rather than simply the mechanics of accessibility. The following subsections explain each of the criteria.

4.1.1 Clarity and Structure

The clarity and good structure of a web tool are important, if not in fact the most important prerequisites for achieving user-friendly design. Authors prefer information in a WaSP to be ordered in as self-explanatory a way as possible, for the information to be restricted to what is absolutely essential and like having clear user guidance available if needed.

The purpose of a web tool and its logical structure should be obvious the second a user looks at it. This means that the various content, search and navigational regions must be well structured and their benefits or function be self-explanatory. The selected layout must be applied as consistently as possible across all the pages within the web application.

If the content of the pages is arranged well, this makes the website easier to read and understand.

Clarity

- The purpose and logical structure of the web application should be clear the second the user looks at it.
- The purpose of each of the UI components should be clear and readily observable.

Structure

- Design style and elements should be applied consistently across all pages.
- It should be easy to distinguish the various areas of a web application and users should be able to identify their benefits and functions immediately.
- Content should be clearly structured.
- Menus should be clearly identifiable as such

4.1.2 User Guidance and Navigation

Navigation elements must be self-explanatory and identifiable as such and must have the same design throughout the website.

If icons or symbols are used for navigation purposes, their functions must be readily recognizable.

User guidance

- Changes to the status of the web application (after a user action or a system event) should be clearly identifiable.
- The user guidance should be clearly identifiable as such and be consistent, clear and constructive.

Navigation

- The navigation bar should always be visible and have the same structure throughout the site.

- All users using the wasp should be able to use the navigational elements.

- Keyboard Access should be standardized and uniform on all pages of the web application.

- Relevant operating elements such as icons and symbols should be based on existing standards and be large enough and self-explanatory.

- If pull-down menus are in use then they must be designed in such a way that they are clear, consistent, of a sufficient size and self-explanatory.

4.1.3 Text and Language

The text is designed in such a way that it comprises a content component and a design component. The combination of both elements makes it easier to read and understand. The design component also includes ensuring that suitable colour contrast is taken into account.

Users of the web application must be able to follow the provided information and understand it.

With regard to the text design (line length, line spacing, spacing, contrasts), it is important to bear legibility and compatibility with different terminal devices (screen size, resolution, contrast and luminosity) in mind.

Features such as text enlargement should be able to gracefully adapt.

Colour combinations Complementary or opposite of each other in the chromatic circle) should be avoided.

FIGURE 1: CHROMATIC CIRCLE (HTTP://ARTISTICMAKEUP.WORDPRESS.COM)

The content of the component

- The language should be easy to understand, be consistent and tailored to the target group.
- Any technical language should be clearly explained. Note that where possible, technical "jargon" should be avoided.

Design component

- The text size should be legible even in standard mode.
- Headings should be clearly identifiable as such.
- Enlarging the font should not lose parts of the content and impair the operation or the layout of the website.
- The font type should be legible on the screen.
- The layout should be Conducive to reading.
- The inter-character and inter-word distances should be sufficiently large.
- There should be enough contrast between the text and the background to the text.
- The colour combinations should provide enough contrast. Refer to figure X above.

4.1.4 Graphics, animated Features and Multimedia

Graphics and multi-media content are not only design elements, but are also used to display information and operate the web application. If they are reduced exclusively to their creative benefits, they can have a diverting influence or be very off-putting. The proportion of text to images should be balanced.

As already discussed for text and language, there must be sufficient contrast with the images as well. From the point of view of readability and detectability, the size in which the images are displayed is important and it should be possible to adjust this size individually without any loss of quality.

Decorative elements such as animated images and background music often have a more jarring effect.

Graphics

- Images and text should be tailored to each other in a meaningful way.
- It should be possible to enlarge graphics without any loss of quality.
- Icons and buttons should be displayed in a sufficiently large size.
- The degree of contrast in graphics should be sufficient.

Animations

- If flashing elements or animated features which cause strobing are used they should be avoided unless absolutely necessary. If used, warnings should be provided.

Multimedia

- There should be adequate Textual alternatives for graphics/images and multimedia content.
- If possible, the use of background music or audio should not be used as it can result in a user being unable to hear the speech produced by screen readers. If it is necessary, then controls to stop the playback of the background audio should be included.

Advertising

- Advertising should be clearly identifiable as such.

4.1.5 Links

Links allow navigation within a web application (web app) and to tap into additional as well as external information. If links are used, make sure that they are clearly identifiable and self-explanatory.

Links within a web app should be clearly identifiable and should be presented in a uniform manner throughout the entire web application. The needs of users with vision impairments such as colour blindness should be taken into account and appropriate colours chosen to indicate the various types of link used.

Mouse-over effects (texts that are displayed as soon as the mouse pointer hovers over the link) have become an additional source of information for many users. However, these effects do not work with touchscreens (tablets and smartphones) and for this reason alternatives must be provided.

- All links should be up-to-date and work properly.
- The look and functionality of the link should be uniform throughout the web application.
- References to links should be clearly described, including for users with sensory restrictions (e.g. colour blindness?. it is important to avoid phrases such as "Click here" or "read more" as users who use tab navigation will not be in a position to understand the purpose of the link.

4.1.6 Search

The search engine makes it easier to locate a specific entity on a website.

Positioning the search fields well is just as important as the transparency of the search process. An option for refining the search through further criteria improves its usefulness.

When search results are displayed, the range of sorting options, for example, by date, place or other criteria can improve the overview.

Search field

- Users of the web application should be able to find the search field easily.
- A search field should be immediately identifiable as such.

Search results

- The criteria by which searches are carried out should be clearly defined, but also how the content of the search results is generated.
- The search results should be displayed in a clearly arranged way.

There should be an option for sorting the results in accordance with different criteria

4.1.7   Currentness, Consistency and Robustness

Users of web applications appreciate if the interface does not regularly change its appearance and design) significantly. They do, however, expect that the content is always up-to-date. The structure and presentation of the entire web application should therefore be as stable as possible. For users, finding their way on a newly designed page always involves a degree of learning. If the layout of web sites changes constantly, this reduces users' motivation to use the web application.

When it comes to layout, the content and the functionality must be kept up to date.

The key aspect is that the user quickly gets to grips with the website.

It is important to note that the community of users is visiting the website from all kinds of terminal devices and it should therefore be accessible on all such devices.

Currentness

- Contents and linking should be up-to-date.

Consistency

- The entire layout of a web application should be consistent.

Robustness

- The web app should be compatible with different browsers and also provide adequate robustness to various display sizes.

4.1.8   Contact Information and Support

In order to be able to support users of a web application in the event of questions or problems, they must have some contact options. It is important to display information about the provider of the web app in the masthead. This helps to promote transparency. An obvious question here is why this is relevant to accessibility. As with many aspects of accessible website design, incorporation of easily locatable contact information benefits all users of the web application. However, it is particularly useful if a person using Assistive Technology to access the web application encounters problems which other users might not come up against.

Contact options

- Contact information should be available and easy to find.

Transparency

- The masthead should specify the people responsible for the web application as well as any legal restrictions.

Support

- The web application should contain a link to FAQs, online manual or introduction videos.
- The symbols offered in a webapp should be clearly visible and as self-explanatory as possible and if necessary be accompanied by additional explanations.

4.1.9   Registration and Forms

Registration and forms require a self-explanatory design. The purpose and benefits of the data entry should make sense to the users immediately. With regard to data protection, data use, archiving and access by third parties must be able to be detected by users or explained on an additional page. For the design of forms, impaired sight and slower reaction times must also be taken into account.

When personal data is entered, the meaning and purpose of the data and the necessary steps must be visible to the users before the data is input.

As far as possible, incorrect entries should be eliminated when the data is first entered. In the event of errors, one should provide meaningful advice and a targeted correction function.

What are known as captchas are often used to provide protection against spam. These, however, are difficult to read for many authors even with "normal" vision. It is recommended to offer alternative security methods.

Registration

- For authors, the registration should be comprehensible and self-explanatory.

Forms

- Forms must be designed in such a way that they are self-explanatory and unambiguous.
- The process for handling errors in forms should be easy to understand and user-friendly.
- Sufficient time should be given to enter data in to the form.
- It should be possible to enter the data correctly without requiring any additional knowledge.

Captcha

CAPTCHA is an acronym for "**C**ompletely **A**utomated **P**ublic **T**uring test to tell **C**omputers and **H**umans **A**part".

FIGURE 2: CAPTCHA (WWW.WASHINGTONPOST.COM)

- The use of captchas should be avoided altogether or they should be provided in conjunction with the appropriate tools or accessible alternatives.

Data protection

- It must be clearly explained to authors how and for what purpose the entered data will be used.

4.2   Content authoring criteria

There are numerous features of content authoring tools that can be used for the creation of UG-OER. In this report we will focus on the basic features of authoring tools in following categories:

- Audio
- Graphics and Animation
- Video
- Format Templates, Themes and Text
- Integration with Social Media
- Mobile compatibility

Depending on content authoring tools different evaluation criteria can be applied.

The work presented by Shank and Ganci (2013) regarding desired features in authoring tools for eLearning, was taken as main reference to elaborate the features criteria per each of the categories above mentioned, which are presented in the following sections.

Audio Features Criteria

Reference number	Description
AF1	Can embed audio files
AF2	Can set audio quality and other options
AF3	Can record narration audio
AF4	Can perform basic audio editing
AF5	Can perform advanced audio editing
AF6	Can record system audio
AF7	Can add links to external audio files
AF8	Can publish to OER video formats

GRAPHICS AND ANIMATION FEATURES CRITERIA

Reference number	Description
GAF1	Can make objects on the screen interactive
GAF2	Can animate screen elements
GAF3	Can edit images, basic
GAF3	Can edit images, advanced
GAF4	Can insert HTML5 animations
GAF5	Can choose from multiple transitions (fade in, etc.)
GAF6	Can insert Flash animations

GAF7	Can insert text animation
GAF8	Can use built-in characters
GAF9	Can publish to OER audio format

VIDEO FEATURES CRITERIA

Reference number	Description
VF1	Can embed video files
VF2	Can link to external or web video files
VF3	Can set video quality and other options
VF4	Can record screen video
VF5	Can pan and zoom
VF6	Can store video in a library
VF7	Can perform basic video editing
VF8	Can export recorded video to OER format

FORMAT TEMPLATES, THEMES AND TEXT FEATURES CRITERIA

Reference number	Description
TF1	Can use numerous text formatting options (styles, bullets, justification, etc.)
TF2	Can create and format tables
TF3	Can insert picture
TF4	Can insert links
TF5	Can copy&paste from other text editors
TF7	Can create custom templates
TF8	Can choose from provided templates (built-in themes)

INTEGRATION WITH SOCIAL MEDIA FEATURES CRITERIA

Reference number	Description
SF1	Integrates with Facebook
SF2	Integrates with Twitter
SF3	Integrates with other social media

MOBILE COMPATIBILITY FEATURES CRITERIA

Reference number	Description
MF1	Can author on mobile device
MF2	Can publish to mobile web (e.g., HTML5)

5 Example of LIFERAY tools' evaluation

5.1 ACCESSIBILITY TEST RESULTS OF LIFERAY'S MESSAGE BOARD

The following section presents an example of the application of the accessibility criteria outlined above to an evaluation of the Liferay's message board tool.

Only the negative results (points to be changed) are shown.

Clarity and structure

- The method of opening a new category has been implemented in an unusual manner. Use "Subscribe" instead of "Add Category".

-
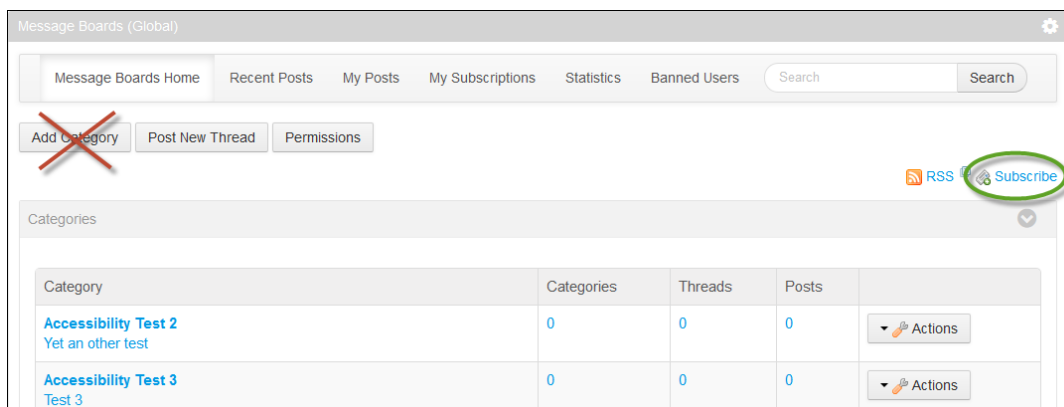
FIGURE 3: MESSAGE BOARDS: ADDING A CATEGORY

- The purpose of "Add Category" (category for what) and "Subscribe" (subscribe to what specifically) is not clear.
- It is not possible at all to post a new thread.

User guidance and navigation

- The "RSS" and "Subscribe" action items are too close together.

-

FIGURE 4: MESSAGE BOARDS: RSS TOO CLOSE TO SUBSCRIBE

- In the menus the contrast ratio test between foreground (text) and background fails multiple times. The required minimum ratio is 1: 4.5.
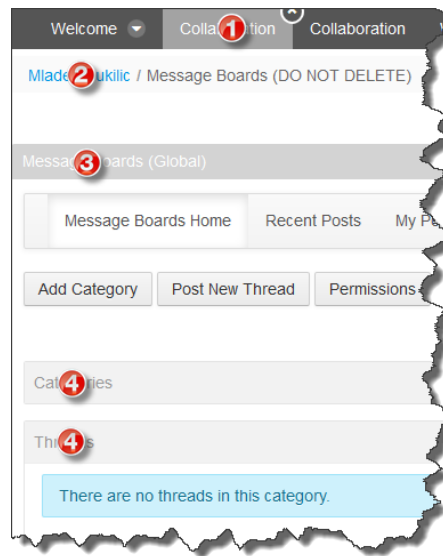
-

FIGURE 5: MESSAGE BOARDS: COLOUR CONTRAST RATIO IN MENUS TOO LOW

(1)	hover over menu item	1 : 2.5
(2)	user name	1 : 3.0
(3)	top heading	1 : 1.5
(4)	heading	1 : 3.2

Text and Language

- The purpose of the technical terms used (RSS, Subscribe, Move) should be made clear.
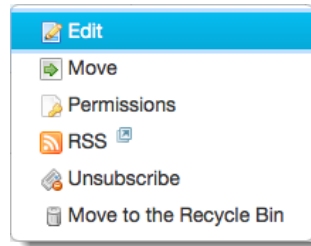 i.e. "move": Where does it move the thread / category?

-

FIGURE 6: MESSAGE BOARDS: PURPOSE OF TECHNICAL TERMS

- No built-in text enlargement functionality is provided, but the layout scales nicely when enlarging the text using the browser.
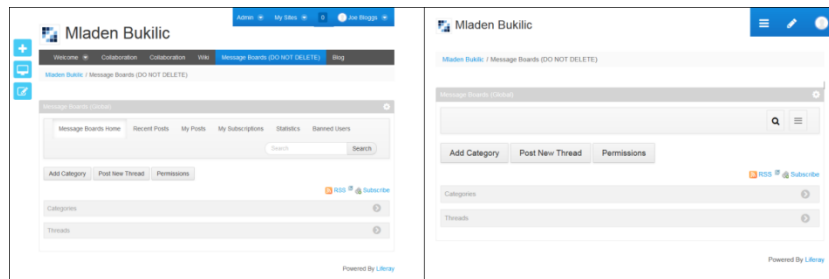
-

FIGURE 7: MESSAGE BOARDS: TEXT AND LAYOUT SCALING BY BROWSER

- Colour contrast ratio in category list too low (normal = 1 : 3.0, hover = 1 : 2.9)

Graphics, Animated Features and Multimedia

- The colour contrast ratio between foreground and background within the graphics is often too low.

Colour contrast ratio = 1 : 2.4   Colour contrast ratio = 1 : 1.5

FIGURE 8: MESSAGE BOARDS: COLOUR CONTRAST RATIO IN GRAPHICS TOO LOW

Links

- The colours chosen for links result in a low contrast ratio 1: 3.82.

-

FIGURE 9: MESSAGE BOARDS: COLOUR CONTRAST RATIO OF LINKS TOO LOW

Search

- No advanced search options.
  There is no discoverable way to search categories. What if, for example, the user wants to view posts of two different categories?
- Display of search results cannot be checked.
  It does not seem possible to create threads (and there are currently no threads).

Currentness, Consistency and Robustness

- Since there are no threads in the message board it is not possible to check either for correct linking or for currentness. However, once threads are created, it should be possible to view when they were created and when the last message was posted in a particular thread.

Contact Information and Support

- The message boards should have a way to contact the admin (in case help is needed).
- No information is provided about the webmaster or the message board's administrator.
- There is no help functionality such as FAQ or How-To for the message boards. A short introduction should be provided.
- The symbols offered on the website (i.e. under actions, sea Figure 6) are mostly self-explanatory. However, they do not carry any additional information; especially "move" does not make much sense.

Registration and Forms

- There is an ambiguity between sign-in / register and the display of no-content with a no-permission message when a user is not signed in.
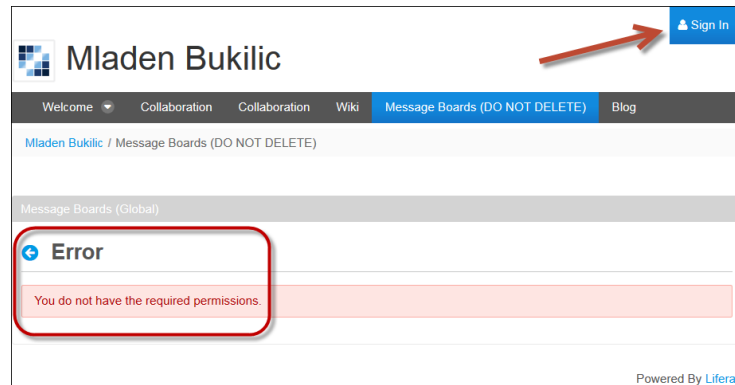
-

FIGURE 10; MESSAGE BOARDS: USER NOT SIGNED IN RESULTS IN PERMISSION ERROR

- The website uses a simple captcha that is easy to understand but does not provide any alternative for visually impaired users.
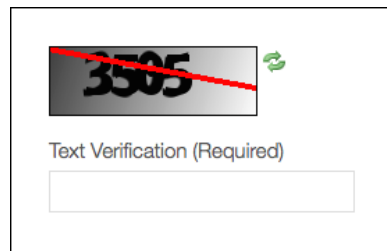
-

FIGURE 11: MESSAGE BOARDS: SIMPLE CAPTCHA WITHOUT ALTERNATIVES

- During the registration data protection or privacy of the personal data is not mentioned.

5.2   Accessibility test of Liferay's Wiki

It was not possible for a blind author using Assistive Technology (In this instance a Screen reader) to access the message board and wiki at all.

CONTENT AUTHORING TEST RESULTS OF LIFERAY'S WIKI

Depending on the category of authoring tool, different content features criteria (presented in 5.2) can be used for evaluation. For evaluation of wiki tool we have used criteria defined in 5.2.4, 5.2.5 and 5.2.6.

Liferay's wiki tool provides a text editor with basic and advance options needed for creating wiki pages (Figure 12)

FIGURE 12: LIFERAY'S WIKI TEXT EDITOR OPTIONS

In the following we are presenting some negative points that we have found during evaluation of Liferay's wiki tool.

a) User cannot copy&paste text from Word document or other text document

FIGURE 13: WIKI TOOL OPTIONS: PASTE, PASTE AS PLAIN TEXT AND PASTE FROM WORD

Options *Paste*, *Paste as plain text* and *Paste from Word* (Figure 13) are not functional.

a) Wiki editor does not provide **insert picture** option.

If the user copies and pastes a picture into the wiki editor results appear like in Figure below. (lack of a link to a picture).

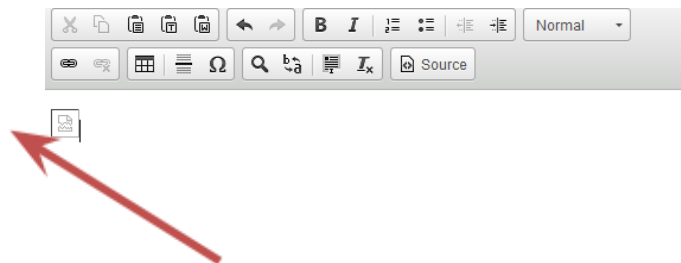FIGURE 14: RESULT OF COPY&PASTE PICTURE INTO WIKI EDITOR

If the user copy&paste the text with images the result is shown as in picture below (lack of a link to a picture).
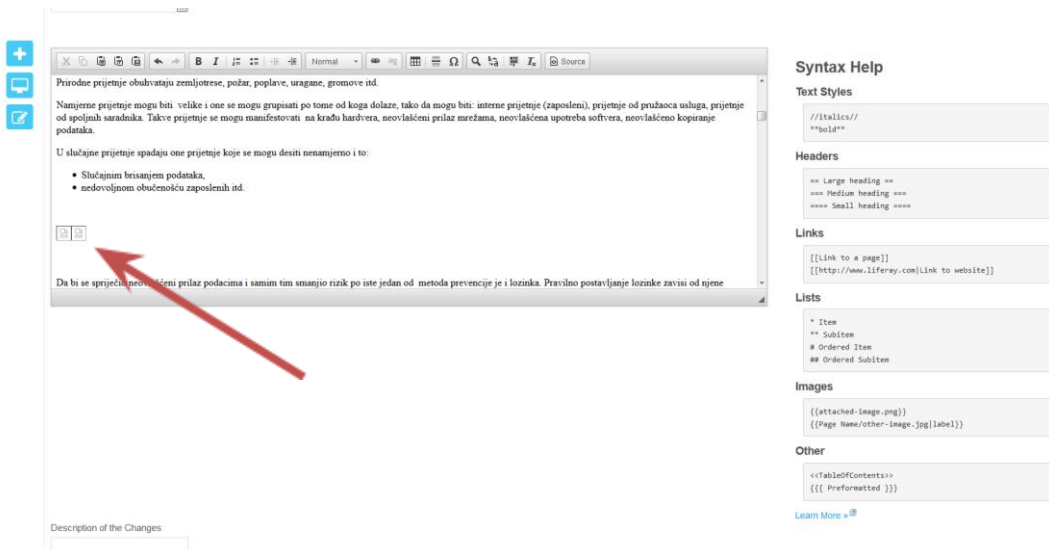
FIGURE 15: RESULT OF COPY&PASTE TEXT WITH PICTURES INTO WIKI EDITOR

b) If the user wants to insert a table the result is the **table without borders**, like in the image below.
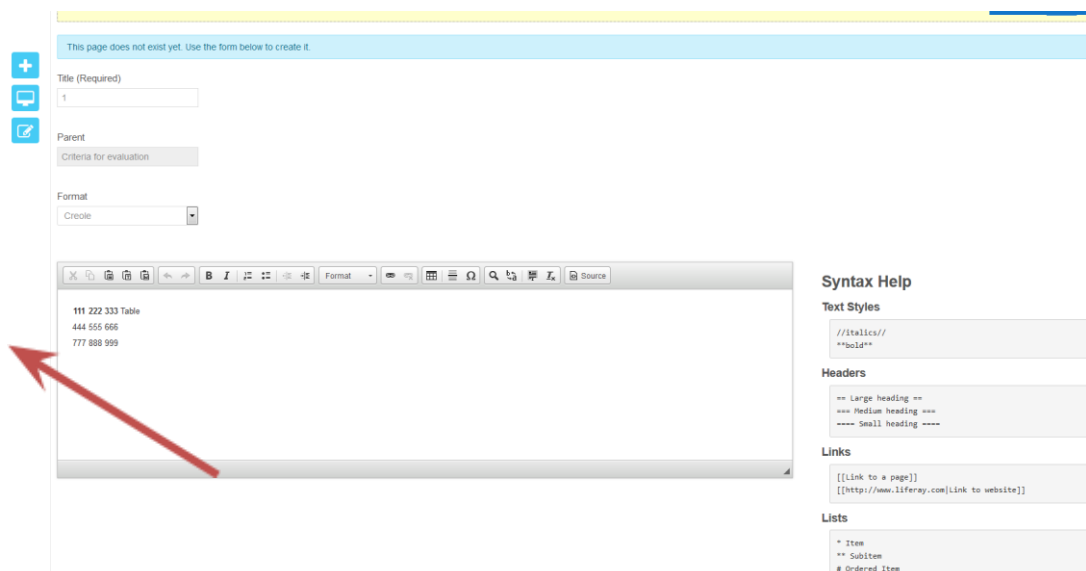

FIGURE 16: RESULTS OF CREATING TABLE IN WIKI TEXT EDITOR

5.3   Preliminary remarks from accessibility evaluation

The Liferay's message board has major errors in its basic functionality. But even with these restrictions it was possible to test the user interface according to the accessibility criteria outlined in this document. However, it is also important to note that the tests were carried out by a user who was simply applying and evaluating according to various metrics. **It was not possible for a blind author using Assistive Technology (In this instance a Screen reader) to access the message board and wiki at all.** Thus, the results here should be viewed in that context. As authoring content depends on the user being able to actually find and activate the link to do so, it is a key recommendation of this portion of the evaluation that the overall Liferay platform be evaluated from the perspective of accessibility. To date, work has been carried out on evaluating various widgets (with mixed results) however in the opinion of the experts undertaking the evaluation of the accessibility of authoring tools, it is pointless to have an accessible message board or Wiki when the underlying infrastructure is fundamentally flawed. This should be a high priority for the further development of any proposed platform.

The Liferay's Wiki tool text editor provide all basic and advanced options for content authoring of wiki pages except *Insert picture* option. Not all options can be tested since there are errors in basic functionality of wiki tool in Liferay.

Summary:

1) Add missing functionality. Focus on adding:
   a) **new thread** (message board);
   b) **insert picture** (wiki tool);
   c) **copy&paste** (wiki tool);
2) Menu, graphics, formating links.
   Improve colour contrast ratio between foreground and background to the required minimum of 1: 4.5

   Improve formatting of tables (wiki tools)

3) add help functionality (i.e. link to manual, FAQ, introduction video)

In the preliminary report specific recommendations were provided. It is a matter of grave concern to the experts carrying out the accessibility review (one of whom was blind) that the tools themselves could not be reached with a Screen Reader from the Liferay homepage. It is **absolutely imperative** that this be addressed as a matter of urgency. Other observations detailed above can be adopted thus improving not only the accessibility of the various authoring tools, but the resulting OER and the platform as a whole.

6 Conclusion

This document aims to provide a basis for allowing EAGLE developers and partners to select the appropriate tools for supporting the pedagogical concept and respect accessible criteria. It has explicitly not been a goal of this work to select a set of tools to be used, since there are still other WPs that will develop their work from the contents of this deliverable.

From the pedagogical perspective, it has been the goal to show the activities that must be supported by the EAGLE learning platform. What this investigation has highlighted is that to describe the tools needed to support those activities is the complexity of the selection of those tools, since emerging technologies for social and collaborative activities is growing at a rapid rate and new options are created with each technological advancement. It is highly probable that in the future new multi-purpose tools will be developed that will merge some activities that experts are not able to presently imagine. At the same time, the use of tools, regardless of the purpose for which they have been created are strongly dependent on the digital competences and the interest of the users (skills, knowledge and attitudes). For this reason it is advisable to select tools that have room for expansion rather than one-purpose tools so that users who advance in their competence development have the opportunity to explore different uses of EAGLE tools.

From the technological dimension it should be remarked that the creation of an open source platform, conformed by the integration (at different levels) of other open source tools, is indeed a difficult task due to the dynamically changing landscape of OS projects. From this perspective it is advisable to encourage EAGLE users to explore tools and to consider in the change management strategies the inclusion of system administrators that have experience or are familiar with the OS movement. This way it will be possible to keep the tools updated and allow users to find and suggest new more adequate tools for their needs and interests.

In the previous sections details of the evaluation of the two EAGLE OER-LP (Liferay) was provided. These examples should, we hope, provide a useful starting point for the evaluation of other components in the future. As the EAGLE OER-LP is built using an agile methodology, it is felt that this example of the process, procedure and criteria for performing an accessibility evaluation should serve to ensure that all aspects of the project deliverables conform to the highest standards of best practise. It is explicitly stated in the DoW that all project artefacts should be universally accessible. Thus, the findings presented in this report will guide future development and tool selection.

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8   Appendix

A. 8.1 Summary of the pedagogical, technical and accessibility criteria for
    EAGLE OER-LP learning technologies evaluation.

Pedagogical considerations

The tools are presented in a descriptive way by their purpose, explicitly avoiding to mention specific tools at least they serve as reference for the description of the suggest tool.

*8.4   Suggested learning tools for community building*9

	Tools	Features
Networking	One-to-one communication	○ Messaging system that allows synchronous communication via text, audio and/or video ○ Allow recording messages in audio or video ○ Allow sending of private messages to other users within the system ○ Allow sending of emails to the given address of another user (when the user makes her/his address visible) or send email notifications when the users have a private message
	group communication	○ includes mailing list system ○ email notification when a group message is arriving ○ allows multi-users synchronous communication via text, audio and/or video ○ Allows recording messages for multiple receivers in audio or video ○ Allows private messages to multiple-users simultaneously (group message) ○ Allows @mentions in private or public messages
	Social media tool (if the features are not embedded in the system)	○ Allows different types of connections: reciprocal (mutal acceptance), unidirectional (follow), indirect (#Hashtag, @Mentions).
*Participating (rating, reviewing and commenting in digital objects of the system are embedded features of the system)	Discussion board (forum like)	○ with notification system ○ allows replay to posts ○ allows replay to a replay ○ allows @mentions in private or public messages ○ allows rate posts and threads ○ posts and threads can be tagged
	Annotation in a digital object	○ llows individual (private) and collaborative (public/shared) annotation ○ function with web based digital objects ○ allows use of tags in the annotation
Sharing (tools types are provided)	Social bookmarking (or tools for sharing links)	Bookmarking tools with social features: tagging, rates, comments, etc.
	shareable boards	this are some examples, are always new tools emerging - padlet, Realtimeboard.
	Mind maps	- With collaborative features - allows to create a digital object

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9 *(Interacting, contributing and collaborating are terms that describe intentions from the users' perspectve, the tools needed to carry out this activites are independent of these intentions)

8.5 Suggested learning tools for UG-OER and other digital objects creation 10

	Tools	Features
Authoring UG-OER and other digital objects*	Text production	- allows rich text edition - with collaborative features (anotations, trach changes, multi-user) - allows embed graphics and links
	Online text production	(wiki like) - allows production of collaborative text - history and versioning system - Allow to embed graphics and links (Blog like) - allows individual production with social features - history system - allows embed different media and links
	graphics and animation production	- with basic editing options (resize, crop, contrast/saturation adjustment) - with advanced options (leyers, retouching) - multi-user features (desirable)
	audio production	- allows to capture audio from the device (mobile or desktop) - allow adjust and editing - allow noise reduction
	video production	- allows to capture from the device camera (mobile or desktop) - allows basic color adjusments - allows editing - allows adding transition effects - allows integration of audio files
	Screencast production	As one of the currently most used ways to produce tutorials. - allows ilimited time recording - allows editing - allows audio integration
	presentation production	- allows to gather different media in one file - allows to have an structure (beginning, content, end) - alllows audio integration
	Aggregation	(Shearable board: Padlet or realtimeboard like) - allows to gather different media - allows to save a file to share the work done

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[10] All the creation tools should allow editing files not created in this tool, for adaptation. They should also allow opening commonly used formats (proprietary or not). The creation tools should also provide a galleries to allow users to easily find resources to aggregate to enhance their created digital objects. The multi-user option, as opportunity for collaboration, is expected in all the creation tools.

8.6   *Suggested EAGLE learning tools for supporting autonomous learning*

	Tools	Features
Autonomous learning	Content collection	- push technology (select and provide content externally collected) - allow tagging - allows to add notes to the collections - with social features - with recommendation system
	Content curation	- Pull technology (allow to collect user's selected content) - allows tagging - allows to add notes - allows sharing
	Content analysis tools	- allow visualization of content network - hyperlink from graphic network and the content
	Multimedia tools for notes taking and collecting digital objects	(evernotes like) - allows to collect any type of digital objects, including ideas, and personal thoughts - allows to set reminders - allows tagging - allows sharing - allows creation of different collections
	Blog	- allow online text production - with options to save production private or public - with social features (for the public digital artifacts) - allows tagging and subtagging - with history options
	Mind Map	- allows to add links and attachments - allows notes - allows to save a file from the map

Technical considerations

8.7 Free and Open source

Name/ OS criterion	Description
Re-use	The tool can be used for personal means
Re-mix	The tool can be mashed-up and used to create new tools
Re-vise	The source code of the tool can be changed.
Re-distribute	The tool can be distributed freely.
Fees	The tool can be used without fees

8.8 Integration levels for user-generated OERs integration

Level	Description	Comments
0	Referential Integration of externally hosted content on an untrusted and uncontrolled system	Hyperlink from a Liferay document to somewhere in the Internet. This is applicable for all common types of digital artifacts such as texts, images, audio files or videos. A rich text editor in the EAGLE platform will allow the editing users to store a URL to any web resource. The linked content can be reached by activating a hyperlink
1	Integration of externally hosted content/tool on a trusted system	Outgoing from hyperlinks inside the Liferay system, the access for editors to a resource of an external system is only possible for EAGLE-editors. Technically the content could be presented in an iframe. The access rights to resources could be controlled in three ways: • Access is granted by accepting a cookie from the Liferay environment which is communicated through a mutual webservice interface • External system realizes its authentication against an EAGLE webservice. Therefor the EAGLE's Liferay-environment should speak one of the common authentication protocols like LDAP. • An autonomous authentication system: EAGLE's Liferay environment as well as all other integrated systems are authenticating against a central and autonomous user administration system speaking a common protocol like LDAP.
2	Direct integration of standard digital artifacts into EAGLE's Liferay environment	Content is uploaded into EAGLE's Liferay environment or is produced directly in Liferay's text editor.
3	Direct integration of content created by external applications into Liferay	Integration of content by uploading digital objects, which are supported by EAGLE's Liferay environment or by plug ins which have been installed according to upcoming requirements.

8.9   Tools' Mobile Compatibility

● Be able to operate in desktop as in mobile devices.
● Be optimized to empower the characteristic embedded functionalities of mobile devices, e.g. camera use, location awareness, use of cloud services, etc.
● Avoids use functionalities that are not common to mobile devices, e.g. upload documents store in the device.
● Allows interoperability between web applications and mobile apps installed in the device
● Avoids software that is not common on mobile devices, e.g. Flash
● Optimizes the GUI for mobile devices
    ○ Places links far enough apart so that the correct one can be easily tapped
    ○ Resize text to be readable without zooming in the mobile version
Sizes content to the screen so users don't have to scroll horizontally or zoom

Accessibility considerations

8.10 Clarity and Structure

clarity	● The purpose and logical structure of the web application should be clear the second the user looks at it. ● The purpose of each of the UI components should be clear and readily observable.
Structure	● Design style and elements should be applied consistently across all pages. ● It should be easy to distinguish the various areas of a web application and users should be able to identify their benefits and functions immediately. ● Content should be clearly structured. ● Menus should be clearly identifiable as such.?

8.11 User Guidance and Navigation

User guidance	● Changes to the status of the web application (after a user action or a system event) should be clearly identifiable. ● The user guidance should be clearly identifiable as such and be consistent, clear and constructive.
Navigation	● The navigation bar should always be visible and have the same structure throughout the site. ● All users using the webapp should be able to use the navigational elements. ● Keyboard Access should be standardized and uniform on all pages of the web application. ● Relevant operating elements such as icons and symbols should be based on existing standards and be large enough and self-explanatory. ● If pull-down menus are in use then they must be designed in such a way that they are clear, consistent, of a sufficient size and self-explanatory.

8.12 Text and Language

The content of the component	● The language should be easy to understand, be consistent and tailored to the target group. ● Any technical language should be clearly explained. note that where possible, technical "jargon" should be avoided.
Design component	● The text size should be legible even in standard mode. ● Headings should be clearly identifiable as such. ● Enlarging the font should not lose parts of the content and impair the operation or the layout of the website. ● The font type should be legible on the screen. ● The layout should be Conducive to reading. ● The inter-character and inter-word distances should be sufficiently large. ● There should be enough contrast between the text and the background to the text. ● The colour combinations should provide enough contrast. Refer to figure X above.

8.14 Graphics, animated Features and Multimedia

Graphics	● Images and text should be tailored to each other in a meaningful way. ● It should be possible to enlarge graphics without any loss of quality. ● Icons and buttons should be displayed in a sufficiently large size. ● The degree of contrast in graphics should be sufficient.
Animations	● If flashing elements or animated features which cause strobing are used they should be avoided unless absolutely necessary. If used, warnings should be provided.
Multimedia	● There should be adequate Textual alternatives for graphics/images and multimedia content. ● If possible, the use of background music or audio should not be used as it can result in a user being unable to hear the speech produced by Screenreaders. If it is necessary, then controls to stop the playback of the background audio should be included.
Advertising	● Advertising should be clearly identifiable as such.
Links	● All links should be up-to-date and work properly. ● The look and functionality of the link should be uniform throughout the web application. ● References to links should be clearly described, including for users with sensory restrictions (e.g. colour blindness?. it is important to avoid phrases such as "Click here" or "read more" as users who use tab navigation will not be in a position to understand the purpose of the link.

8.15 Search

Search field	● Users of the web application should be able to find the search field easily. ● A search field should be immediately identifiable as such.
Search results	● The criteria by which searches are carried out should be clearly defined, but also how the content of the search results is generated. ● The search results should be displayed in a clearly arranged way. ● There should be an option for sorting the results in accordance with different criteria.

8.16 Currentness, Consistency and Robustness

Currentness	● Contents and linking should be up-to-date.
Consistency	● The entire layout of a web application should be consistent.
Robustness	● The web app should be compatible with different browsers and also provide adequate robustness to various display sizes.

8.17 Contact Information and Support

Contact options	● Contact information should be available and easy to find.
Transparency	● The masthead should specify the people responsible for the web application as well as any legal restrictions.
Support	● The web application should contain a link to FAQs, online manual or introduction videos. ● The symbols offered in a webapp should be clearly visible and as self-explanatory as possible and if necessary be accompanied by additional explanations.

8.18   Registration and Forms

Registration	● For authors, the registration should be comprehensible and self-explanatory. Forms
Forms	● Forms must be designed in such a way that they are self-explanatory and unambiguous. ● The process for handling errors in forms should be easy to understand and user-friendly. ● Sufficient time should be given to enter data in to the form. ● It should be possible to enter the data correctly without requiring any additional knowledge.
Captcha	● The use of captchas should be avoided altogether or they should be provided in conjunction with the appropriate tools or accessible alternatives.
Data protection	● It must be clearly explained to authors how and for what purpose the entered data will be used.

B. 8.2 Accesibility test results for EAGLE OER_LP (Liferray) – MESSAGE BOARDS

Accesibility test results for EAGLE OER_LP (Liferray) – MESSAGE BOARDS

1. Clarity and structure		3.7		
Clarity			3.5	
The purpose and the logical structure of a web page must be clear the second the user looks at it.	Information is limited to only what is essential. Provide information which is not absolutely necessary by means of links.	Are spirit and purpose of the document instantly registered?	4.0	The complete expected functionality of a message board is instantly registered for the user
		Is the previded information regarding to the principal purpose relevant and complete?	3.0	The purpose of "Add Category" (category for what) and "Subscribe" (again, subcribe to what specifically) is not clear
Structure			3.8	
Design style and elements must be applied consistently across all web pages.	Use a standardized layout with consistent logic. Uniform terms, buttons, menus, links, etc. The design of menus should be consistent and conform to the standard.	Uniform layout overall with consistent logic - uniform terms - uniform buttons - uniform menus - uniform styling of links - Is the column layout used uniform? - Are the different sectors clearly recognisable and is their purpose obvious?	4.0	The web application is consistent in its use of iconography and visual elements
		Does the layout (page, menu) correspond to todays standards?	4.0	Yes, the design is consistent with modern standards.
Content must be clearly structured.	Use titles, subtitles and tables of contents and connect them with links.	The content is clearly structured. - Is the page reasonable structured with title, subtitle, table of content?	3.0	The presence of "Categories" sub-category in the Table Category does not appear to make any sense. It's also not clear (what with post new thread functionality broken)

Longer texts should be divided up in a sensible way.	Provide a summary for longer texts. If necessary, provide vertical scrolling or spread the content over several pages and connect it with links. Avoid scrolling in two dimensions – provide a scrolling function that is either horizontal or vertical. No new windows or pop-ups.	- Is a sitemap available and is it usefull? - Do summarys of the long texts exist? - Is HORIZONTAL scrolling NOT needed with standard display sizes? - Are new windows or pop-ups NOT used?		whether the threads shown on the landing page are from all categories, or only from one category.
Related content must be linked in a suitable way.	To do this, use links within texts or use navigation options with buttons outside of the text.	Is associated content linked?	4.0	Yes, categories are linked (with the description). It's not possible to add new threads but it appears that they would work the same way as categories - that is, work well.
Menus should be clearly identifiable as such.	Always provide menus in the same place and make sure they are clearly visible.		4.0	Yes, menus are clear and well marked.

2. **User guidance and navigation**			3.3	
User guidance			3.5	
Changes to the status of the website (after a user action or a system event) must be clearly identifiable.	Integrate clear and unique visual and acoustic feedback.	For user guidance, are clear and explicit visual and acustic feedbacks about states, state changes and actions implemented?	4.0	Buttons are pressed when actioned upon, selected navigation tab is highlighted - user is always informed of his actions.
The user guidance must be clearly identifiable as such and be consistent, clear and constructive.	Navigational elements and user guidance should be distinct from the remaining information by way of several clear features. Do not use solely visual or acoustic features such as "the most important thing is highlighted in red", "click the blue button to the right".	Do navigation elements contain multiple but different features?	3.0	The RSS and Subscribe action items are too close together.
Navigation			3.0	
The navigation bar should always be visible and have the same structure throughout the site.	Same place, same functionality	Is the navigation easy understandable, consistent und easy to use? - Does the navigation always works in the same way? - Is the navigation always on the same place? - Is navigation level max. 2? - Is it obvious for the user where the current page is located hierarchically within the website? - If needed: is additional information (i.e. tool tips) available? - Are the icons large enough? - Is the font size >= 11 pt? menus: - self descriptive	3.0	The navigation bar is always visible and stays in the same place. The number of navigation elements are in reasonable limits. Current navigation element is highlighted, therefore users know where they are. The layout of navigation elements is standard throughout the different tabs. The navigation elements are mostly large enough (apart from Subscribe and RSS). No pull down menus. The font size is >11px throughout.
All users of the website should be able to use the navigational elements.	Keep the number of navigational elements within reasonable limits. User-friendliness can be improved by keeping interface elements to an appropriate size.			
Users should know at all times where they are in the website and how they got there.	Highlight current web page in the navigation (particularly in the case of access via a search engine). A hierarchical overview (breadcrumbs) can be offered in addition.			

The arrangement and functionality of the navigational elements must be uniform on all subpages and the functionality must also be very clear.	Define the navigation early on when the website is being designed and check the functionality and compliance with the requirements regularly.	- large enough - consistent - no pulldown menus (if possible) - color contrast min. 4.5 : 1		
If keyboard control (control keys) is offered, this must be standardized and uniform on all web pages and be able to be used at the same time.	Use standard keyboard combinations. Provide context-related information on keyboard combinations (e.g. in menus).			
Navigation-relevant operating elements such as icons and symbols must be based on existing standards and must be large enough and self-explanatory.	Consult the relevant style guides. Review of font size, level of contrast and function.			
Avoid pull-down menus, if possible.	If you cannot do without pull-down menus, then these must be designed in such a way that they are clear, consistent, of a sufficient size and self-explanatory.			
Usability test				
Check and optimize website using specific usability tests.	A usability test should be carried out with representatives of the target group to check and if necessary to adapt the serviceability of a website for the specified end users.			

3. Text and language				3.3			3.5
The content of the component				3.5			
The language should be easy to understand, consistent and tailored to the target group.	Short sentences, active voice, avoid foreign words.			4.0	The text is clear and concise, uses common English words and is easy to understand.		[1] readability test [3] length of text
Avoid technical jargon as far as possible.	Avoid technical or specialist jargon and abbreviations if possible. If, however, it is necessary to use such terms, provide a glossary.			3.0	The purpose of the technical terms used (RSS, Subscribe, Move) should be made clear. Especially, move. Where does it move the thread/category?		
Design component				3.0			
The text size should be very legible even in standard mode.	Use at least font size 11 pt.			4.0	Sans serif fonts are used throughout.		[3] test for font size min. 11 pt
Headings should be clearly identifiable as such.	Headings divide up flowing text and make it easier to read. Ideally, the largest heading is 50% bigger than the flowing text.						
If a font enlargement function is provided, it should be possible to do this without losing parts of the content and without impairing the operation or the layout of the website.	Can be enlarged by up to 200%. Make dynamic layout changes, in order to avoid the need to scroll sideways.						
The font type must be legible on the screen.	Use Sans-Serif font types (Grotesk) such as Arial or Verdana instead of Serif font types such as Times New Roman.						

The layout must be reader-friendly.	Use left-aligned flatter text, avoid longer texts in capital letters or italics.			
The distances in and between the text must be sufficiently large.	The distances between letters, rows and paragraphs must be sufficiently large (1.5 line spacing at least).			
There should be enough contrast between the text and the background to the text.	The smaller the text, the greater the contrast is likely to be. Avoid patterned backgrounds. The contrast of the text and the images in comparison with the background should be in a ratio of at least 4.5:1.			[4] color contrast min. 4.5 : 1
Avoid complementary color combinations.	Do not use complementary colors directly beside each other (e.g. red/green, blue/orange, yellow/purple).			
If a font enlargement function is provided, it should be possible to do this without losing parts of the content and without impairing the operation or the layout of the website.	Can be enlarged by up to 200%. Make dynamic layout changes, in order to avoid the need to scroll sideways.		2.0	No built-in text enralgement functionality is provided, but the design scales nicely when enlarging the text using the browser.

4. Graphics, animated features and multimedia				3.8		1.0
Graphics				3.0		
Images and text should be tailored to each other in a meaningful way. It should be possible to enlarge graphics without any loss of quality.	Use text-relevant images and graphics. For purely design-based reasons, do not use images. Use vector graphics or bitmap graphics/images in various sizes.			3.0	Minimal use of images, however the icons for "subscribe" and "actions" are not clear. There are no multimedia graphics that are to be enlarged.	
Icons and buttons must be displayed in a sufficiently large size. The degree of contrast in graphics must also be sufficient.	Use recommended standard sizes in accordance with the relevant style guides. The contrast of graphics/graphic operating elements should be sufficient. The same applies to text within these elements. Review using software which measures the degree of contrast.					[4] test color contrast within the image min. 4.5 : 1
Animated features				4.0		
Avoid flashing elements or animated features.	Avoid animated graphics or at the very least it should be possible to deactivate these.			4.0	The application is devoid of any animations.	
Multimedia				4.0		
Textual alternatives should be provided for graphics/images and multimedia content.	Provide what are known as "screenplays" which describe the multimedia content in the form of text like a script.			4.0	The application, thankfully, does not rely on or use multimedia elements and/or background music.	

If possible, do not use background music.	If background music is used, then make sure it is very quiet (less than 20 dbA). Provide a function for switching the music off.			
Loading times of multimedia content should be displayed.	Display progress indicators for longer loading times.		4.0	There are no multimedia elements to load and/or display.
Content to be downloaded must be marked as such and must be described in sufficient detail.	Use clear symbols for downloads. Display information about the format, file size in Kbytes, and if necessary, the duration in minutes.			
Advertising			**4.0**	
Advertising should not be flashy and should be clearly identifiable as such.	Use advertising sparingly and, if possible, relate it to a specific context. Label advertising fields. Make sure animated advertising features can be switched off. The website should not feature too much advertising.		4.0	There are no advertisements.

5. Links	3.5		
Links	**3.0**		
Links should be up-to-date and work properly.	Check links regularly, either manually or using a link checker tool.	3.0	There are no broken links, selected links are underlined and references to links are clearly defined. It is possible to navigate back to the origin if you navigate away using a link. However, the colour chosen for links has a low contrast ratio (3.82).	[5] check links regularly: No dead links?
The look and functionality of the link should be uniform throughout the website.	For example, by using standardized coloring and underlining. Visual feedback can be obtained by hovering your mouse over the link (mouse-over). Use links that describe the action in question (explain what happens when the link is clicked). Link names should always refer to the target information (not: click here).			
References to links must be clearly described, including for users with sensory restrictions (e.g. color blindness).	It is better to use descriptions that relate to objects or shapes rather than just colors such as "click on the circle" instead of "click on the purple icon". In general, use several distinguishing features.			
When following links, Web users should be able to get back to the original page easily.	Make sure the Back button is working properly; if necessary open linked pages outside the website in a separate register window.			

Mouse-over			4.0		
Does not work on most touchscreens (Touch Pads, smartphones).	Provide alternatives, for example, with displayed submenus or meaningful link texts.		4.0	The Message Boards does not use mouse overs.	

6. Search			3.0		
Search field			**4.0**		
Users must be able to find the search field easily.	Use one of the usual positions, top left/middle/right-hand side of the screen.		4.0	The search field is located at the right-top corner of the application space and is distinguishable from the rest of the application components.	
A search field must be immediately identifiable as such.	The design of the search fields should be standardized on all pages. If necessary, use text icons and symbols such as the magnifying glass icon. Tag clouds should be avoided.				
Search results			**2.0**		
The criteria by which searches are carried out should be clearly defined but also how the content of the search results is generated.	Make the search process transparent (e.g. the area in which the search is being carried out).		2.0	No advanced search options, there is no discoverable way to search categories (what if we want to view posts of two different categories). Display of search results can't be checked because it doesn't seem possible to create threads (and there are currently no threads).	
The search results should be displayed in a clearly arranged way.	Group search results together and map logical relationships (e.g. related terms).				
There should be an option for sorting the results in accordance with different criteria.	Provide different options for ordering the information.				

7. Currentness, consistency and robustness			3.0		
Currentness			1.0		
Web contents and linkings should be up-to-date	Even if automatic updates are implemented, the user still needs to be informed about the renewal (i.e. by date of last update).		1.0	Not possible to check since there are no threads in the message board. However, once threads are created, it should be possible to view when they were created and when was the last message posted in a particular thread.	
Consistency			4.0		
The entire layout of a website should prove consistency.	In order to avoid losing former users, the layout of the websites should basically remain unchanged (recognition value). Changes in the basic layout should be made explicable and introduced step by step. User assistance must be provided for the new layout.		4.0	The layout of the application remains consistent when navigating to different sections.	
Robustness			4.0		
The website must be compatible with different browsers and also provide adequate robustness to various display sizes.	Equal representation on all computers and browsers. It is to be kept in mind, that computers of elderly people are not always well-equipped with the latest browser versions. Due to the small screen sizes of tablets and mobile phones special requirements are met in order to qualify with today's website.		4.0	The web application uses a responsive design and scales well on different screen sizes.	

8. Contact information and support			1.5		
Contact options			1.0		
Contact information should be available and easy to find.	Provide users with contact details in the event of questions or problems, names of contacts, address, email and telephone number and keep them up-to-date.		1.0	Message boards should have a way to contact the admin (in case help is needed). There doesn't seem to be any here.	
Transparency			1.0		
The masthead should specify the people responsible for the website as well as any legal restrictions.	The masthead should specify the people responsible for the website as well as any legal restrictions.		1.0	No information is provided about the webmaster or the forum administrator.	
FAQs			1.0		
The website should contain a page with FAQs / glossary.	Position the glossary and FAQs (Frequently Asked Questions) and legends in a clearly visible position.		1.0	There is no FAQ or How-To for the message board. A short introduction must be provided.	
Tools			3.0		
The tools and symbols offered on a website should be clearly visible and as self-explanatory as possible and if necessary be accompanied by additional explanations.	Consistent use of unique symbols also for tools (enlarge text, read out text, etc.) throughout the entire website. As an option, you can integrate a page with explanations on the symbols used and the tools offered.		3.0	The tools offered on the website (under actions) are mostly self-explanatory. However, they do not carry any additional information and "move" does not make much sense.	

9. Registration and forms			2.3		
Registration			**3.0**		
For users, the registration should be comprehensible and self-explanatory.	Unnecessary registrations should be avoided. If a registration is necessary, this should be formulated in such a way that it is self-explanatory, understandable and user-friendly. Why registration is necessary should be explained in transparent terms. Only request information which is absolutely necessary.		3.0	The applications asks the users to sign in. A pop-up is then displayed which asks the user to either login with existing credentials or create a new ID. The registration process is straightforward with mandatory fields clearly marked which provide a clear error message when they are left unfilled. However, the ambiguity between sign-in/register and the display of no-content with a no-permission message when a user is not signed in (instead of a helpful tip asking him to sign-in) necessitates that we deduct a point.	
Forms			**4.0**		
Forms must be designed in such a way that they are self-explanatory and unambiguous.	The input screen must be designed in such a way that it is sufficiently large and easy to understand. The mandatory fields must be clearly marked. The current field in entry forms must be clearly identifiable.		4.0	The forms (eg. registration forms) are well designed. The input fields are labelled so that it is easy for the user to understand. Required entries are distinguished and the error messages are concise and self-explanatory. The fields themselves are clear and easy to understand so it is easy to fill them.	
The process for handling errors in forms should be easy to understand and user-friendly.	Incorrect or missing entries in the forms should be clearly marked and an option should be provided to make the corrections without losing any of the data previously entered.				

Sufficient time must be given to make the entries in the form.	The time limits set by the web application should be generous and it should be possible to adjust them. In the case of more extensive form entries, an option should be provided which allows the entry to be interrupted without all the data which has already been entered getting lost and then having to be re-entered once more at a later date.			
It should be possible to enter the data correctly without requiring any additional knowledge.	If user entries are requested in a specific format, clear instructions must be specified regarding the input format (example entries) and errors must be reported immediately.			
Captcha			1.0	
Either avoid using captchas altogether or they should be provided in conjunction with the appropriate tools or alternatives.	Have the captchas read out, enlarge captchas, answer captchas through test questions.		1.0	The website uses a simple captcha that is easy to understand but does not provide any alternative for visually impaired users.
Data protection			1.0	
It must be clearly explained to users how and for what purpose the entered data will be used.	Notes or FAQs on "What will happen to your data?" / "What do we need your data for?".		1.0	The application makes no mention of data protection or privacy.