eGovernment Web Development Strategy

Government of Liberia
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Executive summary

This document presents the eGovernment Web Development Strategy for the Government of Liberia. In the first chapter, the methodology used to develop this strategy, based on an iterative model, is introduced. The second chapter gives an overview of the current states of the eGovernment in Liberia. The third chapter gives an analysis of the reference documents and some recommendations. The fourth chapter gives an overview of the future states of the eGovernment in Liberia and the fifth chapter suggests a methodology to implement the strategy. The sixth chapter proposes three initiatives, a Self Evaluation and Digital Development Toolkit, a Centralized Web Platform and a Rural One-Stop-Shop Kiosk Network. The last chapter defines important notions to build an open ecosystem in Liberia.

eGovernment is the use of ICTs to improve the performance of Government. The eGovernment Web Development Strategy supports the Government of Liberia to improve its eGovernment capability and to improve its ranking. In the eGovernment maturity model, Liberian Ministries, Agencies and Commissions (MACs) rank at the level of Web Presence and Interaction. This strategy guides the development of eGovernment towards a Distribution stage. The strategy will request the installation of sustainable infrastructures to serve public entities and citizens while a secure infrastructure is needed to rise to the Transaction level, supporting operations inside and outside the government.

The Self Evaluation and Digital Development Toolkit includes a scaling tool to measure the current stage of an institution’s public digital service.

The development of any digital services either can be done in-house or by outsourcing service development. Adoption of a shared-service offered by GoL is also an option (eg. use a Centralized Web Platform to deliver services).

The Self Evaluation and Digital Development Toolkit supports MACs to build digital services. This toolkit will be online and it will define principles, personas and methods to develop digital services for and with citizens.
The Centralized Web Platform will be an infrastructure providing services to share information, knowledge and contacts inside the MACs. This platform will be based on an Open Source CMS template such as Drupal, Jumla or WordPress, and will harmonize MAC websites, which would like to be part of this initiative.

Finally, the Rural One-Stop-Shop Kiosk Network will provide centralized information and services for the rural population.
1. Methodology

The eGovernment Web Development Strategy has been developed following a participative and iterative model, including review, research and personal meetings to understand the context and the current eGovernment state. Then, a group meeting and two workshops were conducted at MoPT to present the current state of the strategy and encourage feedbacks on it.

1.1 Review

A desk review was conducted to understand the current state of ICT within various MACs using key Liberian documents.

1.2 Research

A desk review was conducted to review eGovernment initiatives from other countries. This research permitted insight into the approaches and challenges other countries faced while implementing an eGovernment strategy and how they were able to overcome them.

1.3 Meetings with MACs

Individual meetings were held with ICT specialists from various Liberian entities:

1. The Ministry of Posts and Telecommunication (MoPT);
2. The Liberia Institute of Public Administration (LIPA);
3. The Civil Service Agency (CSA);
4. The National Bureau of Concessions (NBC);
5. The Ministry of Agriculture (MoA);
6. The Ministry of Health (MoH);
7. The Governance Commission (GC);
8. The Ministry of Finance & Development Planning (MFDP);
9. The Ministry of Education (MoE);
10. iLab Liberia

These meetings were useful to understand the current state of ICT within various entities.

1.4 Group meeting: proposition and feedbacks’ analysis

The eGovernment Web Development Strategy was introduced at a workshop of ICT Specialists convened by MoPT in a community-of-practice. It was a good opportunity to present the first strategy ideas and have feedback from MACs’ ICT specialists.

1.5 First workshop: proposition and feedbacks’ analysis

A workshop was organized at MoPT with MACs’ ICT specialists to discuss issues and solutions concerning ICT in the government. During this workshop, one hour was dedicated to the eGovernment Web Development Strategy. A presentation was given introducing the first strategy framework then a discussion around it was facilitated in order to get feedbacks.
1.6 Second workshop: proposition and feedbacks’ analysis

A second workshop dedicated to the eGovernment Web Development Strategy was conducted at MoPT. A presentation was given on the current state of the strategy, new ideas were introduced, and discussions facilitated on a potential NICTCC and a Digital Services Toolkit.

1.7 Report

The development of two documents constituted the last step:

- The eGovernment Web Development Strategy report;
- The Self Evaluation and Digital Development Toolkit.
2. **Current state**

This chapter presents an overview of the eGovernment “current state” in nineteen MACs. It introduces a reference documents list, the nineteen considered MACs and a websites snapshot.

2.1 **Reference documents**

The GoL has adopted several ICT policy documents, the main ones being:

- The National Telecommunications and ICT Policy 2010-2015;
- The Access to Broadband Connectivity in Liberia in the Post-Ebola context: A Roundtable with Public, Private and Civil Society Sector Stakeholders;
- e-Government Interoperability Framework;

2.2 **Considered MACs**

Nineteen government entities, taken into consideration because they have presence on the web, are:

1. The Ministry of Posts and Telecommunication (MoPT);
2. The Liberia Institute of Public Administration (LIPA);
3. The Ministry of Foreign Affairs (MoFA)
4. The Ministry of Information, Cultural Affairs and Tourism (MICAT);
5. The Ministry of Justice (MoJ);
6. The Ministry of Mine and Energy (MoLME);
7. The Civil Service Agency (CSA);
8. The National Bureau of Concessions (NBC);
9. The Ministry of Agriculture (MoA);
10. Ministry of Health (MoHSW);
11. The Governance Commission (GC);
12. The Ministry of Finance & Development Planning (MFDP);
13. The Ministry of Education (MoE);
14. e-liberia (MoPT);
15. The Executive Mansion;
16. Ministry of Commerce and Industry (MoCI);
17. Ministry of National Defense (MoND);
18. Ministry of Transport (MoT);
19. Ministry of Youth and Sports (MoYS).

2.3 **Websites snapshot**

In order to grade these websites, a classification originally proposed by Gartner Group, and amended to include the expansion of open government, is used. This is a five-stage model...
 involving *Web presence*, *Interaction*, *Transaction*, *Transformation* and *Distribution* to measure the eGovernment maturity.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web presence</td>
<td>Governments provide a website to post basic information to public. The website provides information such as MAC name, MAC address, MAC phone number, hours of operation, staff member names and basic informative contents.</td>
</tr>
<tr>
<td>Interaction</td>
<td>Users are able to contact MACs through websites (e.g. e-mail, contact form), do self-service (e.g. download documents), and have a social media presence. The website provides information such as online contact (email address or contact form), downloadable documents in open format and links to working and active social medias.</td>
</tr>
<tr>
<td>Transaction</td>
<td>Users (including customers and businesses) can complete entire transactions online. The website provides information such as encrypted communication, electronic payment system and online user profiles.</td>
</tr>
<tr>
<td>Transformation</td>
<td>Governments transform the current operational processes to provide more efficient, integrated, unified, and personalized service. The GoL information systems are interoperable and eServices are fully integrated across administrative boundaries.</td>
</tr>
<tr>
<td>Distribution</td>
<td>Citizens get more directly involved in the governmental process by participating to the political decisions using distributed digital tools. Government provides services as a platform to its citizens. Citizens are part of public discussions and decisions through a democratic process.</td>
</tr>
</tbody>
</table>

The following snapshots have been taken on December 11th and 12th, 2015. The Websites have been visited again on February 10th and 11th, 2016.

### Ministry of Posts and Telecommunication (MoPT)

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<tr>
<th>URL</th>
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<td>Social media</td>
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</tr>
<tr>
<td>Services</td>
<td>Email, contact form, pdf files</td>
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<td>Currency</td>
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## Liberia Institute of Public Administration (LIPA)

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<td>Services</td>
<td>Email, contact form, pdf files</td>
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<tr>
<td>Comments</td>
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## Ministry of Foreign Affairs (MoFA)

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<td>Services</td>
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<td>Comments</td>
<td>The MoFA provides an online service to request passport (<a href="https://secure.liberiapassports.com">https://secure.liberiapassports.com</a>).</td>
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## Ministry of Information, Cultural Affairs and Tourism (MICAT)

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<td>Services</td>
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### Ministry of Education (MoE)

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<td>Ministry</td>
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<tr>
<td>----------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>e-liberia (MoPT)</td>
<td><a href="http://www.eLiberia.gov.lr">http://www.eLiberia.gov.lr</a></td>
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<tr>
<td>Executive Mansion</td>
<td><a href="http://www.emansion.gov.lr">http://www.emansion.gov.lr</a></td>
</tr>
<tr>
<td>Ministry of Commerce and Industry (MoCI)</td>
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</tr>
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<td>Ministry of Transport (MoT)</td>
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<tr>
<td>Stage</td>
<td>Interaction</td>
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</tr>
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<td>Social media</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>Minister’s email, pdf files</td>
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<tr>
<td>Responsive</td>
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<td>Currency</td>
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<td>The web site is empty except the home page, the minister’s CV and a ‘Who we are’ paragraph.</td>
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### 2.4 Open Budget Initiative in Liberia

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<th><strong>Open Budget Initiative</strong></th>
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<tr>
<td><strong>Comments</strong></td>
<td>This initiative is part of the Ministry of Finance &amp; Development Planning. It has a presence on Facebook at: <a href="https://www.facebook.com/Open-Budget-Initiative-Govt-of-Liberia-354192398023885/">https://www.facebook.com/Open-Budget-Initiative-Govt-of-Liberia-354192398023885/</a></td>
</tr>
</tbody>
</table>

The Open Budget Initiative is part of the Open Government Partnership that President Ellen Johnson Sirleaf committed Liberia to in 2011. This initiative is to ensure fiscal transparency in government budgetary transaction. This initiative gives access to seven dataset in PDF format on:

- National Budget FY 2015/16
- Summary Budget Preparation Calendar FY2016/17
- Medium Term Expenditure Framework Budget Manual
- Draft National Budget FY2015/2016
- FY2015-16 Budget Framework Paper
- Final National Budget 2014/2015
3. Analysis and recommendations

3.1 Reference documents

Reference documents give a global vision of what the eGovernment should be in Liberia and how to build an eGovernment.

According to the current official documents, information standards have been developed, eLegislation is defined and eServices have to reach all citizens. It is highlight that “the government of Liberia has to provide digital services for common services such as national identification cards, passports, driver's licenses, birth certificates, death certificates, marriage certificates, and voter registration cards.”

These documents state that “the GoL should develop an eGovernment and Shared Services strategy from which both urban and rural areas can benefit. Also, the GoL should provide eServices instead of only static websites.” Thus, all citizens should have access to ICT services in the territory of Liberia and from abroad. The GoL has to strengthen its web presence and find adapted solutions to reached citizens outside Monrovia. According to the Nethope report on the Liberia broadband technical assessment, only 10% of the population have subscription to the Internet and mostly are using 2.5/3G in Monrovia.

This study has identified opportunities to improve the reference documents. The Liberian population is spread all over the country, some of them are expatriates, and the government should provide services to all of them. The lack of infrastructures outside Monrovia is a challenge and the GoL should provide adapted solutions to reach the last miles.

Moreover, the eGovernment strategy should review procurement strategy. Indeed, information systems are immaterial and cannot follow the same procedures than furniture or common goods. Procurement for information systems should focus on data management with the ability to build a system in an iterative manner. GoL needs to rely on internal technical team to adapt information systems to their needs and follow its implementation according to the GoL vision.

MACs should adopt an interactive web presence but sharp standards and procedures have to be defined before implementing eServices. For the implementation of an eGovernment Web Development Strategy, an open ecosystem overviews is proposed, including a preference for the use of open source software, open standards, open content and open data when it is possible. Indeed, open source software should be considered in all procurements and design decisions especially for web services.

Standard Web tools cannot permit the government to reach all citizens in rural areas and adapted solutions, using other channels, such as feature phones, radio stations or TV should be explored.

3.2 Inventory and need assumptions

All the MACs taking into account have a web presence. Most of the MACs websites have been developed independently of a common policy or strategy. MACs tried to do their best
with their actual skills and common sense. MoPT have been involved in some website’s specification to recommend practices. These websites are a good start for GoL online-presence.

There existing portfolio of GoL websites also exhibits weaknesses, including:

- Loss of control of websites. This means MACs no longer have access to webservers and web services to update websites, or to migrate websites and databases;
- Loss of control of domain administration;
- Domain names are not standardized, with different entities operating in .com, .net as well as the .gov.lr domain;
- A few MACs have multiple websites, as older sites are abandoned;
- There is little consistent branding or design;
- Readability and ease of use for visitors with low literacy levels;
- Accessibility (Vision and Hearing impaired);
- Access from smartphone platforms and a range of browser types are not setup properly;
- Broken links;
- Outdated information.

To support improvements to MAC online offerings a practical eGovernment Web Development Strategy and a Self Evaluation and Digital Development Toolkit giving commands, instruments and methodologies to develop websites and services should be welcome by the Liberian ICT community.

It is also important to underline that most of the MACs included in this study are currently at the web presence and interaction stages. A secure infrastructure is needed to go to the transaction level and support operations inside and outside the government.

### 3.3 Open budget initiative

Having these data online is a good step for the GoL and it is a proof of transparency. It is could be interesting to have these dataset available also in a CVS format in order to compute them more easily. The open budget initiative is also present on Facebook and has more that 1.000 ‘like’.

### 3.4 Overview

Overview of the current situation has shown the strengths and weaknesses of the existing ICT ecosystem stakeholders active on the web.

**Pros:**
- On level of MACs a web presence is noticeable;
- There are several local ICT SMEs, which can develop website and eServices;
- Some ICT skills are in the MACs;
- Most important MACs are at the level two (interaction) of the eGovernment maturity model.
Cons:

- There is no web presence in the research and higher education sector;
- There is no public ICT curriculum at the public university;
- Web presence baseline in the government is very fragmented and there is virtually no exchange of information;
- There is no strong coordinating body or initiatives, neither common collaboration platform;
- The quality of service is poor in Monrovia;
- No governmental infrastructure;
- Some MACs have no presence on the web.

All cons have a common denominator, which indicates a lack of knowledge, experience and coordination. GoL needs to accelerate the creation, management and sharing of knowledge between all stakeholders.

Strategy has to use existing pros and has to address four main pillars:

- Reinforce web presence;
- Reinforce interactivity with citizens;
- Common collaboration and technology platform for civil servants;
- Empower the ICT ecosystem.
4. Future state

4.1 Vision: Creating an open ecosystem

The development of an information society in Liberia shall be based on a shared and open knowledge-based society, open standards, technological neutrality and broadly available ICT to empower citizens and the private sector. Effective use of ICTs can bring benefits to an open knowledge-based society by:

- Achieving enhanced human capital;
- Increasing the growth of a knowledge-based society;
- Reducing the digital divide;
- Reducing the software piracy rate;
- Increasing interoperability among systems;
- Reducing total cost of ownership;
- Increasing growth in the local ICT industry;
- Enhancing local ICT companies, universities and the public sector.

To realize the ICT vision of the government, it’s necessary to encourage an ambitious and dynamic ICT ecosystem, which will involve collaboration of all stakeholders. It will be necessary to integrate in this ecosystem all of the existing knowledge and experience for the mutual benefit of all stakeholders. All stakeholders should be part of the ecosystem, which provides the resources and means for the realization of their respective visions and missions.

An open ecosystem is preferable that a closed one because it boosts innovation by providing tools to improve the ecosystem.

An ecosystem encompasses the policies, strategies, processes, information, technologies, applications and stakeholders that together make up a technology environment for a country, government or an enterprise. Most importantly, an ICT ecosystem includes people: diverse individuals who create, buy, sell, regulate, manage and use technology. An ICT ecosystem is defined as open when it is capable of:

- Incorporating and sustaining interoperability;
- Empowering collaborative development;
- Supporting transparency.

Increasing these capabilities helps create flexible and service-oriented ICT applications that can be taken apart and recombined to meet changing needs more efficiently and effectively.

4.2 Recommendations

Recommendations for the development of eGovernment and shared services in Liberia were given during the Roundtable, which was hosted by the Liberian Ministry of Post and Telecommunications (MoPT), the Liberian Telecommunications Authority (LTA) and USAID, held on Friday, May 16, 2015, in Monrovia, Liberia. These recommendations are:
The GoL should develop an e-Government and Shared Services strategy from which both urban and rural areas can benefit;

The development of the strategy will require coordination, cooperation and information sharing simultaneously;

Currently, eGovernment is limited to websites that are mainly sources of information rather than providing useful services;

There is little synergy between the creators of these websites and the citizens and businesses that were intended to benefit from them;

A major challenge posed by the lack of eGovernment today is that there is a long paper trail for citizens and businesses to interact with government. If you need to interact with the government in some way (e.g. obtaining a birth certificate, renewing a license), you must travel to the right Ministry in person, wait in long queues, and often pay for the forms you are filling in. This is even more challenging in rural areas that are less serviced by government. The stakeholders believe a holistic eGovernment and communications approach, integrated across government agencies, is the place to start;

Low levels of literacy and ICT literacy present a challenge to the development and use of eGovernment services. Yet the stakeholders feel that if the services are provided citizens will use them – “if you build it, they will come”; 

The best possible approach to eGovernment is to focus on user-friendliness and implementation;

If the Government of Liberia starts with an ePortal, the content must be developed with the target audience in mind and placed in the hands of the right people to ensure that the content is managed and updated;

To implement and facilitate uptake, radio can be used as a medium for teaching people to learn about the government’s ICT strategy and how they can use it;

In rural areas, where there are few cybercafés, we suggest that schools be used as centers of learning for key ICT efforts. This has two purposes: first, students, the new generation, must learn to be technologically literate. Second, they will teach the adults in their lives.

4.3 Actions

A broad-based Stakeholders Workshop on Short-term Priority of ICT Projects jointly convened by the MOPT, Liberia Telecommunications Authority (LTA) and USAID-Liberia was held on December 15, 2015 in Mamba Point. The eServices Group recommended actions to take to better-enhanced eGovernment services in Liberia:

The Chief Information Office (CIO) and the Project Management Office (PMO) be “resourced” to enable them to implement GoL’s eGovernment programs. Presently it is grossly incapacitated. This is not just about funding, but also capacity building and training;

Provisioning of reliable, affordable and sustainable Internet Access to MACs, with effective utilization of capacity available at the Cable Station;

The Creation and Advocacy for an ICT institution/Agency with authority to implement ICT/eGovernment programs in Liberia. The Ministry of Science and Technology or the
National Information and Technology Agency were the suggested names for the proposed institutions. Strategies to achieve this should be put in place;

- The Mini Shared Services Center be implemented to enable MACs to gradually enroll into the program;
- Outsourcing to the private sector should be considered for the development and operation of eServices and facilities.

These are some of the steps for GoL to create a cost-effective and connected eGovernment to increase competitiveness, improve web presence, increase interoperability and reduce total cost of ownership. GoL shall also foster all measures to design and create sustainable ICT communities, disseminate ICT skills, empower citizens, boost private sector and train ICT professionals.

4.4 Propositions

4.4.1 Digital Development services

The history of digital service development reflects a very high failure rate, with some estimates that 60 to 70% of all ICT initiatives in developed countries fail to meet their objectives. Great care is needed to maximize the opportunity for success. Factors that need to be taken into consideration include:

- The development of digital services requires specialist technical skills, often distributed across a team. It is very often the case that people skilled at understanding requirements and designing solutions are not the same people who have the technical skills to build the service;
- Development needs to be determined by the business needs of the organization, and not by the IT technical team;
- Sustainability of the solution is a key requirement. Dimensions of sustainability include technical, financial and managerial aspects;

MACs have three options to provide a digital service: in-house, outsourcing to the private sector or using a Centralized Platform.

4.4.1.1 In-house web development

A few MACs may have the right human resources internally to develop a digital service or could find them in another public entity. It could be the right solution to easily manage the entire project; utilizing existing resources to save on additional expenses; allocating as many resources as available to build it quickly; resources are allocated within the operating budget; it avoids cultural boundaries, and it avoids questions on ownership and control.

On the other hand, the know-how required for web development changes fast, and the in-house resources need to be technically up-to-date. A project manager could be needed and additional resources may be required, such as designers, extra developers, testers and others. It also could be difficult to keep the service updated and maintained if in-house skills are not retained.
4.4.1.2 Outsourcing web development

It may be possible to find a private sector firm or NGO expert in the design, development, and promotion of digital services. Benefits of outsourcing are:

- Cost advantages;
- Increased efficiency;
- Focus on core areas;
- Save on infrastructure;
- Access to skilled resources;
- Time zone advantage;
- Fast and good services.

Thus, an external enterprise can easily maintain the service while solid professional development firms tend to have low turnover on staff, so the same developers are there to keep the service updated. It is much easier for a developer to learn GoL needs than for a GoL staff to learn web development.

On the other hand, cost can seem high and it can be risky if the wrong development firm is chosen. GoL must make sure that it owns all rights to the code and content.

4.4.1 Centralized Web Platform

Today platforms such as Google, Facebook, Amazon, AirBnb are dominant. A platform is a web-based information system, which provides specific services to a community of users. A platform is very useful to build a community, to easily share information and to provide specific services to a community of citizens.

To implement the vision, GoL could build a centralized platform including all MAC information in it. This platform could run on the Government Cloud Platform and should be a single portal to access all GoL eServices and information. This centralized platform could be developed using a CMS such as Drupal, WordPress or Joomla. Each MAC would only have to provide content to the platform. Each MAC would have its own page based on the same model. At minimum, each page should including several sections such as: Home, About, Mission, Vision, Staff Directory, Our Projects, Our Services, Contact. The standard should be state by the CIO office and NICTCC could handle technical aspects.

4.5 Under Service Communities

Liberia has only 10% of Internet penetration and it is mainly in Monrovia and around. Others mediums such as TV, radio stations, and newspapers could be used to bring governmental services to the population. Rural one-stop-shop kiosks could be also deployed to bring eGovernmental services to the 90% of the population without Internet access.
5. Methodology

5.1 Guiding principles

The aim of GoL when preparing eGovernment documents is to foster an open information society and as such, is non-exclusive, non-discriminatory and providing common platform for collaboration and upgrade the current ICT usage with the new open concepts. As from general principles stated in the national reference documents, we can conclude the guiding principles for implementing an eGovernment Web Development Strategy:

- Purpose driven choice of best of breed, with intention to provide the best solutions from different models, technologies and solutions;
- Least disruptive to operations, as implementation of eGovernment guidelines are a process of the evolution and not the revolution;
- Co-existence with other legacy proprietary system and extend functionality and life span;
- Levering on existing facilities, hardware, communications, knowledge and expertise already present in ecosystem;
- Not driven or controlled by any hardware or software vendors.

The eGovernment Web Development Strategy has to be based on existing, approved national documents as well as documents that are adopted and are in the implementation phase. To ensure eGovernment suitability and sustainability, this strategy provides an ICT ecosystem model adapted to Liberia. Each stakeholder has a defined function in order to run eGovernment functionalities properly.

5.2 Stakeholders landscape

We could consider four typical groups: MACs, Universities, private sector and ICT communities. The usual duties for these groups are the followings:

- **MACs** must implement various national ICT policies to improve GoL web performance.
- The **universities** should work on the development of ICT skills. The Liberia Institute of Public Administration (LIPA) is a MAC responsible for the capacity development of civil servants.
- The **private sector** is responsible to develop and provide websites, software and eServices. They also have a role in capacity development.
- The **ICT communities**, including NGOs and informal groups, should develop ICT skills into the population.

At the MACs level:

- Seventeen websites taking into consideration are at the interaction stage;
- They provide contents and the possibility to interact with MACs;
- On some websites, whole sections are empty;
- Five MACs have a social media presence using platforms like Facebook or Twitter;
5.3 Recommendations for MACs websites

Despite a good GoL web presence, it is necessary to increase the digital authority of the government and to provide new services.

Government wishes to deliver services in an effective, transparent and efficient way, with improved accessibility to residents and businesses across Liberia, including in rural areas. eServices is one channel to service this need.

Oversight for designing and delivering eServices rests with the CIO program, which is responsible for setting standards and ensuring harmonization and interoperability of systems. ICT Initiatives can be initiated at MAC or Centralized level, but are dependent on sufficient buy-in and capacity of stakeholder.

5.3.1 Contents

MACs need to continuously work on content development, suitably adapted to web reading. A website needs to provide accurate, interesting and up-to-date content which should be authoritative and as complete as possible. MACs need to commit themselves to regularly contributing to and reviewing the content of their websites. Ideas are discussed in the Toolkit. They also need to use social media platforms to communicate efficiently with the public.

Pdf is a perfect format to download a file, store it locally, and print it out. In some case, it could be more effective to propose online forms. Indeed, some administrative forms could be online such as the online passport service (https://secure.liberiapassports.com) in order to provide better interactivity with citizens.

MACs website are providing some data in pdf format but it would be better to provide datasets in CVS format. It is difficult to extract data from pdf files. CVS is an open standards file format for dataset and should be used for open data initiatives.

5.3.2 eServices

It is important to offer contact options to site visitors. Most of the MACs understand already this requirement. It could be an email address, a contact form, a call center or a chat. Additionally, it could be effective to have a public servant repository (yellow pages) detailing MAC personnel.

Search engine optimization is important. MAC websites have to be easily findable with search engines, and websites should be optimized to have a good ranking.

Sites should be easily searchable. As sites grow and develop visitors will need help to find the resources they are looking for. Search facilities, and “Quick Links” provide such help.
5.3.3 Open source technology

MACs should use open source Content Management Systems (CMS) such as Wordpress, Drupal or Joomla. They are good tools to build websites and are free to use, except if you want to use proprietary templates or services. It is important to update these CMS regularly in order to avoid pirate attacks and data loss or corruption. Web servers and websites must be secure using security tools such as Secure Sockets Layer (SSL) for private transactions. Templates should be used that are designed to work on any devices, meaning content is easily accessible on workstations, as well as tablet and smartphone screens.

5.3.4 ccTLD (country code Top-Level Domain)

The subdomain ‘.gov.lr’ must be use for all MACs websites and services. It is a way to increase web presence, build authority and to promote a national presence.

5.3.5 Community manager

MAC webmasters should act as community managers. They have to empower MAC staff as a community to interact with their websites. CMS give the possibility to have several users publishing on a website and it should be a norm. The IT technical teams must resist the temptation to insist that they are the only authorized people to publish on the website. It should also include the Communication Units and others who develop good content.

5.3.6 Web design

MACs web design should be simple, providing easy access to useful information. A good example is the New York City Green Book (http://www.nyc.gov/greenbook), which has a functional design covering a treasure trove of information important to citizens.

5.3.7 User-centered design

MAC websites should be focused on citizens and less self-centered. Citizens are visiting websites to look for information. Provide them with what they need; they must have an easy access to relevant information. Information, which is not relevant for visitors, should be removed.

5.4 Goals and objectives

For GoL the goals should be:
- Creation a cost-effective and connected eGovernment;
- Creation of an open ecosystem with included all major stakeholders;

For the private sector, the goals should be:
- Implementation of the eGovernment Web Development Strategy;
- Organization of capacity development Workshops.

For ICT communities the goal should be:
- Development of integrated and active ICT communities.
For universities the goal should be:

- Development of ICT skills.

### 5.4.1 Government goal 1.1: Creation a cost-effective and connected eGovernment

<table>
<thead>
<tr>
<th>Objective 1.1.1</th>
<th>Current situation</th>
</tr>
</thead>
</table>
| Procurement tech neutral, focused on innovation, sustainability and open solutions | • Not technology neutral  
• Procurement system for ICT is inadequate, based on procurement of goods  
• Global practice fair competition requests for tech neutrality |

<table>
<thead>
<tr>
<th>Objective 1.1.2</th>
<th>Current situation</th>
</tr>
</thead>
</table>
| Reduced total cost of web platform ownership | • Proprietary software piracy  
• Costly maintenance  
• Open solutions as foundation to lower integration costs  
• Few accurate financial records on ICT spend |

<table>
<thead>
<tr>
<th>Objective 1.1.3</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased interoperability among systems</td>
<td>• Enterprise architecture developed, although not yet implemented</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 1.1.4</th>
<th>Current situation</th>
</tr>
</thead>
</table>
| Usage of open solutions wherever it's possible | • Open solutions are in place in some MACs as the Ministry of Health  
• Legislature moved to open solutions but it failed |

<table>
<thead>
<tr>
<th>Objective 1.1.5</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>To gain know-how and experience using open source software for eGovernment projects</td>
<td>• No or very little know how about using open solutions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 1.1.6</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take the control back on public websites</td>
<td>• Some public entities lost control on their websites while there are not able to do any update</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 1.1.7</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase cyber security</td>
<td>• There is no documented cyber</td>
</tr>
</tbody>
</table>
5.4.2 Government goal 1.2: Creation of an open ecosystem with included all major stakeholders

<table>
<thead>
<tr>
<th>Objective 1.3.1</th>
<th>Current situation</th>
</tr>
</thead>
</table>
| Governmental cloud platform | • There is no central governmental infrastructure in use  
• A data center is on project  
• Importance of national cloud infrastructure in terms of supporting MACs activities |

<table>
<thead>
<tr>
<th>Objective 1.3.2</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion of open models in ICT private sector</td>
<td>• Little influence from the public sector on the private sector</td>
</tr>
</tbody>
</table>

5.4.3 Private sector goal 2.1: Implementation of the eGovernment Web Development Strategy

<table>
<thead>
<tr>
<th>Objective 2.1.1</th>
<th>Current situation</th>
</tr>
</thead>
</table>
| Development of digital services | • Some websites and services are developed in country  
• Most of the websites are developed in the US |

<table>
<thead>
<tr>
<th>Objective 2.1.2</th>
<th>Current situation</th>
</tr>
</thead>
</table>
| Maintenance of digital services | • Some websites and services are maintained in country  
• Most of the websites are maintained in the US |

<table>
<thead>
<tr>
<th>Objective 2.1.3</th>
<th>Current situation</th>
</tr>
</thead>
</table>
| Installation of infrastructures | • Some companies are able to install local area network infrastructures  
• No company can setup metropolitan area network infrastructures |
### Objective 2.1.4

**Current situation**

- Some companies are able to maintain local area network infrastructures
- No company can maintain metropolitan area network infrastructures

### Objective 2.1.5

**Current situation**

- No company provides local web hosting

### Objective 2.1.6

**Current situation**

- No registrar to buy .lr web domain

### 5.4.4 Private sector goal 2.2: Organization of capacity development Workshops

### Objective 2.2.1

**Current situation**

- Some websites and services are developed in country
- Most of the websites are developed in the US

### Objective 2.2.2

**Current situation**

- No LPI certification available in country

### 5.4.5 ICT communities goal 3.1: Development of integrated and active ICT communities

### Objective 5.1.1

**Current situation**

- One active ICT community
- Several disseminate geeks

### Objective 5.1.2

**Current situation**

- No public funding for ICT communities

### Objective 5.1.3

**Current situation**

- No national exchange program
5.4.6 Academic goal 4.1: Development of ICT skills

<table>
<thead>
<tr>
<th>Objective 4.1.1</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support public and private universities to produce ICT skilled professionals</td>
<td>• No ICT program at the public university</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 4.1.2</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support LIPA on ICT training sessions</td>
<td>• No ICT training sessions</td>
</tr>
</tbody>
</table>
6. Proposed initiatives

6.1 Self Evaluation and Digital Development Toolkit

The governmental web presence has to be strengthened and harmonized to further legitimize the Liberian ICT capability on the web. A Self Evaluation and Digital Development Toolkit should be provided online to support website and eServices development.

A digital development toolkit is an online service for public ICT officers, as well as private sector developers, to find a methodology to build or improve websites by following design and technical specifications. This service will define useful information such as public websites policy, supply chain procedure and websites management.

6.2 Centralized Web Platform

A centralized government platform provides opportunities to improve efficiencies. This platform could host a Centralized Web Platform, configured to allow MACs to easily host websites and related eServices. It could be based on an Open Source CMS, with common templates applicable to all MACs. MACs would be responsible for content creation and responding to interaction, with the platform providing a secure and efficient technical foundation.

This platform will support the next generation of eGovernment services. It is intended to help GoL operate more efficiently, and will save public sector cash flow.

This platform will provide an important central information technology infrastructure with full cloud computing functions.

6.3 Rural One-Stop-Shop Kiosk Network

This rural one-stop-shop kiosk network will provide and centralize information and services for citizens. It will provide smart, cost-effective, modern public services to the population. Administrative information will be available, such as links to the online passport request service, legal Q&A concerning the GoL laws, online access to birth certificates, administrative forms, text of laws and public datasets from MACs with offline and online access.

In this one-stop-shop kiosk citizens can also access services typically offered by Internet-Café’s:

- Use a word processor to create job applications and other documents;
- Consult an offline Wikipedia;
- Photocopy documents;
- Take digital pictures with a rugged digital camera and print them out;
- Watch movies and listen to music;
- Access the Internet if there’s a GPRS connection provided in the locality.

The equipment include in a one-stop-shop is:

- A rugged PC;
- eGovernment Web Development Strategy-

- A solar system equipment;
- A scanner;
- A printer;
- A rugged digital camera and its printer.

Such one-stop-shop kiosks can be located at the County Community Centers, which are being open across the country, as well as at other government facilities.
7. **Explanation of concepts**

eGovernment, open source software, open standards, open content, open educational resources and open data are concepts that have different meanings and scope to different authors. To avoid any misunderstanding, we refer to the six most commonly used definitions that are used in this document. Deeper explanations of these concepts are in appendix.

7.1 **eGovernment**

According to the World Bank, “eGovernment” refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions. Thus, eGovernment refers to the use of ICT to improve the efficiency, effectiveness, transparency and accountability of government.

7.2 **Open source software**

The concept of open source is increasingly being used beyond software to represent the development and sharing models of intellectual work. For the purposes of this document, we use the narrower concept of the open source as a software movement.

The open source movement is a broad-reaching movement of individuals who support the use of open source licenses for some or all software. Open source software is made available for anybody to use or modify, as its source code is made available. Some open source software is based on a share-alike principle, whereby users are free to pass on the software subject to the stipulation that any enhancements or changes are just as freely available to the public, while other open source projects may be freely incorporated into any derivative work, open source or proprietary. Open source software promotes learning and understanding through the dissemination of understanding. The main difference between open source and traditional proprietary software is in user and property rights, the conditions of use imposed on the user by the software license, as opposed to differences in the programming code. With open source software, such as LibreOffice, users are granted the right to both the program’s functionality and methodology. With proprietary software programs, such as Microsoft Office, users only have the rights to functionality. Examples of popular open source software products include Mozilla Firefox, Google Chrome, Android and LibreOffice.

Open Source software is a computer software with its source code made available and licensed with a license in which the copyright holder provides the rights to study, change and distribute the software to anyone and for any purpose. Very often open source software is developed in a public, collaborative manner and is the most prominent example of an open source collaborative development model. Strengths of open source movement and open source software are numerous.
7.3 Open standards

An open standard is a standard that is publicly available and has various rights to use associated with it, and may also have various properties of how it was designed. There is no single definition and interpretations vary with usage.

The terms "open" and "standard" have a wide range of meanings associated with their usage. There are a number of definitions of open standards, which emphasize different aspects of openness, including of the resulting specification, the openness of the drafting process, and the ownership of rights in the standard. The term "standard" is sometimes restricted to technologies approved by formalized committees that are open to participation by all interested parties and operate on a consensus basis.

The definitions of the term "open standard" used by academics, the European Union and some of its member governments or parliaments such as Denmark, France, and Spain preclude open standards requiring fees for use, as do the New Zealand, South African and the Venezuelan governments. On the standard organization side, the World Wide Web Consortium (W3C) ensures that its specifications can be implemented on a royalty-free basis.

7.4 Open content

Open content is a neologism coined by David Wiley in 1998, which describes a creative work that others can copy or modify. The term evokes open source software, which is a related concept in software.

When the term Open Content was first used by Wiley, it described works licensed under the Open Content License (a non-free share-alike license) and perhaps other works licensed under similar terms. It has since come to describe a broader class of content without conventional copyright restrictions. The openness of content can be assessed under the '5Rs Framework' based on the extent to which it can be reused, revised, remixed and redistributed by members of the public without violating copyright law.

7.5 Open educational resources

Open educational resources (OER) are teaching and learning materials that you may freely use and reuse, without charge. That means they have been authored or created by an individual or organization that chooses to retain few, if any, ownership rights. For some of these resources, that means you can download the resource and share it with colleagues and students. For others, it may be that you can download a resource, edit it in some way, and then re-post it as a remixed work. OER often have a Creative Commons or GNU license that state specifically how the material may be used, reused, adapted, and shared.

7.6 Open data

Open data is the idea that certain data should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control. The goals of the open data movement are similar to those of other "Open" movements such as open source, open hardware, open content, and open access. The
philosophy behind open data has been long established, but the term "open data" itself is recent, gaining popularity with the rise of the Internet and World Wide Web and, especially, with the launch of open data government initiatives such as Data.gov and Data.gov.uk.

7.7 Technological neutrality

Technological Neutrality is the freedom of individuals and organizations to choose the most appropriate and suitable technology to their needs and requirements for development, acquisition, use or commercialization, without dependencies on knowledge involved as information or data.
Conclusion

This document introduced the eGovernment Web Development Strategy. Its main focus is to guide the Government of Liberia’s online presence towards a Distribution stage by empowering citizens and supporting transparency in all instances of the government. To reach this goal, three initiatives have been introduced: the Self Evaluation and Digital Development Toolkit, the Centralized Web Platform and the rural One-Stop-Shop Kiosk Network. The first initiative, the Toolkit, will support GoL with a methodology to build useful digital services for the Government. The second one, the Centralized Web Platform, will support GoL with dedicated and specialized national services. The third one, the kiosk, will provide eGovernment services to rural people.

Thus, GoL web presence could be a mix of independent sites and a Centralized Web Platform.

Usefully implemented, this strategy encourages the Government of Liberia to increase its web presence, empower citizens and intensify its authority at the international level.
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Open Source Initiative. Online <https://opensource.org>


Open Government Declaration. Online <http://www.opengovpartnership.org/about/open-government-declaration>
Appendix 1: Open government

In general terms, an open government is one with high levels of transparency and mechanisms for public scrutiny and oversight in place, with an emphasis on government accountability.

Transparency is considered the traditional hallmark of an open government, meaning that the public should have access to government-held information and be informed of government proceedings. In recent years, however, the definition of open government has expanded to include expectations for increased citizen participation and collaboration in government proceedings through the use of modern and open technologies.

The open government partnership

The vision

Open government partnership’s (OGP) vision is that as more governments become sustainably more transparent, more accountable, and more responsive to their own citizens, with the ultimate goal of improving the quality of public policies and services, as well as the level and scope of public participation. This will require a shift in norms and culture to ensure open and honest dialogue between governments and civil society.

The mission

OGP provides an international platform to connect, empower and encourage domestic reformers committed to transforming government and society through openness. It also introduces a domestic policy mechanism, the action planning process, through which government and civil society are encouraged to establish an ongoing dialogue on the design, implementation and monitoring of open government reforms.

Guiding principles

OGP governments and civil society participants share the belief that governments perform better when they invite and facilitate public input and oversight. Each government that joins OGP commits to uphold the guiding principles outlined in the open government declaration, including (among others):

- We uphold the value of openness in our engagement with citizens, in order to improve services, more effectively manage public resources, promote innovation, and create safer communities.

- We commit to increase the availability of information about governmental activities, support civic participation, implement the highest standards of professional integrity throughout our administrations, and increase access to new technologies for openness and accountability.
• We will report publicly on actions undertaken to realize these principles, consult with the public on their implementation, and update our commitments in light of new challenges and opportunities.

• We pledge to lead by example and contribute to advancing open government in other countries by sharing best practices and expertise.

• Our goal is to foster innovation and spur progress, and not to define standards to be used as a precondition for cooperation or assistance.

**Principles of open government data**

Government data shall be considered open if it is made public in a way that complies with the principles below:

**Complete:** All public data is made available. Public data is data that is not subject to valid privacy, security or privilege limitations.

While non-electronic information resources, such as physical artifacts, are not subject to the open government data principles, it is always encouraged that such resources be made available electronically to the extent feasible.

**Primary:** Data is as collected at the source, with the highest possible level of granularity, not in aggregate or modified forms.

If an entity chooses to transform data by aggregation or transcoding for use on an Internet site built for end users, it still has an obligation to make the full-resolution information available in bulk for others to build their own sites with and to preserve the data for posterity.

**Timely:** Data is made available as quickly as necessary to preserve the value of the data.

**Accessible:** Data is available to the widest range of users for the widest range of purposes.

Data must be made available on the Internet so as to accommodate the widest practical range of users and uses. This means considering how choices in data preparation and publication affect access to the disabled and how it may impact users of a variety of software and hardware platforms. Data must be published with current industry standard protocols and formats, as well as alternative protocols and formats when industry standards impose burdens on wide reuse of the data.

Data is not accessible if it can be retrieved only through navigating web forms, or if automated tools are not permitted to access it because of a robots.txt file, other policy, or technological restrictions.
**Machine processable:** Data is reasonably structured to allow automated processing.

The ability for data to be widely used requires that the data be properly encoded. Free-form text is not a substitute for tabular and normalized records. Images of text are not a substitute for the text itself. Sufficient documentation on the data format and meanings of normalized data items must be available to users of the data.

**Non-discriminatory:** Data is available to anyone, with no requirement of registration.

Anonymous access to the data must be allowed for public data, including access through anonymous proxies. Data should not be hidden behind “walled gardens.”

**Non-proprietary:** Data is available in a format over which no entity has exclusive control.

Proprietary formats add unnecessary restrictions over who can use the data, how it can be used and shared, and whether the data will be usable in the future. While some proprietary formats are nearly ubiquitous, it is nevertheless not acceptable to use only proprietary formats. Likewise, the relevant non-proprietary formats may not reach a wide audience. In these cases, it may be necessary to make the data available in multiple formats.

**License-free:** Data is not subject to any copyright, patent, trademark or trade secret regulation. Reasonable privacy, security and privilege restrictions may be allowed.

Because government information is a mix of public records, personal information, copyrighted work, and other non-open data, it is important to be clear about what data is available and what licensing, terms of service, and legal restrictions apply. Data for which no restrictions apply should be marked clearly as being in the public domain.

**Online & free:** Information is not meaningfully public if it is not available on the Internet at no charge, or at least no more than the marginal cost of reproduction. It should also be findable.

**Permanent:** Data should be made available at a stable Internet location indefinitely and in a stable data format for as long as possible.

**Trusted:** The Association of Computing Machinery’s Recommendation on open government (February 2009) stated, “Published content should be digitally signed or include attestation of publication/creation date, authenticity, and integrity.” Digital signatures help the public validate the source of the data they find so that they can trust that the data has not been modified since it was published. Since provenance is for originally published documents, it is not a reason to prevent the public from modifying government documents.

**A Presumption of openness:** The presumption of openness rests on laws like the Freedom of Information Act, procedures including records management, and tools such as data catalogs.
Sunlight Foundation’s Open Data Policy Guidelines state, “Setting the default to open means that the government and parties acting on its behalf will make public information available proactively and that they’ll put that information within reach of the public (online), with low to no barriers for its reuse and consumption. Setting the default to open is about living up to the potential of our information, about looking at comprehensive information management, and making determinations that fall in the public interest.”

**Documented:** Documentation about the format and meaning of data goes a long way to making the data useful.

The American Association of Law Libraries’s Principles & Core Values Concerning Public Information on Government Websites (March 24, 2007) noted that it is as important for users to know the data is current as for the data itself to be current. Their principles state, “Government websites must provide users with sufficient information to make assessments about the accuracy and currency of legal information published on the website.”

**Safe to open:** The Association of Computing Machinery’s Recommendation on open government (February 2009) stated, “Government bodies publishing data online should always seek to publish using data formats that do not include executable content.” Executable content within documents poses a security risk to users of the data because the executable content may be malware (viruses, worms, etc.).

**Designed with public input:** The public is in the best position to determine what information technologies will be best suited for the applications the public intends to create for itself. Public input is therefore crucial to disseminating information in such a way that it has value.
Appendix 2: Web standards

The World Wide Web Consortium (W3C) is the main international standards organization for the World Wide Web. This organization defines Web standards as follow.

**Web design and applications header**

**HTML & CSS header:** HTML and CSS are the fundamental technologies for building Web pages: HTML (html and xhtml) for structure, CSS for style and layout, including WebFonts.

**JavaScript Web APIs header:** Standard APIs for client-side Web Application development include those for Geolocation, XMLHttpRequest, and mobile widgets. W3C standards for document models (the “DOM”) and technologies such as XBL allow content providers to create interactive documents through scripting.

**Graphics header:** W3C is the home of the widely deployed PNG raster format, SVG vector format, and the Canvas API. WebCGM is a more specialized format used, for example, in the fields of automotive engineering, aeronautics.

**Audio and video header:** Some of the W3C formats that enable authoring audio and video presentations include HTML, SVG, and SMIL (for synchronization). W3C is also working on a timed text format for captioning and other applications.

**Accessibility header:** W3C’s Web Accessibility Initiative (WAI) has published Web Content Accessibility Guidelines (WCAG) to help authors create content that is accessible to people with disabilities. WAI-ARIA gives authors more tools to create accessible Web Applications by providing additional semantics about widgets and behaviors.

**Internationalization header:** W3C has a mission to design technology that works across cultures and languages. W3C standards such as HTML and XML are built on Unicode, for instance. In addition, W3C has published guidance for authors related to language tags bidirectional (bidi) text, and more.

**Mobile Web header:** W3C promotes “One Web” that is available on any device. W3C’s Mobile Web Best Practices help authors understand how to create content that provides a reasonable experience on a wide variety of devices, contexts, and locations.

**Privacy header:** The Web is a powerful tool for communications and transactions of all sorts. It is important to consider privacy and security implications of the Web as part of technology design.

**Math on the Web header:** Mathematics and formula are used on the Web for business reports, education materials and scientific research. W3C’s MathML enables mathematics to be served, received, and processed on the World Wide Web, just as HTML has enabled this functionality for other types of content.

**Web of devices**
Mobile Web header: W3C promotes “One Web” that is available on any device. W3C’s Mobile Web Initiative helps ensure the best user experience on mobile devices, taking into account device capabilities, location, and other context information.

Voice browsing header: The W3C Speech Interface Framework is a suite of specifications (e.g., VoiceXML) integrating Web technology and speech interaction. VoiceXML, PLS, SISR, SRGS, SCXML, and CCXML all contribute to the Speech Interface Framework.

Device Independence and Content Adaptation header: Devices come in many shapes, capabilities and sizes which define constraints on the content these devices can handle. Device descriptions, content transformation guidelines, device APIs and CC/PP help developers to optimize the user experience.

Multimodal Access header: Increasingly, interactions with devices doesn’t only happen with a keyboard, but also through voice, touch and gestures. The W3C Multimodal architecture and its components (EMMA, InkXML) allow developers to adapt applications to new interaction modes.

Web and TV header: With the advent of IP-based devices, connected TVs are progressing at a fast pace and traditional TV broadcasting is quickly evolving into a more immersive experience where users can interact with rich applications that are at least partly based on Web technologies. There is strong growth in the deployment of devices that integrate regular Web technologies such as HTML, CSS, and SVG, coupled with various device APIs.

Web architecture

Architecture Principles header: Web Architecture principles help to design technologies by providing guidance and articulating the issues around some specific choices.

Identifiers header: We share things by their names. URL, URI, IRI is the way to name things on the Web and manipulate them. Some additional addressing needs in the Web Services stack motivated some additional layers.

Protocols header: Protocols are the vehicle for exchanging our ideas. HTTP is the core protocol of the Web. W3C is also working on XML Protocols and SOAP in relation to Web Services.

Meta formats header: XML, the Extensible Markup Language, is used to build new formats at low cost (due to widely available tools to manipulate content in those new formats). RDF and OWL allow people to define vocabularies (“ontologies”) of terms as part of the Semantic Web.

Protocol and meta format considerations header: Documents on the Web are loosely joined pieces by identifiers. It creates a maze of rich interactions between protocols and formats.

Internationalization header: W3C has worked with the community on the internationalization of identifiers (IRIs) and a general character model for the Web.
Semantic web

Linked data header: The Semantic Web is a Web of data — of dates and titles and part numbers and chemical properties and any other data one might conceive of. RDF provides the foundation for publishing and linking your data. Various technologies allow you to embed data in documents (RDFa, GRDDL) or expose what you have in SQL databases, or make it available as RDF files.

Vocabularies header: At times it may be important or valuable to organize data. Using OWL (to build vocabularies, or “ontologies”) and SKOS (for designing knowledge organization systems) it is possible to enrich data with additional meaning, which allows more people (and more machines) to do more with the data.

Query header: Query languages go hand-in-hand with databases. If the Semantic Web is viewed as a global database, then it is easy to understand why one would need a query language for that data. SPARQL is the query language for the Semantic Web.

Inference header: Near the top of the Semantic Web stack one finds inference — reasoning over data through rules. W3C work on rules, primarily through RIF and OWL, is focused on translating between rule languages and exchanging rules among different systems.

Vertical applications header: W3C is working with different industries — for example in Health Care and Life Sciences, eGovernment, and Energy — to improve collaboration, research and development, and innovation adoption through Semantic Web technology. For instance, by aiding decision-making in clinical research, Semantic Web technologies will bridge many forms of biological and medical information across institutions.

XML technology

XML essentials header: XML is shouldered by a set of essential technologies such as the infoset and namespaces. They address issues when using XML in specific applications contexts.

Efficient interchange header: XML standards are omnipresent in enterprise computing, and are part of the foundation of the Web. Because the standards are highly interoperable and affordable, people have wanted to use them in a wide variety of applications. However, in some settings (on devices with low memory or low bandwidth, or where performance is critical) experience has shown that a more efficient form of XML is required.

Schema header: Formal descriptions of vocabularies create flexibility in authoring environments and quality control chains. W3C’s XML Schema, SML, and data binding technologies provide the tools for quality control of XML data.

Security header: Manipulating data with XML requires sometimes integrity, authentication and privacy. XML signature, encryption, and xkms can help create a secure environment for XML.
**Transformation header:** Very frequently one wants to transform XML content into other formats (including other XML formats). XSLT and XPath are very powerful tools for creating different representations of XML content.

**Query header:** XQuery (supported by XPath) is a query language for XML to extract data, similar to the role of SQL for databases, or SPARQL for the Semantic Web.

**Components header:** The XML ecosystem is using additional tools to create a richer environment for using and manipulating XML documents. These components include style sheets, xlink xml:id, xinclude, xpointer, xforms, xml fragments, and events.

**Processing header:** A processing model defines what operations should be performed in what order on an XML document.

**Internationalization header:** W3C has worked with the community on the internationalization of XML, for instance for specifying the language of XML content.

**Publishing header:** XML grew out of the technical publication community. Use XSL-FO to publish even large or complex multilingual XML documents to HTML, PDF or other formats; include SVG diagrams and MathML formulas in the output.

**Web of services**

**Payments header:** W3C seeks to integrate payments seamlessly into the Open Web Platform. The result will be new business opportunities, an improved user experience for online transactions, reduced fraud, and increased interoperability among traditional solutions and future payment innovations.

**Security header:** Transferring data from one domain to another domain or between applications needs sometimes a secure transaction and well defined document authentication. XML Encryption and XML Signature are key pieces of the XML security stack.

**Internationalization header:** Internationalization of Web services concerns service descriptions, communicating language and locale, and internationalization of human-readable messages exchanged by services.

**Browsers and authoring tools**

**Browsers, media players header:** There are many types of tools that allow us to read the Web, including browsers, media players, publishing platforms, social networks, bots, aggregators, forums, and media-sharing sites.

**Authoring tools, social media header:** The Web is not a read-only medium. There are many types of tools for publishing content, including authoring tools and environments, content management systems (CMSs), social media profile pages and apps, blogging tools and sites, microblogging tools, social bookmarks, forums, and video and photo sharing and more.
## Appendix 3: Embassies’ websites

Here is a list of the Liberian embassies with a websites. There is no policy on the domain name which should be under “.gov.lr”. Half of these links are not working.

<table>
<thead>
<tr>
<th>Embassy</th>
<th>Website address provided by the Ministry of Foreign Affairs</th>
<th>Website address (URL) broken or working</th>
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</thead>
<tbody>
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<td>Working</td>
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**Appendix 4: Open ecosystem**

**eGovernment**

eGovernment can be seen simply as moving citizen services online, but in its broadest sense it refers to the technology-enabled transformation of government. It is Governments’ strategy to reduce costs, whilst promoting economic development, increasing transparency in government, improving service delivery and public administration, and facilitating the advancement of an information society.

**Reducing Costs**: Putting services online substantially decreases the processing costs of many activities compared with the manual way of handling operations. Efficiency is also attained by streamlining internal processes and by enabling faster and more informed decision-making.

**Promoting economic development**: Technology enables governments to create positive business climates by simplifying relationships with businesses and reducing the administrative steps needed to comply with regulatory obligations. There is a direct impact on the economy, as in the case of eProcurement, which creates wider competition and more participants in the public sector marketplace.

**Enhancing transparency and accountability**: eGovernment helps to increase the transparency of decision-making processes by making information accessible - publishing government debates and minutes, budgets and expenditure statements, outcomes and rationales for key decisions, and in some cases, allowing the on-line tracking of applications on the web by the public and press.

**Improving service delivery**: government service delivery, in the traditional process, is time consuming, lacks transparency, and leads to citizen and business dissatisfaction. By putting government services online, eGovernment reduces bureaucracy and enhances the quality of services in terms of time, content and accessibility.

**Improving public administration**: eGovernment administrative components, such as a computerized treasury, integrated financial management information systems, and human resource management systems, lead to greater efficiency in public administration. Features include the integration of expenditure and receipt data, control of expenditure, human resources management, intelligent audit through data analysis and the publishing of financial data.

**Facilitating an eSociety**: One of the main benefits of an eGovernment initiative consists of the promotion of ICT use in other sectors. The technological and management capacities required for eGovernment administration encourage, in turn, the development of new training courses and modules in schools and universities trying to supply the required skills and capabilities to the market.

**Relationships across modalities**

eGovernment usually describes relationships across 3 modalities:
**Government to Citizen:** deals with the relationship between government and citizens. G2C allows citizens to access government information and services instantly, conveniently, from everywhere, by use of multiple channels.

**Government to Business:** consists of eInteractions between government and the private sector. The opportunity to conduct online transactions with government reduces red tape and simplifies regulatory processes, therefore helping businesses to become more competitive.

**Government to Government:** Governments depend on other levels of government within the state to effectively deliver services and allocate responsibilities. In promoting citizen-centric service, a single access point to government is the ultimate goal, for which cooperation among different governmental departments and agencies is necessary. G2G facilitates the sharing of databases, resources and capabilities, enhancing the efficiency and effectiveness of processes.

**Strengths of open source software**

- The collaborative nature of the open source community creates software that can offer customizability and, as a result, promotes the adoption of its products.
- The open source community promotes the creation of software that is not proprietary, resulting in lower costs.
- Individuals who have intrinsic interest in code writing and software creation motivate the development of open source software within the community. This differs from proprietary software, the development of which is often motivated through potential monetary gains.
- An open source tool puts the system administrator in control of the level of risk assumed in deploying the tool.
- Open source provides flexibility not available in closed products. The hope is that individuals make improvements to an open tool and will offer those improvements to the original developer and community at large. The give-and-take of the gift economy benefits the entire community.
- Open source licenses and software can be combined with proprietary software. While open source was initially seen as a threat to corporations, some companies found ways to strengthen their proprietary code with open source code, re-releasing it as an improvement.
- In the event of market failure, programmers and innovators work together to make sure that the software still works.
- Security improvement of operating system.
**Definition of open source software**

Open source doesn't just mean access to the source code. The distribution terms of open source software must comply with the following criteria:

**Free redistribution:** The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.

**Source code:** The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a preprocessor or translator are not allowed.

**Derived works:** The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

**Integrity of the author's source code:** The license may restrict source code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.

**No discrimination against persons or groups:** The license must not discriminate against any person or group of persons.

**No discrimination against fields of endeavor:** The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

**Distribution of license:** The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

**License must not be specific to a product:** The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.

**License must not restrict other software:** The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must
not insist that all other programs distributed on the same medium must be open source software.

**License must be technology-neutral:** No provision of the license may be predicated on any individual technology or style of interface.

**Definition of open source licenses**

Open source licenses are licenses that comply with the open source definition. In brief, they allow software to be freely used, modified, and shared. To be approved by the Open Source Initiative (also known as the OSI), a license must go through the Open Source Initiative's license review process.

The following OSI-approved licenses are popular, widely used, or have strong communities (as defined in the 2006 Proliferation Report):

- Apache License 2.0
- BSD 3-Clause "New" or "Revised" license
- BSD 2-Clause "Simplified" or "FreeBSD" license
- GNU General Public License (GPL)
- GNU Library or "Lesser" General Public License (LGPL)
- MIT license
- Mozilla Public License 2.0
- Common Development and Distribution License
- Eclipse Public License

**Open standards**

Many definitions of the term "standard" permit patent holders to impose "reasonable and non-discriminatory licensing" royalty fees and other licensing terms on implementers and/or users of the standard. For example, the rules for standards published by the major internationally recognized standards bodies such as the IETF, ISO, IEC, and ITU-T permit their standards to contain specifications whose implementation will require payment of patent licensing fees. Among these organizations, only the IETF and ITU-T explicitly refer to their standards as "open standards," while the others refer only to producing "standards." The IETF and ITU-T use definitions of "open standard" that allow "reasonable and non-discriminatory" patent licensing fee requirements.

There are those in the open source software community who hold that an "open standard" is only open if it can be freely adopted, implemented and extended. While open standards or architectures are considered non-proprietary in the sense that the standard is either un-owned or owned by a collective body it can still be publicly shared and not tightly guarded. The typical example of "open source" that has become a standard is the personal computer originated by IBM and now referred to as Wintel, the combination of the Microsoft operating system and Intel microprocessor. There are three others that are most widely accepted as "open" which include the GSM phones (adopted as a government standard), Open Group which promotes UNIX and the like, and the Internet Engineering Task Force (IETF) which created the first standards of SMTP and TCP/IP. Buyers tend to prefer open standards, which
they believe, offer them cheaper products and more choice for access due to network effects and increased competition between vendors.

**Open standards requirements**

**The Requirement:** An "open standard" must not prohibit conforming implementations in open source software.

**The Criteria:** To comply with the Open Standards Requirement (OSR), an "open standard" must satisfy the following criteria. If an "open standard" does not meet these criteria, it will be discriminating against open source developers.

- **No intentional secrets:** The standard must not withhold any detail necessary for interoperable implementation. As flaws are inevitable, the standard must define a process for fixing flaws identified during implementation and interoperability testing and to incorporate said changes into a revised version or superseding version of the standard to be released under terms that do not violate the OSR.

- **Availability:** The standard must be freely and publicly available (e.g., from a stable web site) under royalty-free terms at reasonable and non-discriminatory cost.

- **Patents:** All patents essential to implementation of the standard must:
  - Be licensed under royalty-free terms for unrestricted use, or
  - Be covered by a promise of non-assertion when practiced by open source software

- **No Agreements:** There must not be any requirement for execution of a license agreement, NDA, grant, click-through, or any other form of paperwork to deploy conforming implementations of the standard.

- **No OSR-incompatible dependencies:** Implementation of the standard must not require any other technology that fails to meet the criteria of this requirement.

**Open standards - national considerations**

From the national viewpoint, the usage of open standards by a government is even more important. In this information age, a government will need to use IT solutions to ensure that it has adequate and reliable information to enable it to govern the country effectively. It is vital that these IT implementations make use of standards that are open as far as possible. In cases where open standards are not available, the government may want to consider other standards that are freely available for usage and implementation. It should also take into consideration how open these standards are and whether they have the possibility of becoming open standards later.
All this can help ensure that there is less likelihood of its information systems being locked in later by any single technology or product. It is also in the interests of national security that open standards are followed to guard against the possibility of over-reliance on foreign technologies/products. Imagine the implications to a sovereign nation if the electronic records of its citizens are kept in databases that can be accessed readily only by proprietary software from a foreign vendor or the documents of the government are kept in a format that belongs to a vendor who thus has total control over its accessibility both now and in the future.

**eGovernment projects specify open standards**

Many countries have started on eGovernment projects or initiatives, most of which have policies stating that, as far as possible, open IT standards and specifications are to be followed. Countries that have such policies include Norway, Denmark, the United Kingdom, the Netherlands, France, Brazil, Australia, New Zealand, and Malaysia.

The European Union's EIF, a framework to facilitate the interoperability of its member countries' eGovernment services, recommends the use of open standards for maximum interoperability.

In addition, more and more public sector agencies all over the world have adopted or are considering adopting policies that require open standards.

Another important national benefit is that open standards will make it easier and, in some cases, the only possible means for local companies to participate as major players in supplying services and solutions to the government. This is because the local companies usually lack the strength and resources of multinationals and may be strong only in certain areas or solutions. The government can leverage open standards to mix and match solutions from different suppliers in order to give the local suppliers a chance.

It is a reality in the IT world that the main language used and supported by all mainstream software is English and because of this it is sometimes difficult to produce electronic documents in another language. The availability of an open character coding standard, Unicode, designed to support the worldwide interchange, processing, and display of the written texts of diverse languages makes it feasible for the translation and localization of software and electronic office documents for nations or cultures whose language is not English.

**Particular benefits of open standards**

Open standards are particularly beneficial to some IT activities or services. Some of these are examined in greater detail here.

**File formats**

Modern information systems generate data (lots of it in many cases) that have to be stored in some form of electronic file formats for efficient storage, retrieval and exchange. If their specifications are not publicly known, only software and systems from the owner of these
proprietary formats can readily access them. Also, the exchange of information is essential to the functioning of modern society. This exchange will be severely hampered if non-open file formats are utilized as products from one vendor may not be able to retrieve, access or store the information from the products of another vendor properly. Since there is no guarantee that commercial products and the companies that produce them, will survive in the long run, there is a real danger that access to these records will be hampered by the fact, that there will be no appropriate tools for read them.

In some cases, while the format may be known, it may be the property of a particular party and this party may control the way the format evolves or is used. In such cases, users can have very little say or control over the format. Also it may be possible that the owner may not publish the format specifications at a later stage for a new version. So while compatible systems can be created that can access the files now, there is no guarantee of this when a newer version comes out. In addition, there have been cases where, when a proprietary format becomes popular and is widely used by the industry, the owner of the format starts to impose restrictions like charging a fee or royalty charges (if it is patented) for using the format at a later stage. The case of Microsoft attempting to charge flash drive makers and manufacturers of devices, such as digital cameras, a licensing fee for using its File Allocation Table or FAT file format is a good example of this.

All this shows that it is of utmost importance that electronic file formats should follow some specifications that are accessible to all interested parties and also be developed by processes that are open and easy for any party to participate. In other words, they should be implemented using open standards. It is vital in today's information-centric society that the data from which information is derived can be stored and exchanged following standards that are open so that no single party or even group can control the access to this data.

**Office Applications**

This lack of complete compatibility between documents created using MS Office and the competing alternatives has prevented some users from using or migrating to the latter. This effectively results in a specific product/vendor lock-in.

This example illustrates that open and standardized file formats are needed to give users the flexibility and freedom to choose and use products from different vendors and to prevent them from being locked in to a specific product and/or vendor. The published OpenDocument standard from OASIS and ISO (ISO/IEC 26300) for office applications offers this. Currently, applications that support this open format include StarOffice, KOffice, IBM Works, AbiWord, LibreOffice and OpenOffice.org. Microsoft does not support this but instead it has come up with its own XML-based file formats for its office suite. Again, while the MS Office XML schemas are publicly published and licensed for use royalty-free, they are owned by a single vendor (Microsoft) and hence are subject to the potential abuse discussed previously for non-open formats. In an attempt to allay fears over this and acceding to the requests of some of its biggest customers, the Microsoft Office XML file formats have been submitted to European Computer Manufacturers Association (ECMA) International for development as formal standard.
**Internet services and applications**

The Internet is perhaps the best showcase of how when technologies are implemented using mainly open standards, there is almost universal accessibility, acceptance and benefits. Most networking infrastructure of the Internet is implemented based on open standards drawn up by IETF. In addition, many services and applications running now as well as being planned for the future are being implemented following open standards and recommendations from several bodies notably, IETF, W3C and OASIS. As a result, today, it is possible for one to access major services offered on the Internet using a multitude of environments ranging from commodity PCs, hand-held Personal Digital Assistants (PDAs) and mobile devices to proprietary set-top black boxes and TV sets. Without this adherence to open standards, the Internet would not be as ubiquitous as it is today.

**The 5Rs framework**

"Open content" is content that is licensed in a manner that provides users with the right to make more kinds of uses than those normally permitted under the law. These permissions are granted to users free of charge.

The primary permissions or usage rights open content is concerned with are expressed in the "5Rs Framework:"

- Retain- the right to make, own, and control copies of the content (e.g., download, duplicate, store, and manage);
- Reuse- the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video);
- Revise- the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language);
- Remix- the right to combine the original or revised content with other open content to create something new (e.g., incorporate the content into a mashup);
- Redistribute- the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend).

Content is open to the extent that its license allows users to engage in the 5R activities. Content is less open to the extent that its license places restrictions (e.g., forbidding derivatives or prohibiting commercial use) or requirements (e.g., mandating that derivatives adopt a certain license or demanding attribution to the original author) on a user’s ability to engage in the 5R activities.

**The scope and nature of open educational resources**

The idea of open educational resources (OER) has numerous working definitions. Often cited is the William and Flora Hewlett Foundation which defines OER as: "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge". The Organization for Economic Co-operation and Development (OECD)
defines OER as: "digitized materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research. OER includes learning content, software tools to develop, use, and distribute content, and implementation resources such as open licenses". (This is the definition cited by Wikipedia's sister project, Wikiversity.) By way of comparison, the Commonwealth of Learning "has adopted the widest definition of Open Educational Resources (OER) as ‘materials offered freely and openly to use and adapt for teaching, learning, development and research’.

Given the diversity of users, creators and sponsors of open educational resources, it is not surprising to find a variety of use cases and requirements. For this reason, it may be as helpful to consider the differences between descriptions of open educational resources as it is to consider the descriptions themselves. One of several tensions in reaching a consensus description of OER (as found in the above definitions) is whether there should be explicit emphasis placed on specific technologies. For example, a video can be openly licensed and freely used without being a streaming video. A book can be openly licensed and freely used without being an electronic document. This technologically driven tension is deeply bound up with the discourse of open source licensing.

There is also a tension between entities, which find value in quantifying usage of OER and those, which see such metrics as themselves being irrelevant to free and open resources. Those requiring metrics associated with OER are often those with economic investment in the technologies needed to access or provide electronic OER, those with economic interests potentially threatened by OER, or those requiring justification for the costs of implementing and maintaining the infrastructure or access to the freely available OER. While a semantic distinction can be made delineating the technologies used to access and host learning content from the content itself, these technologies are generally accepted as part of the collective of open educational resources.

**Licensing and types of open educational resources**

Open educational resources often involve issues relating to intellectual property rights. Traditional educational materials, such as textbooks, are protected under conventional copyright terms. However, alternative and more flexible licensing options have become available as a result of the work of Creative Commons, an organization that provides ready-made licensing agreements that are less restrictive than the "all rights reserved" terms of standard international copyright. These new options have become a "critical infrastructure service for the OER movement." Another license, typically used by developers of OER software, is the GNU General Public License from the free and open-source software (FOSS) community. Open licensing allows uses of the materials that would not be easily permitted under copyright alone.

Types of open educational resources include: full courses, course materials, modules, learning objects, open textbooks, openly licensed (often streamed) videos, tests, software, and other tools, materials, or techniques used to support access to knowledge. OER may be freely and openly available static resources, dynamic resources which change over time in the course of having knowledge seekers interacting with and updating them (such as this Wikipedia article), or a course or module with a combination of these resources.
Some examples of open educational resources materials

- Full university courses, complete with readings, videos of lectures, homework assignments, and lecture notes.
- Interactive mini-lessons and simulations about a specific topic, such as math or physics.
- Adaptations of existing open work.
- Electronic textbooks that are peer-reviewed and frequently updated.
- Elementary school and high school lesson plans, worksheets, and activities that are aligned with state standards.

Institutional support

UNESCO is taking a leading role in "making countries aware of the potential of OER." The organization has instigated debate on how to apply OERs in practice and chaired vivid discussions on this matter through its International Institute of Educational Planning (IIEP). Believing that OERs can widen access to quality education, particularly when shared by many countries and higher education institutions, UNESCO also champions OERs as a means of promoting access, equity and quality in the spirit of the Universal Declaration of Human Rights.

Conditions of open data

A work is open if its manner of distribution satisfies the following conditions:

- The work shall be available as a whole and at no more than a reasonable reproduction cost, preferably downloading via the Internet without charge. The work must also be available in a convenient and modifiable form.
- The license shall not restrict any party from selling or giving away the work either on its own or as part of a package made from works from many different sources. The license shall not require a royalty or other fee for such sale or distribution.
- The license must allow for modifications and derivative works and must allow them to be distributed under the terms of the original work.
- The work must be provided in such a form that there are no technological obstacles to the performance of the above activities. This can be achieved by the provision of the work in an open data format, i.e. one whose specification is publicly and freely available and which places no restrictions monetary or otherwise upon its use.
- The license may require as a condition for redistribution and re-use the attribution of the contributors and creators to the work. If this condition is imposed it must not be onerous. For example if attribution is required a list of those requiring attribution should accompany the work.
- The license may require as a condition for the work being distributed in modified form that the resulting work carry a different name or version number from the original work.
- The license must not discriminate against any person or group of persons.
• The license must not restrict anyone from making use of the work in a specific field of endeavor. For example, it may not restrict the work from being used in a business, or from being used for genetic research.

• The rights attached to the work must apply to all to whom it is redistributed without the need for execution of an additional license by those parties.

• The rights attached to the work must not depend on the work being part of a particular package. If the work is extracted from that package and used or distributed within the terms of the work’s license, all parties to whom the work is redistributed should have the same rights as those that are granted in conjunction with the original package.

• The license must not place restrictions on other works that are distributed along with the licensed work. For example, the license must not insist that all other works distributed on the same medium are open.