The African Academy of Sciences

Driving Scientific and Technological Development in Africa

System Documentation

Alliance for Accelerating Excellence in Science in Africa – Community of Practice Portal (AESACoP)

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Date: July 2017
Version: 2.0

Document Information

Document location

Location
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Revision history

Version	Issue date	Author/editor	Description/Summary of changes
1.0	23-05-2017	Nelson Kimaiga	Documentation manual version for the CoP

Reviewed by

Version	Issue date	Name	Position	Review date
1.0		Alphonsus Neba	Programme Manager, DELTAS - AESA	

Approvals

Version	Issue date	Name	Position	Approval date

INTRODUCTION

Purpose

The Alliance for Accelerating Excellence in Science in Africa (AESA) is a funding and agenda setting platform, seeking to address Africa's health and developmental challenges by promoting the development of Africa's research leadership, scientific excellence and innovation. It currently implements five key programmes which further its agenda of promoting excellence in sciences. These programmes are listed as follows:

(1) Good Financial Grant Practice – GFGP.
(2) Grand Challenges Africa – GCA
(3) Developing Excellence in Leadership, Training and Science – DELTAS
(4) The Climate Impact Research Capacity and Leadership Enhancement – CIRCLE
(5) H3Africa

Within the AESA, these programmes are similar to communities. It is these communities that shall be expected to form the end user group of the CoP portal. Ideally, the user groups envisage a platform whose functionality and scope will be synonymous to the Global Health Network (https://tghn.org)

This document is intended to:

1. Provide usage guidance and manuals for end users.

How to use this document

Readers will use this document as follows:

End-users– sections on Background Information and Scope, Implementation and Testing, Modules developed, Process overview and user guides, Conclusions and recommendations

The following stages were covered during the course of the project and development of this document:

1. **Draft**: The first version, or draft version, was compiled after requirements had been discovered, recorded, classified, and prioritized.
1. **Proposed**: The draft document was then proposed as a potential requirements specification for the project. The proposed document was reviewed by all parties, who commented on any requirements and any priorities, either to agree, to disagree, or to identify missing requirements. Readers included end-users, developers, programme managers, and other stakeholders. The document was amended and re-proposed several times before moving to the next stage.
1. **Validated**: Once the various stakeholders had agreed to the requirements in the document, it was considered validated.
1. **Approved**: The validated document was accepted by representatives of each party of stakeholders as an appropriate statement of requirements for the project. The developer then use the requirements document as a guide to implementation and to check the progress of the project as it developed.
1. **System documentation** - The completed first version of the system was documented by listing its specifications of the platform, and how it operates as well as its maintenance aspects.

History

Each of the five programmatic activities within AESA, have different groups of stakeholders which are similar to communities. The programmes form the end user group of the CoP portal. These programmes have their own specific content, materials and documents which needs to be centralised for easier access by other programmes across the board. The nature of communication within the named programmes is also subjective. There is, therefore a need to centralise all these activities together. As the Community of Practice portal comes on board, each of these AESA programmes need to connect and communicate with each of these groups on a regular basis.

The objectives of this project are to develop the community of practice based on user requirements that have been scoped from the user groups and stakeholders of the five programmes of the AESA.

The end user groups of the CoP envisage a platform that shall allow seamless communication amongst community members. Ideally, getting access to relevant information would be a key motivator to increase communication activity within the site. Information such as developments within the community, circulation of newsletters to various stakeholder groups, news as well as research publications done by fellows of the AAS community. This shall greatly address the information needs of the community.

Table of Contents

Background Information and Scope

The community of practice – CoP is the interactive and collaborative portal that the AESA seeks to implement so as to consolidate the communication activities within the four key programmes of the AESA. These programmes have their own specific content, materials and documents which needs to be centralised for easier access by other programmes across the board.

Functionality of the community of practice includes document sharing and repository, an online chat room and training and development manuals. The overall implementation of the project was conducted based on recommendations and requirements commonalities that were observed across other community groups within the AESA during their respective scoping exercises.

As the Community of Practice portal comes on board, each of these AESA programmes need to connect and communicate with each of these groups on a regular basis. These are key objectives of what the CoP is expected to achieve.

Some key benefits of the community of practice portal are both impacted on an individual level as well as on an organisational level as follows:

- Provision of access to new knowledge
- Foster trust and a sense of common purpose
- Generation of knowledge and encouragement of skill development
- Dissemination of valuable information and transfer of best practice

Translation - All documentation shall be produced in English. The community of practice platform shall be accessible in both English and French. The content generated such as documents would however be in English and not undergo translation.

Property Rights – CoP software Codebase The codebase for which the community of practice software has been developed on shall be transferred and handed over to the AAS/AESA for ongoing post-deployment support and development.

With reference to the user requirements specification, the requirements for the community of practice were listed on a decision matrix table and were marked as either Mandatory (M) or Specific (SP) meaning the particular feature was unique to only one user group.

1.1 User requirements matrix

Feature	DELTAS	H3Africa	GCA	GFGP	Think Tank	COMMONALITIES
Site Landing Page	**M**	**M**	**M**	**M**	**M**	**YES**
Online Chat	**SP**	**SP**		**SP**		**NO**
Document Repository	**SP**	**SP**		**SP**	**SP**	**NO**
Document Sharing	**M**	**M**	**M**	**M**		**YES**
ELearning	**M**	**M**	**M**	**M**	**M**	**YES**
Find expertise	**SP**	**SP**		**SP**		**NO**
Newsletter	**SP**	**SP**		**SP**		**NO**
Open Access			**SP**			**NO**
News and Events	**SP**	**SP**		**SP**	**SP**	**NO**
Blog					**SP**	**NO**
Groups and forums					**SP**	**NO**
Bi-Lingual capabilities					**SP**	**NO**
E-marketplace				**SP**		**NO**

System analysis and choice of methodology

A methodology is an algorithm, which includes formulas as well as a set of practices. It does not set out to provide solutions, but rather sets out to create an understanding of which method can be applied to a particular case.

The preferred methodology for the implementation of this project therefore was through Object-oriented analysis and design (OOAD).

Object-oriented analysis and design (OOAD) is a software development approach that analyses a system as a group of interacting objects. Software objects are conceptually similar to real-world objects, they too consist of state and related behavior. Basically, an object exposes its behavior through methods or functions. (Bennett, 2005)

The idea behind the selection of this methodology is to facilitate development of system components in a way that they are flexible and can be easily reused. It also facilitates changing of system requirements to improve functionality during the system lifetime. Concepts in the analysis model which is technology independent, are mapped onto implementing classes and interfaces resulting in a model of the solution domain, i.e., a detailed description of how the system is to be built on concrete technologies. (Wikipedia, 2014)

Object-oriented analysis and design enables the standardization of objects which increases design understanding and decreases the risk associated with project development.

Some of the benefits of this methodology are;

1) Maintainable- Object-Oriented programming methods make code more maintainable. Identifying the source of errors becomes easier because objects are self-contained .The principles of good Object-Oriented Programming design contribute to an application's maintainability. (Booch, 2007)
2) Reusable-Because objects contain both data and functions that act on data, objects can be thought of as self-contained "boxes" (encapsulation).This feature makes it easy to reuse code in systems anywhere it suites. (Booch, 2007)
3) Scalability is the ability of a system, network, or process, to handle growing amount of work in a capable manner or its ability to be enlarged to accommodate that growth. As an object's interface provides a roadmap for reusing the object in new software, it also provides you with all the information you need to replace the object without affecting other code. This makes it easy to replace old and aging code with faster algorithms and newer technology. (Booch, 2007)

Platform/Properties	Object-Oriented Analysis	Structured analysis
Methodology used	Incremental	Software development Life Cycle
Focuses on	Objects, their names and methods.	Processes only
Risk	Low	High
Suitability	Large risky projects with changing user requirements	Well defined projects with stable user requirements.

Table 1: The difference between OOAD and SADS

Analysis

In the analysis phase, a vague understanding of the problem is translated into a precise description of the task that the system will carry out. It concerns itself with the description of what needs to be done, not how it should be done.

Software Requirements Analysis-this is the process of determining user expectations from a new or modified product. It is critical to the success of a project. Energy should be directed towards ensuring that the final system or product conforms to client needs rather than attempting to mold user expectations to fit the requirements.

System Design

System Development Tools and Techniques

Database development tools

The system database shall be developed using PHP MySQL, which is an open source relational database management system. PHP MySQL is a very convenient and flexible database development tool since it is free of charge. It is also easily accessible since it does not rely on web connectivity and hence can be accessed from a local server within a computer.

Programming tools

After an assessment of the elicited requirements, an open source customizable solution would be most preferred way to iterate on the first version of the CoP. The fact that there are certain commonalities in what either community group requires for the CoP makes it a more feasible choice. The solution exists in the form of Drupal which is a content management system with a dynamic backend on which additional features and capabilities can be added incrementally.

For the purposes of branding the look and feel of the platform, the following front-end frameworks have been used:

- Foundation Zurb
- Bootstrap
- JQuery
- HTML5/CSS3

Source and version control has been been used to manage changes and releases of the platform to be developed in a code repository. This has been facilitated by git, which is a version control software.

Implementation and Testing

Modules developed

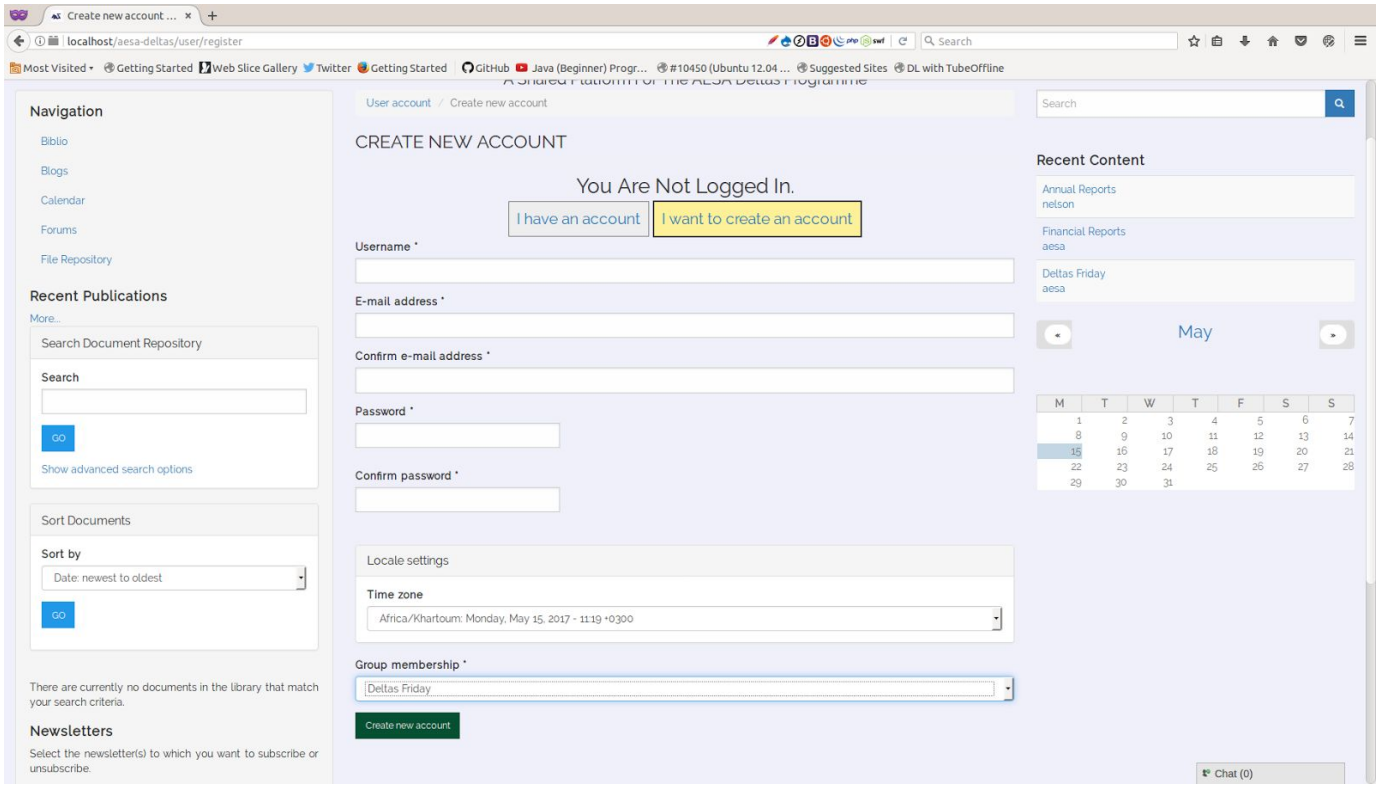
The following modules have been developed for the first version of the community of practice. Priority was given to common requirements that were observed during the requirements elicitation phase

- User authentication
- Document repository
- Online-learning platform
- Forums and blogging
- Groups
- Platform wide chatting among users
- News and event calendar

Process overview and user guides

User authentication

To use the community of practice, one needs to be a registered user. Once registered, a user gets a login through the email address they used to sign up with. On the registration screen, there will be options to select your timezone as well as subscribe for a newsletter.



Upon successful registration, an invitation email will be sent to the user's email address which will provide further instructions on how to create a password. Ideally, a clickable link will be provided and will redirect the user back to the CoP platform such that they create a new password.Illustration below:

kamiakaze,

Thank you for registering at AESA | Community of Practice : Deltas. You may now log in by clicking this link or copying and pasting it to your browser:

http://aesacop.mna2012.co.ke/aesa-deltas/user/reset/61/1491398494/i2UT5Zs-CXd3SbRwHNAWk_Wd3hTHerNGvoGAAOeBlHs

This link can only be used once to log in and will lead you to a page where you can set your password.

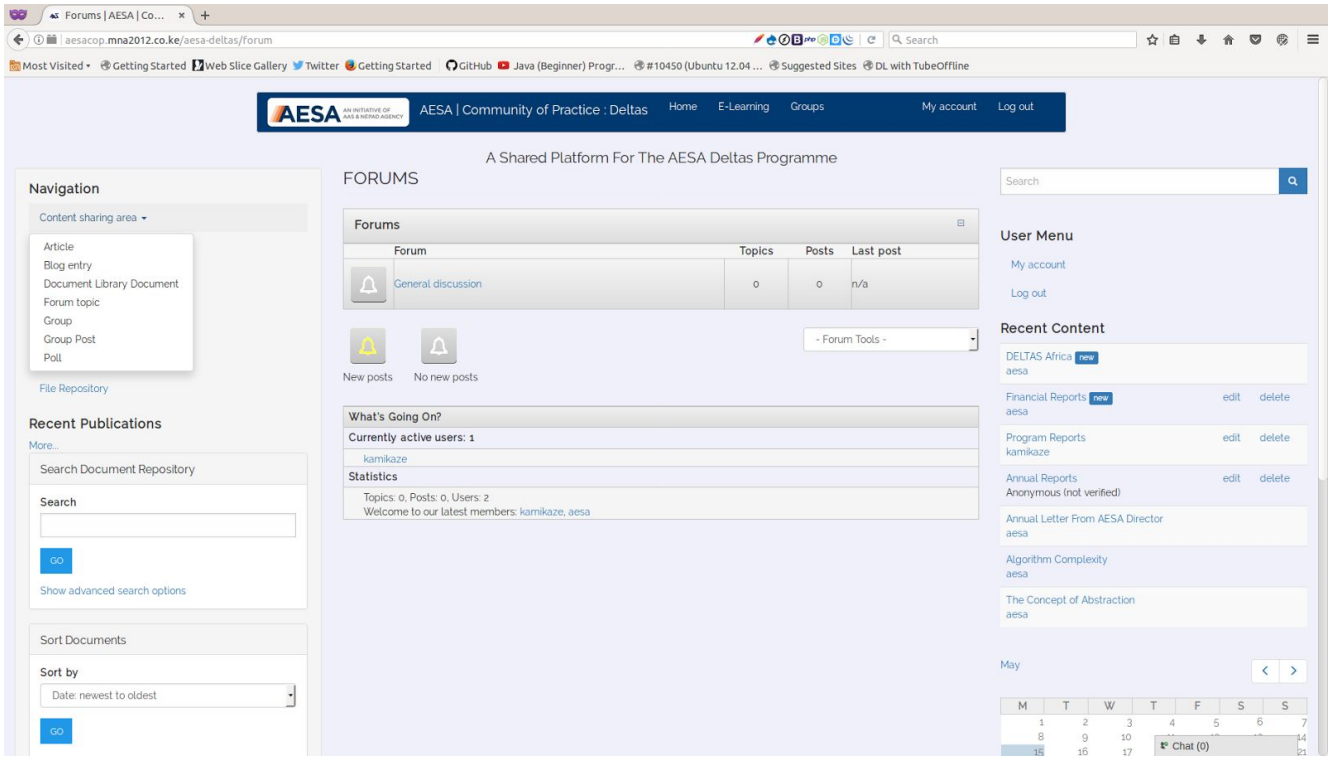
After setting your password, you will be able to log in at http://aesacop.mna2012.co.ke/aesa-deltas/user in the future using:

username: kamiakaze
password: Your password

-- AESA | Community of Practice : Deltas team

Navigation and layout

The navigation controls are placed on both left and right hand sides of the screen. In the middle part is where published content displays in full. On the left hand side, there exists a menu that contains options for a user to share or create new content for publishing in the community of practice platform. On the right hand side menu, a user is able to see recent published content in hierarchical format, a list of recently joined users and a chat box on the far bottom as well. A top navigation bar includes links to the groups and the online learning portal.



Creating and sharing content

The community of practice portal is currently designed to shared the following types of content:

1. News articles
2. Blogs
3. Forum topics
4. Polls
5. Group content
6. Shared documents and file uploads

When any of these content types are created, they will appear in a feed section in a timeline format. For instance to come up with a simple blog post, the following steps are to be followed:

1. On the left panel labelled as **Content sharing area**, locate a dropdown menu with options representing various content types.
2. Select blog entry and click to proceed.
3. You will be presented with a text editor that will allow you to type your blog article and publish it for other users of the CoP to view. There additional options for allowing users to subscribe and add comments to your blog post.

N/B: The above procedure works when creating content for the following types:

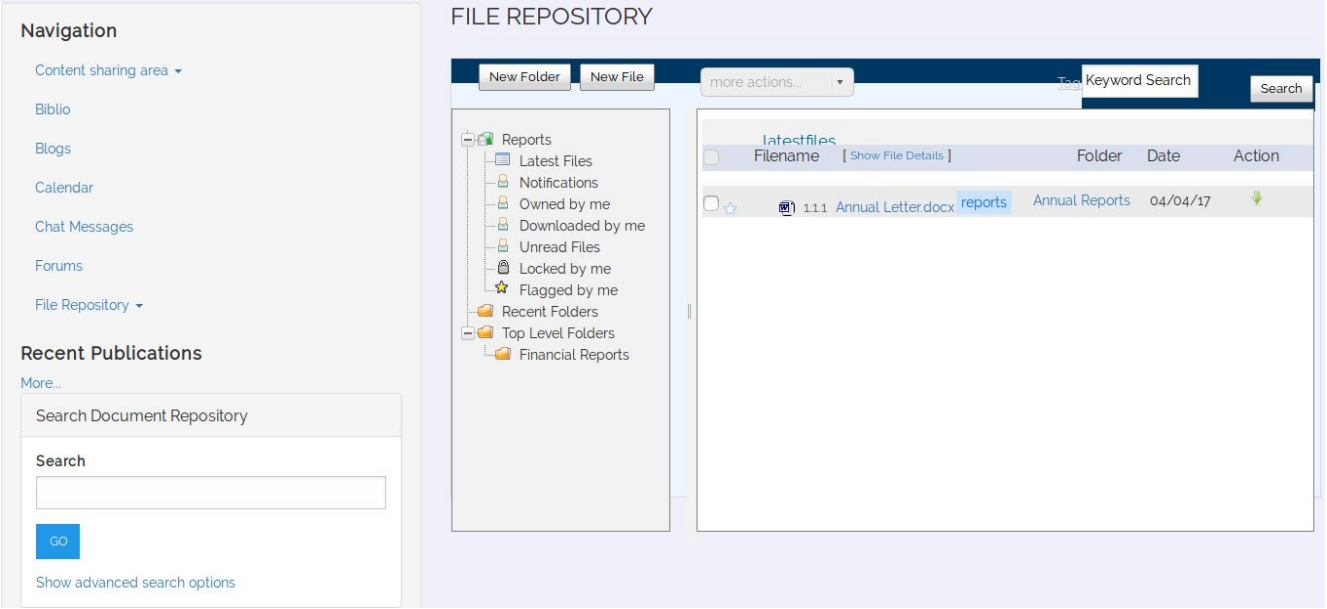
1. News articles
2. Blogs
3. Forum topics
4. Polls

Document repository and file sharing

This is a document management feature for managing and sharing files securely across the user community. . Documents can be saved outside the portal's public directory to protect documents for safe access and distribution. This feature has been developed to provide the user with an easy to use functions to search, download, edit and add documents. The user interface makes extensive use of modern web application technologies to behave like a desktop application.

To get started with uploading documents to the portal, the following procedure can be used.

1. Locate the **File Repository** link which is on the left menu. Click on it to access the document repository interface.



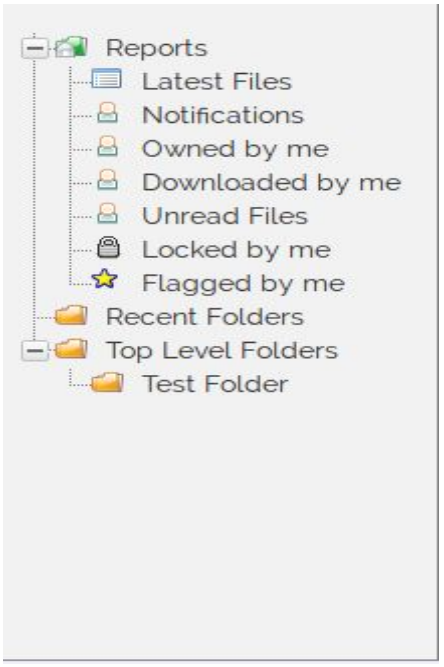
- You are presented with a file explorer interface that displays uploaded files on the right while folders exist on the left.
- There are options to create a new folder or add a new file on the right side of the file explorer. Additionally, there exists a search box for file search within the document manager.

Creating folders and uploading files

- Click on the **New Folder** button on the top right of the file explorer window.

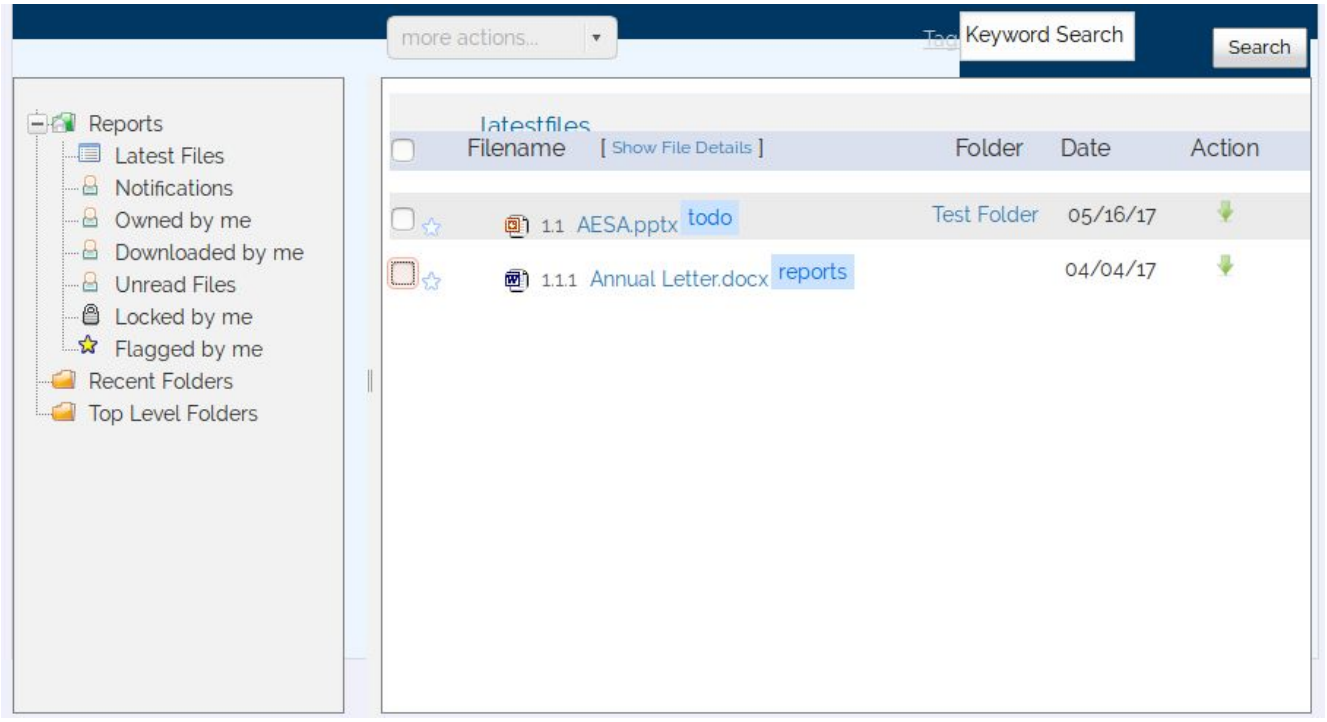
A dialog box with options to name and create your new folder appears. Press submit when done

- Your newly created folder which was named as ‘Test Folder’ should appear in the left pane of the file explorer as show:



- To upload a file into the newly created folder:
  - Click on the newly created folder (Test Folder)
  - The right side of the file explorer will display a blank area. Uploaded files reside here.
  - Locate the button labelled as **New File** and click on it in order to access the file upload dialog box.
  - The file to be uploaded to the file explorer can be browsed for within the file system of your computer and uploaded.
  - Note that the files to be uploaded must be a maximum of **2 MB** in size.

- There are further options to add tag names as well as the description of the file uploaded.
- Your newly uploaded document will finally display on the file explorer window labelled as **latest files**. Noted that the name of the folder in which the file has been stored is also visible in the file explorer window.



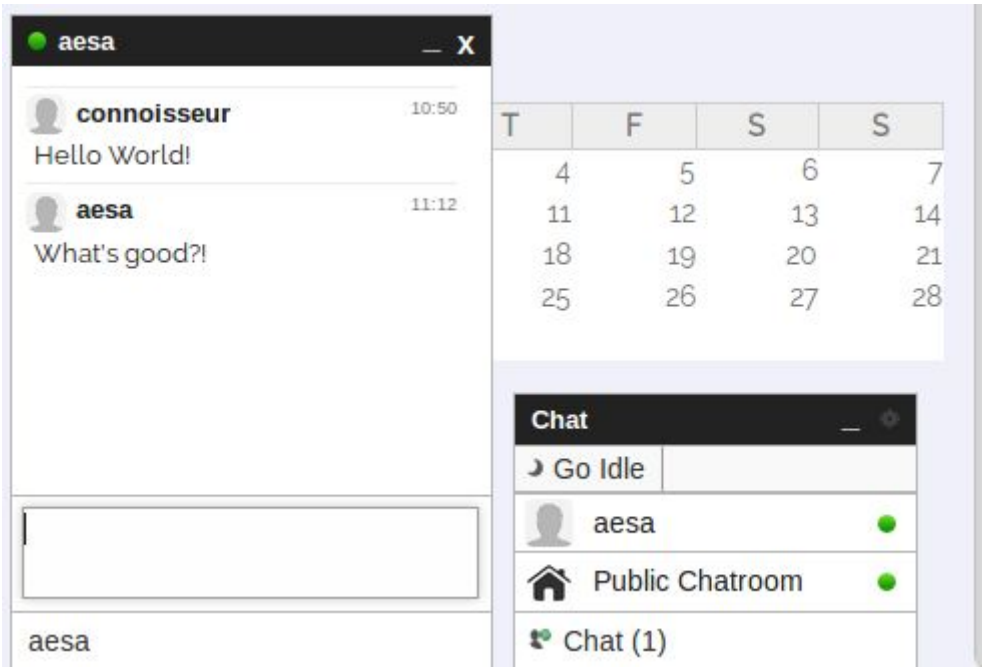
- Further options exist for:
  - Downloading the document (displayed in a green arrow pointing downwards)
  - Deleting, renaming, downloading or moving the file to a different location. This can be achieved by clicking on a check box besides the document then accessing a drop down menu at the top labelled as **more actions.**

Permissions

When creating folders, sometimes administrator approval might be required in order for nwly uploaded documents to display on the file repository as a means of access control.

Chatting

This feature allows visitors of the community of practice portal to chat with each other privately or together in a public chatroom. Ideally, this module enables user engagement. It logs the user conversations so that they can be later viewed in the message inbox. Any user who is logged in to the community of practice appears in the chat list and can initiate private chats with another logged in user.



To view a log of all chat messages, a user can locate on the left menu a link named **messages** and a list of all message history is accessible. Due to access control restrictions, the public chatroom may be disabled, so as to prevent unregistered anonymous visitors from outside the site using this feature as it could amount to spamming. The option to go idle takes a user's online availability from the chat box. Online availability is denoted by a green dot that is besides a username.

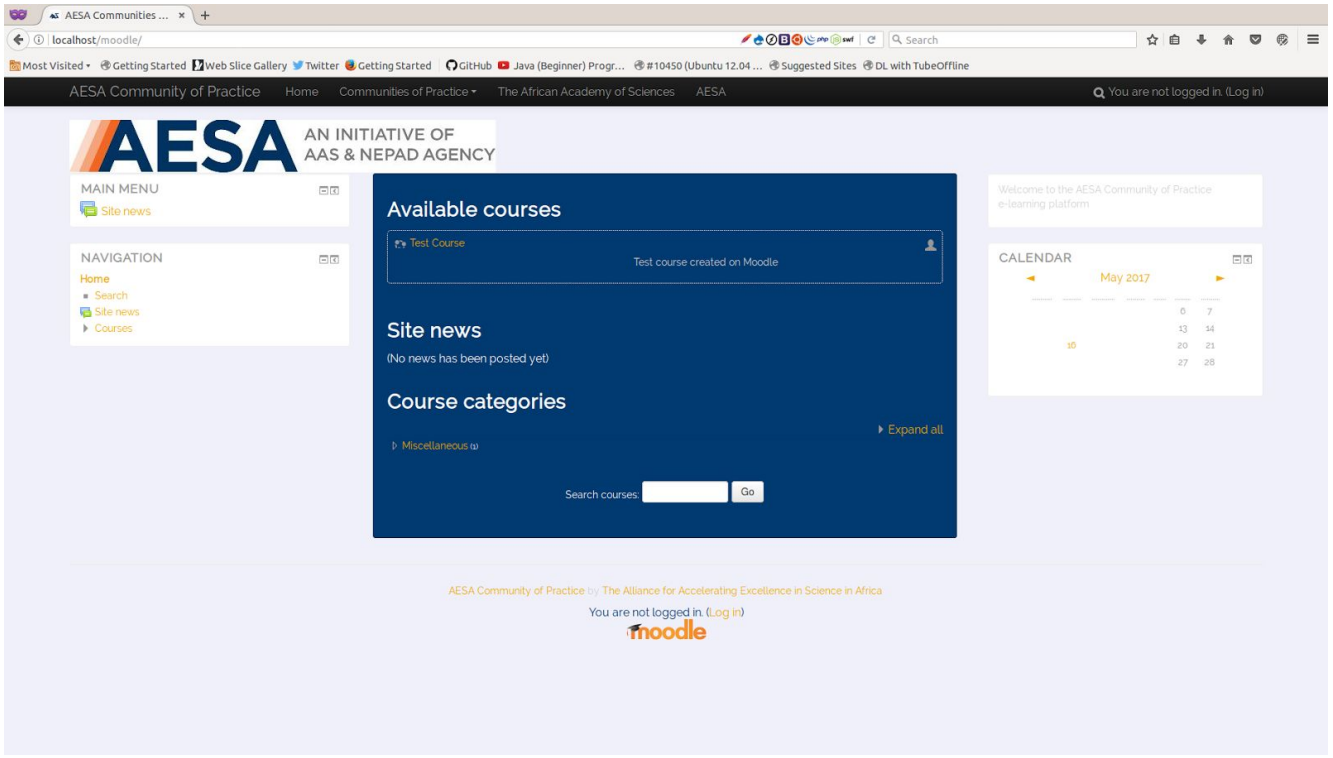
E-Learning

The e-learning platform is designed to provide educators, administrators and learners with a **single robust, secure and integrated system** to create personalised learning environments. It is capable of serving all the AESA programmes. This integrated feature can be used to achieve the following objectives:

- Competency-based Training and Management
- Online Learning and Continued Education Opportunities
- Online Course Development
- Communities of Practice

The le-learning platform has the following capabilities;

- Audio/visual content (videos, pictures, audio clips)
- Wikis
- creation of courses with specific timings and durations
- Specific distinction of various learner groups using the platform
- Hosting of various course content types.



Authentication to the E-learning site

The email-based self-registration authentication method enables users to create their own accounts via the 'Create new account' button on the login page. They then receive an email at the address they specified in their account profile to confirm their account.

Email confirmation message

An automated email confirmation message is sent to the user using the AESA contact email address like the sample shown below:

Hi Phil Coulson,

A new account has been requested at 'AESA E -learning System'
using your email address.

To confirm your new account, please go to this web address:

http://aesaelearning.azurewebsites.net/login/confirm.php?data=2GxYVPCtVFt2jw2/coulson

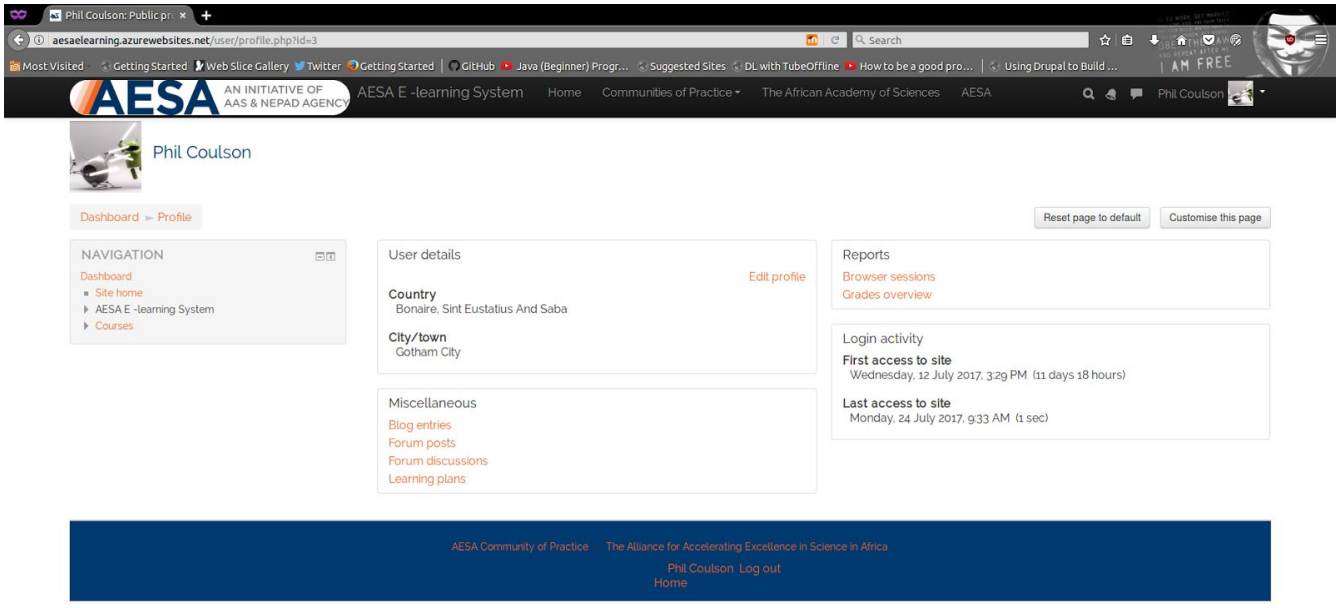
In most mail programs, this should appear as a blue link
which you can just click on. If that doesn't work,
then cut and paste the address into the address
line at the top of your web browser window.

If you need help, please contact the site administrator,

Admin User

Your profile

As a logged in user, you can access your profile from the user menu top right. It's where you see your name and an arrow. Click there *(1)* to open up the menu *(2)* Clicking the Profile link will then display other options, such as a list of your courses, any forum and blog entries and a link to edit your profile (3).



Clicking the *Edit profile* link will allow you to change certain information such as your correct timezone, add an avatar, description and, optionally, extra contact details. You cannot normally change your username and your admin might have restricted other changes too.

When you upload an image, it will appear in the user menu by your name and also on your dashboard page.

Your notifications and messages

Your site can alert you when you have new messages from your teacher and other participants. You can receive alerts about new forum posts or graded assignments and more.

You can receive these alerts via email, mobile (coming soon) or pop up, and you can control how you receive them from *Preferences* > *Messaging* in the user menu.

Your courses

Depending on how the administrator has set up the site, you should be able to see your course on:

1. The **Site front page** - When you are logged in, the site front pages may display only the courses you are enrolled in.
2. **Navigation block** - The **navigation block** has a link to display courses. If you are not yet enrolled in any courses, you will see all available courses. Once you are enrolled in at least one course, you will see that and further courses only.
3. **Dashboard** - This is your personal page which you can customise and view your enrolled courses and outstanding tasks.

Conclusions and recommendations

Following the development of the first version of the AESA community of practice, the following deductions and recommendations can be made:

1. The CoP portal will be a shared platform to integrate the key programmes of the AESA for collaboration purposes.
2. **Incremental development** – In order to achieve maximum feature functionality, it would be best that development of the most basic features of a community platform be given priority during the iteration of the first version of the CoP. Further features and advanced functionality shall be added incrementally after the first iteration using an agile approach. A decision matrix of open source platforms with their supported features is illustrated in the final section of this document.
3. **Online presence** – That as the community of practice comes on board, it shall be necessary to have it linked to a key platform which is a product of the AAS. One such fitting platform should be the website. The community of practice should be accessed from a dedicated domain linked to the main AAS and AESA websites respectively for purposes of accessibility.
4. **Ownership and administration**– The community of practice shall be developed as a product of the African Academy of Sciences. Therefore, its development process, training needs, maintenance and administration shall fall under the ownership of the African Academy of Sciences. This also includes branding guidelines, which the portal shall be subjected to.

   When the community of practice shall have matured, it will ideally become largely self-supporting. A designated coordinator or maintainer shall undertake the following activities to help ensure that the community of practice is continuing to function well and work towards its goals.
   - Maintain a watching brief regarding participation of members in email discussion and the web pages.
   - Updating of the web page and email discussion list.
   - Monitoring of participation.
   - Feeding the community of practice useful reference material and information.
   - Gather further insights to be used for future feature additions and iterations of the CoP.
5. **Content and knowledge management**- Although a working and appealing technology platform is integral for reaching a broad audience, technology is not the most important facet for building a strong community base. High-quality content, participation incentives and meeting the needs of the community must be preeminent.
6. **Development solution**- That after an assessment of the elicited requirements, an open source customizable solution was the most preferred way to iterate on the first version of the CoP. The fact that there are certain commonalities in what either community group requires for the CoP made it a more feasible choice. Further selection and consideration of the desired technology will be made in the next implementation phases of the project.

Works Cited

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"Documentation." *Drupal.org*. 09 Feb. 2017. Web. 24 May 2017.

Acronyms and Definitions

Acronym or Term	Definition
AESA	The Alliance for Accelerating Excellence in Science in Africa, an initiative of the African Academy of Sciences (AAS) and the New Partnership for Africa's Development (NEPAD) Agency, is an agenda setting and funding platform established to address Africa's health and development challenges.
GFGP	The Good Financial Grant Practice is a programme established to strengthen Africa's research and development infrastructure by developing an innovative standard for the best practices in the management of funds awarded to grantees.
GCA	The Grand Challenges Africa, a programme being implemented under the AESA
CIRCLE	Climate Impact Research Capacity and Leadership Enhancement – a programme under implementation at the AESA
DELTAS	Developing Excellence in Leadership, Training and Science, also one of the key AESA programmes under implementation.
CoP	The Community of Practice portal.
Codebase	whole collection of source code that is used to build a particular software system, application, or software component.
Open source	software for which the original source code is made freely available and may be redistributed and modified.
User	Someone who interacts with the mobile phone application
Stakeholder	Any person who has interaction with the system who is not a developer.