

# Qualifications and Credentials Platform

## Development Report

**ACQF**  
African Continental  
Qualifications Framework

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Visit the [QCP Webpage](#)

Approved by ACQF-II coordinator on 17/12/2024



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# 1. Introduction

This development report provides a comprehensive account of the technical progress achieved in building the ACQF Qualifications and Credentials Platform (QCP). It focuses on the platform's system architecture, software development, and deployment processes. The report highlights completed development tasks, including backend services, frontend interfaces, and security implementations, ensuring the platform's operational readiness.

## 1.1. Objectives

The primary objectives of this document are:

- To present a detailed summary of the technical development activities, including system architecture, software implementation, and infrastructure deployment.
- To document the progress in system features, user interfaces, and backend services.
- To provide an overview of the security protocols and system integrity measures implemented.
- To outline next steps, recommendations, and plans for future platform enhancements.

## 1.2. Document Structure

This report is structured as follows:

- **Global Progress Status:** summarises key milestones, including development timelines, task completion rates, and remaining work.
- **Software Development Status:** describes system development tasks, including backend, frontend, and infrastructure components.
- **Features Delivered:** lists functionalities implemented, such as data entry, user management, and system configuration.
- **Technical Tasks:** details the work done backend services, API development, and deployment configurations.
- **Deployment Status:** describes the infrastructure setup, and platform readiness.
- **URLs and Domains:** Lists relevant platform access points and operational environments.
- **User Roles and Permissions:** Defines roles, access levels, and associated responsibilities.
- **Platform Security:** Explains security measures such as authentication, encryption, and data protection.

- **Next Steps and Recommendations:** Outlines planned improvements, future releases, and long-term sustainability goals.

The sections above reflect the key areas covered in the report, providing a comprehensive view of the platform's technical development progress and the next steps in its implementation.

## 2. Global Progress Status

Milestone	Status	Completion rate	Expected delivery date	Actual delivery date	Next steps
Analysis and design					
<a href="#">Architecture Report</a>	Completed	100%		05/2024	Update the document as needed to reflect changes or evolving project needs
<a href="#">Report on baseline analysis and stakeholders' consultation.</a>	Completed	100%		05/2024	Data collection coordination (cf. <a href="#">chapter 7</a> )
<a href="#">Curator user interface prototype</a>	Completed	100%	20/12/2024		Iterative refinements based on testing feedback
<a href="#">General Public user interface prototype</a>	Stakeholders review and validation	90%	20/12/2024		Handoff to development team
Import service user interface prototype	In progress	80%	20/12/2024		Stakeholder Review and Validation
Data Modelling					
<a href="#">ALM model for data exchange</a>	Completed, implementation ongoing	100%		07/2024	Data Mapping and Transformation
<a href="#">Controlled lists</a>	Completed, implementation ongoing	100%		07/2024	Data Mapping and Transformation
<a href="#">Documentation portal</a>	Completed	100%		07/2024	Stakeholder Review and Validation

Software Development

Deployment setup of the application	Completed	100%		07/2024	Iterative refinements based on testing feedback
Curator user stories	In progress	90%	20/12/2024		User Acceptance Testing
General public user stories	Expecting stakeholders review and validation of the UI prototype	-	06/2025		Development and Implementation
Import service user stories	UI prototype under development	-	03/2026 (partial delivery in 06/2025)		Stakeholders review and validation of the UI prototype

## 3. Software Development Status

In this step, the development activities moved beyond the foundational phase and focused on adding functionality and interactivity to the frontend skeleton, effectively bringing it closer to a fully operational interface.

By focusing on these activities, the project moves from a foundational framework to a more feature-rich, user-focused application, ready for testing and refinement. This step sets the stage for further iterations, including advanced features, enhanced performance, and user feedback incorporation.

During this phase the scope of development was limited to the Curator section of the UI, of which the prototype can be consulted [here](#).

### 3.1. Features delivered

The following user-centric functionalities were implemented:

- **Enter Qualifications Data Directly in UI:** For qualification curators that do not have qualifications data available in the ACQF Model for Data Exchange, the system must provide a web-based UI to manually enter individual qualifications for their specific country, following the properties/fields of the ACQF Model for Data Exchange.
- **Verify Data:** Check that input data complies with the ACQF Model for Data Exchange and throw an error for records that do not.
- **Manage Qualification Status:** Set the following qualification statuses and roles:
  - **Draft** for qualifications where data import/upload/entering has not been completed
  - **Under Review** for qualifications that have not been approved for publication
  - **Ready for release** for qualifications that have been approved for publication
  - **Ready for obsolescence** for qualifications that have been approved for obsolescence
- **Require User Confirmation for Publication:** Require users to approve each qualification for publication manually. Provide a functionality to provide this approval in bulk.
- **Sandbox Data Between Countries:** Ensure that virtual space administrators and all qualification curators managed by those virtual space administrators can only access and manage unpublished data linked to the country they are associated with. Therefore, a user account (except the administrator) is always connected to only one country.
- **Define Virtual Space Administrators:** As an administrator, be able to create/delete/edit accounts for virtual space administrators, and associate those virtual space administrators with a specific virtual space.

- **Define Qualification Curators:** As an administrator or virtual space administrator, create/delete/edit accounts for qualification curators and associate those qualification curators with a specific virtual space.
- **Virtual Space Administrator Permissions:** Virtual space administrators may change the ownership of data in the system and for any data in the system:
  - Create new records
  - Edit or delete records which have not been published
  - This only applies to data from the virtual space to which the virtual space administrator is associated
- **Qualification Curator Permissions:** Qualification curators can import, change or enter data, and for data which they own:
  - Create new records
  - Edit or delete records which have not been published
  - A qualification curator should own any data they upload or enter by default.
- **Dynamic User Menu:** Create a dynamic, context-sensitive user menu that adapts based on the user's role and permissions.
- **User Authentication and Authorization:** Implement secure user authentication mechanisms and a role-based authorization system to manage access.
- **Create and Edit Organisations:** allowing users to create, view, and edit organizational data for flexibility and control.

The development of these features has enhanced the platform's functionality, providing a robust framework for data management, user roles, and security. Further testing and refinements will continue to improve the overall user experience.

## 1.1. Technical tasks

- **Develop Elasticsearch indexing scripts:** creating scripts to define, populate, and maintain Elasticsearch indexes. These indexes enable the frontend to efficiently query and retrieve data for various operations such as searching, filtering, and displaying information
- **Integrate and configure Keycloak:** setting up Keycloak, an open-source identity and access management tool, to manage user authentication, authorization, and role-based access. The configuration ensures secure login, session management, and permissions enforcement.
- **Create mock data generator:** developing a tool or script to generate realistic mock data that mimics actual platform data. This mock data is used for testing platform features, APIs, and performance under various scenarios without requiring real user data.
- **Implement APIs for backend services :** building and deploying backend APIs to enable functionalities such as data validation, user management, qualification entry, and status updates.



These APIs will serve as the bridge between the frontend and backend for all data-driven operations.

## 3.2. Analysis and design tasks

- **Design UI prototypes** : involves creating visual mockups of the user interface to illustrate layouts, navigation, and functionality. These prototypes help stakeholders visualize the system, test usability, and refine features before development, ensuring the design meets user needs effectively.
  - Data Curator : screens that allow curators to input, manage, validate, and publish qualifications data.
  - General Public: these prototypes focus on presenting data in a clear and visually appealing manner, with features like search, filters, and intuitive navigation to enhance the user experience.
  - Automated Publication (Import) : illustrating how users will upload large datasets, monitor upload progress, and review validation results.
- **Design architecture for the Automated Publication (Import) section**: defining the technical structure and workflow for the bulk data import functionality. This task includes specifying how data files will be uploaded, processed, and validated against the ACQF model.

## 4. Deployment Status

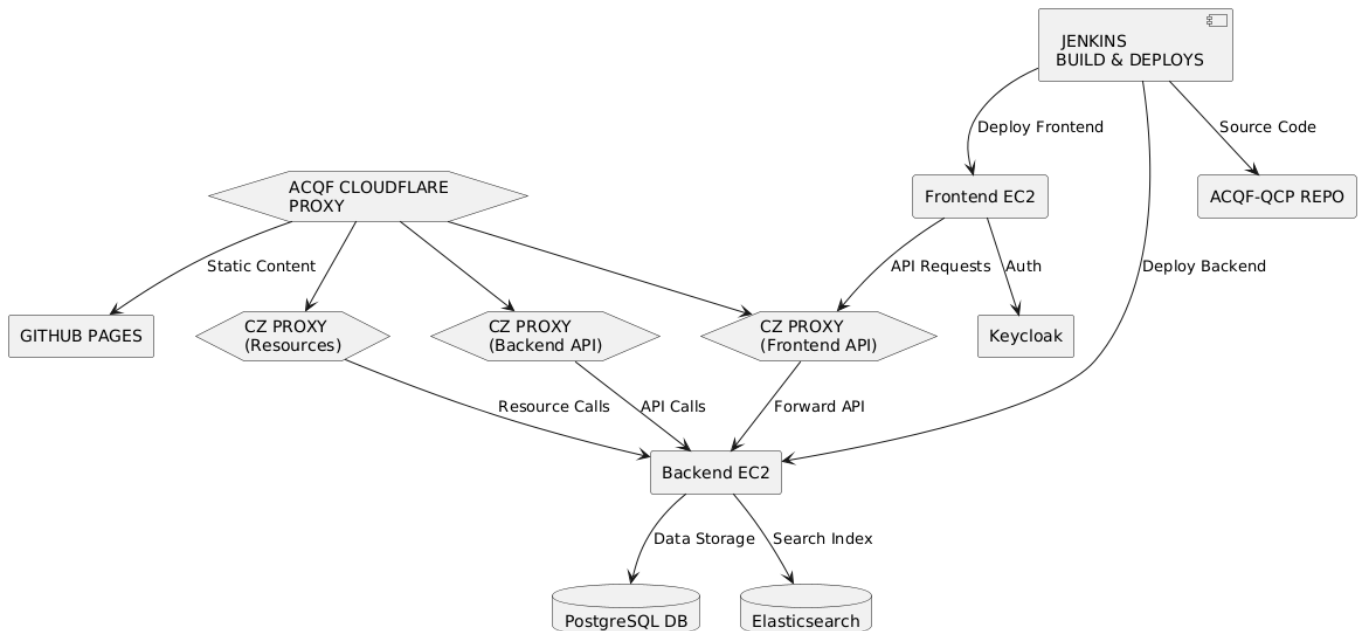
The deployment activity involved setting up the necessary infrastructure and domains to host the ACQF QCP, continuously integrate and deliver software to it and make its services available through the web.

The domain acqf-qcp.africa was secured for this purpose.

This activity also detailed the deployment architecture, including the following components

- Cloudflare Proxy
- Cognizone Proxy
- GitHub Pages
- Backend and Frontend EC2 instances
- PostgreSQL database
- Jenkins for CI/CD processes.
- Elasticsearch for data indexing and search optimisation
- Keycloak for authentication and authorization services

The deployment setup is designed to ensure efficient traffic routing, robust backend operations, and seamless frontend interactions, providing a reliable and scalable platform for the ACQF QCP.



## 4.1. Components

- **ACQF Cloudflare Proxy:** Acts as the entry point for external traffic, routing traffic to various subdomains and resources.
- **Cognizone Proxy:** Intermediate proxy layer for routing traffic within the infrastructure, handling traffic to and from backend and frontend EC2 instances.
- **GitHub Pages:** Source for static content deployment, accessible through <https://data.acqf-qcp.africa/>.
- **Backend EC2:** Backend server for processing and handling backend operations, connected to the PostgreSQL database for data storage.
- **Frontend EC2:** Frontend server for handling user interface and client-side applications.
- **PostgreSQL DB:** Database server for storing application data, directly connected to the Backend EC2 instance for data operations.
- **Jenkins Build & Deploys:** CI/CD tool used for automating builds and deployments, interacting with the ACQF-QCP repository to deploy updates to Backend and Frontend EC2 instances.
- **ACQF-QCP Repo:** Source code repository containing the codebase for the project, integrated with Jenkins for build and deployment pipelines.
- **Elasticsearch :** Elasticsearch is a distributed, RESTful search and analytics engine designed to provide powerful full-text search capabilities and real-time data indexing for large-scale applications.
- **Keycloak:** Keycloak is an open-source identity and access management (IAM) solution designed to provide authentication, authorization, and single sign-on (SSO) capabilities for modern applications and services.

## 4.2. Interactions

### External Traffic Flow

- Incoming requests from external users are first processed by the **ACQF Cloudflare Proxy**, acting as the central entry point.
- Depending on the request type:
  - **Static Content Requests:** Requests for static resources are routed to **GitHub Pages** through the Cloudflare Proxy.
  - **Backend Operations:** Requests requiring backend logic are forwarded to **CZ Proxy (Backend API)**, which relays them to **Backend EC2**.
  - **Frontend Interactions:** Requests involving the frontend interface are directed to **CZ Proxy (Frontend API)**, connecting to **Frontend EC2** for user interaction.

### Internal Traffic Flow

- **Frontend EC2** uses **Keycloak** for authentication and authorization, ensuring secure access to protected resources.
- **CZ Proxy** facilitates internal traffic routing:
  - **Frontend API Requests:** Forwarded from **Frontend EC2** through **CZ Proxy (Frontend API)** to **Backend EC2** for backend processing.
  - **Backend Data Access:** **Backend EC2** performs business logic and communicates with:
    - **PostgreSQL DB** for persistent data storage.
    - **Elasticsearch** for high-performance search and indexing operations.

### 3. Deployment Flow

- **Jenkins Build & Deploys** automates continuous integration and deployment (CI/CD):
  - It fetches the latest source code from the **ACQF-QCP Repo**.
  - After successful builds:
    - **Frontend EC2** is updated with the latest frontend application code.
    - **Backend EC2** receives updates to backend services, ensuring up-to-date business logic and APIs.

This flow ensures high availability, scalability, and secure interactions while maintaining a modular and optimized deployment process.

## 4.3. Public URLs

Environment	ACC	PROD
Public URLs	<a href="https://curate-acc.acqf-qcp.africa/">https://curate-acc.acqf-qcp.africa/</a>	<a href="https://curate.acqf-qcp.africa/">https://curate.acqf-qcp.africa/</a>

## 5. User roles

### 5.1. Administrator

#### Key Skills and Expertise:

- Strong understanding of all system features, architecture and infrastructure.
- Proficiency in managing cloud-based environments, CI/CD pipelines, and database systems.
- Knowledge of security protocols, such as authentication, encryption, and monitoring tools.
- Technical troubleshooting and problem-solving skills.

#### Role and Functions:

- Full oversight and management of the platform.
- Configure and maintain backend and frontend services.
- Monitor performance, handle security configurations, and manage user roles.
- Implement updates, patches, and fixes.
- Enforce system-wide policies and resolve any operational issues.

#### Type of Authorization Needed:

- Full administrative access to all system components, including infrastructure, backend, frontend, and user management.

### 5.2. Qualification Curator

#### Key Skills and Expertise:

- Familiarity with data management processes, including CRUD (Create, Read, Update, Delete) operations.
- Understanding of qualification frameworks and organizational structures.
- Basic knowledge of user-friendly content management tools.
- Attention to detail and ability to validate data for accuracy and relevance.

#### Role and Functions:

- Manage qualification and organization-related data on the platform.
- Create, edit, update, and delete qualifications and organizational records.
- Collaborate with other stakeholders to ensure data consistency.

**Type of Authorization Needed:**

- Access to CRUD screens for Qualifications and Organizations.
- Restricted permissions to ensure focus on content management only, without access to user or system configurations.

### 5.3. Virtual Space Administrator

**Key Skills and Expertise:**

- Intermediate understanding of data and user management.
- Familiarity with role-based access control principles.
- Strong organizational and communication skills for team coordination.
- Attention to security and user-specific access protocols.

**Role and Functions:**

- Perform all Qualification Curator functions (manage qualifications and organizations).
- Manage user accounts within their specific virtual space, including:
  - Creating and assigning user roles.
  - Modifying access permissions as needed.
- Ensure that the virtual space adheres to data access policies and security standards.

**Type of Authorization Needed:**

- Access to CRUD screens for Qualifications, Organizations, and Users.
- Role-based access limited to the specific virtual space they administer, preventing overlap or interference with other spaces.

This structure ensures each role operates effectively within its scope, contributing to the overall security and efficiency of the ACQF QCP platform.

## 6. Platform Security

The ACQF Qualifications and Credentials Platform (QCP) has been designed with a strong focus on protecting the confidentiality, integrity, and availability of stakeholders' data. We understand that ensuring data security is critical to building trust and enabling effective platform adoption. This section explains how the platform safeguards sensitive information through clearly defined measures.

### **Authentication and Authorization:**

- **Controlled Access:** Each user is assigned specific roles that determine their access level, ensuring that data is only accessible to authorized individuals.
- **Role-Based Permissions:** Permissions are assigned based on users' responsibilities, limiting access to data and features strictly necessary for their tasks.
- **Administrative Management:** Designated administrators can manage user accounts, adjust permissions, and revoke access when necessary.

### **Encrypted Data Transfer:**

- **Secure Communication Channels:** All data transmitted between users and the platform is encrypted using Transport Layer Security (TLS). This prevents interception and ensures data confidentiality.
- **Data Integrity Assurance:** Encrypted transfers protect against tampering during data exchanges, preserving the integrity of transmitted information.

### **Data Access Restrictions:**

- **Virtual Space Isolation:** Each organization's data is stored in its dedicated virtual space, fully isolated from other organizations. This prevents data overlap and unauthorized access.
- **Fine-Grained Access Control:** Access is granted on a need-to-know basis, ensuring that only relevant personnel can access sensitive data.

### **Data Validation:**

- **Quality Assurance:** Every data entry is checked against strict validation rules to ensure completeness, correctness, and consistency.
- **Error Detection and Alerts:** The system automatically flags invalid entries, enabling corrective action before data is processed or published.

### **Vulnerability Watch:**

- **Security Awareness:** The platform maintains a proactive approach to identifying potential vulnerabilities by staying informed of emerging security risks.
- **Incident Preparedness:** Established procedures ensure that any reported or detected vulnerabilities are assessed and addressed promptly.

These measures ensure that data handled within the ACQF QCP remains secure, private, and reliable. By adhering to industry best practices and implementing strict access controls, we are committed to providing a safe environment for managing and sharing educational and credential data.

## 7. Overview of the offer forms

### 7.1. Current Order Form (OF3)

The current Order Form (OF3) for the ACQF QCP is set to conclude by **June 2025**, and covers the following remaining deliveries:

#### Software Development

- **By 30 June 2025:**
  - Deployed new release of the Software Service: Fully operational backend and frontend components, including the General Public User Interface.
  - Updated user Documentation: Comprehensive guides on using platform features.
  - Set of Test Cases: Documented test scenarios for system validation.
  - Development Report: Detailed summary of development progress, system implementation, and technical specifications.

#### Data Collection Coordination

- **By 31 March 2025:**
  - Data Collection Status Report (March 2025): Update on national-level data collection progress.
- **By 30 June 2025:**
  - Data Collection Status Report (June 2025): Final update on data collection efforts.
  - Initial Data Upload: Successful upload of validated qualifications data to the platform.

#### Capacity Development and Advocacy (Phase 2)

- **By 31 March 2025:**
  - Comprehensive Training Manual: Detailed reference material for stakeholders managing the platform.
  - Training Workshop and Materials: In-person training sessions with supporting resources.
- **By 30 June 2025:**
  - Webinar Series and Digital Resources: Delivery of five webinars covering key platform features and use cases.

- eLearning Modules and Support Package: Interactive training modules for continuous learning.
- Learners' Feedback Analysis Report: Summary of feedback from training participants.

These deliverables will ensure the platform's full deployment, robust data collection, and comprehensive training of relevant stakeholders, supporting the operational readiness of the ACQF QCP by mid-2025.

## 7.2. Main Packages for the Next Order Form (OF4) and Timeline

The next Order Form (OF4) is expected to focus on further expanding and refining the ACQF QCP. Based on the current documentation and projections, the key packages and timeline might include the following:

### 1. Main Packages:

- **Software Enhancements:** Expanding functionalities such as advanced data import services, enhanced UI/UX, and integrating machine learning for data analysis and comparison.
- **Data Integration:** Scaling the connection of national qualifications databases to the continental platform.
- **Advanced Capacity Development:** Additional training modules, workshops, and support for stakeholders to maximize platform adoption and efficiency.
- **Monitoring and Optimization:** System performance tracking, bug fixes, and iterative improvements based on stakeholder feedback.

### 2. Timeline:

- Expected start: **July 2025** (immediately after OF3 concludes).
- Expected end: **June 2026**.

### 3. Estimated Budget:

- The estimated amount could be expected to range between **€150,000 and €200,000**, depending on the scope of work and deliverables.

This next phase will ensure continued development and operational stability, laying the groundwork for a fully functional and widely adopted platform by the end of the ACQF-II project timeline in 2026.

## 8. Conclusions

The development of the ACQF Qualifications and Credentials Platform (QCP) has advanced significantly, establishing a robust foundation for a modern, scalable, user-centered and data-centric system.

The project has achieved critical milestones, including system design, core functionalities development, and platform deployment.



Key infrastructure components such as backend and frontend services, secure authentication, and role-based access have been successfully implemented, ensuring seamless and secure operations.

### **Achievements Summary:**

- **Software Development:** Major platform features, including user role management, data validation, and secure data storage, have been deployed. The implementation of Elasticsearch, Keycloak, and CI/CD pipelines has strengthened system performance and security.
- **Data Management:** The data collection process has been streamlined with a clear protocol, ensuring quality and accuracy. Continuous data uploads and validation processes are now operational.
- **Capacity Development:** Comprehensive training manuals, webinars, and in-person workshops have equipped stakeholders with the necessary skills for platform management. This has built a knowledge base critical to sustaining the platform.
- **Security and Compliance:** Robust security protocols, including TLS encryption, data access restrictions, and vulnerability monitoring, have reinforced the platform's data protection and operational integrity.

### **Next Steps:**

Looking ahead, the next phases of development (second phase of OF3 and OF4) will build on these foundations by enhancing platform functionalities, expanding data integration capabilities, and delivering advanced features such as data analysis, machine learning integration, and a fully developed public user interface.

### **Final Reflection:**

The ACQF QCP development journey has demonstrated strong collaborative efforts, technological innovation, and adherence to best practices. By fostering partnerships with stakeholders, national authorities, and technical experts, the platform has evolved into a comprehensive solution ready to support the educational and qualifications framework across Africa.

The continued development, guided by lessons learned and evolving project goals, promises a highly impactful, scalable, and user-friendly platform that will enable efficient data management, policy development, and cross-border recognition of qualifications across the continent.