MINISTRY OF GENDER, LABOUR
AND SOCIAL DEVELOPMENT

REPUBLIC OF UGANDA

Ministry of Gender, Labour & Social Development (MGLSD)

Maintenance of National Single Registry (NSR)

Closing Report

September 2024

DOCUMENT ACCEPTANCE AND RELEASE NOTICE

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ACRONYMS

API	Application Programming Interface
BRD	Business Requirements Document
DP	Development Pathways Ltd
ESP	Expanding Social Protection
MGLSD	Ministry of Gender, Labour & Social Development
MoLG	Ministry of Local Government
MoPS	Ministry of Public Service
M&E	Monitoring and Evaluation
MIS	Management Information System
GoU	Government of Uganda
NIN	National Identification Number
NSPP	National Social Protection Policy
HCM	Human Capital MIS
NITA-U	National Information Technology Authority - Uganda
NIRA	National Identification & Registration Authority
NSR	National Single Registry
PMU	Programme Management Unit
SAGE	Social Assistance Grant for Empowerment
TOR	Terms of Reference
SDD	System Design Document
TOT	Training of Trainers
UAT	User Acceptance Training
WFP	World Food Programme
MDA's	Ministries and Development Agencies

REVISION HISTORY

Date	Version	Description	Author
8th Sept 2024	1.0	1st draft of the NSR Closing Report	Jeniffer Chirchir
13th Sept 2024	1.1	2nd draft of the NSR Closing Report	Peter Ndeda & Elias Maina

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A INTRODUCTION

The Ministry of Gender, Labour, and Social Development (MoGLSD) has been implementing the National Single Registry (NSR) to support the coordination of the broader Social Protection (SP) system and enhance national level monitoring. Commissioned in February 2021, the NSR is designed to bring together information on a range of national social protection systems, integrate information from the World Food Programme's (WFP) Karamoja Social Registry (KSR) and provide unified gateway to National Identification and Registration Authority (NIRA) for sector-wide verification of applicants and beneficiaries of social protection interventions.

Whilst previous phases have led to integration of new SP MISs, MGLSD in partnership with the World Food Programme (WFP) contracted Development Pathways (DP) from June 2023 to on board additional SP schemes and provide maintenance and support of NSR under the work streams to be described in this report.

The National Single Registry (NSR) serves a critical function of consolidating essential information on beneficiaries/potential beneficiaries, payments, complaints & grievances and exits for social protection programmes through establishment of linkages with social protection schemes Management Information Systems (MISs), National ID Database, Human Capital Management Information System (HCM MIS) and other relevant systems.

In terms of functionality, the NSR MIS is designed to consolidate information across the main processes of social protection programmes:

i. Applicants/Beneficiaries processes;
ii. Payments/disbursements (Payments, Loans/Grants and Benefit's) processes;
iii. Complaints processes; and
iv. Exits processes

This report therefore provides the activities of each work stream and the deliverables that were submitted as defined in the TORs. It does not aim to re-produce the deliverables as these are set out as separate outputs and have been shared with stakeholders for review. This report provides a summary of the deliverables status against what is set out in the TORs, describes key risks, benefits and recommendations associated with the implementation of the National Single Registry (NSR).

The report is broken down as follows:

i. Section A: provides the project introduction;
ii. Section B: presents the activities of the project work streams and the deliverables;
iii. Section C: presents the schedule of milestones and deliverables;
iv. Section D: sets out the key achievements and challenges.

B PROJECT WORKSTREAMS AND DELIVERABLES

The assignment consisted of four main work streams, namely:

B.1 Inception and Analysis Phase

The Inception and Analysis Phase was critical for laying the groundwork for upgrading and maintaining the NSR, as well as supporting its integration with other social protection programmes Management Information Systems. The process began with validating the requirements that were issued, and it involved consultations with key stakeholders to define the necessary improvements, such as feature enhancements, security upgrades, and performance optimizations. In parallel, integration requirements for external MIS systems were thoroughly evaluated to ensure seamless data exchange and standardized communication protocols.

A thorough technical analysis of the current system, including the API architecture, data flow, and performance metrics, was conducted to identify bottlenecks and areas of improvement. This analysis fed into the creation of a strategic upgrade plan that outlined necessary enhancements, integration strategies, and project milestones.

As part of the planning process, a detailed risk analysis and mitigation strategy was developed. Potential risks, such as system downtimes during the upgrade, integration challenges with external MIS, or security vulnerabilities, were identified and addressed. Mitigation plans, including fall-back systems, contingency measures, and backup protocols, are established to minimize the impact of these risks. The outputs for this phase were **an inception report, Project Management Plan and Risk Management Plan Report**.

B.2 Additional Enhancements

As part of ongoing efforts to improve the NSR's performance, functionality, and user experience, several additional enhancements have been implemented, including a major upgrade to .NET 8.0 and C#12 from .NET 2.2 and C# 7.3 this phase was split into two key work streams i.e.

i. Upgrade of the NSR; and
ii. End to End Quality Assurance.

B.2.1 Upgrade of NSR

This upgrade allows NSR to leverage the advanced features and improvements offered by .NET 8.0, enhancing both the system's efficiency and its ability to support modern development practices. Key highlights of these enhancements included optimized data processing, enhanced security protocols, a more intuitive user interface, and workflows that reduce manual intervention, by transitioning the NSR to .NET 8.0 and C#12 from .NET 2.2 and C# 7.3, we have also gained access to superior performance optimizations, better scalability,

and improved support and cross-platform deployment capability. The enhancements undertaken included the following,

- Introduction of Import feature across (Beneficiaries (Individual/Group & Household), Disbursement (Payments/Group Disbursements, Repayments and Benefits Benefits)/Recoveries/Complains/Exits, HCM (Public Service Pensioners) and Contribution details and summaries.
- Upgrade of the public portal to make it more appealing and enhance its readability/presentation.
- Upgrade of API's (NIRA NIN Check to include Living status, photo and in addition include a complementarity check across programmes for an individual in the NSR and the Benefits API to allow for multiple benefits to be send to the NSR.
- Introduction of One Time Password (OTP) over email and other security features such as device and location sensitive logins and disabling simultaneous logins from multiple devices at same time.
- Split of audit functions in the system (System audit and API audits) to ease the administration of the system.
- Added feature to allow selection of multiple years on the financial year filter in reports and specify the period to be able to view trends.

These changes not only improved the overall usability of the NSR Version 2.0 but also ensured that the NSR is better equipped to handle complex tasks, and evolving user demands both in the medium and long term. Through continuous development, we delivered a system that is robust, reliable, and responsive to the needs of its users, while staying at the forefront of technological advancements.

B.2.2 End to End Quality Assurance

To ensure the reliability and effectiveness of these changes, a comprehensive User Acceptance Testing (UAT) was conducted. This involved thorough testing of the NSR Version 2 by end users from the NSR TWG team to validate that the enhancements that were performed to the NSR met business requirements and performed as expected in real-world scenarios.

UAT activities included verifying system functionality, performance, and user interface improvements, with a focus on identifying and addressing any potential issues before full deployment. This process ensured that all updates were aligned with user needs and business objectives of the NSR.

Key highlights of these enhancements include optimized data processing, enhanced security protocols, a more intuitive user interface, and automated workflows that reduce manual intervention. By transitioning to .NET 8.0, we gained access to superior performance optimizations, better scalability, and improved support for cloud-based applications and cross-platform development.

These changes, validated through UAT, not only improve the overall usability but also ensured that the system is better equipped to handle complex tasks and evolving user demands. Through continuous development and quality assurance, we delivered a system that is robust, reliable, and responsive to the needs of its users, while staying at the forefront of technological advancements.

The UAT was conducted by the National Support and Training Specialist and the Lead developer in Ridar hotel in Mukono district between **15th and 19th January 2024**. a comprehensive QA report entailing QA and UAT activities and outcomes was produced as an output/deliverable for this work stream.

B.3 Onboarding of additional social protection schemes

The on boarding of additional social protection schemes to the National Single Registry for Social Protection represented a vital contribution to the implementation of the National Social Protection Policy (NSPP 2019). This process ensures a unified and streamlined approach to managing social protection programs, enhancing the efficiency and coordination of service delivery by the MGLSD as part of its mandate in its functions as outlined by the NSPP 2019 Version.

As part of the Onboarding of social protection schemes to the NSR, standardisation of Geo locations to the MoLG master list for Districts, Sub counties, Parishes and villages was undertaken, Additionally the Geo Locations were coded with Location codes as per UBOS standards and specifications for Geo coding, this activity ensured that the correct locations were incorporated to the NSR and that the SP programs could validate and update the geo locations for their use from the NSR.

By integrating the various social protection schemes into a the NSR, policymakers and other key industry players at the MGLSD and GoU can better monitor, evaluate, and target support to vulnerable populations, ensuring that resources are allocated equitably and effectively. Ultimately, this effort strengthens social protection promoting inclusivity and advancing the goals of the National Social Protection Policy.

During the current maintenance phase (June 2023 to August 2024), a total of 10 legacy programme MISs ratified their geo locations and integrated with the upgraded NSR (Version 2), either through API'S or using the NSR's data import templates. The activity was led by the National consultant who was also a QA specialist and the lead developer, the DP and MGLSD team engaged with the different personnel managing the different social protection programmes throughout the maintenance period.

B. 3.1. Data Synchronisation from Individual SP Programmes to the NSR

During the maintenance phase of the NSR, ensuring the seamless flow of data between individual social protection programs MISs and the NSR was considered a priority activity. This activity focused on refining and optimizing data streaming and loading processes, where data

generated by various programs SP programs that have previously been linked to the NSR and the newly on boarded SP programs needed to be efficiently transferred and integrated into the NSR by leveraging APIs and employing templates to transfer data as applicable.

During the just concluded maintenance phase, the following legacy programme MISs have been integrated and data synchronised with the upgraded NSR (Version 2.0):

1. Social Assistance Grants for Empowerment (SAGE);
2. Northern Uganda Social Action Fund3(NUSAF3);
3. Development Response to Displacement Impact Project (DRDIP);
4. National Social security Fund (NSSF);
5. Orphans and Vulnerable Children (OVC);
6. JUAKALI
7. Uganda Child Helpline (UCHL) /SAUTI-116);
8. Uganda Women Entrepreneurship Program (UWEP);
9. Youth Livelihoods programme (YLP); and
10. Disability Programme.

As part of this maintenance phase, the following new social protection schemes had also been planned to be integrated to the NSR, but data is yet to be synchronised to the NSR due to delays in administrative processes, data protection concerns and lack of technical staff;

11. Girls Empowering Girls (GEG) Programme;
12. Public Service Pension Scheme (PSPS)/Human Capital MIS(HCM);
13. Karamoja Social Registry (KSR);
14. Integrated Community Learning for Wealth creation (ICOLEW)

Other new SP schemes that were requested during the UAT session and need to be synchronised but are either at concept stage, do not have MIS/data or there are data protection concerns;

15. Social Grant for older Persons (SEGOP)
16. Uganda Retirement Benefits Authority (URBRA)
17. Growth for Rural Opportunities and Wealth creation (GROW)
18. Northern Uganda Social Action Fund4(NUSAF4)

B.3.1 Detailed Synchronisation Activities

B.3.1.1. SAGEMIS

SAGEMIS is one of the legacy systems that had been integrated to the NSR in previous maintenance phases. However, data streaming to the NSR had stalled due to the following reasons:

- Ongoing system update activities for SAGEMIS had caused mismatches in the endpoints for data transmission;
- Mismatches in Geo locations due to spit in locations which had been implemented in SAGEMIS but not in the NSR;

- Mismatches in Geo location codes;
- Misalignment of data for synchronisation; and
- Missing fields in data that was being synced by SAGEMIS to the NSR being rejected due to validation.

The DP team supported the SAGEMIS Team synchronise data to the NSR through the NSR API involved a multifaceted approach which included, aligning the Geo codes for SAGEMIS and the NSR with Geo data from the Ministry of Local Government to ensure standardisation, continued functionality and efficiency.

We worked collaboratively with SAGEMIS Team and the team at NITA-U & the MGLSD to undertaken analysis, troubleshooting, corrective data maintenance at both SAGE MIS & the NSR MIS and optimization efforts to address any issues that arose during data synchronisation and post-implementation.

Further maintenance activities included regular performance evaluations to identify and rectify potential bottlenecks, ensuring optimal data transmission rates and system responsiveness. Moreover, proactive measures such as implementing security patches and updates safeguard against potential vulnerabilities, ensuring data integrity and system reliability. Timely resolution of any encountered issues through comprehensive support mechanisms, including support and user training, fostered further user confidence and minimized downtime ensuring optimal data flow between SAGEMIS & the NSR now and in the medium and long term.

B.3.1.2. DRDIP/NUSAF 3 MIS

DRDIP & NUSAF3 had been integrated to the NSR in previous maintenance phases. However, data synchronisation to the NSR had also stalled at some point due to the following reasons:

- Outdated API being implemented by DRDIP for individual beneficiaries' data synchronisation the NSR;
- Mismatches in Geo locations due to spit in locations which had been implemented in the NSR but not in the NUSAF/DRDIP MIS;
- Mismatches in Geo location codes; and
- Misalignment of data for synchronisation.

The DP team supported the DRDIP team to synchronise data to the NSR through the NSR API involved employment of multiple strategies. The strategies employed included, error identification for the numbers that failed to synchronise from DRDIP to the NSR, capture & update of missing files on data received from DRDIP to the NSR and DRDIP upgrading their MIS to consume the latest version of the NSR API to minimise geo location error's (i.e. match for sub counties instead of villages), these efforts are still ongoing.

B.3.1.3. OVC MIS

OVC-MIS had been integrated with the NSR during previous maintenance phases. However, data synchronization to the NSR encountered delays for the following reasons:

- Mismatches in Geo location codes;
- Outdated API being implemented by OVC MIS for individual beneficiaries' data synchronisation the NSR; and
- Mismatches in Geo locations due to spit in locations which have been implemented in the NSR but not in the OVC MIS.

The DP team has assisted the OVC Team in synchronizing data with the NSR through the NSR API, employing a comprehensive strategy. This strategy involved identifying errors for numbers that didn't synchronize from OVC-MIS to the NSR and upgrading the OVC MIS to utilize the latest version of the NSR API, aiming to reduce geolocation errors (e.g., matching sub-counties instead of villages).

During this period, these initiatives resulted in significant gains as the submissions from the OVC to the NSR. Additional endeavours to further boost the quantity and data sent to the NSR from the OVC-MIS were finalised and OVC has 100% data synchronisation rates with the NSR.

B.3.1.4. NSSF Registration, Claims and Payments Management Information System (RCPMIS)

During this maintenance phase, the integration of NSSF into the NSR was completed. NSSF can share data with the NSR using upload templates structured according to formats previously agreed upon by both NSSF and MGLSD. NSSF provides the NSR with several types of data as per the below templates for improved clarity and organization:

- **Import Beneficiary Summaries:** These summaries are employed to update payment summaries for beneficiaries, facilitating the aggregation of data.
- **Import Contribution Summaries:** This data is used to update contribution summaries, aiding in the aggregation of beneficiary data from NSSF.
- **Import Payment Summaries:** These summaries are utilized to update payment summaries, enabling the aggregation of beneficiary data.
- **Import Complaint Summaries:** Used to update complaints summaries for aggregate data for beneficiaries

The DP team supported the MGLSD team in uploading data from the NSSF to the NSR.

B.3.1.5. JUAKALI & ICOLEW MIS

Throughout this maintenance phase, the integration of JUACALI & ICOLEW into the NSR was finalized. Both JUAKALI & ICOLEW can seamlessly share data with the NSR through upload templates structured according to formats previously endorsed by the TWG assisting the MGLSD with the NSR.

JUAKALI & ICOLEW contributes group beneficiaries' data to the NSR using the 'Import Group Beneficiaries' templates provided, enhancing clarity and organization. The DP team supported the MGLSD team in uploading data from the JUAKALI & ICOLEW data to the NSR.

The templates described above were utilized to transfer the relevant data onto the NSR platform.

B.3.1.6. DISABILITY & SEGOP MIS

During this maintenance phase, the integration of DISABILITY & SEGOP into the NSR was completed. Both DISABILITY & SEGOP now effortlessly share data with the NSR using upload templates designed according to formats previously approved by the TWG supporting the MGLSD with the NSR.

DISABILITY & SEGOP contributes group beneficiaries' data to the NSR using the 'Import Group Beneficiaries' templates, enhancing clarity and organization.
The DP team assisted the MGLSD team in uploading data from the JUAKALI & ICOLEW datasets to the NSR. The templates mentioned earlier were employed to transfer the pertinent data onto the NSR platform.

B.3.1.7. YLP & UWEP MIS

Both YLP & UWEP can seamlessly share data with the NSR through upload templates structured according to formats previously endorsed by the TWG assisting the MGLSD with the NSR.

YLP & UWEP contributes group beneficiaries' data to the NSR using the 'Import Group Beneficiaries' templates provided, enhancing clarity and organization. The DP team supported the MGLSD team in uploading data from the YLP & UWEP data to the NSR. The templates described above were utilized to transfer the relevant data onto the NSR platform.

B.3.1.8. GEG MIS

GEG a new program under KCCA and UNICEF GEG-MIS has been integrated with the NSR during this maintenance phase. However, data synchronization to the NSR has encountered delays due to administrative issues that are internal to the GEG Program

The DP team has supported the GEG Team/I-Tec (Team Supporting GEG MIS Integration) in integrating the GEG MIS with the NSR through the NSR API. Further efforts to facilitate data transfer from the GEG-MIS to the NSR are currently underway through collaboration between KCCA and MGLSD.

B.3.1.9. HCM (Public Service Pensioners Scheme) MIS

The DP team collaborated with MGLSD, NITA, and MoPS (supported by the HSENID-BIZ ICT team working with MoPS on building the HCM) to test the APIs for HCM integration. We developed an API Web client feature within the NSR and configured the NSR to request data from the HCM through a "Wake Up" feature interface within the NSR.

These tests were successfully completed, documented, and approved by MGLSD management. All necessary configurations for synchronizing data from the HCM to the NSR

are in place. However, the synchronization has not occurred due to administrative challenges between NITA and MGLSD as of the time of writing this report.

B.3.2. Social Protection Schemes Integration and data synchronisation Modes with the NSR.

Significant progress was made in integrating legacy program MISs with the upgraded NSR (Version 2.0). These integrations have been achieved using either the Data Imports template or the NSR API Endpoints. The table below summarizes the integration modes applied to respective MISs and in addition indicates status of data synchronization for the MISs/SP Programs.

Table 1: Integration Modes to NSR

#	System/Programme Name	Mode of Synchronisation	Status of Synchronisation	Comments
1	SAGE	API Integration	Synchronised	
2	UHCL/SAUTI 116	API Integration	Synchronised	
3	NUSAF 3	API Integration	Synchronised	
4	DRDIP	API Integration	Synchronised	
5	OVC	API Integration	Synchronised	
6	UWEP	Integration Via Templates	Synchronised	
7	YLP	Integration Via Templates	Synchronised	
8	Disability Grant	Integration Via Templates	Synchronised	
9	SEGOP	Integration Via Templates	Not Synchronised	Program does not have data to share
10	NUSAF4	Not Integrated	Not Synchronised	Program is at concept stage
11	KCCA/GEG	API Integration	Pending Synchronisation	Delays in System Enhancements by KCCA Vendors
12	PSPS/HCM	API Integration	Pending Synchronisation	MGLSD/NITA resolving VPN Connectivity
13	ICOLEW	Integration Via Templates	Pending Synchronisation	MIS At development Stage
14	URBRA	Not Integrated	Not Synchronised	Program at Administrative clearance stage with MGLSD

#	System/Programme Name	Mode of Synchronisation	Status of Synchronisation	Comments
15	GROW	Not Integrated	Not Synchronised	Program Just Started/No MIS
16	NSSF	Integration Via Templates	Synchronised	
17	KSR	Integration Via Templates	Pending Synchronisation	Clearance for Data synchronisation being sought
18	JUAKALI	Integration Via Templates	Synchronised	

B.3.3. Data Synchronisation Statistics

The table below outline the extent of work involved in transferring data to the NSR from individual SP schemes and highlights current progress. It is important to note that these figures are latest based on NSR portal statistics and will continue to evolve based on ongoing data synchronization efforts from individual SP programmes.

Table 2: Summary table with numbers of data synchronised to the NSR in the current maintenance phase

#	System/Programme Name	Applicants/ Beneficiaries	Payments/Benefits	Amount (Paid)	Complaints & Grievances	Exits
1	SAGE	2,063,283	9,930,270[1]	735,587,100,727	2,442	144,538
2	NSSF	1,710,912	403,386	6,683,808, 821,508	8,992	
3	DRDIP	3,101				
4	UCHL	5,088				
5	OVC	473,910				
6	NUSAF3	93,073				
7	JUAKALI Programme	874				
8	DISABILITY Programme	27,565				
9	UWEP	17,348				
10	YLP	17,723				
	Total	**4,412,877**	**10,333,656**	**7,087,194,512,700**	**11,434**	**144,538**

It is important to highlight the significant improvement across thematic areas compared to the pre-maintenance phase, as illustrated in Table 3 below.

Table 3: Thematic areas

#	System/Programme Name	Applicants/ Beneficiaries	Payments/Benefits	Amount(Paid)	Complaints & Grievances	Exits
1	SAGE	247,012				
2	DRDIP	2,712				
3	UCHL	5,088				
4	OVC	74,547				
5	NUSAF3	93,073				
	Total	**422,432**	**0**	**0**	**0**	**0**

[1] As at the time of authoring this document, data from SAGE for payments, was still synchronising to the NSR.

Table 4: Comparison of data for the previous maintenance phase versus the current maintenance phase.

#	Thematic Area	Current maintenance phase(June 2023-Aug 2024)	Before the Current maintenance phase	Total Increment
1	Applicants/ Beneficiaries	4,412,877	422,432	3,990,445
2	Payments/Benefits (Individuals)	10,333,656	0	10,333,656
3	Amount (Total Amounts Paid)	7,087,194,512,700	0	7,087,194,512,700
4	Complaints & Grievances	11,434	0	11,434
5	Exits	144,538	0	144,538

As we move forward from this maintenance phase, we anticipate increased data synchronization to the NSR in the short and medium term. This includes data from social protection (SP) schemes integrated during this maintenance phase, as well as from previous NSR maintenance phases and newly integrated or synchronized SP schemes.

Through concerted efforts, the DP Team, MGLSD, and stakeholders from the integrated SP schemes are working to streamline processes and ensure efficient data synchronization to the NSR. The teams are proactively addressing potential challenges and optimizing operations to maximize efficiency. The primary focus remains on fostering collaboration, enhancing interoperability, and staying attuned to emerging trends to quickly adapt to evolving data synchronization needs for both the NSR and the individual MISs of SP schemes.

Additionally, the emphasis will continue to be placed on collaboration, interoperability, and adapting swiftly to changes in data synchronization requirements for the NSR and other MISs.

B.4 Knowledge Transfer

The Knowledge Transfer phase was a critical component in the successful completion and transition of the NSR maintenance phase. It encompassed a comprehensive handover of knowledge, skills, and assets to ensure the continuity, sustainability, and effective future management of the NSR beyond the maintenance contract.

This phase was organized around three key components: updating NSR documentation, conducting onsite training, and delivering the NSR's source code and database designs to the MGLSD Technical Team. Each of these elements played a crucial role in empowering MGLSD stakeholders and ensuring the long-term success of the NSR.

1. Updating Manuals and Documentation

One of the first steps in the knowledge transfer process for the NSR was the thorough review and updating of all NSR's technical documentation. These included the following:

- **User Manuals:** The **public and Private portal user manuals** were updated, in addition, the **API documentation was also updated to the latest version (0.9)**. These manuals were updated to reflect the changes and additions because of the upgrades to the NSR, providing end users with clear, step-by-step instructions for operating the NSR and utilizing its features. They are essential for guiding users through daily tasks, troubleshooting common issues, and understanding system capabilities after the recent upgrades.
- **Source code and System Administration Manuals:** These were updated, and the manuals has configuration details, integration points and deployment processes. The technical documentation is crucial for IT personnel at the MGLSD responsible for NSR's maintenance and support, ensuring they have the detailed knowledge needed for troubleshooting, upgrading, or modifying the system in the future post the current maintenance contract expiry.

This step ensured that all relevant information was up to date and readily accessible, enhancing the capacity of MGLSD's users and technical teams to manage and operate the NSR effectively with minimal external support

2. Technical Onsite Training

This training was a key part of the knowledge transfer phase, providing hands-on, practical learning opportunities for the end users and technical teams at the MGLSD for the NSR. The training was structured to cater to different audiences, ensuring that all relevant personnel receive the necessary skills and knowledge. These training was done in Kampala at MGLSD offices between 24th and 26th July 2024 led by the Lead Developer and National consultant.

Key aspects of the training included the following:

- **Operational Training for End Users:** Focused on ensuring that users can effectively utilize the NSR's features in their daily tasks. The training covered common workflows, system navigation, reporting capabilities, and other advanced features specific to their

roles. The goal of this training was to empower end users to perform their jobs efficiently, reducing the need for external support especially in general usage or in the integration and data sharing between SP programs MIS's and the NSR.

- **Technical Training for IT and Support Teams:** This training delved into the NSR's underlying architecture, covering areas such as database management, software configuration, system integration, and troubleshooting techniques. This knowledge is essential for ensuring that internal teams can maintain and support the NSR post-handover, allowing them to resolve issues quickly and reduce downtime.

The training involved scenario-based Learning that included practical, scenario-based case studies designed to mimic real-world situations that users and technical teams may encounter. These exercises helped in solidifying the understanding and prepared the MGLSD teams for actual operational challenges with the NSR.

The training also included an introduction to the user manuals for the public and private portal of the NSR, feedback and endorsement of the operational manual was obtained from the team. The training also included review of material and practical activities for the following Modules and sub-modules in both the public and private portal:

Public Portal Submodules

i. **Applicants:** includes a function for viewing the number of beneficiaries and potential beneficiaries for each programme disaggregated by gender.
ii. **Payments:** includes a function for viewing the payments/disbursements/benefits made to beneficiaries as per thematic areas, programmes, and fiscal year.
iii. **Complaints:** includes a function for viewing beneficiaries' complaints resolved that are categorised by payments, programme, and district as per thematic areas, programmes, and fiscal year.
iv. **Exits:** includes a function for viewing beneficiaries exits made by reason, programme, and district as per thematic areas, programmes, and fiscal year.
v. **Reports:** includes a function for viewing, producing, and downloading reports across various programmes operational functions i.e. beneficiaries, payments, complaints and exits. The reports can be extracted as per thematic area, programme, financial year, District/City, County/Municipality, Sub-County/Division/Town Council, Parish/Ward, Village/Cell.
vi. **Publications:** includes a function for viewing and downloading publications.

Private Portal Submodules

i. **Applicants:** includes a function for viewing the number of beneficiaries and potential beneficiaries for each programme disaggregated by gender.
ii. **Payments:** includes a function for viewing the payments/disbursements/benefits made to beneficiaries as per thematic areas, programmes, and fiscal year.
iii. **Complaints:** includes a function for viewing beneficiaries' complaints resolved that are categorised by payments, programme, and district as per thematic areas, programmes, and fiscal year.
iv. **Exits:** includes a function for viewing beneficiaries exits made by reason, programme, and district as per thematic areas, programmes, and fiscal year.
v. **Reports:** includes a function for viewing, producing, and downloading reports across various programmes operational functions i.e. beneficiaries, payments, complaints

and exits. The reports can be extracted as per thematic area, programme, financial year, District/City, County/Municipality, Sub-County/Division/Town Council, Parish/Ward, Village/Cell.

vi. **Publications:** includes a function for viewing and downloading publications.
vii. **Services:** includes a function for Complementarity Analysis, NIRA National Identification Number (NIN) Verification, NIRA Bulk Verification and Application Programming Interfaces (API) Data Updates.
viii. **Geolocations:** includes functions to view, create, edit, and search regions, districts, counties, sub-counties, parishes, and villages.
ix. **Administration:** includes sub modules to view, create, edit, and search benefits, sectors, programmes, programmes components, funding sources, exit types, complaint types, document types, documents, institutions, age groups, indicators, acronyms and definitions, and useful links.
x. **Settings:** includes a function to change mail settings, function to view, create, edit, and search notifications, a function to change NIRA API settings sectors, and a function to change account settings.
xi. **Security:** includes sub modules for application roles, application users and Audit Trail.

To facilitate the smooth transition of technical responsibilities from the development team to the MGLSD, the following knowledge transfer activities were undertaken:

i. **Technical configurations and operations:** The DP team conducted thorough training sessions covering the technical configurations and operational facets of the NSR. The MGLSD technical team received detailed guidance on the entire NSR system, focusing particularly on the initial setup tasks such as uploading the MGLSD logo and configuring the privacy policy, among other system settings.

   Additionally, there were discussions on the technical implications of various settings within the system, with a concerted effort to ensure that the MGLSD team gains proficiency in managing the system autonomously post-handover.

ii. **Trouble shooting and resolution to issues:** the DP team the DP team provided support to the MGLSD team on trouble shooting and resolution of key technical issues that may arise in the operation of the NSR, the team was taken through a systematic approach. This involved identifying issues, conducting root cause analysis, prioritizing based on impact, developing resolution plans, testing solutions, implementing fixes, monitoring for recurrence, and documenting the process for future reference.

The onsite nature of this training allowed for direct interaction, immediate feedback, and personalized instruction, ensuring a higher level of engagement and understanding in addition, the training also involved trouble shooting of errors and configuring the upgraded NSR. A training and maintenance report detailing the training activities and personnel that were trained at MGLSD was produced as an output for this activity.

3. Handover of Source Code and Database Designs

The final component of the knowledge transfer phase was the formal handover of all NSR Maintenance phase project assets, including source code, database designs, and other critical

configuration files. This handover was conducted with thorough documentation and detailed explanations during the training phases to ensure the receiving team at MGLSD has full ownership of the following:

- **Source Code:** A complete set of source code files for the NSR was provided, including the version number, dependencies, and deployment instructions. This included any relevant libraries, frameworks, or third-party integrations that the system relies on. Documentation around coding standards, structure, and modularization was included in the source code documentation to make it easier for future developers to understand and extend the codebase of the NSR.
- **Database Designs:** a comprehensive handover of the database schema, including stored procedures was provided. This gave the MGLSD team a deep understanding of how the data is structured, stored, and managed within the NSR. Any database-specific performance tuning, indexing strategies, or maintenance routines tips were also shared.

During the on-site training in Kampala from **24th – 26th July 2024**, MGLSD team had a walkthrough on source code manual and System administrator manual. Additionally, further source code walkthrough was also done virtually on **29th July 2024** before source code hand over on **31st July 2024**. The lead developer backed up the code on WeTransfer, password protected it and shared it with the MGLSD technical team in charge of the NSR. Important to note is that since there have been some additional changes on the code since the handover, and as discussed during governance meeting held on **30th August 2024**, the lead developer will repackage the code and share with MGLSD admin once all the updates has been done.

The Knowledge Transfer phase was more than just a handover—it was a structured process designed to ensure that the receiving teams are fully equipped to operate, maintain, and evolve the system without dependency on external resources. By focusing on updating comprehensive documentation, delivering in-depth onsite training, and providing a clear, well-documented handover of all system assets, The DP Team aimed to guarantee the NSR's sustainability and long-term success. This phase laid the foundation for a smooth transition and empowered the technical team at MGLSD to confidently take ownership of the NSR.

B.5 Maintenance and Support

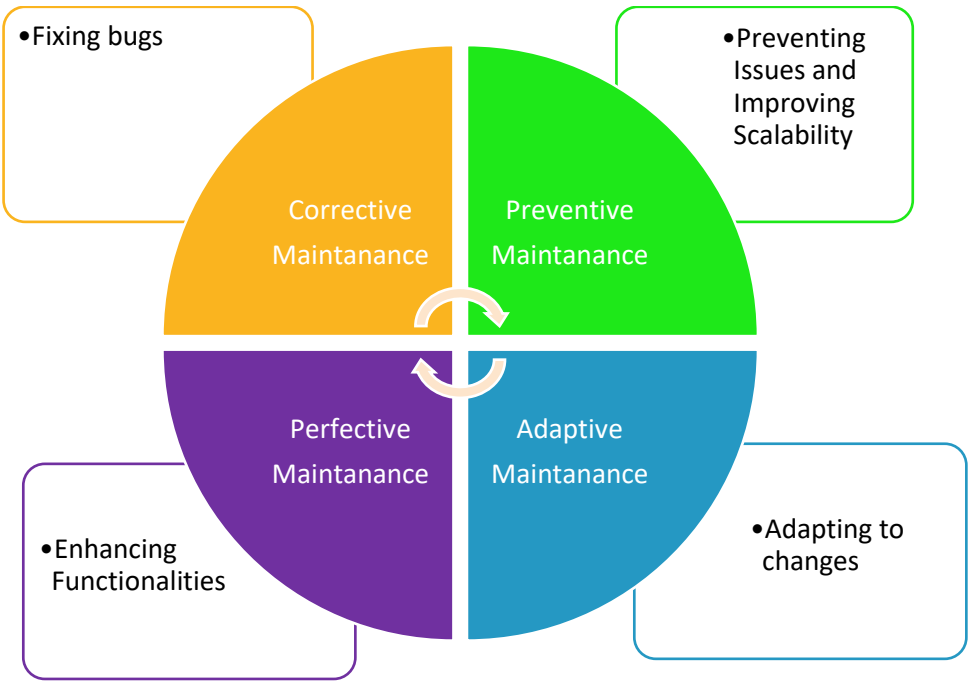
Maintenance and Support of NSR was a continuous activity since the start of the project. The DP National Support and Training consultant has been providing support in country by engaging with MGLSD and attending physical meetings with other Social Protection programmes that were meant to integrate and share data with the NSR. The lead developer has also been providing support remotely and during the in-country missions, as an output for these activities' maintenance reports have been produced.

Software maintenance encompassed a set of protocols aimed at enhancing the performance of the National Single Registry (NSR) application after its deployment. It encompasses various tasks, including bug fixes and adjustments to align the NSR with the National Social Protection Policy (NSPP) and the Ministry of Gender Labour and Social Development (MGLSD) goals and other associated requirements. Additionally, maintenance was undertaken to optimize the

NSR performance and keep it current and up to date. As illustrated in Figure B-, the NSR maintenance activities was divided into four categories, namely:

i. Corrective maintenance;
ii. Preventive maintenance;
iii. Adaptive maintenance; and
iv. Perfective maintenance.

Figure B-1: Maintenance typology



These maintenance activities are described in the following sections of the report.

B.5.1 Corrective Maintenance

This entailed the processes of changing, modifying, and updating the NSR to keep up with any changing needs after deployment to the production environment. This was done after the NSR was deployed to correct bugs and glitches identified by users.

The table below summarises errors that were identified and resolution that were provided during the maintenance phase

B.5.2 Preventive Maintenance

Preventative maintenance entails anticipating future needs to ensure that the NSR continues functioning optimally for an extended period. It encompassed essential adjustments, upgrades, and adaptations. The table below summarises preventive maintenance issues that were identified in the NSR and solutions applied.

B.5.3 Perfective Maintenance

Perfective software maintenance involves enhancing the NSR by incorporating new features as needed and eliminating features that are obsolete or ineffective. This iterative process ensures that the software remains aligned with evolving trends and user demands. This is meant to ensure that the NSR software remains a valuable tool for its users, by addressing their evolving requirements and preferences.

The table below summarises errors that were identified and resolution that were undertaken for perfective maintenance.

B.5.4 Adaptive Maintenance

Adaptive software maintenance endeavours to modify the software to ensure its continuous operation despite alterations in hardware, operating systems, business policies, and other variables. The table below summarises errors that were identified and resolution that were undertaken for adaptive maintenance.

Table 5: Summary of Issues identified and resolutions

No	Maintenance Issues	Resolution
1	Slow response on usage of the Bulk National Identity Number (NIN) Verification feature. This feature in the NSR allows programs to perform bulk verification for NIN's for individuals in their programs using an Excel template from the NSR. The feature was slow and would take longer than expected to validate files. Additionally, the background service that was implementing this task with the NIRA servers was not functional due to an outage and additionally failed to implement a password change service.	The slow responsiveness was fixed by further optimisation. The password change service was fixed and through collaboration with the team at MGLSD and NIRA the service was reinstated, and the feature tested and was confirmed to be working as expected with good throughput.
2	Error 500 on login with a link to go to homepage. This was caused by a redirection and data failure load on login.	The system was modified, and a resolution was made for this error.
3	Error on loading of the cascading filters for program data on the homepage on login to the private portal.	The cascade function was corrected, and this feature is working as expected.
4	The save button on assignment of roles and permissions was not responsive.	This was addressed and the button is now responsive
5	Lag in verification during usage of the Bulk National Identity Number (NIN) Verification feature. This	An auto refresh feature was added and in addition, this

No	Maintenance Issues	Resolution
	feature in the NSR allows programs to perform bulk verification for NIN's for individuals in their programs using an Excel template from the NSR.	function was converted to a system service, to enhance its reliability
6	Displaying immense numbers on the NSR dashboards without proper formatting or scaling can lead to visual clutter and reduced readability, hindering users' ability to quickly grasp the meaning of data.	To manage the challenge of displaying large numbers on dashboards as NSR data expands, data aggregation was implemented. This includes converting numbers into smaller units for improved readability. Utilize data summarization techniques and hierarchical visualization to convey trends without overwhelming users. And the deployment of Interactive features like zooming and filtering to enable users to explore details, ensuring usability and clarity amidst large data volumes.
7	Performance optimization for the Bulk NIN checks and user interface responsiveness	This was resolved by Identifying and addressing bottlenecks to improve the speed and efficiency of data retrieval and processing. It Involved optimizing database queries, enhancing caching mechanisms and leveraging parallel processing techniques to handle larger datasets more efficiently.
8	User Interface (UI) Enhancements & inclusion of the maps feature in the public portal.	This was resolved by updating the user interface to improve usability and user experience. This included redesigning dashboards for better organization and clarity, introducing intuitive navigation features, or implementing customizable

No	Maintenance Issues	Resolution
		layouts to cater to diverse user preferences.
9	User Interface (UI) Enhancements & inclusion of feature for beneficiaries by thematic areas in the public portal. In addition to including graphs for complains to enhance readability.	This included redesigning dashboards for better organization and clarity, introducing intuitive navigation features, and implementing customizable layouts to cater to diverse user preferences.
10	Integration of the NSR with Third-party Tools (NIRA API/HSM API) & Hardware Systems through VPN	Resolved, to proactively monitor and adaptively maintain the NSR's features that are reliant on third-party APIs to ensure seamless functionality amidst changes in API endpoints, authentication mechanisms, or data formats. This included promptly updating the NSR's integration logic, API endpoints, and data processing mechanisms to accommodate any modifications from the third-party providers to sustain optimal performance and user experience while leveraging external data sources
11.	Integration of the NSR with Third-party Tools (NIRA API/HSM API) & Hardware Systems through VPN and inclusion of additional files in the Bulk NIN Verification file, Inclusion of Photo's in the NIN API, and creation of an additional API for both NIN Checks and complementarity checks in the NSR	This included promptly updating the NSR's integration logic, API endpoints, and data processing mechanisms to accommodate the modifications from NIRA the third-party providers to sustain optimal performance and user experience while leveraging external data sources

B.6 Feedback and Continuous Improvement

Feedback collection and continuous improvement activities play a crucial role in enhancing the effectiveness and efficiency of processes in the NSR. This activity involved systematically gathering feedback from stakeholders both in MGLSD and the different SP schemes that are being supported to synchronise data in this maintenance phase, analysing it to identify areas for improvement, and implementing necessary changes to drive positive outcomes.

The table below outlines the key feedback collected during this maintenance phase and their status.

Table 6: Maintenance Phase Feedback

#	Feedback	Status
1	Error 500 on login with a link to go to homepage	Addressed
2	Error on loading of the cascading filters for program data on the homepage on login to the private portal	Addressed
3	User Interface (UI) Enhancements & inclusion of the maps (Uganda Map) feature in the public portal.	Addressed/Map has been included
4	The save button on assignment of roles and permissions was not responsive	Addressed
5	Date widget loading incorrectly on reports filter in the private portal	Addressed
6	Include Sub Regions in the NSR	Addressed
7	Build use cases for use of the MoLGSD geo locations	Addressed
8	Improve “Program data filter” to load all SP schemes	Addressed
9	Correct Geo data reports to download data correctly	Addressed
10	Overall improvement of dashboards to introduce tabbed approach	Addressed
11	Slow response in loading users’ data and searching/filtering users’ data.	Addressed
12	Reports page showing error if there is no data instead of displaying a blank report	Addressed
13	Timeout error and outage on usage of the Bulk NIN Verification feature	Addressed
14	Include photo on the API for NIN validation and store the same in the NSR	Addressed
15	Introduce API to do NIRA/NIN Validation checks and complementarity checks in the NSR and submit both results to the users	Addressed

#	Feedback	Status
16	Update the NSR public portal to include graphs for complains and graph for beneficiaries by thematic areas in the public portal	Addressed
17	Improve Audit Trail to separate API updates and User Audit Trails in the NSR for ease of Use	Addressed

The DP team has addressed the all the feedback raised during this maintenance phase.

C MILESTONES AND DELIVERABLES SCHEDULE

The agile software development approach was strategically implemented for both Upgrading of NSR and on boarding of other SP programmes. This approach ensured that the development of an enhanced software platform for NSR adhered to User Experience Testing (UET) standards.

Throughout the upgrading and Onboarding phases, we conducted frequent meetings and discussions with the development team, stakeholders, and technical team. This open and collaborative approach ensured that everyone involved had a clear understanding of the project's progress and any changes that needed to be made.

The table below outlines the milestones and deliverables that were delivered across the five work streams.

Table 7: Milestones and Deliverables

CONSOLIDATED WORK STREAM	DELIVERABLES	STATUS
Inception and planning	• Inception Report	• Completed
Additional enhancements	• Upgraded NSR Platform (Version 2) • Quality Assurance Report	• Completed
On-boarding of additional social protection schemes	• Onboarding of the YLP & UWEP MIS • On-boarding of Girls Empowerment Girls (GEG) Programme • On boarding of the Human Capital MIS • Onboarding of the Disability & SEGOP MIS • Onboarding of the JuaKali & ICOLEW MIS • Address and finalise any issues associated with existing MISs using the NSR	• Completed-10 programmes on boarded, 4 pending MGLSD decision
Knowledge transfer	• Updated User Manuals • Updated Source Code Manual • On site walkthrough of the Single Registry Source Code	• Completed

CONSOLIDATED WORK STREAM	DELIVERABLES	STATUS
Maintenance and support	• Handover of the source code and the database designs • 1st quarter maintenance report; and • 2nd quarter maintenance report.	• Completed

D KEY ACHIEVEMENTS, LESSONS AND CHALLENGES

D.1 Key Achievements

i. Upgraded NSR (version 2) to latest technology stack i.e. .NET 8.0 and C#12 from .NET 2.2 and C# 7.3. The new technology platform offers speed, security, latest features and long-term support.

ii. Successful coordination to integrations and data transmission to NSR MIS by different SP projects and across thematic areas as outlined in the table 4 above.

iii. Successful ratification of Geo master list in the NSR and across SP programmes as per the MoLG geo master list and update of geo locations to the current 146 districts from 115.

iv. Upgrade of API's (NIRA NIN Check to include Living status, photo and in addition include a complementarity check across programmes for an individual in the NSR and the Benefits API to allow for multiple benefits to be send to the NSR.

v. Support to programs for NIRA check in bulk and individually, most notable DRDIP and SAGEMIS which perform real-time checks to NIRA via the NSR for the on-demand registration module/feature on mobile and web applications from the field/upcountry.

vi. Introduction of Import feature across (Beneficiaries (Individual/Group & Household), Disbursement (Payments/Group Disbursements, Repayments and Benefits Benefits)/Recoveries/Complains/Exits, HCM (Public Service Pensioners) and Contribution details and summaries to support technologically challenged SP Programs to upload their data to the NSR.

D.2 Challenges

i. Significant delays in resolving in resolving integration issues due to administrative processes within MGLSD and individual SP Programmes.

ii. Lack of technical staff and expired technical support contracts in some SP schemes hindered the integration processes.

iii. Coordination challenges arising from inability to enforce governance framework established during Inception due to competing priorities from partners.

iv. System Outages of the NSR, the NSR has been experiencing outages due to power cuts on the main electricity supply, these outages, as has been observed sometimes last as long as 48 hours hence affecting the NSR Utilization.

v. Compatibility Issues & Data Mapping Complexity, some existing SP MISs have different data structures and formats, posing challenges in aligning them with the required API specifications. The most common challenge was the alignment of Geo Locations and the names of beneficiaries in the SP MIS's.

vi. Customization Technology and Resource Limitations, some existing SP MISs are built on different technology stacks, necessitating updates or modifications for seamless API integration. It is worth noting that some MISs lack robust API support, requiring additional development to establish a reliable and efficient connection.

D.3 Lessons/Recommendations

i. The presence of a national consultant in the country has been very helpful in following up with the client and attending meetings in person. This has saved time spent on follow-up emails, which at times go unanswered due to competing priorities by different stakeholders.

ii. MGLSD to consider having power back ups to avoid interruption of services whenever there is power outage.

iii. MGLSD to convene a technical working group (TWG) to discuss SP schemes to be prioritised within the contract period.