

REQUEST FOR PROPOSAL

for

**SELECTION OF IMPLEMENTING AGENCY
FOR DESIGN, DEVELOPMENT, IMPLEMENTATION AND MAINTENANCE
SUPPORT OF ODISHA INTEGRATED STATISTICAL SYSTEM (OISS) PORTAL
FOR DIRECTORATE OF ECONOMICS & STATISTICS (DE&S),
FOR STRENGTHENING OF STATE STATISTICAL SYSTEM IN ODISHA,
UNDER ODISHA STATE CAPABILITY & RESILIENT GROWTH POLICY PROGRAM
(SUPPORTED BY THE WORLD BANK)**

RFP REFERENCE NUMBER: OCAC-SEGP-SPD-0031-2024-26047



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VOLUME 2: Terms of Reference

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Glossary Of Terms

Acronym	Full Form
AI	Artificial Intelligence
API	Application Programming Interface
ASI	Annual Survey of Industries
CA	Certification Authority
CAPI	Computer-Assisted Personal Interviewing
CAWI	Computer-Assisted Web Interviewing
CERT-In	Indian Computer Emergency Response Team
CIS	Center for Internet Security
COTS	Commercial Off-The-Shelf
CPI	Consumer Price Index
CR	Change Request
CRN	Change Request Note
CVE	Common Vulnerabilities and Exposures
DE&S	Directorate of Economics & Statistics
DMS	Document Management System
DPDP	Digital Personal Data Protection Act
DR	Disaster Recovery
EARAS	Establishment of an Agency for Reporting Agricultural Statistics
EDW	Enterprise Data Warehouse
ELT	Extract, Load, Transform
ER	Entity Relationship
ETL	Extract, Transform, Load
FRS	Functional Requirement Specification
GIS	Geographic Information System
GPU	Graphics Processing Unit
GSBPM	Generic Statistical Business Process Model
HA	High Availability
HLD	High-Level Design
IAM	Identity and Access Management
IIP	Index of Industrial Production
IndEA	India Enterprise Architecture
IRS	Infrastructure Requirement Specification
KT	Knowledge Transfer
LGD	Local Government Directory

Acronym	Full Form
LLD	Low-Level Design
LMS	Learning Management System
MAPE	Mean Absolute Percentage Error
MDM	Master Data Management
MeitY	Ministry of Electronics and Information Technology
ML	Machine Learning
MLOps	Machine Learning Operations
MoSPI	Ministry of Statistics and Programme Implementation
NADA	National Data Archive
NFR	Non-Functional Requirements
NIC	National Informatics Centre
OCAC	Odisha Computer Application Centre
OCR	Optical Character Recognition
OLAP	Online Analytical Processing
OLTP	Online Transaction Processing
O&M	Operations and Maintenance
OISS	Odisha Integrated Statistical System
OTP	One-Time Password
PII	Personally Identifiable Information
PMU	Project Management Unit
PSC	Project Steering Committee
QA	Quality Assurance
QRG	Quick Reference Guide
RBAC	Role-Based Access Control
RDBMS	Relational Database Management System
RMSE	Root Mean Square Error
RTM	Requirements Traceability Matrix
SDC	State Data Centre
SDMX	Statistical Data and Metadata eXchange
SI	System Integrator
SIEM	Security Information and Event Management
SLA	Service Level Agreement
SOP	Standard Operating Procedure
SPOF	Single Point of Failure
SRS	System Requirement Specification
SSO	Single Sign-On
TAC	Takeover Acceptance Certificate

Acronym	Full Form
TLS	Transport Layer Security
TtT	Train-the-Trainer
UAT	User Acceptance Testing
UIDAI	Unique Identification Authority of India
VAPT	Vulnerability Assessment and Penetration Testing
WAF	Web Application Firewall
WMS	Workflow Management System
WPI	Wholesale Price Index
XAI	Explainable Artificial Intelligence

1. Introduction

1.1. Project Background

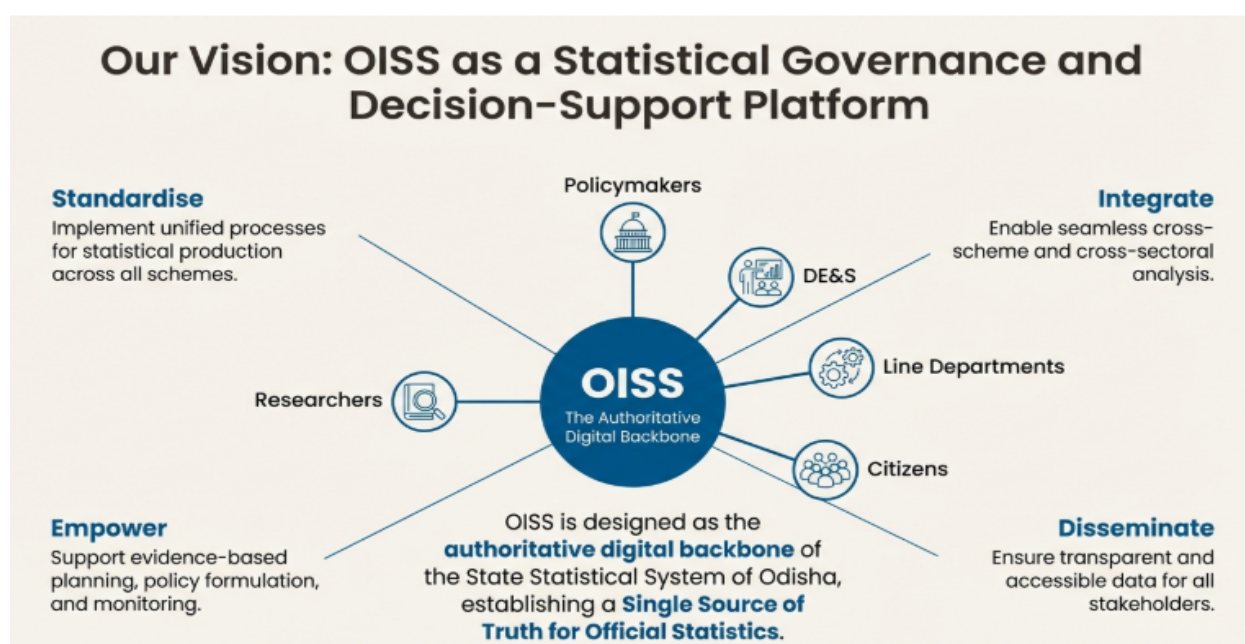
The Directorate of Economics & Statistics (DE&S), Government of Odisha, with support from the World Bank's Odisha State Capability and Resilient Growth Program(P4R), has embarked on an initiative to modernize the state's statistical system. This initiative aims to digitize all statistical activities under the purview of DE&S, enhancing efficiency, accuracy, and accessibility of data.

To achieve this objective, DE&S has engaged the **Odisha Computer Application Centre (OCAC)** to design, develop and implement a comprehensive digital platform known as the **Odisha Integrated Statistical System (OISS)**.

The **Odisha Integrated Statistical System (OISS)** is envisioned as a unified, scheme-agnostic platform that automates the entire statistical lifecycle—from data collection to dissemination. It is built upon the international standard of the **Generic Statistical Business Process Model (GSBPM)**, ensuring that all statistical workflows follow a global best-practice framework.

Key capabilities of the system include:

- **Multi-Channel Data Ingestion:** Seamless collection via CAPI (leveraging World Bank's Survey Solutions), CAWI, APIs, and legacy data digitisation.
- **Automated Processing Pipeline:** A robust ETL (Extract, Transform, Load) engine with scheme-specific business rules for automated validation and cleaning.



- **Layered Data Architecture:** A multi-layered data storage architecture comprising:
 - A Transactional Database (OLTP Layer) to manage real-time data entry, workflow state management, and application transactions;
 - A Staging & Processing Layer to handle ETL/ELT workflows, data validation, and transformation logic;
 - An Enterprise Data Warehouse (OLAP Layer) optimized for aggregation, cross-scheme analysis, and high-speed analytical queries;

- An Object Storage Layer for unstructured and semi-structured artifacts such as CAPI audio recordings, images, scanned documents, and legacy publications.
- **Unified Access:** An "OISS Portal" serving as the single, secure entry point for authorized users to access tools, dashboards, and workflows.

1.2. About the DE&S

The Directorate of Economics and Statistics (DES) under the Department of Planning and Convergence in Odisha is the primary statistical organisation for the state. It is responsible for collecting, compiling, analysing, and disseminating statistical data to aid in planning, policy formulation, and decision-making.

The Directorate plays a vital role in the State Statistical System of Odisha. It collects official statistics and conducts large-scale socio-economic censuses and surveys. They are engaged in data collection, data processing, analysis, interpretation, and dissemination of administrative, survey, and census data collected through their field functionaries.

The DES serves as an important arm of the Odisha government, providing reliable data to evaluate the performance of state schemes, monitor development goals, and ensure evidence-based policymaking. It plays a pivotal role in improving transparency, accountability, and efficiency in governance.

1.3. About OCAC

The Department of Electronics & Information Technology is the nodal department for the Government of Odisha in matters of IT, ITES, and Communication. The department plays a vital role in formulating and implementing policy matters in Information Technology, ITES, Electronics, and Telecom; promotion of Odisha as an ultimate ICT destination for investment and facilitating ICT industries; assisting other departments for effective e-Governance and capacity building; Promotion of ICT-based education in the State.

Odisha Computer Application Centre (OCAC), the Technical Directorate of Electronics & Information Technology Department, Government of Odisha, has evolved through years as a Centre of Excellence in IT solutions and e-Governance. It has contributed significantly to the steady growth of IT in the state. It helps IT to reach the common citizen so as to narrow down the Digital Divide and widespread applications of IT in establishing a system where the citizens are receiving good governance in addition to ensuring speed of decisions from a transparent Government through an effective e-Governance System.

1.4. About OISS

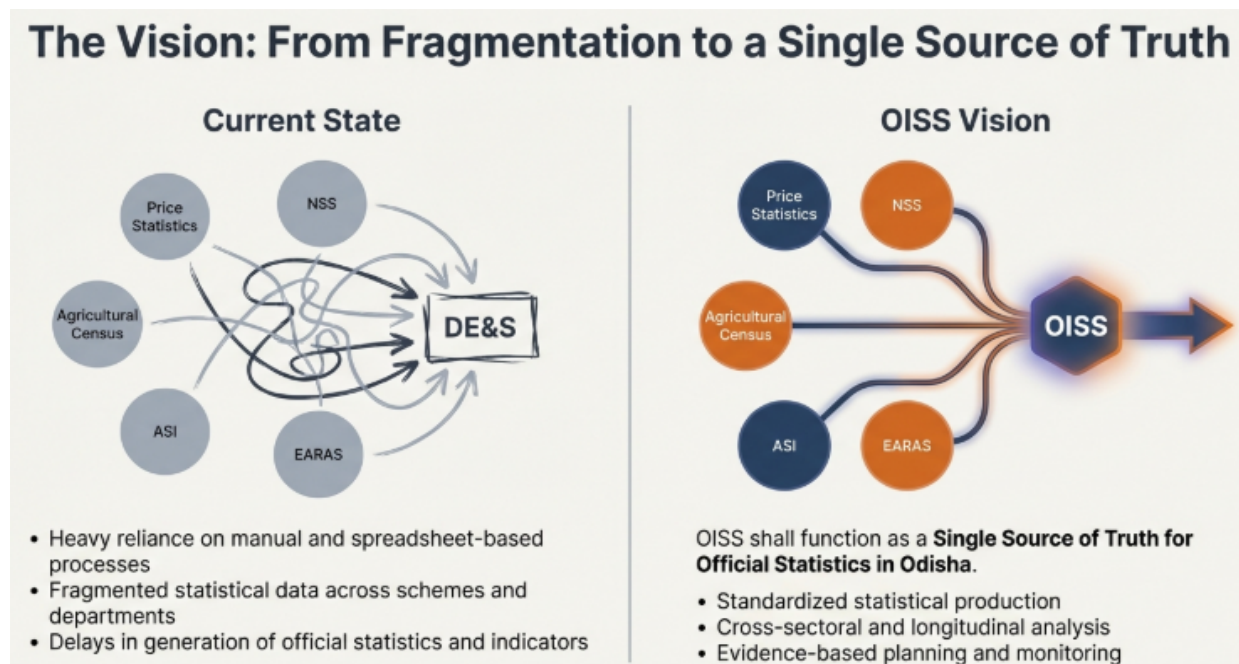
The Odisha Integrated Statistical System (OISS) is a comprehensive digital platform to be developed by the Government of Odisha, India, to streamline and modernise the collection, management, and analysis of statistical data across various departments and sectors within the state. It is designed to incorporate advanced data collection methods, centralised data storage, analytical tools, and mechanisms for data visualisation and dissemination. The primary objective of the OISS is to strengthen evidence-based planning and decision-making across the state by ensuring the timely and accurate production of statistical outputs.

The OISS is expected to play a crucial role in promoting data-driven governance in Odisha, ultimately leading to improved planning, resource allocation, and service delivery.

1.5. Project Goal and Objectives

1.5.1. Goal

The primary goal of this project is to modernize the statistical ecosystem of the Directorate of Economics & Statistics (DE&S), Government of Odisha, through the design, development, and implementation of a robust, scalable, and secure digital platform – the Odisha Integrated



Statistical System (OISS). The OISS aims to transform current statistical operations, enhancing the quality, timeliness, and accessibility of official statistics to strengthen evidence-based planning, policy formulation, and decision-making across the state.

1.5.2. Objectives

The specific objectives for the implementation of OISS include:

- **Digitization and Integration:** To digitize and integrate the various statistical activities currently managed by DE&S onto a unified platform, reducing reliance on manual processes and eliminating data silos.
- **Enhance Data Quality and Timeliness:** To significantly improve the accuracy, consistency, reliability, and timeliness of statistical data collection, processing, and output generation through automation, standardized validation, and streamlined workflows.
- **Improve Operational Efficiency:** To increase the operational efficiency of DE&S personnel by automating routine tasks related to data handling, processing, analysis, and reporting.
- **Establish Centralised Data Repository:** To create a secure, centralized data repository or platform capable of storing diverse datasets (structured, unstructured, geospatial) with proper metadata management, version control, and easy retrieval capabilities.
- **Strengthen Analytical Capabilities:** To enhance the analytical capacity of DE&S by incorporating advanced statistical analysis, data modelling, predictive analytics, and AI/ML capabilities within the OISS platform.
- **Improve Data Dissemination and Access:** To facilitate wider and easier access to statistical data, reports, and visualisations for policymakers, researchers, and the public through user-friendly interfaces and improved dissemination mechanisms like a public portal.

- **Ensure Security and Compliance:** To build a secure platform that complies with relevant government standards, data protection regulations, and security best practices.
- **Provide a Scalable and Sustainable Platform:** To implement a modern, scalable, and maintainable system architecture capable of handling future growth in data volume and complexity, ensuring long-term sustainability.
- **Support Capacity Building:** To provide a platform complemented by training and support mechanisms that facilitate user adoption and enhance the skills of DE&S personnel.

2. Scope of Work

This Request for Proposal (RFP) seeks to engage a qualified System Integrator (SI) partner to design, develop, deploy, and provide post-implementation maintenance and support for the Odisha Integrated Statistical System (OISS), based on the detailed functional and non-functional requirements outlined in this document. The SI will play a crucial role in translating the vision for OISS into a functional, scalable, and secure digital platform for DE&S, Odisha

2.1. Overall Scope Summary

The overall scope of work for the selected System Integrator (SI) encompasses the end-to-end design, development, configuration, testing, deployment, training, and post-implementation maintenance of the Odisha Integrated Statistical System (OISS) application platform.

Specifically, the SI shall be responsible for:

- Conducting a detailed system study, including an assessment and recommendation for the optimal data storage architecture (Data Warehouse vs. Data Lake vs. Data Lakehouse).
- Performing detailed design of the OISS application based on the Functional Requirements Specification (FRS) provided and the approved architecture.
- Specifying the infrastructure requirements necessary for hosting the OISS application (Note: Infrastructure procurement, provisioning, and management are outside the scope of this RFP and will be handled separately by DE&S).
- Developing and configuring all modules of the OISS platform as defined in the FRS, including integration with Survey Solutions, data processing & modelling, analysis (statistical and AI/ML), visualization, GIS, DMS, WMS, user management, security, monitoring, reporting, notification, feedback, training, and support features.
- Developing necessary APIs and integrating OISS with identified external and internal systems.
- Facilitating and supporting DE&S in the migration of legacy datasets and the digitization of legacy documents into the OISS platform.
- Conducting comprehensive testing, including functional, integration, performance, and security testing (VAPT), and supporting User Acceptance Testing (UAT).
- Deploying the OISS application onto the infrastructure provided by DE&S.
- Developing and delivering comprehensive training programs and materials for various user groups within DE&S.
- Providing ongoing application-level operations, maintenance, and technical support services for OISS post-implementation, as defined by the agreed Service Level Agreements (SLAs).

The SI is expected to deliver a fully functional, secure, scalable, and user-friendly OISS application platform that meets all the requirements outlined in the FRS and this Scope of Work.

While this RFP provides the functional baseline and conceptual architecture for OISS, the SI is strictly mandated to review the *Final AS-IS & TO-BE Assessment Report* and all relevant scheme-specific technical and project reports issued by DE&S to gather better understanding of functioning of DE&S as well as its statistical activities.

2.2. Detailed Scope of Work

This section details the specific activities, tasks, and responsibilities that the selected System Integrator (SI) must undertake throughout the OISS project lifecycle. The SI is expected to perform these tasks, adhering to industry best practices, project management methodologies agreed upon with DE&S/OCAC, and the requirements specified in the FRS.

2.2.1. System Study and Requirement Gathering

This phase focuses on developing a comprehensive understanding of the OISS solution requirements, validating the existing Functional Requirement Specification (FRS), assessing architectural and technical considerations, and finalising the System Requirement Specification (SRS) prior to commencement of development activities.

The Authority has developed a foundational Functional Requirement Specification (FRS) based on comprehensive As-Is and To-Be assessments. The selected SI shall not undertake fresh business requirement discovery. However, the SI shall validate, technically refine, and strengthen the FRS to ensure architectural robustness, integration feasibility, performance optimization, and alignment with emerging best practices. Any proposed enhancements or refinements shall be documented, impact-assessed, and formally approved by DE&S/OCAC prior to implementation.

During this phase, the SI must conduct a deep-dive analysis into the specific operational documents for each scheme onboarded. This includes, but is not limited to, studying the physical questionnaires, statistical methodologies, indicator frameworks, sampling designs, and data analysis guidelines. The SI must ensure the OISS workflows are accurately configured to support the unique, ground-level statistical lifecycle of each DE&S scheme prior to finalizing the Software Requirements Specification (SRS).

As part of this phase, the Selected Agency/SI shall undertake the following activities:

a. FRS Review, Confirmation, and Validation

Conduct a detailed review of the FRS provided by the Authority to confirm understanding, ensure technical feasibility, and validate completeness and coverage across all GSBPM (Generic Statistical Business Process Model) phases. Any clarifications, assumptions, or minor refinements identified during this process shall be documented and shared with DE&S/OCAC for review and formal sign-off. Major deviations from the approved FRS are not anticipated; however, if identified, they must be clearly highlighted along with detailed justifications.

The validation exercise shall be limited to technical optimization, architectural alignment, integration consistency, and performance improvements. It shall not constitute open-ended functional expansion unless specifically approved through a formal Change Request (CR) mechanism.

b. Stakeholder Consultations and Workshops

Liaise closely with DE&S officials and OCAC and conduct structured workshops and meetings with key stakeholders, including Nodal Officers of core schemes. These workshops shall be used to validate the To-Be process flows, confirm functional expectations, and ensure alignment with the business processes documented in the As-To-Be Report.

Stakeholder consultations shall focus on confirming documented To-Be workflows and ensuring implementation readiness. Any deviation from the approved FRS shall require formal documentation and approval through the established governance framework.

c. System Study and Technical Assessment

Perform a detailed system study, including an assessment of architectural options where specified. This shall include a technical analysis of existing systems such as CAPI (Survey Solutions) and NADA to understand current data structures (e.g., PostgreSQL schemas, DDI metadata) and to map requirements for the proposed OISS Data Warehouse.

ArcGIS Assessment: The SI shall study the existing ArcGIS licensing status (Desktop vs. Enterprise) and deployment architecture at DE&S to determine the integration points for the OISS Spatial Module.

d. System Requirement Specification (SRS) Development

Based on the validated FRS and consultations, develop and finalise the System Requirement Specification (SRS) using a standardised and approved requirements-capturing template. All functional and non-functional requirements shall be translated into clear system requirements (including Use Case Diagrams and API Specifications), ensuring consistency with the approved FRS.

e. Requirements Traceability

Establish and maintain a comprehensive Requirements Traceability Matrix (RTM) from the SRS stage onward, covering the entire implementation lifecycle to ensure end-to-end traceability of requirements.

f. Inception Deliverables and Sign-off

Submit an Inception Report comprising the detailed Project Plan, Resource Deployment Schedule, Risk Management Plan, validated and finalised SRS, and other relevant planning artefacts for review and formal approval by DE&S/OCAC prior to proceeding to the design and development phase.

2.2.2. Infrastructure Requirements Specification and Sizing

This phase focuses on determining the precise computational, storage, and networking requirements for the OISS ecosystem. The objective is to translate the functional and non-functional requirements into a definitive Bill of Materials (BoM) that ensures performance, scalability, and security over the contract duration.

The Authority has provided an Indicative Bill of Materials (BoM) in the **Form Tech-8 of the Volume 1 of this RFP** as a reference. However, the System Integrator (SI) / Selected Agency is not expected to rely solely on this indicative list. Instead, the SI shall independently validate, analyze, and recommend the optimal infrastructure specifications based on their proposed solution architecture.

As part of this phase, the Selected Agency/SI shall undertake the following activities:

a. Volumetric Analysis and Capacity Planning

Conduct a comprehensive volumetric analysis of the data generated by all statistical schemes (e.g., Price Statistics, EARAS, ASI) and the legacy data digitization requirements. The analysis shall account for the projected data growth over the Contract Period, considering peak loads during large-scale operations like the Agricultural Census. The findings must translate business metrics (e.g., concurrent users, survey volume) into technical metrics (e.g., IOPS, Throughput, Network Bandwidth).

b. Infrastructure Architecture and Sizing

Based on the volumetric analysis and the proposed Solution Architecture, prepare the Infrastructure Requirements Specification (IRS). This document shall clearly define the exact specifications for:

Compute: CPU Cores and RAM for Web, App, Database, and Analytics Servers.

Storage: Sizing for the Enterprise Data Warehouse (EDW), Transactional Databases, and Object Storage (for unstructured artifacts like CAPI audio/images), ensuring High Availability (HA) and Disaster Recovery (DR) readiness.

Network & Security: Specifications for Firewalls, Load Balancers, and WAF required to secure the application.

GIS Infrastructure: The hardware sizing must explicitly account for the heavy compute and memory requirements of ArcGIS Enterprise / Server, ensuring sufficient resources for rendering map layers and processing spatial queries.

The recommended specifications must be optimal – ensuring the system is neither under-provisioned (risking performance) nor over-provisioned (wasting public funds).

The analytical infrastructure should support optional GPU-based acceleration for advanced machine learning or deep learning workloads, where required and justified through workload assessment.

GPU provisioning shall be based on approved sizing and shall not be mandatory unless specified in the finalized IRS.

c. Procurement Assistance and Advisory

Since the IT Infrastructure is being procured through a separate tender process based on these recommendations, the SI shall act as a Technical Advisor to the Authority. This includes assisting the DE&S/OCAC Technical Committee in evaluating the technical bids of the Hardware Tender to ensure that the proposed equipment meets the OISS performance benchmarks and is compatible with the SI's software solution.

d. Inception Phase Hardware Dependency Sign-Off

Clearly document any specific hardware dependencies (e.g., GPU requirements for AI models, specific Appliance needs) in the IRS. Once the IRS is approved, the SI shall provide a formal "Hardware Sufficiency Undertaking," confirming that the specified infrastructure is adequate to meet all SLAs defined in this RFP.

Note:

While procurement, ownership, and management of physical/cloud infrastructure shall remain with the Authority, the SI shall be fully responsible for defining, validating, and certifying the infrastructure specifications required to meet the performance and SLA obligations of the OISS application. Any deviation from the approved Infrastructure Requirement Specification (IRS) shall proportionately adjust the SI's SLA accountability.

2.2.3. Takeover, Integration & O&M of CAPI & NADA Eco-System

The Authority has adopted the World Bank's Survey Solutions (CAPI) and NADA (Data Catalog) as the standard tools for field data collection and public dissemination.

The Authority is engaging a separate System Integrator (hereafter referred to as the "CAPI-NADA SI") for the initial configuration, mobile app development, and Go-Live of these tools. The OISS SI shall be responsible for seamlessly integrating the OISS platform with these tools during the 1-

year development phase, and subsequently assuming full Operations & Maintenance (O&M) responsibilities for the CAPI and NADA ecosystem for the remaining 2-year O&M period.

As part of this phase, the SI shall undertake the following activities:

a. Parallel Integration (Year 1 - Development Phase)

API Collaboration: During the 1-year OISS development phase, the OISS SI must work collaboratively with the parallel CAPI-NADA SI to establish secure, automated API pipelines between the systems.

Data Flow Implementation: The OISS SI shall configure the OISS Enterprise Data Warehouse (EDW) to automatically ingest raw survey data from the CAPI servers, and simultaneously configure pipelines to push finalized, anonymized statistical outputs from OISS directly to the NADA portal and its companion mobile app.

b. System Takeover & Knowledge Transfer (KT)

At the conclusion of the initial development phase (or upon a timeline mutually agreed with the Authority), the OISS SI shall initiate a formal Takeover and Knowledge Transfer (KT) process from the incumbent CAPI-NADA SI. The takeover shall be governed through a structured Transition, Audit, and Stabilization Framework to ensure continuity, technical integrity, and operational readiness prior to assumption of full O&M responsibility.

• Structured Knowledge Transfer (KT) Period

A structured Knowledge Transfer (KT) period of minimum 30–60 days shall be provided by the incumbent CAPI-NADA SI to the OISS SI. The KT shall include, but not be limited to:

1. Detailed system architecture walkthrough.
2. Deployment architecture and infrastructure configuration documentation.
3. Database schema, data flow diagrams, and API integration logic.
4. Application source code repositories (including version history).
5. Mobile application source code and build pipelines (for NADA companion app).
6. Security configurations and SSL certificate management details.
7. Backup and recovery procedures.
8. Operational SOPs, incident management logs, and configuration manuals.

The incumbent SI shall extend reasonable technical cooperation during this transition phase as facilitated by the Authority.

• Mandatory Joint Technical Audit

Prior to formal O&M assumption, a Joint Technical Audit shall be conducted by the Authority, the incumbent CAPI-NADA SI, and the selected OISS SI. The audit shall assess:

1. Application stability and performance benchmarks.
2. Infrastructure deployment configuration at the State Data Centre (SDC).
3. Administrative credentials and access control completeness.
4. Security posture, patch levels, and vulnerability exposure.
5. Backup integrity and disaster recovery readiness.
6. Documentation adequacy and configuration completeness.

All findings shall be documented in a formal Transition Assessment Report.

• Asset Handover

The OISS SI must formally receive and verify:

1. All administrative credentials and privileged access accounts.
2. Infrastructure access details.
3. Master data configurations.
4. SSL certificates and domain configurations.
5. Complete source code and build documentation for the NADA companion mobile application.
6. Relevant licenses, third-party integrations, and system configuration records.

A formal Handover Checklist shall be signed off by all parties.

- **Stabilization Period**

Following completion of the Joint Technical Audit and Asset Handover, a defined Stabilization Period (minimum 60 days) shall be observed.

During this period:

1. Identified critical or high-severity issues attributable to the incumbent implementation shall be rectified in coordination with the Authority.
2. The OISS SI shall support operational continuity but shall not be held accountable for legacy defects formally documented in the Transition Assessment Report.

- **Takeover Acceptance Certificate (TAC)**

Formal O&M liability of the CAPI and NADA ecosystem shall commence only upon issuance of a Takeover Acceptance Certificate (TAC) by the Authority, confirming:

1. Completion of structured KT.
2. Closure or risk acceptance of identified critical findings.
3. Operational stability during stabilization.

Post issuance of the TAC, the OISS SI shall assume full operational responsibility as per the defined SLA framework.

c. Ongoing Form Digitization & Configuration (O&M Phase)

While the initial Go-Live is handled by the parallel vendor, the OISS SI must manage the evolving needs of the department during the 2-year O&M phase.

Workflow Management: The OISS SI shall digitize new survey forms, update existing questionnaires, and configure synchronization workflows within Survey Solutions as DE&S launches new statistical schemes.

Master Data Updates: Continuously update User Roles (SFS, Supervisors) and spatial Master Data (LGD codes) within the CAPI HQ software to reflect real-world administrative changes.

d. Security, SSL & Version Management

World Bank Updates: The OISS SI must regularly update the Survey Solutions and NADA software to the latest stable versions released by the World Bank/IHSN, strictly following a "Backup → Test in Staging → Deploy to Production" protocol.

Security & Compliance: Ensure continuous compliance with CERT-In guidelines. The OISS SI shall procure, renew, and install SSL certificates for all CAPI and NADA domains and apply necessary security patches to the web servers.

e. Helpdesk & O&M Support

To guarantee operational continuity for critical state systems, the underlying core RDBMS platform must be backed by an OEM possessing a fully functional, localized technical support structure within India. The OEM must provide a direct, multi-tiered (L1, L2, L3) technical engineering communication channel operating on a 24x7x365 basis to resolve infrastructure and database engine emergencies throughout the complete lifecycle of the contract.

End-User Support: Once the handover is complete, the OISS SI's central Helpdesk must absorb all L2/L3 support for the CAPI and NADA tools.

Troubleshooting: Provide dedicated support to Field Surveyors and DE&S Officials for resolving mobile app crashes, offline synchronization failures, and NADA dashboard anomalies.

Database Maintenance: Manage regular automated backups, database tuning, and archival of CAPI survey media (images/GPS logs) in accordance with the SDC backup policy.

The OISS SI shall not be held liable for pre-existing architectural limitations, undocumented configurations, legacy vulnerabilities, or performance issues attributable to the incumbent SI, provided such observations are formally documented during the Joint Technical Audit.

2.2.4. Solution Architecture & Design

Based on the finalized System Requirement Specification (SRS), the approved Data Storage Architecture, and the recommendations from the "Build vs. Buy" analysis, the SI shall develop the comprehensive Solution Architecture for the OISS ecosystem.

The SI shall prepare detailed High-Level Design (HLD) and Low-Level Design (LLD) documents covering all modules (both custom-developed and COTS/Open-Source), their interfaces, data flows, security controls, and deployment models. The design must ensure that all chosen components integrate seamlessly to meet the functional requirements defined in the FRS.

The Solution Architecture must be designed as a Data-Centric, Service-Oriented Platform compliant with the India Enterprise Architecture (IndEA 2.0) framework.

As part of this phase, the SI shall undertake the following activities:

a. Architectural Principles & Standards

The proposed architecture must adhere to the following core design principles:

- **Core Application Architecture (Microservices):**

The custom-developed components of OISS (e.g., Price Module, GSDP Module, Web Portal) shall be built on a modular, containerized Microservices Architecture. Distinct business functions must operate as independent services to ensure that failure in one module does not impact the availability of others.

- **Integration Architecture (Heterogeneous Ecosystem):**

The architecture must function as a unified "System of Systems," seamlessly orchestrating data flow between:

The OISS Core: (The Data Warehouse & Processing Engine).

1. Proprietary Components: ESRI ArcGIS Enterprise for spatial analytics.
2. External Frameworks: World Bank's Survey Solutions (CAPI) for data ingestion and NADA for data cataloging.
3. Integration Strategy: This integration must be achieved via standard REST APIs and automated ETL pipelines, ensuring the Core remains loosely coupled from these external dependencies.

- **GSBPM Alignment:**

The system logic must mirror the GSBPM Level 2 framework, explicitly decoupling the phases of "Collect" (CAPI), "Process" (OISS Core), "Analyze" (ArcGIS/Python), and "Disseminate" (NADA/Dashboard) into separate logical layers.

- **API-First Design:**

All internal and external communications must route through a centralized API Gateway. The architecture must utilize Open Standards (REST/JSON) to prevent vendor lock-in.

- **High Availability (HA):**

The design must eliminate "Single Points of Failure" (SPOF) at all layers (Web, App, DB) by employing active-active clustering and load balancing.

b. High-Level Design (HLD)

The SI shall prepare the HLD document providing a strategic view of the system, including:

Logical Architecture: Diagramming the interaction between the Web Portal, Mobile App, API Gateway, Microservices, and Data Warehouse.

Deployment Architecture: Mapping the software components to the hardware infrastructure (Web Servers, App Servers, DB Clusters) to be deployed at the State Data Centre (SDC).

Integration Architecture: Defining the strategy for data exchange with external systems (e.g., LGD, MoSPI, Parichay SSO).

c. Low-Level Design (LLD)

Upon approval of the HLD, the SI shall prepare the LLD document to serve as the definitive guide for developers. This shall include:

Module Design: Detailed logic flows, class diagrams, and sequence diagrams for each microservice.

Database Design: Entity-Relationship (ER) diagrams, Data Dictionary, and Schema definitions for the RDBMS and Data Warehouse.

API Specifications: Swagger/OpenAPI definitions for all internal and external APIs.

Security Controls: Field-level encryption details, session management logic, and error handling mechanisms.

d. Design Review and Approval

The HLD and LLD documents shall be submitted to the DE&S/OCAC Technical Committee for review. The SI must conduct a walkthrough of the design, incorporating any feedback or changes requested by the Authority before proceeding to the Development phase.

2.2.5. Technology Stack Strategy & Build vs. Buy Analysis

The Authority encourages a "Fit-for-Purpose" technology strategy. While there is a general preference for Open-Source technologies, the Authority has already standardized on specific platforms (e.g., ArcGIS), which the SI must adopt.

As part of this phase, the SI shall undertake the following activities:

a. Build Vs. Buy/Configure Analysis and Recommendation

For major functional modules of OISS (e.g., Data Processing/ETL, Visualization, Workflow Engine), the SI shall conduct a detailed analysis comparing Custom Development versus leveraging suitable COTS or Open-Source platforms.

This analysis must evaluate options based on factors including, but not limited to:

1. Alignment with FRS: Does the COTS product meet the specific GSBPM requirements of DE&S?
2. Total Cost of Ownership (TCO): Analysis of licensing (one-time vs. recurring), implementation, and long-term maintenance costs over 5 years.
3. Scalability & Flexibility: Ability to handle the data volumes defined in the Volumetric Analysis.
4. Exit Management: Ease of data extraction and migration if the tool is replaced in the future.

The SI shall present recommendations based on this analysis, justifying the proposed approach (Build, Buy, or Configure) for each major component for DE&S/OCAC approval.

Exclusion: GIS (Geographic Information System) is excluded from this analysis as the Authority has already procured ESRI ArcGIS. The SI is mandated to build the spatial analytics module on top of the existing ArcGIS stack.

b. Technology Stack Recommendation

Based on the FRS and the approved Solution Architecture, the SI shall recommend a specific, modern, and robust technology stack. This recommendation must include specific approved COTS or Open-Source platforms alongside the programming languages and frameworks for custom development.

To ensure the stack covers all FRS requirements, the SI must propose components for the following Logical Layers:

Presentation Layer: Web Frameworks (React/Angular), Mobile Technologies (Native/Cross-Platform).

Application Layer: Backend Frameworks (Python/Java), API Gateway, and Microservices Orchestration.

Data Processing & Integration Layer:

- **ETL/ELT Tools:** For ingesting and cleaning data from CAPI and Legacy sources.
- **Workflow Engine:** For managing the multi-level approval hierarchies defined in the FRS.

Data Storage Layer: Relational Databases (PostgreSQL preferred) and Data Warehouse technologies.

Analytics & GIS Layer:

- **GIS Server:** ESRI ArcGIS Enterprise (Mandated). The SI must utilize the existing licenses available with DE&S and integrate the ArcGIS Server with the OISS Data Warehouse.
- **BI/Visualization:** For the Dynamic Dashboards and Report Builders.
- **Advanced Analytics:** Tools/Languages for the Data Science models (Crop Prediction, CPI Forecasting).

c. Justification And Approval

The recommendation must include justifications for each component choice regarding performance, security, maintainability, scalability, and licensing costs.

Open-Source Preference: The SI shall prioritize Open-Source technologies where feasible. If a proprietary COTS product is proposed, the SI must demonstrate why an equivalent Open-Source alternative is insufficient.

Final Approval: The final technology stack requires formal confirmation and sign-off from the DE&S/OCAC Technical Committee before development begins.

2.2.6. Security Architecture and Data Privacy

The System Integrator (SI) shall design a comprehensive "Secure by Design" architecture for the OISS ecosystem, addressing all requirements outlined in the FRS. The security posture must cover the entire stack—including the Custom Microservices, the Proprietary ArcGIS Environment, and the Mobile Application.

As part of this phase, the SI shall undertake the following activities:

a. Zero-Trust Security Framework

The SI shall implement a Zero-Trust Architecture where no user, device, or application is trusted by default, regardless of their location within the network.

Micro-Segmentation: The network architecture must segment the Web, App, and Database layers using internal firewalls to prevent lateral movement of threats.

Granular RBAC: Access to modules (e.g., Price Entry vs. GSDP Approval) must be granted based on strict Role-Based Access Control (RBAC) verified at every API request.

b. Identity & Access Management (IAM)

At the database tier, the RDBMS must empower administrative superusers to establish secure user profiles and enforce stringent authentication hardening policies. These policies must natively support tracking and logging failed login attempts, executing automated account lockouts following a configurable threshold of successive authentication failures, enforcing mandatory password expiration timelines, and verifying strict password complexity rules.

Single Sign-On (SSO): The system must support integration with "Parichay" (Govt. of India SSO) / "Jan Parichay" to enable seamless login for government officials without managing separate credentials.

Multi-Factor Authentication (MFA): MFA (OTP/Biometric) shall be mandatory for administrative users and privileged accounts (e.g., Database Administrators).

c. Data Privacy & Encryption Standards

Data at Rest: All sensitive data stored in the Database and File Storage (e.g., Census records, draft Economic Survey chapters) must be encrypted using AES-256 standards.

Data in Transit: All data transmission between the Mobile App, Web Portal, and Server must be encrypted using TLS 1.2 or higher protocols.

PII Protection: The system must comply with the Digital Personal Data Protection (DPDP) Act, 2023. PII fields (e.g., Aadhaar Number, Phone Number) must be masked in the "Public Dashboard" and "Reports."

d. Secure Configuration of COTS & Open Source

Hardening: The SI is responsible for the "Security Hardening" of all components, including the ArcGIS Server and PostgreSQL Database, disabling default ports/users and applying CIS Benchmarks.

Dependency Scanning: The SI must implement automated tools (SCA) to scan Open-Source libraries for known vulnerabilities (CVEs) during the build process.

e. Audit Trails & Logging

Immutable Logs: The system must maintain a tamper-proof audit trail of every critical action (e.g., "User X modified Wheat Price for Bargarh District on Date Y").

Log Retention: Audit logs must be retained for a minimum period of 7 years for forensic analysis.

- **Log Retention, Tiering & Archival Policy**

Audit logs shall be maintained under a structured log lifecycle management framework.

1. **Hot Storage (Active Logs):** Recent logs (e.g., last 3–6 months) shall remain in high-performance searchable storage for real-time monitoring and operational analysis.
2. **Warm Storage (Intermediate Archive):** Logs older than the defined hot storage window may be migrated to lower-cost indexed archival storage while remaining retrievable within defined SLA timelines.
3. **Cold Archive:** Logs beyond one year may be compressed and stored in long-term archival storage optimized for compliance retention, with retrieval subject to predefined restoration timelines.
4. **Retrieval SLA:** Archived logs must be retrievable within a mutually defined SLA (e.g., 24–48 hours for cold archive retrieval).
5. **Storage Optimization:** Log compression, rotation policies, and centralized log aggregation mechanisms (e.g., SIEM/log management platform) shall be implemented to optimize storage utilization without compromising audit integrity.
6. **Infrastructure Dependency:** The log storage architecture shall be aligned with the approved Infrastructure Requirement Specification (IRS).

f. Security Audit & Compliance

Third-Party Audit: Before Go-Live, the SI must coordinate a "Safe-to-Host" security audit by a CERT-In empaneled agency.

Vulnerability Remediation: The SI is responsible for closing all vulnerabilities (OWASP Top 10) identified during the audit. The "Go-Live" certificate shall be issued only after the auditor certifies the closure of all Critical, High, and Medium vulnerabilities.

2.2.7. Data Storage & Enterprise Data Warehouse (EDW) Architecture

While the Functional Requirement Specification (FRS) details the data variables, schemes, and reporting outputs, the System Integrator (SI) is responsible for designing a high-performance **Storage Architecture** that can sustainably scale to handle the projected data volumes without performance degradation.

As part of this phase, the SI shall undertake the following activities to design the underlying data engines:

a. Decoupled Database Architecture (OLTP vs. OLAP)

To ensure that heavy analytical queries do not impact day-to-day data entry operations, the SI must design a decoupled storage architecture:

Transactional Layer (OLTP): Implement a highly normalized Relational Database (e.g., PostgreSQL) to handle real-time data entry, workflow state management, and user authentication.

Analytical Layer (OLAP/EDW): Design the Enterprise Data Warehouse using Columnar storage or specific Data Marts optimized for high-speed aggregation, allowing DE&S to run complex cross-scheme queries (e.g., correlating Agricultural Yield with Price Statistics) in near real-time.

The System Integrator (SI) shall supply, install, configure, and maintain the necessary enterprise-tier RDBMS licenses inclusive of all updates, security patches, and OEM technical support. The core database layer must be deployed in a clustered, high-availability (HA) configuration featuring native, automated failover management to ensure near-zero downtime and zero transactional data loss. The database engine must support industry-standard Multi-Version Concurrency Control (MVCC) and maintain strict ANSI SQL compliance.

For distributed architectures, the platform must natively support robust data replication models—including both unidirectional and bidirectional data streams—equipped with rule-based conflict detection and resolution mechanisms. The relational database engine must be capable of processing high-performance transactional data (OLTP) while supporting optimized execution of analytical queries (OLAP) via columnar optimizations or read-replica scaling, ensuring heavy cross-scheme analytical reporting does not degrade live operational workflows.

The database engine should provide verified database drivers and native connectors for dominant programming languages, including SQL, Python, Java, C/C++, and .NET.

All administrative, monitoring, performance-tuning, and cross-platform migration utilities required to run the database ecosystem must be provided by the OEM as part of the core technical offering without incurring separate licensing fees.

b. Hybrid Storage for Unstructured & Legacy Data

The SI must implement an Object Storage or robust File System architecture parallel to the RDBMS to handle unstructured and semi-structured data. This layer is strictly required to securely ingest, store, and retrieve:

CAPI Artifacts: Unstructured paradata generated by the Survey Solutions tool, including offline GPS tracks, interviewer audio audit recordings, and image uploads.

Legacy & Document Repository: Historical survey datasets (Excel/CSV/Access files), digitized legacy records (scanned images), and official published departmental reports (PDFs, Word documents). This storage layer shall act as the foundational document repository serving both the OISS ecosystem and the NADA platform.

c. Enterprise Metadata & Data Lineage Framework

The OISS platform shall implement an enterprise-grade metadata management and data lineage framework to ensure transparency, traceability, and auditability of data across its lifecycle.

The framework shall include:

7. A centralized metadata repository capturing technical metadata, business metadata, and operational metadata.
8. Integration with the data dictionary and business glossary defined in the FRS.
9. Automated end-to-end lineage tracking from data ingestion, transformation, aggregation, analytical modelling, and dissemination layers.
10. Table-level and column-level lineage visualisation capabilities.

11. Impact analysis functionality to assess downstream effects of schema or transformation changes.
12. Support for open and industry-standard metadata exchange formats.

The metadata and lineage framework shall support future extensibility to additional subject domains without structural redesign.

d. Data Lifecycle & Archival Strategy

The SI shall design and implement an automated Data Archival Policy.

- **Tiering:** Define rules to move "Cold Data" (e.g., raw survey schedules older than 5 years) to low-cost archival storage, while keeping aggregated "Golden Data" in high-performance storage.
- **Retrieval:** Ensure archived data can be seamlessly retrieved for historical trend analysis within defined SLAs without requiring manual database restoration.

e. In-Engine / In-Database Analytical Execution

The analytical environment should support in-engine or in-database model execution capabilities to minimise unnecessary data movement between data storage and analytical layers, thereby enhancing security, performance, and operational efficiency.

The overall architecture shall be designed in a modular and domain-extensible manner, enabling onboarding of additional subject domains or departments in future phases without requiring structural redesign of the core platform.

2.2.8. OISS Platform Development and Configuration

This phase involves the core coding, configuration, and unit testing of the OISS application. The System Integrator (SI) shall build the system based on the approved Low-Level Design (LLD) and Technology Stack.

Crucially, the detailed functionalities, process flows, business rules, and specific requirements for each statistical scheme and module are comprehensively documented in the Functional Requirement Specification (FRS). The SI is mandated to refer to the FRS as the definitive baseline and must ensure that every single functionality outlined therein is fully developed, configured, tested, and operationalized within the OISS platform.

The OISS platform shall be developed as a unified, scheme-agnostic platform built upon the international standard of the Generic Statistical Business Process Model (GSBPM).

As part of the platform development, the SI shall build and configure the following core modules:

a. Unified Web Portal & UI/UX Development (The Gateway)

The SI shall develop a single, unified, web-based portal that acts as the overarching framework and single-entry point for all system interactions.

Internal Role-Based Workspace: For DE&S employees, the portal shall serve as a secure intranet (accessed via SSO/Parichay). Upon login, users must be presented with a personalized dashboard allowing them to seamlessly navigate to other OISS modules (WMS, DMS, Data Processing) based on their RBAC permissions.

Public Dissemination Portal: The unauthenticated, public-facing side of the portal shall act as the official data dissemination platform for the State. It will host published statistical reports, interactive dashboards, and the NADA data catalog.

Compliance & UI/UX: The entire portal must feature a bilingual interface (English and Odia), be fully responsive across devices, and strictly adhere to the Guidelines for Indian Government Websites (GIGW 3.0) and WCAG 2.1 AA accessibility standards.

b. CAPI Integration & ETL Pipelines

API Development: Develop secure RESTful APIs to handle automated, scheduled data ingestion from the Survey Solutions (CAPI) server into the OISS Data Warehouse.

Validation & Mapping: Implement ETL scripts that map the CAPI metadata to the OISS schema, ensuring automated error handling for failed synchronizations.

c. GSBPM-Aligned Data Processing & Analysis Modules

Data Processing: Implement robust rule engines for data cleaning, wrangling, and transformation within the internal portal. Provide a user-facing data modeling interface for defining mathematical relationships and aggregations.

Statistical Analysis: Develop the analytical engine to execute EDA, regression, and time-series forecasting. Provide a secure, sandboxed environment for DE&S statisticians to execute custom analysis scripts (e.g., Python/R).

Data Revision & Versioning: The processing logic must natively support the publishing of "Provisional" versus "Final" data. The system must maintain strict revision history, ensuring that whenever a published dataset is revised, the changes are publicly auditable and flagged.

• Workflow (WMS) & Document Management (DMS)

Workflow Management System (WMS): Implement a dynamic WMS accessible via the unified portal to automate validation and report approval hierarchies. It must feature real-time status monitoring and immutable audit trails.

Document Management System (DMS): Develop a centralized repository with version control and OCR metadata indexing for official documents. It must integrate seamlessly with the WMS for document-centric workflows.

The WMS shall support configurable, scheme-specific workflow hierarchies as detailed in Section 3.

• Data Visualization, BI Engine & Reporting

Interactive Dashboards: Configure the embedded Business Intelligence (BI) tool to provide drag-and-drop dashboard creation for internal users, supporting drill-down capabilities and multi-format export options (PDF, Excel, CSV).

Standard Reports: Develop all static, periodic, and statutory reports (e.g., District-wise CPI reports, automated GSBPM format reports) exactly as explicitly documented in the FRS.

Ad-Hoc Querying: Provide a secure "Self-Service" report builder for authorized DE&S officials to generate custom cross-tabulations and visual charts on the fly, without requiring SI developer assistance or code changes.

Seamless Embedding: Ensure the charts, graphs, and tabular reports generated by this engine can be securely published and embedded directly into the Public Dissemination side of the Unified Portal.

Compliance with DE&S Data Dissemination Policy: The platform's public and inter-departmental data sharing modules must strictly adhere to the approved Data Dissemination

Policy and Guidelines of the Directorate of Economics & Statistics (DE&S). The SI shall configure role-based workflows, embargo/release calendars, and statistical disclosure controls (e.g., data masking) to ensure all outputs are disseminated in a policy-compliant manner, preventing the unauthorized identification of individual survey units.

- **Geographic Information System (GIS) Integration**

ArcGIS Enterprise Integration: The SI shall integrate the OISS platform with the Authority's existing **ESRI ArcGIS** environment via standard APIs (GeoJSON/REST).

Spatial Processing: Push aggregated statistical data from the OISS EDW to the ArcGIS server to enable dynamic spatial visualizations (heatmaps, buffering) within the portal.

- **System Administration & User Management**

Granular RBAC: Implement hierarchical role structures to manage permissions across all portal modules (System Administrators, DE&S Management, District Statistical Officers, etc.).

Notification & Helpdesk: Configure customizable, role-based notifications (Email, SMS, In-App alerts) and embed a context-sensitive help system and knowledge base directly into the portal interface.

- **Analytical Service Exposure & API Enablement**

The platform shall provide the capability to securely expose approved analytical models and statistical outputs as standardized REST-based services, subject to Authority approval.

The API framework shall include:

1. Role-based access control.
2. Authentication and authorization mechanisms.
3. Usage monitoring and throttling.
4. Audit logging of API consumption.
5. Version management of exposed services.

This shall enable controlled analytical service consumption by authorized internal or external systems in future phases.

2.2.9. Development of Advanced Analytics & Data Science Models

Beyond standard reporting and visualization, the System Integrator (SI) shall design, train, and deploy Advanced Analytics and Machine Learning (ML) models. These models will leverage the historical and real-time data stored in the Enterprise Data Warehouse (EDW) to automate quality control, forecast economic trends, and support data-driven policymaking.

The SI must strictly ensure that all developed models integrate seamlessly into the OISS platform's workflow and adhere to the requirements specified in the Functional Requirement Specification (FRS).

Phase-Wise AI/ML Implementation & Flexibility: The scope of Artificial Intelligence and Machine Learning (AI/ML) across the OISS platform is categorized into two primary phases of the statistical lifecycle:

- **Processing Phase (Data Transformation & Validation):** The SI shall implement AI interventions to automate the transformation, cleaning, and processing of ingested data. This includes deploying ML algorithms for advanced anomaly detection, outlier identification, and automated data imputation to ensure high data quality before entering the analytical warehouse.

- **Analysis Phase (Statistical Analysis & Decision Support):** The SI shall deploy advanced AI models and algorithms to support deep statistical data analysis, scenario forecasting, and decision support. As mandated, this includes operationalizing predictive models (e.g., price forecasting, yield prediction) on DE&S-identified indicators.

Flexibility for Future Enhancements: While the baseline models must be operational before Go-Live, the AI/ML architecture and the SI's technical approach must remain highly flexible and extensible to accommodate future enhancements, evolving analytical expectations, and the addition of new algorithms without requiring structural changes to the platform.

As part of this phase, the SI shall undertake the following specific activities:

a. Automated Anomaly & Outlier Detection

To execute the AI interventions mandated in the Processing Phase above, the SI shall deploy specific ML-based algorithms to act as the first line of automated defence for data quality:

Smart Validation: Develop models to automatically flag statistically improbable entries during data collection (e.g., a Field Surveyor entering an unusually high retail price for a commodity that deviates from historical district trends and seasonal variance).

Workflow Trigger: When an outlier is detected, the system must automatically isolate the record and trigger a notification to the respective Range Inspector or Supervisor for manual verification via the Workflow Management System (WMS).

b. Predictive Modelling & Forecasting Use Cases

The SI shall develop specific predictive models tailored to the core schemes of DE&S. The baseline use cases include, but are not limited to:

- **Crop Yield & Production Forecasting (EARAS):** Utilize historical crop cutting experiment (CCE) data, weather patterns, and spatial data to forecast agricultural yield and production estimates for key crops at the District and Block levels.
- **Inflation & Price Trend Analysis (Price Statistics):** Develop time-series forecasting models (e.g., ARIMA, Prophet) to predict short-term and medium-term trends in the Consumer Price Index (CPI) and Wholesale Price Index (WPI).
- **Economic Indicator Projections:** Build regression models to assist the State Income division in projecting Gross State Domestic Product (GSDP) estimates based on high-frequency indicators (IIP, GST collections, energy consumption).

Operationalizing AI/ML Models: The system shall support configurable analytical models for trend analysis and forecasting on selected time-series indicators. Prior to final system acceptance, the SI must successfully operationalize at least two (2) AI/ML-based analytical or predictive models on specific indicators identified by DE&S.

Scenario Comparison & Labelling: The system must allow users to configure parameters, compare scenarios, and visualize forecasts versus actuals. To maintain the integrity of State data, all predictive AI/ML outputs must be clearly and permanently labeled as "*Analytical Estimates*" and shall not be treated or published as "Official Statistics" unless formally approved by DE&S via the integrated approval workflow.

c. Model Explainability & Unbiased AI (XAI)

Transparent Logic: Because government policy decisions will be based on these insights, "Black-Box" models are unacceptable. The SI must implement eXplainable AI (XAI) frameworks

(e.g., SHAP, LIME) so that DE&S statisticians can clearly understand which variables drove a specific prediction.

Auditability: The logic, weighting, and training parameters of every deployed model must be fully documented and accessible to the Authority.

d. MLOps, Model Lifecycle Management & Governance

In addition to model development, the SI shall implement a robust MLOps (Machine Learning Operations) and Model Lifecycle Management framework to ensure accountability, reproducibility, and performance governance of all analytical models. The framework shall include:

- DPQ-DP-1 **Model Registry & Versioning:** A centralized model registry to store model artefacts, with strict version control and role-based access.
- DPQ-DP-2 **Metadata & Lineage:** Storage of model metadata (training datasets, features used, hyperparameters) and model lineage tracking for audit and compliance purposes.
- DPQ-DP-3 **Drift Monitoring:** Continuous monitoring mechanisms to detect data drift, model drift, concept drift, and prediction bias as new, verified survey data flows into the Data Warehouse.
- DPQ-DP-4 **Automated Retraining:** Capability to trigger automated or semi-automated retraining workflows and generate alerts when performance thresholds are breached.
- DPQ-DP-5 **Champion-Challenger:** Comparison capability for model benchmarking prior to promoting a new model to production.
- DPQ-DP-6 **Secure Deployment:** Support for containerized model deployment and secure exposure of approved models through controlled REST APIs.

e. Geospatial Predictive Analytics

ArcGIS Synergy: Working in tandem with the GIS Integration (Section 2.2.8.6), the SI shall deploy spatial statistics tools to analyze geographical clustering of economic activities or agricultural distress, rendering these predictive heatmaps directly on the ESRI ArcGIS enterprise layer.

f. AI/ML Deployment, Validation & Go-Live Clarification

The AI/ML components under OISS shall be delivered as advanced analytical capabilities integrated within the platform.

Data Dependency Acknowledgement

Model performance shall depend upon the availability, completeness, and historical depth of validated datasets provided by the Authority. The SI shall not be held accountable for predictive limitations arising from insufficient or inconsistent historical data.

Model Evaluation Framework

Each AI/ML model shall be evaluated using appropriate statistical validation metrics (such as MAPE, RMSE, Precision/Recall, or R-squared, as applicable to the use case). The evaluation approach shall be mutually agreed during the design phase.

Acceptance shall be based on:

1. Correct implementation of agreed methodology
2. Transparent and explainable model logic
3. Demonstration of validation results on historical test datasets

Absolute predictive accuracy guarantees shall not be implied.

Go-Live Dependency Clarification

While at least two (2) AI/ML-based analytical or predictive use cases must be operationalized prior to Final System Acceptance, predictive accuracy stabilization and continuous model tuning shall not be treated as Go-Live blocking criteria.

AI/ML refinement and performance optimization may continue during the Operations & Maintenance (O&M) phase under structured model lifecycle management.

2.2.10. Integration Services (Internal & External)

The OISS platform is envisioned as a highly interoperable "System of Systems." The System Integrator (SI) shall design, develop, and manage all necessary internal and external integrations required to fulfil the business workflows defined in the Functional Requirement Specification (FRS).

All integrations must be implemented using standard, secure protocols (RESTful APIs, SOAP, GeoJSON, SDMX) routed through a centralized API Gateway. Point-to-point hardcoded integrations are strictly prohibited.

The integration landscape for the OISS platform spans three primary domains to ensure comprehensive statistical data consolidation:

- a) **Internal DE&S Ecosystem:** Seamless coupling with existing and upcoming departmental applications (e.g., HRMS, DMS, mobile apps) and core statistical tools (CAPI, NADA, ArcGIS).
- b) **State Line Departments:** Automated data pipelines from over 40+ state departments to ingest administrative data, specifically powering State Income (GSDP) estimation across 18 sub-sectors.
- c) **National & MoSPI Platforms:** Two-way data exchange with national statistical frameworks, including e-Sigma and future MoSPI survey tools, alongside standard national registries (LGD, Parichay).

Flexibility for Future Integrations: The SI must ensure the integration architecture remains highly decoupled and extensible. The SI shall proactively facilitate the integration of any future national surveys, state administrative portals, or internal DE&S applications identified during the contract period without requiring structural changes to the platform.

As part of this phase, the SI shall undertake the following specific activities:

a. Implementation Of Api Gateway & Middleware

The SI shall deploy an Enterprise API Gateway to manage, monitor, and secure all data exchanges.

Security & Governance: The gateway must enforce authentication (OAuth 2.0 / API Keys), rate-limiting, and payload validation (to prevent injection attacks) for every API call.

Audit Logging: Every data exchange (success or failure) must be logged with timestamps for troubleshooting and compliance audits.

b. Internal Ecosystem Integrations

The SI must ensure seamless, automated two-way communication between the core OISS platform and its mandated companion systems:

Internal DE&S Administrative & Operational Systems:

The SI is mandated to integrate the OISS platform with the existing and upcoming internal applications of DE&S for unified data ingestion and validation. This explicitly includes integration with the Document Management System (DMS), HRMS, MPR, Inventory Management System, Learning Management System (LMS), STAT Odisha Mobile Application, the official DE&S website, and the RIPEAS platform.

World Bank's Survey Solutions (CAPI):

- *Pull:* Automated ingestion of completed survey microdata and paradata into the OISS Data Warehouse.
- *Push:* Automated syncing of updated Master Data (e.g., new LGD codes, user rosters) from OISS MDM to the CAPI HQ Server.

NADA (Data Catalog): Automated publishing workflows that push finalized, anonymized microdata and DDI-compliant metadata from the OISS repository to the NADA portal for public dissemination.

ESRI ArcGIS Enterprise: Two-way integration utilizing REST endpoints to push aggregated statistical indicators (e.g., District-wise CPI) from the OISS EDW to the ArcGIS Server, and pull rendered map layers back into the OISS Unified Portal.

c. External State & National Integrations

The SI shall develop standard connectors to integrate with critical external Government platforms, including but not limited to:

State Line Departments & GSDP Estimation Sources (40+ Departments): OISS must be designed to ingest and consolidate statistical data from over 40+ State Line Departments. Specifically, to support accurate State Income (GSDP) Estimation, the SI must establish prescribed integration data pipelines covering 3 broad sectors and 18 sub-sectors of the economy.

This includes automated data ingestion from departments handling: Agriculture (Crop Proper), Livestock, Fishery, Forestry, Mining & Quarrying, Manufacturing, Electricity, Gas, Water Supply and Other Utility Services, Construction, Trade & Repair Services, Hotel & Restaurant, Transport, Storage, Communication & Services related to Broadcasting, Financial Services, Real Estate, Ownership of Dwellings and Professional Services, Public Administration & Defence, and Other Services.

National CAPI Tools & MoSPI Portals: The system must support seamless API-based or secure file-based integration with national CAPI tools, including **e-Sigma**, utilized for conducting National Surveys and statistical activities (e.g., NSS, EARAS) administered by MoSPI. Furthermore, the SI must develop data-sharing APIs (preferably using SDMX standards) to push finalized State-level statistical indicators (such as IIP, CPI, and ASI data) directly to MoSPI central portals, eliminating manual data entry at the National level.

Local Government Directory (LGD): Real-time or scheduled API integration with the Ministry of Panchayati Raj's LGD portal to fetch the latest administrative boundaries and village codes, ensuring the OISS Master Data Management (MDM) module is always synchronized with the national standard.

MoSPI Portals: Develop data-sharing APIs (preferably using SDMX standards) to push finalized State-level statistical indicators (such as IIP, CPI, and ASI data) directly to the Ministry of Statistics and Programme Implementation (MoSPI) central portals, eliminating manual data entry at the National level.

Jan Parichay / Parichay (SSO): Integration with the National/State Single Sign-On framework to allow DE&S officials to access the OISS Unified Portal using their standard government credentials.

State Communication Gateways: Integration with the NIC SMS Gateway and designated State Email Gateways to dispatch automated workflow notifications, OTPs, and system alerts to users.

d. API Documentation & Developer Portal

The SI must provide comprehensive, auto-generated API documentation (e.g., Swagger / OpenAPI specification) detailing all endpoints, request/response payloads, and error codes.

If DE&S requires data to be shared with other State Departments (e.g., Agriculture, Health) in the future, the SI must facilitate this via a secure "Developer Portal" where other departments can request API access keys.

2.2.11. Legacy Data Onboarding & Digitization

The Directorate of Economics and Statistics (DE&S) possesses decades of historical statistical data, spanning disparate formats including legacy databases, standalone spreadsheets, and physical analog publications. The System Integrator (SI) shall design, develop, configure, and maintain dedicated modules within OISS to execute a comprehensive, structured migration and digitization exercise.

a. Legacy Data Onboarding Application

The SI shall design, develop, configure, and maintain an internal legacy data onboarding application/module within OISS to facilitate the structured onboarding of historical and legacy statistical datasets into the centralized statistical repository.

Ingestion Capabilities: The module shall support the seamless upload and ingestion of legacy digital datasets, spreadsheets, CSV files, scanned tabular records, and departmental historical databases.

Configurable Mapping: The system shall feature configurable templates and mapping rules to ensure strict data standardization, classification alignment, metadata tagging, validation, and reconciliation.

Workflow-Driven Process: The onboarding process must follow a strict, role-based workflow encompassing: Upload, Validation, Review, Approval, and Final publishing into OISS repositories.

Governance & Incremental Support: The module must maintain an immutable audit trail and version control for all onboarding activities. The onboarding mechanism shall actively support incremental onboarding of legacy datasets as and when identified by DE&S or participating departments during both the implementation and operational lifecycle of OISS.

b. Robotic Process Automation (RPA) and OCR-Based Digitization

The SI shall provide advanced capabilities for the digitization and structured extraction of information from analog statistical documents, registers, reports, and books.

Core Technologies: The SI shall deploy a combination of Optical Character Recognition (OCR), Intelligent Character Recognition (ICR) where applicable, Robotic Process Automation (RPA), and configurable validation workflows.

Supported Framework: The digitization framework shall support scanned statistical reports and publications, historical statistical registers, printed schedules and tabular forms, legacy books and archival documents, as well as semi-structured and unstructured statistical records.

Digitization Workflow Features: The solution shall specifically include:

1. Automated extraction of textual and tabular information.
2. Human-assisted verification workflows for low-confidence extraction cases.
3. Metadata tagging and indexing to power a searchable archival repository.
4. Workflow-based approval, publishing, and strict audit logs for all digitization and correction activities.

Integration & Strategy: Digitized outputs shall be natively capable of integration into OISS analytical repositories, metadata catalog systems, and statistical dissemination workflows. The detailed implementation approach, automation strategy, and confidence threshold management framework shall be formally proposed by the SI and approved by DE&S / OCAC prior to execution.

c. Volume Estimation & Scope Clarification (Bulk Digitization)

The bulk digitization exercise (OCR/ICR/RPA) shall be limited to documents and records formally identified and approved by the Authority.

Baseline Survey: The Authority shall provide an indicative estimate of document volumes (number of files, approximate page counts, formats, and language distribution) during project initiation. In the absence of a finalized volume assessment at the RFP stage, the selected SI shall conduct a comprehensive baseline document survey within the first 30 days of project initiation to finalize the digitization scope.

Scope Lock & Change Requests: The mutually approved baseline volume from this survey shall form the binding digitization scope for contractual purposes. Any digitization requirement exceeding the approved baseline volume shall be treated under the structured Change Request (CR) mechanism and utilizing the blended man-month rates provided in the Commercial Bid.

d. Post-Migration Data Validation & Sign-Off

For all legacy datasets onboarded into the OISS repository, the SI must enforce a strict, documented validation protocol before the data is considered "migrated."

Validation Checks: The SI shall conduct thorough automated and manual data validation checks on all migrated datasets. This includes verifying row counts, performing checksums, and testing against predefined data quality rules to ensure absolute completeness and consistency between the source data and the new Enterprise Data Warehouse (EDW).

Discrepancy Resolution: The SI must document the validation results, generate automated exception reports for any orphaned, duplicated, or corrupt records, and collaborate directly with DE&S domain experts to resolve identified issues prior to seeking final sign-off from the Authority.

2.2.12. Testing and Quality Assurance

This phase focuses on the rigorous validation of the developed OISS platform to ensure it meets all functional, non-functional, performance, and security requirements defined in the FRS. The

System Integrator (SI) shall execute a comprehensive testing strategy and obtain all necessary certifications prior to system deployment.

As part of this phase, the SI shall undertake the following activities:

a. Comprehensive Testing Execution

The SI shall meticulously execute the approved Test Plan across all custom-developed modules, configured COTS/Open-Source platforms, and external integration points.

Unit & Integration Testing: Conduct thorough Unit Testing for all individual code modules. Execute Integration Testing to verify seamless data flow between internal OISS modules and external systems (e.g., CAPI, LGD, MoSPI, ArcGIS).

Performance Testing: Carry out Load, Stress, and Volume testing to ensure the application meets the performance benchmarks defined in the Non-Functional Requirements, even during peak data entry periods (e.g., concurrent access by thousands of field surveyors).

Digitization Quality Assurance (QA): Execute specific QA checks on the bulk digitized legacy documents, validating OCR text accuracy against predefined benchmarks, image legibility, and successful indexing within the Document Management System (DMS).

Test Documentation: Maintain detailed records of all executed test cases, results obtained, and defects logged, providing weekly testing summary reports to the DE&S/OCAC Technical Committee.

b. User Acceptance Testing (UAT) & Defect Resolution

The SI shall provide comprehensive support to designated DE&S/OCAC officials during the User Acceptance Testing (UAT) phase.

UAT Environment: Deploy the fully tested application to a dedicated, isolated UAT staging environment (mimicking the production environment).

User Handholding: Assist DE&S users in understanding the system functionalities, executing predefined UAT test scenarios, and providing live troubleshooting guidance.

Defect Tracking & Regression: Implement a robust defect tracking system. All issues reported during UAT must be logged, assigned a severity/priority level, and resolved by the SI within agreed SLAs. The SI must perform complete regression testing on fixed builds before final UAT sign-off is granted by DE&S/OCAC.

c. Security Audit & Compliance Certification

The SI shall facilitate and bear the full cost of obtaining all relevant quality and security certifications for the OISS platform.

CERT-In Audit (Safe-to-Host): The SI shall appoint a CERT-In empanelled auditor to perform a comprehensive Vulnerability Assessment and Penetration Testing (VAPT) prior to Go-Live.

Vulnerability Remediation: The SI must provide the VAPT report to the Authority and promptly remediate all identified vulnerabilities. The "Safe-to-Host" certificate must be obtained before the application is deployed to the production data center.

UIDAI Compliance: If the platform processes or authenticates Aadhaar data, the SI shall perform a UIDAI compliance audit as per the latest guidelines.

Periodic Audits: The SI must support periodic security audits and certifications as required by the State Data Centre (SDC) or MeitY policies throughout the contract lifecycle.

d. SSL & Protocol Security Configuration

Certificate Procurement: The SI shall procure, install, and configure valid SSL certificates from a recognized Certification Authority (CA) for all domains and sub-domains associated with the OISS platform.

Transit Encryption: Ensure strictly secure connections between clients and the server using HTTPS protocols (TLS 1.2 or higher), guaranteeing end-to-end encryption of all data in transit.

2.2.13. Training and Capacity Building

This phase focuses on equipping Directorate of Economics & Statistics (DE&S) personnel with the necessary knowledge and skills to effectively use, manage, and leverage the OISS platform. The System Integrator (SI) shall develop and deliver comprehensive training programs and materials tailored to different user groups prior to the system's official Go-Live.

As part of this phase, the SI shall undertake the following activities:

a. Development Of Training Content & Materials

The SI shall develop comprehensive training materials based on the final OISS functionalities, fulfilling the requirements outlined in the FRS. All materials must be provided in both **English and Odia**, where appropriate for the target audience.

- **Deliverables:** The SI must develop and submit the following:
 - Detailed User Manuals and System Administrator Guides.
 - Role-specific Quick Reference Guides (QRGs) for quick on-the-job assistance.
 - Training presentations and hands-on exercise workbooks.
 - Video tutorials demonstrating key module functionalities (to be hosted within the OISS platform's internal helpdesk).

Editable Formats: All training materials must be handed over to the Authority in both editable formats (e.g., MS Word, PowerPoint) and finalized deployment versions (e.g., PDF, MP4) for future internal updates.

b. Comprehensive Training Strategy & Plan

Target Audience Mapping: The SI shall map all user categories (System Administrators, DE&S Management, District Statistical Officers, Block Officials, and Field Surveyors) and tailor the training modules to their specific access levels.

Delivery Modes & Qualified Trainers: The SI shall submit a detailed Training Calendar outlining the schedule, batch sizes, and delivery modes (e.g., classroom, virtual instructor-led, or hybrid). The SI must deploy qualified trainers with expertise in both the OISS platform and relevant statistical domains.

Feedback Mechanism: The SI must collect, document, and analyze user feedback after each training session to continuously improve the delivery mechanism.

E-Learning Portal (LMS): The SI shall deploy a Learning Management System (LMS) within the OISS portal to host training videos, interactive tutorials, and SOPs. The LMS must track user progress and issue completion certificates for field staff.

c. Execution Of Role-Based Training Sessions

Train-the-Trainer (ToT) Program: For mass state-wide rollout, the SI shall conduct intensive, in-person ToT sessions at the State HQ for designated "Master Trainers" (e.g., DSOs or Range Inspectors) who will subsequently assist in training block and field-level staff.

Hands-on Sandbox Training: All training must be highly interactive and hands-on, utilizing a dedicated Training Environment (Sandbox) with dummy data so users can practice data entry, validations, and report generation without impacting production data.

d. Handholding & Technical Knowledge Transfer (KT)

Go-Live Handholding: Following the formal training sessions, the SI shall provide a defined period of intensive "handholding" support (e.g., deploying support engineers on-site) to assist users as they begin using the live OISS system during the initial weeks of Go-Live.

Technical Knowledge Transfer (KT): The SI must conduct specific, deep-dive KT sessions for key DE&S and OCAC IT personnel. This must cover system architecture, backend configuration, master data (LGD) management, and basic troubleshooting procedures to facilitate departmental self-sufficiency.

e. Continuous Capacity Building (O&M Phase)

Refresher Courses: The SI shall conduct biannual virtual refresher training sessions throughout the Operations & Maintenance (O&M) period to accommodate newly recruited or transferred staff.

Update Briefings: Whenever a major feature is rolled out or a scheme's logic is fundamentally altered during the contract period, the SI must provide updated training materials and conduct targeted orientation sessions.

2.2.14. Deployment, Hosting & Go-Live

This phase covers the critical transition of the fully tested, UAT-approved OISS application platform onto the live Production Environment. While the underlying physical or cloud infrastructure will be provisioned by the Authority (OCAC / State Data Centre), the System Integrator (SI) holds sole responsibility for the successful deployment, configuration, and performance tuning of the application layer.

As part of this phase, the SI shall undertake the following activities:

a. Infrastructure Validation & Configuration

Readiness Audit: Prior to deployment, the SI must conduct an audit of the provisioned production infrastructure to ensure it strictly meets the Compute, Storage, and Network specifications defined in the SI's approved Infrastructure Requirement Specification (IRS).

Application-Layer Setup: The SI shall perform all necessary software installations, including configuring the Microservices orchestration (e.g., Kubernetes), web servers, API Gateways, database clusters, and ArcGIS integration endpoints.

Performance Tuning: The SI must configure application-level load balancing, database indexing, and caching mechanisms to ensure the system meets the required Non-Functional Requirements (NFRs) for speed and concurrency.

b. Deployment Management & CI/CD Pipeline

Release Management: The SI must establish a secure Continuous Integration / Continuous Deployment (CI/CD) pipeline for automated, error-free code migration from Staging to Production.

Deployment & Rollback Plans: The SI shall submit a detailed "Deployment Runbook" for DE&S/OCAC approval. This must include step-by-step release procedures, downtime estimates (to be scheduled during non-business hours), and a mandatory **Rollback Plan** to restore the previous stable state in case of a critical deployment failure.

Post-Deployment Sanity Testing: Immediately following deployment, the SI shall conduct live sanity checks to verify that the core application functions, external APIs, and SSO integrations are fully operational in the production environment.

c. Data Cut-Over & Synchronization

Final Delta Migration: Building upon the legacy data migration executed in Section 2.2.11, the SI must execute the final "Cut-Over." This involves pausing legacy data entry, migrating the final delta of records to the OISS Data Warehouse, and ensuring 100% data parity at the moment of Go-Live.

System Switch-On: Once data parity is confirmed by DE&S, the SI shall officially point the live domain URLs to the new production system.

d. Go-Live Declaration & Hypercare Support

Hypercare Period: The SI shall provide dedicated, heightened technical support during an initial "Hypercare" period (60 days post Go-Live). This involves deploying senior technical resources to closely monitor application logs, server loads, and database locks.

Rapid Defect Resolution: Any critical issues, bugs, or workflow bottlenecks arising immediately post-launch must be addressed on a priority basis (within hours, circumventing standard SLA wait times).

Formal Handover: The SI shall formally declare the system "Stable" and transition the platform to the long-term Operations & Maintenance (O&M) team only upon successful completion of the Hypercare period and written sign-off from DE&S/OCAC.

2.2.15. Operations, Maintenance (O&M) & Helpdesk Support

Following the successful Go-Live and completion of the Hypercare period, the System Integrator (SI) shall provide comprehensive Operations and Maintenance (O&M) support for the OISS platform for a strict period of Two (2) Years.

This support scope is strictly focused on the Application Layer (custom code, COTS platforms, databases, APIs, and integrations). Infrastructure-level management (servers, base OS, network firewalls) will be handled by OCAC or its designated infrastructure vendor.

As part of this phase, the SI shall undertake the following activities:

a. Application Maintenance & Version Control

Corrective Maintenance: The SI shall identify, diagnose, and fix all software bugs, defects, and broken workflows in the OISS platform to ensure it functions strictly according to the FRS.

Adaptive Maintenance: The SI shall proactively modify the application to ensure continuous compatibility with underlying software updates (e.g., upgrading to a new version of PostgreSQL or Django) and external API changes (e.g., MoSPI or LGD endpoint updates).

Patch Management: The SI shall manage the deployment of all application-level security patches and minor version updates via the approved Change Management process, ensuring zero vulnerabilities during the 2-year O&M period.

Source Code Management: The SI must maintain a continuously updated, heavily commented version of the source code in the Authority's Git repository.

b. Helpdesk Operations & L2/L3 Support

Ticketing System: The SI shall establish and operate a dedicated technical Helpdesk (L2/L3 support) utilizing a standard IT Service Management (ITSM) ticketing tool.

Incident Management: The Helpdesk will log, track, resolve, and report on application-related incidents, user access issues, and service requests raised by DE&S administrators.

SLA Adherence: The SI must strictly adhere to the response and resolution times defined in the Service Level Agreement (SLA) section of the RFP. Failure to meet these SLAs will result in contractual penalties.

Threat Detection (SIEM): The SI shall implement a Security Information and Event Management (SIEM) tool to actively detect network threats, monitor unusual user behavior, and generate automated alerts for potential data breaches or DDoS attacks.

c. Multilingual IVRS & Field Support Helpdesk

To support the thousands of Field Surveyors and external entities interacting with the system, the SI shall deploy an Interactive Voice Response System (IVRS):

- **Multilingual Support:** The IVRS must operate in **Odia, English, and Hindi**.
- **Field-Centric Design:** Design a streamlined call flow for field staff to report CAPI sync issues, offline app crashes, or master data discrepancies.
- **Ticketing Integration:** The IVRS must be integrated with the central Helpdesk CRM, automatically generating support tickets based on caller inputs (e.g., Mobile Number, User ID) for end-to-end tracking.

The IVRS shall be developed and tested during the implementation phase but will officially Go-Live and commence routing calls concurrently with the OISS platform Go-Live and the formal handover of the CAPI/NADA ecosystem.

d. Performance Monitoring & Database Administration

Application Performance Monitoring (APM): The SI shall deploy APM tools to proactively monitor system health, API response times, and resource utilization.

Database Optimization: The SI shall conduct routine database cleansing, re-indexing, and query tuning to ensure the Enterprise Data Warehouse (EDW) and OLTP databases do not degrade in performance as data volume grows.

Monthly MIS Reports: The SI shall provide monthly SLA and performance reports to the DE&S technical committee.

e. Backup, Recovery & Disaster Recovery (DR) Drills

Backup Configuration: While the State Data Centre (SDC) handles physical infrastructure backups, the SI must define the application-specific data backup policies (frequency, retention rules for databases and Object Storage) and ensure the automated scripts are running successfully.

DR Support: In the event of a critical failure, the SI shall provide immediate technical support to reinstall, reconfigure, and validate the OISS application on the Disaster Recovery (DR) infrastructure, ensuring the Recovery Time Objective (RTO) is met.

f. Change Management & Minor Enhancements

Process Flow: Any deployment of fixes or updates must follow a formal Change Management process approved by DE&S/OCAC to prevent unapproved code from entering production.

Continuous Improvement: The SI is responsible for developing mutually agreed-upon minor enhancements (e.g., adding a new column to a statutory report, tweaking a UI dashboard) as part of the standard O&M scope, at no additional cost.

2.2.16. Exit Management & Knowledge Transfer

To ensure long-term sustainability and prevent vendor lock-in, the System Integrator (SI) must execute a comprehensive Exit Management and Knowledge Transfer plan at the end of the 3-year contract period (or upon premature termination). The exit process shall guarantee complete vendor independence and the uninterrupted operation of the OISS platform by DE&S, OCAC, or an incoming nominated agency.

At least sixty (60) days prior to the completion of the contract, the SI shall initiate the handover process, which must strictly include:

- **Source Code & Intellectual Property:** Transfer of the complete, unencrypted, and fully commented source code, along with all build scripts and configuration artifacts.
- **Documentation:** Handover of updated As-Built architectures, technical and functional manuals, API integration documents, and database schema Data Dictionaries.
- **Metadata & Workflows:** Transfer of all active metadata definitions, classification code lists, and configured GSBPM workflows.
- **Access & Credentials:** Handover of all super-administrator credentials, root access to servers/VMs, database passwords, and domain SSL certificates.

The SI shall provide adequate "shadowing" and Knowledge Transfer (KT) sessions to the departmental team during this transition period at no additional cost. The final O&M quarterly payment and Performance Bank Guarantee (PBG) shall only be released upon the issuance of a successful "Exit Sign-off" certificate by the Authority.

2.3. Project Deliverables

The System Integrator (SI) shall provide the following tangible deliverables, aligned with the project phases outlined in Section 2.2. All deliverables must be submitted to the DE&S/OCAC

Technical Committee for review and formal sign-off. The list below is foundational; additional intermediate deliverables may be defined during project execution.

2.3.1. Project Initiation & System Study (Ref: 2.2.1 To 2.2.3)

- **Project Inception Report:** Detailing the mobilized team, project schedule (Gantt chart), and risk management plan.
- **System Requirement Specification (SRS):** Finalized requirement analysis based on the FRS and system study.
- **Infrastructure Requirements Specification (IRS):** Exact compute, storage, and network sizing required for the State Data Centre (including ArcGIS requirements).
- **CAPI Takeover Plan:** Documented strategy for assuming O&M of the existing Survey Solutions environment.

2.3.2. Architecture & Design (Ref: 2.2.4 To 2.2.7)

- **High-Level Design (HLD) & Low-Level Design (LLD) Documents:** Covering all microservices, modules, and API gateways.
- **Approved Technology Stack & COTS Report:** Final list of approved Open-Source and proprietary tools (including the Build vs. Buy analysis).
- **Security Architecture Document:** Detailing Zero-Trust implementation, encryption, and DPDP compliance strategies.
- **Data Storage & EDW Architecture Document:** Database schemas, Object Storage design for CAPI data, and data archival policies.

2.3.3. Platform Development & Integration (Ref: 2.2.8 To 2.2.10)

- **Developed Software Codebase:** Fully commented source code pushed to the Authority's Git repository.
- **Configured AI/ML Models:** Deployed predictive models (Yield, CPI) along with their algorithm documentation and XAI (Explainability) parameters.
- **Integration Specifications & API Docs:** Swagger/OpenAPI documentation for all internal and external integrations (LGD, MoSPI, ArcGIS, NADA, Parichay).

2.3.4. Data Migration & Testing (Ref: 2.2.11 To 2.2.12)

- **Data Migration Completion Report:** Confirming the successful ETL of structured legacy datasets.
- **Digitization QA Report:** Confirming successful OCR scanning, indexing, and DMS ingestion of historical documents.
- **Comprehensive Test Reports:** Documentation of Unit, Integration, System, and Performance (Load/Stress) test results.
- **Security Audit (VAPT) Report:** Safe-to-Host certificate from a CERT-In empanelled agency, with proof of vulnerability closure.
- **User Acceptance Testing (UAT) Sign-off:** Formal approval from DE&S nodal officers confirming functional readiness.

2.3.5. Capacity Building, Go-Live & O&M (Ref: 2.2.13 To 2.2.15)

- **Bilingual Training Materials:** Editable and final versions of User Manuals, QRGs, and Video Tutorials in English and Odia.
- **Training Completion Report:** Attendance logs, feedback summaries, and Knowledge Transfer (KT) sign-offs.

- **Deployment & Rollback Plan:** Step-by-step production release runbook.
- **Go-Live Certificate:** Formal declaration of the system operating successfully in the production environment after the Hypercare period.
- **Ongoing O&M Deliverables (For the 2-Year Support Phase):**
 - Monthly SLA and Application Health Reports.
 - Incident & Root Cause Analysis (RCA) Reports.
 - Updated version-release notes and patch deployment logs.

2.3.6. Exit & Handover Phase (Ref: 2.2.16)

- Exit Management & Transition Plan (Submitted 60 days prior to contract expiry)
- Complete Source Code & Configuration Repository (Unencrypted, fully commented)
- Final As-Built Documentation (Including System Architecture, API specs, and Database Schema/Data Dictionaries)
- Knowledge Transfer (KT) Completion & Handover Sign-off Report
- Handover of all Administrative Credentials & SSL Certificates

3. Functional Requirement Specification (FRS) for OISS

Odisha Integrated Statistical System (OISS) will be a state level digital framework proposed to modernize how the government collects, processes, analyses, and shares data across departments. It aims to create a unified, technology driven platform by integrating systems to build data warehouse and live dashboards for evidence-based policymaking and improve governance efficiency.

The Functional Requirement Specification (FRS) outlined in this section serves as the definitive functional blueprint for the business processes, system workflows, and user interactions required within the Odisha Integrated Statistical System (OISS). The System Integrator (SI) shall design, develop, and configure the platform to strictly fulfill every requirement detailed herein. This FRS constitutes the functional baseline of OISS, subject to technical validation and refinement as per Section 2.2.1. Further, all the functional requirements in this section shall be implemented strictly in accordance with the Scope of Work defined in Section 2.

To ensure alignment with international statistical best practices, all functional modules and technical capabilities are logically mapped to the standard phases of the Generic Statistical Business Process Model (GSBPM) – spanning across the collection, processing, analysis, and dissemination of data. The following sub-sections detail the specific functional capabilities expected of the platform, beginning with a high-level conceptual landscape of the integrated OISS ecosystem.

3.1. OISS High-Level Functional Landscape

The OISS architecture is designed as a modular, four-stage data pipeline supported by a robust governance layer. The flow of data moves logically from **Collect** → **Process** → **Analyze** → **Disseminate**.

- **Collect:** Ingests data from diverse sources including Enumerators (CAPI), Departmental Users (CAWI), external APIs, and legacy archives.
- **Process:** A dedicated Staging/SDC environment where raw data is ingested, validated, cleaned, and transformed.

- **Analyze:** The Enterprise Data Warehouse (EDW) serves as the core hub for generating insights, supporting GIS mapping, and powering visualization dashboards.
- **Disseminate:** The final output is shared via the public DE&S website and Open APIs.
- **OISS Portal:** A central interface layer that provides authorized users (DE&S officials, Analysts) access to these underlying systems.

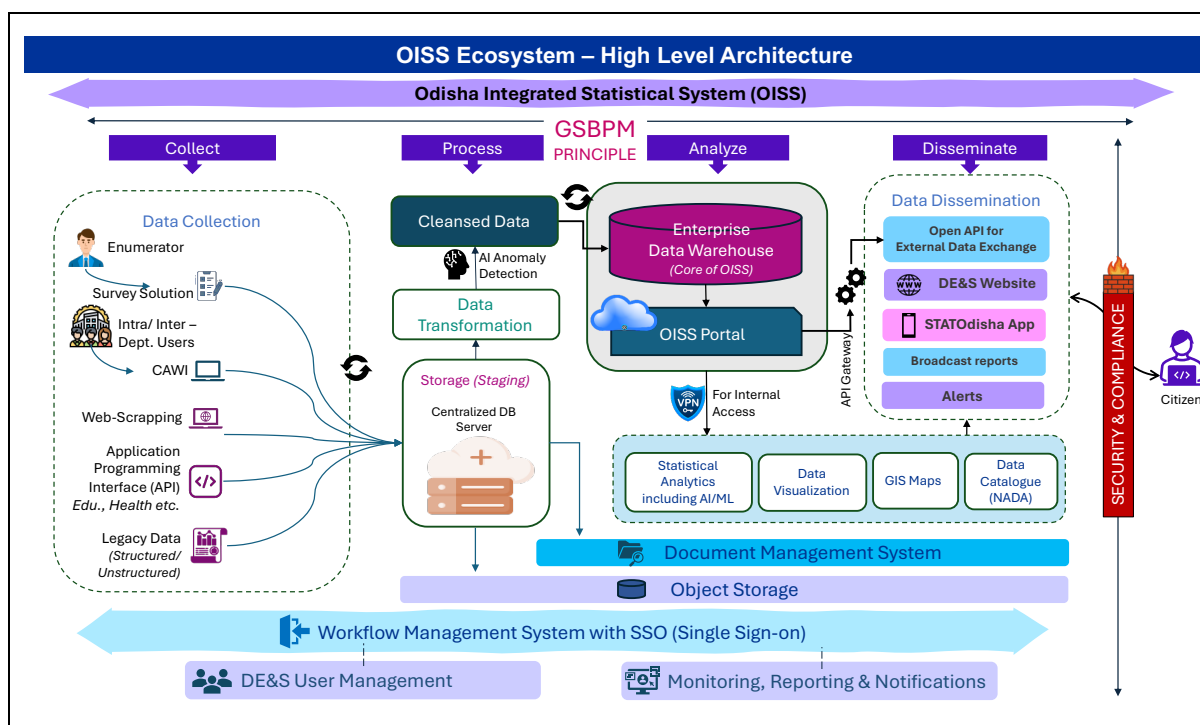


Fig: OISS High Level Architecture

3.2. Core Schemes and Operational Profile

The OISS platform must be configured to seamlessly manage the end-to-end statistical lifecycle for all active schemes operated by the Directorate of Economics and Statistics (DE&S). Currently, DE&S has identified 22 active schemes, which are categorized into 11 Core Schemes and 11 Additional Schemes.

The System Integrator (SI) shall ensure that the data collection pathways, Workflow Management System (WMS), processing logic, and statutory reporting modules are dynamically tailored to accommodate the specific operational profile, frequency, and data volume of each scheme detailed in the table below.

Core Scheme Details - Consolidated Operational Profile and Data Metrics

S.N	Scheme Name	Central/ State Scheme	Frequency	Major Indicators	Data Availability Since	Volume of Data (Approx.)
1	Price Statistics	State Scheme (DE&S)	Fortnightly / Monthly	District wise average price (Farm Harvest Price,	FHP (1989), Wholesale (2001), CPI	< 1 GB per year

S.N	Scheme Name	Central/ State Scheme	Frequency	Major Indicators	Data Availability Since	Volume of Data (Approx.)
				Producers' Price (Agri/Animal), Wholesale Price, District wise CPI by 6 major groups	(2021)	
2	Index of Industrial Production (IIP)	State Scheme (Compilation)	Monthly	Index of industrial production (Manufacturing, Mining, Electricity)	2017-18 onwards	NA - monthly
3	State Income / DDP	State Scheme	Annual	GSDP: Current, Constant, Per capita NSDP, GVA by sectors DDP: GDDP, NDDP, Per Capita Income, GDDP/ NDDP by sectors	1950-51 onwards for GSDPP 1993-94 to 2011-12 for DDP	NA (Excel files)
4	Economic Survey Report	State Scheme	Annual	GSDP, Fiscal Position, Sectoral Performance (Agri, Industry, Services), Inflation, Social development, Industrial development, employment, Infrastructure growth	2004-05 onwards	~30-50 MB per year

S.N	Scheme Name	Central/ State Scheme	Frequency	Major Indicators	Data Availability Since	Volume of Data (Approx.)
5	District Statistical Handbook	State Scheme	Biennial	Socio-economic data across 24+ sectors (Demography, Health, Agri, etc.)	2009 onwards (Digital), 1999-2007 (Physical)	160-270 MB per biennial
6	Annual Survey of Industries (ASI)	Central Scheme (State Participation)	Annual	Capital, Output, GVA, Employment, Labor Cost, Input/Output items	2006-07 to 2019-20	< 1 GB per year Industrial data of around 300 factories per year
7	National Sample Survey (NSS)	Central Scheme (State Participation)	Annual / Rounds	Socio-economic indicators (Consumption, Health, Education, Employment, Tourism etc.)	State Sample: 66th (2009-10) to 78th Round	Varies (e.g., ~23-124 MB per round)
8	Basic Statistics for Local Level Development (BSLLD)	Central Scheme (Sponsored)	Ad-hoc Survey Irregular (Pilot/One-time)	Village level demographics, employment, health, education, infrastructure	2016-17 (Pilot 2013-14)	160-270 MB
9	Agricultural Census	Central Scheme (Centrally Sponsored)	Quinquennial (5 Years)	Operational holdings, Land utilization, Cropping pattern, Irrigation, Tenancy	1970-71 to 2015-16; 2021-22	150-200 MB per survey (Phase-I, II, III survey data)

S.N.	Scheme Name	Central/ State Scheme	Frequency	Major Indicators	Data Availability Since	Volume of Data (Approx.)
10	Rationalization of Minor Irrigation Statistics (RMIS)	Central Scheme (100% Funded)	Quinquennial (5 Years)	Culturable Command Area (CCA), Irrigation potential, Water distribution, Ownership.	1986-87 to 2017-18	500-800 MB per Census
11	EARAS	Central Scheme (Fully Funded)	Seasonal / Annual	Crop Area, Yield, Production, Land Use Statistics	1976-77 to 2024-25	160-270 MB per year

Additional 11 Schemes - Consolidated Operational Profile and Data Metrics

S.N.	Scheme Name	Central/ State Scheme	Frequency	Major Indicators	Data Availability Since	Volume of Data (Approx.)
1	Agriculture Labour Wages	State	Adhoc	District-wise annual average wage of agriculture workers, mason etc.	2015-16 onwards	—
2	Housing statistics	Central	Adhoc	Average price of building materials	2015-16 onwards	—
3	District at a Glance	State	Biennial	Population, Average rain fall, Land use statistics, Production of crops, education, health etc.	2016 onwards	2 MB per year (approx.)
4	Statistical Abstract of Odisha	State	Quinquennial	Population, rainfall, education, health, industry, Crops etc.	1990 onwards	—
5	Municipal	State	Biennial	Urban statistics	2004-05	—

S.N.	Scheme Name	Central/ State Scheme	Frequency	Major Indicators	Data Availability Since	Volume of Data (Approx.)
	Yearbook			(housing, health, education, sanitation, drinking water etc)	and fresh data collection to be initiated	
6	Labour and Manpower	State	Adhoc	Employment, Literacy, Worker's participation etc	2016 onwards	—
7	Census of Employees	State	Adhoc	No of employees by category, average salary	2015-16 onwards	—
8	Business Register	State	Adhoc	Name and number of establishments by 7 registering authorities	2013-14	—
9	Edge Indicator framework	State	Annual (To be collected)	Gender statistics	To be compiled	—
10	Energy Statistics in Odisha,	State	Biennial	Energy Potential, Production, consumption, distribution etc	2026 onwards (to be compiled)	—
11	Economic Census	Central	Quinquennial	No of establishment, employment, type of establishment etc	1998-99 (4 th eco Census onwards)	—

3.3. User Categories and Role-Based Access Control (RBAC)

The OISS platform shall implement a highly granular, secure, and configurable Role-Based Access Control (RBAC) framework to manage the diverse set of users interacting with the system across different administrative levels of the State.

3.3.1. Defined User Categories

The system must support, at a minimum, the onboarding and management of the following user hierarchies:

- **Field Users:** Enumerators, Statistical Field Surveyors (SFS), and Primary Investigators responsible for on-ground data collection via CAPI and web forms.

- **Supervisory Users:** Range Inspectors, Block Level Officers, and District Statistical Officers (DSOs) responsible for primary data validation and workflow approvals.
- **Analytical Users:** DE&S Statisticians, Planners, and Economists at the State Headquarters responsible for data processing, index compilation, and statutory report generation.
- **Administrative Users:** Scheme-specific Nodal Officers and Data Stewards responsible for Master Data Management (MDM) and scheme-level configurations.
- **System Administrators:** IT personnel at DE&S/OCAC responsible for overall user provisioning, security policies, and technical platform configuration.
- **Public Users:** Citizens, academic researchers, and external stakeholders accessing published, anonymized datasets and dashboards via the public dissemination portal.

3.3.2. RBAC Governance & Permissions

The SI must ensure that access to any module, screen, or data point within the OISS platform is dynamically governed by a strict access matrix combining the following parameters:

- **Role & Designation**
- **Organizational Unit / Department**
- **Specific Scheme Allocation**
- **Geographical Jurisdiction:** Strict spatial access boundaries (e.g., a DSO mapped to Balasore district must only see and approve data originating from Balasore).
- **Data Sensitivity Level:** Restricting access to Personally Identifiable Information (PII) versus aggregated statistical outputs.

3.3.3. Functional Access Controls

Granular Permissions: The system must support matrix-driven permissions allowing administrators to toggle specific rights for any role: *View, Create, Edit, Approve, Reject, Return, Publish, and Delete*.

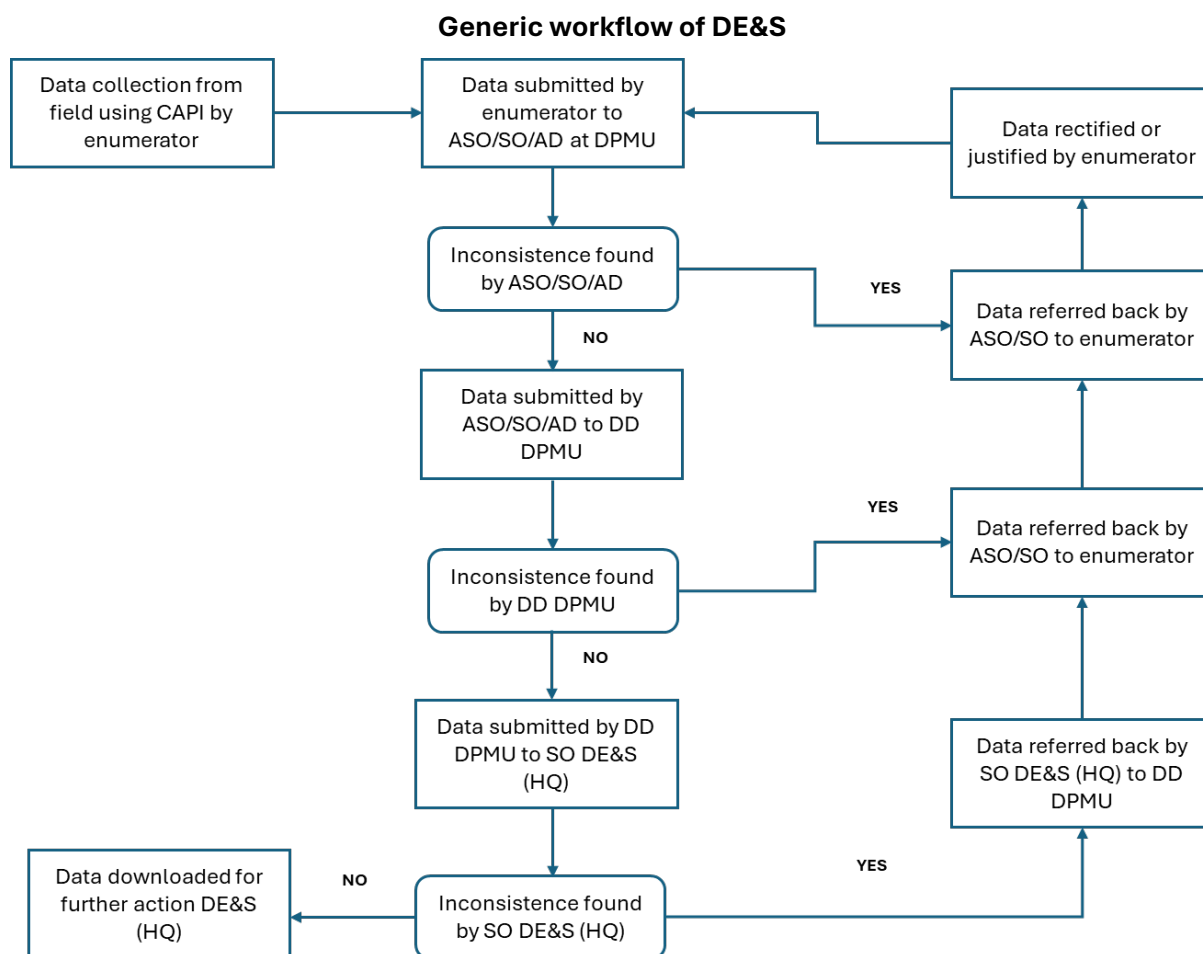
Temporary Delegation: The WMS must support the secure, temporary delegation of roles and approval authorities to accommodate officer leave or official absences. These delegations must have a strict, system-enforced validity period (expiry date).

Strict Auditability: Every role assignment, permission modification, and temporary delegation must be permanently logged in an immutable system audit trail.

3.4. Workflow Automation

In the Proposed system,

- All data flows shall follow configurable, rule-based workflows.
- Multi-level approvals (Block → District → State).
- Exception handling and rework loops.
- Escalation on SLA breaches.



3.4.1. Scheme Specific Workflow

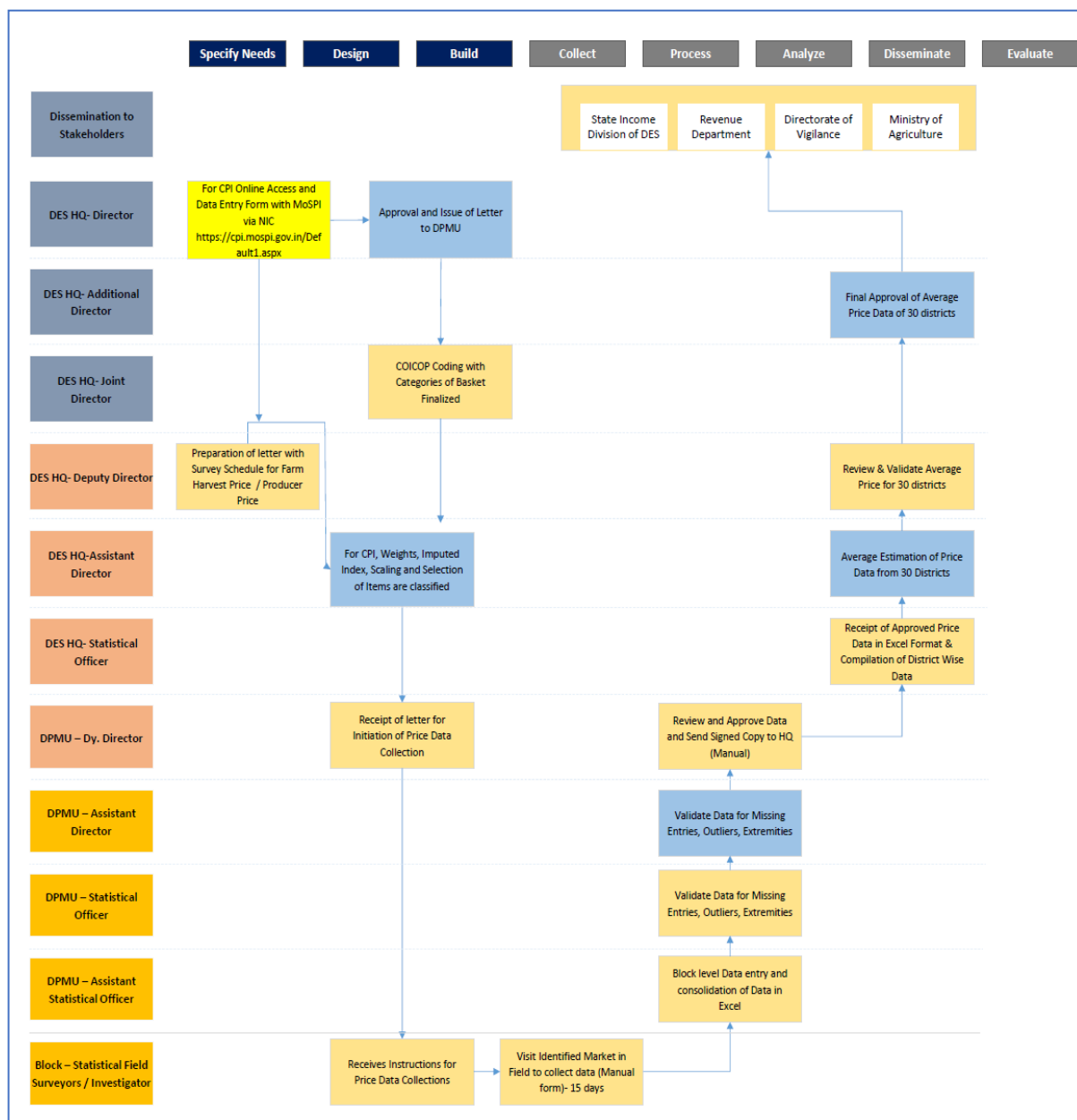
Below are the list of schemes and the detailed workflows.

Item No.	Scheme Name
1	Price Statistics
2	Index of Industrial Production (IIP)
3	State Income / DDP
4	Economic Survey Report
5	District Statistical Handbook
6	Annual Survey of Industries (ASI)
7	National Sample Survey (NSS)
8	Basic Statistics for Local Level Development (BSLLD)
9	Agricultural Census

Item No.	Scheme Name
10	Rationalization of Minor Irrigation Statistics (RMIS)
11	EARAS

a. Price Statistics – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the survey under Price Statistics.



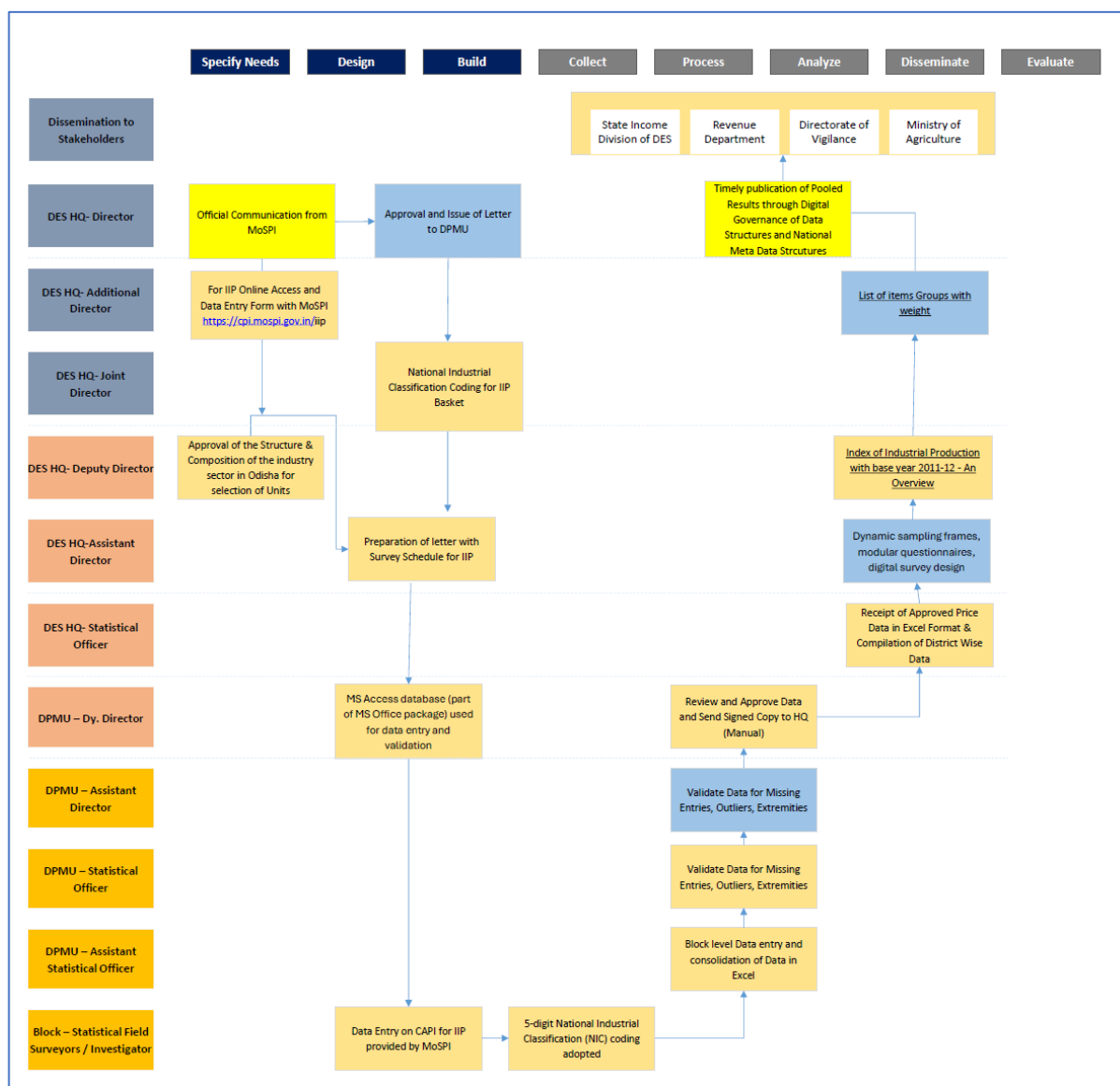
Process Flow:

Stage	To be Process
Initiation	<ul style="list-style-type: none"> Issue of instructions to all Districts for collection of Price statistics.

	Stakeholder meeting with Dte of Agriculture, FS & CW Dept and Dte of AH & VS to be conducted. Training to district officials/ field staff on CAPI tool.
Sampling Design	<ul style="list-style-type: none"> • Updation of sample frame and coverage of items
Data Collection	<ul style="list-style-type: none"> • CAPI tool for data collection of Price Statistics and CPI
Data validation	<ul style="list-style-type: none"> • Scrutiny programme and online data validation, cross check with past data
Data Processing	<ul style="list-style-type: none"> • District data files to be combined, verified and processed. Tables for state weighted average / district average price to be generated.
Dissemination	<ul style="list-style-type: none"> • Data analysis. Reports to be published in pdf copy. Price Indices to be prepared. District level CPI to be generated and inflation compiled. • Dashboard, Workshops and Seminars, social media, Press release • Data repository, Data catalogue for easy access to Price data • Data to be shared with State Income Division, Ministry of Agriculture & FW, Govt of India and Directorate of Vigilance.

b. Index of Industrial Production (IIP) – Workflow

DPQ-DP-7 The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the survey under IIP.



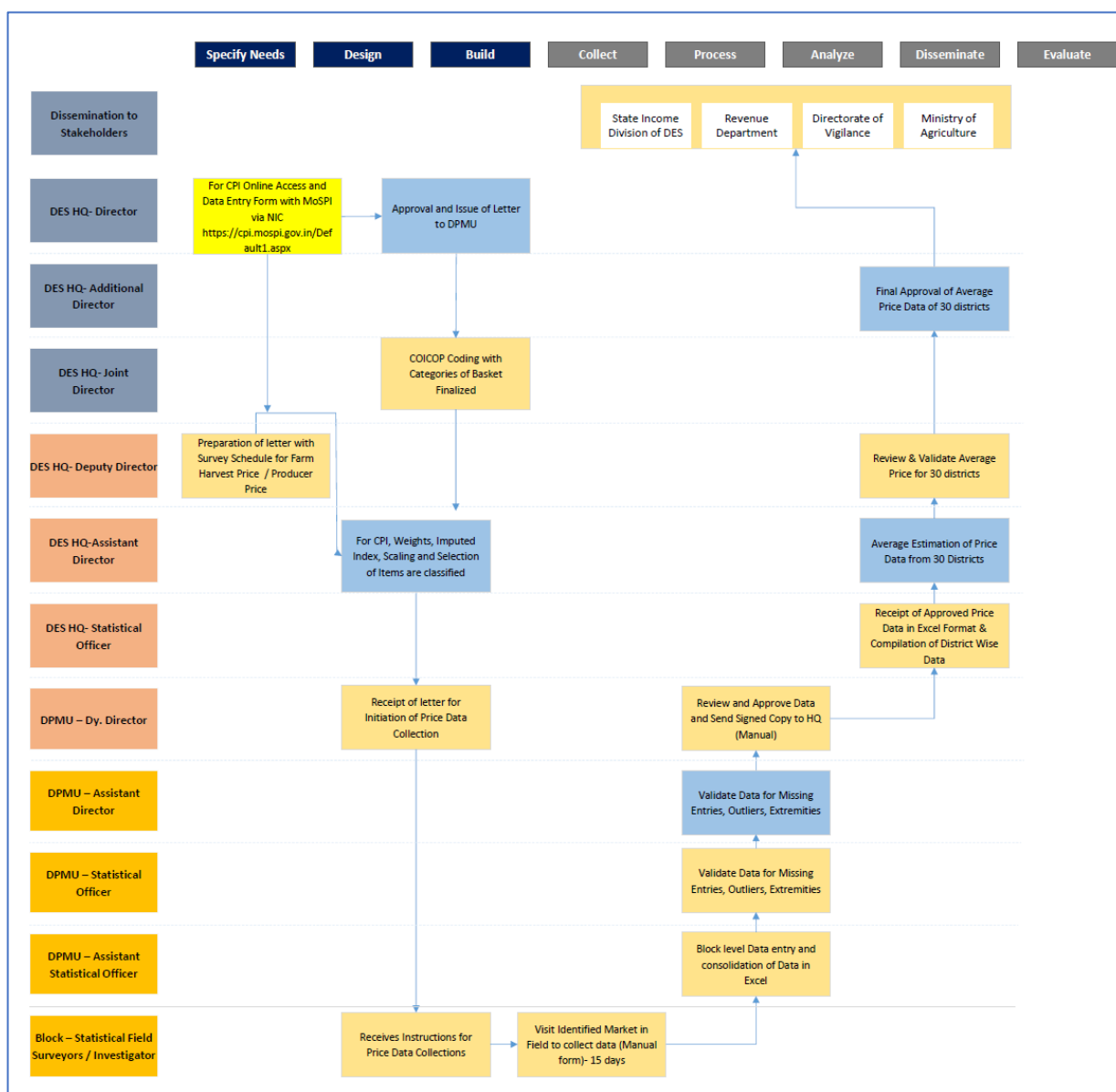
Process Flow:

Activity	Description	Responsible Unit
1. Specify needs	Identify requirements for the IIP and its categories.	Industrial Statistics Unit
2. Design	Design methodologies and frameworks for calculating the IIP.	-do-

3. Build	Prepare data collection instruments and systems for IIP calculation.	-do-
4. Collect	Gather production data from various industrial sectors.	-do-
5. Process	Clean and validate data for accurate IIP computation.	-do-
6. Analyze	Calculate the IIP and analyze the trends in industrial production.	-do-
7. Disseminate	Distribute IIP results and reports to stakeholders and the public.	Data Dissemination cell
8. Evaluate	Assess the reliability and relevance of IIP data and gather user feedback.	-do-

c. State Income / DDP– Workflow

It has eight processes and sub-processes. Accordingly, the model is applied with DDP and details are enclosed in the Grid matrix.



Process Flow of DDP:

Key Area	Improved Features (To-Be State)
Initiation	Regular Stakeholders meeting (Line Departments)
Data collection	The following data to be collected at regular intervals in digital mode to improve DDP estimates: <ul style="list-style-type: none"> • Dist wise HRMS employee data, IFMS salary data, dist-wise bank credit and deposits and IBM data.

	<ul style="list-style-type: none"> Industries Department to provide list of registered industries with balance sheets for analysis. For Industries and Services sectors: Pooled result (district wise estimates) of ASI to be used for manufacturing sector and GST data (HSN classification wise) to be explored and used for services sector. For un-registered sector, Pooled datasets of PLFS and ASUSE , be used to distribute state GVA. Electricity GVA may be allocated using dist wise consumption of electricity. Gas GVA using number of bio-gas plants/workforce, water supply using dist wise salaries from govt and workforce for remaining part. To explore GST data For Railway sector, salaries by districts. Road length in KM Air passenger and cargo handled data Cold storage capacity District wise bank credit and deposits Education and health salary bill data For Recreation, population data can be used.
Digitalization	<ul style="list-style-type: none"> Data from Departments/ divisions to be collected through DDP portal. The sectoral input and output tables of DDP need be digitized. Data to be stored in a centralized digital database, accessible in real time. All processes—from planning to reporting—will be connected in a single digital workflow.
Enhanced Accuracy and Timeliness	<ul style="list-style-type: none"> DDP portal will have built-in error checks, reducing mistakes. Information will be instantly transmitted to the central system from the Department No more re-entering or re-checking data manually. Reports of DDP estimates will be available faster.
Use of Advanced Tools	<ul style="list-style-type: none"> Modern technologies like GIS (maps), and analytics software will be used for analysis of data and interpretation.
Dissemination	<ul style="list-style-type: none"> The new system will include online dashboards and portals. Visual charts and maps will make the data easier to understand. Workshops, Seminars, social media and Press release
Feedback mechanism	<ul style="list-style-type: none"> A feedback system will be included to collect suggestions from users and staff. Evaluation based on the feedback and to take initiatives for improvement.

d. Economic Survey Report – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the preparation of Economic Survey Report.

Process Flow:

Stage	Process
Initiation	<ul style="list-style-type: none"> Issue of instructions to all Departments / Directorates for submission of data, reports, best practices etc
Sampling Design	<ul style="list-style-type: none"> Updation of list of Departments / Institutions
Data Collection	<ul style="list-style-type: none"> Portal for data collection of Economic Survey
Data validation	<ul style="list-style-type: none"> Scrutiny programme and online data validation, cross check with past data
Data Processing	<ul style="list-style-type: none"> Department data files to be processed, analyzed and reports generate
Dissemination	<ul style="list-style-type: none"> Preparation of Economic Survey report. Reports to be published in pdf copy, hosted in websites. Workshops and Seminars, Social media, Press release Data repository, data catalogue, dashboard
Resource	<ul style="list-style-type: none"> Adequate manpower for data collection, supervision, processing and analysis
Feedback mechanism	<ul style="list-style-type: none"> Feedback mechanism in the portal. Receive feedbacks and reply.

e. District Statistical Handbook – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of preparation of District Statistical Handbook (DSHB).

Key Area	Improved Features (To-Be State)
Initiation	Stakeholder meeting Training and capacity building
Adoption of tool and data collection	CAPI based data collection (DSHB portal)
Coverage and Methodology	Comprehensive inclusion of all departments; adoption of GSBPM-aligned methods; standardized templates
Validation	Multi-tier validation: DPMU: DD and AD, DE&S: SO, AD/DD. JD); automated anomaly detection; built-in

Key Area	Improved Features (To-Be State)
	validation checks, ML algorithms for validation
Timeliness	Real-time data entry and integration; streamlined workflows; annual or rolling update mechanism
Use of Advanced Tools for analysis	Integration of Power BI/Tableau for dashboards;
User-Friendly Data Access and dissemination	Cloud-based storage and data pipelines, Public data portals with downloadable Excel/PDF formats; district-level dashboards; API-based access;
Feedback mechanism	Feedback loops from stakeholders; incorporation of National Quality Assurance Framework (NQAF); regular system upgrades based on user needs
Coverage	<p>Increased coverage.</p> <p>Data from the following Departments may be collected: Electronics & Information Technology, Excise, General Administration & Public Grievance, Law, Mission Shakti, Public Enterprises, Rural Development, Science & Technology, Social Security & Empowerment of Persons with Disabilities, Sports & Youth Services, ST & SC Development, Minorities & Backward Classes Welfare, Steel & Mines Dept, Water Resources, Works.</p>

f. Annual Survey of Industries (ASI) – Workflow

Process Stage	Proposed Improvements / To-Be State
Initiation	Clearly defined objectives based on policy and stakeholder inputs- Stakeholder meetings (Industries Dept/ Labour & ESI), instruction to all DPMUs, Training and capacity building
Sampling Design	Updation of frame of factories
Data Collection	Adoption of the CAPI tool, Factories to upload balance sheet etc in ASI portal, analysis of inputs at the DPMU / DE&S level
Data Validation	In-built rule engine for auto validation- Real-time error detection and correction using digital tools
Data Processing	Data files to be combined. Use of statistical software for automated computation- summary tables, cross check of data, consistency, and comparative analysis

Process Stage	Proposed Improvements / To-Be State
Resource	Adequate manpower to be engaged
Dissemination	Dynamic dashboards and web portals- Role-based access and visualization tools (charts, maps, tables) Workshops, Seminars, social media and press release Dashboard, Data repository, Data catalogue for easy view and access of ASI data
Feedback & Evaluation	Online feedback module for stakeholders- System to track progress vs target- Continuous process improvement

g. National Sample Survey (NSS) – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the survey under NSS.

The State DES participates in the socio-economic surveys of NSSO with an objective of generating sub-state level estimates to be used for planning and policy decisions at grassroots level. There is a lack of access to unit-level datasets and documentation as no data warehouse has been developed.

The proposed To-be processes aim to modernize and automate data processing, analysis, reporting, and dissemination using IT interventions while aligning with the GSBPM guidelines.

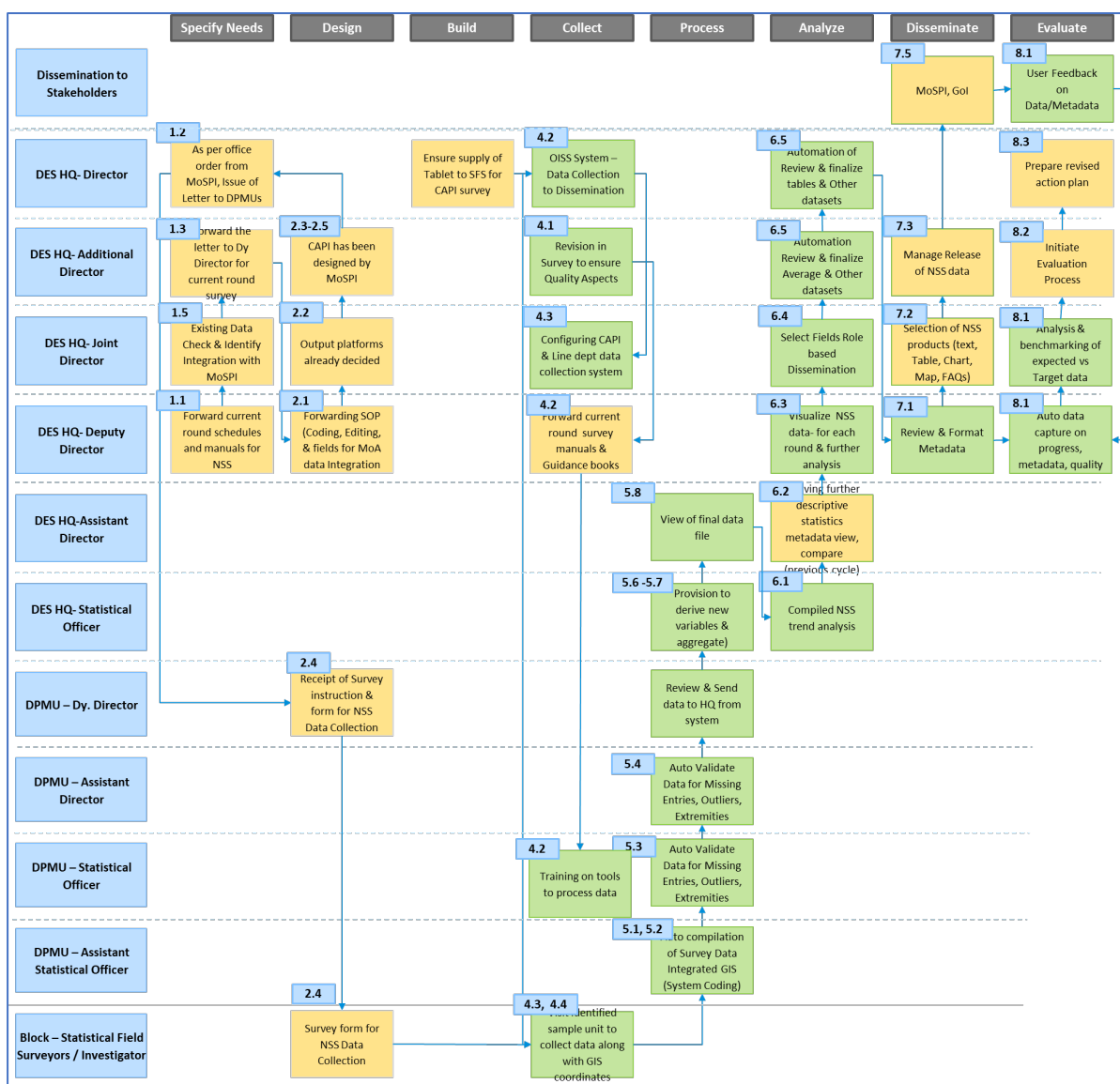


Fig: National Sample Survey (NSS) – To Be Process Flowchart

Process Flow:

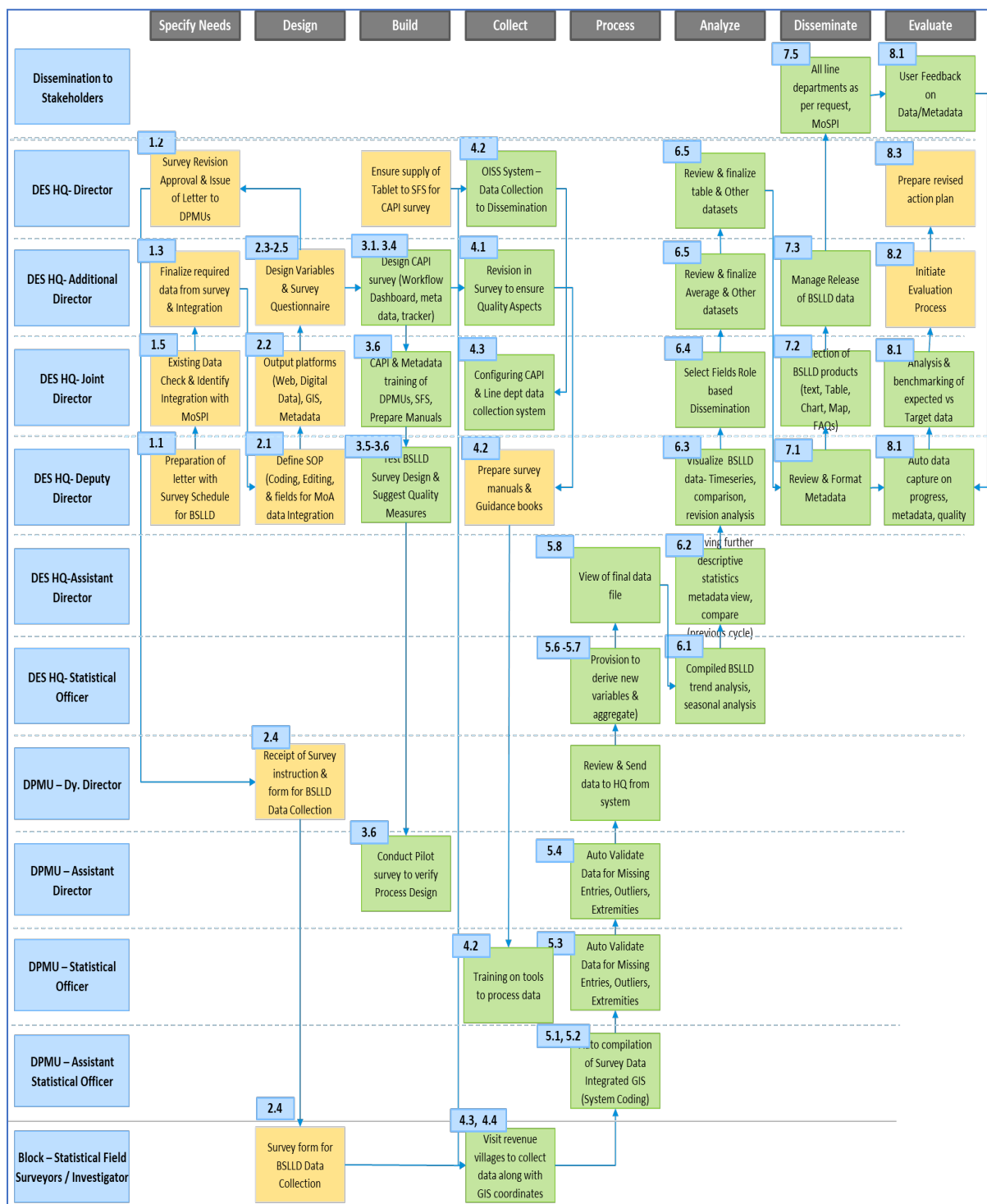
Key Area	Proposed Features
Initiation	<ul style="list-style-type: none"> Stakeholder meetings, training and capacity building of DPM officials
Sample Design	<ul style="list-style-type: none"> Increased state sample size for pooling of central and state sample data
Data Collection	<ul style="list-style-type: none"> To use CAPI tool for collection of NSS data NSS portal to be developed
Data validation	<ul style="list-style-type: none"> In built mechanism to validate data.
Quality Assurance	<ul style="list-style-type: none"> Increased data quality through online and offline scrutiny, monitoring and supervision.

Key Area	Proposed Features
	<ul style="list-style-type: none"> To follow NQAF framework
Data dissemination	<ul style="list-style-type: none"> Pooled NSS report to be prepared. Host in website, Circulation of hard copies. Workshops, Seminars, Social media and press release Dashboard, Data repository, Data catalogue for easy access of data
Resource	<ul style="list-style-type: none"> Adequate human resource at DPMU level for efficient collection and supervision Human resource at DE&S level for data validation, analysis and timely report writing and release.

h. Basic Statistics for Local Level Development (BSLLD) – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the survey under BSLLD. There is a need to standardize process of data collection, validation and dissemination by leveraging technology. The proposed To-be processes aim to modernize and automate data collection, processing, analysis, reporting, and dissemination.

The flow chart below highlights the details of To-be analysis of BSLLD following GSBPM framework.



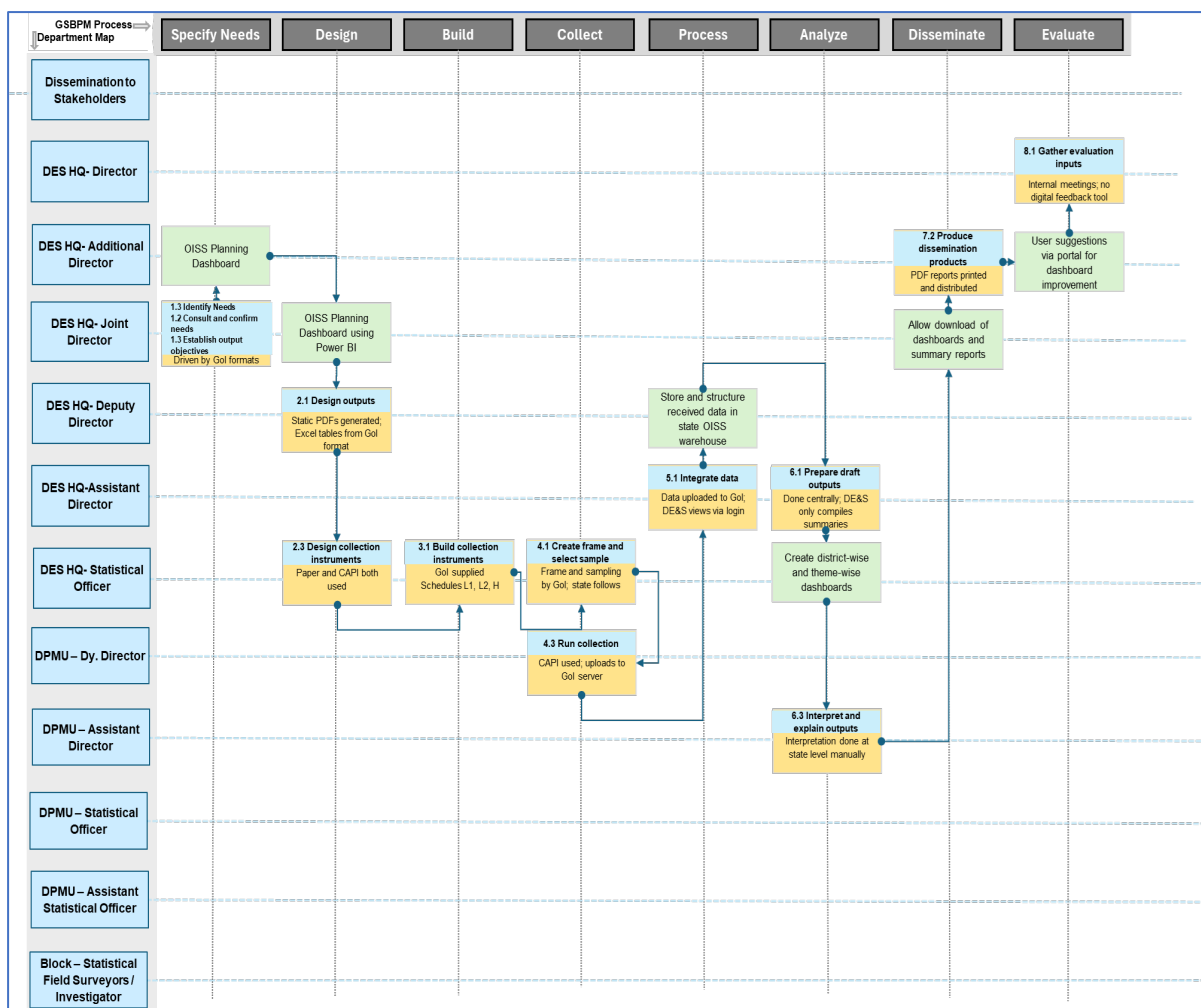
Process Flow:

Stage	Process (Current As-Is)
Initiation	<ul style="list-style-type: none"> Stakeholder Departments meeting, finalization of schedules Training and capacity building

Stage	Process (Current As-Is)
Sampling Design	<ul style="list-style-type: none"> • Updation of village list
Data Collection	<ul style="list-style-type: none"> • CAPI tool for data collection of BSLLD and BSLLD portal
Data validation	<ul style="list-style-type: none"> • Scrutiny programme and online data validation, cross check with administrative data
Data Processing	<ul style="list-style-type: none"> • District data files to be combined, verified and processed. Tables generated
Dissemination	<ul style="list-style-type: none"> • Reports to be prepared and published in pdf copy. • Workshops and Seminars, Social media, Press release • Data repository, Data catalogue and dashboard, Data to be shared with stakeholders
Resource	<ul style="list-style-type: none"> • Adequate manpower for data collection, supervision, processing and analysis
Feedback mechanism	<ul style="list-style-type: none"> • Feedback mechanism in the portal. Receive feedbacks and reply.

i. Agricultural Census – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the survey under Agricultural Census.



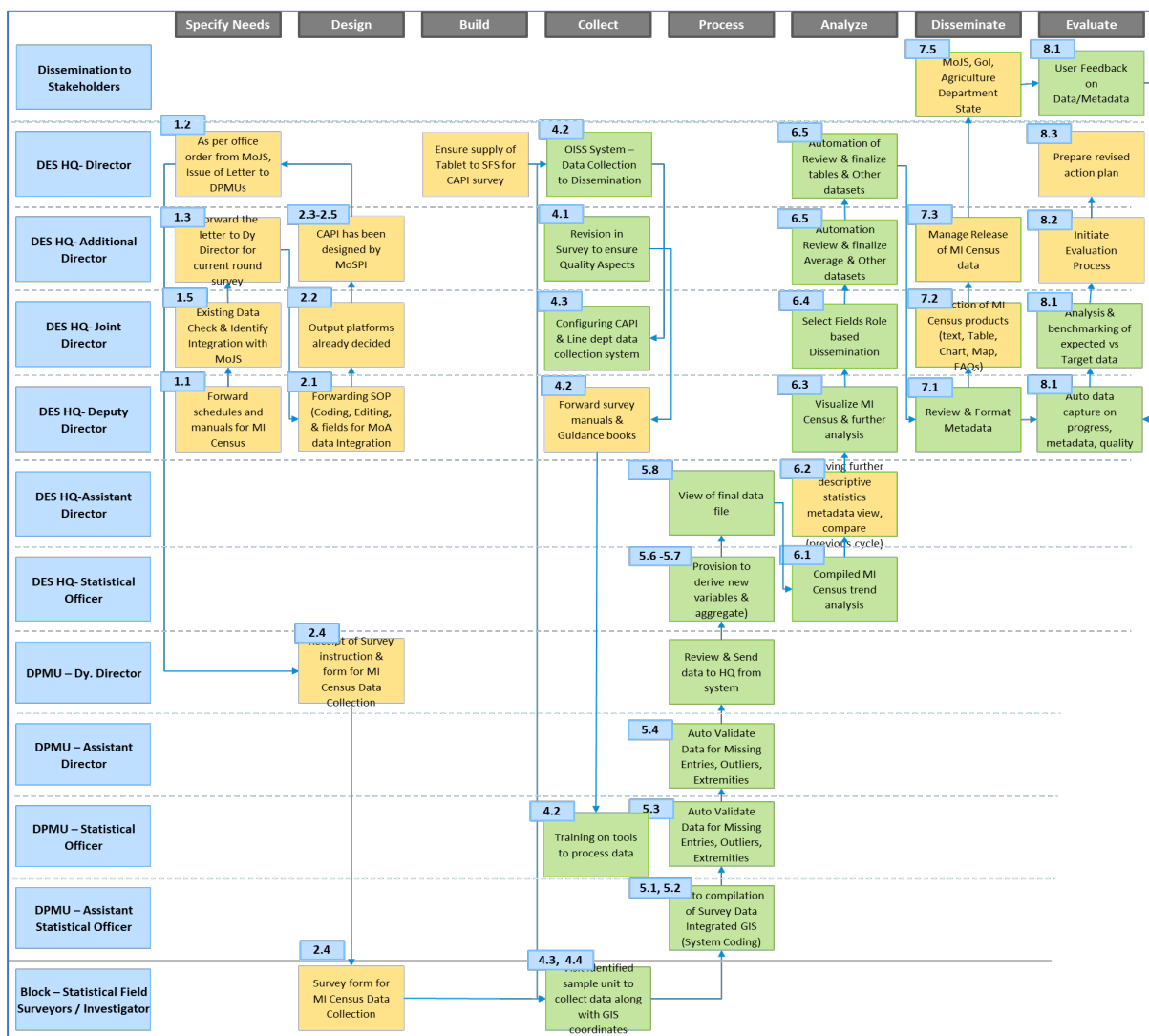
Process Flow:

Key Area	Improved Features (To-Be State)
1. Initiation	Stakeholders meeting, Communication to all DPMUs Training and capacity building
2. Digitized and Integrated Process	1. The entire 11 th Agricultural Census system moved from paper-based to CAPI mode.
	2. Data are collected from the village using tablets or mobile devices.
	3. Data are stored in a centralized digital database which will be accessible in real time.
	4. The new system will follow the best international practices and standards (e.g., GSBPM).
3. Enhanced	5. Digital monitoring of work done by the enumerators as well as

Key Area	Improved Features (To-Be State)
Accuracy and Timeliness	supervisors
	6. Data are transmitted from the field to the central system.
	7. Agricultural Census reports will be generated more quickly, aiding in the timely publication of Government reports.
4. Use of Advanced Tools for data analysis	8. Additional data sources (e.g., SDG indicators, other socio-demographic parameters) can be integrated for further analysis.
	9. These tools will enhance the reliability and usefulness of statistics for policymaking.
5. User-Friendly Data Access	10. The new system will feature a data repository, data catalog, online dashboards.
	11. Easy access by Government officials, researchers, academicians
	12. Interactive charts and graphs will make the data more comprehensible.
	13. Data dissemination will be done through analytical reports.
6. Continuous Improvement	14. A feedback system will be implemented to gather suggestions from users and staff.
	15. Regular review meetings and evaluations will help identify issues and enhance the process.
7.Resource	Adequate skilled human resource to be engaged

j. Rationalization of Minor Irrigation Statistics (RMIS) – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the survey under MI Census aligning to GSBPM guidelines



Process Flow:

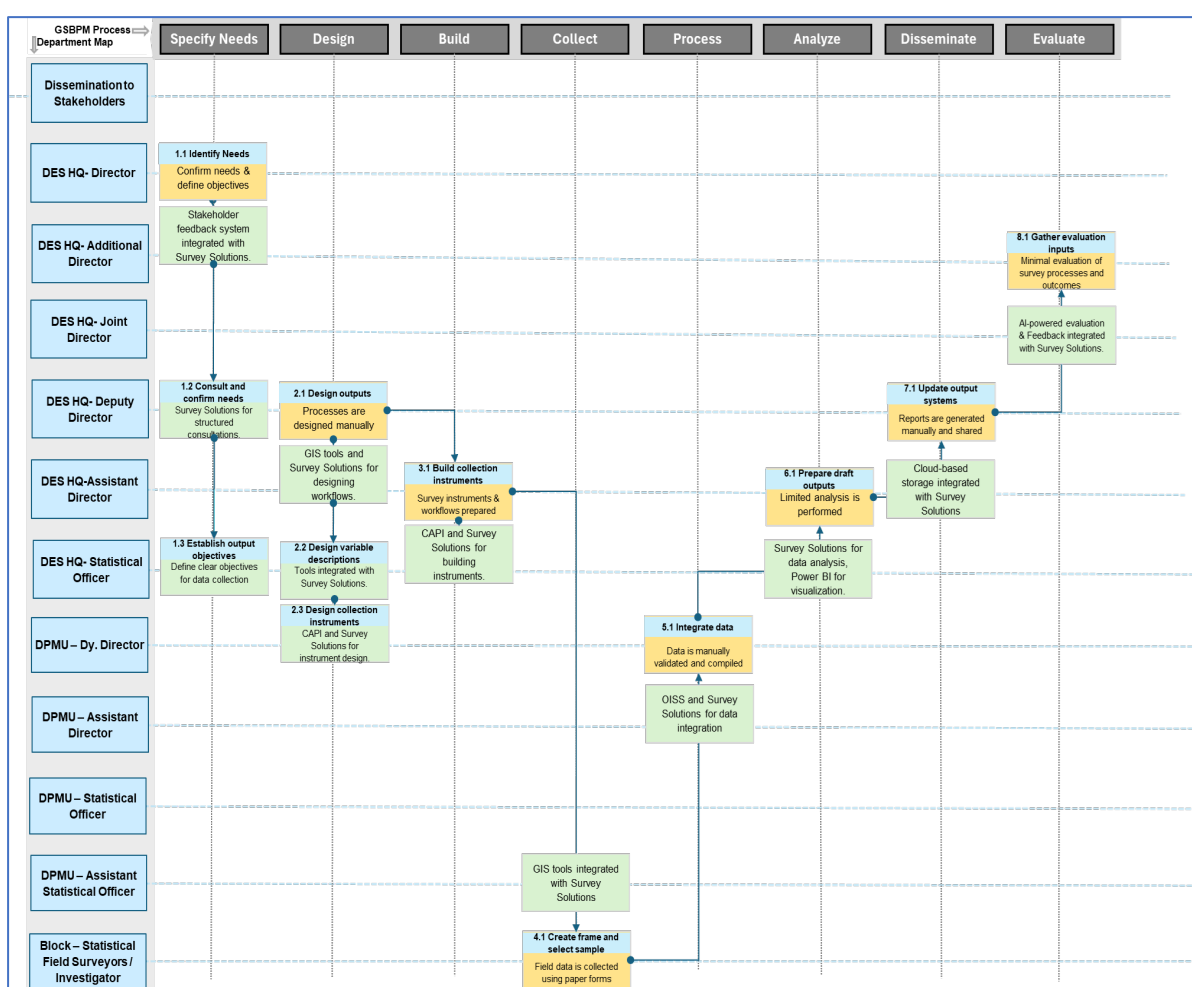
Key Area	Improved Features (To-Be State)
Initiation	Stakeholder meeting, Training and capacity building
Digitized and Integrated Process	1. The entire MI Scheme system will move from paper-based to CAPI mode.
	2. Data will be collected from the village using tablets or mobile devices.
	3. Data will be stored in a centralized digital

Key Area	Improved Features (To-Be State)
	<p>database which will be accessible in real time.</p> <p>4. The new system will follow the best international practices and standards (e.g., GSBPM).</p>
Enhanced Accuracy and Timeliness	<p>5. Data collection apps will include built-in error checks to reduce errors.</p> <p>6. Digital monitoring of work done by the enumerators as well as supervisors</p> <p>7. Data will be directly transmitted from the field to the central system.</p> <p>8. MI Census estimates reports will be generated more quickly, aiding in the timely publication of Government reports.</p> <p>9. Increase in data quality through online and offline scrutiny, monitoring and supervision will be done.</p>
Use of Advanced Tools for data analysis	<p>10. Advanced technologies such as GIS (maps), and analytics software will be utilized.</p> <p>11. Additional data sources (e.g., SDG indicators, other socio-demographic parameters) can be integrated for further analysis.</p> <p>12. These tools will enhance the reliability and usefulness of statistics for policymaking.</p>
User-Friendly Data Access	<p>13. The new system will feature a data repository, data catalog, online dashboards, and portals.</p> <p>14. Government officials, researchers, and farmers can access updated crop statistics at any time.</p> <p>15. Interactive charts and graphs will make the data more comprehensible.</p> <p>16. Data dissemination will be done through analytical reports. Workshops, Seminars, Social media and Press release.</p>

Key Area	Improved Features (To-Be State)
Feedback mechanism	17. A feedback system will be implemented to gather suggestions from users and staff.
	18. Regular review meetings and evaluations will help identify issues and enhance the process.

k. EARAS – Workflow

The DE&S seeks to develop data collection, compilation, dissemination and best practices related to all stages of the survey under EARAS.



Process Flow:

Key Area	Improved Features (To-Be State)
Initiation	1. Stakeholders (Agriculture & FE Dept, Revenue & DM Dept, ORSAC, Ministry of Agriculture, GoI) meetings 2. Training and capacity building
Coverage and	3. Frame for minor crops

Key Area	Improved Features (To-Be State)
methodology	4. DE&S presently covers 14 crops. Rest crops may be covered. 5. Use of remote sensing tools.
Data collection	6. Use of CAPI
Validation	7. In-built real-time validation rules in CAPI apps - Cross-checks with remote sensing & secondary sources. 8. Automated anomaly detection and flagging
Use of Advanced Tools	9. Anomaly detection, outlier detection, crop detection etc through AI/ML 10. Dashboard-driven monitoring at district/state level
User-Friendly Data Access	11. Interactive online dashboards with filtering options 12. Role-based access for different stakeholders 13. Visualizations (charts, maps, summaries) for policymakers 14. Mobile-friendly data views for field officers (Login based access)
Continuous Improvement	15. A feedback system will be included to collect suggestions from users and staff. 16. Regular review meetings and evaluations will help identify issues and improve the process. 17. Training programs and workshops will be held to learn how to adopt new tools; methods to field staffs and supervisor. 18. The system will grow stronger over time with ongoing improvements and staff skill upgrades.
Dissemination	19. EARAS technical report, Workshop/Seminars social media, Press release 20. Data repository, Data catalogue for easy access to EARAS data

3.5. Identity & Access Management (IAM)

To ensure secure, auditable access aligned with the institutional roles defined in Section 3.3, the System Integrator (SI) shall implement a robust Identity and Access Management (IAM) module.

3.5.1. Key Security Requirements

Single Identity: Ensure a unique user identity across the entire OISS ecosystem, integrating seamlessly with State/National Single Sign-On (SSO) gateways like Jan Parichay.

Authentication: Mandate Multi-Factor Authentication (MFA) for all privileged users (System Administrators, State HQ Officials, and DSOs).

Policy Enforcement: Implement strict password complexity, session timeout policies, and automated account lockout/recovery mechanisms after consecutive failed attempts.

3.5.2. Audit & Logging Mechanisms

The system must maintain tamper-proof, time-stamped audit logs for all IAM activities, specifically capturing:

1. Successful and failed login/logout attempts (including IP addresses and device details).
2. Complete history of privilege escalations or role changes.
3. Attempts to access unauthorized or restricted data sets.

3.6. Adoption Of the GSBPM Framework

The Generic Statistical Business Process Model (GSBPM) is an internationally recognised framework designed to standardise and improve the production of Official Statistics. It provides a structured approach for defining, organising, and managing statistical processes, enhancing consistency, quality, and efficiency across statistical agencies.

The development of the GSBPM by the United Nations Economic Commission for Europe (UNECE) in 2008 was driven by the need for a common structure that could help NSOs worldwide to classify and document their statistical processes. The GSBPM built on earlier models such as the Business Process Model developed by Statistics New Zealand and the Statistics Production Model from Statistics Sweden. It was designed to provide a generic and flexible framework applicable to all types of statistical production processes, regardless of data sources, statistical methods, or subject areas. Over the years, the GSBPM has undergone several revisions, with major updates in 2013 and 2019 to reflect advancements in statistical methods and emerging data sources, such as Big Data.

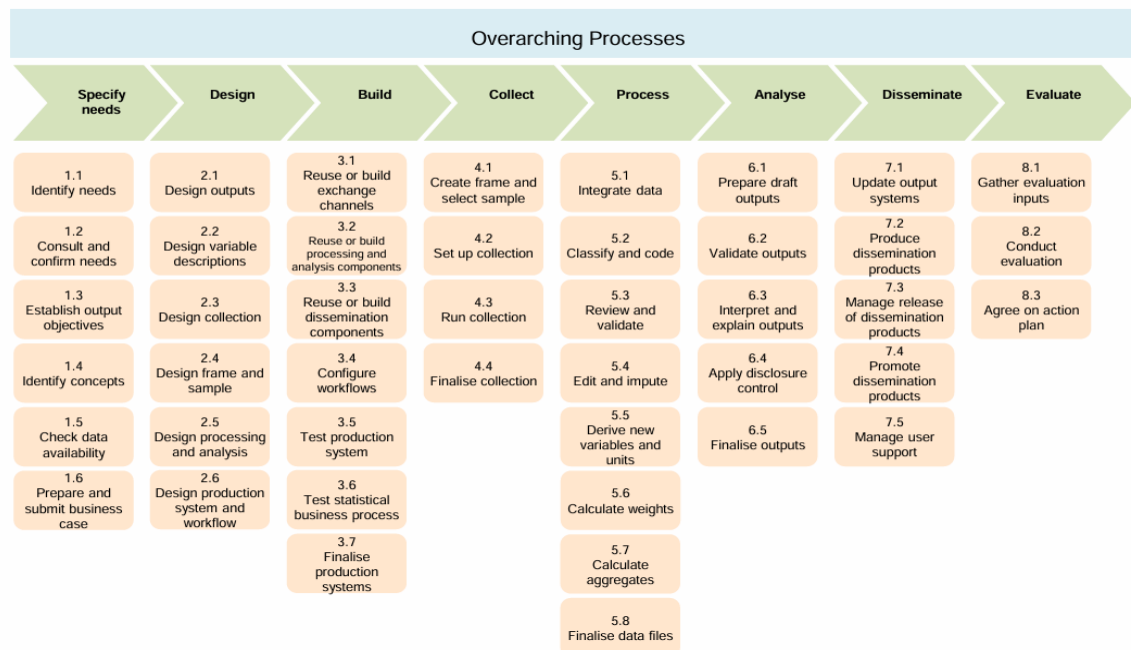
Today, the GSBPM is widely used by NSOs across the globe. It serves as a reference framework for:

- Designing and documenting statistical processes
- Identifying and addressing inefficiencies
- Improving communication and collaboration between departments
- Supporting modernization efforts by integrating new technologies and data sources.

The GSBPM has also influenced the development of other frameworks, such as the Common Statistical Production Architecture (CSPA) and the Generic Activity Model for Statistical Organizations (GAMSO).

Every module, workflow, and dataset of OISS shall be explicitly mapped to the GSBPM framework, ensuring a standardized and internationally recognised statistical production lifecycle. The process flow of GSBPM is cited below.

GSBPM 5.1



Phase wise Activity of GSBPM

S.N.	GSBPM Phase	Key Activities to be Performed
1.	Specify Needs	<ul style="list-style-type: none"> • Identify stakeholder and user requirements • Define statistical objectives and outputs • Assess data gaps and feasibility • Prepare business case and scope
2.	Design	<ul style="list-style-type: none"> • Design survey/questionnaire or data acquisition method • Define data sources and sampling methodology • Design processing workflows and validation rules • Define metadata and classification standards
3.	Build	<ul style="list-style-type: none"> • Develop data collection instruments (forms, APIs, systems) • Configure databases and data pipelines • Build validation and processing scripts • Conduct pilot testing and refinements

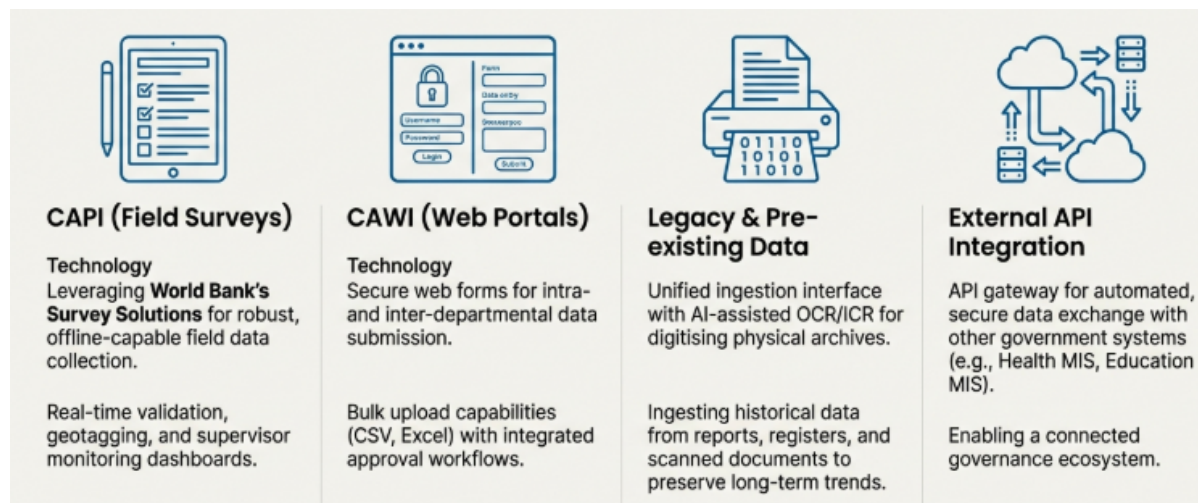
S.N.	GSBPM Phase	Key Activities to be Performed
4.	Collect	<ul style="list-style-type: none"> • Deploy surveys or data extraction mechanisms • Acquire data from respondents or source systems • Monitor collection progress and response rates • Handle follow-ups and reminders
5.	Process	<ul style="list-style-type: none"> • Data cleaning and error detection • Data validation and editing • Coding and classification • Data integration from multiple sources • Create analysis-ready datasets
6.	Analyze	<ul style="list-style-type: none"> • Apply statistical methods and calculations • Generate indicators and reports • Perform trend and comparative analysis • Conduct quality assurance checks
7.	Disseminate	<ul style="list-style-type: none"> • Prepare reports, dashboards, and publications • Release data through portals or APIs • Manage data access and user support • Ensure confidentiality and data security
8.	Evaluate	<ul style="list-style-type: none"> • Review process efficiency and effectiveness • Assess data quality and user satisfaction • Document lessons learned • Identify improvement opportunities

3.7. Data Collection & Validation (Collect Phase)

The Objective of this module is to capture, ingest and register all relevant data - both historical (Legacy) and ongoing- across surveys, administrative departments, and secondary sources in standardized digital formats with embedded validation, traceability and metadata.

This Layer forms the foundation of OISS and must integrate both structure data (databases, forms) and unstructured/legacy content (document, Images, pdfs, scanned registers, reports) ensuring that no historical information is lost during transition to the digital platform.

DE&S execute and collect information from sample surveys conducted across multiple schemes such as National Sample Surveys (NSS), Annual Survey of Industries (ASI) and Censuses and Sectoral Surveys etc.



The architecture for this module is broadly categorised with following four primary data collection mode:

- CAPI (Computer-Assisted Personal Interviewing): Leveraging World Bank's Survey Solutions.
- CAWI (Computer-Assisted Web Interviewing): For manual data entry by departmental users.
- Legacy & Pre-existing Data Ingestion: For historical digitization and ad-hoc file uploads.
- External API Ingestion: For automated data flow from other government systems.
- Web Scraping: For automated extraction of data from public domains.
- Bulk upload: Bulk upload of data in form of CSV or excel
- Legacy ingestion: Ingestion of legacy data.

Validation

The system shall implement a baseline data validation framework consisting of rule-based, statistical, and consistency checks for all datasets.

In addition, the system shall provide configurable support for AI/ML-based anomaly detection for selected datasets and indicators, with human-in-the-loop review and override capability.

AI/ML-based validation shall be implemented for at least two (2) high-volume schemes identified by DE&S during implementation.

The System shall also support the following:

- Rule-based validation
- Cross-variable consistency checks
- Geo-tagging and timestamping

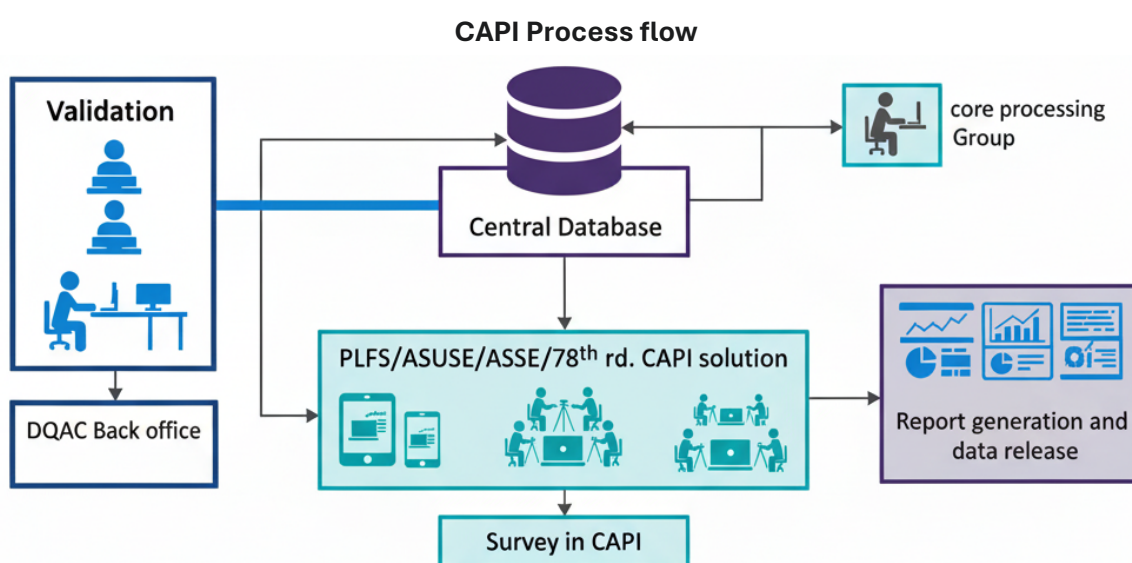
Web-based data extraction, where required, shall be permitted only for explicitly approved sources and shall comply with applicable legal, policy, and ethical guidelines.

The system shall enforce:

- Source allow-listing
- Approval workflows
- Extraction frequency limits
- Mandatory source citation and timestamping
- Full audit logging.

3.7.1. Computer-Assisted Personal Interviewing (Survey Solution)

This mode will cover all field-level data collection conducted by enumerators and monitored by supervisors. The OISS will seamlessly integrate with and utilize the CAPI Tool. Process flow of CAPI is depicted below.



Req. ID	Component	Proposed Functionality
DCV-CAPI-01	CAPI Tool	OISS shall seamlessly integrate with the CAPI tool (Survey Solution) to manage, deploy, and receive data from CAPI surveys. This integration is foundational for field data collection for the identified schemes.
DCV-CAPI-02	Enumerator Mobile Application	The system shall leverage the CAPI application for Android and iOS devices (tablets/mobiles) to allow enumerators to conduct surveys.
DCV-CAPI-03	Offline Capability & Auto-Synchronization	The CAPI application must function fully offline and automatically synchronize collected data with the central CAPI application server whenever an internet connection becomes available.
DCV-CAPI-04	Scheme-Specific Questionnaire Design	The system shall utilize Survey capabilities for designing and deploying dynamic, scheme-specific digital questionnaires (schedules) with robust question types

Req. ID	Component	Proposed Functionality
		(text, numeric, multiple-choice, geotagging, image/audio capture).
DCV-CAPI-05	In-built Validation Rules	CAPI Solutions questionnaires shall enforce real-time validation at the point of entry, including skip logic, range checks, and consistency checks, to minimize data entry errors.
DCV-CAPI-06	Supervisor & District Consoles	The CAPI system shall leverage web-based consoles for Supervisors and District officials for survey management and monitoring.
DCV-CAPI-07	Survey Management & Assignment	The consoles shall allow authorized users to assign surveys to enumerators, track progress, and manage survey logistics directly within the CAPI Solutions environment.
DCV-CAPI-08	Real-Time Field Monitoring Dashboard	The consoles shall feature a real-time dashboard to monitor field operations, including survey completion rates, enumerator performance, and data submission status, provided by CAPI Solution. Real-time behavior shall be governed by the refresh intervals and response time thresholds defined in Section 4.1 (Performance SLAs).
DCV-CAPI-09	Central Server CAPI	All CAPI data collected via CAPI Solutions shall be transmitted to its central server.
DCV-CAPI-10	Secure Data Gateway for CAPI Solution	A secure data gateway shall manage the robust and validated transfer of data from the CAPI Solutions server to the OISS staging area, ensuring secure and reliable data flow into the main data pipeline.

3.7.2. Computer-Assisted Web Interviewing (CAWI)

This pathway covers data submission from intra- and inter-departmental users through secure web-based portals.

Req. ID	Component	Proposed Functionality
DCV-CAWI-01	Secure Web Portal	The system shall provide a secure, role-based web portal for authorized departmental users (e.g., from Health, Education, HR Staff, DPMU) to submit data.
DCV-CAWI-02	Scheme-Specific Web Forms	The portal shall host dynamic, scheme-specific web forms with in-built validation rules for direct data entry for relevant surveys/data points.
DCV-CAWI-03	Bulk Data Upload	The system must support the upload of data in predefined formats (e.g., CSV, Excel) for bulk submissions, with schema validation.

Req. ID	Component	Proposed Functionality
DCV-CAWI-04	Integrated Workflow for Submissions	The CAWI submission process shall be managed by the OISS Workflow Management System (WMS), guiding users through submission, review, and approval steps.
DCV-CAWI-05	Submission Status Tracking	The portal shall provide users with the ability to track the status of their data submissions (Check Status/Log) in real-time.
DCV-CAWI-06	Online Completion (OLC) Dashboard	An OLC dashboard shall be available for DE&S administrators to monitor the overall progress of data submission from various departments and individual users.

3.7.3. Legacy & Pre-existing Data Ingestion

This pathway provides a unified mechanism for ingesting historical data originating from DE&S and for uploading other structured, third-party datasets required for analysis.

Req. ID	Component	Proposed Functionality
DCV-LEG-01	Unified Ingestion Interface	The system shall provide a secure, role-based interface for authorized DE&S personnel to manage the ingestion of all pre-existing datasets.
DCV-LEG-02	Legacy Data Assessment	The system shall provide tools or a defined methodology to inventory, categorize, and assess various types of DE&S legacy data, including physical Paper Archives, existing Geospatial Data, Database Slices, and Unstructured Archives.
DCV-LEG-03	Challenge Identification & Mitigation	The assessment process for legacy data must identify specific data quality issues and format inconsistencies to inform the necessary ETL strategies.
DCV-LEG-04	Digitization & Ingestion Support	For physical paper archives, the system must support processes for digitization (e.g., OCR integration) and provide interfaces for structured data entry from these digitized records.
DCV-LEG-05	Ad-hoc File Upload	The interface must allow authorized users to upload structured, third-party datasets in standard file formats, including but not limited to Excel (XLS, XLSX), Comma-Separated Values (CSV), and other delimited text files.
DCV-LEG-06	Mandatory Metadata Tagging	During any file upload (Legacy or Ad-hoc), the user must be prompted to provide essential metadata, including data source (e.g., "DE&S Archives," "Census of India 2011"), description, time period, and ownership, to ensure proper data cataloguing.

Req. ID	Component	Proposed Functionality
DCV-LEG-07	Schema Validation	The system shall provide tools to validate uploaded files against a predefined or user-defined schema to ensure structural integrity before it is passed to the staging server.
DCV-LEG-08	Standardized ETL Ingestion	All prepared legacy and uploaded ad-hoc datasets must be ingested through the standard OISS ETL pipeline, ensuring adherence to data quality and format standards.
DCV-LEG-09	Legacy Data Digitization (Historical and Semi Structure Data)	Facilitate ingestion of scanned documents, handwritten form, registers, pdf, and archival materials maintained at district ad blocks.
		Integrate AI-assisted OCR (Optical character Recognition) and ICR (Intelligent Character Recognition) tools to extract text, tabular and numeric data from pdf and images.
		For digitized legacy documents processed using OCR/ICR, the system shall compute field-level extraction confidence scores based on the underlying recognition engine. Any extracted field with a confidence score below a configurable threshold (default: 90%) shall be mandatorily routed to a manual verification workflow. All manual corrections shall be logged with user ID, timestamp, and reason for change
		Store both raw (Image/pdf) and processed (structured) form in the Document Repository (DMS) with version tracking and metadata (source, year, type, owner, location)
		Enabling metadata tagging (year, surveyor name, scheme, file type, data category) for every ingested file for quick retrieval through search API
DCV-LEG-10	Unstructured Data Capture (Report, Excel Sheet, Image)	<p>Allow ingestion of files received from line departments in word, excel, PowerPoint and CSV formats.</p> <p>Define Standard ingestion template (Column Name, type, permissible value) for bulk uploads</p> <p>Automatically detect format mismatches and alert uploaders for correction.</p> <p>Extract tabular data embedded in images or scanned reports using table detection models and convert to machine-readable CSV.</p>

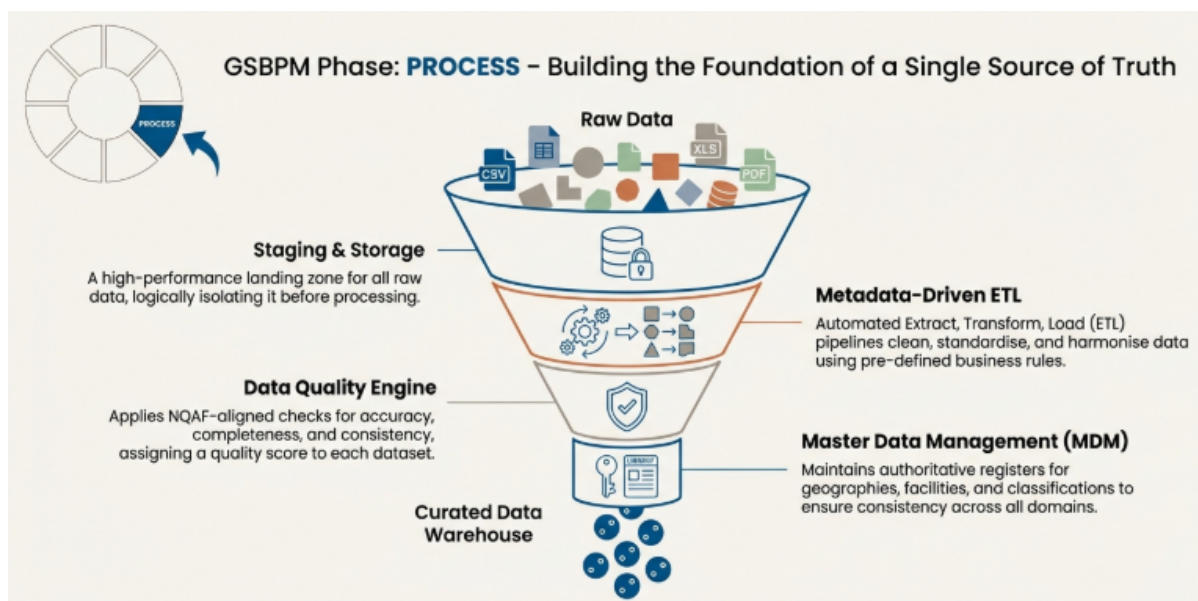
3.7.4. External API Integration

This pathway covers the automated ingestion of data from external digital systems via Application Programming Interfaces (APIs).

Req. ID	Component	Proposed Functionality
DCV-API-E-01	API Management Module	The system shall include a robust API management module to securely configure, register, manage, and monitor all inbound API connections from external systems.
DCV-API-E-02	Data Exchange Protocols & Formats	The system must support standard data exchange protocols (e.g., REST, SOAP) and data formats (e.g., JSON, XML, CSV) for seamless integration.
DCV-API-E-03	Secure Authentication & Authorization	All API connections must utilize robust authentication and authorization mechanisms (e.g., OAuth 2.0, API Keys, mutual TLS) to ensure secure data transfer.
DCV-API-E-04	Error Handling, Retries & Logging	The system must implement comprehensive error handling, automatic retry mechanisms for transient failures, and detailed logging for all API transactions to ensure data integrity and facilitate troubleshooting.
DCV-API-E-05	Data Governance for External APIs	The system must enforce data governance policies specific to external API data, including data ownership, usage rights, and data retention.
DCV-API-E-06	Semi-Structured and External Data Integration	<p>APIs for consuming JSON/XML feeds from line departments, NIC applications, or third-party datasets (e.g. Health MIS, Education MIS, Agriculture MIS)</p> <p>Schedule batch ingestion via SFTP or data exchange gateway.</p> <p>Governed integration with open data repositories (RBI, NSO, NITI Aayog, MOSPI, OGD Portal) through SDMX 3.0 or DCAT 2.0 standards.</p> <p>Consent-based web scraping with source acknowledgement and metadata capture (title, data, frequency URL, copyright).</p>

3.8. Data Processing & Quality Management (Process Phase)

This module defines the functional requirements for the OISS Staging Area, which will be hosted on a centralized server or the Data Centre (DC). The primary objective of the Staging Area is to serve as a temporary, secure, and high-performance landing zone for all raw and in-process data received from the Data Collection module. This phase replaces the manual and siloed flow with structured, automated, metadata-driven, on-prem data processing pipeline aligned with NQAF and GSBPM best practice.



This module focuses on turning raw inputs into clean, standardized analytical data within the on-prem warehouse. It is the workspace for the Data Processing module, designed to handle the ingestion, validation, cleaning, and transformation of data before the final, curated output is loaded into the Enterprise Data Warehouse.

1) Functions

- Structured Ingestion
- Data cleaning & harmonization
- Coding & classification
- Data Quality (NQAF-aligned)
- Aggregation across dimensions
- Lineage and audit trail

2) Analysis

- Indicator computation
- Time-series analysis
- District / block comparisons
- Trend and variance analysis
- Statistical validation
- GIS analytics
- Reproducible analytical workflows

3) Outcome

- Clean, standardized, analysis-ready datasets

3.8.1. Metadata & Document Management

1) Metadata

- Dataset & indicator metadata
- Methodology documents

- Revision history
- Version control
- Search and discovery

Document Management

- Survey manuals
- Technical notes
- Methodology documents
- Version control and access rules

3.8.2. Data Storage - Staging

Req. ID	Component	Proposed Functionality
DPQ-DS-1	Landing Zone (Raw data Store)	The landing shall have the following capability <ul style="list-style-type: none"> • Store raw incoming data exactly as received (CSV, JSON, XLS, XML, pdf, Images, SDMC, etc.) • Immutable archival with timestamp + checksum verification • Ensure auditability and traceability of the source submission. • Holds unprocessed versions for historical references.
DPQ-DS-2	Staging Zone	The Staging area shall have capability of the following: <ul style="list-style-type: none"> • Standardizes all the file format into a open format (CSV /Parquet) • Perform basic structural check (field count, type validation, missing fields) • Normalizes encoding (UTF-8), date formats, numeric precision. • Act as temporary buffer before transformation.
DPQ-DS-3	Operational Data Store (ODS)	The ODS area shall be present in staging area to store clean and harmonized data align with global scheme definitions. Remove duplicate, fix type mismatch, trim/clean string fields. It shall also apply mapping to classification systems (NIC, COICOP, Geo Code, etc.) and support fast validation queries prior to DW loads.
DPQ-DS-4	Data Warehouse (DW)	The data warehouse shall have the following capabilities: <ul style="list-style-type: none"> • It will store the final analytical-grade dataset using star/snowflake schema. • Maintains historical snapshot for multiple-year trend analysis • Support incremental and full refresh loads. • Enables cross-domain fusion (Price + Agriculture+ Labour)
DPQ-DS-5	Data Mart (Domain Specific Stores)	There shall be a provision of Data Mart with the following features: <ul style="list-style-type: none"> • Provide specialized data structures optimized for CPI, WPI, GSDP, Agriculture, Labour, Industry, Social Indicator, etc. • Stores process

Req. ID	Component	Proposed Functionality
DPQ-DS-6	Metadata Repository	<p>The system should have a repository to store data about data with the following features:</p> <ul style="list-style-type: none"> Manages dataset definitions, schema versions, data types, classification lists. Stores transformation rules, units, confidentiality levels. Enables metadata-driven standardization across all domains. Provides unified view of lineage, provenance, and dataset ownership
DPQ-DS-7	Master Data Management (MDM) Layer	<p>The solution shall have MDM layer with the following features:</p> <ul style="list-style-type: none"> Maintains authoritative master registers for geo hierarchy, facilities, classifications. Version controls boundaries and code lists with effective dates. Ensures cross-domain consistency for aggregation and comparison. Supports integration with external validator application for geo-validation.
DPQ-DS-8	Lineage & Audit Layer	<p>This layer shall have the following features:</p> <ul style="list-style-type: none"> Captures record-level lineage from raw → intermediate → final stage. Logs every transformation step with user, timestamp, and process ID. Ensures DPDP/ISO 27001 and audit compliance. Provides traceability for published official statistics.
DPQ-DS-9	OLTP Workload Optimization	<p>The Staging Area's underlying technology (database/storage) must be optimized for Online Transaction Processing (OLTP). It must be designed to handle a high volume of concurrent, short write transactions (e.g., inserts from CAPI, CAWI, APIs) with low latency.</p>
DPQ-DS-10	Multi-Source Ingestion Support	<p>The Staging Area must be capable of receiving and storing data concurrently from all four data collection pathways: CAPI Solution, CAWI, Legacy & Pre-existing Data Ingestion, and External APIs.</p>
DPQ-DS-11	Diverse Data Format Support	<p>The storage solution must natively support a wide variety of data formats, including structured (e.g., relational tables, CSV), semi-structured (e.g., JSON, XML), and unstructured (e.g., images, scanned documents) data.</p>
DPQ-DS-12	Batch and Record Integrity	<p>The Staging Area must preserve the Batch IDs and Timestamps assigned during ingestion for every dataset and record. This is essential for maintaining data lineage and traceability.</p>
DPQ-DS-13	Logical Data Isolation	<p>The Staging Area must be logically partitioned to keep raw, validated, and quarantined data separate. This prevents cross-contamination and</p>

Req. ID	Component	Proposed Functionality
		ensures that only data that has passed quality checks moves to the transformation stage.
DPQ-DS-14	High-Throughput Read/Write Access	The storage must be optimized for high-speed read and write operations to efficiently support the intensive data validation, cleaning, and transformation jobs performed by the Data Processing module.
DPQ-DS-15	Integration with Processing Engine	The Staging Area must provide seamless, low-latency connectivity to the Data Processing engine's validation and transformation tools.

The staging and storage layers shall provide high-throughput, reliable, and scalable data ingestion and access capabilities suitable for concurrent CAPI, CAWI, API, and batch workloads.

The detailed storage architecture and technology choices shall be proposed by the System Integrator and shall be subject to approval by DE&S / OCAC, provided all functional, performance, security, and audit requirements of this FRS are met.

The specific choice of storage technologies and architectural patterns shall be proposed by the System Integrator, subject to compliance with the functional requirements and approval by DE&S / OCAC

3.8.3. Data Processing using Extract Transform Load (ETL)

The ETL (Extract, Transform, Load) process is a core component of data integration and analytics. It will begin with Extract, where data is collected from various sources such as databases, APIs, files, or cloud platforms. This ensures raw data is retrieved efficiently and securely. The Transform phase will clean, standardizes, and reshapes the data-removing duplicates, correcting errors, mapping fields, and applying business rules to make it consistent and usable. Finally, the Load.

Req ID	Component	Proposed Functionality
DPQ-DP-1	Data Source Connectivity	Connects to databases, APIs, files, and cloud systems to retrieve raw data.
DPQ-DP-2	Extraction Engine	Imports data from Landing/Staging based on schema metadata. Validates mandatory fields, data types, record formats. Extracts tabular content from PDFs/images using OCR/ICR, and Ensures lossless ingestion of all source systems.
DPQ-DP-3	Full & Incremental Extraction	Supports full dataset ingestion and incremental updates using timestamps or change tracking.
DPQ-DP-4	Transformation Engine	Transformation Engine shall support: <ul style="list-style-type: none"> Cleans, standardizes, enriches, and harmonizes data using metadata-driven rules.

Req ID	Component	Proposed Functionality
		<ul style="list-style-type: none"> Applies code mappings (COICOP, NIC, ISIC). Performs unit conversions (e.g., litre → kg). Implements Slowly Changing Dimensions (SCD Type 1/2).
DPQ-DP-5	Change Data Capture (CDC)	Detects and extracts only the changes made in source systems for real-time updates.
DPQ-DP-6	Data Cleansing	Removes duplicates, corrects errors, and handles missing or inconsistent values.
DPQ-DP-7	Data Standardization	Converts data into consistent formats (e.g., dates, currencies, units).
DPQ-DP-8	Data Mapping	Aligns source fields to target schema and applies transformation rules.
DPQ-DP-9	Data Enrichment	Adds external or contextual data to enhance value (e.g., geolocation, demographics).
DPQ-DP-10	Aggregation & Summarization	Computes totals, averages, and other metrics for reporting.
DPQ-DP-11	Filtering & Sorting	Includes/excludes records and organizes data by specified fields.
DPQ-DP-12	Validation Engine	<ul style="list-style-type: none"> Applies rules to ensure data integrity and compliance. Executes structural, domain, statistical, temporal, and referential checks. Runs rule-based validation (range, dependency, logical constraints). Uses statistical anomaly detection (z-score, IQR, ARIMA residuals). Generates validation error logs and quality reports.
DPQ-DP-13	Data Quality (DQ) Engine	<ul style="list-style-type: none"> Computes NQAF-aligned quality dimensions (accuracy, coherence, completeness, timeliness). Assigns DQ score to each dataset with threshold-based flags. Provides dataset-level quality dashboards. Supports automated re-validation after corrections.
DPQ-DP-14	Master Data Mapping Engine	<ul style="list-style-type: none"> Harmonizes incoming records to DE&S master registries (geo, facility, classification). Handles deprecated codes and boundary changes. Ensures accurate aggregation at district/state levels. Prevents cross-domain mismatches.
DPQ-DP-15	Business Rules / Derivation Engine	<ul style="list-style-type: none"> Applies transformation logic to derive indicators, ratios, percentages, indexes. Computes domain-specific aggregation (CPI, WPI, GSDP). Ensures formula consistency across time and geography. Maintains version-controlled rule sets.
DPQ-DP-16	Batch & Real-Time Loading (Loading Engine)	<p>Loads data in scheduled batches or streams it continuously.</p> <ul style="list-style-type: none"> Loads validated datasets into DW and domain marts. Supports incremental loads, upserts, and bulk inserts. Refreshes materialized views for fast dashboard rendering. Generates summary tables for reporting.

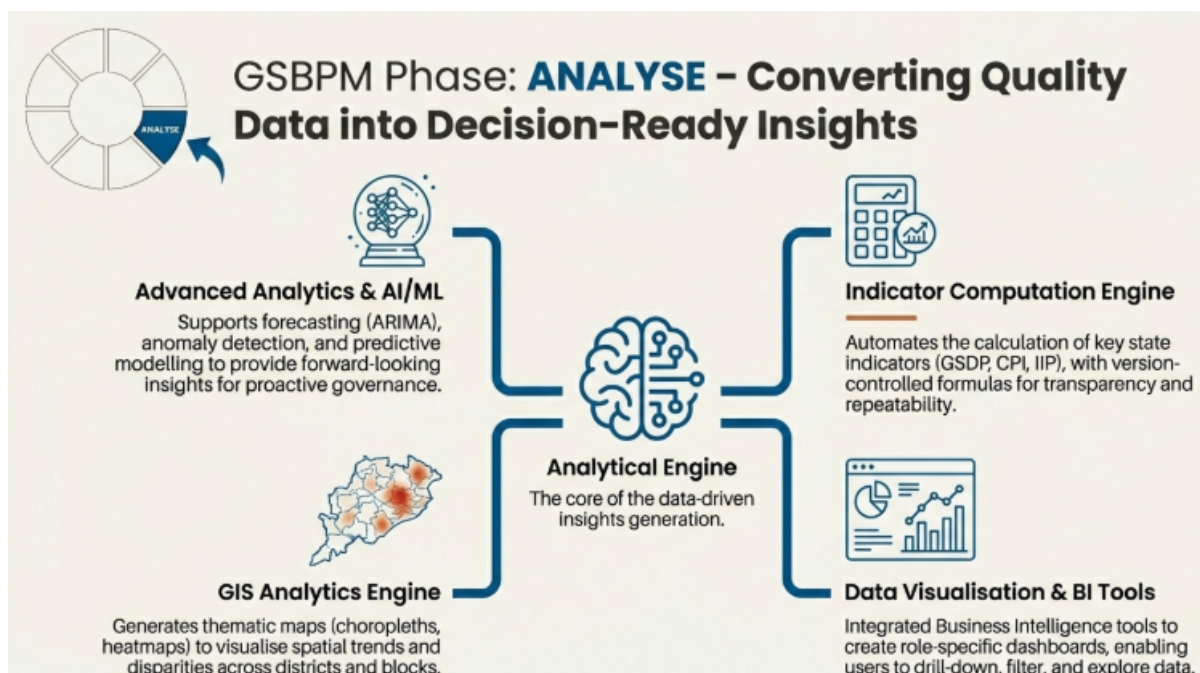
Req ID	Component	Proposed Functionality
DPQ-DP-17	Upsert Operations	Inserts new records or updates existing ones in the target system.
DPQ-DP-18	Partitioning & Indexing	Organizes data for performance optimization and faster querying.
DPQ-DP-19	Workflow Scheduling	Automates ETL jobs using time or event-based triggers.
DPQ-DP-20	Logging & Alerting	Tracks ETL operations, errors, and sends notifications for failures or anomalies.
DPQ-DP-21	Lineage & Audit Engine	<ul style="list-style-type: none"> • Logs ETL workflows, transformations, data movements. • Maintains an immutable audit trail for every stage of processing. • Allows rollback and comparison of old vs new versions. • Ensures compliance with DPDP Act, ISO 27001, and GoO IT policies.
DPQ-DP-22	Error Handling & Reconciliation Engine	<ul style="list-style-type: none"> • Identifies rejected records and routes them for correction. • Supports automated reconciliation with previous cycles. • Generates delta reports (added/removed/changed rows). • Provides feedback loop to collection teams.

3.9. Data Analysis & Visualisation Phase

The ANALYZE stage converts processed, validated, harmonised datasets into meaningful statistical insights.

It is directly responsible for computing indicators, preparing analytical datasets, enabling statistical modelling, generating time-series trends, GIS layers, and supporting high-level dashboards used for policy decisions.

The detailed AI/ML modules described in this section shall be implemented in phases as defined in Section 2.2.9.



This phase includes analytical processing, computation of SDG and program indicators, machine learning models, econometric analysis, integration of geospatial analytics, and preparation of structured insights for dissemination.

This phase defines the functional requirements for the OISS data processing pipeline. Its primary objective is to transform raw data received from the Data Collection stage into validated, cleaned, enriched, and analysis-ready datasets. The entire process is designed to be automated, auditable, and governed by scheme-specific business rules, ensuring the highest standards of data quality and reliability

3.9.1. Analyse Stage (Data Warehouse - Core of OISS)

This stage produces the high-quality, trusted datasets that will feed all downstream analytical activities. It addresses DE&S challenges around delayed publications, manual statistical calculations, and lack of forecasting capability mentioned historically in the DPR.

Req. ID	Component	Proposed Functionality
DAV-DA-1	Centralized Data Storage	Stores integrated, structured data from multiple sources in one unified repository.
DAV-DA-2	Analytical Warehouse Layer (Fact-Dimension Models)	This component shall: <ul style="list-style-type: none"> Provides analytical-grade fact tables for Prices, Agriculture, Labour, Industry, NAS, Demography. Supports time-series trend analysis, comparisons across districts, and aggregation at different administrative levels.

		<ul style="list-style-type: none"> Allows slice-and-dice queries across sectors.
DAV-DA-3	Indicator Computation Engine	<p>This component shall:</p> <ul style="list-style-type: none"> Computes CPI, WPI, GSDP, District Domestic Product (DDP), Labour indicators, Agriculture productivity metrics, Social indicators. Automates formulas, weights, and calculation logic using metadata-driven rules. Supports version-controlled formulas for transparency and repeatability.
DAV-DA-4	Statistical Analysis Engine	<p>This component shall:</p> <ul style="list-style-type: none"> Perform descriptive statistics, correlation analysis, sampling error estimation, and econometric functions. Support forecasting using statistical and machine learning approaches including ARIMA, Prophet, exponential smoothing, and other extensible methods. Support hierarchical forecasting across administrative levels (e.g., State, Division, District, Block, Gram Panchayat or equivalent units). Provide reconciliation mechanisms including Bottom-Up, Top-Down, and Middle-Out approaches to ensure consistency between aggregated and disaggregated forecasts. Generate forecast outputs with confidence intervals and prediction bands. Provide controlled override functionality for forecast adjustments with complete audit trail and approval workflow. Provide anomaly detection using statistical and ML models.
DAV-DA-5	ML/AI Modeling Engine	<p>This component shall:</p> <ul style="list-style-type: none"> Enable clustering (e.g., district similarity), classification models, and predictive modeling (price forecasting, migration prediction). Store model versions, parameters, evaluation metrics, and training datasets. Support reproducible analytical workflows. Provide model performance monitoring dashboards tracking validation metrics over time. Detect and monitor data drift, model drift, and concept drift using configurable statistical thresholds. Provide mechanisms to identify potential prediction bias in deployed models. Generate automated alerts when performance degradation exceeds defined thresholds. Support controlled retraining workflows subject to approval and governance rules.

DAV-DA-6	GIS Analytics Engine	<p>This component shall:</p> <ul style="list-style-type: none"> • Supports geospatial joins (district-level, block-level, village-level maps). • Generates heatmaps, choropleths, density layers, and spatial trend dashboards. • Uses GeoJSON/WMS layers with historical boundary versions.
DAV-DA-7	Analytical Notebook Environment	<p>Provides a browser-based analytical notebook environment supporting statistical analysis using open-source languages (e.g., R, Python), with controlled access to curated datasets, versioned workflows, and full audit logging.</p> <p>Notebook execution shall operate only on curated and authorized datasets within the governed analytical environment.</p>
DAV-DA-8	Metadata & Lineage View for Analysis	<p>This component shall:</p> <ul style="list-style-type: none"> • Shows formula lineage, indicator dependencies, and data sources. • Maintains traceability from raw → processed → indicator → dashboard. • Ensures transparency for audit and publication.
DAV-DA-9	Analytical Quality Engine	<p>This component shall:</p> <ul style="list-style-type: none"> • Validates analytical outputs using cross-check rules (YoY change reasonability, variance bounds, sector ratios). • Flags abnormal values for review before publication. • Generates confidence scores for indicators. • Performs peer dataset consistency validation (cross-indicator coherence checks where applicable).
DAV-DA-10	Historical Data Management	Maintains data for trend analysis and long-term reporting.
DAV-DA-11	Analytical Data Optimization	The analytical storage layer shall be optimized for efficient querying, time-series analysis, and aggregation across schemes, geographies, and time periods, while ensuring auditability, historical consistency, and performance SLAs.
DAV-DA-12	Security & Access Control	Implements role-based permissions and encryption to protect sensitive data.

DAV-DA-13	Backup & Recovery	Ensures data durability and disaster recovery through scheduled backups.
DAV-DA-14	Integration with BI Tools	Seamlessly connects with visualization platforms with industry-standard BI and visualization tools supporting open connectivity standards (e.g., JDBC/ODBC, REST APIs)
DAV-DA-15	Scalability & Performance Tuning	Supports growing data volumes and user loads with elastic architecture and tuning.

3.9.2. Data Visualization

Data visualisation tools turn raw data into interactive dashboards, charts, and reports for better insights.

Features

- Role-specific dashboards
- Drill-down by geography, time, scheme
- Comparative and trend views
- Export and share (as permitted)

Req. ID	Component	Proposed Functionality
DAV-DV-01	Dashboard Creation	Builds interactive dashboards to display key metrics and trends across departments.
DAV-DV-02	Report Generation	Produces scheduled and ad-hoc reports for stakeholders and decision-makers. Only validated and approved analytical datasets shall be eligible for public-facing dashboards.
DAV-DV-03	Data Exploration Tools	Enables users to drill down, filter, and slice data for deeper insights.
DAV-DV-04	Visual Charting	Offers various chart types (bar, line, pie, heatmap, etc.) for intuitive data representation.
DAV-DV-05	Custom KPI Tracking	Tracks performance indicators tailored to departmental goals and programs.
DAV-DV-06	Real-Time Visualization	Displays live data streams for monitoring operations and alerts. Real-time behavior shall be governed by the

		refresh intervals and response time thresholds defined in Section 4.1 (Performance SLAs).
DAV-DV-07	User Access Control	Restricts visualization access based on roles and permissions.
DAV-DV-08	Mobile & Web Accessibility	Supports responsive design for access across devices and platforms.
DAV-DV-09	Integration with BI Tools	Connects with industry-standard BI and visualization tools supporting open connectivity standards (e.g., JDBC/ODBC, REST APIs) for advanced analytics.
DAV-DV-10	Export & Sharing Options	Allows users to export visuals in formats like PDF, Excel, or share via links and portals.

Advanced Visualization & Conversational Analytics (NLP/LLM)

The OISS analytics and visualization engine must move beyond static reporting by incorporating Natural Language Processing (NLP) and Natural Language Generation (NLG) capabilities to democratize data access for non-technical administrators:

- **Conversational Querying:** The platform shall support conversational-style search, allowing administrative users to query datasets using natural language (e.g., *"Show me the crop yield trends in Balasore compared to state averages over the last 3 years"*).
- **Natural Language Generation (NLG):** Dashboards must automatically generate dynamic, natural language text explanations alongside charts and graphs. These text insights must automatically update as users modify filter conditions, actively detecting and summarizing key drivers, patterns, and anomalies in the underlying data without human intervention.
- **Data Residency & Security:** While leveraging advanced LLM/NLP capabilities for visualization and conversational querying, the core statistical datasets must strictly remain within the secure State-approved hosting boundary to comply with data regulatory and privacy requirements.

3.9.3. GIS Analysis

GIS capabilities under OISS shall be strictly limited to statistical visualization, spatial aggregation, and analytical representation of official statistics produced or curated by DE&S.

The OISS GIS module shall not replace, duplicate, or function as an operational GIS system for urban planning, infrastructure design, disaster response, or departmental decision execution.

All spatial analysis shall be confined to descriptive and analytical use in support of statistical reporting and policy analysis.

GIS Analysis within OISS focuses on the **statistical representation and spatial analysis of official indicators** produced by DE&S.

The GIS module supports thematic mapping, spatial aggregation, and trend analysis **for statistical reporting and policy analysis only**, and does not provide operational planning or execution capabilities.

Req. ID	Component	Proposed Functionality
DAV-GIS-01	Spatial Data Collection	Gathers georeferenced data from satellites, drones, GPS, and surveys.
DAV-GIS-02	Mapping & Visualization	Displays data as interactive maps with layers for roads, land use, population, etc.
DAV-GIS-03	Spatial Analysis Tools	Performs buffer, overlay, proximity, and network analysis to study spatial relationships.
DAV-GIS-04	Attribute Data Integration	Links geographic features with tabular data (e.g., population, income, crop yield).
DAV-GIS-05	Geostatistical Modeling	Uses statistical techniques to predict spatial phenomena (e.g., rainfall, pollution).
DAV-GIS-06	Statistical Spatial Analysis	Performs statistical spatial analysis (thematic mapping, spatial aggregation, trend visualization) strictly for official statistical indicators produced or curated by DE&S.

3.9.4. Data Cataloguing

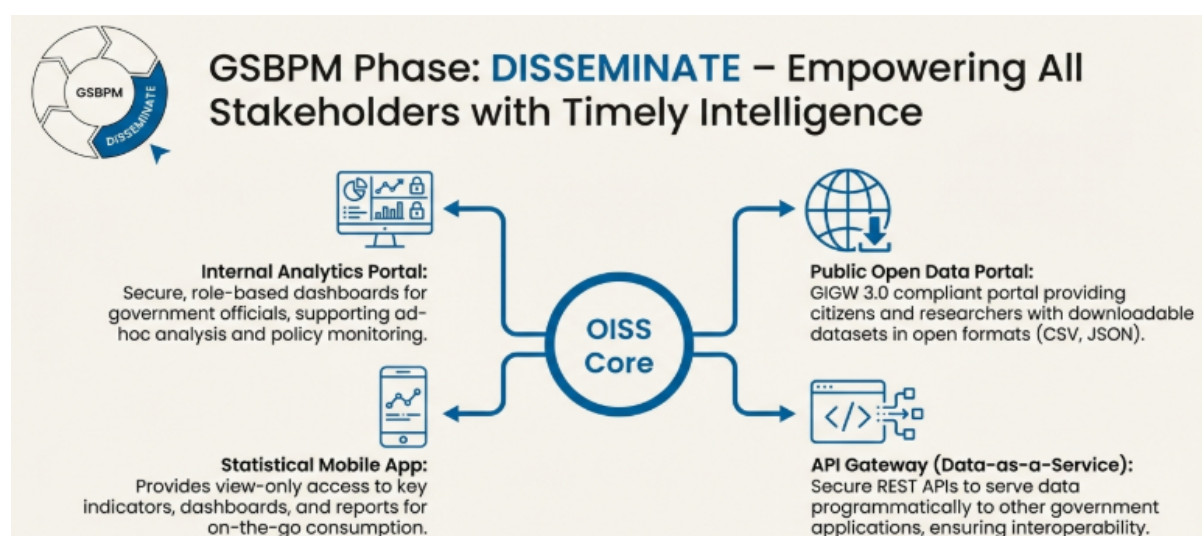
The proposed OISS solution will have integrated Data cataloguing module that will organize metadata, making datasets searchable, understandable, and governed for secure access. The Data Catalogue tool to be integrate with OISS is NADA (National Data Archive) Tool, as proposed by World Bank.

Req ID	Component	Proposed Functionality
DAV-DC-01	Metadata Management	The proposed system shall support Dataset and indicator metadata management
DAV-DC-02	Search and discovery	The proposed system shall support Search and discovery

Req ID	Component	Proposed Functionality
DAV-DC-03	Dataset Ownership	The proposed system shall support Dataset ownership and stewardship tagging
DAV-DC-04	Versioning	The proposed system shall support versioning and revision history
DAV-DC-05	Visualization	The proposed system shall support lineage and provenance visualization
DAV-DC-06	Role-based access	The proposed system shall support Role-based access to metadata and datasets

3.10. Data Dissemination & Reporting Phase

The Disseminate Phase ensures that validated and approved statistical outputs reach internal decision-makers, public users, and external agencies in a secure, standardized, and accessible manner.



This Module will be a critical component of a OISS data warehouse ecosystem that will ensure processed and validated data reaches the right users in the right format, securely and efficiently for decision making and other consumption purpose.

All dissemination channels shall comply with statistical disclosure control and masking requirements defined in Section 2.2.8.5.

The system shall support dissemination through a responsive web portal optimized for desktop and **mobile** browsers.

Any native mobile application, if required, shall be limited to view-only access to published indicators, dashboards, and reports, and shall not include data entry or offline storage unless explicitly approved by DE&S.

This stage produces dashboards, printed publications, open datasets, APIs, GIS layers, and auto-generated statistical reports.

It addresses DE&S challenges such as:

- delays in publishing reports,
- lack of a centralized dissemination channel,
- manual formatting of publications,
- no machine-readable datasets,
- absence of GIGW 3.0 / WCAG compliance

Internal Outputs

- Management reports
- Scheme dashboards
- Policy briefs

Public Outputs

- Statistical tables
- Open data downloads
- Visualization dashboards
- Statistical Mobile App

Controls

- Publication approval workflows
- Embargo and release dates
- Revision flags

Req ID	Component	Proposed Functionality
DSR-DS-01	Internal Analytics Portal (OISS Enterprise Portal)	<ul style="list-style-type: none"> - Role-based dashboards for HQ, District, Division, and Section officers. - Ad-hoc analysis and drill-down capability. - Subscription-based alerts for new datasets.
DSR-DS-02	Public Open Data Portal (GIGW 3.0 Compliant)	<ul style="list-style-type: none"> - Provides downloadable datasets in CSV, JSON, SDMX formats. - Displays dataset metadata, DQ score, source, and periodicity. - Supports WCAG 2.1 AA accessibility guidelines. - Offers visualizations for public transparency.

DSR-DS-03	API Gateway (Data-as-a-Service)	<ul style="list-style-type: none"> - REST APIs with token-based access control. - Supports rate limiting, usage logs, and developer sandbox. - Serves datasets programmatically to ministries, researchers, startups.
DSR-DS-04	GIS Visualization Layer	<ul style="list-style-type: none"> - Displays interactive maps for sectoral indicators. - Enables thematic visualization (e.g., CPI inflation by district, rainfall patterns). - Supports time-lapse animated maps.
DSR-DS-05	Publication Automation Engine	<ul style="list-style-type: none"> - Generates Economic Survey chapters, District Statistical Handbook tables, Price Bulletins, Agriculture Reports. - Pulls data directly from DW/Data Marts. - Formats outputs in PDF/Word/Excel templates.
DSR-DS-06	Advance Release Calendar (ARC) Module	<ul style="list-style-type: none"> - Manages publication schedule for all statistical reports. - Tracks delays and generates compliance alerts. - Maintains revision logs and errata.
DSR-DS-07	Dataset Versioning & Archive Layer	<ul style="list-style-type: none"> - Stores old versions of datasets for historical comparison. - Provides stable permalinks and DOIs for official publications. - Maintains retrieval logs for audit.
DSR-DS-08	Security and Privacy Module	<ul style="list-style-type: none"> - Applies anonymization for microdata before release. - Implements digital signatures for official PDFs. - Ensures HTTPS, CSP, and input sanitization for portal and APIs.

3.10.1. Statistical Mobile App

The Statistical Mobile App is a mandatory dissemination component of OISS.

The mobile application shall provide view-only access to published indicators, dashboards, reports, and open datasets.

Offline access shall be limited to cached public content. No data entry, editing, or submission shall be supported.

All personalization features shall be limited to user interface preferences and notification settings and shall not modify, annotate, or store statistical data beyond cached public content.

Following are the proposed features of Statistical Mobile App.

Req ID	Component	Proposed Functionality
DSR-SMA-01	National & State-Level Indicators	Provide access to key statistics like GDP, inflation, literacy, employment, and sectoral data.
DSR-SMA-02	Interactive Dashboards	Visualize trends using charts, graphs, and maps for intuitive understanding of data.
DSR-SMA-03	Searchable Dataset Catalog	Allow users to search and filter datasets by theme, geography, or time period.
DSR-SMA-04	Downloadable Reports	Offer access to official publications, survey results, and statistical abstracts in PDF or Excel formats.
DSR-SMA-05	Multilingual Interface	Support multiple Indian languages to ensure accessibility across diverse user groups.
DSR-SMA-06	Push Notifications	Send alerts for new data releases, updates, and important statistical announcements.
DSR-SMA-07	Offline Access	Enable browsing of cached data and reports without internet connectivity.
DSR-SMA-08	User Personalization	Let users bookmark datasets, customize dashboards, and set alerts for specific indicators.
DSR-SMA-09	Data Sharing Options	Allow users to share charts, reports, or links via email, messaging apps, or social media.

3.10.2. DE&S Website

The revamped DE&S website will be a centralized digital platform that provides seamless access to Odisha's official statistics, interactive dashboards, downloadable reports, and open datasets. It will empower citizens, researchers, and policymakers to explore, analyze, and utilize data for evidence-based decision-making. With features like multilingual support, secure departmental access, and feedback mechanisms, the site will ensure transparency, inclusivity, and responsiveness in public data dissemination. The detail functionality about the DE&S website is cited the specific section of this document.

3.10.3. Open API for external data sharing

The proposed OISS solution will have open API's for sharing statistical data with other government departments, researchers and academia etc. The feature of this module will be as follows.

Req ID	Component	Proposed Functionality
DSR-API-01	Programmatic Data Access	Enables developers and researchers to fetch datasets directly using secure API endpoints.
DSR-API-02	Real-Time Data Feeds	Provides live updates of key indicators like GDP, inflation, and employment for integration into external platforms. Real-time behavior shall be governed by the refresh intervals and response time thresholds defined in Section 4.1 (Performance SLAs).
DSR-API-03	Metadata Schema API	& Shares dataset structure, definitions, and lineage to ensure proper interpretation and reuse.
DSR-API-04	Authentication Security	& Uses token-based access control to ensure secure and authorized data exchange.
DSR-API-05	Integration with External Systems	Supports embedding DE&S data into third-party apps, portals, and dashboards for broader dissemination.

3.10.4. Reporting

This component will enable the Directorate of Economics & Statistics (DE&S) to disseminate curated statistical insights and reports proactively to stakeholders through multiple broadcast channels.

Internal Outputs

- Management reports
- Scheme dashboards
- Policy briefs

Public Outputs

- Statistical tables
- Open data downloads
- Visualization dashboards

Controls

- Publication approval workflows
- Embargo and release dates
- Revision flags

Req ID	Component	Proposed Functionality
DSR-BR-01	Broadcast Engine	Automates the distribution of statistical reports, dashboards, and alerts to predefined stakeholder groups (Government departments, policymakers,

		researchers, media, and citizens).
DSR-BR-02	Multi-Channel Delivery	Supports dissemination via email, SMS, push notifications (mobile app), and web portal alerts to ensure wide reach.
DSR-BR-03	Role-Based Targeting	Allows administrators to configure broadcast lists based on user roles (e.g., district officials, line departments, public users) and customize content accordingly.
DSR-BR-04	Scheduled & Event-Driven Broadcasts	Enables both scheduled dissemination (e.g., monthly CPI release) and event-triggered broadcasts (e.g., completion of survey cycle, new dataset availability).
DSR-BR-05	Personalized Subscriptions	Provides users the option to subscribe to specific indicators, domains, or datasets, ensuring they receive only relevant updates.
DSR-BR-06	Integration with Analytical Engine	Connects directly with the OISS analytical layer to broadcast validated, real-time insights without manual intervention. Real-time behavior shall be governed by the refresh intervals and response time thresholds defined in Section 4.1 (Performance SLAs).
DSR-BR-07	Audit & Compliance Logging	Maintains logs of all broadcast activities (time, recipients, content) to ensure transparency, accountability, and compliance with DPDP/ISO 27001 standards.
DSR-BR-08	Feedback & Acknowledgement Tracking	Captures recipient engagement (e.g., report opened, link clicked) and provides feedback dashboards for administrators to assess dissemination effectiveness.

3.10.5. Alert Module

This component will provide real-time notifications to stakeholders about critical updates, anomalies, or events within the OISS ecosystem, ensuring timely awareness and action.

Req ID	Component	Proposed Functionality
DSR-AM-01	Alert Engine	Generates and manages system alerts based on predefined rules, thresholds, or events (e.g., data

		quality issues, survey completion, new dataset availability).
DSR-AM-02	Multi-Channel Notifications	Delivers alerts via email, SMS, in-app push notifications, and web portal banners to maximize reach.
DSR-AM-03	Configurable Alert Rules	Allows administrators to define custom alert conditions (e.g., data submission delays, validation failures, SLA breaches).
DSR-AM-04	Role-Based Alerting	Ensures alerts are targeted to relevant stakeholders (e.g., enumerators, supervisors, policymakers) depending on the nature of the issue.
DSR-AM-05	Priority Levels	Supports categorization of alerts (critical, high, medium, low) to help users prioritize responses.
DSR-AM-06	Real-Time Monitoring Integration	Connects with dashboards and monitoring consoles to trigger alerts instantly when anomalies or events occur. Real-time behavior shall be governed by the refresh intervals and response time thresholds defined in Section 4.1 (Performance SLAs).
DSR-AM-07	Acknowledgement & Escalation Workflow	Tracks whether alerts are acknowledged; escalates unresolved critical alerts to higher authorities.
DSR-AM-08	Audit & Compliance Logging	Maintains records of all alerts generated, recipients, and responses for transparency and compliance with DPDP/ISO 27001.
DSR-AM-09	Feedback Loop	Provides administrators with analytics on alert effectiveness (response times, resolution rates) to refine alerting strategies.

3.11. Administration & Configuration

The proposed systems shall have the following functionality for administration and configuration.

- Master data management
- Workflow configuration
- Validation rule management

- Dashboard configuration
- System parameters

4. Non-Functional Requirements (NFR)

This section defines the Non-Functional Requirements (NFRs) that govern the overall quality, performance, security, and usability of the OISS platform. While the Functional Requirements define what the system must do, these NFRs dictate the strict technical benchmarks and standards the System Integrator (SI) must meet to ensure the platform is robust, scalable, and secure.

The SI's proposed architecture and final developed solution must natively comply with all metrics detailed below. Failure to meet these performance benchmarks during the User Acceptance Testing (UAT) or the 2-year Operations & Maintenance (O&M) phase will be considered a breach of performance SLAs.

4.1. Performance & Scalability Metrics

The system must be highly responsive and capable of handling large volumes of concurrent data ingestion without degradation in the User Experience (UX).

Req. Id	Metric/ Component	Particulars/benchmark
NFR-PSM-01	Response Time (UI)	Dashboard and web page load time \leq 3 seconds (under normal load).
NFR-PSM-02	Response Time (API)	API and integration response time \leq 2 seconds.
NFR-PSM-03	Performance (ETL)	\geq 10 GB/hour data processing and throughput capability.
NFR-PSM-04	Micro batch Latency	\leq 10 minutes latency for real-time/near real-time data ingestion.
NFR-PSM-05	Scalability architecture	Architecture must support at least 5 \times growth in data volume over the baseline year and the onboarding of a minimum of 10 additional schemes without requiring structural architectural changes.
NFR-PSM-06	Concurrency	System must support concurrent access by at least 2,000 authenticated users without degradation.

4.2. Availability & Business Continuity

The system must be highly available, ensuring that critical data collection and dissemination activities are not interrupted.

Req. Id	Metric/ Component	Particulars/benchmark
NFR-BCM-01	System Uptime	System availability \geq 99.9% (excluding pre-approved planned maintenance windows).
NFR-BCM-02	Recovery Point Objective (RPO)	RPO \leq 15 minutes (Maximum acceptable data loss in the event of a critical failure).
NFR-BCM-03	Recovery Time Objective (RTO)	RTO \leq 4 hours (Maximum allowable downtime before the system is restored from the DR site).
NFR-BCM-04	Failover Capability	Automated, DR-enabled failover routing to the secondary Disaster Recovery site.

4.3. Security, Audit & Data Privacy

As a repository of sensitive State economic and enterprise data, the platform must adhere to the highest state and national security standards.

Req. Id	Metric/ Component	Particulars/benchmark
NFR-SAD-01	Regulatory Compliance	Mandatory adherence to the Digital Personal Data Protection (DPDP) Act, 2023.
NFR-SAD-02	Security Standards	Implementation of ISO 27001 aligned security controls across all infrastructure and application layers.
NFR-SAD-03	Vulnerability Assessment	Mandatory Safe-to-Host certification prior to Go-Live and Annual VAPT audits by a CERT-In empanelled agency.
NFR-SAD-04	Audit Compliance	100% of critical business processes, login attempts, and data modifications covered by immutable audit trails.
NFR-SAD-05	Data Encryption	AES-256-bit encryption for Data at Rest; TLS 1.2 or higher (preferably TLS 1.3) for Data in Transit.
NFR-SAD-06	Data Anonymization	Dynamic data masking of Personally Identifiable Information (PII) before publishing to analytical dashboards or the public NADA portal.

4.4. Usability & Accessibility

The platform must be universally accessible, barrier-free, and responsive across various devices.

Req. Id	Metric/ Component	Particulars/benchmark
NFR-UA-01	Government Standards	Strict compliance with the Guidelines for Indian Government Websites (GIGW 3.0).
NFR-UA-02	Accessibility	Strict compliance with WCAG 2.1 AA standards, including full screen-reader support.
NFR-UA-03	Multilingual Support	The Unified Portal UI and public dissemination modules must natively support English and Odia.
NFR-UA-04	Device Compatibility	Fully responsive UI design ensuring seamless functionality across Desktop, Tablet, and Mobile browsers (Chrome, Firefox, Safari, Edge).

4.5. Data Quality & Completeness Metrics

To ensure the statistical outputs are reliable, the automated processing layers must enforce strict quality controls before data is used for State planning.

Req. Id	Metric/ Component	Particulars/benchmark
NFR-DQ-01	Data Quality (DQ) Score	Automated validation workflows must ensure a DQ Score of $\geq 95\%$ before raw data enters the analytical data mart.
NFR-DQ-02	Metadata Completeness	The system must strictly enforce the capture of $\geq 98\%$ of all mandatory metadata fields during the data ingestion phase.

5. Project Schedule & Payment Milestones

5.1. Tenure of Contract

The Contract shall be in force for a total period of **Thirty-Six (36)** months, subject to adherence to the timelines and framework, and as per the General Terms and Conditions of the Contract.

Out of the 36 months, twelve (12) months shall be utilized for the design, development, integration, and Go-Live of the OISS platform. The remaining twenty-four (24) months shall be

dedicated to Operations, Maintenance (O&M), and warranty support commencing from the official date of Go-Live.

5.2. Project Schedule

"T₀" is defined as the event marking Team Mobilization, which must occur within 15 days of the acceptance of the Letter of Intent (LoI) by the successful bidder (System Integrator).

The SI must execute a detailed implementation plan adopting the Critical Path Method (CPM). The time schedule for each milestone shown below will be enforced independently. Delays in precedent milestones will have a cascading effect on penalties; therefore, the SI must establish an excellent project management setup.

Sl. No	Deliverables	Completion Timeline
1.	Team Mobilization (should happen within 15 days of acceptance of Letter of Intent (LoI)), Signing of Contract	T ₀
2.	Project initiation: Preparation of Project Charter, and project work plan, kick-off meeting	T ₀ + 2 weeks
3.	Requirement Gathering and Analysis: Conduct stakeholder interviews, prioritize features, and gather business/technical requirements.	T ₀ + 6 weeks
4.	System & Architecture Design: Functional Design Documents, technology stack, and UI/UX wireframes/prototypes.	T ₀ + 10 weeks
5.	Systems Requirements Specification (SRS): Final Approval	T ₀ + 12 weeks
6.	Development Phase - Backend and frontend development, Unit testing during each sprint, Continuous integration setup	T ₀ + 38 weeks
7.	Testing - Functional testing, Integration testing, Performance & load testing, Bug fixing & regression testing	T ₀ + 42 weeks
8.	UAT and Feedback- User Acceptance Testing with stakeholders, collect feedback, and apply changes. Final production approval	T ₀ + 46 weeks
9.	Deployment & Go-Live- Finalise deployment checklist, Deploy to production environment	T ₀ + 48 weeks
10.	Post Go-Live Support (Warranty): Warranty of Portal, database and Software's	T ₀ + 100 weeks
11.	Operation and Maintenance: Comprehensive support for 12 months	T ₀ + 152 weeks

It may be noted that the time schedule for each milestone shown in the table above would be enforced independently, even though some of them are interdependent. This would have a cascading effect of penalties for delays in all other milestones dependent on the precedent milestone. Therefore, the SI will have to be extremely careful in establishing an excellent project management setup.

5.3. Payment Milestones

Sl. #	Category	Payment Terms	
1.	Design, Development, and Implementation <i>(Reference - Design & Development- Pt. 1 of Form-2/BOQ)</i>	<ul style="list-style-type: none"> – 2% payment on <ul style="list-style-type: none"> • Signing of the Contract, • Onboarding of the Team, and • Submission of the strategy report, including the work plan, with acceptance of the OEM(s). – 8% payment of <ul style="list-style-type: none"> • Design and Development on approval of SRS, • System design Document, • Data architecture and security strategy, ensuring the project has a robust and approved foundation before development begins. – 25% payment of Design and Development <ul style="list-style-type: none"> • Completion of 50% of Module Development on completion of UAT. – 40% payment of Design and Development <ul style="list-style-type: none"> • Completion of 100% of Module Development on completion of UAT. – 25% payment of Design and Development <ul style="list-style-type: none"> • on receipt of security audit & STQC Audit certificate and after 3 months from Go-Live. 	
2.	SSL certificate <i>(Reference - Pt. 4 of Form-2/BOQ)</i>	100% payment on submission of the configuration and installation report	
3.	Cyber Security Audit Cost <i>(Reference - Pt. 5 of Form-2/BOQ)</i>	100% payment on submission of Safe-To-Host Certificate	
4.	STQC Audit Certificate <i>(Reference - Pt. 6 of Form-2/BOQ)</i>	100% payment on submission of STQC Audit Certificate	
5.	Change Request / Additional Modules <i>(Reference - Pt. 7 of Form-2/BOQ)</i>	100% payment on Go-Live of the additional modules/change request upon formal authority approval	
6.	Operation & Maintenance (AMC) <i>(Reference - AMC-Pt. 9 of Form-2/BOQ)</i>	Application Support	100% of the cost of this item is divided into 8 quarters (24-month period) after the successful completion of each
		Software Maintenance	
		System/ Infra Support	

			quarter.
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5.4. Other Terms of Payment

- Project is a service project and not simply a project involving the supply of goods. Hence, the payment will be made only if services are rendered by the SI as agreed upon.
- All the payments to SI will be made as per the Payment Schedule and Terms of Payment set out in this RFP, upon submission of invoices that are verified by OCAC along with relevant Signoffs.
- In the event of premature termination of the agreement prior to the launch of the Project, the SI shall not be eligible to receive any compensation or payment.
- In the event of the premature termination of the agreement post-commencement of the operations, the SI would be eligible to be paid strictly as per the payment terms for the completed milestones only.

The Selected SI shall make a payment request after the end of each quarter with the following supporting document:

- SLA compliance report as prepared by the SI.
- Server logs
- All supporting documents like the bills, invoices, etc.

Note: All prices should include all taxes, transport, insurance, installation, etc. as applicable at implementation sites.

5.5. System Acceptance & Completion Criteria

System acceptance and milestone sign-offs shall be evaluated strictly on a module-wise and GSBPM-phase-wise basis. The System Integrator (SI) must demonstrate successful completion of all mapped functional requirements and approved User Acceptance Testing (UAT) scenarios.

5.5.1. Phase-wise UAT & Sign-off

A statistical scheme or module shall be considered "accepted" for payment only after all applicable GSBPM phases (Specify, Design, Build, Collect, Process, Analyse, Disseminate) are successfully validated by DE&S. For each scheme onboarded, the system must successfully demonstrate:

- Configured role-based approvals and maker-checker workflows.
- Rule-based and statistical data validation acting as the mandatory baseline for all datasets.
- Tamper-proof audit trails capturing all data lineage.
- Controlled dissemination and published outputs.

5.5.2. Final System Acceptance (Go-Live Prerequisites)

The overall OISS platform shall be considered fully accepted, and the final Implementation Milestone payment released, only upon the fulfillment of the following criteria:

1. **Scheme Onboarding:** Successful configuration and UAT completion for all baseline schemes/surveys listed in the Scope of Work.
2. **AI/ML Operationalization:** Successful deployment of at least two (2) DE&S-approved AI/ML predictive models into the analytical dashboards.
3. **KPI Achievement:** Demonstrated achievement of the baseline Performance, Availability, and Data Quality Service Level Agreements (SLAs).
4. **Security & DR:** Successful completion of the initial CERT-In empanelled Security Audit (Safe-to-Host) and a validated Disaster Recovery (DR) failover drill.

Final acceptance shall be certified in writing by the designated DE&S/OCAC Project Management Committee.

5.6. Change Request (CR) & Scope Management Framework

The OISS project shall be governed by a structured Change Request (CR) mechanism to manage any modifications, enhancements, refinements, or deviations from the approved Functional Requirement Specification (FRS), System Requirement Specification (SRS), or finalized design documents.

5.6.1. Definition of Change Request

A Change Request shall include, but not be limited to:

- Addition of new modules or features
- Functional enhancements beyond approved SRS
- Workflow restructuring not originally specified
- New external integrations
- Expansion of digitization volume beyond approved baseline
- Additional AI/ML use cases beyond agreed minimum
- Policy-driven or statutory-driven system modifications

The following shall NOT constitute a CR:

- Bug fixes
- Performance optimizations
- Security hardening
- Minor UI adjustments
- Configuration corrections required to meet agreed specifications

5.6.2. CR Initiation & Documentation

Any change proposed by DE&S, OCAC, or the SI shall be formally documented in a Change Request Note (CRN), including:

- Description of change

- Business justification
- Impact assessment (technical, effort, timeline)
- Risk implications
- Dependencies

The SI shall submit a detailed impact analysis within 10–15 working days of CRN submission.

5.6.3. Evaluation & Approval

All CRs shall be reviewed by the designated Authority / Project Steering Committee.

No CR shall be implemented without formal written approval.

5.6.4. Commercial Treatment (Case-by-Case Basis)

If the CR results in additional effort beyond contractual scope:

- Effort shall be estimated based on detailed technical analysis.
- Commercial implications shall be mutually agreed prior to implementation.
- Revised timelines, if applicable, shall be formally documented.

If the CR reduces scope, appropriate financial adjustment may be applied.

No work beyond approved scope shall be undertaken without CR approval.

5.6.5. Timeline Adjustment

Approved CRs impacting project timelines shall proportionately adjust delivery schedules and milestone commitments.

5.6.6. Emergency Changes

For urgent statutory, regulatory, or security-driven changes, the Authority may invoke expedited CR processing. The SI shall prioritize such requests under mutually agreed impact assessment and commercial terms.

5.7. Project Governance Framework

The OISS implementation shall be governed through a structured multi-tier governance framework to ensure timely decision-making, accountability, and coordinated execution.

5.7.1. Project Steering Committee (PSC)

The Project Steering Committee shall be the apex decision-making body for strategic oversight.

Responsibilities:

- Approval of major scope changes (CRs with financial impact)
- Resolution of escalated disputes
- Policy-level decisions

- Go-Live approval
- Approval of major timeline extensions

The PSC shall consist of senior representatives from DE&S and OCAC.

5.7.2. Technical Committee

The Technical Committee shall oversee functional, architectural, and implementation-level decisions.

Responsibilities:

- Approval of SRS
- Approval of HLD and LLD
- Review of integration architecture
- Review of security audit findings
- Approval of minor CRs (without major financial implications)
- Monitoring milestone completion

The Technical Committee shall include designated technical officers from DE&S and OCAC.

5.7.3. Project Management Unit (PMU) / Nodal Officers

The designated Nodal Officer(s), with support from the PMU & PMCs will manage day-to-day coordination.

Responsibilities:

- Requirement clarifications
- UAT coordination
- Validation of deliverables
- Operational coordination during implementation and O&M
- Escalation of issues to Technical Committee

5.7.4. System Integrator (SI)

The SI shall:

- Provide a dedicated Project Manager
- Submit regular status reports
- Escalate risks in structured manner
- Comply with reporting timelines
- Maintain risk and issue registers

5.7.5. Escalation Matrix

In case of disputes or delays:

1. Project-level issue → PMU resolution
2. Unresolved issue → Technical Committee review
3. Strategic/financial dispute → Project Steering Committee decision

Decisions of the PSC shall be final and binding within the project governance framework.

6. Key Personnel & Team Composition

The System Integrator (SI) must deploy a highly qualified, dedicated, and experienced team of professionals to ensure the successful design, development, integration, and maintenance of the OISS platform.

The SI must strictly adhere to the resource deployment schedule and provide detailed Curriculum Vitae (CVs) for the proposed Key Personnel as part of their Technical Bid.

6.1. Core Team Composition & Qualifications

The SI must propose a team comprising, at a minimum, the following Key Personnel. The Bidder is free to propose additional support resources as necessary to meet the project timelines and SLAs.

Sl. No	Role / Designation	Min. Count	Min. Qualification	Min. Experience	Mandatory Certifications / Specific Experience
1	Project Manager (PM)	1	BE / B.Tech / MCA	12 Years	<ul style="list-style-type: none"> • Must possess a valid PMP or PRINCE2 certification. • Must have managed at least one (1) large-scale IT project in the Statistical or e-Governance domain.
2	Lead Solution Architect	1	BE / B.Tech / MCA	10 Years	<ul style="list-style-type: none"> • Must possess a valid TOGAF certification. • Proven experience in designing microservices and hybrid-cloud architectures.
3	Lead Data Scientist / AI/ML Expert	1	Master's or Ph.D. in Statistics, Mathematics, or Data Science	10 Years	<ul style="list-style-type: none"> • Valid certification in Data Science / AI / ML from a leading OEM (AWS, Google, IBM) or an Institute of National Importance (IIT, IIM, ISI).

4	Data Warehouse / ETL Expert	1	BE / B.Tech / MCA	10 Years	<ul style="list-style-type: none"> Valid Professional-Level Certification from a leading Database OEM (e.g., Oracle OCP, MS Azure DBA, PostgreSQL).
5	Cloud Architect & DevOps Lead	1	BE / B.Tech / MCA	8 Years	<ul style="list-style-type: none"> Valid certification in Cloud Architecture (AWS/Azure/GCP) or Kubernetes (e.g., CKA). Proven experience in CI/CD pipeline setup, DevSecOps, and managing State Data Centre (SDC) application deployments.
6	Senior Application Developer	3	BE / B.Tech / MCA	8 Years	<ul style="list-style-type: none"> At least 2 years of experience developing microservice-based enterprise applications.
7	Quality Assurance (QA) / Testing Lead	1	BE / B.Tech / MCA	6 Years	<ul style="list-style-type: none"> Proven experience in functional, integration, and load testing of large-scale web applications.
8	On-Site O&M Support Engineer	2	Graduate + PGDCA or equivalent	4 Years	<ul style="list-style-type: none"> Must be fluent in English, Odia, and Hindi. Experience managing L2/L3 IT Helpdesk operations.

- The bidder (SI) is to propose the number of resources (s) for each category as mentioned above and other resources apart from the above-mentioned ones, keeping in consideration of meeting the project schedule and scope of work.
- The resources will be finalised only after detailed discussions and interviews conducted by OCAC/DE&S.

6.2. Mandatory requirements

In addition to the resources specified above, the bidder shall be required to deploy one Service Matter Expert (SME) and one Handholding Support personnel to ensure effective implementation, operational continuity, and user assistance. The Service Matter Expert (SME) will be responsible for providing domain-specific expertise, guidance, and oversight, while the Handholding Support personnel will assist end-users through training, troubleshooting, and day-to-day operational support. The cost associated with the deployment of these additional

resources shall not be quoted separately but must be duly factored into and discovered within the Bill of Quantities (BOQ).

6.3. Instructions for Proposing Resources

1. The Bidder is required to provide the CVs for each of the positions specified above.
2. Only 1 CV must be provided for each profile mentioned.
3. Only relevant projects, aligned with the scope of the OISS platform, should be detailed in the CVs.
4. Each profile shall be signed by the resource (of whom the profile is submitted) and the authorised Signatory of the Bidder. If the signature of the resource cannot be obtained, the authorised Signatory, in each profile, shall mention and certify that he has obtained the consent of the respective employee on the accuracy and completeness of qualifications, experience and other details specified in the profile.
5. The Tender Evaluation Committee may, at its discretion, request the Bidder to provide additional details with respect to any or all the personnel proposed, if required in the evaluation process.
6. The Successful Bidder shall confirm the availability of the team members as proposed in the technical proposal.
7. During project implementation, there is a specific requirement for full-time deployment of resources at the client site.

6.4. Resource Deployment & On-Site Requirements

- **Development Phase:** During the 1-year design and development phase, the Project Manager and Lead Solution Architect must be available for regular in-person sprint planning and review meetings at the DE&S/OCAC headquarters in Bhubaneswar.
- **O&M Phase (On-Site Mandate):** Following the Go-Live, the SI must deploy a minimum of Two (2) full-time Application Maintenance Resources stationed permanently at the Directorate of Economics and Statistics (DE&S) office in Bhubaneswar.
- **State Provisioning:** DE&S will provide the necessary office space, furniture, and basic internet connectivity for these on-site resources. The SI is responsible for providing their laptops and required software development tools.
- **Working Hours:** The resources will work as per the calendar and business hours (if not mentioned specifically anywhere else in the RFP) of OCAC. The SI however, recognises the fact that the offices will be required to work beyond the business hours on a need basis. In exceptional cases the resources should be available to work on holidays also, OCAC will issue prior notice for such kind of requirements.
- **Leave:** A personal leave of resources working on the project should be planned at least 3 (three) days prior to availing the actual leave with prior approval of the client and during this period the SI will provide alternative resources with the same qualifications and experience.

6.5. Removal and/or Replacement of Personnel

- Except as the Client may otherwise agree, no changes shall be made in the Personnel proposed in the bid for the project. If, for any reason beyond the reasonable control of the SI, such as retirement, death, or medical incapacity, among others, it becomes necessary to replace any of the proposed Personnel, the SI shall provide as a

replacement a person of equivalent or better qualifications prior to relieving the outgoing personnel. For any replacement of resources, prior approval of OCAC is required.

- If the Client finds that any of the Personnel have
 - Committed serious misconduct or have been charged with having committed a criminal action, or
 - Have reasonable cause to be dissatisfied with the performance of any of the Personnel, then the SI shall, at the Client's written request specifying the grounds thereof, provide as a replacement a person with qualifications and experience acceptable to the Client.
- The SI shall have no claim for additional costs arising out of or incidental to any removal and/ or replacement of Personnel.
- The resource deployment schedule and detailed CVs of the resources mentioned in the RFP are to be submitted as part of the technical bid.
- Separate Development and Maintenance resources to be factored, and the same needs to be proposed in the technical document.
- The major resource type, their minimum educational qualification, and minimum years of experience as required under this project are as follows:

7. Service Level Agreements (SLAs) & Penalties

The purpose of this Service Level Agreement (SLA) is to clearly define the measurable performance standards the System Integrator (SI) must meet during the design, development, and Operations & Maintenance (O&M) of the Odisha Integrated Statistical System (OISS).

7.1. Definitions

1. "Availability (uptime)" means the time for which the services and facilities are available for conducting operations on the OISS web portal, including the website, application modules and services. Availability is defined as:

$$DPQ-DP-8 \quad \{(Scheduled\ Operation\ Time - System\ Downtime) / (Scheduled\ Operation\ Time)\} * 100\%$$
2. "Downtime" means accumulated time during which the System is totally inoperable within the scheduled operation time but outside the scheduled maintenance time and measured from the time DE&S/OCAC and/or its officials log a call with the bidder team of the failure, or the failure is known to the bidder from the availability measurement tools to the time when the system is returned to proper operation.
3. "Incident" refers to any event/abnormalities in the functioning of any of the IT Services that may lead to disruption in the normal operations of the DE&S office or application services of the proposed solution.
4. Automated Monitoring: The SI must implement and provide DE&S/OCAC access to automated Application Performance Monitoring (APM) tools to generate real-time SLA compliance reports.
5. Root Cause Analysis (RCA): The SI must prepare and submit an RCA report for all critical SLA breaches within 48 hours to determine if the breach was within the SI's control.

7.2. Commencement and duration of Service Level Agreement (SLA)

This SLA shall commence on the date of signing of Agreement or issue of Work Order by OCAC and the Bidder (hereinafter the 'effective date') whichever is earlier and shall, unless terminated

earlier in accordance with its terms or unless otherwise agreed by the parties, continue for a period of Thirty-Six (36) months (12 months Implementation + 24 months O&M).

- a) Interpretation and General Instruction of SLA
- b) Bidder shall implement automated tools to monitor and report all the SLAs as mentioned.
- c) A Service Level violation will occur if the Bidder fails to meet Minimum Service Levels, as measured on a monthly or Quarterly basis, for a Service Level. Overall Availability and Performance Measurements will be on a monthly / quarterly basis for the purpose of Service Level reporting. An “Availability and Performance Report” will be provided by the Bidder on a monthly basis in the Department’s suggested format, and a review shall be conducted based on this report. A monthly Availability and Performance Report shall be provided to the Department at the end of every month, containing the summary of all incidents reported and associated Bidder performance measurement for that period.
- d) The SLAs will prevail from the date of signing of the Agreement or issue of the Work Order. Payments to the Bidder are linked to compliance with the SLA metrics laid down in the tables below. The penalties will be computed and calculated as per the computation explained in this Section. During the contract period, it is envisaged that there could be changes to the SLA, in terms of addition, alteration or deletion of certain parameters, based on mutual consent of both the parties, i.e., Department and Bidder.
- e) Root cause analysis (RCA) shall be prepared for all cases of breach in SLAs and shared with DE&S/OCAC. For any exceptions or SLA breaches beyond the control of the bidder, the bidder may submit the RCA along with justification, which may be considered by the Department. In case the RCA establishes that the breach of SLA was on account of the services provided by the bidder under the agreement, the bidder would be liable for the application penalty.
- f) The liquidated damages are mentioned as a percentage of certain components of costs:
- g) During the O&M phase, liquidated damages are capped at 10% of the total amount payable quarterly for the O&M phase.
- h) If overall liquidated damages exceed 10% of the Total Project Cost as defined in the Commercial Bid format of this RFP, then DE&S/OCAC may take appropriate action, including termination of the contract and invoking the Performance Bank Guarantee.
- i) If the SLA penalty or liquidated damage calculations exceed 10% of the quarterly payment for two consecutive quarters or 25% in any single quarter, then DE&S/OCAC may take appropriate action, including termination of the contract and invoking the Performance Bank Guarantee.
- j) The SLA is not a fixed document to be produced once and used forever. Instead, it must be re-evaluated and updated as the work environment changes. As technology changes, the services and systems covered by the SLA and their performance expectations will change. This document may be reviewed and revised by mutual Agreement between the Department and Bidder. Changes to the SLA may be required at other times to include new systems, changes in operating hours, etc.

- k) All changes to the SLA will be initiated in writing between the Department and the Bidder. The Service levels here are considered to be standard for the Department and will be modified when both parties agree to an appended set of terms and conditions.
- l) Reporting Procedures: The bidder shall prepare the SLA compliance reports of monthly and quarterly SLAs in an agreed format and date of the subsequent month. The bidder shall develop tools and mechanisms for monitoring & reporting of SLAs on real real-time basis. The SLA reports will include details of each incident reported to the bidder, i.e., date and time of receiving call/ email/ request through any other means, which is being proposed, date and time of response/ acknowledgement email, date and time of resolution provided for the reported problem, name of the module/ functionality which not working up to the mark. The report shall also include the total number of incidents reported, the total number and % of compliance to the service levels, total number and % of non-compliance to the service level etc. The reports, along with all the documentary proofs, shall be submitted to DE&S/OCAC. However actual reporting mechanism, format and list of supporting documents will be discussed and finalised by the bidder with DE&S/OCAC before the start of engagement.
- m) All measurements and calculations shall be in the metric system and calculations done to 2 (two) decimal places, with the third digit of 5 (five) or above being rounded up and below 5 (five) being rounded down, except in money calculations where such amounts shall be rounded off to the nearest Rupee.
- n) The following tables outline the key service level requirements for the system, which need to be ensured by the Bidder during the operations and maintenance period. These requirements shall be strictly imposed, and either the Department or a third-party audit/certification agency shall be deployed for certifying the performance of the Bidder against the target performance metrics as outlined in the tables below.

7.3. Implementation Phase Penalties (Year 1)

- a) Time is the essence of the project. During the 12-month design and development phase, penalties will be levied for failure to meet the agreed project schedule.
- b) If the SI is unable to meet the defined milestones due to delays attributed to the SI, a penalty of 0.5% per week (or part thereof) will be charged. This 0.5% penalty will be calculated against the specific Payment Linkage amount defined in the table below.

Sl. No	Deliverable / Milestone	Target Timeline	Payment Linkage on which the 0.5% / week penalty is imposed
1	Team Mobilization	T0	10% of the Total Project Cost.
2	Project Initiation: Signing of Contract, Project Charter, and Work Plan.	T0 + 2 weeks	10% of the Total Project Cost.

3	Design & SRS Approval: Functional Design, UI/UX Specifications, Technical Architecture, and SRS.	T0 + 12 weeks	10% of the Design & Development Cost (Linked to Milestone M1/M2).
4	Module Development: Completion of core backend/frontend development and integration.	T0 + 38 weeks	30% of the Design & Development Cost (Linked to Milestone M3).
5	Testing & UAT: Successful completion of UAT and submission of User Acceptance Report.	T0 + 46 weeks	20% of the Design & Development Cost (Linked to Milestone M4).
6	System Certification: Safe-to-Host, VAPT, and STQC Certification.	T0 + 46 weeks	Cost of the respective Audit (Linked to BOQ Pt. 3 & Pt. 5).
7	Deployment & Go-Live: Successful Production Live Run and CAPI/NADA technical takeover.	T0 + 48 weeks	25% of the Design & Development Cost (Linked to Milestone M5).

Note: The maximum cumulative penalty for the Implementation Phase is capped at 10% of the Total Project Cost. If delays continue beyond 10 weeks, DE&S/OCAC reserves the right to terminate the Agreement and invoke the Performance Bank Guarantee (PBG) as per the law.

7.4. Operations and Maintenance SLAs (Year 2 & Year 3)

The following SLA metrics apply during the 24-month O&M phase. Penalties will be calculated and deducted directly from the SI's Quarterly O&M invoice.

7.4.1. System Availability & Disaster Recovery (DR)

SLA Parameter / Metric	Target / Timeline	Penalty for Breach
OISS System Uptime (Optimum)	>= 99.9% uptime per month.	NIL
OISS System Uptime (Minor Drop)	>= 98.0% to < 99.9% uptime.	2% of the Quarterly O&M Payment.
OISS System Uptime (Major Drop)	>= 95.0% to < 98.0% uptime.	5% of the Quarterly O&M Payment.
OISS System Uptime (Critical Drop)	< 95.0% uptime.	10% of the Quarterly O&M Payment.
Recovery Point Objective (RPO)	<= 15 minutes of data loss.	3% of the Quarterly O&M payment per failed DR incident.
Recovery Time Objective (RTO)	<= 4 hours to restore from DR site.	3% of the Quarterly O&M payment per failed DR incident.
Scheduled Notice Downtime	>= 48 hrs. notice; max 8 hrs./month.	3% of the Quarterly O&M payment per unnotified downtime incident.

7.4.2. Application Performance & Data Quality

SLA Parameter / Metric	Target / Timeline	Penalty for Breach
Dashboard & API Response	UI <= 3 seconds; API <= 2 seconds (for 95% of requests).	3% of the Quarterly O&M payment for each percentage point below the 95% target.
ETL & Micro-Batch Latency	>= 10 GB/hrs. throughput; <= 10 mins latency.	2% of the Quarterly O&M payment if average throughput fails the target.
Data Quality (DQ) Score	>= 95% DQ Score for production datasets.	2% of the Quarterly O&M payment if average DQ drops below target.
Metadata Completeness	>= 98% mandatory fields captured.	2% of the Quarterly O&M payment if metadata capture drops below target.

7.4.3. Security & Compliance

SLA Parameter / Metric	Target / Timeline	Penalty for Breach
Critical Security Incidents	Respond <= 30 mins; Resolve <= 4 hours.	INR 10,000 per incident failing the resolution timeline.
VAPT & Patch Management	Install patches & close critical VAPT issues <= 14 days.	INR 3,000 per day of delay for each unclosed critical vulnerability.
DPDP Act Compliance	100% masking of PII before dissemination.	INR 10,000 per incident of unauthorized PII exposure.
Reporting & Review	Monthly SLAs & Quarterly Security Reports submitted on time.	INR 20,000 per week for delay in report submission.

7.4.4. Helpdesk & Issue Resolution

SLA Parameter / Metric	Target / Timeline	Penalty for Breach
Critical Bug Resolution	Resolved <= 4 hours.	INR 1,000 per hour of delay beyond target.
High Priority Bug Resolution	Resolved <= 12 hours.	INR 500 per hour of delay beyond target.
Medium/Low Bug Resolution	Medium <= 2 days; Low <= 5 days.	INR 2,000 per day of delay beyond target.
Excessive Issue Volume	<= 15 bugs/issues reported per quarter.	2% of Quarterly O&M payment deducted if volume exceeds 20 bugs.

7.5. Penalty Caps & Termination Clauses

Quarterly Cap: During the O&M phase, total liquidated damages are capped at 10% of the total amount payable for that specific quarter.

Contractual Cap: If overall cumulative liquidated damages (across both Implementation and O&M phases) exceed 10% of the Total Project Cost, DE&S/OCAC may take appropriate action, including termination of the contract and invoking the Performance Bank Guarantee (PBG).

Chronic Failure: If the SLA penalty calculations exceed 10% of the quarterly payment for two consecutive quarters, or exceed 25% in any single quarter, DE&S/OCAC reserves the right to immediately terminate the contract and invoke the PBG without further notice.

*** THE END ***