

Farmer Data Collection System - Detailed Requirements Document

1. User Roles & Access Management

1.1 Admin

- Responsibilities:
 - System configuration and management.
 - User management (create/edit/deactivate operators).
 - Access to all reports and analytics.
 - Ability to override any data validation rules in exceptional cases.
 - Monitor system usage and audit logs for compliance and performance.
- Permissions:
 - Full system access.
 - Override any system constraints (e.g., bypass validation rules in rare scenarios).
 - Export reports for further analysis.
 - Monitor operator performance metrics.

1.2 Operator

- Responsibilities:
 - Farmer registration and profile management.
 - Data collection and validation.
 - Document verification for authenticity.
 - Limited access to reports based on assigned geographic regions.
 - Profile search and updates for farmers within their region.
- Permissions:
 - Create, edit, and validate farmer profiles.
 - Access reports only for assigned regions.
 - Cannot override data validation rules but can flag exceptions for Admin review.

1.3 Farmer

- Capabilities:
 - View their own profile and details.
 - Update basic profile information (e.g., contact details).
 - Access farming history and land details.
 - Retrieve QR code and digital ID for system use.
- Permissions:
 - View and download profile data.
 - Submit requests for updates to non-editable fields (subject to operator approval).

2. Farmer Registration Process

2.1 Step 1: Personal Information

- Required Fields:
 - First Name, Last Name.
 - Primary Phone Number.
 - Alternate Phone Number (optional).
 - Email Address (optional).
 - Date of Birth (with age validation).
 - Gender.

- Address Details:
 - Permanent Address:
 - Street/Village, District, State, Pincode.
 - GPS Coordinates (auto-captured via device/location services).
 - Farm Address:
 - Same as Permanent Address (toggle option available).
 - Separate fields for Farm Address if different.
- Identification Documents:
 - At least one government ID is mandatory.
 - Supported ID Types:
 - Aadhaar Card.
 - PAN Card.
 - Voter ID.
 - Driving License.
 - Document verification status to be tracked and updated.
- Validation Rules:
 - Duplicate checks for phone numbers and document IDs.
 - Format validation for phone numbers, email addresses, and document numbers.

2.2 Step 2: Land Details

- Land Parcels:
 - Support for registering multiple land parcels per farmer.
 - Required details for each parcel:
 - Area (Acres or Hectares).
 - Land Type (Irrigated/Non-irrigated).
 - Ownership Status:
 - If Leased: Lease Period, Owner Details.
 - Location Details (GPS coordinates and physical address).
 - Soil Type.
 - Water Sources.
 - Current Utilization Status.
- Validation Rules:
 - Minimum and maximum area constraints based on regional norms.
 - GPS coordinate validation (no overlapping parcels).
- Edge Cases:
 - Handling shared ownership or disputed ownership (add status flags).
 - Temporary land usage for specific crops (short-term leases).

2.3 Step 3: Farming Details

- Current Crops:
 - Multiple crops can be added for each land parcel.
 - Details required:
 - Crop Name, Variety.
 - Cultivation Area.
 - Planting Date, Expected Harvest Date.
 - Irrigation Method.

- Expected Yield.

- Historical Data:
 - Past 3 years of farming history.
 - Season-wise crop details and yield information.
 - Record of successes and failures.
- Future Planning:
 - Intended crops and planting timelines.
 - Resources required (seeds, fertilizers, machinery).
- Validation Rules:
 - Crop-season compatibility based on regional guidelines.
 - Yield predictions cross-referenced with historical data.

2.4 Step 4: Document Collection

- Mandatory Documents:
 - Land ownership or lease documents.
 - Identity proof.
 - Recent photograph.
 - Bank account details.
 - Optional Documents:
 - Farming certifications.
 - Insurance policies.
 - Loan-related documents.
 - Training certifications.
 - Edge Cases:
 - Handling incomplete documents (flag for follow-up).
 - Support for uploading scanned copies and photographs of documents.
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3. QR Code System

3.1 QR Code Generation

- Content:
 - Unique Farmer ID.
 - Basic profile information.
 - Land holding summary.
 - Current farming status.
 - Features:
 - Auto-generated upon profile completion.
 - Version control for updates (ensures the latest data is reflected).
 - Embedded digital signature for authenticity.
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4. Data Validation & Quality

4.1 Input Validation

- Field-Level Checks:
 - Phone number, email, and document format validations.
 - Area and GPS coordinates within logical ranges.
- Business Rules:

- Age limits (e.g., >18 years).
- Landholding size thresholds.
- Expiry checks for identification documents.

4.2 Data Quality Checks

- Automated Checks:
 - Duplicate entries.
 - Data completeness and consistency.
 - Geographical validation for land parcels.
 - Manual Verification:
 - Document authenticity.
 - Physical verification notes by operators.
 - Exceptions flagged for Admin review.
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5. Reporting & Analytics

5.1 Operational Reports

- Registration statistics (daily, weekly, monthly trends).
- Verification and document collection statuses.
- District-wise farmer distribution and demographics.

5.2 Agricultural Reports

- Crop Analytics:
 - Crop-wise cultivation data.
 - Seasonal trends.
 - Success/failure rates.
- Land Usage:
 - Irrigation and soil type coverage.
 - Uncultivated land analysis.

5.3 Performance Metrics

- Operator performance metrics (data quality, completion rates).
 - System performance (response time, error rates).
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6. Technical Requirements

6.1 Indexing Strategy

- Indexed fields: Phone number, Farmer ID, District/State, Document numbers.

6.2 Performance Requirements

- Profile loading: <2 seconds.
- Search results: <1 second.
- Report generation: <5 seconds.

6.3 Security Requirements

- Data encryption at rest and in transit.
 - Role-based access control.
 - Audit trails and logs for compliance.
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