

# 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).

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## 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.