Technical Implementation Proposal

SustAIn - Green Building Project Management Platform

---

1. Project Overview

1.1 Objective

Development of a comprehensive web-based platform to streamline green building certification processes and project management for sustainability consultants.

1.2 Key Stakeholders

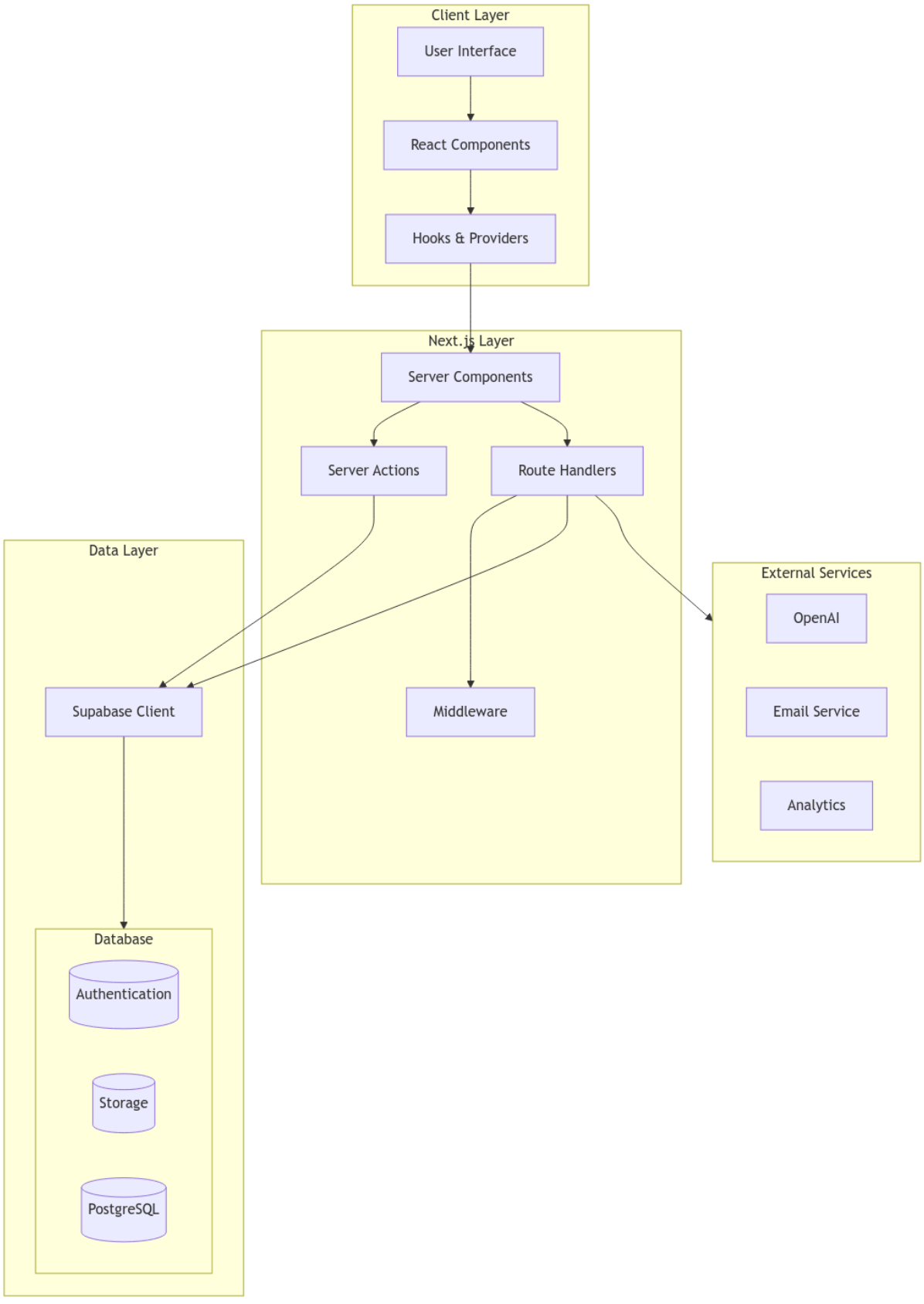
1. Sustainability Consultants (Primary Users)
2. Building Owners/Clients
3. Contractors
4. Team Members
5. System Administrators

1.3 Core Features

1. Project Management Dashboard
2. Document Generation & Management
3. AI-Powered Compliance Checking
4. Real-time Progress Tracking
5. Automated Action List Generation
6. Tender Specifications Generator

---

2. System Architecture



2.1 High-Level Architecture

We will implement a modern, scalable architecture using:

- **Frontend**: Next.js 14 (App Router)
- **Backend**: Serverless Architecture with Next.js API Routes
- **Database**: Supabase (PostgreSQL)
- **Authentication**: Supabase Auth
- **File Storage**: Supabase Storage
- **AI Integration**: OpenAI API/ In House Model

2.2 Key Technical Advantages

- Serverless Architecture: Reduced operational costs
- Real-time Capabilities: Instant updates
- Scalable Infrastructure: Handles growth
- Modern Tech Stack: Future-proof
- Strong Security: Enterprise-grade

---

3. Technical Stack Details

3.1 Frontend Technologies

- Next.js 14 with TypeScript
- React Server Components
- TailwindCSS for styling
- Shadcn UI for components
- Zustand for state management
- React Query for data fetching

3.2 Backend Services

- Next.js API Routes/ Server Actions
- Supabase Real-time subscriptions
- Edge Functions for processing
- Serverless Functions
- WebSocket connections

3.3 Database Structure

- PostgreSQL with Supabase
- Real-time capabilities
- Row Level Security
- Automated backups
- Data encryption

3.4 Integration Points

- OpenAI API for AI features
- Email service integration
- Analytics integration
- Export capabilities

---

4. Feature Implementation Details

4.1 Authentication System

Features:

- Multi-role support
- Email verification
- Password recovery
- 2FA (Optional)
- Session management

4.2 Project Management Module

Features:

- Project creation/management
- Team assignment
- Progress tracking
- Timeline management
- Real-time updates

4.3 Document Management System

Features:

- Automated generation
- Version control
- Access control
- Real-time collaboration
- AI-powered analysis

4.4 AI Integration

Features:

- Document analysis
- Compliance checking
- Pre-scoring tool
- AI chatbot assistance
- Automated reporting

---

5. Security & Access Control

5.1 Role-Based Access Control

1. System Administrator
- Full system access
- User management
- System configuration

2. Lead Consultant
- Project creation
- Team management
- Full feature access

3. Team Member
- Assigned project access
- Document management
- Limited admin features

4. Client
- Project viewing
- Document upload
- Progress tracking

5. Contractor
- Task-specific access
- Document submission
- Limited viewing

5.2 Security Measures

- Data encryption at rest
- SSL/TLS encryption
- Regular security audits
- Automated backups
- Activity logging

---

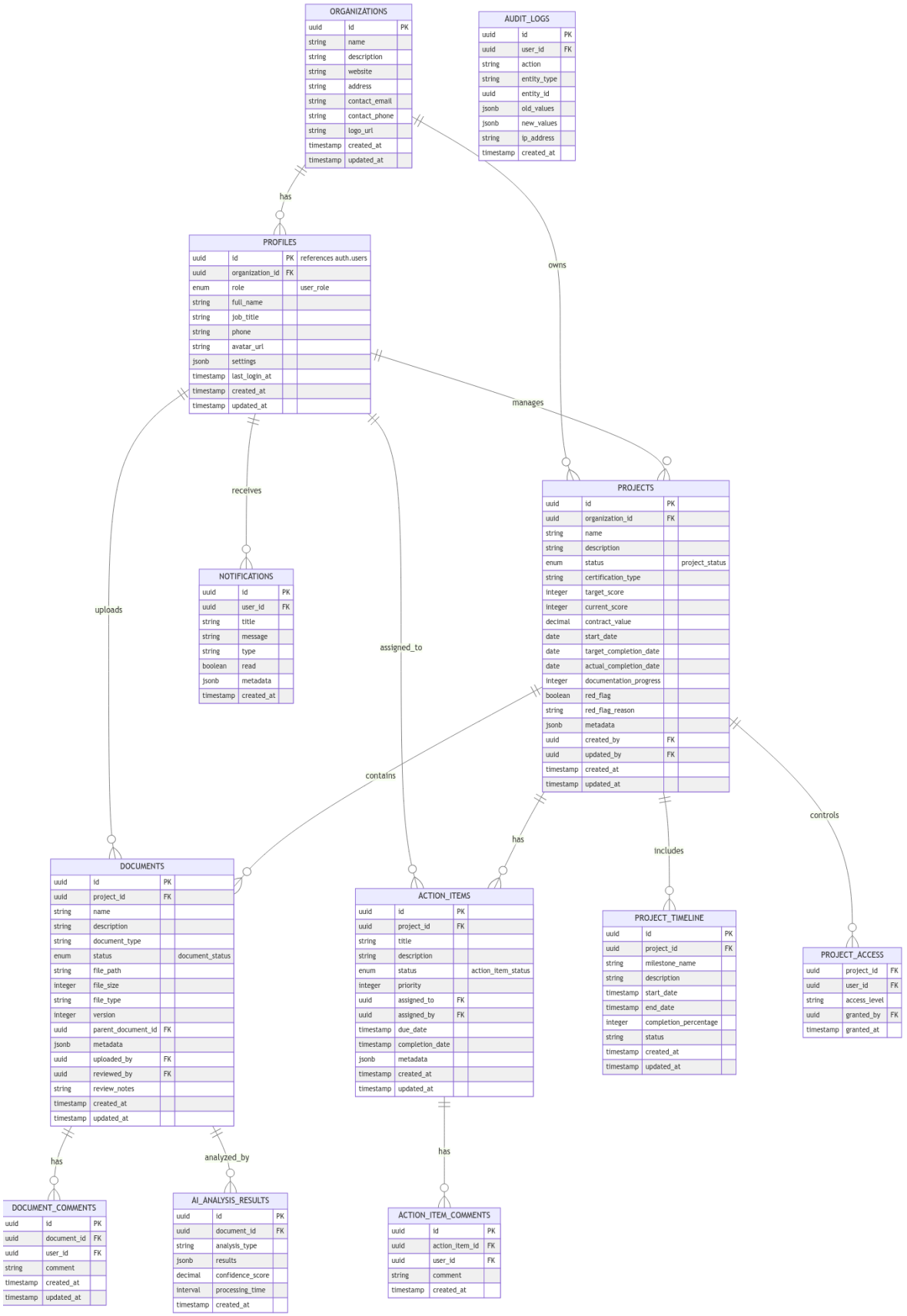
6. Database Tables

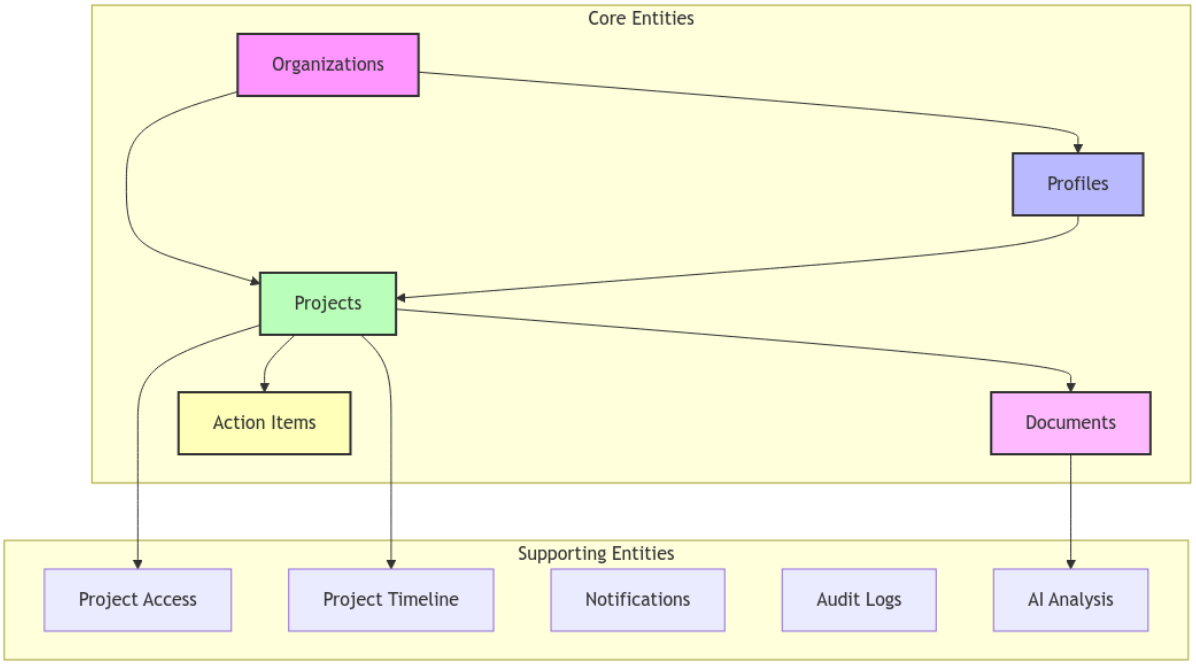
Core Tables:

- **organisations**: Company/firm details
- **profiles**: Extended user profiles
- **projects**: Main project information
- **documents**: Document management
- **action_items**: Tasks and to-dos
- **notifications**: User notifications

Supporting Tables:

- **project_access**: Access control
- **document_comments**: Document feedback
- **action_item_comments**: Task discussions
- **project_timeline**: Project milestones
- **audit_logs**: System audit trail
- **ai_analysis_results**: AI processing results


ORGANIZATIONS
uuid id PK
string name
string description
string website
string address
string contact_email
string contact_phone
string logo_url
timestamp created_at
timestamp updated_at
AUDIT_LOGS
uuid id PK
uuid user_id FK
string action
string entity_type
uuid entity_id
jsonb old_values
jsonb new_values
string ip_address
timestamp created_at
has
owns
PROFILES
uuid id PK references auth.users
uuid organization_id FK
enum role user_role
string full_name
string job_title
string phone
string avatar_url
jsonb settings
timestamp last_login_at
timestamp created_at
timestamp updated_at
manages
receives
uploads
assigned_to
NOTIFICATIONS
uuid id PK
uuid user_id FK
string title
string message
string type
boolean read
jsonb metadata
timestamp created_at
PROJECTS
uuid id PK
uuid organization_id FK
string name
string description
enum status project_status
string certification_type
integer target_score
integer current_score
decimal contract_value
date start_date
date target_completion_date
date actual_completion_date
integer documentation_progress
boolean red_flag
string red_flag_reason
jsonb metadata
uuid created_by FK
uuid updated_by FK
timestamp created_at
timestamp updated_at
contains
has
includes
controls
DOCUMENTS
uuid id PK
uuid project_id FK
string name
string description
string document_type
enum status document_status
string file_path
integer file_size
string file_type
integer version
uuid parent_document_id FK
jsonb metadata
uuid uploaded_by FK
uuid reviewed_by FK
string review_notes
timestamp created_at
timestamp updated_at
ACTION_ITEMS
uuid id PK
uuid project_id FK
string title
string description
enum status action_item_status
integer priority
uuid assigned_to FK
uuid assigned_by FK
timestamp due_date
timestamp completion_date
jsonb metadata
timestamp created_at
timestamp updated_at
PROJECT_TIMELINE
uuid id PK
uuid project_id FK
string milestone_name
string description
timestamp start_date
timestamp end_date
integer completion_percentage
string status
timestamp created_at
timestamp updated_at
PROJECT_ACCESS
uuid project_id FK
uuid user_id FK
string access_level
uuid granted_by FK
timestamp granted_at
has
analyzed_by
has
DOCUMENT_COMMENTS
uuid id PK
uuid document_id FK
uuid user_id FK
string comment
timestamp created_at
timestamp updated_at
AI_ANALYSIS_RESULTS
uuid id PK
uuid document_id FK
string analysis_type
jsonb results
decimal confidence_score
interval processing_time
timestamp created_at
ACTION_ITEM_COMMENTS
uuid id PK
uuid action_item_id FK
uuid user_id FK
string comment
timestamp created_at



Key Relationships:

Organisation-Centric:

- One organisation has many profiles (users)
- One organisation owns many projects
- Organization is the top-level entity

Project-Centric:

- Project belongs to one organisation
- Project has many documents
- Project has many action items
- Project has one timeline
- Project has multiple access controls

User-Centric:

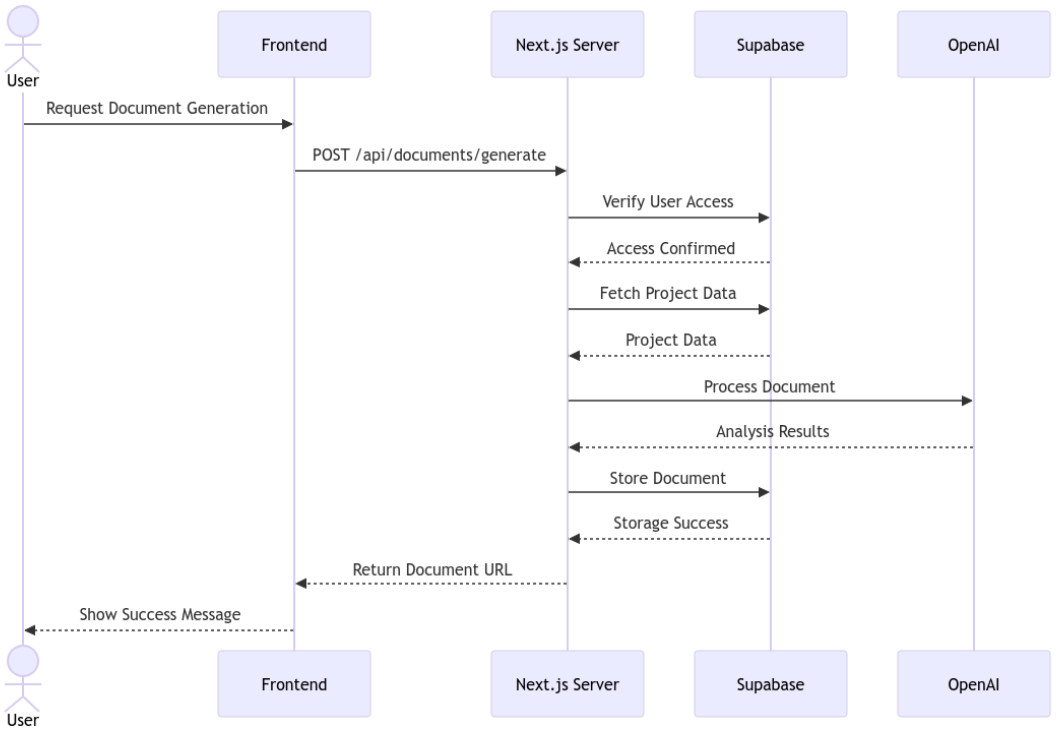
- User belongs to one organisation
- User can access multiple projects
- User can be assigned multiple action items
- User can upload multiple documents

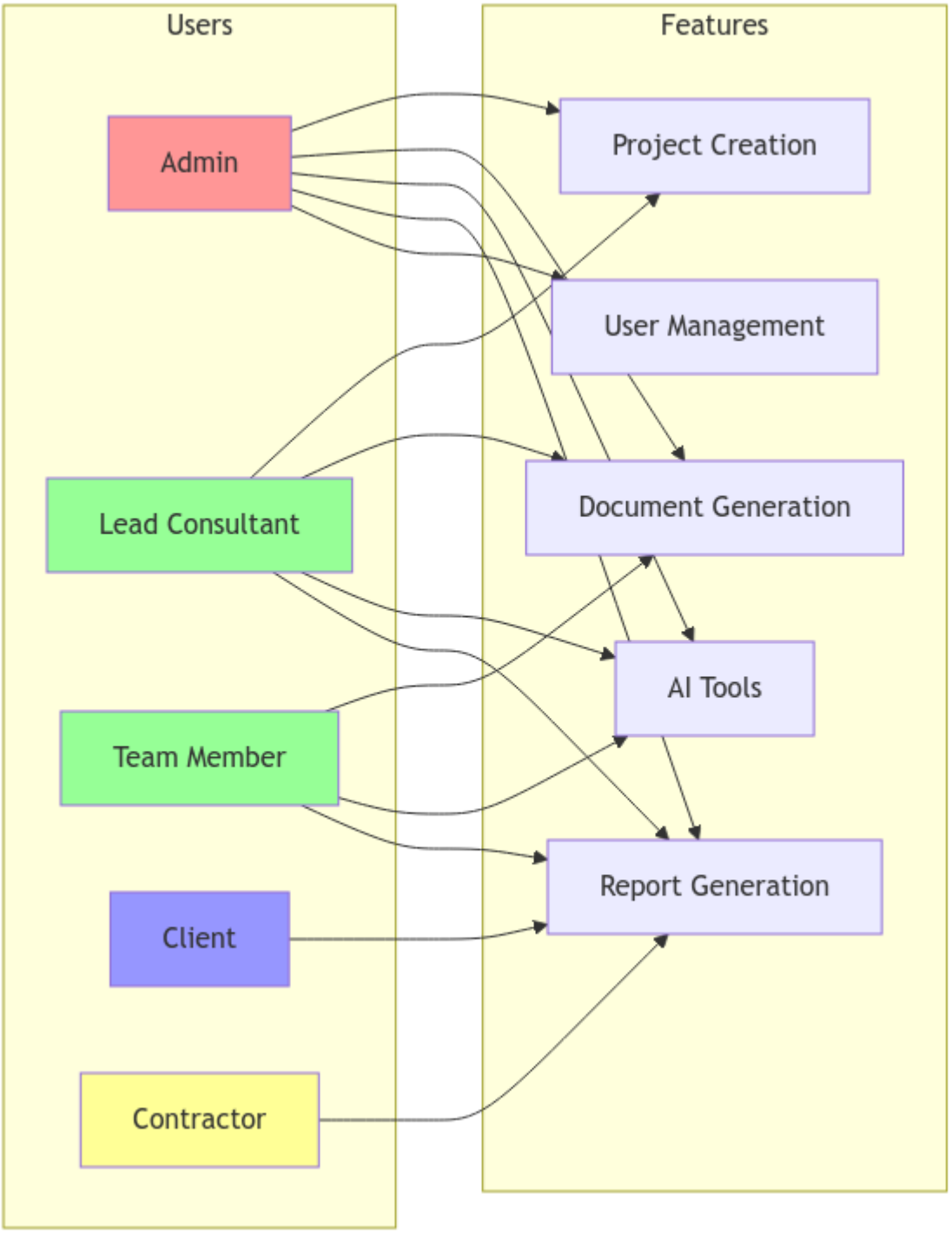
Document-Centric:

- Document belongs to one project
- Document can have multiple comments

- Document can have multiple AI analyses
- Document can have versions

Document Generation Sequence




Users
Features
Admin
Lead Consultant
Team Member
Client
Contractor
Project Creation
User Management
Document Generation
AI Tools
Report Generation

1. **Sustainability Consultants (Primary Users):**

   Registration & Access:
   - Full registration with company details
   - Professional credentials
   - Team management capabilities

   Features They Use:
   - Dashboard for all projects
   - Create and manage projects
   - Generate documents (tender specs, action lists)
   - Use AI tools for compliance checking
   - Track project progress
   - Assign tasks to team members
   - Upload and manage documents
   - Use pre-scoring tool
   - Generate reports
   - Communicate with clients/contractors

2. **Building Owners/Clients:**

   Registration & Access:
   - Limited registration (usually invited by consultants)
   - View access to their projects only

   Features They Use:
   - View their project status
   - Access project documents
   - View action items assigned to them
   - Upload required documents
   - Track certification progress
   - View reports
   - Communicate with consultants

3. **Contractors:**

   Registration & Access:
   - Limited registration (invited by consultants)
   - Project-specific access

   Features They Use:
   - View assigned action items
   - Access relevant documents
   - Upload construction documents
   - View requirements/specifications

- Track their tasks
- Communicate with consultants

4. **Team Members:**

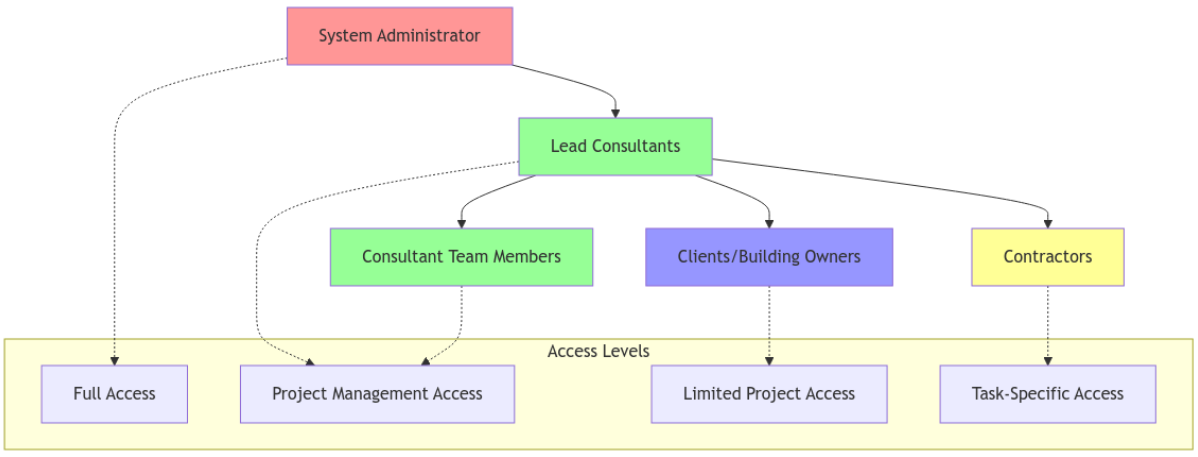
Registration & Access:
- Added by lead consultant
- Team member permissions

Features They Use:
- Handle assigned projects
- Use document generators
- Track assigned tasks
- Upload/manage documents
- Use AI tools
- Generate reports

5. **System Administrator**

Registration & Access:
- Super admin access
- Created during system setup

Features They Use:
- User management
- System configuration
- Monitor system usage
- Handle support requests
- Manage templates
- System maintenance



Breakdown of Required Functionalities:

1. Project Repository (Core Dashboard):

- Project listing with filters:
    * By consultant
    * By certification type
    * By contract value
    * By typology
    * By project stage
    * By documentation status

- Project monitoring:
    * Red-flag detection system
    * Documentation progress tracking
    * Project stage tracking

- Per project details:
    * Client information
    * Contract value
    * Certification targets
    * Project timelines
    * Stage-specific status

2. Pre-Scoring Tool:

- Input parameters:
    * Project location
    * Project typology
    * Certification type
    * Target score

- Functionalities:
    * Generate initial scorecard
    * Use historical data for predictions
    * Pre-fill assessment forms

3. Action List Generator:

- Excel integration:
    * Upload scorecard capability
    * Extract scored credits
    * Parse Excel documents

- Task management:
    * Generate stage-specific tasks
    * Auto-assign to disciplines:
        - Architect
        - M&E
        - C&S
        - Contractor
        - Client

- Timeline features:
    * Predict submission dates
    * Set realistic deadlines
    * Align with project schedule

- Output generation:
    * Customised Excel outputs per party
    * Discipline-specific lists
    * Weekly/monthly action lists

4. Tender Specifications Generator:

- Input handling:
    * Contract type selection (Design & Build / Build Only)
    * Scorecard integration
    * Project requirements input

- Document generation:
    * Discipline-specific sections
    * Auto-divide specifications
    * Generate editable documents

- Validation:
    * AI-powered validation
    * Cross-check with other consultants' documents
    * Requirements verification

- Dashboard features:
    * Prerequisites view
    * Credit requirements
    * Associated documentation needs

5. Project Progress Tracking:

- Timeline management:
    * Multi-project view
    * Individual project timelines
    * Milestone tracking
    * Deadline monitoring

- Credit tracking:
    * Attempted credits list
    * Score calculation
    * Documentation status
    * Completion percentage

- Alert system:
    * Deadline notifications
    * Red-flag alerts
    * Issue warnings

- Resource management:
    * Consultant workload view
    * Multi-project planning

6. AI Copilot:

A. AI Chatbot:
    - Query handling:
        * Green building standards
        * Certification guidelines
        * Best practices
        * Project-specific questions

    - Document processing:
        * Document summarization
        * Table extraction
        * Structured data extraction
        * Key insights identification

    - Privacy features:
        * Private LLM deployment
        * Sensitive data handling
        * Security measures

B. Compliance Monitoring Tool (Beta):
- Document verification:
  * OCR processing
  * Rule-based analysis
  * Standards compliance check

- Reporting:
  * Compliance reports
  * Issue identification
  * Action recommendations

- Database management:
  * Regular updates
  * Standards tracking
  * Regulation changes

7. Additional Requirements:

- User Management:
  * Role-based access control
  * User permissions
  * Client access portal

- File Management:
  * Document storage
  * Version control
  * File organisation
  * Sharing capabilities

- Reporting:
  * Progress reports
  * Compliance status
  * Project analytics
  * Performance metrics

- Integration Capabilities:
  * Email notifications
  * Calendar integration
  * Export functionality
  * API access