Product Requirements Document - Google-Only Architecture

Product Name

GoVAULT - Household Information Management System

Overview

Problem Statement

Families struggle to organize and maintain access to critical household information scattered across physical documents, multiple digital locations, and various family members' knowledge. Important documents like insurance policies, passwords, financial accounts, and legal papers are often lost, forgotten, or inaccessible when needed most, creating stress and inefficiency in managing household affairs.

Solution Summary

GoVAULT is a modern, highly secure web application that serves as a centralized repository for all essential family information. The system operates entirely within the Google Workspace ecosystem, leveraging Google Drive for secure document storage and Google Sheets for structured data management. The elegant dashboard interface provides easy access and management, with the family owner maintaining complete control over access permissions while enabling secure collaboration with family members and trusted third parties.

CRITICAL INTERFACE PRINCIPLE: All user interactions occur exclusively through the GoVAULT web interface. Users never directly access Google Drive folders, files, or Google Sheets - all document viewing, editing, uploading, and management happens within the secure web application. The web interface provides comprehensive functionality that eliminates any need for users to interact with the underlying Google Workspace storage.

Success Metrics

- Time to locate important family documents reduced by 80%
- Time to find specific information (policy numbers, account details) reduced by 90%
- 100% of critical household information digitally organized and accessible
- Zero missed renewal dates or important deadlines through automated reminders
- All authorized family members able to access needed information within 30 seconds
- 100% secure access control with zero unauthorized data exposure incidents
- 95% of information requests satisfied through quick-access data without opening documents

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Simplified Google-Only Architecture

Single Ecosystem Benefits

GoVAULT operates entirely within Google Workspace, providing several critical advantages:

Complete Google Integration

- Single authentication system using Google OAuth
- Native collaboration features built into Google Sheets
- Seamless integration between Drive documents and Sheets data
- Unified permission system across all Google services
- Built-in real-time updates and synchronization

Simplified Technical Stack

```
Frontend (React) ↔ Google APIs Only
                   ├── Drive API (documents)
                   ├── Sheets API (structured data + permissions + logs)
                   ├── Docs API (document generation)
                   └── Gmail API (invitations)
```

Cost and Maintenance Benefits

- **Lower operational costs** - no third-party database services
- **Simplified architecture** - fewer moving parts and integration points
- **Easier maintenance** - single ecosystem reduces complexity
- **Native scalability** - Google's infrastructure handles all scaling
- **Built-in backups** - Google's redundancy and backup systems

Web Interface as Universal Gateway

GoVAULT operates on a fundamental principle: **the web interface is the ONLY way users interact with their family information**. This architecture provides several critical benefits:

Complete Abstraction from Google Services

- Users never see Google Drive folders, file structures, or Sheets
- All document management appears as intuitive web-based file management
- Underlying Google storage complexity is completely hidden from users
- No need for users to understand or navigate Google Drive permissions or sharing

Unified User Experience

- Single login provides access to all family information
- Consistent interface across all devices and platforms
- No switching between Google applications or services
- All functionality available through responsive web design

Enhanced Security Through Interface Control

- All access is mediated through secure web application
- No direct Google service access reduces security vulnerabilities
- Complete audit trail of all user activities
- Granular permission control enforced at interface level

Google-Only Data Architecture & Storage Strategy

Document Storage Layer (Google Drive Backend)

Document Management Through Drive API

Purpose: Secure, versioned storage of complete documents

- **User Perspective:** Documents appear as embedded viewers within web interface
- **Technical Reality:** Files stored in owner's Google Drive with automated organization
- **User Interaction:** Upload, view, and download through web interface only
- **Version Control:** Google Drive's native versioning handled transparently
- **Organization:** Automated folder structure invisible to users
- **Permissions:** Managed entirely through Drive API, never exposed to users

Google Drive Folder Structure (Hidden from Users)

```
GoVAULT_Family_Data/
├── Documents/
│   ├── Financial/
│   ├── Insurance/
│   ├── Legal/
│   ├── Medical/
│   ├── Personal_ID/
│   └── Property/
├── Generated_Reports/
└── System_Backups/
```

Structured Data Layer (Google Sheets Backend)

Multi-Sheet Database Architecture

Purpose: Instant access to critical information without opening documents

Master Data Sheets

- **Financial_Accounts:** Account numbers, routing numbers, bank details, contact information
- **Insurance_Policies:** Policy numbers, coverage amounts, deductibles, renewal dates, agent details
- **Legal_Documents:** Document types, parties involved, effective dates, key terms
- **Personal_ID:** ID numbers, expiration dates, issuing authorities, renewal requirements
- **Medical_Info:** Doctor names, insurance numbers, prescription details, emergency contacts
- **Property_Assets:** Addresses, purchase dates, mortgage details, insurance policy links

System Management Sheets

- **Users_Permissions:** User roles, access levels, permission matrices
- **Audit_Log:** All user activities, document access, data modifications
- **Document_Registry:** Links between Google Drive files and structured data
- **Reminders_Alerts:** Automated reminder system data and alert history
- **System_Config:** Application settings and configuration data

Data Relationship Management

- **Cross-Sheet References:** Google Sheets formulas link related data across sheets
- **Document Linking:** Each data row contains Google Drive file IDs for associated documents
- **Permission Enforcement:** User access controlled through permission matrix in Google Sheets
- **Audit Tracking:** All data changes automatically logged with user identification and timestamps

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Google-Based User Management & Access Control

Authentication & User Management

Google OAuth Integration

- **Single Sign-On:** Users authenticate exclusively through Google accounts
- **No Password Management:** Leverages Google's secure authentication system
- **Multi-Factor Authentication:** Inherits Google's MFA capabilities
- **Session Management:** Google OAuth tokens manage user sessions securely

User Permission System (Google Sheets-Based)

Permission Matrix Sheet Structure

```
User_Email | Role | Financial_View | Financial_Edit | Insurance_View |
Insurance_Edit | ...
john@gmail.com | Owner | TRUE | TRUE | TRUE | TRUE | ...
jane@gmail.com | Spouse | TRUE | TRUE | TRUE | FALSE | ...
kid@gmail.com | Child | FALSE | FALSE | TRUE | FALSE | ...
advisor@firm.com | Financial | TRUE | FALSE | FALSE | FALSE | ...
```

Role-Based Access Templates

- **Primary Owner:** Complete control over all documents and data
- **Spouse/Partner:** Broad access with editing capabilities across most categories
- **Adult Children:** Limited access to relevant categories with restricted sensitive data
- **Dependents:** View-only access to basic family information
- **Financial Advisor:** Access to financial documents with selective field visibility
- **Attorney:** Legal document access with time-limited permissions
- **Tax Preparer:** Seasonal access to tax-related information with automatic expiration

Real-Time Permission Enforcement

Google Apps Script Integration

- **Permission Validation:** Apps Script functions validate user access in real-time
- **Dynamic Filtering:** Data filtered based on user permissions before display
- **Audit Logging:** All access attempts logged automatically to Audit_Log sheet
- **Alert System:** Unauthorized access attempts trigger immediate notifications

Document-Level Security

- **Google Drive Permissions:** Documents shared with specific users based on role
- **Web Interface Mediation:** All document access goes through permission validation
- **Temporary Access:** Time-limited document sharing for professionals
- **Download Control:** Download permissions enforced through Drive API

Enhanced Page Structure & Google-Powered Functionality

1. User Dashboard - Google Sheets-Powered Command Center

Real-Time Data Widgets

- **Critical Information Cards:** Live data from Google Sheets displayed instantly
- **Recent Updates:** Automatic tracking of Sheets modifications
- **Pending Actions:** Smart alerts generated from Sheets formulas
- **Quick Search:** Full-text search across all Sheets data
- **Activity Feed:** Real-time updates from Audit_Log sheet

Google Drive Document Activity

- **Recent Documents:** Drive API queries for latest accessed files
- **Processing Queue:** Apps Script-managed document processing status
- **Shared Items:** Drive API integration for shared document tracking
- **Version Updates:** Drive API notifications for document revisions

2. Category Management Pages - Dual Google Integration

Quick Data View (Google Sheets Frontend)

- **Structured Data Table:** Live Google Sheets data with real-time updates
- **Inline Editing:** Direct Sheets API updates through web interface
- **Collaborative Editing:** Google Sheets native collaboration visible in real-time
- **Formula-Driven Insights:** Sheets calculations displayed as interface elements
- **Cross-Sheet References:** Related data from other sheets displayed contextually

Document View (Google Drive Frontend)

- **Document Grid:** Drive API thumbnail views
- **Embedded Preview:** Google Drive viewers embedded in web interface

- **Metadata Display:** Associated Sheets data alongside document viewer
- **Version History:** Drive API version access through web interface
- **Related Items:** Automatic linking through Document_Registry sheet

3. Google-Powered Search & Discovery

Unified Search Across Google Services

- **Sheets Data Search:** Full-text search across all structured data
- **Drive Document Search:** Google Drive API search integration
- **Combined Results:** Merged results from both Sheets and Drive
- **Permission-Aware:** Results filtered by user's permission matrix
- **Smart Suggestions:** Apps Script-powered search suggestions

Google Apps Script Search Enhancement

- **Indexed Search:** Apps Script maintains search indexes in Sheets
- **Relationship Search:** Find related documents and data automatically
- **Saved Searches:** Store complex search queries in Google Sheets
- **Search Analytics:** Track popular searches for interface optimization

4. Intelligent Google-Based Reminders & Alerts

Google Sheets Formula-Driven Alerts

- **Date-Based Triggers:** Sheets formulas calculate upcoming expirations
- **Smart Notifications:** Apps Script processes formulas into user notifications
- **Escalation Rules:** Sheets logic determines alert routing based on user roles
- **Batch Processing:** Apps Script handles multiple alerts efficiently

Google Workspace Alert Delivery

- **Gmail Integration:** Automated emails with structured data summaries
- **Google Calendar:** Automatic calendar events for important dates
- **Drive Notifications:** Document-based alerts through Drive API
- **Apps Script Triggers:** Time-based and event-based notification processing

5. Native Google Collaboration Features

Google Sheets Real-Time Collaboration

- **Live Updates:** Instant reflection of changes across all users
- **Conflict Resolution:** Google Sheets native simultaneous editing
- **Change History:** Complete revision history for all data modifications
- **Comment System:** Google Sheets comments system for collaboration

Google Drive Document Collaboration

- **Document Sharing:** Native Google Drive sharing through web interface
- **Collaborative Editing:** Google Docs/Sheets editing capabilities
- **Approval Workflows:** Apps Script-managed approval processes
- **Activity Notifications:** Drive API activity notifications

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Technical Implementation - Google-Only Stack

Frontend Architecture

React Application with Google APIs

- **Framework:** React 18+ with TypeScript
- **Google API Integration:** Google APIs Client Library for JavaScript
- **Authentication:** Google OAuth 2.0 with React integration
- **State Management:** React Context for Google API responses
- **Real-time Updates:** Google Sheets API change notifications

Google API Integration Points

Google Drive API

```javascript
// Document upload through web interface
const uploadDocument = async (file, category) => {
  const response = await gapi.client.drive.files.create({
    resource: { name: file.name, parents: [categoryFolderId] },
    media: { body: file }
  });
  // Update Document_Registry sheet with new file
  await updateDocumentRegistry(response.result.id, category);
};
```

Google Sheets API

```javascript
// Real-time data updates
const updateStructuredData = async (sheet, range, values) => {
  await gapi.client.sheets.spreadsheets.values.update({
    spreadsheetId: MASTER_SPREADSHEET_ID,
    range: `${sheet}!${range}`,
    valueInputOption: 'USER_ENTERED',
    resource: { values: values }
  });
  // Trigger audit log entry
  await logUserActivity('DATA_UPDATE', sheet, range);
};
```

Google Apps Script Backend

Permission Enforcement Functions

```javascript
// Apps Script function for permission validation
function validateUserAccess(userEmail, dataCategory, accessType) {
  const permissionSheet = SpreadsheetApp.getActiveSpreadsheet()
    .getSheetByName('Users_Permissions');
  const userRow = findUserRow(permissionSheet, userEmail);
  const columnName = `${dataCategory}_${accessType}`;
  return permissionSheet.getRange(userRow, getColumnIndex(columnName)).getValue();
}
```

Automated Alert Processing

```javascript
// Apps Script trigger for processing alerts
function processAlerts() {
  const reminderSheet = SpreadsheetApp.getActiveSpreadsheet()
    .getSheetByName('Reminders_Alerts');
  const today = new Date();
  const upcomingAlerts = findUpcomingAlerts(reminderSheet, today);

  upcomingAlerts.forEach(alert => {
    sendEmailAlert(alert.userEmail, alert.message);
    createCalendarEvent(alert.date, alert.title);
    logAuditEntry('ALERT_SENT', alert.type, alert.userEmail);
  });
}
```

Google Workspace Security Implementation

OAuth 2.0 Security

- **Secure Authentication:** Google OAuth handles all authentication
- **Token Management:** Automatic token refresh and validation
- **Scope Limitation:** Minimal required scopes for Google APIs
- **Session Security:** Google's secure session management

Google Drive Security

- **File-Level Permissions:** Individual document access control
- **Sharing Control:** Programmatic sharing through Drive API
- **Access Auditing:** Complete Drive access logs
- **Version Control:** Google Drive's native versioning system

Google Sheets Security

- **Sheet Protection:** Protected ranges for sensitive data
- **Cell-Level Permissions:** Granular access control within sheets
- **Edit History:** Complete change tracking and user identification
- **Formula Protection:** Critical formulas protected from modification

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Google-Only Benefits & Trade-offs

Benefits of Google-Only Architecture

Simplified Operations

- **Single Ecosystem:** Everything within Google Workspace
- **Native Integration:** Seamless data flow between Google services
- **Reduced Complexity:** Fewer moving parts and integration points
- **Lower Costs:** No third-party database or backend services
- **Easier Maintenance:** Single vendor relationship and support

Enhanced Collaboration

- **Built-in Sharing:** Native Google sharing and collaboration
- **Real-time Updates:** Google's real-time synchronization
- **Comment Systems:** Native commenting and discussion features
- **Version Control:** Automatic versioning across all Google services
- **Mobile Access:** Native Google mobile app integration

Security & Reliability

- **Enterprise Security:** Google's enterprise-grade security
- **Automatic Backups:** Built-in redundancy and backup systems
- **Compliance:** Google's compliance certifications
- **Scalability:** Google's infrastructure handles all scaling
- **Uptime:** Google's reliability and service level agreements

Technical Considerations

Google Sheets Limitations

- **Row Limits:** 10 million cells per spreadsheet (sufficient for family data)
- **Query Complexity:** Less sophisticated than SQL databases
- **Processing Speed:** May be slower for very large datasets
- **Advanced Features:** Limited compared to dedicated databases

Mitigation Strategies

- **Multiple Spreadsheets:** Distribute data across multiple sheets if needed
- **Apps Script Processing:** Use server-side processing for complex operations
- **Caching:** Cache frequently accessed data in the frontend
- **Optimization:** Regular optimization of Sheets structure and formulas

User Experience Scenarios

Scenario 1: New Family Setup with Google Integration

1. **Owner Authentication:** Primary owner signs in with Google account
2. **Google Drive Setup:** System creates folder structure in owner's Drive
3. **Sheets Initialization:** Master spreadsheet created with all required sheets
4. **Document Upload:** Owner uploads documents through web interface to Drive
5. **Data Extraction:** Apps Script processes documents and populates Sheets
6. **Family Invitation:** Gmail API sends secure invitations to family members
7. **Permission Setup:** User permissions configured in Google Sheets matrix

Scenario 2: Real-Time Collaborative Editing

1. **Simultaneous Access:** Multiple family members access insurance information
2. **Live Updates:** Changes to policy information visible in real-time
3. **Conflict Resolution:** Google Sheets handles simultaneous edits automatically
4. **Audit Trail:** All changes automatically logged with user identification
5. **Notifications:** Other users notified of changes through Apps Script triggers

Scenario 3: Professional Integration

1. **Temporary Access:** Tax preparer granted seasonal access through permission matrix
2. **Limited Scope:** Access restricted to tax-related documents and data
3. **Secure Collaboration:** Professional accesses information through web interface only
4. **Audit Logging:** All professional activities logged in Google Sheets
5. **Automatic Expiration:** Access automatically revoked after tax season

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Implementation Roadmap

Phase 1: Google Foundation (Months 1-2)

- Google OAuth authentication integration
- Basic Google Drive API document management
- Core Google Sheets structure and API integration
- Simple permission system using Sheets-based matrix
- Basic web interface with Google API connections

Phase 2: Advanced Google Integration (Months 3-4)

- Google Apps Script automation for alerts and processing
- Advanced permission enforcement with field-level security
- Gmail API integration for notifications and invitations
- Google Calendar integration for automated reminders
- Real-time collaboration features using Google's native capabilities

Phase 3: Enhanced User Experience (Months 5-6)

- Advanced search across Google Drive and Sheets
- Bulk operations and batch processing through Apps Script
- Mobile-optimized interface with Google API integration
- Advanced audit and monitoring using Google Sheets analytics
- Document processing automation with Apps Script

Phase 4: Optimization & Advanced Features (Months 7-8)

- Performance optimization for Google API calls
- Advanced Apps Script automation for intelligent insights
- Progressive web app features with offline Google API caching
- Advanced reporting and analytics using Google Sheets
- Final security hardening and compliance verification

Success Metrics & KPIs

Google Integration Metrics

- **API Performance:** Average response time under 2 seconds for all Google API calls
- **Real-time Sync:** Changes reflected across all users within 5 seconds
- **Google Authentication:** 100% of authentication handled through Google OAuth
- **Storage Efficiency:** Optimal use of Google Drive storage and Sheets capacity
- **Collaboration Usage:** Active use of Google's native collaboration features

System Performance with Google Backend

- **Search Performance:** Sub-3-second search across Google Drive and Sheets
- **Data Accuracy:** 99% accuracy in Google Sheets data synchronization
- **Permission Enforcement:** 100% of access controlled through Google-based permissions

- **Audit Completeness:** 100% of activities logged in Google Sheets
- **Mobile Performance:** Optimized performance on mobile devices through Google APIs

Cost & Maintenance Benefits

- **Operational Costs:** Reduced infrastructure costs through Google-only architecture
- **Maintenance Overhead:** Simplified maintenance with single ecosystem
- **Development Speed:** Faster feature development using Google's APIs
- **Security Incidents:** Zero security breaches leveraging Google's enterprise security
- **User Satisfaction:** High user satisfaction with familiar Google integration

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This Google-only architecture provides a simpler, more cost-effective solution while maintaining all the core functionality of GoVAULT. The tight integration with Google Workspace services creates a seamless user experience while reducing technical complexity and operational overhead.