Intelleges Website - Complete QA Testing Guide

Version: 2.0
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Purpose: Comprehensive testing specification for QA team covering all clickable elements, business rules, email management, analytics, and expected behaviors

Table of Contents

System Overview

Technology Stack

- **Frontend:** React 19 + Wouter (client-side routing)
- **Backend:** tRPC API
- **Database:** MySQL (Drizzle ORM)
- **Email:** SendGrid with webhook integration
- **Storage:** S3 (Manus CDN)
- **Analytics:** Custom email engagement tracking

Key Business Rules

1. **3-Document Lifetime Limit:** Each email address can download maximum 3 documents (lifetime, not per day)
2. **2-Hour Email Delay:** Follow-up emails sent 2 hours after document download
3. **Email Capture Required:** All service one-pagers and featured documents require email capture
4. **Case Studies Require Meeting:** Case study downloads require Calendly meeting booking
5. **Email Suppression:** Bounced, spam-reported, and unsubscribed emails are automatically blocked from future communications **NEW**
6. **Lead Qualification:** High-value prospects are tracked and qualified through dedicated workflows **NEW**

Global Navigation & Header

Header Elements (All Pages)

Element	Location	Click Behavior	Expected Result
Intelleges Logo	Top left	Click	Navigate to homepage (/)
Product	Top nav	Click	Navigate to /product
Protocols	Top nav	Click	Navigate to /protocols
About	Top nav	Click	Navigate to /about
Pricing	Top nav	Click	Navigate to /pricing
Contact	Top nav	Click	Navigate to /contact
Client Login	Top right button	Click	Navigate to OAuth login portal
Book a Demo	Top right button	Click	Navigate to /contact page

Footer Elements (All Pages)

Section	Links	Click Behavior
Product	Overview, Protocols, Supplier Onboarding, Pricing	Navigate to respective pages
Company	About, Contact, +1-917-818-0225	Navigate or initiate phone call
Resources	Case Studies, Whitepapers, One-Pagers	Navigate to /case-studies, /resources, /one-pagers
Legal	Security, Privacy, Terms	Navigate to respective pages
Access	Client Login	Navigate to OAuth login portal

Page-by-Page Testing Guide

1. Homepage (/)

Hero Section

Element	Type	Click Behavior	Expected Result
Book a Demo button	Primary CTA	Click	Navigate to /contact
Watch 2-Minute Overview button	Secondary CTA	Click	Open video modal (placeholder)

Protocols Section

Element	Type	Click Behavior	Expected Result
Protocol cards (16 total)	Interactive cards	Hover	Show subtle scale effect
Protocol cards	Interactive cards	Click	No action (informational only)

How Intelleges Works Section

- **6 numbered steps:** Informational only, no click actions

Download Whitepaper CTA

Element	Type	Click Behavior	Expected Result
Download Whitepaper button	CTA	Click	Navigate to /resources

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2. One-Pagers Page (/one-pagers)

Service Document Cards (11 Total)

List of Documents:

1. Reps & Certs Compliance Service

2. Export Control (ITAR/EAR) Service

3. Cybersecurity (CMMC/NIST) Service

4. Small Business Programs Service

5. Conflict Minerals Service

6. Buy American Compliance Service

7. Supplier Risk Management Service

8. Quality Systems (ISO/AS9100) Service

9. Environmental & COI Tracking Service

10. Compliance Maturity Model (NEW)

11. Current Compliance Landscape (NEW)

Click Behavior for Each Card

Action	Expected Result
Hover	Card scales up slightly, shadow increases, title font weight increases
Click	Opens EmailCaptureModal with document title pre-filled

EmailCaptureModal Workflow

Step 1: Modal Opens

- Title: "Download [Document Name]"
- 3 required fields: Full Name, Email Address, Company Name
- All fields have validation

Step 2: Form Validation

Field	Validation Rule	Error Message
Full Name	Required, non-empty	"Name is required"
Email Address	Required, valid email format	"Email is required" / "Please enter a valid email address"
Company Name	Required, non-empty	"Company name is required"

Step 3: Email Suppression Check NEW

Before processing the download, the system checks if the email is suppressed:

1. Call `emailSuppression.checkEmailSuppression` API

2. If email is suppressed:
    - Show error toast: "This email address cannot receive communications (reason: [bounce/spam/unsubscribe])"
    - Do NOT proceed with download
    - Keep modal open for user to try different email

3. If email is NOT suppressed:
    - Proceed to Step 4 (download limit check)

Step 4: Download Limit Check

1. Check download limit via `documentDownloads.checkLimit` API

2. If limit reached (≥3 downloads):
    - Close EmailCaptureModal
    - Open DownloadLimitReachedModal
    - **STOP** (no download occurs)

3. If limit NOT reached:
    - Proceed to Step 5

Step 5: Record Download & Schedule Email

- Record download via `documentDownloads.recordDownload` API
- **Check suppression status again** before scheduling follow-up email **NEW**
- If NOT suppressed: Schedule follow-up email for 2 hours later
- If suppressed: Skip email scheduling (log suppression block)
- Trigger browser download of PDF from S3 CDN URL
- Show success state (green checkmark)
- Display toast: "Download started! Check your email in 2 hours for a follow-up message."
- Auto-close modal after 2 seconds

Step 6: Success State

- Green checkmark icon

- Message: "Download Started!"

- Subtext: "Your document is downloading now. Check your email in 2 hours for a personalized follow-up."

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3. Resources Page (/resources)

Featured Compliance Frameworks Section

2 Featured Documents:

1. Compliance Maturity Model
2. Current Compliance Landscape

Element	Type	Click Behavior	Expected Result
Featured document card	Interactive card	Hover	Scale up, shadow increase, gradient effect
Featured document card	Interactive card	Click	Open EmailCaptureModal (same workflow as One-Pagers)
Download button	Button inside card	Click	Open EmailCaptureModal

Visual Design:

- Gradient backgrounds (indigo/violet)

- Custom icons (TrendingUp, Map)

- Border ring effects

- Badge: "One-Pager"

- "PDF · Free Download" footer text

Additional Resources Section

4 Placeholder Resource Cards:

1. CMMC 2.0 Readiness Guide

2. The Future of Supply Chain Risk

3. Intelleges Platform Datasheet

4. Audit Preparation Handbook

Element	Type	Click Behavior	Expected Result
Resource cards	Interactive cards	Hover	Border darkens, shadow appears
Download button	Button	Click	No action (placeholder, not wired up)

Testing Note: These 4 cards are placeholders and should NOT trigger downloads. QA should verify no modal opens when clicking Download.

4. Case Studies Page (/case-studies)

Case Study Cards (17 Total)

Gating Rule: All case studies require Calendly meeting booking (NOT email capture)

Element	Type	Click Behavior	Expected Result
Case study card	Interactive card	Hover	Scale effect, shadow increase
Download Case Study button	CTA button	Click	Redirect to Calendly booking page (external link)

Expected Calendly URL Format:

```
https://calendly.com/intelleges/demo?prefill_email=
[user_email]&prefill_name=[user_name]
```

Testing Note: Case studies do NOT use EmailCaptureModal. They bypass email capture and go straight to Calendly.

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5. Contact Page (/contact)

Contact Form Fields

Field	Type	Validation	Required
Full Name	Text input	Non-empty	Yes
Email	Email input	Valid email format	Yes
Company	Text input	Non-empty	Yes
Message	Textarea	Non-empty	Yes

Submit Behavior

1. Validate all fields

2. Call `contact.submitForm` API

3. Show success toast: "Message sent! We'll get back to you soon."

4. Clear form fields

5. No email suppression check (contact form submissions always go through)

Download System Rules

3-Document Lifetime Limit

Business Rule: Each email address can download a maximum of 3 documents across their lifetime (not per day, not per session).

Implementation

1. **Check Limit Before Download:**

   - API: `documentDownloads.checkLimit({ email })`
   - Returns: `{ canDownload: boolean, downloadsUsed: number, limit: number }`

2. **If Limit Reached:**

   - Close EmailCaptureModal
   - Open DownloadLimitReachedModal
   - Display message: "You've reached your download limit (3 documents)"
   - Provide contact information for additional access

3. **If Limit NOT Reached:**

   - Proceed with download
   - Increment download count in database

Testing Scenarios

Scenario	Downloads Used	Expected Behavior
First download	0	Allow download, show success
Second download	1	Allow download, show success
Third download	2	Allow download, show success
Fourth download	3	Block download, show DownloadLimitReachedModal
Fifth+ download	3+	Block download, show DownloadLimitReachedModal

Email Automation Workflows

Follow-Up Email Schedule

Business Rule: Follow-up emails are sent 2 hours after document download (unless email is suppressed).

Workflow

1. **User downloads document** via EmailCaptureModal

2. **System records download** in `documentDownloads` table

3. **System checks suppression status NEW**
   - If suppressed: Skip email scheduling, log suppression block
   - If not suppressed: Continue to step 4

4. **System schedules email** in `scheduledEmails` table
   - `scheduledFor` : current time + 2 hours
   - `status` : "pending"

5. **Background worker processes scheduled emails** every minute
   - Finds emails where `scheduledFor <= NOW()` and `status = "pending"`
   - Sends email via SendGrid
   - Updates status to "sent"
   - Records email event in `emailStatus` and `emailEvents` tables **NEW**

Email Content

Subject: "Your [Document Name] - Next Steps"

Body:

- Personalized greeting with user's name
- Summary of downloaded document
- Call-to-action: Book a demo or contact sales
- Unsubscribe link

Testing Scenarios

Scenario	Expected Behavior
Download at 10:00 AM	Email sent at 12:00 PM
Download at 11:59 PM	Email sent at 1:59 AM next day
Email suppressed (bounced)	Email NOT sent, suppression logged
Email suppressed (spam)	Email NOT sent, suppression logged
Email suppressed (unsubscribed)	Email NOT sent, suppression logged

Email Suppression System NEW

Overview

The email suppression system automatically blocks bounced, spam-reported, and unsubscribed email addresses from receiving future communications. This protects sender reputation and ensures compliance with email best practices.

Suppression Reasons

Reason	Trigger	Description
bounce	SendGrid bounce event	Email address bounced (hard or soft bounce)
spam	SendGrid spam_report event	Recipient marked email as spam
unsubscribe	SendGrid unsubscribe event	Recipient clicked unsubscribe link
dropped	SendGrid dropped event	SendGrid dropped email (invalid address, suppression list)
manual	Admin action	Manually suppressed by administrator

Automatic Suppression Flow

1. **SendGrid sends email** to recipient

2. **Recipient action triggers event** (bounce, spam report, unsubscribe)

3. **SendGrid webhook fires** to `/api/webhooks/sendgrid`

4. **Webhook handler processes event:**
   - Records event in `emailEvents` table
   - Updates `emailStatus` table with engagement metrics
   - **If event is bounce/spam/unsubscribe/dropped:**
     - Sets `isSuppressed = 1`
     - Sets `suppressionReason = [reason]`
     - Sets `suppressedAt = NOW()`
     - Logs suppression action

5. **Future email attempts are blocked:**
   - EmailCaptureModal checks suppression before submission
   - Follow-up email scheduler checks suppression before scheduling
   - Contact form submissions bypass suppression (always go through)

Testing Email Suppression

Test Case 1: Bounce Event

Setup:

1. Use test email: `bounce@simulator.amazonses.com`

2. Download a document with this email

3. Simulate bounce event via webhook

Expected Behavior:

- Email status shows `isSuppressed = 1`, `suppressionReason = "bounce"`

- Attempting to download another document with same email shows error: "This email address cannot receive communications (reason: bounce)"

- Follow-up emails are NOT scheduled for this address

Test Case 2: Spam Report

Setup:

1. Use test email: `spam@example.com`

2. Download a document with this email

3. Simulate spam_report event via webhook

Expected Behavior:

- Email status shows `isSuppressed = 1`, `suppressionReason = "spam"`
- Future download attempts blocked with error message
- Follow-up emails are NOT scheduled

Test Case 3: Unsubscribe

Setup:

1. Use test email: `unsubscribe@example.com`

2. Download a document with this email

3. Simulate unsubscribe event via webhook

Expected Behavior:

- Email status shows `isSuppressed = 1`, `suppressionReason = "unsubscribe"`
- Future download attempts blocked with error message
- Follow-up emails are NOT scheduled

Test Case 4: Manual Suppression

Setup:

1. Admin logs into `/admin/email-analytics`

2. Manually suppresses email via API (future enhancement)

Expected Behavior:

- Email status shows `isSuppressed = 1`, `suppressionReason = "manual"`
- All future communications blocked

Test Case 5: Unsuppression

Setup:

1. Admin logs into `/admin/email-analytics`

2. Removes suppression via API (future enhancement)

Expected Behavior:

- Email status shows `isSuppressed = 0`, `suppressionReason = NULL`

- Email can now receive communications again

Suppression API Endpoints

Endpoint	Method	Purpose
`emailSuppression.checkEmailSuppression`	Query	Check if email is suppressed
`emailSuppression.suppressEmail`	Mutation	Manually suppress an email
`emailSuppression.unsuppressEmail`	Mutation	Remove suppression
`emailSuppression.getSuppressionStats`	Query	Get suppression counts by reason

Testing Checklist: Email Suppression

- ☐ Bounced email is automatically suppressed
- ☐ Spam-reported email is automatically suppressed
- ☐ Unsubscribed email is automatically suppressed
- ☐ Dropped email is automatically suppressed
- ☐ Suppressed email cannot download documents (error shown)
- ☐ Suppressed email does not receive follow-up emails
- ☐ Suppression reason is correctly recorded
- ☐ Suppression timestamp is correctly recorded
- ☐ Manual suppression works (if implemented)
- ☐ Unsuppression works (if implemented)

- ☐ Suppression stats are accurate
- ☐ Case-insensitive email matching works (Test@Example.com = test@example.com)

Email Analytics Dashboard NEW

Overview

The Email Analytics Dashboard (`/admin/email-analytics`) provides comprehensive insights into email engagement, deliverability, and suppression status.

Access Control

- **URL:** `/admin/email-analytics`
- **Authentication:** Required (OAuth login)
- **Authorization:** Admin users only (currently all authenticated users, pending role implementation)

Dashboard Sections

1. Overview Cards

Metric	Description	Calculation
Total Tracked Emails	Number of unique email addresses tracked	COUNT(*) from emailStatus
Total Delivered	Number of successfully delivered emails	SUM(delivered)
Total Opened	Number of emails opened	SUM(opened)
Total Clicked	Number of emails with link clicks	SUM(clicked)
Total Bounced	Number of bounced emails	SUM(bounce)
Total Spam Reports	Number of spam complaints	SUM(spam)
Total Unsubscribed	Number of unsubscribe requests	SUM(unsubscribed)
Open Rate	Percentage of delivered emails opened	(opened / delivered) * 100
Click Rate	Percentage of delivered emails clicked	(clicked / delivered) * 100
Bounce Rate	Percentage of emails bounced	(bounced / (delivered + bounced)) * 100

2. Email Status Table

Columns:

Column	Description	Data Type
Email	Email address	String (monospace font)
Engagement Status	Visual health badges	Badge group component
Delivered	Delivered count	Number (✓ if > 0)
Opened	Opened count	Number (✓ if > 0)
Clicked	Clicked count	Number (✓ if > 0)
Bounced	Bounce count	Number (⚠ if > 0)
Unsubscribed	Unsubscribe count	Number (✖ if > 0)
Last Event At	Timestamp of last event	Formatted date/time

Features:

- **Search:** Filter by email address (partial match)
- **Filter:** Filter by event type (all, bounced, opened, clicked, spam, unsubscribed)
- **Pagination:** 25 rows per page with offset-based navigation
- **Row Selection:** Click row to view detailed timeline
- **Sorting:** Ordered by last event timestamp (descending)

3. Email Timeline (Detail View)

When clicking an email row, a detailed timeline appears showing all events for that email:

Event Types Displayed:

- Delivered
- Opened
- Clicked
- Bounced
- Spam Report
- Unsubscribed

- Dropped

Event Details:

- Event type (with icon)
- Timestamp (formatted as relative time)
- Event metadata (if available)

Testing Email Analytics Dashboard

Test Case 1: Overview Metrics

Setup:

1. Ensure test data exists in database (use test-webhook.mjs to simulate events)
2. Navigate to `/admin/email-analytics`

Expected Behavior:

- All overview cards display correct counts
- Rates (open, click, bounce) are calculated correctly
- Metrics update when new events occur

Test Case 2: Email Search

Setup:

1. Navigate to `/admin/email-analytics`
2. Enter partial email in search box (e.g., "test")

Expected Behavior:

- Table filters to show only matching emails
- Search is case-insensitive
- Partial matches work (e.g., "test" matches "test@example.com")

Test Case 3: Event Filter

Setup:

1. Navigate to `/admin/email-analytics`
2. Select filter: "Bounced"

Expected Behavior:

- Table shows only emails with bounce = 1
- Other emails are hidden
- Filter persists when searching

Test Case 4: Email Timeline

Setup:

1. Navigate to `/admin/email-analytics`
2. Click on an email row with multiple events

Expected Behavior:

- Timeline appears below overview cards
- All events for that email are displayed
- Events are sorted by timestamp (newest first)
- Event types have appropriate icons and colors

Test Case 5: Pagination

Setup:

1. Ensure > 25 emails exist in database
2. Navigate to `/admin/email-analytics`

Expected Behavior:

- Only 25 rows displayed initially
- "Next" button appears if more rows exist
- Clicking "Next" loads next 25 rows
- "Previous" button appears on page 2+

Testing Checklist: Email Analytics Dashboard

- ☐ Dashboard loads without errors
- ☐ Overview cards display correct metrics
- ☐ Open rate calculation is correct
- ☐ Click rate calculation is correct
- ☐ Bounce rate calculation is correct
- ☐ Email search works (case-insensitive, partial match)
- ☐ Event filter works (bounced, opened, clicked, spam, unsubscribed)
- ☐ Email status table displays all columns
- ☐ Clicking email row shows timeline
- ☐ Timeline displays all events for email
- ☐ Timeline events are sorted correctly
- ☐ Pagination works (next/previous)
- ☐ Health badges display correctly (see next section)

Email Health Badges NEW

Overview

Email health badges provide visual indicators of email engagement status throughout the platform. They appear in the email analytics dashboard and will be extended to lead qualification views and personalized welcome pages.

Badge Types

Status	Icon	Color	Description
delivered	✓	Green	Email successfully delivered
opened	✉	Blue	Recipient opened email
clicked	🔗	Purple	Recipient clicked link in email
bounced	⚠	Orange	Email bounced (hard or soft)
spam	🚫	Red	Marked as spam
unsubscribed	✖	Gray	Recipient unsubscribed
suppressed	🚫	Red	Email is suppressed (cannot receive emails)

Badge Sizes

- **sm:** Small (used in compact tables)
- **md:** Medium (default)
- **lg:** Large (used in prominent displays)

Badge Components

1. EmailHealthBadge (Single Badge)

Props:

- `status` : Badge type (delivered, opened, clicked, bounced, spam, unsubscribed, suppressed)
- `count` : Number of events (optional, shows badge with count)
- `timestamp` : Event timestamp (optional, shows in tooltip)
- `size` : Badge size (sm, md, lg)

Example Usage:

```
<EmailHealthBadge
  status="opened"
  count={3}
  timestamp="2025-11-30T10:30:00Z"
  size="md"
/>
```

Expected Display:

- Blue badge with ✉ icon
- Count "3" displayed
- Tooltip: "Opened (3) - Last: Nov 30, 2025 10:30 AM"

2. EmailHealthBadgeGroup (Multiple Badges)

Props:

- `statuses` : Array of badge objects `[{ status, count, timestamp }]`
- `size` : Badge size for all badges
- `maxVisible` : Maximum number of badges to show (default: 4)

Example Usage:

```
<EmailHealthBadgeGroup
  statuses={[
    { status: "delivered", count: 1, timestamp: "2025-11-30T10:00:00Z" },
    { status: "opened", count: 2, timestamp: "2025-11-30T10:30:00Z" },
    { status: "clicked", count: 1, timestamp: "2025-11-30T11:00:00Z" },
  ]}
  size="sm"
  maxVisible={4}
/>
```

Expected Display:

- Three badges displayed horizontally
- Each badge shows icon and count
```

- Hover shows tooltip with details
- If > maxVisible badges, show "+N more" indicator

## Badge Placement

### Current Implementation

- **Email Analytics Dashboard:** Email status table shows badge group for each email

### Future Implementation (Planned)

- **Lead Qualification Views:** Show badges next to email in qualification attempts table
- **Admin Lead Management:** Display engagement badges in lead detail modals
- **Personalized Welcome Pages:** Show "Your email engagement" card with badges

## Testing Email Health Badges

### Test Case 1: Single Badge Display

**Setup:**

1. Navigate to `/admin/email-analytics`
2. Find email with single event (e.g., only delivered)

**Expected Behavior:**

- Single badge displayed with correct icon and color
- Hover shows tooltip with timestamp
- Badge size matches specified size

### Test Case 2: Multiple Badges Display

**Setup:**

1. Navigate to `/admin/email-analytics`

2. Find email with multiple events (delivered, opened, clicked)

**Expected Behavior:**

- Badge group displays all badges horizontally
- Each badge has correct icon, color, and count
- Badges are ordered by priority (delivered → opened → clicked → bounced → spam → unsubscribed)
- Hover on each badge shows individual tooltip

### Test Case 3: Badge with Count

**Setup:**

1. Simulate multiple "opened" events for same email
2. Navigate to `/admin/email-analytics`

**Expected Behavior:**

- Opened badge shows count (e.g., "✉ 3")
- Tooltip shows: "Opened (3) - Last: [timestamp]"

### Test Case 4: Suppressed Badge

**Setup:**

1. Suppress an email (bounce, spam, or unsubscribe)
2. Navigate to `/admin/email-analytics`

**Expected Behavior:**

- Suppressed badge (🚫) displayed in red
- Tooltip shows: "Suppressed ([reason]) - [timestamp]"
- Badge appears prominently to indicate blocked status

### Test Case 5: Badge Overflow

**Setup:**

1. Create email with > 4 events

2. Navigate to `/admin/email-analytics`

**Expected Behavior:**

- First 4 badges displayed
- "+N more" indicator shown
- Clicking indicator shows all badges (future enhancement)

## Testing Checklist: Email Health Badges

- ☐ Delivered badge displays correctly (green, ✓)
- ☐ Opened badge displays correctly (blue, ✉)
- ☐ Clicked badge displays correctly (purple, 🔗)
- ☐ Bounced badge displays correctly (orange, ⚠)
- ☐ Spam badge displays correctly (red, 🚫)
- ☐ Unsubscribed badge displays correctly (gray, ✖)
- ☐ Suppressed badge displays correctly (red, 🚫)
- ☐ Badge counts display correctly
- ☐ Badge tooltips show correct information
- ☐ Badge sizes (sm, md, lg) render correctly
- ☐ Badge group displays multiple badges
- ☐ Badge group respects maxVisible limit
- ☐ Badge colors match design system
- ☐ Badges are responsive on mobile

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# Lead Qualification System NEW

## Overview

The lead qualification system identifies high-value prospects and guides them through a structured qualification process. Qualified leads receive personalized welcome pages with their engagement data.

# Qualification Criteria

A lead is considered "qualified" if they meet ANY of the following criteria:

1. **Government Email Domain:** Email ends with `.gov` or `.mil`
2. **Fortune 500 Company:** Company name matches Fortune 500 list
3. **High Download Volume:** Downloaded 2+ documents
4. **High Engagement:** Opened and clicked follow-up emails

## Qualification Workflow

### Step 1: Lead Capture

- User downloads document via EmailCaptureModal
- System records: name, email, company, document downloaded
- System checks qualification criteria

### Step 2: Qualification Check

**API:** `qualification.checkQualification({ email })`

**Returns:**

```
{
  "isQualified": true,
  "reason": "government_email",
  "qualificationScore": 85
}
```

Step 3: Qualification Gate (If Qualified)

- After download success, show QualificationGate modal
- Ask 3 additional questions:
    1. **Job Title:** Text input
    2. **Company Size:** Dropdown (1-50, 51-200, 201-1000, 1000+)
    3. **Primary Compliance Need:** Dropdown (CMMC, ITAR, AS9100, etc.)

- Submit via `qualification.submitQualification` API

Step 4: Personalized Welcome Page

- System generates unique welcome URL: `/welcome/[token]`
- Welcome page displays:
    - Personalized greeting with user's name
    - Company information
    - Downloaded documents list
    - Email engagement metrics **NEW**
    - Call-to-action: Book a demo
- URL is included in follow-up email

Testing Lead Qualification

Test Case 1: Government Email Qualification

Setup:

1. Download document with email: `john.doe@navy.mil`

Expected Behavior:

- After download success, QualificationGate modal opens
- Modal shows: "We noticed you're from a government organization"
- User fills out 3 additional fields
- Submit creates qualification record
- Welcome page URL generated

Test Case 2: Fortune 500 Qualification

Setup:

1. Download document with company: "Lockheed Martin"

Expected Behavior:

- After download success, QualificationGate modal opens
- Modal shows: "We noticed you're from a Fortune 500 company"
- User completes qualification
- Welcome page URL generated

Test Case 3: High Download Volume Qualification

Setup:

1. Download 2 documents with same email

Expected Behavior:

- After 2nd download, QualificationGate modal opens
- Modal shows: "You've shown strong interest in our resources"
- User completes qualification
- Welcome page URL generated

Test Case 4: Non-Qualified Lead

Setup:

1. Download document with generic email: `test@example.com`
2. Company: "Small Business Inc"

Expected Behavior:

- Download completes successfully
- QualificationGate modal does NOT open
- Standard follow-up email sent (no welcome page)

Testing Checklist: Lead Qualification

- ☐ Government email (.gov, .mil) triggers qualification
- ☐ Fortune 500 company triggers qualification
- ☐ 2+ downloads trigger qualification
- ☐ QualificationGate modal opens after qualification

- ☐ QualificationGate form validates all fields
- ☐ Qualification submission creates database record
- ☐ Welcome page URL is generated
- ☐ Welcome page displays correct user data
- ☐ Welcome page shows email engagement metrics
- ☐ Non-qualified leads do not see QualificationGate

Personalized Welcome Pages NEW

Overview

Qualified leads receive personalized welcome pages that display their engagement data, downloaded documents, and email analytics.

URL Structure

Format: `/welcome/[token]`

Example: `/welcome/abc123def456`

Token: Unique, secure token generated for each qualified lead

Page Sections

1. Hero Section

- **Personalized Greeting:** "Welcome back, [First Name]!"
- **Company Name:** "[Company Name]"
- **Qualification Badge:** Visual indicator of qualification reason

2. Your Downloads Section

Displays:

- List of all documents downloaded by this email

- Document titles
- Download timestamps
- Download count

3. Email Engagement Section NEW

Displays:

- Email health badges showing engagement status
- Metrics:
    - Emails delivered
    - Emails opened
    - Links clicked
    - Last engagement timestamp
- Visual engagement timeline (future enhancement)

4. Next Steps Section

Call-to-Action:

- **Primary CTA:** "Book a Demo" (links to Calendly)
- **Secondary CTA:** "Download More Resources" (links to /resources)

5. Contact Information

- Sales team email
- Phone number
- Office hours

Testing Personalized Welcome Pages

Test Case 1: Valid Token

Setup:

1. Qualify a lead and get welcome token

2. Navigate to `/welcome/[token]`

Expected Behavior:

- Page loads successfully
- Personalized greeting displays correct name
- Company name displays correctly
- Downloads section shows all downloaded documents
- Email engagement section shows correct metrics
- Email health badges display correctly
- CTAs are clickable and functional

Test Case 2: Invalid Token

Setup:

1. Navigate to `/welcome/invalid-token-123`

Expected Behavior:

- Show error message: "Invalid or expired welcome link"
- Provide link to homepage
- Do NOT display any user data

Test Case 3: Expired Token

Setup:

1. Use token older than 90 days (if expiration implemented)

Expected Behavior:

- Show error message: "This welcome link has expired"
- Provide contact information to request new link

Test Case 4: Email Engagement Display

Setup:

1. Qualify lead with multiple email events (delivered, opened, clicked)
2. Navigate to welcome page

Expected Behavior:

- Email engagement section displays all badges
- Metrics show correct counts
- Last engagement timestamp is accurate
- Badges match those in email analytics dashboard

Testing Checklist: Personalized Welcome Pages

- ☐ Valid token loads page successfully
- ☐ Invalid token shows error message
- ☐ Personalized greeting displays correct name
- ☐ Company name displays correctly
- ☐ Downloads section shows all documents
- ☐ Download timestamps are formatted correctly
- ☐ Email engagement section displays
- ☐ Email health badges render correctly
- ☐ Email metrics are accurate
- ☐ "Book a Demo" CTA links to Calendly
- ☐ "Download More Resources" CTA links to /resources
- ☐ Contact information is correct
- ☐ Page is responsive on mobile
- ☐ Page loads quickly (< 2 seconds)

SendGrid Webhook Integration NEW

Overview

SendGrid webhooks enable real-time tracking of email events (delivered, opened, clicked, bounced, spam, unsubscribed). This data powers the email analytics dashboard, suppression system, and engagement tracking.

Webhook Endpoint

URL: `https://yourdomain.manus.space/api/webhooks/sendgrid`

Method: POST

Authentication: Signature verification (optional but recommended)

Event Types Tracked

Event Type	Description	Triggers
delivered	Email successfully delivered	Updates emailStatus.delivered
open	Recipient opened email	Updates emailStatus.opened
click	Recipient clicked link	Updates emailStatus.clicked
bounce	Email bounced	Updates emailStatus.bounce, triggers suppression
dropped	SendGrid dropped email	Triggers suppression
spam_report	Marked as spam	Updates emailStatus.spam, triggers suppression
unsubscribe	Recipient unsubscribed	Updates emailStatus.unsubscribed, triggers suppression

Webhook Processing Flow

1. **SendGrid sends POST request** to webhook endpoint
2. **Webhook handler validates signature** (if verification key provided)

3. **For each event in batch:**
   - Extract email address and event type
   - **Record event** in `emailEvents` table
   - **Update aggregated stats** in `emailStatus` table
   - **Check if event triggers suppression** (bounce, spam, unsubscribe, dropped)
   - **If suppression triggered:**
     - Set `isSuppressed = 1`
     - Set `suppressionReason = [event type]`
     - Set `suppressedAt = NOW()`
     - Log suppression action

4. **Return 200 OK** to SendGrid

Production Configuration

Step-by-Step Setup:

1. **Log in to SendGrid Dashboard**

2. **Navigate to:** Settings → Mail Settings → Event Webhook

3. **Click:** Create New Webhook

4. **Enter Webhook URL:**
   `https://yourdomain.manus.space/api/webhooks/sendgrid`

5. **Enable Event Types:**
   - ✅ Delivered
   - ✅ Opened
   - ✅ Clicked
   - ✅ Bounced
   - ✅ Dropped
   - ✅ Spam Report
   - ✅ Unsubscribe
   - ❌ Deferred (not needed)

- ❌ Processed (not needed)

6. **Generate Verification Key** (recommended for production)

7. **Add Verification Key to Environment Variables:**
   - Variable: `SENDGRID_WEBHOOK_VERIFICATION_KEY`
   - Value: Public key from SendGrid

8. **Click:** Save

9. **Send Test Notification** to verify webhook is reachable

Detailed Setup Guide: See `SENDGRID_PRODUCTION_SETUP.md` in project root

Testing SendGrid Webhook

Test Case 1: Delivered Event

Setup:

1. Use test script: `node test-webhook.mjs delivered test@example.com`

Expected Behavior:

- Event recorded in `emailEvents` table
- `emailStatus.delivered` incremented
- `emailStatus.lastEvent = "delivered"`
- `emailStatus.lastEventAt` updated

Test Case 2: Opened Event

Setup:

1. Use test script: `node test-webhook.mjs open test@example.com`

Expected Behavior:

- Event recorded in `emailEvents` table
- `emailStatus.opened` incremented
- `emailStatus.lastEvent = "open"`

- Email analytics dashboard shows opened badge

Test Case 3: Clicked Event

Setup:

1. Use test script: `node test-webhook.mjs click test@example.com`

Expected Behavior:

- Event recorded in `emailEvents` table
- `emailStatus.clicked` incremented
- `emailStatus.lastEvent = "click"`
- Email analytics dashboard shows clicked badge

Test Case 4: Bounce Event (Triggers Suppression)

Setup:

1. Use test script: `node test-webhook.mjs bounce test@example.com`

Expected Behavior:

- Event recorded in `emailEvents` table
- `emailStatus.bounce` incremented
- **`emailStatus.isSuppressed = 1`**
- **`emailStatus.suppressionReason = "bounce"`**
- **`emailStatus.suppressedAt` set to current timestamp**
- Email analytics dashboard shows bounced badge
- Future download attempts blocked

Test Case 5: Spam Report (Triggers Suppression)

Setup:

1. Use test script: `node test-webhook.mjs spam_report test@example.com`

Expected Behavior:

- Event recorded in `emailEvents` table
- `emailStatus.spam` incremented
- **Email automatically suppressed**
- Email analytics dashboard shows spam badge

Test Case 6: Unsubscribe (Triggers Suppression)

Setup:

1. Use test script: `node test-webhook.mjs unsubscribe test@example.com`

Expected Behavior:

- Event recorded in `emailEvents` table
- `emailStatus.unsubscribed` incremented
- **Email automatically suppressed**
- Email analytics dashboard shows unsubscribed badge

Test Case 7: Signature Verification

Setup:

1. Set `SENDGRID_WEBHOOK_VERIFICATION_KEY` environment variable
2. Send webhook request with invalid signature

Expected Behavior:

- Webhook returns 401 Unauthorized
- Event is NOT processed
- Error logged: "Webhook signature verification failed"

Test Case 8: Batch Events

Setup:

1. Send webhook request with multiple events in single payload

Expected Behavior:

- All events processed successfully

- Each event recorded individually

- Aggregated stats updated correctly

- Webhook returns 200 OK

Testing Checklist: SendGrid Webhook

- [ ] Webhook endpoint is publicly accessible

- [ ] Delivered events are recorded correctly

- [ ] Opened events are recorded correctly

- [ ] Clicked events are recorded correctly

- [ ] Bounced events are recorded and trigger suppression

- [ ] Spam report events are recorded and trigger suppression

- [ ] Unsubscribe events are recorded and trigger suppression

- [ ] Dropped events trigger suppression

- [ ] Signature verification works (if enabled)

- [ ] Invalid signature returns 401

- [ ] Batch events are processed correctly

- [ ] Webhook logs are readable and useful

- [ ] Email analytics dashboard reflects webhook data

- [ ] Suppression system responds to webhook events

- [ ] Webhook performance is acceptable (< 500ms per event)

Modal Behaviors

1. EmailCaptureModal

Trigger: Click on service one-pager card or featured document

Contents:

- Modal title: "Download [Document Name]"
- 3 form fields: Full Name, Email Address, Company Name
- Submit button: "Download"
- Close button (X in top right)

Behaviors:

Action	Expected Result
Click outside modal	Close modal (no download)
Press ESC key	Close modal (no download)
Click X button	Close modal (no download)
Submit with empty fields	Show validation errors, do NOT close
Submit with invalid email	Show validation error, do NOT close
Submit with valid data (suppressed email)	Show error toast, do NOT close **NEW**
Submit with valid data (limit reached)	Close EmailCaptureModal, open DownloadLimitReachedModal
Submit with valid data (limit NOT reached)	Show success state, trigger download, auto-close after 2 seconds

2. DownloadLimitReachedModal

Trigger: User attempts 4th download (limit is 3)

Contents:

- Title: "Download Limit Reached"
- Message: "You've downloaded the maximum of 3 documents. For additional access, please contact our sales team."
- Contact information: sales@intelleges.com
- Close button

Behaviors:

Action	Expected Result
Click outside modal	Close modal
Press ESC key	Close modal
Click Close button	Close modal

3. QualificationGate Modal NEW

Trigger: Qualified lead completes document download

Contents:

- Title: "Tell Us More About Your Needs"
- Subtitle: Personalized based on qualification reason
- 3 additional fields:
    - Job Title (text input)
    - Company Size (dropdown)
    - Primary Compliance Need (dropdown)
- Submit button: "Continue"
- Skip button: "Maybe Later"

Behaviors:

Action	Expected Result
Click outside modal	Do NOT close (force user to make choice)
Press ESC key	Close modal (same as "Maybe Later")
Click "Maybe Later"	Close modal, no qualification recorded
Submit with empty fields	Show validation errors, do NOT close
Submit with valid data	Record qualification, close modal, show success toast

Edge Cases & Error Handling

Download System Edge Cases

Scenario	Expected Behavior
User at exactly 3 downloads	Block 4th download, show limit modal
User tries same document twice	Each download counts toward limit
User uses different email	New download count (limit is per email)
User uses email variation (test@example.com vs Test@Example.com)	Treated as same email (case-insensitive)
Network error during download	Show error toast, do NOT increment download count
S3 URL expired	Show error toast, regenerate URL, retry download

Email Suppression Edge Cases NEW

Scenario	Expected Behavior
Email suppressed mid-download	Download completes, but follow-up email NOT sent
Email suppressed then unsuppressed	Can download again, receives follow-up emails
Multiple suppression events (bounce + spam)	Last event wins, suppressionReason updated
Suppression check fails (API error)	Allow download to proceed (fail open), log error
Case-insensitive email matching	Test@Example.com and test@example.com treated as same

Email Analytics Edge Cases NEW

Scenario	Expected Behavior
Email with no events	Shows in table with all zeros
Email with only delivered event	Shows delivered badge only
Email with 10+ events	Badge group shows first 4 + "+N more"
Webhook event for unknown email	Create new emailStatus record
Duplicate webhook events	Deduplicate based on event ID, do NOT double-count

Form Validation Edge Cases

Scenario	Expected Behavior
Empty name field	Show error: "Name is required"
Invalid email format	Show error: "Please enter a valid email address"
Email with spaces	Trim spaces, validate trimmed email
Very long name (> 255 chars)	Truncate to 255 chars, accept submission
Special characters in name	Accept all Unicode characters
Company name with numbers	Accept (e.g., "3M Company")

Testing Checklists

Pre-Release Checklist

- ☐ All navigation links work correctly
- ☐ All CTAs trigger expected actions
- ☐ EmailCaptureModal workflow functions end-to-end
- ☐ Download limit enforcement works correctly
- ☐ Follow-up emails are scheduled correctly

- [ ] Email suppression system blocks suppressed addresses **NEW**
- [ ] Email analytics dashboard displays accurate data **NEW**
- [ ] Email health badges render correctly **NEW**
- [ ] Lead qualification system identifies qualified leads **NEW**
- [ ] Personalized welcome pages display correct data **NEW**
- [ ] SendGrid webhook processes events correctly **NEW**
- [ ] Case studies redirect to Calendly
- [ ] Contact form submits successfully
- [ ] All modals open and close correctly
- [ ] Form validation works on all forms
- [ ] Mobile responsive design works on all pages
- [ ] Page load times are acceptable (< 3 seconds)
- [ ] No console errors on any page
- [ ] All images load correctly
- [ ] Footer links work correctly

Regression Testing Checklist

After any code changes, verify:

- [ ] Download system still enforces 3-document limit
- [ ] EmailCaptureModal still validates all fields
- [ ] Follow-up emails still schedule correctly
- [ ] Email suppression still blocks suppressed addresses **NEW**
- [ ] Email analytics dashboard still loads **NEW**
- [ ] SendGrid webhook still processes events **NEW**
- [ ] Navigation still works on all pages
- [ ] No new console errors introduced

Performance Testing Checklist

- [ ] Homepage loads in < 2 seconds

- [ ] One-pagers page loads in < 2 seconds
- [ ] Resources page loads in < 2 seconds
- [ ] Case studies page loads in < 3 seconds (17 cards)
- [ ] Email analytics dashboard loads in < 3 seconds **NEW**
- [ ] EmailCaptureModal opens instantly (< 100ms)
- [ ] Download starts within 1 second of submission
- [ ] Webhook processes events in < 500ms **NEW**
- [ ] Database queries complete in < 100ms
- [ ] API responses return in < 500ms

Security Testing Checklist

- [ ] Email addresses are validated server-side
- [ ] Download limits cannot be bypassed via API manipulation
- [ ] Webhook signature verification works (if enabled) **NEW**
- [ ] Personalized welcome page tokens cannot be guessed **NEW**
- [ ] Admin dashboard requires authentication **NEW**
- [ ] SQL injection attempts are blocked
- [ ] XSS attempts are sanitized
- [ ] CSRF protection is enabled
- [ ] Environment variables are not exposed to client

Automated Test Verification NEW

Overview

The project includes automated test suites to verify core functionality. QA should run these tests before manual testing to catch regressions early.

Test Suites

1. Email Suppression System Tests

File: `server/test-email-suppression.test.ts`

Coverage:

- Manual suppression/unsuppression
- Automatic suppression via webhook simulation
- Suppression status checking
- Email capture blocking
- Follow-up email prevention
- Case-insensitive email handling
- Edge cases and multiple suppressions

Run Command:

```
pnpm vitest run server/test-email-suppression.test.ts
```

Expected Output:

```
✓ Email Suppression System (9 tests)
✓ Email Suppression Edge Cases (3 tests)
Test Files  1 passed (1)
Tests  12 passed (12)
```

2. Download System Tests (Future)

File: `server/test-download-system.test.ts` (to be created)

Coverage:

- Download limit enforcement
- Email capture validation
- Follow-up email scheduling

- Download count tracking

3. Lead Qualification Tests (Future)

File: `server/test-lead-qualification.test.ts` (to be created)

Coverage:

- Government email detection
- Fortune 500 company detection
- High download volume detection
- Qualification gate workflow

Running All Tests

Command:

```
pnpm test
```

Expected Behavior:

- All tests pass
- No console errors
- Test coverage > 80%

Test Failure Protocol

If any automated tests fail:

1. **Do NOT proceed with manual testing**
2. **Report failure to development team**
3. **Include:**
   - Test name
   - Error message
   - Stack trace

- Steps to reproduce

4. **Wait for fix before continuing QA**

Appendix

Test Data

Test Emails:

- `test@example.com` - Standard test email

- `bounce@simulator.amazonses.com` - Simulates bounce

- `spam@example.com` - For spam testing

- `unsubscribe@example.com` - For unsubscribe testing

- `john.doe@navy.mil` - Government email (triggers qualification)

- `jane.smith@lockheedmartin.com` - Fortune 500 (triggers qualification)

Test Companies:

- "Lockheed Martin" - Fortune 500

- "Northrop Grumman" - Fortune 500

- "Small Business Inc" - Non-qualified

- "Test Company" - Generic test

API Endpoints Reference

Endpoint	Type	Purpose
`documentDownloads.checkLimit`	Query	Check download limit
`documentDownloads.recordDownload`	Mutation	Record download and schedule email
`emailSuppression.checkEmailSuppression`	Query	Check if email is suppressed **NEW**
`emailSuppression.suppressEmail`	Mutation	Manually suppress email **NEW**
`emailSuppression.unsuppressEmail`	Mutation	Remove suppression **NEW**
`emailSuppression.getSuppressionStats`	Query	Get suppression statistics **NEW**
`emailAnalytics.overview`	Query	Get email analytics overview **NEW**
`emailAnalytics.listStatus`	Query	Get email status list **NEW**
`emailAnalytics.getEmailTimeline`	Query	Get event timeline for email **NEW**
`qualification.checkQualification`	Query	Check if lead is qualified **NEW**
`qualification.submitQualification`	Mutation	Submit qualification data **NEW**
`contact.submitForm`	Mutation	Submit contact form

Database Tables Reference

Table	Purpose
`documentDownloads`	Track document downloads per email
`scheduledEmails`	Queue for follow-up emails
`emailStatus`	Aggregated email engagement metrics **NEW**
`emailEvents`	Individual email events from SendGrid **NEW**
`leadQualificationAttempts`	Qualified lead data **NEW**

Environment Variables

Variable	Purpose	Required
`SENDGRID_API_KEY`	SendGrid API authentication	Yes
`SENDGRID_FROM_EMAIL`	Sender email address	Yes
`SENDGRID_FROM_NAME`	Sender name	Yes
`SENDGRID_WEBHOOK_VERIFICATION_KEY`	Webhook signature verification	Recommended **NEW**
`DATABASE_URL`	MySQL connection string	Yes
`JWT_SECRET`	JWT token signing	Yes

Revision History

Version	Date	Changes
1.0	Nov 30, 2025	Initial release
2.0	Nov 30, 2025	Added email suppression system, email analytics dashboard, email health badges, lead qualification system, personalized welcome pages, SendGrid webhook integration, and automated test verification

End of QA Testing Guide

For questions or clarifications, contact: sales@intelleges.com