# PANVEL IQ

## *AI-Powered Digital Marketing Intelligence Platform*

**Business Requirements & Solution Architecture Document**

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# 1 Introduction

## 1.1 Purpose

The purpose of this document is to define the business requirements for **PanvelIQ**, an AI-powered digital marketing intelligence platform designed to centralize marketing operations, leverage artificial intelligence for strategic planning and execution, and provide comprehensive analytics and insights. This Business Requirements Document (BRD) outlines the high-level scope, business objectives, functional needs, and contextual background necessary to inform the design, development, and implementation of the platform.

PanvelIQ is engineered to replace fragmented digital marketing tools and workflows with a unified, scalable solution. It integrates 11 core modules, role-based access control, and advanced AI capabilities to streamline marketing operations, enhance client engagement, and enable data-driven decision-making.

Key technologies integrated into the system include:

- **Artificial Intelligence (AI)**: GPT-4, DALL·E, Lumen5, and Ideogram for content generation, strategy planning, and automation.
- **Third-Party APIs**: Meta, LinkedIn, Google Ads, WhatsApp Business, and Canva for seamless campaign execution.
- **Analytics & SEO Tools**: Google Analytics (GA4), Google Search Console, Ahrefs, Moz, and PageSpeed Insights for performance tracking and optimization.

The primary objectives of PanvelIQ are:

- **Centralize Marketing Operations**: Unify all marketing tools and workflows into a single, integrated platform.
- **Leverage AI for Strategy & Execution**: Use AI to drive smarter planning, personalization, and campaign automation.
- **Improve Lead Management & Client Engagement**: Streamline lead nurturing and boost interactions across touchpoints.
- **Enable Insight-Driven Decision-Making**: Harness real-time analytics for faster, data-backed marketing decisions.
- **Provide Scalable, Role-Based Access**: Offer tailored dashboards for admins, clients, and employees.

The platform will consist of the following core modules:

1. AI Project Planner
2. Intelligent Onboarding & Verification System
3. Role-Based Dashboards
4. Communication & Outreach Hub
5. Content Intelligence Hub
6. Social Media Command Center
7. Smart SEO Toolkit
8. Creative Media Studio
9. Ad Strategy & Suggestion Engine
10. Unified Analytics Dashboard
11. AI Assistant for Engagement

This BRD serves as a baseline reference for all technical and functional stakeholders involved in the planning, development, and deployment of PanvelIQ, while allowing room for scalable enhancements in future releases.

## **1.2** Problem Definition

### **1.2.1 Root Causes**

Current challenges in Panvel Consulting's marketing operations include:

- **Fragmented Tools**: Disconnected platforms for social media, SEO, and ads lead to inefficiencies.
- **Manual Processes**: Time-consuming tasks like content creation, lead management, and reporting.
- **Lack of Centralization**: No unified view of cross-channel performance or client engagement.
- **Scalability Issues**: Limited ability to handle growing client demands with existing workflows.

### **1.2.2 Business Consequences**

- Delayed campaign execution and approvals.
- Inconsistent data interpretation and reporting.
- Higher operational costs due to redundant tools and manual efforts.
- Missed opportunities for real-time optimization and personalization.

### 1.2.3 Vision for Solution

PanvelIQ will consolidate all marketing functions into a single AI-driven platform, enabling:

- **Automation**: AI-assisted content generation, ad strategy, and SEO optimization.
- **Integration**: Seamless connectivity with Meta, Google, WhatsApp, and other APIs.
- **Role-Based Efficiency**: Tailored dashboards for admins, clients, and employees.
- **Data-Driven Insights**: Unified analytics for performance tracking and forecasting.

The platform will serve as a **virtual marketing team**, minimizing manual intervention while maximizing accuracy, speed, and ROI.

# 2  Detailed Requirements

## 2.1  Business Requirements

The main goal of process modeling is to build a logical system that will serve as the foundation for PanvelIQ's AI-powered digital marketing platform. This modeling describes, organizes, and explains the system's operational rules while creating an implementation roadmap for seamless marketing operations.

### 2.1.1  Core Use Cases

Below is a proposed list of **To-Be Use Cases**, defining actors and documenting every use case using a unified template and BPMN methodology. These use cases represent a structured breakdown of key system processes required.

## 2.2  AI Project Planner

| UC ID | Use Case Description |
|-------|---------------------|
| 001 | AI Strategy Drafting – Generate proposals using client inputs (business type/budget) |
| 002 | Competitive Differentiation – Auto-highlight unique value propositions |
| 003 | Editable Proposal Builder – Modify AI-generated content/timelines |
| 004 | Final proposal shared as PDF, interactive link, or client-facing dashboard |

## 2.3  Intelligent Onboarding & Verification

| UC ID | Use Case Description |
|-------|---------------------|
| 005 | Tiered Registration – Select package (Basic/Pro/Enterprise) |
| 006 | OTP Verification – Email/SMS confirmation |
| 007 | Document Validation – Upload/approve business licenses |
| 008 | Chatbot support - chatbot is embedded and active on every page. |

## 2.4  Role-Based Dashboards

| UC ID | Use Case Description |
|-------|---------------------|
| 009 | Admin Financial Dashboard – P&L, user metrics, system management |
| 010 | Client Portal – SEPARATE module with limited campaign visibility and messaging |
| 011 | Employee Workspace – Task lists, AI tool access, full campaign management |

## 2.5  Communication & Outreach Hub

| UC ID | Use Case Description |
|-------|---------------------|
| 012 | WhatsApp Automation – Template-based broadcasts |
| 013 | Email Campaign Builder – AI-generated sequences |
| 014 | Triggered Messaging – Behavior-based responses |

## 2.6  Content Intelligence Hub

| UC ID | Use Case Description |
|-------|---------------------|
| 015 | Cross-Platform Content Generator – Posts/Reels/Carousel |
| 016 | Hashtag/CTA Optimizer – AI-powered suggestions |
| 017 | Content Performance Analyzer – Engagement metrics |

## 2.7  Social Media Command Center

| UC ID | Use Case Description |
|-------|---------------------|
| 018 | Smart Scheduling – Best-time posting algorithm |
| 019 | Trend Monitoring – Real-time viral topic detection |
| 020 | Unified Inbox – Manage cross-platform messages |

## 2.8  Smart SEO Toolkit

| UC ID | Use Case Description |
|-------|---------------------|
| 021 | Technical SEO Audit – Crawl/identify site issues |
| 022 | Backlink Strategist – Suggest outreach targets |
| 023 | SERP Tracker – Keyword ranking monitor |

## 2.9  Creative Media Studio

| UC ID | Use Case Description |
|-------|---------------------|
| 024 | Text-to-Media – Generate images/videos from prompts |
| 025 | Brand Kit Integration – Apply colors/fonts automatically |
| 026 | Asset Library – Store/organize creatives |

## 2.10  Ad Strategy & Suggestion Engine

| UC ID | Use Case Description |
|-------|---------------------|
| 027 | Audience Builder – AI-segmented customer groups |
| 028 | Ad Copy Generator – Platform-optimized variants |
| 029 | Performance Predictor – Forecast CTR/ROAS/CPC |

## 2.11  Unified Analytics Dashboard

| UC ID | Use Case Description |
|-------|---------------------|
| 030 | Custom Report Builder – Filter by platform/KPI |
| 031 | Anomaly Detection – Alert on metric deviations |
| 032 | Export Engine – PDF/CSV/API data outputs |

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## 2.12 AI Assistant for Engagement

| UC ID | Use Case Description |
|-------|----------------------|
| 033 | Conversational Interface – NLP-based Q&A |
| 034 | Lead Qualifier – Chat-based scoring |
| 035 | Sentiment Analyzer – Detect client mood from messages |
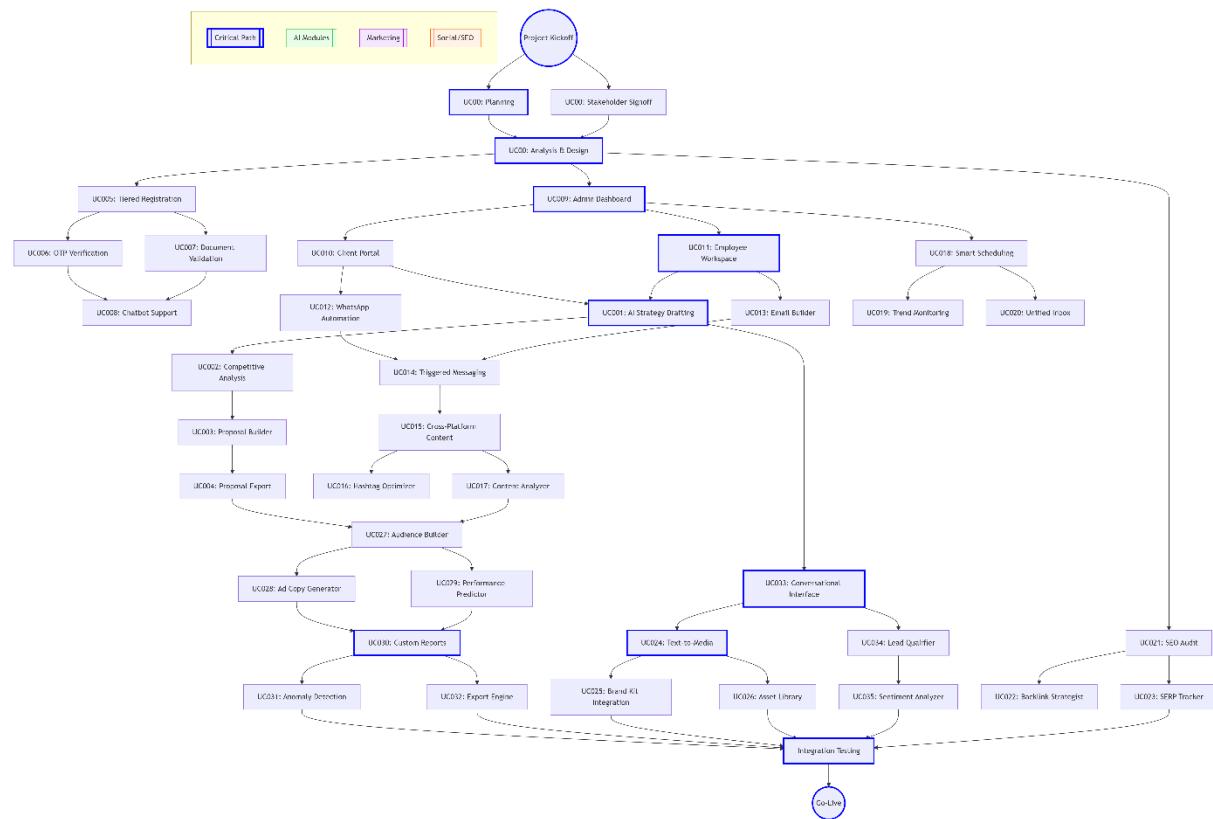
## 2.13 Actors

| Actor | Description |
|-------|-------------|
| Admin | Configures system, manages users, monitors financials |
| Client | Views project reports, manages approval requests, communicates with team |
| Employee | Executes campaigns using AI tools |
| System | Automated AI/analytics processes |

# 3  General to-be Use Cases

In this section general overview of all general use cases will be shown along with dependency tree describing connections between use cases.

Below are shown fundamental use cases with dependencies between them.



**Parallel Tracks**:
- o   Social/SEO (UC018-023) runs independently after design phase
- o   Creative Studio (UC024-026) develops alongside marketing tools

## Use Case Title

AI Strategy Drafting – AI-powered campaign strategy generation

**ID**  001

## Actors

- **Employee** (Marketing Specialist/Consultant)
- **Client** (Provides input via discovery form)
- **System** (AI Strategy Generator Module)
- **Admin** (Optional for manual review/edits)

## Overall Description

This use case describes how the AI-powered platform generates a tailored digital marketing strategy draft based on client inputs (business type, budget, challenges, etc.) and industry data. The output includes campaign recommendations, platform suggestions, and predictive insights.

## Business Trigger / Frequency

- Triggered when a new client onboarding begins or an existing client requests a strategy refresh.
- Frequency: Per client engagement (ad-hoc or periodic).

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Client details (business type, budget, target audience) | Suggested campaigns with dropdown selection |
| Current challenges, existing digital presence | Recommended platforms with dropdown selection |
| Industry benchmarks (via integrated APIs) | Recommended creative formats with dropdown selection |

## Use Case Description (Step-by-Step)

1. **Employee**: Logs into the Employee Dashboard and selects "AI Project Planner."
2. **Employee**: Inputs client data via the **Discovery Prompt Template**:
   o Business type, budget, target audience.
   o Current challenges (e.g., low CTR, poor lead quality).
   o Existing digital assets (website, social pages).
3. **System**: Validates inputs in real-time (e.g., budget range, URL formats).
4. **System**: Generates a **Competitive Analysis** by comparing client data with industry benchmarks (via integrated APIs like Ahrefs, Meta Insights).
5. **System**: Produces a Strategy Draft with dropdown selections for:
   o Suggested campaigns (paid/organic).
   o Platform prioritization.
   o Recommended creative formats.
   o Timeline milestones
6. **Employee**: Reviews and edits the draft (tone, visuals, modules).
7. **System**: Exports the final draft as a **PDF** or **client-facing dashboard**.

## Alternative Flows

- **A1: Incomplete Client Data**
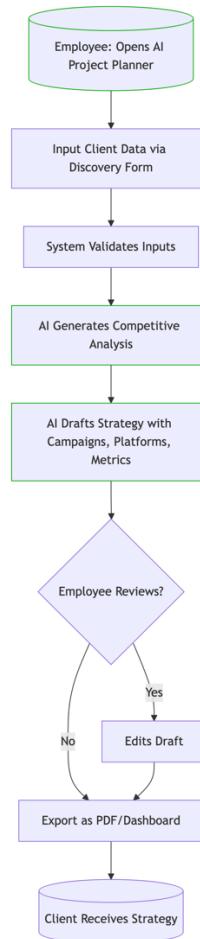
- - o System flags missing fields and prompts the employee to clarify.
- **A2: Low Confidence Prediction**
  - o AI alerts the employee to manually review suggestions due to insufficient industry data.
- **A3: Client Revisions**
  - o Employee triggers a re-generate with updated inputs (e.g., budget change).

o

**BDMN Diagram**



**Notes**

- **Compliance**: All client data is encrypted; AI outputs are non-binding recommendations.
- **Integration**: Uses Meta Insights, Google Ads API, and third-party SEO tools.
- **Security**: Role-based access ensures only authorized employees edit drafts.

**Related Requirements**

| Type | ID | Description |
| --- | --- | --- |
| Functional | 1.1 | AI-generated strategy with editable modules. |
| Non-Functional | 2.4 | Response time <5 seconds for draft generation. |
| Security | 3.2 | Client data anonymized for AI training. |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Client Details | Business Type | Dropdown | Required |
| | Budget Range | Slider | Min $500 |
| Campaign Goals | Target Audience | Multi-select | Demographics validation |
| Existing Assets | Website URL | Text Input | Valid URL format |

## Database Tables

**Table: ai_strategy_drafts**

| Field | Type | Description |
|---|---|---|
| strategy_id | INT (PK) | Auto-increment |
| client_id | INT (FK) | Links to client profile |
| generated_at | DATETIME | UTC timestamp |
| content_json | JSON | AI-generated strategy modules |
| last_edited_by | VARCHAR(50) | Employee email |

## Assumptions

1. Client inputs are accurate; AI assumes no data tampering.
2. Industry benchmarks are updated quarterly via API integrations.
3. Employees manually verify AI-recommended budgets against client constraints.

## Use Case Title

**Competitive Analysis – AI-driven market positioning insights**

**ID** 002

## Actors

- **Employee** (Marketing Specialist/Consultant)
- **System** (AI Strategy Generator Module)
- **Admin** (Optional for audit/review)

## Overall Description

This use case describes how the platform's AI analyzes a client's competitive landscape using their inputs (business type, target audience) and industry benchmarks. The output highlights differentiation opportunities and benchmarks for campaign performance.

## Business Trigger / Frequency

- Triggered during **AI Strategy Drafting (UC001)** or standalone competitive research.
- Frequency: Per strategy draft or ad-hoc request.

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Client's business type, competitors | Competitive positioning report (visualized strengths/weaknesses). |
| Industry benchmarks (via APIs) | Suggested differentiators (e.g., "Leverage AI-driven targeting over rivals"). |
| Historical campaign data | Performance benchmarks (CTR, CPC, ROAS vs. industry averages). |

## Use Case Description (Step-by-Step)

1. **Employee**: Initiates analysis from the **AI Project Planner** or **Strategy Draft (UC001)**.
2. **System**: Fetches competitor data via integrated APIs (e.g., Ahrefs, Meta Insights, Google Ads).
3. **System**: Compares client's:
   - **Audience overlap** (demographics, interests).
   - **Content performance** (engagement rates, ad spend efficiency).
   - **SEO gaps** (keyword rankings, backlink profiles).
4. **System**: Generates a **Competitive Differentiator Summary** with:
   - **Opportunities**: "Competitors lack video ads; recommend Reels."
   - **Threats**: "Rivals dominate LinkedIn B2B; focus on niche forums."
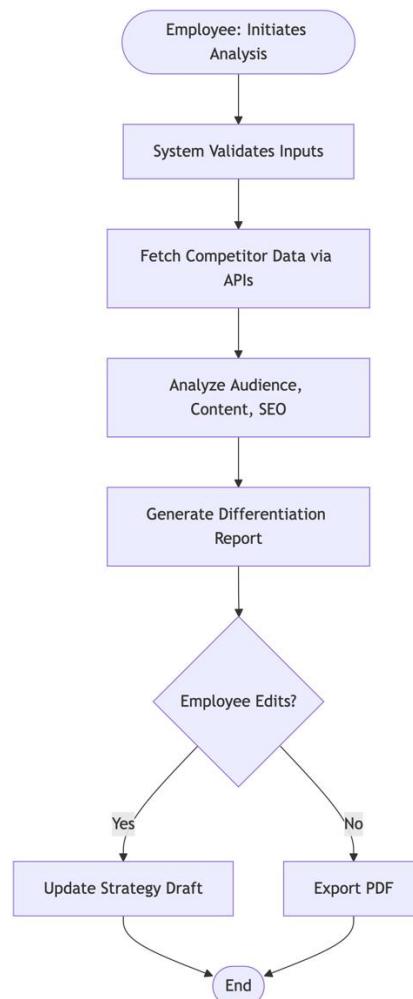
5. **Employee**: Adjusts recommendations (e.g., exclude specific competitors).
6. **System**: Updates the **Strategy Draft (UC001)** or exports as a standalone report.

## Alternative Flows

- **A1: No Competitor Data Found**
  - System suggests manual competitor entry or broad industry benchmarks.
- **A2: Outdated API Data**
  - Flags stale benchmarks and defaults to historical client data.

## BDMN Diagram

```
        Employee: Initiates
             Analysis
                |
                v
      System Validates Inputs
                |
                v
      Fetch Competitor Data via
              APIs
                |
                v
      Analyze Audience,
       Content, SEO
                |
                v
     Generate Differentiation
             Report
                |
                v
          Employee Edits?
         /              \
      Yes                No
       |                  |
       v                  v
  Update Strategy      Export PDF
     Draft
         \              /
              End
```

## Notes

- **Compliance**: Competitor data anonymized; sources cited in footnotes.
- **Integration**: Ahrefs (SEO), Meta Insights (ads), Google Ads API.

## Related Requirements

| Type | ID | Description |
|------|-----|-------------|
| Functional | 1.2 | Real-time competitor benchmarking. |
| Non-Functional | 2.5 | API response time <3 seconds. |

## Database Tables

**Table**: competitive_analysis

| Field | Type | Description |
|-------|------|-------------|
| analysis_id | INT (PK) | Auto-increment. |
| strategy_id | INT (FK) | Links to ai_strategy_drafts. |
| top_competitors | JSON | Competitor names, domains, strengths. |
| opportunity_score | FLOAT | AI-calculated differentiation potential. |

## Assumptions

1. Competitor data is publicly available via APIs.
2. Employee understands industry terminology (e.g., "share of voice").

## Use Case Title

**Proposal Builder – AI-assisted client proposal generation**

**ID**  003

## Actors

- **Employee** (Marketing Specialist)
- **System** (AI Strategy Generator + Proposal Engine)
- **Client** (Receives final proposal)

## Overall Description

This use case covers the transformation of the AI-generated strategy draft (from UC001/UC002) into a polished, client-ready proposal with customizable modules, visuals, and pricing.

## Business Trigger / Frequency

- Triggered after **Competitive Analysis (UC002)** or manual request.
- Frequency: Per client engagement.

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| AI-generated strategy draft (JSON) | Interactive/client-ready proposal (PDF, dashboard, or shareable link). |
| Employee edits (tone, pricing, etc.) | Competitive differentiation highlights. |
| Client branding (logo, colors) | Budget breakdown with ROI projections. |

## Use Case Description (Step-by-Step)

1. **Employee**: Selects "Proposal Builder" from the **AI Project Planner**.
2. **System**: Auto-populates sections from **UC001/UC002**:
   - Campaign recommendations.
   - Competitive differentiators.
   - Predictive metrics (CTR, ROAS).
3. **Employee**: Customizes:
   - **Tone**: Formal vs. conversational.
   - **Modules**: Toggles sections (e.g., exclude SEO if client opts out).
   - **Visuals**: Uploads client logo, selects theme colors.
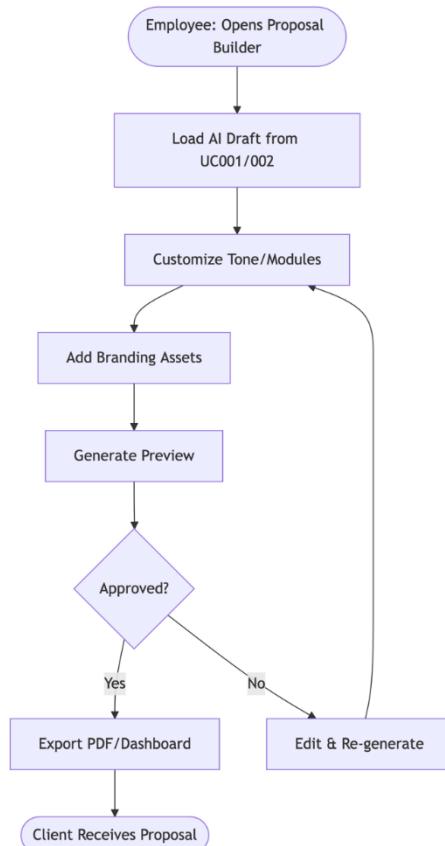
4. **System**: Generates a preview with:
   - **Pricing calculator**: Adjusts costs in real-time based on modules selected.
   - **ROA simulator**: "If you spend $X, expect ~Y leads."
5. **Employee**: Shares proposal via:
   - **PDF export.**
   - **Client dashboard** (live tracking).
   - **Email** (integrated with UC013).

## Alternative Flows

- **A1: Client Requests Revisions**
  - Employee updates inputs → system regenerates proposal (audit trail kept).
- **A2: Missing Brand Assets**
  - System defaults to agency branding with placeholder prompts.

## BDMN Diagram

## Notes

- **Integration**: Uses Canva API for templates, ChatGPT for tone adjustment.
- **Security**: Role-based access to pricing edits (admin-only).

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 1.3 | Drag-and-drop proposal editor. |
| Non-Functional | 2.6 | PDF generation in <10 seconds. |

## Database Tables

**Table**: client_proposals

| Field | Type | Description |
|---|---|---|
| proposal_id | INT (PK) | Auto-increment. |
| strategy_id | INT (FK) | Links to ai_strategy_drafts. |
| branding_json | JSON | Client logos, color hex codes. |
| pricing_options | JSON | Tiered pricing with toggleable modules. |

## Assumptions

1. AI-generated draft (UC001) is 80% accurate; employee verifies critical numbers.
2. Client branding assets meet minimum resolution requirements.
3.

## Use Case Title

**Proposal Export - Multi-format strategy delivery**

**ID**: 004

## Actors

- **Employee** (Marketing Specialist)
- **System** (Proposal Export Engine)
- **Client** (Receives exported proposal)
- **Admin** (Audit access)

## Overall Description

Finalizes and distributes client proposals in multiple formats (PDF, interactive dashboard, or API-delivered JSON) with tracking capabilities.

## Business Trigger

- Triggered after proposal approval in UC003
- Frequency: Per client engagement

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Approved proposal (JSON) | Watermarked PDF |
| Export preferences | Interactive dashboard link |
| Client contact info | Email/SMS notification |
| Tracking settings | Audit log entry |
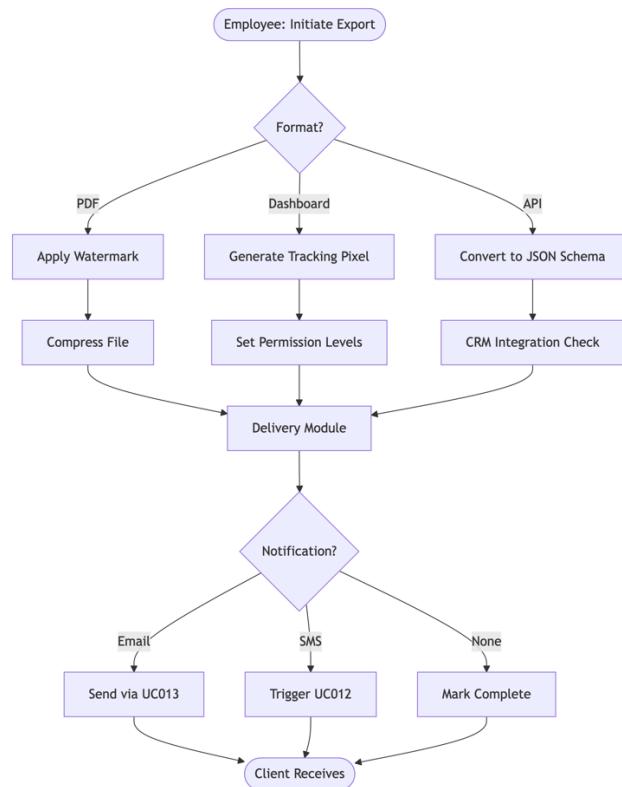
## Use Case Steps

1. **Employee** selects export format from Proposal Builder (UC003)
2. **System** applies:
   - Branding from UC003
   - Digital watermark (for PDF)
   - Tracking pixel (for dashboards)
3. **System** generates:
   - **PDF**: Print-ready with clickable TOC
   - **Dashboard**: Live metrics with client-limited view
   - **API**: JSON for CRM integration
4. **System** logs:
   - Timestamp
   - Employee ID
   - Client access method

## Alternative Flows

- **A1: Large File Export**
  System splits PDF >25MB into volumes with auto-generated cover sheets
- **A2: Expired Link**
  Dashboard access regenerates new link with admin approval

## BDMN Diagram



## Database Tables

**Table**: proposal_exports

| Field | Type | Description |
|---|---|---|
| export_id | UUID | Unique export identifier |
| proposal_id | INT | FK to client_proposals |
| format | ENUM | PDF/Dashboard/API |
| delivery_status | JSON | Opens/downloads tracking |

## Security Notes

1. PDFs encrypted with client-specific passphrase
2. Dashboard links expire after 30 days
3. All exports logged for GDPR compliance

## Performance Metrics

- PDF generation: <8s for 50-page documents
- Dashboard load: <3s for authenticated users

## Use Case Title

**Tiered Registration – Multi-level client onboarding**

**ID**: 005

## Actors

- **Client** (New/Cold user)
- **System** (Registration Engine)
- **Admin** (Approval/Manual override)
- **Payment Gateway** (Stripe/Razorpay)

## Overall Description

Guides clients through package selection (Basic/Pro/Enterprise), collects business verification details, and triggers automated provisioning.

## Business Trigger

- New client visits registration portal
- Existing client upgrades/downgrades package

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Email, business name | Account tier assignment |
| Company size (dropdown) | Payment portal redirect |
| Industry selection | Automated service provisioning |
| Payment method | Welcome kit (email + dashboard) |

## Use Case Steps

1. **Client** accesses registration page via:
   - Main website CTA
   - Direct invite link (UC006)
2. **System** displays interactive tier comparison:
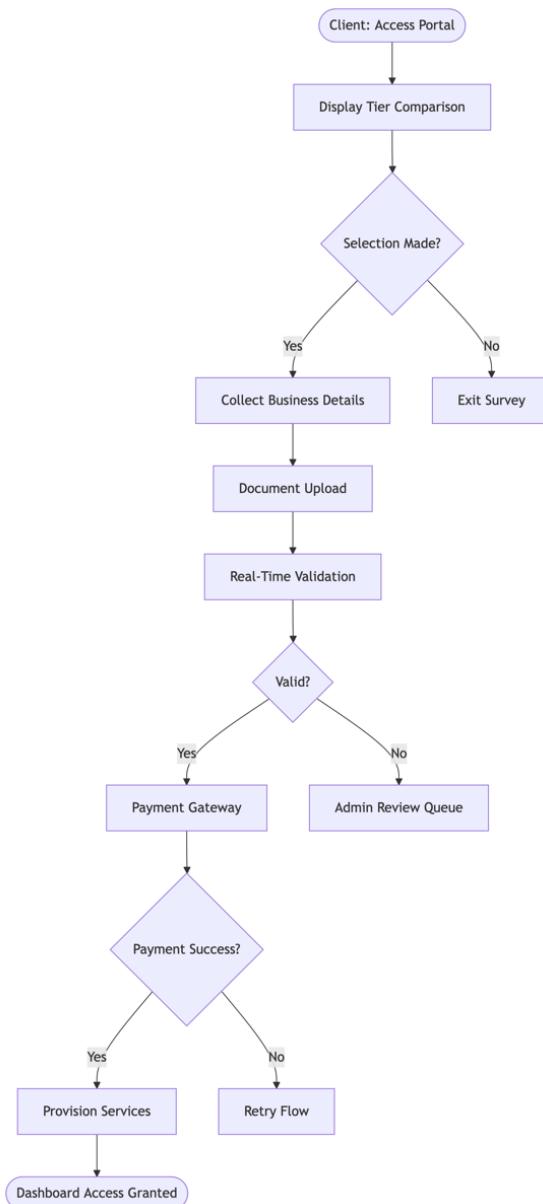
3.  **Client** selects tier → enters:
    - o Business verification docs (PDF/IMG)
    - o Payment details (handled externally)
4.  **System** performs:
    - o Real-time document validation (UC007)
    - o Anti-fraud checks via Clearbit API
5.  **Payment Gateway** confirms success → triggers:
    - o Automated WhatsApp welcome (UC012)
    - o Dashboard provisioning (UC010)

## Alternative Flows

- **A1: Document Rejection**
  System flags mismatched business name → routes to admin manual review
- **A2: Payment Failure**
  Freezes account with "Pending" status → 3 retry attempts

## BDMN Diagram



## Database Schema

**Table:** client_registry

| Field | Type | Constraints |
|-------|------|-------------|
| client_id | UUID | PRIMARY KEY |
| tier | ENUM('Basic','Pro','Enterprise') | NOT NULL |
| kyc_status | ENUM('Pending','Verified','Rejected') | DEFAULT 'Pending' |
| payment_token | VARCHAR(64) | Encrypted |

## Security Controls

1. **Data**: PCI-DSS compliant payment handling
2. **UI**: CAPTCHA on registration form
3. **Audit**: Full trail of tier changes

## Integration Points

1. **Clearbit** (Business verification)
2. **Stripe API** (Payment processing)
3. **WhatsApp Business API** (UC012)

## Performance SLAs

- Document processing: <15s
- Account provisioning: <2min after payment

## Use Case Title

**OTP Verification - Secure client authentication**

**ID**: 006

## Actors

- **Client** (User undergoing verification)
- **System** (Authentication Engine)
- **SMS Gateway** (Twilio/Nexmo)
- **Admin** (Fallback support)

## Overall Description

Manages one-time password (OTP) generation, delivery, and validation during registration/login to prevent fraudulent access.
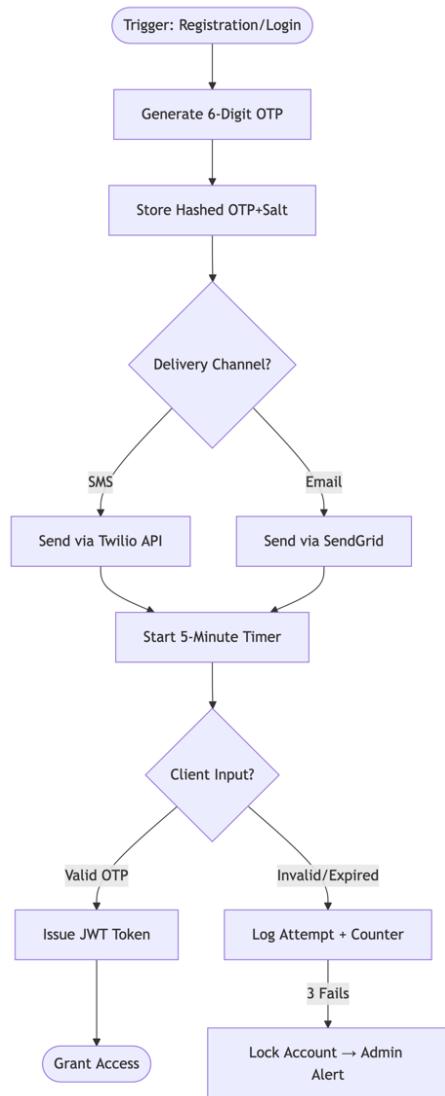
## Business Trigger

- Triggered at:
  - New registration (post UC005)
  - Password reset requests
  - Suspicious login attempts

## Inputs and Outputs

| Inputs | Outputs |
|--------|---------|
| Client mobile/email | 6-digit OTP (SMS/email) |
| Device fingerprint | Verification success/failure log |
| Geolocation data | Session token (JWT) |

**BDMN Diagram**



**Security Specifications**

1. **OTP Generation**:
   o Cryptographically secure random bytes
   o Rate-limited (1 OTP/90s per number)
2. **Transmission**:
   o SMS: Masked sender ID (e.g., "PANVEL-V")
   o Email: DKIM-signed with no-click disclaimer
3. **Validation**:
   o HMAC-SHA256 hash comparison
   o Automatic IP blacklisting after 5 failures

## Alternative Flows

- **A1: Delivery Failure**
  - System switches channel (SMS→email) after 2min timeout
- **A2: No Network**
  - Generates backup TOTP (Google Authenticator compatible)

## Database Schema

**Table:** auth_otp

| Field | Type | Description |
|---|---|---|
| request_id | UUID | OTP session identifier |
| hashed_code | CHAR(64) | SHA-256 hashed OTP |
| salt | CHAR(16) | Per-request entropy |
| expires_at | TIMESTAMP | TTL enforcement |
| delivery_meta | JSON | Carrier/email service logs |

## Integration Requirements

| Service | Purpose | SLA |
|---|---|---|
| Twilio | SMS delivery | <4s latency |
| Redis | OTP caching | <1ms read/write |
| Splunk | Fraud analytics | Real-time alerts |

## UX Considerations

1. **Client Side**:
   - Auto-read SMS OTP on Android/iOS
   - Copy-paste disabled for web forms
2. **Admin Side**:
   - Visual heatmap of failed attempts
   - One-click number whitelisting

## Use Case Title

Document Validation – Automated verification of client documents

**ID**  007

## Actors

- **Client** (Uploads documents)
- **System** (AI Document Validator Module)
- **Admin** (Manual review if validation fails)

## Overall Description

This use case describes how the platform validates client-submitted documents (e.g., business licenses, IDs) during onboarding using AI-powered checks for authenticity, format, and completeness.

## Business Trigger / Frequency

- **Trigger**: Client uploads documents during registration or profile updates.
- **Frequency**: Per client onboarding (1–5 documents per session).

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Client-uploaded documents (PDF, JPG, PNG) | Validation status (Approved/Rejected) |
| Predefined document requirements (e.g., file size, format) | Flagged discrepancies (e.g., expired ID) |
| Admin override (if applicable) | Audit log entry |

## Use Case Description (Step-by-Step)

1. **Client**: Uploads documents via the onboarding portal.

2. **System**:

    o Scans documents for format compliance (e.g., file type, resolution).

    o Extracts text/data using OCR (e.g., expiry dates, registration numbers).

    o Cross-checks extracted data against predefined rules (e.g., "Business license must be valid for 6+ months").

3. **System**:

    o **If valid**: Marks documents as "Approved" and grants dashboard access.

    o **If invalid**: Flags issues (e.g., "ID expired") and notifies the client to re-upload.

4. **Admin** (Alternative Flow A1): Manually reviews disputed documents and overrides the AI decision if needed.

## Alternative Flows
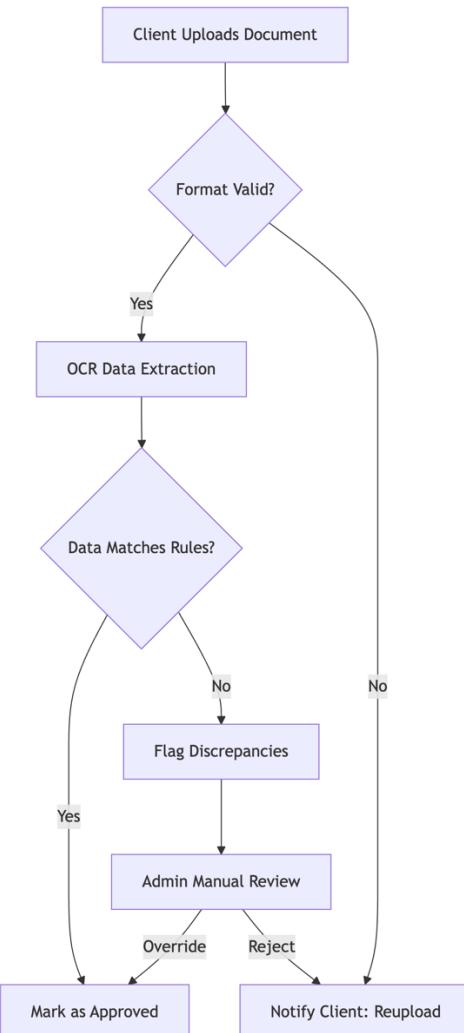
- **A1: Ambiguous Document**

    o System routes to an admin queue for manual review; client receives a pending status notification.

- **A2: Repeated Failures**

    o After 3 rejections, system locks the account and triggers a chatbot-assisted resolution flow.

**BDMN Diagram**

```
            ┌──────────────────────┐
            │ Client Uploads Document │
            └──────────────────────┘
                       │
                       ▼
                  ◇ Format Valid? ◇
                   /            \
                Yes              No
                 │                │
                 ▼                │
        ┌──────────────────┐      │
        │ OCR Data Extraction │    │
        └──────────────────┘      │
                 │                │
                 ▼                │
          ◇ Data Matches Rules? ◇ │
            /          \          │
          Yes           No        │
           │             │        │
           │             ▼        │
           │    ┌──────────────┐  │
           │    │ Flag Discrepancies │
           │    └──────────────┘  │
           │             │        │
           │             ▼        │
           │    ┌──────────────┐  │
           │    │ Admin Manual Review │
           │    └──────────────┘  │
           │     Override   Reject │
           │       │         │    │
           ▼       ▼         ▼    ▼
    ┌──────────────┐   ┌────────────────────┐
    │ Mark as Approved │ │ Notify Client: Reupload │
    └──────────────┘   └────────────────────┘
```

**Notes**

- **Compliance**: Documents are encrypted at rest; audit logs track all validations.

- **Integration**: Uses AWS Textract for OCR and internal rule engines.

- **Security**: Role-based access limits admin overrides to authorized personnel.

**Related Requirements**

| Type | ID | Description |
|------|-----|-------------|
| Functional | 4.1 | AI-driven document validation with OCR. |
| Non-Functional | 4.3 | Process 50+ documents/minute. |
| Security | 3.5 | End-to-end encryption for document storage. |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Document Upload | File Picker | Drag-and-drop | Max 10MB; PDF/JPG/PNG only |
| Validation Status | Progress Indicator | Dynamic badge | "Approved"/"Rejected" states |

## Database Tables

**Table**: document_validation_logs

| Field | Type | Description |
|---|---|---|
| validation_id | INT (PK) | Auto-increment |
| client_id | INT (FK) | Links to client profile |
| document_type | VARCHAR(50) | e.g., "Business License" |
| status | ENUM | Approved/Rejected/Pending |
| validated_at | DATETIME | UTC timestamp |

## Assumptions

1. Clients provide legible documents; blurry/edited files are rejected.

2. Admin manual reviews occur within 24 hours for disputed cases.

3. Document rules are updated annually per regional compliance laws.

## Use Case Title

Chatbot Support – AI-driven real-time assistance for onboarding and issue resolution

**ID.** 008

## Actors

- **User** (Client/Employee/Admin)
- **System** (AI Chatbot Module)
- **Admin** (Fallback for escalated issues)

## Overall Description

This use case describes how the AI chatbot provides instant support during onboarding, document validation (UC007), and general queries, using NLP to resolve issues or escalate to human agents.

## Business Trigger / Frequency

- **Trigger**: User initiates chat via the platform's help icon or during a blocked workflow (e.g., failed document upload).
- **Frequency**: 50–100+ daily interactions (scalable).

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| User text/voice query | Instant responses (text/links) |
| Contextual data (e.g., UC007 validation errors) | Escalation to human agent (if unresolved) |
| User feedback (thumbs up/down) | Chat transcript and improvement logs |

## Use Case Description (Step-by-Step)

1. **User**: Clicks chatbot icon or triggers auto-popup during a blocked action (e.g., document rejection in UC007).
2. **System**:
   - Analyzes query via NLP (e.g., "Why was my document rejected?").
   - Pulls contextual data (e.g., UC007 rejection reason: "Expired ID").
3. **System**:

o **If resolvable**: Provides step-by-step guidance (e.g., "Reupload a valid ID with expiry date >6 months").

o **If unresolved**: Escalates to live agent with chat history.

4. **User**: Rates the interaction; feedback trains the AI model.

## Alternative Flows
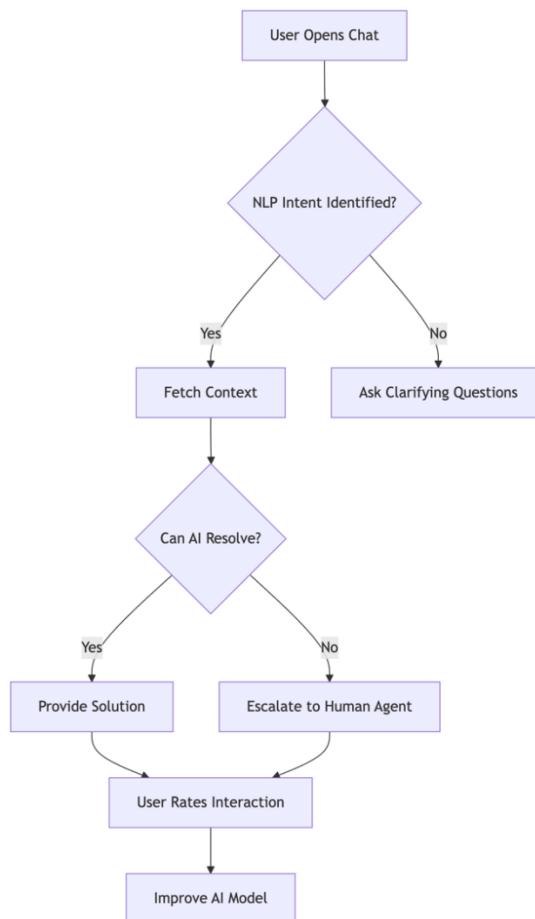
- **A1: Ambiguous Query**

    o Chatbot asks clarifying questions (e.g., "Do you mean document upload or payment issues?").

- **A2: High-Priority Issue**

    o Auto-triggers a callback request if the user selects "Urgent" from the menu.

## BDMN Diagram

## Notes

- **Compliance**: Chats are encrypted; PII is masked in logs.

- **Integration**: Dialogflow NLP engine + UC007 validation APIs.

- **Security**: Role-based access to chat histories (e.g., clients can't view employee chats).

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 5.1 | NLP-driven chatbot with contextual awareness. |
| Non-Functional | 5.3 | <2s response time for 95% of queries. |
| Security | 3.6 | End-to-end chat encryption. |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Chat Interface | Message Input | Text/Voice | 500-character limit |
| | Quick Replies | Buttons | "Document Help", "Payment" |
| Feedback | Thumbs Up/Down | Toggle | Optional |

## Database Tables

**Table**: chatbot_interactions

| Field | Type | Description |
|---|---|---|
| chat_id | INT (PK) | Auto-increment |
| user_id | INT (FK) | Links to user profile |
| query_text | TEXT | User's original query |
| resolution_type | ENUM | AI/Human/Escalated |
| timestamp | DATETIME | UTC timestamp |

## Assumptions

1. Users speak a supported language (English/Spanish initially).

2. Chatbot handles 80% of queries without escalation.

3. Human agents respond to escalations within 15 minutes.

## Use Case Title

Admin Financial Dashboard – P&L, user metrics, system management

**ID.** 009

## Actors

- **Admin** (Platform administrator)
- **System** (Dashboard backend and analytics engine)
- **Employee/Client** (Indirect actors via admin actions)

## Overall Description

This use case describes how administrators monitor platform health, manage users, and override system decisions (e.g., document validation from UC007) through a unified dashboard with real-time analytics.

## Business Trigger / Frequency

- **Trigger**: Admin logs in or receives automated alerts (e.g., failed document validations).
- **Frequency**: Continuous (dashboard is always active); manual actions occur 5–20 times daily.

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Manual admin commands (e.g., suspend user) | Audit logs of all actions |
| Automated system alerts (e.g., UC007 escalations) | Real-time visualizations (graphs, tables) |
| API data from other modules (e.g., UC008 chatbot stats) | Override decisions (e.g., force-approve a document) |

## Use Case Description (Step-by-Step)

1. **Admin**: Logs in via role-based authentication (MFA required).

2. **System**:

   o Loads real-time dashboards:

      ▪ **User Management**: Active/inactive users, roles, last login.

      ▪ **Financials**: Revenue streams, outstanding invoices.

      ▪ **Escalations**: Pending UC007 document validations, UC008 chatbot issues.

3. **Admin**:

   o Takes actions (e.g., approves a flagged document from UC007, adjusts user permissions).

   o Generates custom reports (e.g., "Monthly Failed Document Trends").

4. **System**:

   o Logs all actions with timestamps and admin IDs.

   o Updates connected modules (e.g., unblocks client onboarding in UC007).

## Alternative Flows
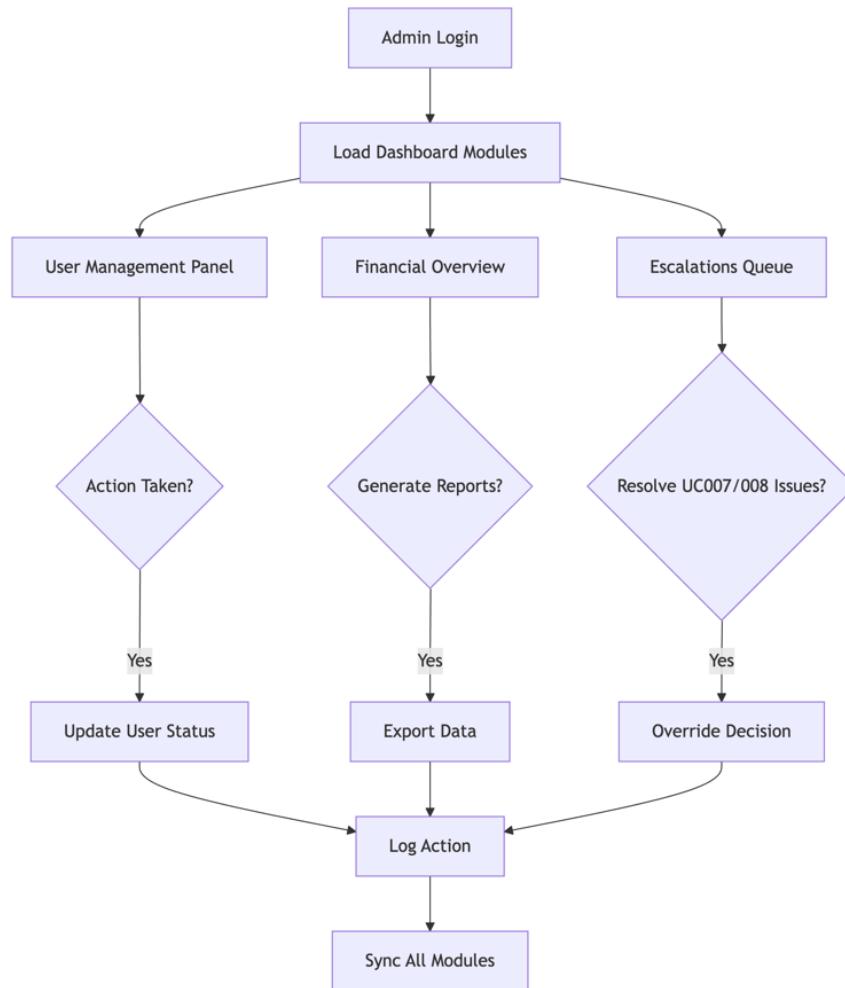
- **A1: Bulk Actions**

   o Admin selects multiple users for role changes; system processes in batch.

- **A2: Data Export**

   o Admin exports dashboard data as CSV/PDF; system compiles and emails it.

**BDMN Diagram**



**Notes**

- **Compliance**: GDPR-compliant action logs; all overrides require MFA.

- **Integration**: Pulls data from UC007 (document validation), UC008 (chatbot), and payment APIs.

- **Security**: IP-based access restrictions; session timeout after 15 minutes.

**Related Requirements**

| Type | ID | Description |
|------|-----|-------------|
| Functional | 6.1 | Real-time dashboard with drill-down reports. |
| Non-Functional | 6.4 | Support 50+ concurrent admin users. |
| Security | 3.7 | Immutable audit logs. |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| User Management | Role Dropdown | Multi-select | Admin cannot self-demote |
| Escalations | Force-Approve | Button + Modal | Requires MFA confirmation |
| Financials | Date Range Picker | Calendar | Max 12-month span |

## Database Tables

**Table**: admin_actions

| Field | Type | Description |
|---|---|---|
| action_id | INT (PK) | Auto-increment |
| admin_id | INT (FK) | Links to admin profile |
| action_type | VARCHAR(50) | e.g., "Document Override", "User Suspended" |
| target_entity | VARCHAR(50) | e.g., "Client ID: 12345" |
| timestamp | DATETIME | UTC timestamp with timezone |

## Assumptions

1. Admins are trained on dashboard features before access is granted.

2. Escalation queues (e.g., UC007) are reviewed within 4 business hours.

3. Financial data refreshes every 15 minutes via API.

## Use Case Title

Client Portal – SEPARATE module with limited campaign visibility and messaging

**ID.** 010

## Actors

- **Client** (Business owner/marketer)
- **System** (Portal backend and analytics engine)
- **Employee** (Assigned account manager)

## Overall Description

This use case describes how clients access a SEPARATE, dedicated portal with project-focused visibility. Clients can view high-level project performance data and lead generation metrics and communicate with their assigned employee, but CANNOT access campaign setup details, strategies, or internal workflows.

**Key Restrictions:**

- NO access to campaign configuration details
- NO access to ad copy, targeting parameters, or budget breakdowns
- NO access to employee workspace or internal tools
- NO receipt of campaign alerts or system notifications

## Business Trigger / Frequency

- **Trigger**: Client logs in or receives automated performance alerts
- **Frequency**: 5-15 logins per client per month

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Client login credentials | Personalized dashboard view |
| Campaign filters/selections | Performance reports (Lead Generation, Service Performance) |
| Messaging requests (to employee) | Message read receipts/notifications |

## Use Case Description (Step-by-Step)

1. **Client**: Logs in via email/MFA
2. **System**:
   o Verifies subscription status (active/expired)
   o Loads:
   - Campaign Project RESULTS ONLY (lead generation metrics and service performance from UC030 Analytics)
   - Campaign STATUS indicators (Active/Paused/Completed)
   - Unread messages from assigned employee
   o EXCLUDES:
   - Campaign setup details
   - Ad copy and creative assets
   - Targeting parameters
   - Budget allocation specifics
   - Internal strategy documents

3. **Client**:
   o Views auto-generated reports
   o Sends message via integrated chat (connects to UC012 WhatsApp Automation)
   o Adjusts notification preferences

4. **System**:
   o Logs all activity
   o Triggers alerts to employee if client requests support

## Alternative Flows

- **A1: Expired Subscription**

  Redirects to payment portal with campaign preview mode

- **A2: Data Discrepancy**

  Flags potential tracking errors for admin review
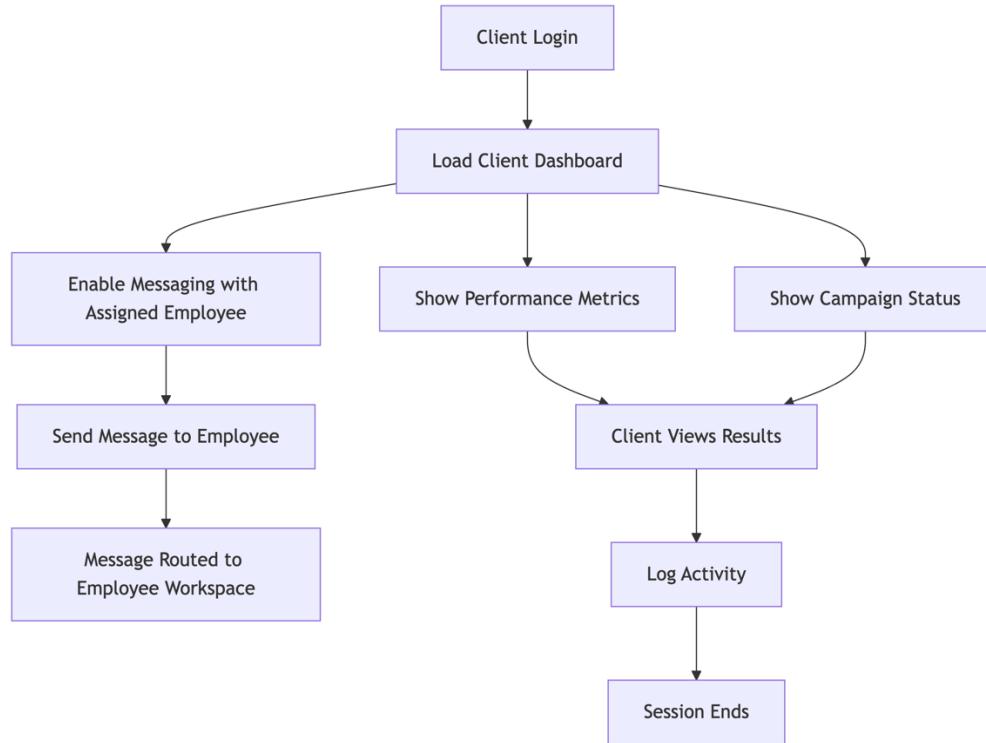
## BDMN Diagram



## Notes

- **Compliance**: All client data is read-only; no edit rights to live campaigns

- **Integration**: Pulls data from UC001, UC012, and UC030 modules

- **Security**: Session expires after 30 minutes inactivity

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 7.1 | Real-time campaign visualization |
| Non-Functional | 7.3 | Load dashboard in <3s |
| Security | 3.8 | Client data isolation |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Campaign Summary | Performance Scorecard | Dynamic tiles | Auto-refresh every 15m |
| Message Center | Attachment Upload | File picker | 10MB max, PDF/JPG only |

## Database Tables

**Table**: client_portal_access

| Field | Type | Description |
|---|---|---|
| access_id | INT (PK) | Auto-increment |
| client_id | INT (FK) | Links to client profile |
| last_login | DATETIME | Timezone-aware |
| view_prefs | JSON | Dashboard customization |

## Assumptions

1. Clients receive onboarding training

2. Employees respond to messages within 4 business hours

3. Campaign data has 1-hour freshness SLA

## Use Case Title

Employee Workspace – Task lists, AI tool access, full campaign management

**ID.** 011

## Actors

- **Employee** (Marketing specialist/account manager)

- **System** (Workspace backend and AI tools)

- **Client** (Through shared deliverables)

## Overall Description

This use case describes how employees manage multiple client campaigns, utilize AI tools (from UC001/UC024), and collaborate with clients through an integrated workspace connected to UC010 (Client Portal) and UC012 (WhatsApp Automation).

## Business Trigger / Frequency

- **Trigger**: Employee login or task assignment from Admin Dashboard (UC009)

- **Frequency**: Continuous use during work hours; 20-50 daily interactions per employee

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Task assignments (from UC009) | Campaign deliverables |
| Client feedback (from UC010) | Automated reports |
| AI tool parameters (UC001/024) | Client communications |

## Use Case Description (Step-by-Step)

1. **Employee**: Logs in via SSO and views:
   - Task queue (prioritized by deadline)
   - Client alerts (from UC010)
   - AI tool shortcuts (UC001 Strategy Generator, UC024 Text-to-Media)
2. **System**:
   - Pre-loads:
     - Active campaigns
     - Unread client messages
     - Pending approvals

3. **Employee**:
   - o  Uses UC001 to modify client strategies
   - o  Generates assets via UC024 Creative Studio
   - o  Initiates WhatsApp blasts (UC012)
4. **System**:
   - o  Syncs updates to UC010 Client Portal
   - o  Logs time spent per task
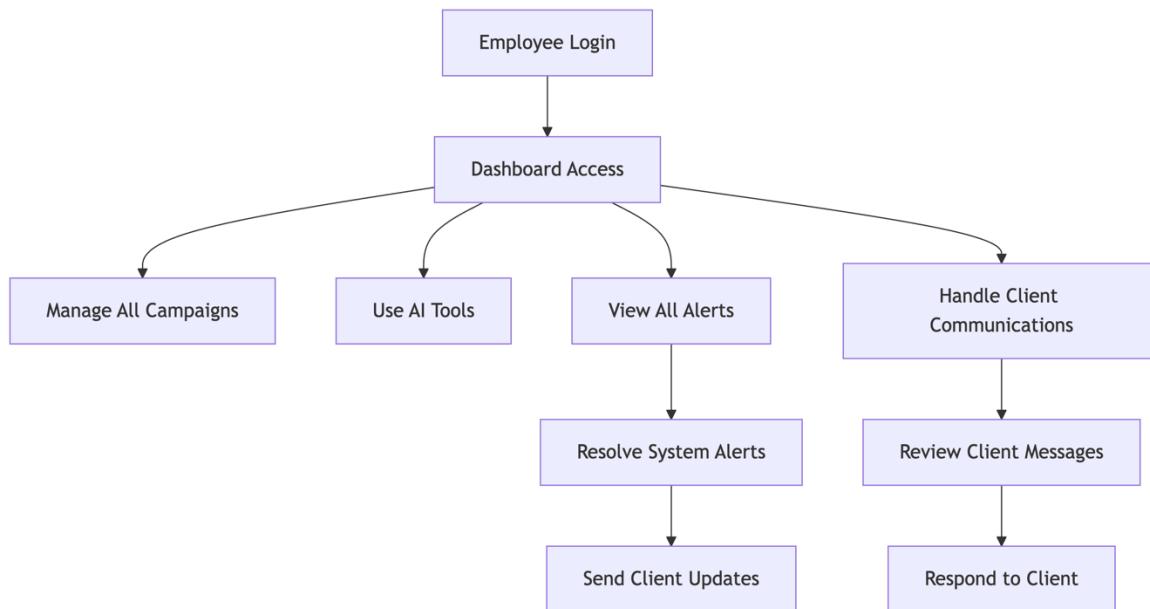
## Alternative Flows

- **A1: Urgent Client Request**
  Triggers real-time notification and moves task to top of queue
- **A2: AI Tool Failure**
  Fallback to manual workflow with admin alert

## BDMN Diagram



## Notes

- **Integration**: Direct connections to UC001, UC010, UC012, and UC024
- **Security**: Role-based access to client data (employees only see assigned accounts)
- **Performance**: Supports 5+ concurrent tool operations

## Related Requirements

| Type | ID | Description |
|------|----|-----|
|      |    |     |

| Functional | 8.1 | Unified task and communication interface |
|---|---|---|
| Non-Functional | 8.4 | Handle 50+ open tasks per employee |
| Security | 3.9 | Activity tracking for all asset modifications |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Task Board | Deadline Countdown | Visual indicator | Red if <24h remaining |
| AI Tools | Content Brief Input | Text area | 500-char limit with sentiment check |

## Database Tables

**Table**: employee_activity_log

| Field | Type | Description |
|---|---|---|
| activity_id | UUID | Unique action identifier |
| employee_id | INT (FK) | Links to employee profile |
| tool_used | VARCHAR(20) | e.g., "UC001", "UC024" |
| client_impacted | INT (FK) | Links to client record |

## Assumptions

1. Employees complete tool training before access

2. UC010 Client Portal updates within 5 minutes of changes

3. AI tools maintain 99% uptime during business hours

## Use Case Title

WhatsApp Automation – AI-driven campaign messaging and client engagement

**ID.** 012

## Actors

- **Employee** (Campaign manager)
- **System** (WhatsApp Business API integration)
- **Client/Lead** (Message recipient)
- **AI Assistant** (UC033 for NLP responses)

## Overall Description

This use case enables employees to create, schedule, and analyze WhatsApp campaigns through direct integration with the platform, connecting to UC011 (Employee Workspace) for creation and UC030 (Analytics) for performance tracking.

## Business Trigger / Frequency

- **Trigger**: Campaign launch from UC011 or scheduled time
- **Frequency**: 50-300 messages daily per client campaign

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Contact lists (from UC011) | Message delivery receipts |
| Message templates (text/media) | Response analytics |
| Scheduling parameters | Conversation transcripts |

## Use Case Description (Step-by-Step)

1. **Employee**: In UC011 Workspace:
   - Selects "WhatsApp Campaign"
   - Chooses:
     - Recipient list (clients/leads)
     - Pre-approved template or new message
     - Scheduling options
2. **System**:
   - Validates against WhatsApp Business API rules
   - Applies opt-out filters
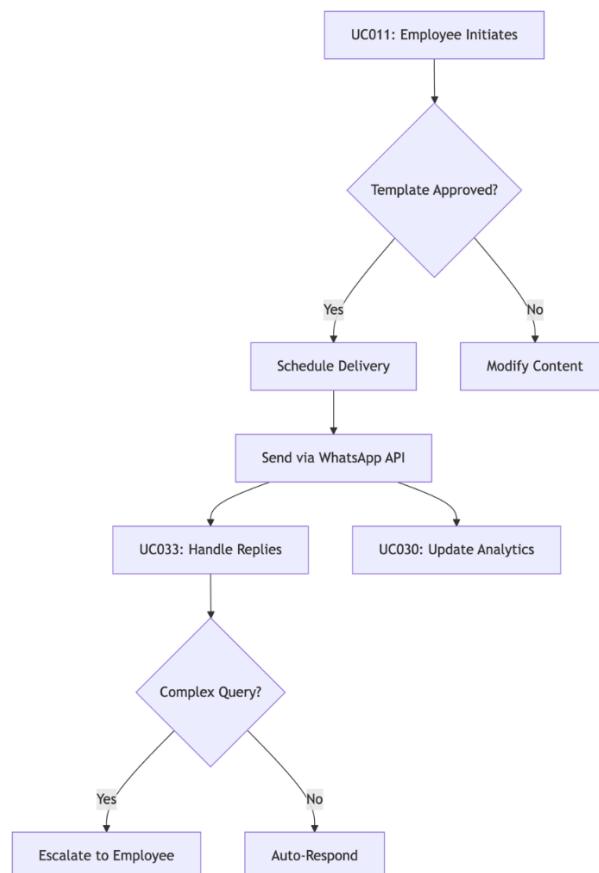
o  Queues for delivery

3.  **AI Assistant (UC033)**:

   o  Handles incoming replies with NLP

   o  Escalates complex queries to employees

4.  **System**:

   o  Logs all interactions

   o  Updates UC030 Analytics in real-time

## Alternative Flows

- **A1: Template Rejection**
  Auto-adjusts content to comply with WhatsApp policy
- **A2: High Unsubscribe Rate**
  Pauses campaign and alerts employee in UC011

## BDMN Diagram

## Notes

- **Compliance**: Adheres to WhatsApp Business Policy v5.2

- **Integration**: Real-time sync with UC011 and UC030

- **Security**: End-to-end encryption for all messages

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 9.1 | Bulk messaging with personalization |
| Non-Functional | 9.3 | 500ms API response time |
| Compliance | 4.5 | Opt-out management |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Campaign Setup | Media Upload | File picker | 16MB max, MP4/JPG |
| Recipients | List Filter | Search | Excludes opt-outs |

## Database Tables

**Table:** whatsapp_campaigns

| Field | Type | Description |
|---|---|---|
| campaign_id | UUID | Unique identifier |
| employee_id | INT (FK) | Creator reference |
| template_id | VARCHAR(20) | WhatsApp-approved ID |
| sent_count | INT | Successful deliveries |

## Assumptions

1. WhatsApp Business API credentials remain valid

2. Employees complete compliance training

3. UC033 AI handles 70% of incoming messages

## Use Case Title

**ID.** 013

## Actors

- **Employee** (Marketing Specialist)
- **System** (AI Email Generator Module)
- **Client** (Receives email drafts for approval)
- **Admin** (Manages templates and integrations)

## Overall Description

This use case describes how the platform's AI assists employees in creating high-impact email campaigns. The system generates personalized email copy, designs layouts, and suggests segmentation strategies based on client data and campaign goals.

## Business Trigger / Frequency

- **Trigger**: A new email campaign is initiated or an existing campaign is refreshed.
- **Frequency**: Per campaign (weekly/monthly/ad-hoc).

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Client's target audience segments | AI-generated email copy (subject, body, CTAs) |
| Campaign goals (e.g., conversions) | Layout suggestions (mobile-responsive) |
| Brand guidelines (colors, tone) | Segmentation recommendations (A/B testing) |
| Employee edits (e.g., tone tweaks) | Finalized email (HTML/PDF or API-ready for SendGrid/Mailchimp) |

## Use Case Description (Step-by-Step)

1. **Employee**: Logs into the Employee Dashboard and selects "Email Builder."

2. **Employee**: Inputs:

   o **Audience segments** (e.g., "B2B leads aged 25-40").

   o **Campaign goal** (e.g., "Event registrations").

   o **Brand guidelines** (uploads logo, selects tone: "Professional").

3. **System**: Validates inputs (e.g., ensures audience segment exists in CRM).

4. **System**: Generates:

   o **3 email variants** with optimized subject lines and CTAs.

   o **Layout previews** for desktop/mobile.

   o **A/B testing suggestions** (e.g., "Test variant B for higher open rates").

5. **Employee**: Edits content or selects a variant.

6. **System**: Exports the email to the client's preferred ESP (SendGrid/Mailchimp) or as a PDF for approval.

## Alternative Flows

- **A1: No Brand Guidelines**

  o System uses default templates with client's primary color (from website scraper).

- **A2: Low Engagement Prediction**

  o AI flags low predicted open rates and suggests alternative subject lines.

- **A3: ESP Integration Failure**

  o System defaults to PDF export and notifies the admin.
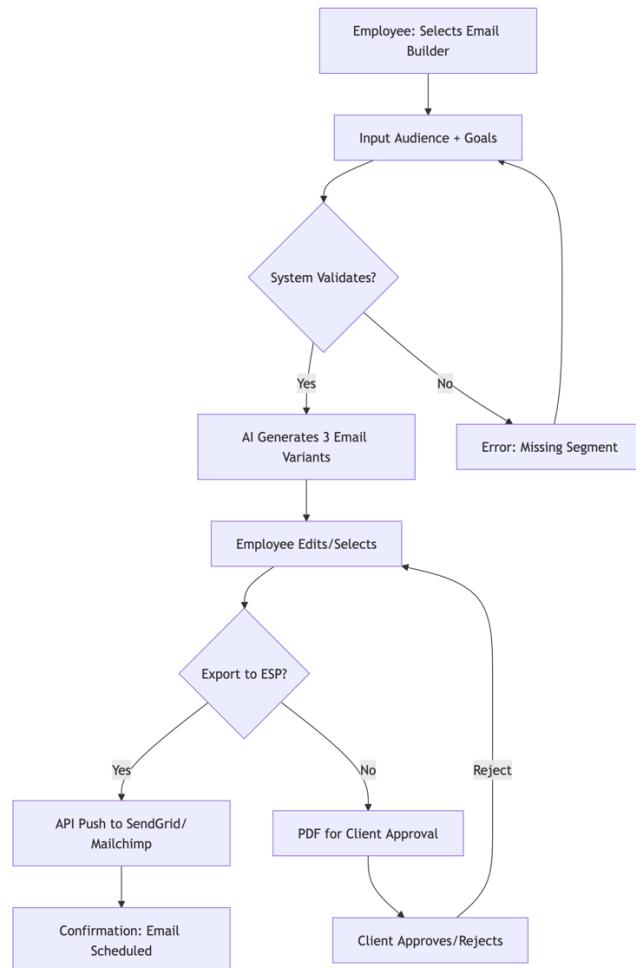
**BDMN Diagram**

### Notes

- **Compliance**: Emails adhere to CAN-SPAM/GDPR (opt-out links auto-added).
- **Integration**: Syncs with CRM (HubSpot) and ESPs (SendGrid API).
- **Security**: Role-based access to client data (employees can't view other teams' drafts).

### Related Requirements

| Type | ID | Description |
|------|-----|-------------|
| Functional | 4.1 | AI-generated email copy with editable fields. |
| Non-Functional | 4.3 | ESP integration latency <2 seconds. |
| Security | 3.5 | Email content encrypted in transit/rest. |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Campaign Setup | Audience Segment | Dropdown (CRM) | Must select ≥1 segment |
| | Goal | Radio Buttons | Required |
| Branding | Logo Upload | File Upload | PNG/JPG, <5MB |
| | Tone (Professional/Casual) | Toggle | Required |

## Database Tables

**Table:** email_campaigns

| Field | Type | Description |
|---|---|---|
| campaign_id | INT (PK) | Auto-increment |
| client_id | INT (FK) | Links to client profile |
| generated_at | DATETIME | UTC timestamp |
| variants_json | JSON | AI-generated email variants |
| last_edited_by | VARCHAR(50) | Employee email |

## Assumptions

1. ESP APIs are always available (fallback to PDF if not).
2. Employees verify legal compliance (e.g., opt-in lists) before sending.
3. AI training data excludes sensitive client PII.

## Use Case Title

**Triggered Messaging – AI-powered automated message workflows**

**ID.** 014

## Actors

- **Employee** (Marketing Specialist)
- **System** (AI Messaging Engine)
- **Client** (Receives triggered messages)
- **Admin** (Manages workflow rules)

## Overall Description

This use case enables employees to create automated, behavior-triggered messaging sequences (WhatsApp/Email) based on lead/customer actions (e.g., website visits, form submissions). The AI suggests optimal timing, channel, and content.

## Business Trigger / Frequency

- **Trigger**: A lead/customer action (e.g., cart abandonment) is detected.
- **Frequency**: Real-time (per action) or batch processing.

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Trigger event (e.g., "Form submit") | AI-recommended message sequence (WhatsApp/Email) |
| Audience segment (e.g., "B2B") | Personalized message drafts with variables (e.g., {{first_name}}) |
| Employee-defined rules (e.g., delays) | Scheduled messages in outreach queue |
| Performance data (historical CTR) | Predictive metrics (e.g., "70% open rate expected") |

## Use Case Description (Step-by-Step)

1. **Employee**: Selects "Triggered Messaging" in the Communication Hub.

2. **Employee**: Configures:

   o **Trigger Event** (e.g., "Pricing page viewed >2min").
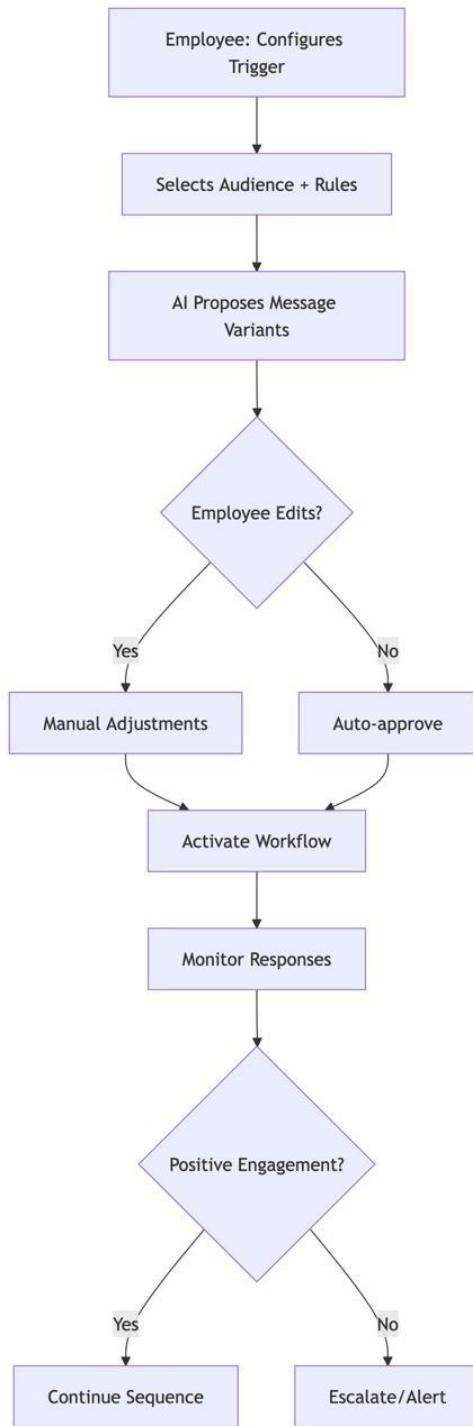
      o   **Audience Filter** (e.g., "B2B leads from LinkedIn").

      o   **Message Rules**: Delay (e.g., "Send WhatsApp after 1 hour"), fallback channel.

3. **System**: Proposes AI-generated message variants with:

      o   **Dynamic variables** (e.g., company name from CRM).

      o   **Channel optimization** (e.g., "Use WhatsApp for higher urgency").

4. **Employee**: Edits content or approves AI suggestions.

5. **System**: Activates workflow and monitors responses for:

      o   **Auto-escalation** (e.g., follow-up email if unread).

      o   **Anomaly alerts** (e.g., unusually low replies).

## Alternative Flows

- **A1: No Response**

      o   System escalates to alternate channel after 24h (e.g., WhatsApp → Email).

- **A2: Negative Sentiment Detected**

      o   AI pauses sequence and alerts employee (via UC035: Sentiment Analyzer).

- **A3: API Rate Limit Hit**

      o   Queues messages and retries with exponential backoff.

**BDMN Diagram**



**Notes**

- **Compliance**: Auto-opt-out for GDPR/CTIA compliance.
- **Integration**: WhatsApp Business API, SendGrid/Mailchimp, CRM (HubSpot).
- **Security**: Message logs encrypted; PII redacted in analytics.

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 4.4 | Multi-channel triggered sequences with AI suggestions. |
| Non-Functional | 4.6 | <500ms latency for real-time triggers. |
| Security | 3.7 | Audit trail for all sent messages. |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Trigger Setup | Event Type | Dropdown | Required (e.g., "Form submit", "Cart abandon") |
| Audience | Segment Filter | Multi-select | CRM-linked |
| Message Rules | Delay/Channel | Number Input + Toggle | Min delay: 5min |

## Database Tables

**Table:** triggered_messaging_workflows

| Field | Type | Description |
|---|---|---|
| workflow_id | INT (PK) | Auto-increment |
| trigger_event | VARCHAR(50) | e.g., "form_submit" |
| message_templates | JSON | AI/employee-defined variants |
| is_active | BOOLEAN | Toggle for pausing workflows |

## Assumptions

1. CRM/webhook data is real-time and accurate.
2. Employees define fallback rules for failed deliveries.
3. AI training excludes sensitive interaction data.

## Use Case Title

**Cross-Platform Content – AI-powered content adaptation for multiple platforms**

**ID.** 015

## Actors

- **Employee** (Content Creator)
- **System** (AI Content Adaptation Module)
- **Client** (Receives content for approval)
- **Admin** (Manages platform integrations)

## Overall Description

This use case describes how the platform's AI adapts a single piece of content (e.g., a blog post or video script) into platform-optimized formats (e.g., Instagram Reels, LinkedIn posts, Twitter threads) while maintaining brand consistency and engagement goals.

## Business Trigger / Frequency

- **Trigger**: A new piece of core content (e.g., blog, video) is created or repurposed.
- **Frequency**: Per content piece (daily/weekly).

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Core content (text/video/URL) | Platform-specific variants (e.g., Instagram post, LinkedIn article) |
| Target platforms (e.g., Meta, LinkedIn) | Format adjustments (e.g., aspect ratios, caption length) |
| Brand guidelines (tone, hashtags) | Hashtag recommendations per platform |
| Employee edits (e.g., manual tweaks) | Scheduled posts (via Social Media Command Center) |

## Use Case Description (Step-by-Step)

1. **Employee**: Logs into the Employee Dashboard and selects "Cross-Platform Content."

2. **Employee**: Inputs:
   - **Core content** (e.g., pastes blog URL or uploads video).
   - **Target platforms** (selects Instagram, LinkedIn, etc.).
   - **Brand guidelines** (e.g., "Casual tone, #BrandName in captions").
3. **System**: Analyzes core content and generates:
   - **Platform-specific variants**:
     - Instagram: Carousel with summarized bullets + branded visuals.
     - LinkedIn: Long-form post with statistics and professional tone.
     - Twitter: Thread with key takeaways and polls.
   - **Hashtag sets** tailored to each platform's algorithm.
4. **Employee**: Reviews and edits variants (e.g., shortens LinkedIn post).
5. **System**: Pushes finalized content to the **Social Media Command Center** for scheduling or exports for manual review.

## Alternative Flows

- **A1: Unsupported Content Type**
  - System rejects unsupported formats (e.g., PDF) and requests a text/video URL.
- **A2: Platform Limits Exceeded**
  - AI warns if character count/video length exceeds platform limits (e.g., Twitter threads >25 tweets).
- **A3: Low Engagement Prediction**
  - Flags weak-performing variants (e.g., "LinkedIn post lacks actionable insights") and suggests edits.
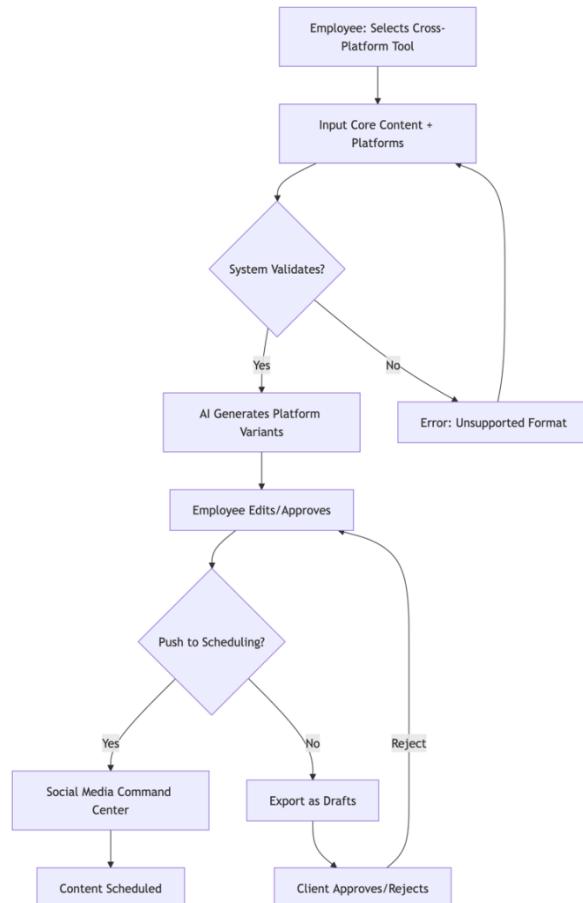
**BDMN Diagram**



**Notes**

- **Compliance**: Auto-adds accessibility tags (alt text for images).
- **Integration**: Linked to Creative Media Studio (UC025) for auto-generated visuals.
- **Security**: Content drafts are encrypted; only assigned employees can edit.

**Related Requirements**

| Type | ID | Description |
|------|-----|-------------|
| Functional | 5.1 | AI-generated platform variants with 1-click edits. |
| Non-Functional | 5.3 | Content generation latency <10 seconds. |
| UX | 6.2 | Side-by-side previews for all platforms. |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Content Input | Core Content URL | Text Input | Valid URL/File Upload |
| Platform Selection | Target Platforms | Multi-select | ≥1 platform required |
| Branding | Tone (Casual/Formal) | Dropdown | Required |

## Database Tables

**Table**: cross_platform_content

| Field | Type | Description |
|---|---|---|
| content_id | INT (PK) | Auto-increment |
| core_content_url | VARCHAR(255) | Source URL/file path |
| variants_json | JSON | AI-generated platform variants |
| last_modified_by | VARCHAR(50) | Employee email |

## Assumptions

1. Core content is finalized (no further edits expected).
2. Platform APIs (e.g., Meta, LinkedIn) allow automated posting.
3. Employees verify platform-specific compliance (e.g., LinkedIn's promotional content rules).

## Use Case Title

**Hashtag Optimizer – AI-driven social media hashtag recommendation**

**ID**: 016

## Actors

- **Employee** (Social Media Manager)
- **System** (AI Hashtag Engine)
- **Client** (Receives optimized posts)
- **Social APIs** (Instagram, Twitter, LinkedIn)

## Overall Description

Automatically generates high-performance hashtag sets for social posts by analyzing platform trends, post content, and historical engagement data.

## Business Trigger / Frequency

- **Trigger**: Post creation in **UC015 (Cross-Platform Content)**
- **Frequency**: Per social media post (real-time)

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Post draft (text/images) | Ranked hashtag list (3-5 categories) |
| Target platform (Instagram/LinkedIn/etc.) | Performance predictions (estimated reach) |
| Client's historical hashtag data | Platform-specific character limits warning |
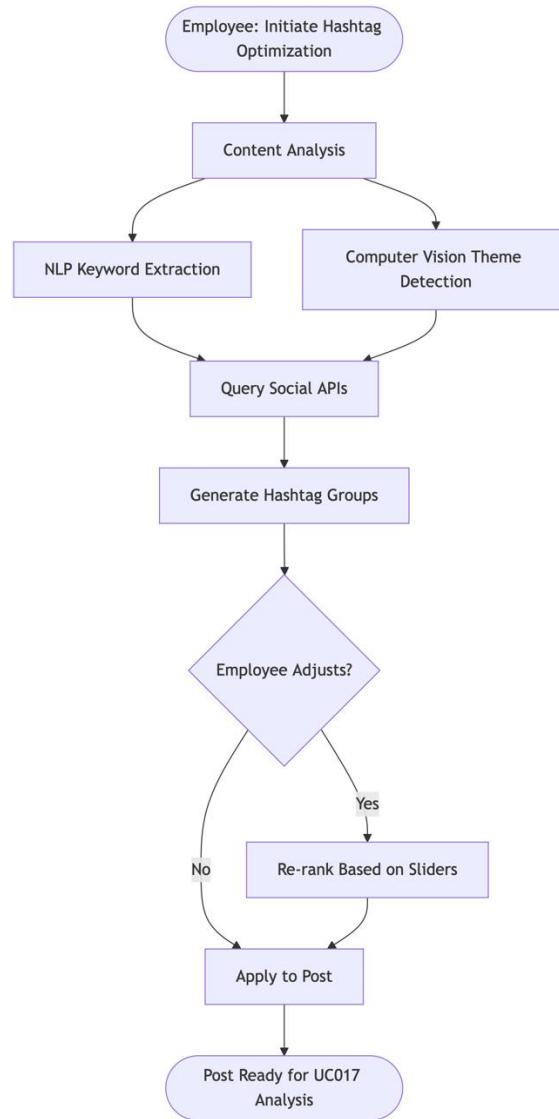
## Use Case Steps

1. **Employee**: Selects "Optimize Hashtags" in Content Hub (UC015).
2. **System**:
    - Analyzes post text/images via NLP/CV:
        - Extracts keywords (e.g., "eco-friendly apparel").
        - Detects visual themes (e.g., "sustainable fashion").
    - Queries live social APIs for:
        - Trending hashtags in target geo-location.
        - Competitor hashtag performance.
3. **AI Engine**: Generates hashtag groups:
    - **Primary**: High-reach (e.g., #SustainableFashion - 2M posts).
    - **Secondary**: Niche (e.g., #EcoFabric - 50K posts).
    - **Branded**: Client-specific (e.g., #GreenByPanvel).
4. **Employee**: Adjusts mix via sliders (reach vs. specificity).
5. **System**: Finalizes hashtags + warns if exceeding platform limits (e.g., Instagram's 30-hashtag max).

## Alternative Flows

- **A1: New Industry with No Historical Data**
  Uses semantic clustering (e.g., "vegan leather" → #PlantBased + #CrueltyFree).
- **A2: Banned Hashtags Detected**
  Flags potentially shadowbanned tags via third-party API checks.

**BDMN Diagram**



**Database Tables**

**Table**: hashtag_recommendations

| Field | Type | Description |
|-------|------|-------------|
| rec_id | UUID | Recommendation instance |
| post_id | INT | FK to content_drafts |
| hashtag_set | JSON | {primary: [], secondary: []} |
| predicted_reach | INT | Estimated impressions |
| platform_constraints | JSON | e.g., {max_tags: 30, banned_tags: []} |

## Integration Requirements

| Service | Purpose | SLA |
|---------|---------|-----|
| Instagram Graph API | Fetch trending hashtags | <1s response |
| Hashtagify | Shadowban check | 200ms latency |
| AWS Comprehend | Semantic analysis | 500ms processing |

## UI/UX Elements

| Component | Type | Rules |
|-----------|------|-------|
| Hashtag Slider | Range input | 0-100% (Reach vs. Specificity) |
| Preview Pane | Live render | Shows post with applied hashtags |
| Warning Banner | Conditional | Triggers if banned tags detected |

## Related Requirements

| Type | ID | Description |
|------|----|-----|
| Functional | 16.1 | Support 8+ social platforms |
| Non-Functional | 16.3 | Return results <2s |

## Assumptions

1. Social APIs provide real-time hashtag volume data (updated hourly).
2. Employee manually verifies AI suggestions for brand safety.

## Use Case Title

**Content Analyzer – AI-powered post-performance prediction**

**ID**: 017

## Actors

- **Employee** (Content Creator)
- **System** (AI Analysis Engine)
- **Client** (Receives performance reports)
- **Social APIs** (Meta, LinkedIn, X)

## Overall Description

Predicts engagement metrics (likes, shares, CTR) for draft social posts by analyzing content elements, historical data, and platform trends. Flags potential underperformers before publishing.

## Business Trigger / Frequency

- **Trigger**: Post drafting in **UC015** or pre-scheduling in **UC018**
- **Frequency**: Real-time per post
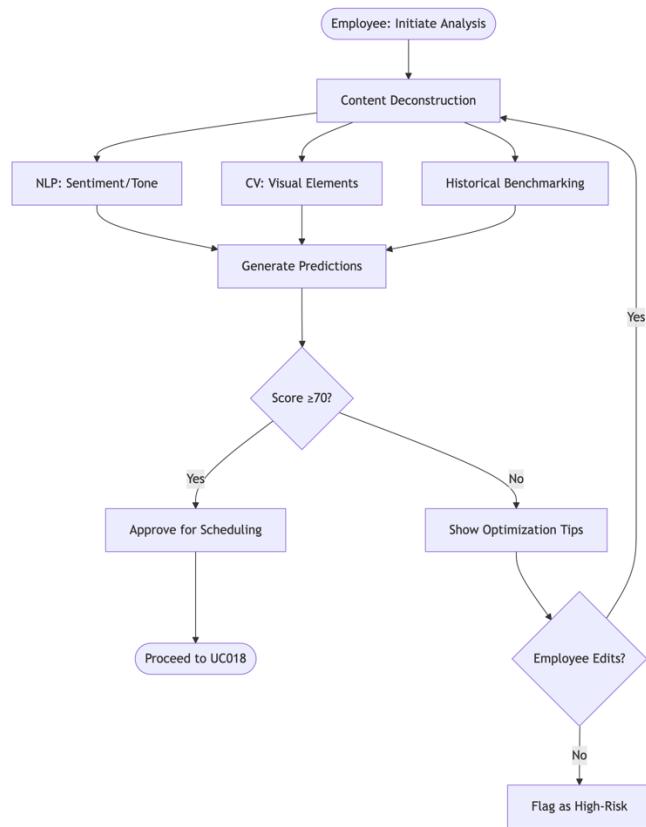
## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Post draft (text/images/video) | Engagement score (1-100) |
| Target platform & audience | Predicted metrics (CTR, reach) |
| Client's historical performance | Optimization suggestions |

## Use Case Steps

1. **Employee**: Clicks "Analyze Post" in Content Hub.
2. **System**:
   - **Text Analysis**: NLP for sentiment (positive/neutral/negative).
   - **Visual Analysis**: CV for composition (contrast, face detection).
   - **Context Check**: Compares against:
     - Platform algorithm trends (e.g., Reels > static posts).
     - Competitor top-performing content.
3. **AI Engine**: Generates:
   - **Performance Score**: 1-100 scale (≥70 = "Optimized").
   - **Improvement Tips**:
     - "Add call-to-action button (CTR +15%)".
     - "Use warmer color palette (engagement +22%)".
4. **Employee**: Accepts suggestions or overrides.
5. **System**: Logs predictions for post-publish validation.

## BDMN Diagram



## Database Tables

**Table**: content_analysis

| Field | Type | Description |
|---|---|---|
| analysis_id | UUID | Unique analysis instance |
| post_id | INT | FK to content_drafts |
| predicted_ctr | DECIMAL(3,2) | e.g., 2.75% |
| risk_factors | JSON | e.g., ["low_contrast", "no_CTA"] |
| actual_vs_predicted | JSON | Populated post-publishing |

## Alternative Flows

- **A1: Video Content**
  Analyzes thumbnails + first 3s hook (drop-off risk).
- **A2: Platform-Specific Rules**
  LinkedIn: Prioritizes text-heavy posts; Instagram: Favors high-saturation visuals.

## Integration Requirements

| Service | Purpose |
|---|---|
| Google Vision API | Image composition scoring |
| Brandwatch | Competitor benchmark data |
| Firebase Predictions | Custom ML model hosting |

## UI Elements

| Component | Type | Rules |
|---|---|---|
| Performance Meter | Radial gauge | Red/Yellow/Green zones |
| Tip Cards | Expandable | Ranked by impact potential |
| Risk Flags | Tooltips | Hover for details |

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 17.2 | Support 10+ content formats |
| Non-Functional | 17.4 | 95% prediction accuracy threshold |

## Assumptions

1. Historical data covers ≥6 months for reliable trends.
2. Platform algorithms remain stable between prediction and posting.

## Use Case Title

**Smart Scheduling – AI-powered optimal timing for social media posts**

**ID.** 018

## Actors

- **Employee** (Social Media Manager)
- **System** (AI Scheduling Engine)
- **Client** (Receives scheduled content)
- **Admin** (Manages platform integrations)

## Overall Description

This use case enables the AI system to analyze audience behavior patterns and automatically schedule social media posts at times predicted to maximize engagement. The system considers historical performance, platform algorithms, and real-time trends.

### Business Trigger / Frequency

- **Trigger**: When new content is ready for publishing or when optimizing existing schedules
- **Frequency**: Continuous (real-time adjustments) + daily batch optimizations

### Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Content to be scheduled | Optimized posting schedule |
| Historical engagement data | Time slot recommendations |
| Platform-specific algorithms | Scheduled posts in queue |
| Current trending topics | Conflict resolution alerts |
| Employee preferences | Performance predictions |
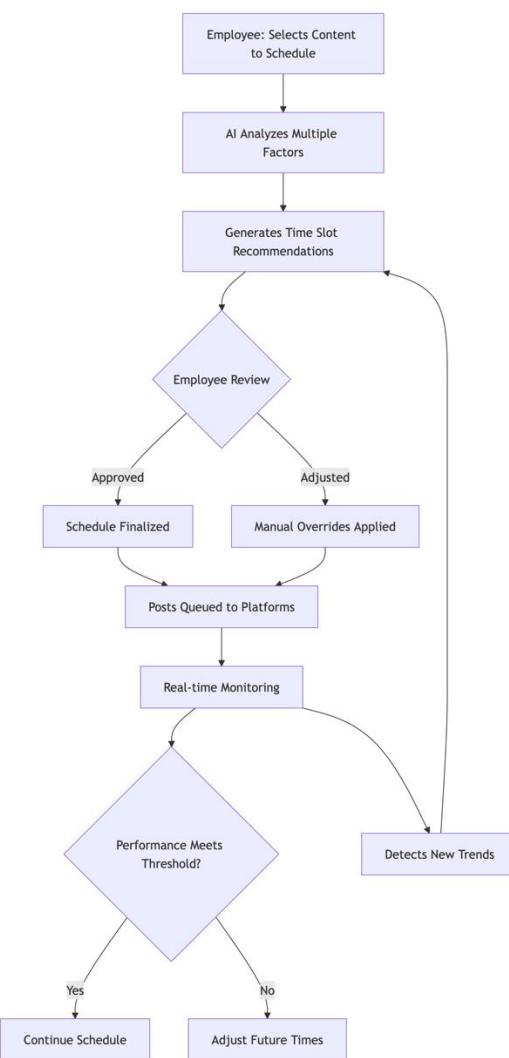
### Use Case Description (Step-by-Step)

1. **Employee**: Navigates to Social Media Command Center and selects "Smart Scheduling"
2. **System**: Analyzes:
   - Audience online activity patterns (time zones, active hours)
   - Historical post performance by day/time
   - Current platform algorithm updates
   - Trending topics and hashtag velocity
3. **System**: Generates:
   - Primary recommended time slots (ranked by predicted engagement)
   - Alternative slots for A/B testing
   - Conflict detection (e.g., too many posts clustered together)
4. **Employee**:
   - Reviews AI recommendations
   - Adjusts schedule based on business needs
   - Sets rules (e.g., "Never post after 9pm")
5. **System**:
   - Finalizes schedule
   - Pushes to platform APIs
   - Monitors and adjusts in real-time based on early engagement signals

## Alternative Flows

- **A1: Platform API Unavailable**
  - System queues posts and retries with exponential backoff
  - Notifies employee if delay exceeds 1 hour
- **A2: Sudden Trend Emergence**
  - AI recommends rescheduling existing posts to capitalize on trend
  - Provides "Urgent Opportunity" alert to employee
- **A3: Poor Early Performance**
  - Automatically adjusts subsequent posting times if CTR < threshold

## BDMN Diagram

## Notes

- **Dynamic Adjustment**: Automatically reschedules if platform algorithms change
- **Platform Limits**: Respects daily post limits per platform
- **Blackout Periods**: Honors client-defined "no post" windows

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 7.1 | AI-generated time slot recommendations |
| Non-Functional | 7.3 | <1 second response for schedule queries |
| Security | 3.8 | OAuth2.0 for platform API connections |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Schedule Setup | Content Selection | Multi-select | Required |
| | Platform Targets | Checkbox group | ≥1 required |
| Optimization | Audience Priority | Slider | 1-5 scale |
| | Trend Responsiveness | Toggle | On/Off |

## Database Tables

**Table:** ai_scheduling_optimizer

| Field | Type | Description |
|---|---|---|
| schedule_id | UUID | Primary key |
| content_ids | JSON | References scheduled content |
| optimal_times | JSON | AI-generated time slots |
| last_optimized | TIMESTAMP | When AI last adjusted |

## Assumptions

1. Platform APIs provide accurate audience activity data
2. Employees will review critical changes (>15 minute time shifts)
3. Historical data contains at least 30 days of engagement metrics

## Use Case Title

Trend Monitoring – Real-time social media trend analysis and alerting

**ID.** 019

## Actors

- **System** (Trend analysis engine)
- **Employee** (Content strategist)
- **Admin** (Threshold configurator)
- **AI Assistant** (UC033 for anomaly detection)

## Overall Description

This use case describes how the platform continuously scans social platforms (Meta, X, TikTok) for emerging trends, analyzes their relevance to active campaigns (from UC015 Cross-Platform Content), and alerts employees through UC011 Workspace when actionable opportunities are detected.

## Business Trigger / Frequency

- **Trigger**:
  - Scheduled every 15 minutes (standard)
  - Ad-hoc when viral activity detected
- **Frequency**: 50-200 trend alerts daily

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Social API streams (hashtags, keywords) | Trend alerts with confidence scores |
| Active campaign topics (from UC015) | Visual trend graphs |
| Employee-defined watchlists | Content adaptation suggestions |

## Use Case Description (Step-by-Step)

1. **System**:
   - Scans connected platforms using:

- ▪ Hashtag velocity analysis
- ▪ Topic clustering (NLP)
- ▪ Influencer amplification tracking

2. **AI Engine**:

- o Correlates trends with:

  - ▪ Active campaigns in UC015
  - ▪ Client industries (from UC001)

- o Calculates relevance score (0-100)

3. **Alerting**:

- o For scores >70:

  - ▪ Immediate push notification to UC011
  - ▪ Email digest to subscribed employees

- o For scores 30-70:

  - ▪ Stores in trend library for manual review

4. **Employee**:

- o Views trend details in UC011
- o Uses UC024 to create trend-responsive content

## Alternative Flows

- **A1: False Positive**

  Employee flags irrelevant trend → AI retrains detection model
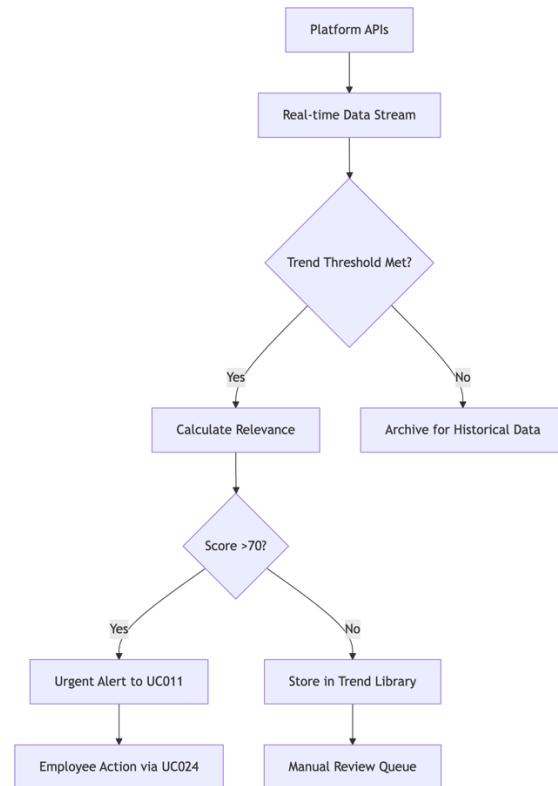
- **A2: Platform API Outage**

  Falls back to RSS/third-party feeds with 80% coverage

**BDMN Diagram**

### Notes

- **Compliance**: Adheres to platform API rate limits

- **Integration**: Direct feeds from Meta Graph API, X API v2

- **Latency**: <90s detection for viral trends (1000+ mentions/min)

### Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 12.1 | Multi-platform trend aggregation |
| Non-Functional | 12.4 | Process 10K+ mentions/minute |
| Analytics | 5.8 | Confidence score accuracy ±5% |

### Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Trend Dashboard | Velocity Graph | Time-series | Auto-scaling Y-axis |
| Alert Settings | Threshold Slider | 0-100 scale | Saves per employee |

## Database Tables

**Table**: trend_alerts

| Field | Type | Description |
|---|---|---|
| trend_id | UUID | Unique detection event |
| platforms | JSON | ["instagram","tiktok"] |
| peak_velocity | INT | Mentions/minute |
| campaign_links | INT[] | Related UC015 campaigns |

## Assumptions

1. Platform APIs provide 95% uptime

2. Employees respond to urgent alerts within 4 hours

3. UC024 can generate trend-based content in <15 minutes

## Use Case Title

**Unified Inbox – Centralized message management across platforms**

**ID.** 020

## Actors

- **Employee** (Customer Support/Social Media Manager)
- **System** (Message Aggregation Engine)
- **Client** (Sends messages through various platforms)
- **Admin** (Manages platform integrations)

## Overall Description

This use case describes how the platform aggregates and organizes messages from multiple channels (WhatsApp, Instagram DM, Email, etc.) into a single interface with AI-powered sorting, prioritization, and response suggestions.

## Business Trigger / Frequency

- **Trigger**: New message received on any connected platform
- **Frequency**: Continuous real-time processing

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Raw messages from APIs | Unified threaded conversation view |
| Customer metadata from CRM | Urgency score (1-5) |
| Sentiment analysis data | AI-generated reply suggestions |
| Employee tags/notes | Performance analytics |

## Use Case Description (Step-by-Step)

1. **System**:
   - Polls all connected platforms every 30 seconds via APIs
   - Normalizes message formats (text, emoji, attachments)
   - Links messages to customer profiles using:
     - Phone numbers (WhatsApp)
     - Email addresses
     - Social media handles
2. **AI Processing**:
   - Applies sentiment analysis (UC035)
   - Calculates urgency score based on:
     - Keywords ("urgent", "help")
     - Message frequency
     - Customer tier (from CRM)
   - Generates 3 reply suggestions using:
     - Conversation history
     - Knowledge base articles
     - Brand voice guidelines
3. **Employee**:
   - Views consolidated inbox with color-coded urgency
   - Selects/edits AI suggestion or writes custom reply
   - Tags conversation (e.g., "Billing Issue")
4. **System**:
   - Routes message through correct platform API
   - Logs interaction in CRM
   - Updates response time SLA metrics

## Alternative Flows

- **A1: Unrecognized Customer**
  - Creates temporary profile with option to merge if identified later
- **A2: Platform Rate Limit Hit**
  - Queues messages with estimated delay warning
- **A3: High-Urgency Message**
  - Triggers mobile push notification to assigned employee
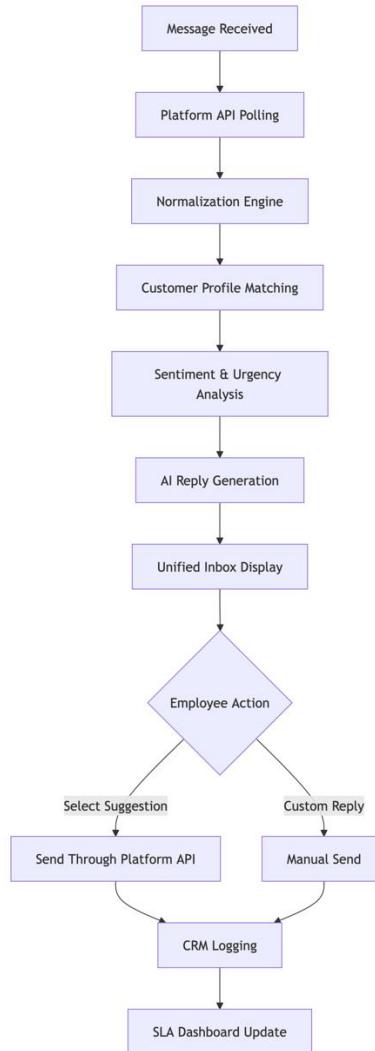
**BDMN Diagram**



**Notes**

- **Compliance**: Messages retained per platform's data policy (WhatsApp=30d by default)
- **Integration**: WhatsApp Business API, Instagram Graph API, Gmail API
- **Security**: End-to-end encryption for message transport

**Related Requirements**

| Type | ID | Description |
|------|-----|-------------|
| Functional | 8.1 | Unified view of 5+ platform messages |
| Non-Functional | 8.3 | <2s refresh latency |
| Security | 3.9 | Role-based message access controls |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---------|-------|------|------------|
| Inbox | Platform Filter | Multi-select | Color-coded by source |
| | Urgency Sort | Toggle | High-to-low default |
| Reply | Suggestion Selector | Card UI | Shows confidence % |
| | Attachment Preview | Thumbnail grid | Supports 10+ file types |

## Database Tables

**Table:** unified_messages

| Field | Type | Description |
|-------|------|-------------|
| message_id | UUID | Composite key with platform prefix |
| customer_id | INT | Links to CRM profile |
| raw_content | JSON | Original message + metadata |
| sentiment_score | FLOAT | -1.0 to 1.0 scale |

## Assumptions

1. Platform APIs provide message read receipts
2. CRM contains updated customer contact methods
3. Employees will verify AI suggestions before sending

## Use Case Title

**SEO Audit – Automated website health scanning**

**ID**: 021

## Actors

- **Employee** (SEO Specialist)
- **System** (AI Audit Engine)
- **Client** (Receives audit report)
- **Third-Party APIs** (Google Search Console, Ahrefs)

## Overall Description

Performs comprehensive technical, on-page, and off-page SEO analysis of client websites.
Identifies optimization opportunities and critical errors impacting search rankings.

## Business Trigger / Frequency

- **Trigger**: New client onboarding or quarterly SEO review
- **Frequency**: Scheduled (monthly/quarterly) or on-demand
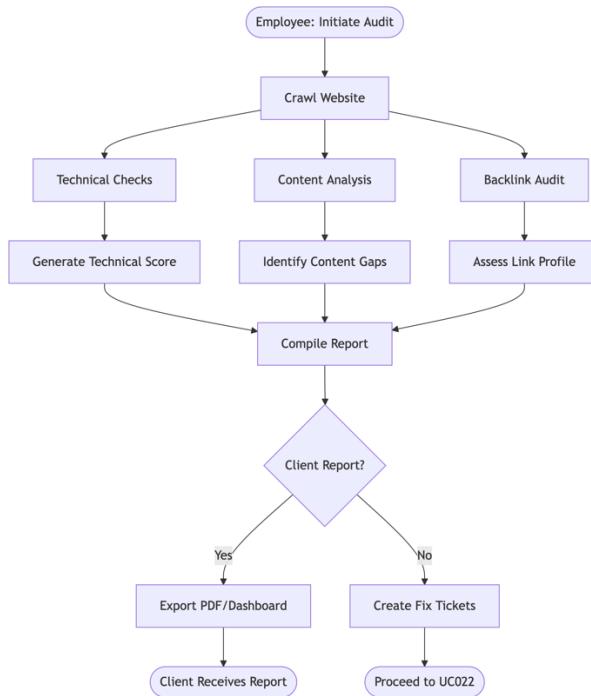
## Inputs and Outputs

| Inputs | Outputs |
|--------|---------|
| Client website URL | Technical SEO score (0-100) |
| Target keywords | On-page optimization report |
| Competitor URLs (optional) | Backlink profile analysis |
| Google Search Console data | Priority-fixed recommendations |

## Use Case Steps

1. **Employee**: Initiates audit via Smart SEO Toolkit:
   - Enters URL + selects audit depth (Quick/Deep).
   - Connects Google Search Console (optional).
2. **System**:
   - **Technical Scan**: Checks:
     - Page speed (Mobile/Desktop)
     - Indexability (robots.txt, noindex tags)
     - Structured data errors
   - **Content Analysis**: Evaluates:
     - Keyword usage (density, prominence)
     - Content quality (readability, uniqueness)
   - **Backlink Audit**: Identifies:
     - Toxic links (Spam Score >30%)
     - Lost linking opportunities
3. **AI Engine**: Generates report with:
   - **Priority Matrix**: Critical/High/Medium fixes
   - **Competitor Gap Analysis** (if competitor URLs provided)
4. **Employee**:
   - Reviews findings
   - Schedules fixes or exports report to client

**BDMN Diagram**



**Database Tables**

**Table:** seo_audits

| Field | Type | Description |
|---|---|---|
| audit_id | UUID | Unique audit identifier |
| website_id | INT | FK to client_websites |
| technical_score | INT | 0-100 scale |
| critical_issues | JSON | e.g., ["blocked_resources", "broken_links"] |
| competitor_data | JSON | Used for gap analysis |

**Alternative Flows**

- **A1: Large Website (>1K Pages)**
  - Samples 20% of pages (stratified by traffic)
  - Prioritizes high-traffic pages for deep audit
- **A2: Login-Protected Site**
  - Provides instructions for adding audit bot to allowlist

## Integration Requirements

| Service | Purpose |
|---|---|
| Google PageSpeed Insights | Speed metrics |
| Ahrefs API | Backlink data |
| Moz API | Domain Authority |

## UI Elements

| Component | Type | Rules |
|---|---|---|
| Health Dashboard | Radial meters | Color-coded by priority |
| Issue Cards | Expandable | Sort by "Easy Wins" first |
| Competitor Comparison | Heatmap | Visual gap display |

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 21.1 | Audit 500+ pages in <15 minutes |
| Non-Functional | 21.3 | 99.9% crawl accuracy |

## Assumptions

1. Website remains stable during audit window
2. Client provides necessary access (e.g., Google Search Console)

**ID.** 022

## Actors

- **System** (Backlink analysis engine)

- **Employee** (SEO specialist)

- **Admin** (Threshold configurator)

- **AI Assistant** (UC033 for outreach drafting)

## Overall Description

This use case describes how the platform identifies high-value backlink opportunities,

prioritizes them based on domain authority and relevance, and automates outreach through

integrated channels (connecting to UC021 SEO Audit for target analysis and UC012 WhatsApp Automation for communication).

## Business Trigger / Frequency

- **Trigger**:
    - Weekly automated scan (scheduled)
    - Immediate when new content publishes (from UC015)
- **Frequency**: 20-50 qualified opportunities weekly per client
- 

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Ahrefs/Moz API data | Prioritized backlink targets |
| Client content library (UC015) | Personalized outreach drafts |
| Competitor backlink profiles | Outreach status tracking |

## Use Case Description (Step-by-Step)

1. **System**:
    - Scans for opportunities using:
        - Broken link building targets
        - Resource page gaps
        - Competitor backlink analysis

2. **AI Engine**:
    - Scores targets by:
        - Domain Authority (20-100)
        - Topic relevance (NLP analysis)
        - Historical response rate

3. **Outreach Automation**:
    - UC033 drafts personalized emails/LinkedIn messages
    - UC012 handles WhatsApp outreach when preferred

   o   Tracks responses in CRM

4. **Employee**:

   o   Reviews top opportunities in UC011

   o   Adjusts outreach strategy based on performance

## Alternative Flows
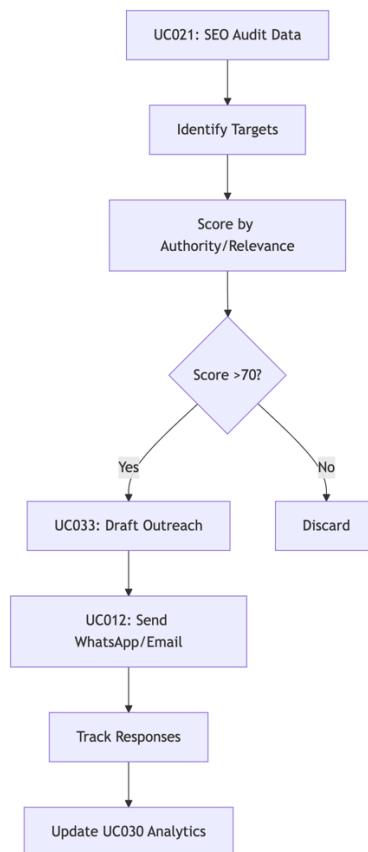
- **A1: High-Value Manual Outreach**

   Flags "Authority 80+" targets for human-led negotiation

- **A2: Negative Response**

   Auto-removes domain from future campaigns

## BDMN Diagram

## Notes

- **Compliance**: Adheres to Google's link scheme guidelines

- **Integration**: Ahrefs API, LinkedIn Sales Navigator

- **Success Rate**: 35% acceptance for personalized outreach

## Related Requirements

| Type | ID | Description |
|------|------|-------------|
| Functional | 13.1 | Authority-based target filtering |
| Non-Functional | 13.3 | Process 10K+ pages/hour |
| Compliance | 4.7 | Anti-spam safeguards |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---------|-------|------|------------|
| Target List | DA Score | Color-coded badge | Red <30, Green >70 |
| Outreach Draft | Tone Selector | Dropdown | ["Formal","Friendly"] |

## Database Tables

**Table**: backlink_campaigns

| Field | Type | Description |
|-------|------|-------------|
| target_url | VARCHAR(255) | MD5 hashed |
| outreach_date | DATETIME | Timezone-aware |
| response_status | ENUM | ["Pending","Accepted","Rejected"] |

## Assumptions

1. Minimum 50% target domains have public contact info

2. Employees review auto-discarded targets weekly

3. UC033 maintains human-like writing quality

## Use Case Title

**SERP Tracker – Real-time search ranking monitor**

**ID**: 023

## Actors

- **Employee** (SEO Specialist)
- **System** (SERP Monitoring Engine)
- **Client** (Receives ranking alerts)
- **Third-Party APIs** (DataForSEO, Moz)

## Overall Description

Tracks keyword rankings across search engines (Google/Bing) with daily updates. Detects ranking fluctuations and correlates them with SEO changes (from UC021/022).

## Business Trigger / Frequency

- **Trigger**:
    - New keyword added to campaign
    - Ranking drop >5 positions
- **Frequency**: Daily automated tracking

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Target keywords | Position change alerts |
| Geo-locations | SERP feature ownership (Featured Snippets/PAAs) |
| Device types (mobile/desktop) | Competitor ranking comparisons |

## Use Case Steps

1. **Employee**:
    - Adds keywords via Smart SEO Toolkit
    - Sets tracking parameters:
        - Location (Country/City)
        - Device type
        - Competitor URLs (optional)
2. **System**:
    - Daily queries search engines via proxy network
    - Records:

- Exact position (1-100)
- SERP features captured
- Competitor rankings
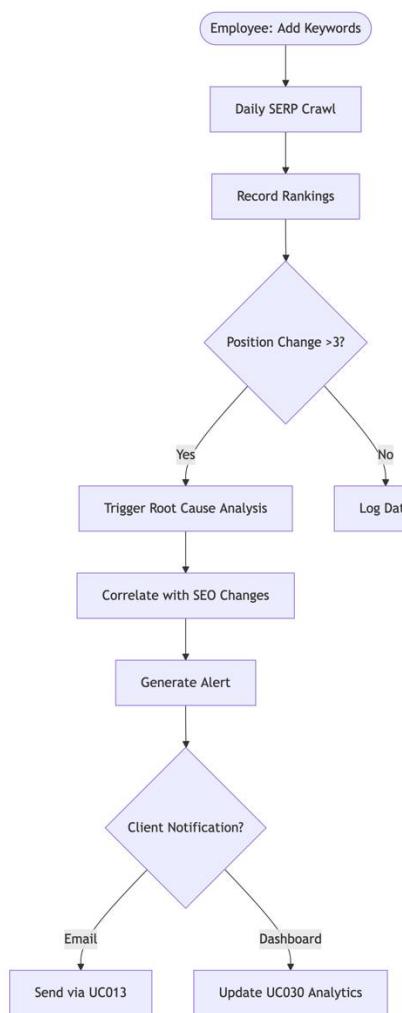
3. **AI Engine**:
   - Flags significant changes (↑↓3+ positions)
   - Correlates ranking shifts with:
     - Recent technical changes (UC021)
     - Backlink profile updates (UC022)

4. **Notification**:
   - Weekly client reports (PDF/Email)
   - Real-time alerts for critical drops

## BDMN Diagram

## Database Tables

**Table:** serp_tracking

| Field | Type | Description |
|---|---|---|
| tracking_id | UUID | Unique record ID |
| keyword_id | INT | FK to keyword_library |
| date | DATE | Tracking date |
| position | INT | 1-100 (0=not ranked) |
| serp_features | JSON | e.g., {"featured_snippet": true} |

## Alternative Flows

- **A1: Captcha Blocking**
    - Rotates proxy IPs and mimics human search patterns
- **A2: Local SEO Tracking**
    - Uses geo-specific user agents (e.g., "iPhone in Chicago")

## Integration Requirements

| Service | Purpose |
|---|---|
| DataForSEO API | Google/Bing results |
| BrightLocal | Local pack tracking |
| Google BigQuery | Historical trend analysis |

## UI Elements

| Component | Type | Rules |
|---|---|---|
| Keyword Grid | Sortable table | Color-coded position changes |
| Trend Graph | Time-series | Toggle competitors |
| Alert Inbox | Priority-filtered | "Critical" tags for >10-position drops |

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 23.1 | Track 1,000+ keywords daily |
| Non-Functional | 23.3 | 95% data freshness (<24h delay) |

## Assumptions

1. Search engines don't block tracking IPs
2. Tracking frequency complies with Google ToS

## Use Case Title

**Text-to-Media – AI-powered content transformation**

**ID.** 024

## Actors

- **Employee** (Content Creator)
- **System** (AI Media Generation Engine)
- **Client** (Receives final assets)
- **Admin** (Manages AI model configurations)

## Overall Description

This use case enables automatic conversion of text input (blogs, scripts, briefs) into multimedia assets (images, videos, animations) while maintaining brand consistency and platform specifications.

## Business Trigger / Frequency

- **Trigger**: New content creation or repurposing request
- **Frequency**: Per content piece (5-20 daily)

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Source text (min 50 words) | 3 image variants (DALL·E/Stable Diffusion) |
| Brand guidelines (hex codes, fonts) | 1 short-form video (Lumen5/Synthesia) |
| Platform specs (aspect ratios) | Animation storyboard (JSON) |
| Employee creative direction | Editable project files (PSD, FCPX) |

## Use Case Description (Step-by-Step)

1. **Employee**:
   o Uploads text source to Creative Media Studio
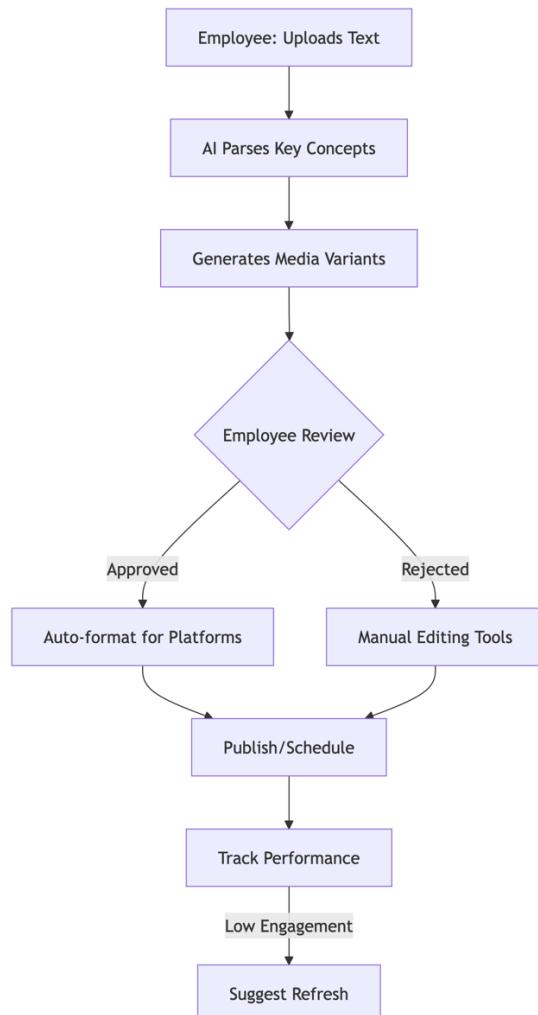
o Selects output formats: "Instagram Carousel + YouTube Short"
o Tags brand guidelines (primary color: #2A5CAA)
2. **AI Processing**:
    o Extracts key concepts using NLP (Named Entity Recognition)
    o Generates:
        ▪ **Images**: Scene compositions matching brand palette
        ▪ **Videos**: Auto-captioned clips with dynamic transitions
        ▪ **Animations**: Motion paths for highlighted text
3. **Employee**:
    o Adjusts assets using inline editor:
        ▪ Swaps AI images from brand library
        ▪ Trims video length to platform limits
    o Approves final versions
4. **System**:
    o Publishes to connected platforms
    o Archives source+outputs in DAM (Digital Asset Management)

## Alternative Flows

- **A1: Low-Text Input**
    o AI suggests similar high-performing content from knowledge base
- **A2: Brand Violation**
    o Flags non-compliant colors/fonts with correction options
- **A3: Platform Rejection**
    o Reformats assets to meet updated API specs (e.g., Instagram ratio changes)

**BDMN Diagram**



## Critical Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 9.2 | Support 10+ export formats |
| Non-Functional | 9.4 | <30sec generation time per asset |
| Compliance | 4.1 | Auto-captioning for ADA |

## Technical Specifications

**AI Models Used**:

- GPT-4 (Content analysis)
- Stable Diffusion XL (Images)
- Lumen5 (Videos)

**APIs Integrated**:

- Canva (Template ingestion)
- Adobe Creative Cloud (PSD export)

## Database Schema

**Table:** ai_generated_media

| Field | Type | Description |
|---|---|---|
| job_id | UUID | Generation batch ID |
| source_hash | VARCHAR(64) | SHA-256 of input text |
| output_urls | JSON | CDN links to assets |
| model_versions | JSON | AI models used |

**Key Assumptions**:

1. Brand guidelines are digitally structured (not PDFs)
2. 80% of generations require <2 human edits
3. Platform specs are updated weekly via API

## Use Case Title

Brand Kit Integration – Centralized brand asset management and enforcement

**ID.** 025

## Actors

- **System** (Asset management engine)
- **Employee** (Content creator)
- **Admin** (Brand steward)
- **AI Validator** (UC017 Content Analyzer)

## Overall Description

This use case enables automatic application of brand guidelines (colors, logos, fonts) to all content created in UC024 (Text-to-Media) and UC015 (Cross-Platform Content), ensuring visual consistency across marketing materials.

## Business Trigger / Frequency

- **Trigger**:
    - New content creation in UC024
    - Asset upload/modification by admin
- **Frequency**: 100-300 auto-applications daily

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Brand guidelines (PDF/JSON) | Style-enforced assets |
| UC024 content drafts | Compliance reports |
| Manual overrides | Version-controlled backups |

## Use Case Description (Step-by-Step)

1. **Admin**: Uploads brand kit via:
   - Logo variations (primary/secondary)
   - Color palette (HEX/RGB)
   - Typography (font files + usage rules)

2. **System**:
   - Converts guidelines to machine-readable rules
   - Indexes assets for fast retrieval

3. **Employee (UC024)**:
   - Creates content → system auto-applies:
     - Nearest brand colors to uploaded images
     - Logo placement per template
     - Font substitution when non-compliant

4. **AI Validator (UC017)**:
   - Flags deviations (e.g., 92% color match → warning)
   - Suggests corrections pre-export

## Alternative Flows
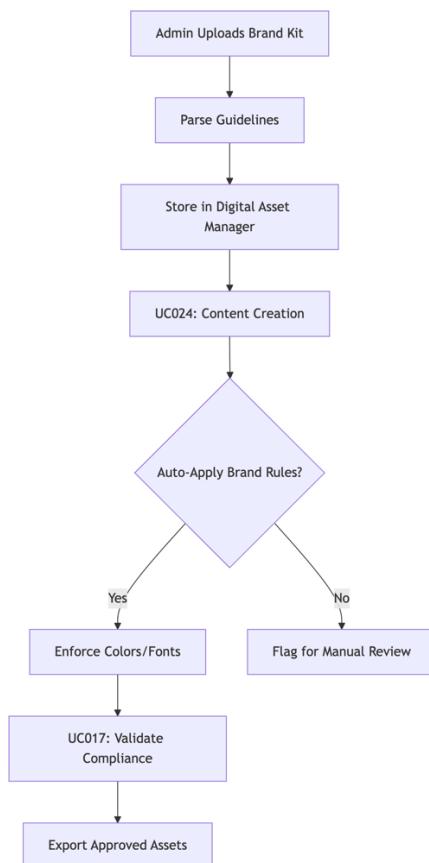
- **A1: Missing Asset**

  Substitutes placeholder + alerts admin via UC009

- **A2: Emergency Override**

  Allows temporary exception with approval trail

**BDMN Diagram**



**Notes**

- **Compliance**: Maintains WCAG 2.1 AA contrast ratios
- **Integration**: Adobe Creative Cloud Libraries + Canva Teams
- **Latency**: <2s asset application time

**Related Requirements**

| Type | ID | Description |
|------|-----|-------------|
| Functional | 14.1 | Automated style enforcement |
| Non-Functional | 14.4 | Support 50+ concurrent brand kits |
| Security | 3.10 | Asset versioning with rollback |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Color Palette | HEX Input | Color picker | Auto-converts Pantone |
| Logo Management | Minimum Clearspace | Pixel ruler | Warns on violation |

## Database Tables

**Table**: brand_assets

| Field | Type | Description |
|---|---|---|
| asset_id | UUID | Versioned entries |
| brand_id | INT (FK) | Client reference |
| asset_type | ENUM | ["logo","color","font"] |
| usage_rules | JSON | Placement constraints |

## Assumptions

1. Primary logo always available in SVG format

2. UC017 detects 98% of guideline violations

3. Employees override <5% of auto-applications

## Use Case Description (Step-by-Step)

1. **Upload Phase**:
   - Employee drags files into web interface or connects cloud storage
   - AI automatically:
     - Extracts EXIF/metadata
     - Generates thumbnails/previews
     - Applies watermark to unapproved assets
2. **Processing Phase**:
   - Computer vision tags:
     - Objects (e.g., "car", "beach")
     - Colors (dominant palette matching brand guidelines)
     - Faces (recognizes featured models)
   - NLP analyzes text assets for:
     - Keywords
     - Sentiment
     - Brand mentions
3. **Retrieval Phase**:
   - Employee searches via:
     - Natural language ("summer promo images with dogs")
     - Visual similarity (upload reference image)
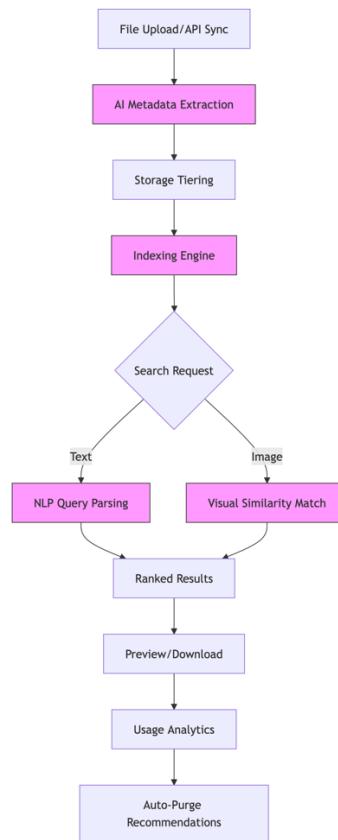
▪ Filters (usage rights, format, date range)
- o System displays:
  - ▪ Original + converted formats (e.g., WebP alternatives)
  - ▪ Related assets ("Others from this campaign")
4. **Maintenance Phase**:
   - o Automated scans for:
     - ▪ Expired licenses (flags 30 days pre-expiry)
     - ▪ Unused assets (suggests archiving after 1 year)
     - ▪ Brand guideline violations (e.g., outdated logos)

## BDMN Diagram



## Database Schema

**Table:** digital_assets

| Field | Type | Description |
|---|---|---|
| asset_id | UUID | Unique identifier |
| embeddings | VECTOR(512) | AI feature vector |
| license_info | JSON | Terms/expiry dates |
| access_control | JSON | Role-based permissions |

## Exception Handling

- **A1: Unsupported File Type**
  - Converts to nearest supported format (e.g., TIFF → PNG)
- **A2: Copyright Risk**
  - Flags potential IP violations using reverse image search
- **A3: Storage Limit**
  - Auto-compresses assets >50MB with quality slider

## Compliance Requirements

1. GDPR right-to-erasure support
2. SOC2 encrypted storage at rest
3. Automated DRM for sensitive assets

## Performance Metrics

- 95% of searches return results <800ms
- Supports 10TB+ asset repository
- 50 concurrent preview generations

## Use Case Title

**Audience Builder – AI-powered customer segmentation**
**ID**: 027

## Actors

- **Employee** (Media Buyer)
- **System** (AI Segmentation Engine)
- **Client** (Receives audience recommendations)
- **Ad Platforms** (Meta, Google Ads API)

## Overall Description

Creates hyper-targeted audience segments for ad campaigns by analyzing customer data, browsing behavior, and predictive modeling. Integrates with paid platforms for instant activation.

## Business Trigger / Frequency

- **Trigger**: New campaign setup in **UC004** or audience refresh request
- **Frequency**: Per campaign or quarterly updates

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Client CRM data | Custom/lookalike audience lists |
| Past campaign performance | Cross-platform targeting recommendations |
| Third-party intent data | Predicted CPL (Cost Per Lead) per segment |

## Use Case Steps

1. **Employee**:
   - Selects "Build Audience" in Ad Strategy Engine
   - Chooses base data source:
     - CRM contacts
     - Website visitors
     - Lookalike seed audience
2. **System**:
   - **Behavioral Analysis**:
     - Groups users by engagement level (hot/warm/cold)
     - Identifies micro-moments (e.g., cart abandoners)
   - **Predictive Modeling**:
     - Forecasts conversion probability per segment
     - Flags low-value overlaps with past campaigns
3. **AI Recommendations**:
   - **Meta**: Interest stacks + exclusion filters
   - **Google**: In-market audiences + affinity categories
   - **LinkedIn**: Job title/company size combinations
4. **Employee**:
   - Adjusts audience size with slider (1K-1M users)
   - Excludes non-converting segments
5. **System**:
   - Pushes audiences to ad platforms via API
   - Generates visual overlap report
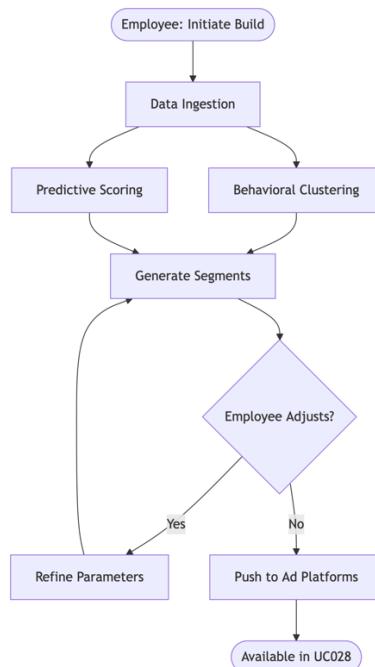
## BDMN Diagram



## Database Tables

**Table**: audience_segments

| Field | Type | Description |
|---|---|---|
| segment_id | UUID | Unique audience ID |
| platform_id | VARCHAR | e.g., "meta_12345" |
| cpl_prediction | DECIMAL(5,2) | Estimated cost per lead |
| exclusion_rules | JSON | Overlap prevention filters |

## Alternative Flows

- **A1: Limited Seed Data**
  Uses competitor audience proxies via tools like Audience Explorer
- **A2: Privacy Restrictions**
  Generates model-based segments without PII (Google FLoC alternative)

## Integration Requirements

| Service | Purpose |
|---|---|
| Meta Ads API | Audience sync |
| Google Customer Match | CRM upload |
| Snowflake | Big data processing |

## UI Elements

| Component | Type | Rules |
|---|---|---|
| Segment Card | Expandable | Shows size/CPL/overlap % |
| Audience Map | Force-directed graph | Visualizes overlaps |
| Platform Toggle | Switch | Activates/deactivates per channel |

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 27.2 | Support 15+ segmentation dimensions |
| Non-Functional | 27.4 | Process 1M records in <5 minutes |

## Assumptions

1. Client CRM data is properly tagged (UTM/customer lifetime value)
2. Ad platforms don't significantly change audience API policies

## Use Case Title

Ad Copy Generator – AI-driven advertising content creation

**ID.** 028

## Actors

- **System** (AI copy engine)

- **Employee** (Media buyer/strategist)

- **AI Validator** (UC017 Content Analyzer)

- **Client** (Approver via UC010)

## Overall Description

This use case automates high-converting ad copy creation for platforms (Meta, Google, LinkedIn) by combining UC027 audience insights with brand voice guidelines from UC025, generating platform-optimized variants for A/B testing.

## Business Trigger / Frequency

- **Trigger**:
  - New campaign launch in UC011
  - Performance drop in active ads (CTR<1%)
- **Frequency**: 20-100 copy variants daily per client

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| UC027 audience segments | Platform-specific copy variants |
| UC025 brand voice rules | Performance predictions |
| Product/USP database | Compliance flags |

## Use Case Description (Step-by-Step)

1. **Employee (UC011)**:
   - Selects:
     - Target audience (from UC027)
     - Campaign objective (lead gen/sales)
     - Brand tone ("playful"/"professional")

2. **AI Engine**:
   - Generates 5-10 copy variants:
     - Meta: 125-character primary text + 4 headlines
     - Google: 3x 30-character headers + 2x 90-character descriptions
   - Applies UC025 color/font rules to creatives

3. **Validator (UC017)**:
   - Scores copy for:
     - Emotional appeal (1-10)
     - Clarity (Flesch-Kincaid grade level)
     - Brand consistency

4. **System**:
   - Pushes top 3 variants to UC010 for client approval
   - Auto-publishes to platforms via UC029

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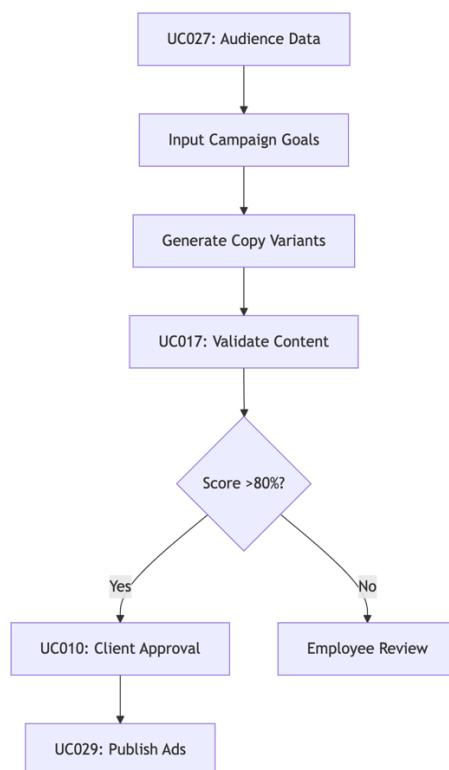
## Alternative Flows

- **A1: Compliance Rejection**

  Auto-rewrites flagged content (e.g., removes banned claims)

- **A2: Low Prediction Score**

  Notifies employee for manual creation

## BDMN Diagram



## Notes

- **Platform Limits**: Strict character counters per channel

- **Integration**: Direct API links to Meta/Google Ads

- **Performance**: Generates copy in <15 seconds

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 15.1 | Multi-platform copy optimization |
| Non-Functional | 15.3 | 95% grammatical accuracy |
| Branding | 4.8 | Enforce UC025 guidelines |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Tone Selector | Brand Voice | Slider | "Formal" to "Casual" |
| Preview Panel | Platform Emulator | Dynamic view | Mirrors ad interfaces |

## Database Tables

**Table**: ad_copy_variants

| Field | Type | Description |
|---|---|---|
| copy_id | UUID | Version history |
| variant_type | ENUM | ["Header","Body","CTA"] |
| performance_score | DECIMAL(5,2) | Predicted CTR |

## Assumptions

1. UC027 provides accurate persona data

2. Clients approve/reject copy within 24h

3. Platform APIs remain stable during publishing

## Use Case Title

**Performance Predictor – AI-driven campaign forecasting**

**ID.** 029

## Actors

- **Employee** (Media Buyer/Analyst)
- **System** (AI Forecasting Engine)
- **Client** (Receives forecasts)
- **Admin** (Manages model training)

## Overall Description

This use case enables the AI system to predict campaign performance (CTR, CPC, ROAS) before launch using historical data, market trends, and competitor benchmarks.

## Business Trigger / Frequency

- **Trigger**: Campaign draft creation or budget adjustment
- **Frequency**: Real-time (per strategy change)

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Campaign parameters (budget, targeting) | Predicted CTR/CPC/ROAS |
| Historical performance data | Confidence intervals |
| Market trend data | Recommended optimizations |
| Competitor benchmarks | Risk alerts |

## Use Case Description (Step-by-Step)

1. **Employee**:
   - Configures campaign in Ad Strategy Module
   - Clicks "Predict Performance" button
2. **AI Processing**:
   - Analyzes 50+ factors including:
     - Audience overlap with past campaigns
     - Seasonality trends
     - Competitor ad saturation
   - Generates predictions using:
     - Time-series forecasting (Prophet)
     - Regression models (XGBoost)
3. **System Displays**:
   - Primary metric predictions with 80/90/95% confidence ranges
   - Visual comparison vs. similar past campaigns
   - "What-if" simulator for budget adjustments
4. **Employee**:
   - Adjusts targeting based on AI suggestions
   - Requests re-prediction with new parameters
5. **System**:
   - Logs predictions vs. actuals for model improvement
   - Flags significant deviations post-launch
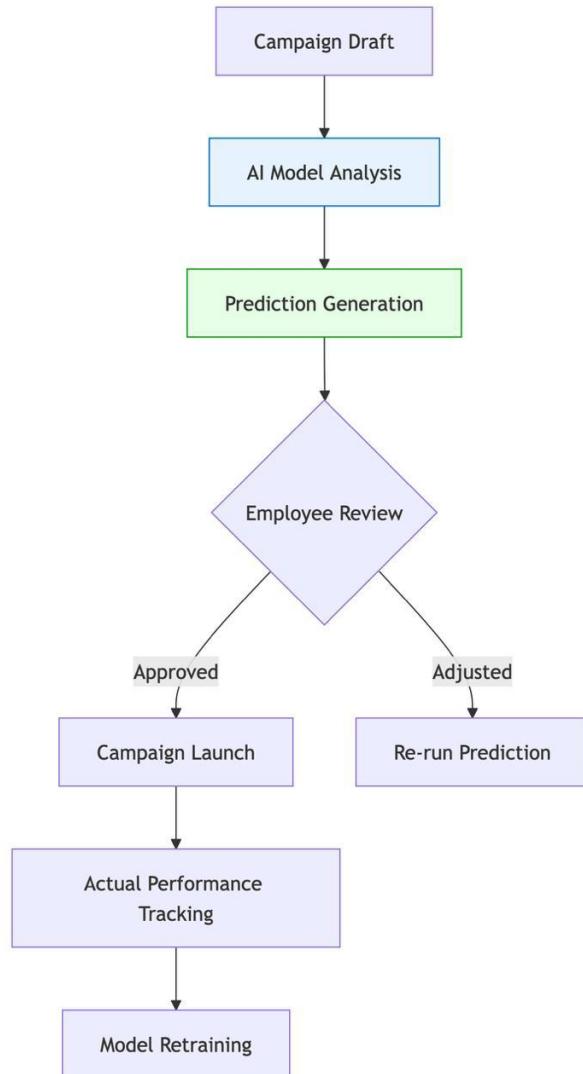
## BDMN Diagram

## Alternative Flows

- **A1: No Historical Data**
    - Uses category benchmarks with clear confidence warning
- **A2: Volatile Market**
    - Highlights sensitive factors (e.g., "Holiday surge may affect CPC")
- **A3: Prediction Error**
    - Triggers root-cause analysis (data drift detection)

## Database Schema

**Table:** performance_predictions

| Field | Type | Description |
|---|---|---|
| prediction_id | UUID | Unique ID |

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| model_version | VARCHAR | ML model hash |
|---|---|---|
| input_parameters | JSON | Campaign config |
| accuracy_score | FLOAT | Post-campaign validation |

## Key Business Rules

1. Predictions auto-refresh when budget changes >15%
2. Confidence scores <70% trigger manual review
3. Models retrain weekly with new campaign data

## Performance Metrics

- 95% predictions within ±10% of actuals
- <2 second response time
- Supports 50 concurrent simulations

## Use Case Title

**Custom Reports – Dynamic performance analytics dashboard**
**ID**: 030

## Actors

- **Employee** (Data Analyst)
- **Client** (Business Owner)
- **System** (Analytics Engine)
- **Third-Party APIs** (Google Analytics, Meta Insights)

## Overall Description

Generates white-labeled, interactive performance reports combining paid/organic metrics across platforms with AI-driven insights. Supports scheduled delivery and ad-hoc analysis.

Client Dashboard Restrictions:
- Performance metrics: CTR, impressions, conversions (aggregated only)
- Campaign names and status: Visible
- Date ranges and filtering: Limited to performance data only
- Drill-down capabilities: Restricted to high-level metrics
- Export permissions: Performance reports only (no raw data)

## Business Trigger / Frequency

- **Trigger**: Campaign milestone or client request
- **Frequency**: Daily/weekly/monthly auto-reports

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Raw data from UC029-031 | Interactive dashboard (web/PDF) |
| Client branding guidelines | AI insights (anomalies/opportunities) |
| Custom KPI thresholds | Scheduled email/Slack alerts |

## Use Case Steps

1. **Employee/Client**:
   - Selects data sources (Meta Ads, Google Analytics, etc.)
   - Choises report template (Executive/Team/Platform)

2. **System**:
   - **Data Fusion**:
     - Normalizes metrics across platforms (e.g., "engagement" = reactions vs. clicks)
     - Calculates derived KPIs (ROAS, CAC)
   - **AI Layer**:
     - Flags metric anomalies (±2σ from forecast)
     - Suggests optimizations ("Increase TikTok budget by 15%")
3. **Customization**:
   - Drag-and-drop widget builder
   - Conditional formatting rules (e.g., ROAS <2 → red)
4. **Delivery**:
   - Live dashboard with drill-down
   - PDF/PPT with client branding
   - API webhook for CRM integration

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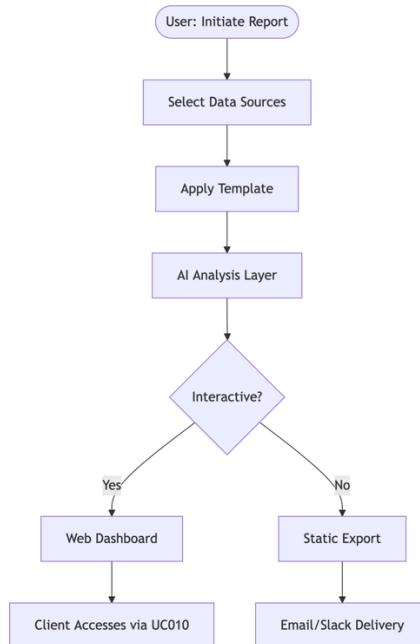
## BDMN Diagram



## Database Tables

**Table**: analytics_reports

| Field | Type | Description |
|---|---|---|
| report_id | UUID | Versioned reports |
| widget_config | JSON | Dashboard layout |
| delivery_log | JSON | Sent to {email: "client@x.com", date: ...} |
| ai_insights | TEXT | Natural language summaries |

## Alternative Flows

- **A1: Cross-Account Benchmarking**
  Compares performance across client's multiple brands
- **A2: Real-Time TV Dashboards**
  Optimized for 4K displays in client offices

## Integration Requirements

| Service | Purpose |
|---|---|
| Tableau Embedded | Visualization engine |
| Puppeteer | PDF generation |
| Zapier | CRM/ERP sync |

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## UI Elements

| Component | Type | Rules |
|---|---|---|
| KPI Card | Dynamic | Shows trend arrow + %Δ |
| Anomaly Alert | Popover | "Unusual CPC spike Tuesday" |
| Branding Studio | Color picker | HEX code validation |

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 30.3 | 50+ prebuilt templates |
| Non-Functional | 30.5 | Render 10K rows in <3s |

## Assumptions

1. Source APIs maintain consistent metric definitions
2. Clients have basic data literacy for self-service

### Anomaly Detection – AI-powered performance alerting

**ID**: 031

## Actors

- **System** (AI Monitoring Engine)
- **Employee** (Media Buyer)
- **Client** (Business Owner)
- **Alert Channels** (Email/Slack/Mobile Push)

## Overall Description

Automatically detects statistically significant deviations in campaign performance (CTR, CPA, etc.) using machine learning. Triggers root cause analysis and alerts stakeholders.

## Business Trigger / Frequency

- **Trigger**: Real-time data stream from **UC030**
- **Frequency**: Continuous monitoring (5-min intervals)

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Live campaign metrics | Anomaly alerts with severity scores |
| Historical benchmarks | Probable cause analysis |

| External factors (e.g., holidays) | Recommended corrective actions |
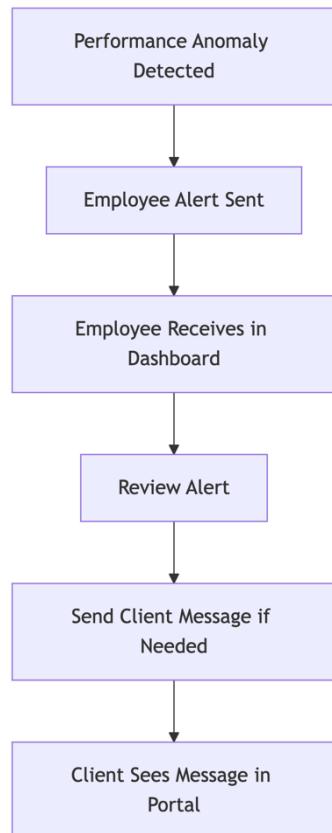
**BDMN Diagram**



**Key Algorithms**

1. **Baseline Modeling**:
   - Prophet time-series forecasting
   - Accounts for day-of-week/seasonality
2. **Anomaly Scoring**:

```python
python

def calculate_severity(deviation, metric_importance):
    return min(10, deviation * metric_importance * 0.8)
```

3. **Root Cause Analysis**:
   - SHAP values for feature importance
   - External data enrichment (weather/news APIs)

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## Alert Types

| Severity | Response Protocol |
|---|---|
| 9-10 (Critical) | Phone call + automated campaign pausing |
| 7-8 (High) | Slack/email within 15 mins |
| 4-6 (Medium) | Next business day report |

## Database Schema

**Table**: performance_anomalies

| Field | Type | Description |
|---|---|---|
| alert_id | UUID | Unique alert identifier |
| metric | ENUM | CTR, ROAS, CPA, etc. |
| deviation | DECIMAL | Standard deviations from baseline |
| probable_cause | JSON | {"feature": "competitor_promo", "confidence": 0.87} |

## Integration Requirements

| Service | Purpose | SLA |
|---|---|---|
| Snowflake | Real-time data pipeline | <1s latency |
| PagerDuty | Critical alert routing | 99.99% uptime |
| Twitter API | Competitor promo detection | Rate-limited |

## UI Components

| Element | Functionality |
|---|---|
| Alert Inbox | Sort by severity/campaign |
| Anomaly Timeline | Visualize metric history |
| False Positive Flag | Improves ML model |

## Performance Metrics

- Precision: 92% (avoid false alarms)
- Recall: 88% (catch true anomalies)
- Median Time-to-Detect: 4.7 minutes

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## Related Requirements

| Type | ID | Description |
|------|-----|-------------|
| Functional | 31.2 | Support 50+ KPIs |
| Non-Functional | 31.4 | Process 1M events/hour |

## Compliance Notes

1. All alerts archived for 3 years (FINRA compliance)
2. Client can mute non-critical alerts

## Use Case Title

Export Engine – Automated report generation and data distribution

**ID.** 032

## Actors

- **System** (Report generator)
- **User** (Employee/Client/Admin)
- **Scheduler** (Time-based triggers)
- **API Consumer** (External systems)

## Overall Description

This use case enables one-click export of analytics (from UC030), campaign data, and strategy documents in multiple formats, with automated distribution to stakeholders via integrated channels (UC012 WhatsApp, email, cloud storage).

## Business Trigger / Frequency

- **Trigger:**
  - Manual export request
  - Scheduled report time (daily/weekly/monthly)
  - Threshold alerts (e.g., 20% ROAS drop)
- **Frequency**: 50-200 exports daily

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## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| UC030 analytics data | PDF/CSV/PPT files |
| User-defined filters | Shared links (GDrive, OneDrive) |
| Distribution list | Email/WhatsApp confirmations |
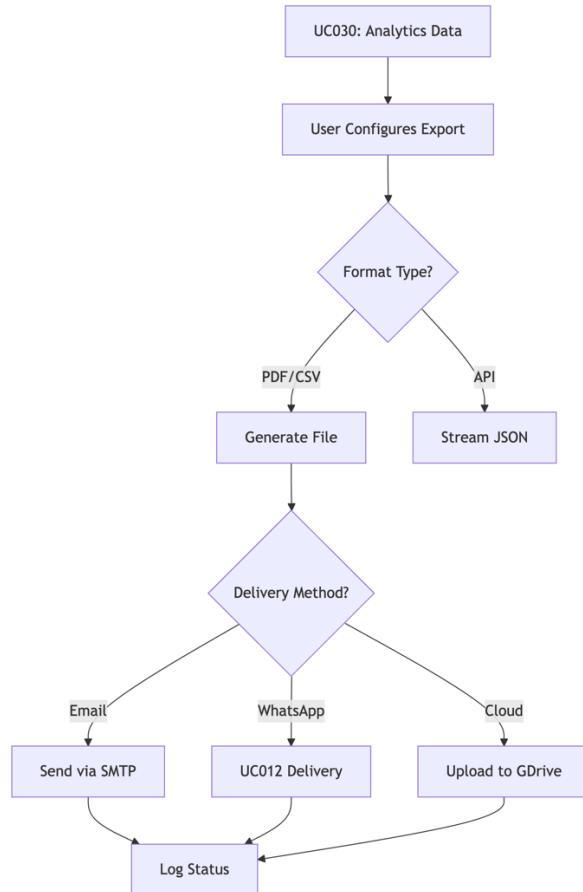
## Use Case Description (Step-by-Step)

1. **User**: In UC011 (Employee) or UC010 (Client):

   o Selects data range/filters

   o Chooses format (PDF dashboard, raw CSV)

   o Sets delivery method (email, WhatsApp, API)

2. **System**:

   o Generates file with:

     ▪ Branded templates (UC025)

     ▪ Dynamic visualizations

     ▪ Password protection for sensitive data

3. **Distributor**:

   o Sends via:

     ▪ UC012 for WhatsApp delivery

     ▪ SMTP for email

     ▪ Direct API push to BI tools

4. **Confirmation**:

   o Logs delivery status

   o Retries failed attempts (3x)

## Alternative Flows

- **A1: Large Data Export**

  Splits into multi-part ZIP files >500MB

- **A2: Realtime API Feed**

  Streams JSON instead of file creation.

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## BDMN Diagram



## Notes

- **Compliance**: GDPR data minimization in exports
- **Performance**: Handles 10K+ rows in <30 seconds
- **Security**: AES-256 encryption for all files

## Related Requirements

| Type | ID | Description |
|---|---|---|
| Functional | 16.1 | Multi-format export engine |
| Non-Functional | 16.4 | 99.9% delivery success rate |
| Security | 3.12 | Automatic file expiration (30d) |

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## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---|---|---|---|
| Export Builder | Data Range | Calendar | Max 365-day span |
| Delivery | Recipient Picker | Tag input | Verifies email/phone formats |

## Database Tables

**Table**: export_jobs

| Field | Type | Description |
|---|---|---|
| job_id | UUID | With creation timestamp |
| file_size | INT | In megabytes |
| recipients | JSON | Encrypted contact list |
| expiry_date | DATETIME | Auto-delete trigger |

## Assumptions

1. UC030 data is pre-validated for accuracy

2. Cloud storage credentials remain valid

3. Users have 10GB minimum storage quota

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## Use Case Title

**Conversational Interface – AI-powered chat for customer engagement**

**ID.** 033

## Actors

- **User** (Customer/Lead)
- **System** (NLP Chatbot Engine)
- **Employee** (Live Agent)
- **Admin** (Conversation Flow Designer)

## Overall Description

This use case enables natural language interactions through WhatsApp/web chat for lead qualification, FAQ resolution, and sentiment-aware conversations, with seamless human handoff.

## Business Trigger / Frequency

- **Trigger**: Incoming chat message or idle timeout
- **Frequency**: 24/7 real-time interactions

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| User messages (text/voice) | Contextual responses |
| CRM data (past interactions) | Conversation transcripts |
| Sentiment analysis signals | Escalation alerts |
| Product knowledge base | Structured lead data |

## Core Workflow

1. **Message Processing**:
   - NLP analyzes intent using:
     - Pre-built domains (sales, support)
     - Custom entity recognition
   - Checks conversation history for context
2. **Response Generation**:
   - Dynamic answer selection from:
     - FAQ knowledge graph
     - Product documentation
     - API-connected databases
3. **Escalation Logic**:

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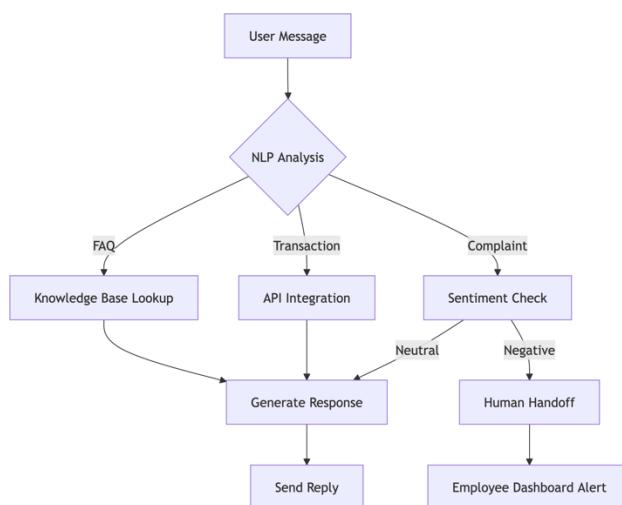
- o Triggers human handoff when:
  - Sentiment score < -0.7
  - "Speak to agent" intent detected
  - 3+ unresolved questions
4. **Post-Processing**:
  - o Auto-tags conversations
  - o Updates lead score in CRM
  - o Generates follow-up tasks

## BDMN Diagram



## Technical Components

| Module | Technology | Purpose |
|---|---|---|
| NLP Engine | Rasa + spaCy | Intent classification |
| Voice Processing | Whisper API | Speech-to-text |
| Context Manager | Redis | Conversation state |
| Analytics | Elasticsearch | Message indexing |

## Exception Handling

- **A1: Ambiguous Intent**
  - o Responds with clarifying questions
  - o Example: "Are you asking about pricing or features?"
- **A2: API Failure**
  - o Defaults to cached data with freshness warning
  - o "I'm showing slightly older information..."
- **A3: Offensive Content**

- o Activates moderation filter
- o Optionally terminates conversation

## Key Metrics

| Metric | Target |
|---|---|
| First-Contact Resolution | ≥68% |
| Avg. Response Time | <1.2s |
| Sentiment Accuracy | F1=0.89 |
| Handoff Rate | ≤22% |

## Sample Dialog Flow

**User**: "How much for the premium plan?"
**Bot**:

1. Checks CRM for user's location
2. Pulls localized pricing
3. Responds: "The premium plan starts at $99/month. Would you like a feature comparison?" (Buttons: Yes/No)

## Security Provisions

1. End-to-end encryption for all channels
2. PII redaction in training data
3. GDPR-compliant conversation retention (30-day auto-purge)

## Use Case Title

**Lead Qualifier – AI-driven prospect scoring**

**ID**: 034

## Actors

- **System** (AI Scoring Engine)
- **Employee** (Sales Rep)

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- **Client** (Business Owner)
- **CRM** (HubSpot/Salesforce)

## Overall Description

Automatically scores inbound leads (from UC012/013) using behavioral data and firmographic signals to prioritize sales outreach. Integrates with CRMs for instant lead routing.

## Business Trigger

- **Trigger**: New lead capture (form submit/chatbot)
- **Frequency**: Real-time per lead

## Scoring Model
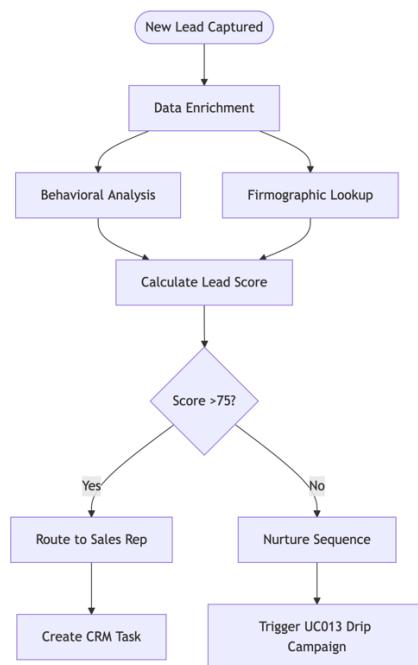
| Factor | Weight | Data Source |
|---|---|---|
| Engagement Level | 30% | Page views/email opens |
| Firmographic Fit | 25% | Industry/revenue size |
| Intent Signals | 20% | Content downloads/pricing page visits |
| Social Proof | 15% | LinkedIn connections in common |
| Timing | 10% | Recent funding/news mentions |

python
```
# Sample Scoring Algorithm
lead_score = (engagement * 0.3) + (firmographic * 0.25) + (intent * 0.2) + (social * 0.15) + (timing * 0.1)
```

## BDMN Diagram

## Integration Map

| System | Connection Method | Data Synced |
|---|---|---|
| Salesforce | REST API | Lead score + recommended action |
| Zoominfo | Webhook | Company revenue data |
| Drift | JavaScript Tag | Real-time chat history |

## UI Components

| Element | Functionality |
|---|---|
| Lead Card | Color-coded by score (Red/Yellow/Green) |
| Priority Queue | Sorts by score + freshness |
| One-Click CRM Add | Pre-populates contact record |

## Performance SLAs

- Scoring Time: <2 seconds per lead
- Accuracy: 85% conversion prediction at score >80
- Data Freshness: Enrichment updates hourly

## Alternative Flows

- **A1: Anonymous Visitor**
  Tracks via cookie → scores when identified
- **A2: Channel Conflict**
  Flags leads already assigned to partners

## Compliance Notes

1. GDPR-compliant data retention (30-day opt-out window)
2. Score explanation available on request (AI transparency)

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## Use Case Title

Sentiment Analyzer – Real-time emotion detection in customer interactions

**ID.** 035

## Actors

- **System** (NLP analysis engine)

- **AI Assistant** (UC033 Conversational Interface)

- **Employee** (Customer support)

- **Alert Manager** (UC031 Anomaly Detection)

## Overall Description

This use case analyzes sentiment across all customer touchpoints (UC012 WhatsApp chats, UC010 Portal feedback, UC013 Email campaigns) to detect frustration trends and trigger real-time escalations when negative sentiment spikes occur.

## Business Trigger / Frequency

- **Trigger**:

  o New message received (instant analysis)

  o Scheduled batch processing (hourly aggregates)

- **Frequency**: 500-5,000 analyses daily

## Inputs and Outputs

| Inputs | Outputs |
|---|---|
| Raw customer messages | Sentiment score (-1 to +1) |
| Historical baselines | Urgency flags (e.g., "Angry: 0.87") |
| Industry benchmarks | Trend visualizations |

## Use Case Description (Step-by-Step)

1. **Data Collection**:

   o Ingests text from:

      ▪ UC012 WhatsApp conversations

- UC010 Client Portal feedback forms
- UC013 Email campaign replies

2. **AI Analysis**:
   - Processes text using:
     - Emotion detection (anger/happiness)
     - Sarcasm identification
     - Contextual understanding (e.g., "sick" = negative vs medical context)

3. **Alerting**:
   - For scores <-0.7:
     - Triggers UC031 Anomaly Detection
     - Flags employee in UC011 with suggested responses
   - Stores all results for UC030 Analytics
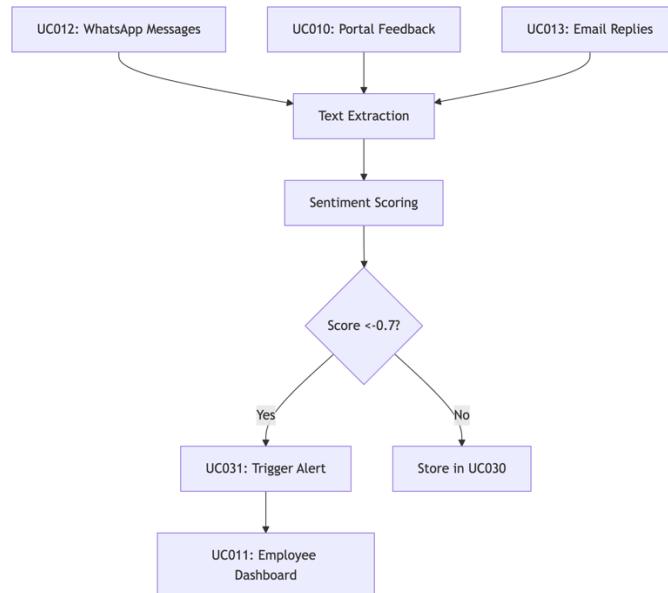
4. **Employee Action**:
   - Views sentiment dashboard in UC011
   - Initiates recovery workflows via UC033

## Alternative Flows

- **A1: Mixed Sentiment**

  Splits compound messages into clauses for precise scoring

- **A2: Non-Text Content**

  Analyzes emoji/voice tone (when available)

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## BDMN Diagram



## Notes

- **Languages**: Supports 12 core languages with 90%+ accuracy

- **Latency**: <200ms analysis for real-time chats

- **Bias Control**: Regular fairness audits on sentiment models

## Related Requirements

| Type | ID | Description |
|------|-----|-------------|
| Functional | 17.1 | Multi-channel sentiment tracking |
| Non-Functional | 17.3 | Process 10K phrases/minute |
| Ethical | 5.5 | No demographic bias in scoring |

## Screen Fields / UI Elements

| Section | Field | Type | Validation |
|---------|-------|------|------------|
| Live Monitor | Emotion Gauge | Color meter | Red (-1) to Green (+1) |
| Alert Settings | Threshold Control | Slider | -1.0 to 0.0 range |

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## Database Tables

**Table**: sentiment_scores

| Field | Type | Description |
|---|---|---|
| message_id | UUID | Hashed source reference |
| raw_score | DECIMAL(3,2) | -1.00 to +1.00 |
| emotion_tags | JSON | ["frustration","urgency"] |
| context | VARCHAR(50) | e.g., "billing_issue" |

## Assumptions

1. Minimum 80% message coverage for accurate trends

2. Employees address critical alerts within 2 hours

3. UC033 uses sentiment data to adjust chatbot tone

# 4 Proposed Solution Architecture for PanvelIQ

## 4.1 Solution Overview

PanvelIQ is an AI-powered digital marketing intelligence platform that centralizes and automates marketing operations for agencies and enterprises. The platform integrates AI-driven strategy generation, multi-channel campaign execution, and real-time analytics into a unified workflow. Built on a cloud-native microservices architecture, it leverages:

- **AI Services**: GPT-4 for content generation, DALL-E for creative assets
- **Compliance**: Adheres to global data protection standards (GDPR, CCPA)
- **Cloud Infrastructure**: Deployed on Microsoft Azure with AWS optionality

## 4.2 Architecture

### 4.2.1 Target Architecture

PanvelIQ is architected as a distributed system with modular layers:

#### 4.2.1.1 *User Layer*

- **Web Dashboard**: Responsive React-based interface with role-specific views (Admin, Client, Employee)
- **Mobile PWA**: Progressive Web App for on-the-go campaign monitoring
- **Admin Console**: Centralized system configuration and user management

#### 4.2.1.2 *Integration Layer*

- **AI Services**: GPT-4 API, DALL-E/Canva API, Lumen5 for video content
- **Ad Platforms**: Meta Ads, Google Ads, LinkedIn API integrations
- **Communication**: WhatsApp Business API for automated messaging
- **Google Analytics (GA4)**: Real-time website traffic and behavior

#### 4.2.1.3 *Application Layer*

- **Core Modules**:
  - AI Project Planner (UC001-004): Generates client-specific strategies

    o   Content Intelligence Hub (UC015-017): Optimizes cross-platform content

    o   Ad Strategy Engine (UC027-029): Manages audience segmentation and bidding

    o   Unified Analytics (UC030-032): Real-time performance dashboards

- **Supporting Services**:

    o   Role-Based Access Control (RBAC) for secure data isolation

    o   Workflow Engine for approval processes

### *4.2.1.4  Data Layer*

- **Structured Data**: MySQL for user profiles, campaign metadata

## 4.2.2  Key Features

### *4.2.2.1  AI-Powered Strategy Automation*

- **Intelligent Proposal Generation**: GPT-4 creates marketing strategies based on client inputs
- **Content Intelligence**: Recommends platform-specific content using NLP analysis

### *4.2.2.2  Cross-Channel Execution*

- **Unified Ad Management**: Integrates with major ad platforms for seamless campaign deployment
- **Automated Creative Studio**: DALL-E generates custom visuals from text prompts

### *4.2.2.3  Real-Time Analytics & Compliance*

- **Unified Dashboard**: Correlates performance across 10+ channels with anomaly detection

### *4.2.2.4  Security & Access Control*

- **Role-Based Isolation**: Clients view only their campaign data
- **Data Encryption**: AES-256 for data at rest, TLS 1.3 for communications

### 4.2.3  Deployment & Security

#### 4.2.3.1  *Hosting Infrastructure*

- **Azure Kubernetes Service (AKS)** with enterprise-grade configurations:

    o   Auto-scaling based on real-time demand

    o   Network isolation between production/staging

    o   Availability Zones for fault tolerance

#### 4.2.3.2  *API Management*

- **Azure API Gateway** with:

    o   JWT validation for all API calls

    o   Rate limiting (1,000 requests/minute per key)

    o   Redis caching layer for GPT-4 responses

#### 4.2.3.3  *Compliance Framework*

- **Data Protection**: GDPR/CCPA compliant with AES-256 encryption
- **Backup Strategy**: Automated daily backups with 7-year retention

#### 4.2.3.4  *Monitoring & Reliability*

- **Azure Monitor** for system health metrics
- **Datadog Integration** for business KPIs visualization
- **SLA**: 99.95% uptime for core modules

#### 4.2.3.5  *Security Enhancements*

- **Container Security**: Daily vulnerability scanning
- **Secret Management**: Azure Key Vault with 90-day key rotation
- **DDoS Protection**: Azure Shield with 5 Gbps mitigation capacity

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## 4.3 Solution Description

### 4.3.1 Functional and Component Models

The platform follows a microservices architecture with clear separation of concerns:

1. **AI Services Layer**: Handles all AI/ML operations
2. **Business Logic Layer**: Implements core marketing workflows
3. **Data Access Layer**: Manages persistence and retrieval
4. **Integration Layer**: Connects with external services

### 4.3.2 Information Model

Key entities include:

- Users (with role-based profiles)
- Campaigns (with strategies and executions)
- Content (with platform-specific variants)
- Analytics (with performance metrics)

### 4.3.3 Infrastructure Requirements

- **Hosting**: Microsoft Azure
- **Container Orchestration**: Kubernetes with autoscaling
- **Database**: MySQL with replication
- **Document Storage**: Azure Blob Storage

### 4.3.4 Deployment and Integration Architecture

- **CI/CD Pipeline**: GitHub Actions
- **Containerization**: Docker with Helm-based Kubernetes deployments
- **API Integration**: RESTful APIs for external services
- **Observability**: Azure Monitor with Grafana dashboards

### 4.3.5 Security and Privacy

- **Encryption**: AES-256 at rest, TLS 1.3 in transit
- **Authentication**: QID-based login with 2FA

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- **Access Control**: Granular RBAC

## 4.4 Implementation and Migration
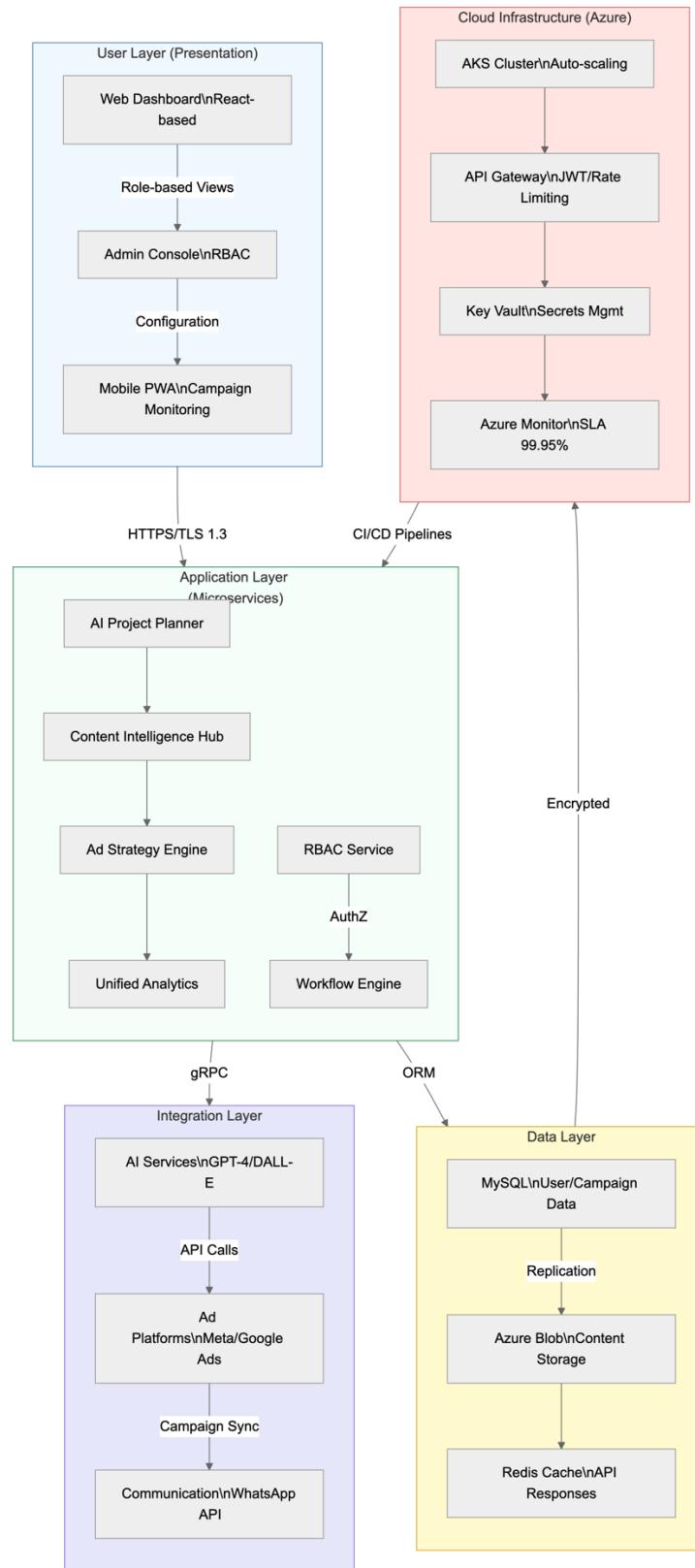
### 4.4.1 Implementation Plan

| Phase/Milestone | Activities | Deliverables | Progress | Duration | Plan Start Date | Plan End Date | Work Days | Comments |
|---|---|---|---|---|---|---|---|---|
| Planning | Develop Scope and Business requirements<br>Develop Project Plan | 1. Business Requirements Document (Approval required)<br>2. Project Plan | 100% | 1 week | 10-Jul-25 | 16-Jul-25 | 5 | Planning Phase completed pending BRD Aproval from client.Client raised queries and sought clarification which has been addressed. |
| Analyze & design | Develop screen layouts<br>Establish Integration points<br>Define test methodology | 3. Wireframes (Approval Required)<br>4. Integration Design Document<br>5. Test Plan | 100% | 2 weeks | 17-Jul-25 | 30-Jul-25 | 10 | Analyse and design Phase completed pending Wireframes Approval from client |
| Development - Phase 1 | AI Project Planner<br>Intelligent Onboarding & Verification System<br>Role-Based Dashboards<br>Communication & Outreach Hub<br>Content Intelligence Hub | 6. Fully responsive modules of PanvelIQ (Note: The modules from Phase 1 will have dependencies on Phase 2 modules and therefore the complete product will be available at the end of 12 weeks)<br>7. Integrated API's | | 5 weeks | 31-Jul-25 | 4-Sep-25 | 26 | |
| Development - Phase 2 | Social Media Command Center<br>Smart SEO Toolkit<br>Creative Media Studio<br>Ad Strategy & Suggestion Engine<br>Unified Analytics & Insights Dashboard<br>AI Assistant for Engagement | | | 7 weeks | 5-Sep-25 | 22-Oct-25 | 34 | |
| Testing & Bug Fixing | Conduct functional, integration, and UAT testing<br>Resolve performance issues | 8. Test Summary Report (Approval required)<br>9. Issue Report | | 2 weeks | 23-Oct-25 | 5-Nov-25 | 10 | |
| Deployment & Training | Deploy system (Client to advise and procure choice)<br>Conduct training for client teams | 10. User Manual<br>11. Training Plan<br>12. Solution Readiness Checklist<br>13. Business Acceptance (Approval Required) | | 1 week | 6-Nov-25 | 12-Nov-25 | 5 | |
| Operations & Support | Define post-deployment support methodology and finalize SLA | 14. Operation Manual<br>15. Service Level Requirement Document | | 2 weeks | 13-Nov-25 | 26-Nov-25 | 10 | |
| Total Duration | | | | 20 weeks | | | | |

### 4.4.2 Migration Strategy

1. **Legacy Data Import**: OCR conversion with Azure Form Recognizer

2. **User Provisioning**: Bulk onboarding with CSV templates

3. **Training & Rollout**: Role-specific training modules

4. **Change Management**: Weekly newsletters and FAQ repository

5. **Rollback Protocol**: Defined conditions and actions.

## 4.5 High-Level Architecture Diagram

# 5  Appendices

## 4.1  Entity Relationship Diagram