

Universal Knowledge Framework - Enhanced Design System

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Core Layout Components

Header Architecture

- Navigation Bar
 - Position: Fixed top, height: 64px
 - Logo: Left-aligned, SVG format
 - Primary menu: Centered, Roboto 16px
 - User profile: Right-aligned with dropdown
 - Language selector: Right corner
 - Accessibility controls: Font size, contrast mode

Hero Banner

- Full-width container (.container-fluid)
- Height: 600px with parallax background
- Gradient overlay: rgba(0,51,102,0.8) to rgba(0,128,128,0.6)
- Main heading: Roboto Bold 48px, white
- Animated knowledge graph visualization using Three.js
- Call-to-action buttons with hover animations

Navigation System

Sidebar Navigation

- Structure
 - Width: 280px, collapsible
 - Dark theme: #1a1a1a
 - Menu items: Roboto Regular 14px
 - Breadcrumb navigation integration
 - Search bar with advanced filtering

Main Content Area

- Grid System
 - 12-column Bootstrap 5 grid
 - Responsive breakpoints: xs, sm, md, lg, xl, xxl
 - Gutters: 24px
 - Content sections with lazy loading

Component Library

Data Cards

- Knowledge Cards
 - Dimensions: 360px × variable height
 - Background: white
 - Shadow: 0 4px 6px rgba(0,0,0,0.1)
 - Border-radius: 8px
 - Loading skeleton states
 - Error handling states

Interactive Elements

- Buttons
 - Primary: #003366 background, white text
 - Secondary: #008080 border, teal text
 - Hover effects: Scale(1.05) with 0.3s transition
 - Loading states with spinners
 - Disabled states with visual feedback

Advanced Features

AI Integration

- Chat Widget
 - Position: Fixed bottom-right
 - Initial state: Collapsed
 - Animation: Slide-up on open
 - AI avatar with typing animation
 - Real-time response indicators
 - Message history preservation

Data Visualization

- Interactive Charts
 - D3.js integration with custom themes
 - Real-time updates via WebSocket
 - Interactive tooltips with rich data
 - Export functionality (PNG, SVG, PDF)
 - Responsive sizing across devices

Multimedia Support

Rich Media Integration

- Video Player
 - HTML5 player with custom controls
 - Autoplay on scroll into view
 - Picture-in-picture support
 - Bandwidth-aware quality switching
 - Closed captions support

Document Handling

- File Management
 - Drag-and-drop upload interface
 - Progress indicators with cancel option
 - Preview functionality for common formats
 - Version control integration

Performance Optimization

- Loading Strategy
 - Progressive image loading
 - Component code splitting
 - Service worker for offline support
 - Browser caching optimization

Security Measures

- Authentication System
 - Multi-factor authentication support
 - Session management with timeout
 - Role-based access control

- Security event logging

Accessibility Compliance

- WCAG 2.1 AA Standards
 - ARIA labels for interactive elements
 - Keyboard navigation support
 - Screen reader optimization
 - High contrast mode toggle
 - Focus indication system
 - Skip navigation links



graph TD

A["Universal Knowledge Framework"] → B["Core Components"]

A → C["Knowledge Organization"]

A → D["User Interface"]

A → E["Security & Compliance"]

B → B1["Data Management"]

B → B2["Analytics Engine"]

B → B3["Integration Layer"]

B → B4["System Core"]

C → C1["Content Structure"]

C → C2["Classification"]

C → C3["Taxonomy"]

D → D1["Dashboard"]

D → D2["Search Interface"]

D → D3["User Controls"]

D → D4["Reports"]

E → E1["Access Control"]

E → E2["Data Protection"]

E → E3["Standards"]

E → E4["Monitoring"]

style A fill:#003366,color:#fff

style B,C,D,E fill:#008080,color:#fff

Design System Guidelines

Typography

Primary Font: Roboto

Secondary Font: Open Sans

- Headers: Roboto Bold
- Body Text: Roboto Regular 16px
- Menu Items: Roboto Regular 14px

Color Palette

- Primary: #003366 (Deep Blue)
- Secondary: #008080 (Teal)
- Background Gradient: rgba(0,51,102,0.8) to rgba(0,128,128,0.6)
- Text: White on dark backgrounds, Dark gray on light backgrounds

Layout Specifications

- Container Width: 100% (.container-fluid)
- Grid System: 12-column Bootstrap 5 grid
- Gutters: 24px
- Card Border Radius: 8px
- Box Shadows: 0 4px 6px rgba(0,0,0,0.1)

Interactive Elements

- Buttons: 40px height with 16px padding
- Hover Effects: Scale(1.05) with 0.3s transition
- Input Fields: 48px height
- Card Dimensions: 300px × variable height

Responsive Breakpoints

- Desktop: 1200px and above
- Tablet: 768px to 1199px
- Mobile: Below 768px

Component Spacing

- Section Margins: 48px top/bottom
- Card Grid Gap: 16px between items
- Widget Spacing: 32px from viewport edges
- Padding: 16px for containers, 8px for elements

```
.chat-container {  
  width: 100%;  
  max-width: 800px;  
  height: 600px;  
  border-radius: 12px;  
  box-shadow: 0 4px 12px rgba(0,0,0,0.15);  
  display: flex;  
  flex-direction: column;  
  background: #fff;  
}  
  
.chat-header {  
  padding: 16px;  
  background: linear-gradient(90deg, #003366, #008080);  
  color: white;  
  border-radius: 12px 12px 0 0;  
}  
  
.message-container {  
  flex: 1;  
  padding: 16px;  
  overflow-y: auto;  
}  
  
.input-area {  
  padding: 16px;  
  border-top: 2px solid #eee;  
  display: flex;
```



```

    gap: 16px;
    align-items: center;
  }

.message-input {
  flex: 1;
  padding: 12px 16px;
  border: 2px solid #ddd;
  border-radius: 24px;
  font-size: 14px;
}

.send-button {
  padding: 12px 24px;
  background: #003366;
  color: white;
  border: none;
  border-radius: 24px;
  cursor: pointer;
  transition: all 0.3s ease;
}

.send-button:hover {
  background: #008080;
  transform: translateY(-1px);
}

```

Application Directory Structure

```

src/
├── ui/           # Frontend Layer
│   ├── components/ # UI Components
│   │   ├── atoms/  # Basic elements (buttons, inputs)
│   │   ├── molecules/ # Composite components (cards, forms)
│   │   └── organisms/ # Complex components (knowledge cards)

```

```

| | — layouts/    # Layout Templates
| |   | — default/ # Standard layout
| |   | — dashboard/ # Data visualization layouts
| |   |   | — auth/    # Login/authentication pages
| | — styles/     # Styling
| |   | — theme/    # Brand colors (#003366, #008080)
| |   | — tokens/   # Design variables
| |   |   | — global/  # Shared styles
| | — animations/ # Motion Effects
| |   | — micro/    # Subtle interactions (hover: scale(1.05))
| |   |   | — page/    # Transitions between views
| — features/     # Core Functionality
|   | — dashboard/ # Data visualization (D3.js)
|   | — chat/      # AI chat widget
|   |   | — knowledge/ # Knowledge graph tools
| — hooks/        # React Hooks
|   | — ui/        # Interface hooks
|   | — auth/      # Security hooks (multi-factor)
|   |   | — data/    # API connectivity
| — services/     # Backend Integration
|   | — api/       # Data endpoints
|   | — auth/      # Authentication (WCAG 2.1 AA)
|   |   | — storage/  # Local/cloud data
| — utils/        # Helper Functions
|   | — accessibility/ # Screen reader support
|   | — validation/   # Data verification
|   | — formatting/   # Content processing

```

The Universal Knowledge Framework Enhanced Design System is a comprehensive system that defines the visual and interactive elements for the Universal Knowledge Framework. It includes:

Core Components

- **Layout Elements:** A fixed-top navigation bar (64px height), hero banner (600px height with parallax background), and sidebar navigation (280px width, collapsible)

- **Design Guidelines:** Typography (Roboto as primary font, Open Sans as secondary), color palette (primary: #003366, secondary: #008080), and layout specifications (12-column Bootstrap 5 grid)
- **Component Library:** Knowledge cards (360px × variable height), interactive buttons with hover effects, and AI chat widget

Advanced Features

- **AI Integration:** Chat widget with typing animation and message history preservation
- **Data Visualization:** D3.js integration with interactive tooltips and real-time updates
- **Multimedia Support:** HTML5 video player and document handling with drag-and-drop interface
- **Accessibility Compliance:** WCAG 2.1 AA standards with keyboard navigation support and screen reader optimization

The system includes a well-structured application directory and CSS implementations for various components like chat interfaces, providing a solid foundation for developing consistent and user-friendly interfaces for the knowledge framework.

This comprehensive design system defines visual and interactive elements for the knowledge framework.

Core Components

The system includes:

- **Layout Components:** Navigation bar (64px height), hero banner (600px parallax), and sidebar navigation (280px width)
- **Design Guidelines:** Typography with Roboto/Open Sans fonts, color palette with primary #003366 and secondary #008080
- **Component Library:** Knowledge cards, interactive buttons, and specialized widgets
- **Advanced Features:** AI chat integration, D3.js data visualization, multimedia support

Technical Implementation

- **Project Structure:** Organized in atomic design pattern with atoms, molecules, and organisms
- **Styling:** Detailed CSS for components including chat interfaces and cards
- **Security:** Multi-factor authentication and role-based access controls
- **Accessibility:** WCAG 2.1 AA standards implementation with screen reader optimization

Additional Features

- **Performance Optimization:** Progressive loading, component code splitting, service worker support
- **Interactive Visualization:** Animated knowledge graph visualizations using Three.js
- **Responsive Design:** Breakpoints for desktop (1200px+), tablet (768-1199px), and mobile (below 768px)

The system provides a cohesive and user-friendly interface for the Universal Knowledge Framework, emphasizing accessibility, performance, and visual consistency.