UI/UX Automation Ontology ORSD

1. Purpose

The purpose of the UI/UX Automation Ontology is to provide a comprehensive knowledge representation framework for UI/UX design processes, components, principles, and evaluation metrics to support automation of UI/UX design decisions using LLMs.

2. Scope

- UI/UX Automation Ontology is specific to user interface and user experience design for digital products.
- The ontology includes knowledge related to design processes, user personas, UI components, evaluation metrics, design artifacts, and contextual considerations.
- It does not include implementation-specific code or platform-specific implementation details beyond what's needed for design decisions.
- It limits to digital interfaces across web, mobile, and desktop platforms.

3. Implementation Language

OWL language will be used to implement the ontology.

4. Intended Users:

Sr.No.	User
User1	UI/UX Designers
User2	Product Managers
User3	Frontend Developers
User4	UX Researchers
User5	Design Systems Teams
User6	LLM-based Automation Tools
User7	Client Stakeholders
User8	Accessibility Specialists

5. Intended Uses:

Sr.No.	Use
Use1	To guide design decisions based on context and user needs
Use2	To select appropriate UI components for specific design scenarios
Use3	To evaluate designs against usability and accessibility metrics

Sr.No.	Use
Use4	To inform appropriate research methods for specific design challenges
Use5	To support automated generation of design artifacts
Use6	To identify appropriate design principles for specific platforms
Use7	To guide evaluation of user interactions with interfaces
Use8	To inform feedback mechanisms for specific interaction types
Use9	To support design decisions across different contexts

6. Ontology Requirements

6.1 Non-Functional Requirements

- **Performance**: Ontology should comprehensively cover all aspects of UI/UX design (as per the defined scope).
- **Maintainability**: The ontology should be modular to allow for updates as UI/UX practices evolve.
- **Extensibility**: The structure should support addition of new components, platforms, and evaluation metrics as technology changes.
- **Interoperability**: The ontology should align with existing web standards and accessibility guidelines.

6.2 Functional Requirements (Competency Question Groups)

G1: Context Considerations (Improved)

- **Specific Questions:**

- G1-A1: Which text input components are most appropriate for right-to-left language contexts like Arabic?
- G1-A3: Which date/time selection components are most appropriate for Japanese cultural contexts?
- G1-B3: Which color contrast ratios should be implemented for interfaces used in high-stress outdoor environments?

Attribute-Based Questions:

- G1-C1: Which feedback mechanisms have response times under 300ms for time-sensitive contexts?
- G1-D1: What layout systems maintain consistency across both portrait and landscape orientations for in-vehicle interfaces?

Relationship-Focused Questions:

- G1-F1: Which specific evaluation metrics apply to both healthcare and financial transaction contexts?
- G1-G1: What is the relationship between social context formality and recommended typography styles?
- G1-H1: Which environmental contexts share the same color system requirements?

G2: User Personas and Research (Improved)

Specific Questions:

- G2-A1: Which research methods yield the most accurate results for understanding elderly users with low technology literacy?
- G2-A2:Which Feedback type is most suitable for user with visual imparments?
- G2-B1: Which authentication UI components are most effective for users with visual impairments?
- G2-B2: What navigation patterns best serve users with cognitive disabilities?

Attribute-Based Questions:

- G2-C1: What is the acceptable task completion time threshold for power user personas?
- G2-D1: Which design principles have the highest priority for personas with attention deficits?
- G2-E1: Which feedback mechanisms have the highest satisfaction ratings among senior user personas?

Relationship-Focused Questions:

- G2-F1: How do the common frustrations of novice user personas relate to specific UI component attributes? Improvement : Which UI component affordance attributes correlate with reported frustration levels in novice users?
- G2-G1: What accessibility needs are shared between elderly personas and personas with temporary disabilities?
- G2-H1: Which research artifacts capture both behavioral and attitudinal data for multi-cultural personas?

G3: UI Components and Interactions (Improved)

Specific Questions:

- G3-A1: What are the required attributes for dropdown menus that contain more than 20 options?
- G3-A2: Which attributes of a toggle switch component indicate its current state to screen readers?
- G3-B2: Which specific keyboard interactions must be supported by modal dialog components?

Attribute-Based Questions:

- G3-C1: Which feedback mechanisms have haptic options for button components on wearable devices?
- G3-D1: What is the minimum target size for touch-based UI components to meet WCAG AA accessibility standards?
- G3-E1: What is the maximum load time acceptable for media-rich UI components on mobile platforms?

Relationship-Focused Questions:

- G3-F1: How do interdependent form field components relate to each other for validation feedback?
- G3-G1: Which evaluation metrics correlate most strongly with user satisfaction for search UI components?
- G3-H1: What relationship exists between gesture complexity and user adoption rates for touch interfaces? Improvement : How does increasing the number of touch points in a gesture correlate with user adoption rates across age demographics?

G4: Design Process and Principles (Improved)

General Questions:

- G4-A: *Which VisibilityPrinciple are applied in EnvironmentalContext requiring low user attention ? (answered)*

Specific Questions:

- G4-A1: Which visual hierarchy principles are most important for financial dashboard interfaces? Skip
- G4-A2: What consistency principles should be applied when designing cross-platform enterprise applications? (answered)
- G4-A3: Which cognitive load reduction principles apply to emergency response interfaces? skip
- G4-B1: What specific user journey artifacts should be created during the discovery phase for e-commerce applications? skip
- G4-B2:How many FidelityLevel values are assigned to each Prototype?(answered)

- G4-C1: Which navigation components support information architectures with more than 5 levels of hierarchy? skip
- G4-D1: What design principles maintain brand consistency while ensuring a WCAG AAA compliance level? (answered)
- G4-E1: Which design process methodologies have produced the highest user satisfaction scores for healthcare applications? Improvement : Which design process methodologies incorporate required regulatory validation steps for healthcare applications?"

Relationship-Focused Questions:

- G4-F1: How do affordance design principles impact accessibility requirements for touch interfaces?
- **G4-G1:**What is the relationship between **ContrastPrinciple** and **TimeOnTaskMetric** for **ChartComponent** performance?
- G4-H1: Which evaluation metrics best measure adherence to minimalist design principles?

G5: Evaluation and Metrics (Improved)

General Questions:

- G5-A: Which usability metrics are most relevant for evaluating specific UI components?
- G5-B: What are the benchmark values for specific evaluation metrics across different Device Platform?

Specific Questions:

- G5-A1: What error rate metrics should be used to evaluate form submission components in financial applications?
- G5-A2: Which time-on-task metrics are most relevant for evaluating search components in e-commerce interfaces?
- G5-B1: What is the industry benchmark for first-time task completion rates for mobile banking applications?
- G5-B2: What are the acceptable system response time thresholds for healthcare diagnostic applications?

Attribute-Based Questions:

- G5-C1: Which engagement metrics correlate with interfaces that implement the progressive disclosure principle?
- G5-D1: What is the minimum acceptable color contrast ratio for interfaces designed for elderly users?
- G5-E1: Which qualitative evaluation methods provide the most insight into users' mental models?

Relationship-Focused Questions:

- G5-F1: How do success rate metrics for the same component differ between desktop and mobile platforms?
- G5-G1: What is the relationship between satisfaction metrics and multimodal feedback mechanisms?
- G5-H1: How does increased task complexity affect the acceptable time-on-task metrics across different user personas?

G6: Platforms and Responsiveness (Improved)

General Questions:

- G6-A: What are the constraints of specific device platforms on UI component implementation?
- G6-B: Which layout systems are most appropriate for specific device platforms?

Specific Questions:

- G6-A1: What touch target size constraints apply to wearable device interfaces with screens smaller than 2 inches?
- G6-A2: Which navigation component variations are required for iOS versus Android implementations?
- G6-B1: What grid system specifications are optimal for 13-inch laptop screens versus 27-inch desktop monitors?
- G6-B2: Which responsive layout system best accommodates both portrait and landscape orientations on tablets?

Attribute-Based Questions:

- G6-C1: What is the maximum acceptable page load time for mobile e-commerce platforms targeting rural users?
- G6-D1: Which gesture-based interactions have the highest recognition accuracy rates on smartwatch platforms?
- G6-E1: What breakpoint values ensure optimal readability of text components across device sizes?

Relationship-Focused Questions:

- G6-F1: How does the priority of performance versus aesthetic design principles shift across platform capabilities?
- G6-G1: What relationship exists between platform processing capabilities and recommended feedback mechanism types?
- G6-H1: Which accessibility considerations are platform-agnostic versus platform-specific?

G7: Design Artifacts and Deliverables (Improved)

General Questions:

- G7-A: Which design artifacts are most appropriate for communicating specific aspects of the design?
- G7-B: What is the relationship between user research methods and the design artifacts they inform?

Specific Questions:

- G7-A1: Which user flow diagram type best communicates multi-path authentication processes?
- G7-A2: What storyboard format most effectively communicates contextual usage scenarios to development teams?
- G7-B1: How should card sorting results directly inform site map artifacts for content-heavy applications?
- G7-B2: Which persona attributes derived from contextual inquiry should be highlighted in persona design artifacts?

Attribute-Based Questions:

- G7-C1: What level of detail should information architecture wireframes include for complex enterprise applications?
- G7-D1: Which visual design specifications must style guide artifacts include for cross-platform consistency?
- G7-E1: What interaction design annotation standards should be included in high-fidelity prototypes?

Relationship-Focused Questions:

- G7-F1: How do design system artifact components map to specific implementation frameworks like React or Angular?
- G7-G1: Which design artifacts most accurately predict post-launch performance on specific evaluation metrics?
- G7-H1: What relationship exists between accessibility requirement documentation and implementation accuracy?

G8: Feedback and User Interaction (Improved)

General Questions:

- G8-A: What feedback mechanisms are most appropriate for specific user interactions?
- G8-B: How do different feedback mechanisms impact user satisfaction?

Specific Questions:

- G8-A1: Which audio feedback characteristics are most effective for confirming successful financial transactions?
- G8-A2: What visual feedback animations best indicate processing states in healthcare applications?
- G8-B1: Which haptic feedback patterns yield the highest satisfaction scores for gaming interfaces?
- G8-B2: What toast notification duration times maximize comprehension while minimizing disruption?

Attribute-Based Questions:

- G8-C1: Which multimodal feedback combinations best support users with partial hearing loss?
- G8-D1: What is the maximum acceptable delay between user action and system feedback before user confidence decreases?
- G8-E1: Which feedback mechanisms maintain effectiveness in high-noise physical environments?

Relationship-Focused Questions:

G8-F1: How does the principle of visibility relate to the implementation of progress indicators?

G8-G1: What relationship exists between feedback mechanism complexity and cognitive load?

G8-H1: How do cultural dimensions like power distance affect the interpretation of error feedback mechanisms?

7. Pre-Glossary of Terms

User experience, user interface, design process, design principle, usability, accessibility, evaluation metric, user research, persona, context, feedback mechanism, UI component, interaction design, information architecture, visual design, layout system, user interaction, platform, device, artifact, wireframe, prototype, engagement, conversion, learnability, efficiency, effectiveness, satisfaction, accessibility, color system, typography, responsive design, microinteraction, task flow, heuristic, usability testing, A/B testing, card sorting, heat map, analytics, survey, interview, ethnography, accessibility standard, WCAG, user journey, sitemap, user flow, cognitive load, mental model.