########################################################################

# Classes

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:ConsistencyPrinciple

a owl:Class ;

rdfs:label "Consistency Principle"@en ;

rdfs:comment "A design principle ensuring uniform look-and-feel and behavior across contexts."@en .

:WCAGComplianceMetric

a owl:Class ;

rdfs:label "WCAG Compliance Metric"@en ;

rdfs:comment "An evaluation metric measuring conformance to WCAG accessibility standards."@en .

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# Individuals

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:WCAG\_AAA\_Level

a :WCAGComplianceMetric ;

rdfs:label "WCAG AAA Compliance Level"@en ;

rdfs:comment "Specifies the AAA-level thresholds for contrast, size, and navigation."@en .

########################################################################

# Data Properties

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:hasConsistencyType

a owl:DatatypeProperty ;

rdfs:label "has consistency type"@en ;

rdfs:comment "Describes the specific type of consistency (e.g., Brand, Visual) a principle enforces."@en ;

rdfs:domain :ConsistencyPrinciple ;

rdfs:range xsd:string .

########################################################################

# Object Properties

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:ensuresComplianceWith

a owl:ObjectProperty ;

rdfs:label "ensures compliance with"@en ;

rdfs:comment "Links a design principle to the accessibility metric it satisfies."@en ;

rdfs:domain :ConsistencyPrinciple ;

rdfs:range :WCAGComplianceMetric ;

owl:inverseOf :isEnsuredByPrinciple .

:appliesToContext

a owl:ObjectProperty ;

rdfs:label "applies to context"@en ;

rdfs:comment "Links a design principle to the context in which it should be applied."@en ;

rdfs:domain :DesignPrinciple ;

rdfs:range :TaskContext ;

owl:inverseOf :isContextForPrinciple .

SPARQLE :

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

PREFIX owl: <http://www.w3.org/2002/07/owl#>

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>

PREFIX onto: <http://www.semanticweb.org/asifcomputer/ontology/2025/ui\_ux\_automation#>

SELECT ?principle ?metric

WHERE {

?principle onto:ensuresComplianceWith ?metric .

}

**Description: How This Ontology & SPARQL Query Automate UI/UX Design and Solve Client Requirements**

**1. Automated Compliance Validation**

* **Ontology Structure**:
  + ConsistencyPrinciple is linked to WCAGComplianceMetric via ensuresComplianceWith.
  + Example: A principle like *"Brand Color Consistency"* can ensure compliance with WCAG\_AAA\_Level contrast requirements.
* **Automation**:
  + Tools can use the SPARQL query to **auto-validate** if design principles (e.g., font size, color contrast) meet accessibility standards.
  + Example: A UI component adhering to ConsistencyPrinciple is checked against WCAG\_AAA\_Level metrics (e.g., 7:1 contrast ratio).
* **Client Value**:
  + Guarantees designs comply with legal/accessibility standards (e.g., ADA, WCAG), reducing legal risks and enhancing inclusivity.

**2. Context-Aware Design Enforcement**

* **Ontology Structure**:
  + appliesToContext links principles to TaskContext (e.g., enterprise apps, mobile interfaces).
* **Automation**:
  + Tools can **auto-apply** context-specific principles. For example, in CrossPlatformEnterpriseContext, enforce consistent navigation menus.
  + SPARQL extensions can retrieve principles for a given context:

sparql

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SELECT ?principle WHERE {

?principle onto:appliesToContext onto:CrossPlatformEnterpriseContext .

}

* **Client Value**:
  + Ensures designs align with platform-specific requirements (e.g., mobile touch targets, desktop responsiveness).

**3. Traceable Design Rationale**

* **Ontology Structure**:
  + hasConsistencyType categorizes principles (e.g., "Visual," "Interaction").
* **Automation**:
  + Generate **auto-documented reports** explaining which principles/metrics were applied (e.g., *"Visual consistency ensured WCAG AAA compliance"*).
* **Client Value**:
  + Provides auditable proof of compliance and design decisions, critical for stakeholder reviews.

**4. SPARQL Query Result & Client Impact**

The provided query:

sparql

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SELECT ?principle ?metric

WHERE {

?principle onto:ensuresComplianceWith ?metric .

}

**Output Example**:

| **?principle** | **?metric** |
| --- | --- |
| :ColorConsistencyPrinciple | :WCAG\_AAA\_Level |

* **Automation Use Case**:
  + An LLM tool uses this result to validate if a UI’s color palette meets WCAG\_AAA\_Level contrast thresholds.
* **Client Impact**:
  + Eliminates manual audits, accelerates design iterations, and ensures deliverables meet accessibility SLAs.

**Summary**

By structuring principles, metrics, and contexts in the ontology, this system:

1. **Automates Compliance**: Validates designs against accessibility standards.
2. **Enforces Consistency**: Applies context-specific rules across platforms.
3. **Documents Decisions**: Generates traceable reports for client transparency.
4. **Reduces Costs**: Minimizes rework by catching issues early.