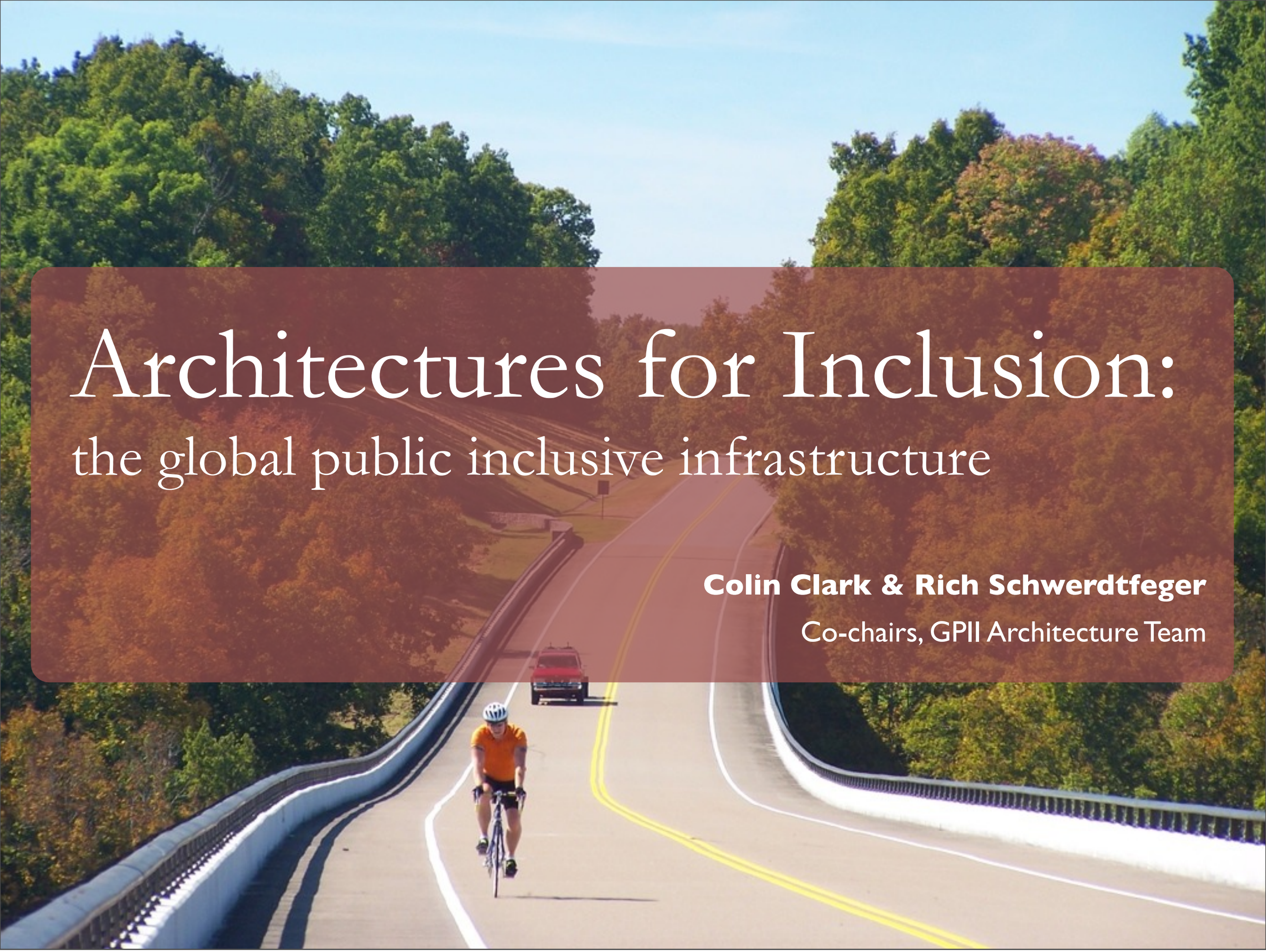


Architectures for Inclusion:

the global public inclusive infrastructure

Colin Clark & Rich Schwerdtfeger

Co-chairs, GPII Architecture Team

Topics We'll Cover

- Industry trends
- Goals
- The architecture
- Standards
- Challenges and risks
- Outcomes
- Lots of questions

Industry Trends

Industry Trends – Leading toward need for a GPII

2012 Mobile
Tipping Point
Many Platforms

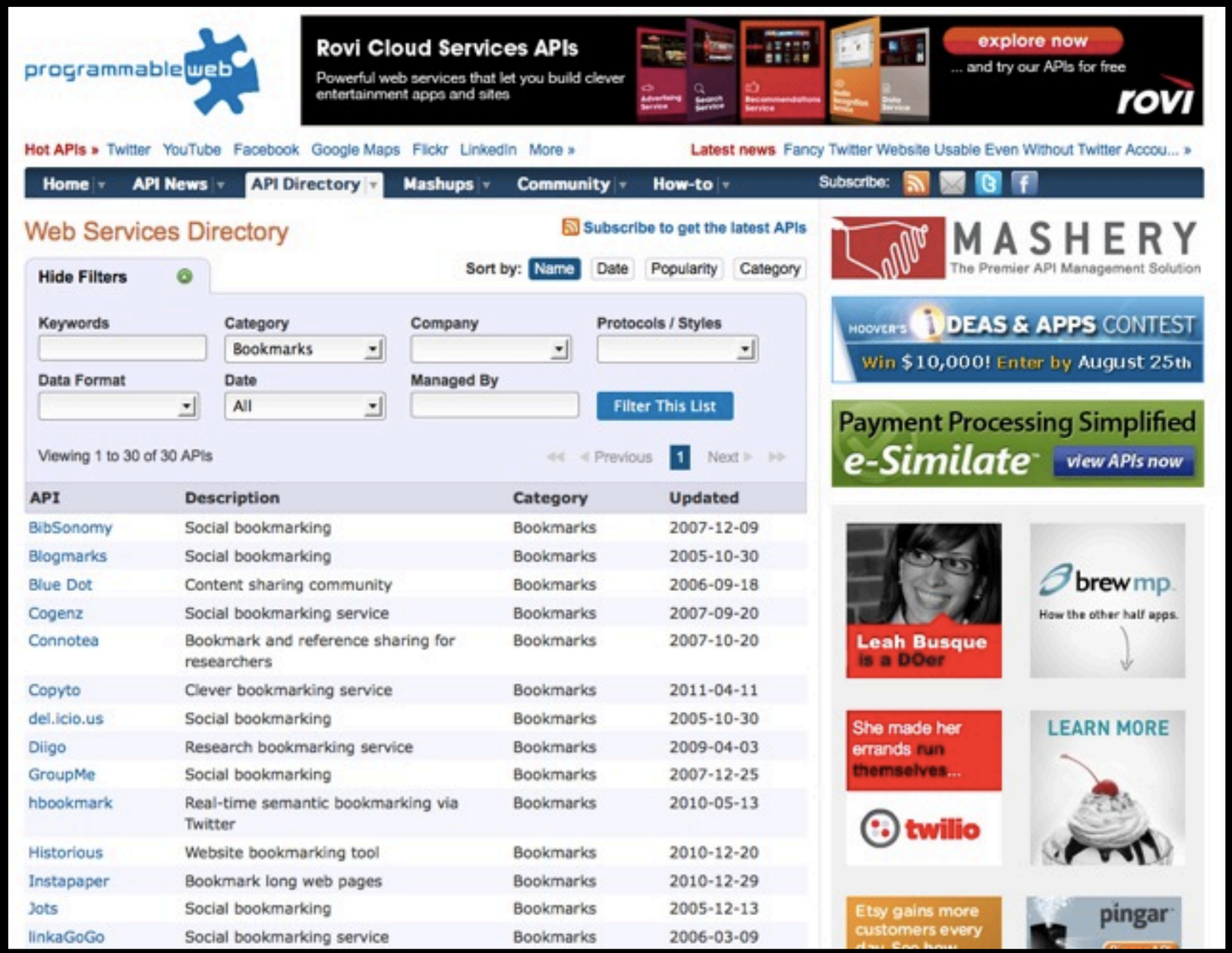
Cloud Based
Software Services

Cloud Services and Synchronization
- ✓Personalization
- ✓Context Aware
- ✓Inclusive Offerings
- ✓Applications at your fingertips

Windows Desktop

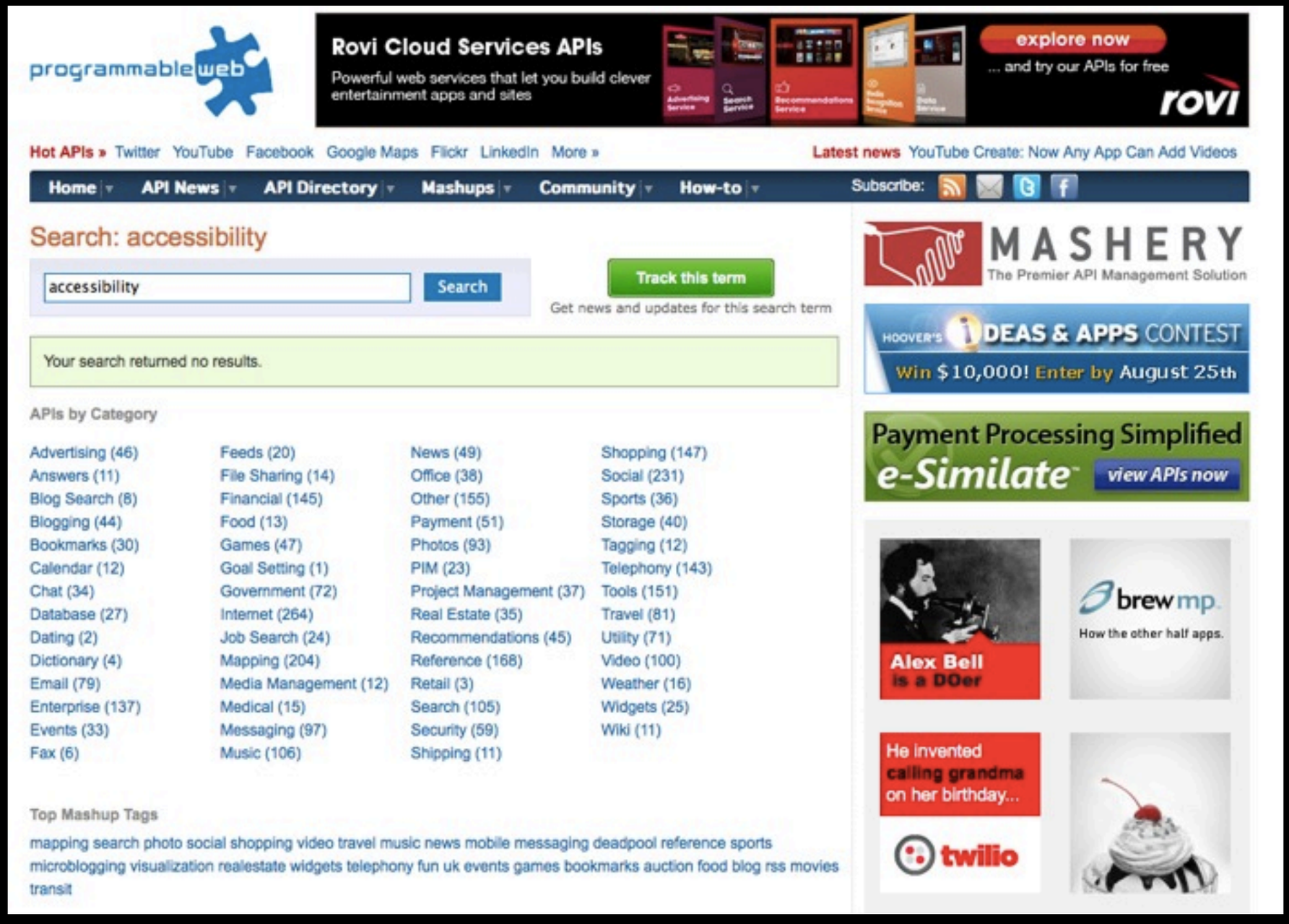
HTML 5 Convergence
- ✓Canvas drawing
- ✓Video
- ✓Audio
- ✓ARIA
- ✓Local data storage
- ✓Accelerometer, GPS, etc.

Services and Mashups



The problem today: discovery, credibility, quality

Services and Mashups



The problem today: lack of accessibility

A vision for services

- Lower the cost of building accessibly: Developers can draw from a diverse range of easy to find adaptive services
- Foster innovation: Novel assistive technologies delivered as modular services and components
- Sustain a flexible, personalized Web and beyond

Architectural Values

- Transparent to users: it just works
- Open
- Resilient to change
- Sustainable

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Open

- source
- community
- standards
- architecture

... and open to commercialization, too!

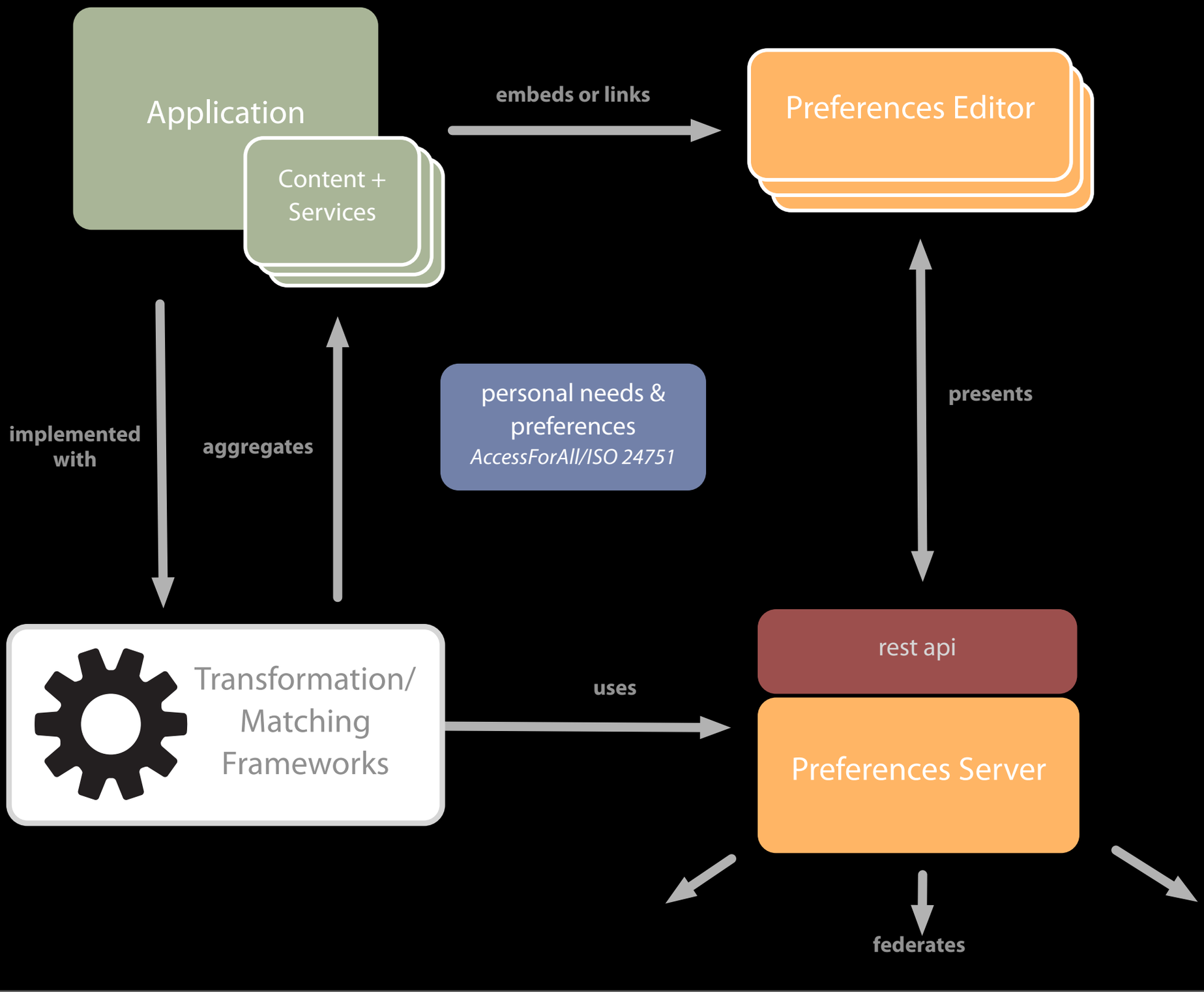
Accessible systems are...

- Flexible
- Separable
- Modifiable
- Declarative

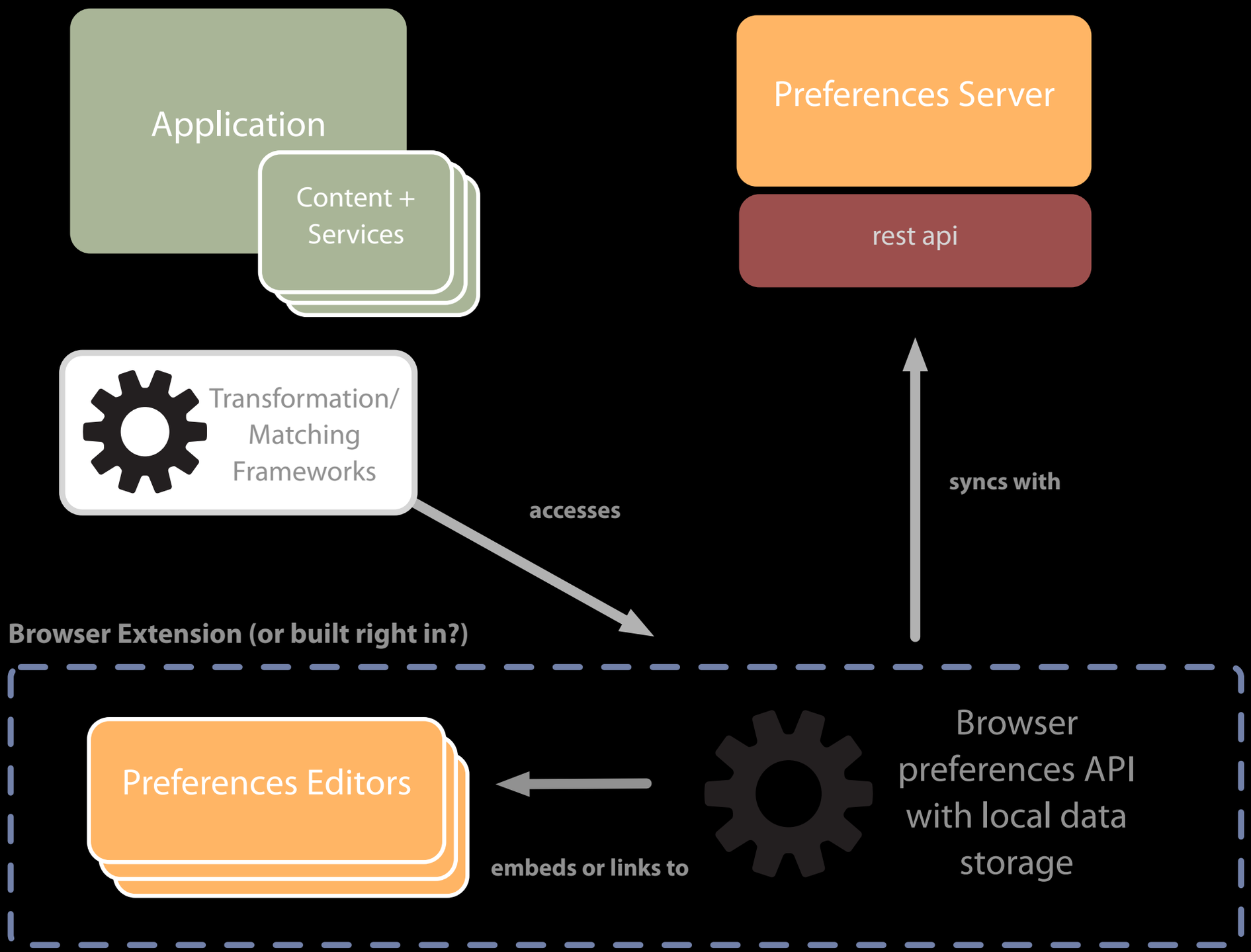
GPII Architecture in a nutshell

- Preferences (editors + server)
- Matching
- Standards & interoperability
- Development tools

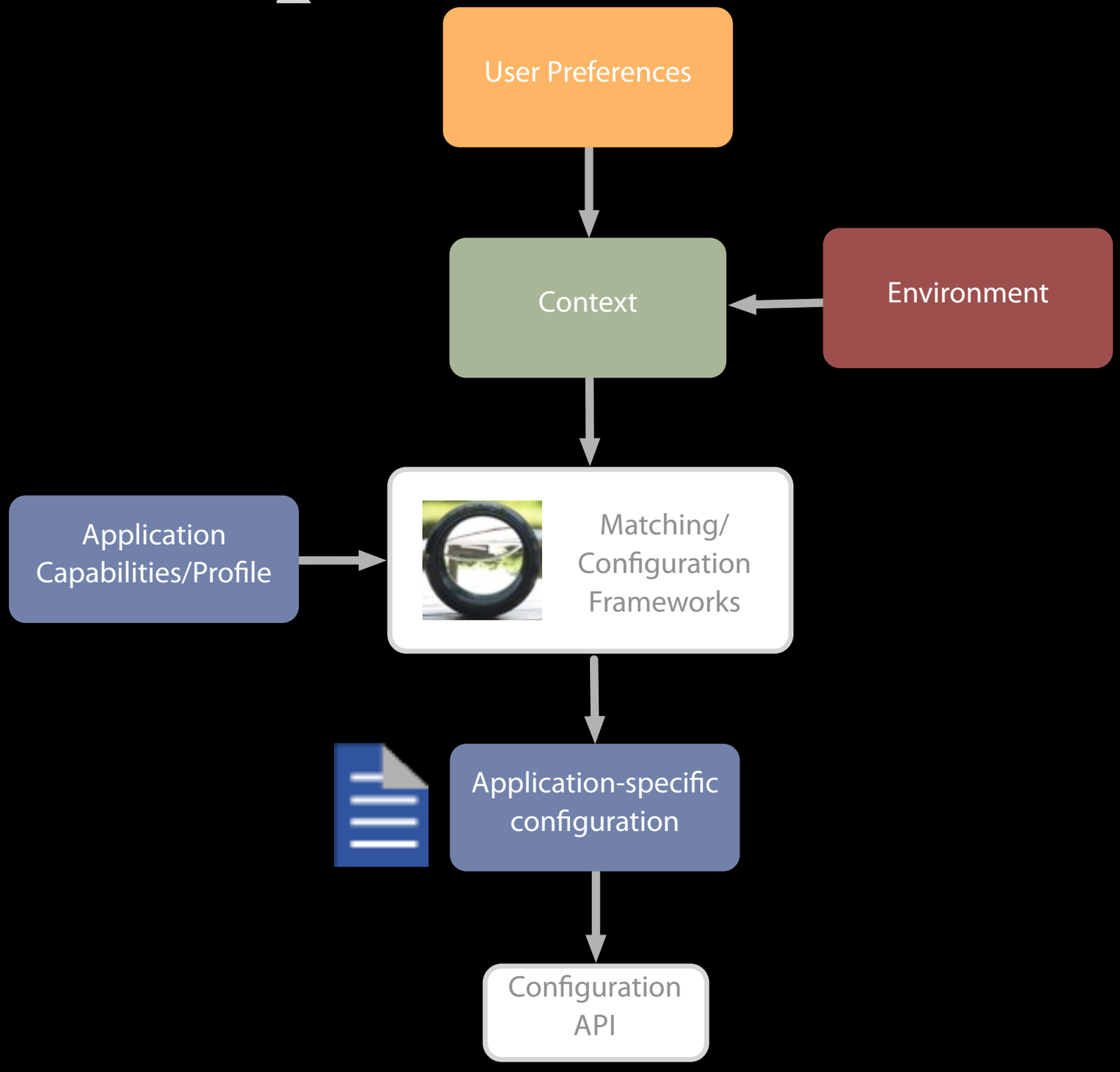
Basic Architecture



In the browser



Desktop Personalization



Preferences

User Experience

- *Easy*: Speaks a language I understand
- *Ubiquitous*: I don't have to constantly reiterate or justify
- *Autonomous*: I can control who sees my preferences

Preferences Editors

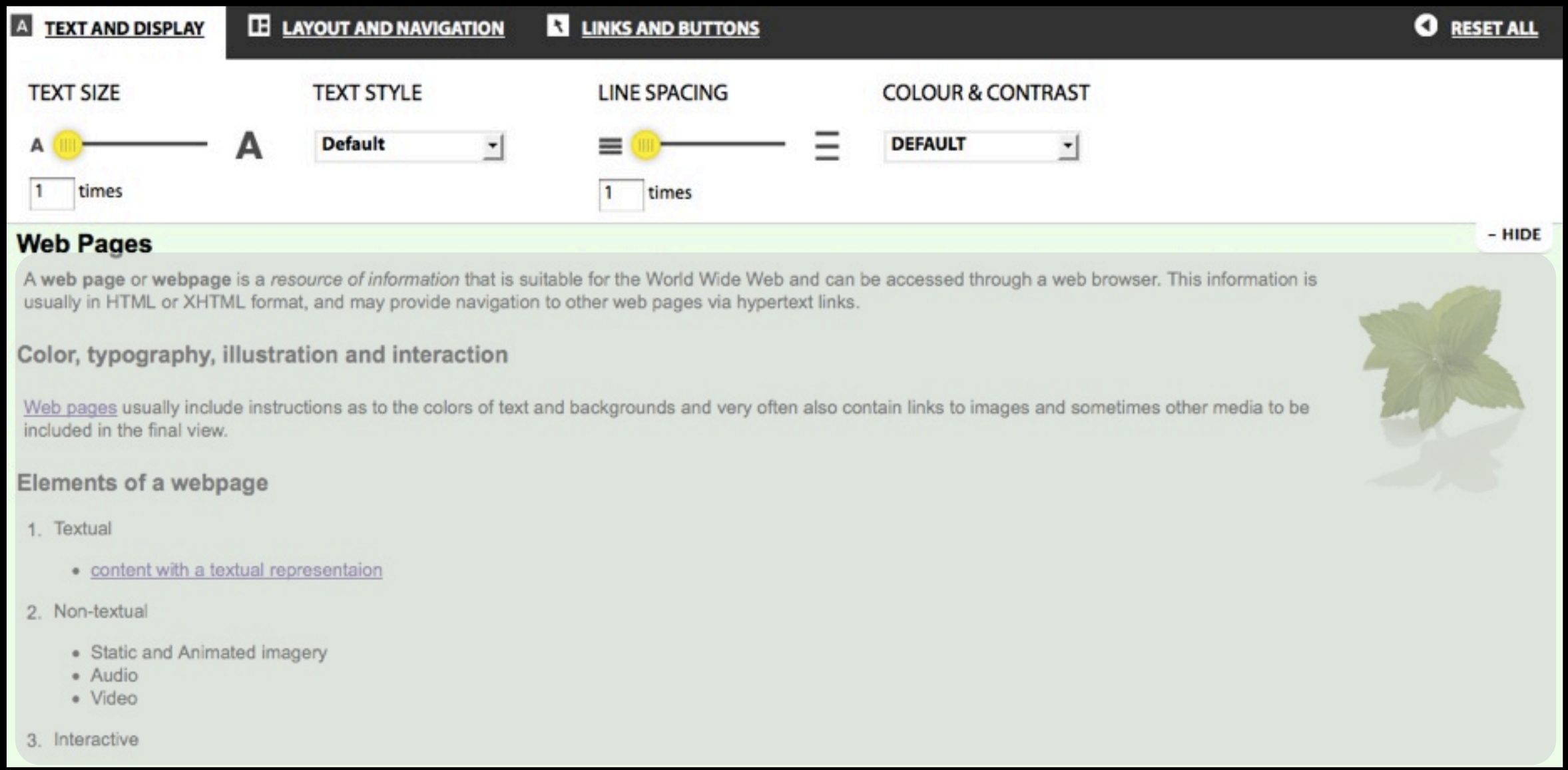
Support many preferences editors, designed for particular audiences, contexts and needs

Preferences Editors

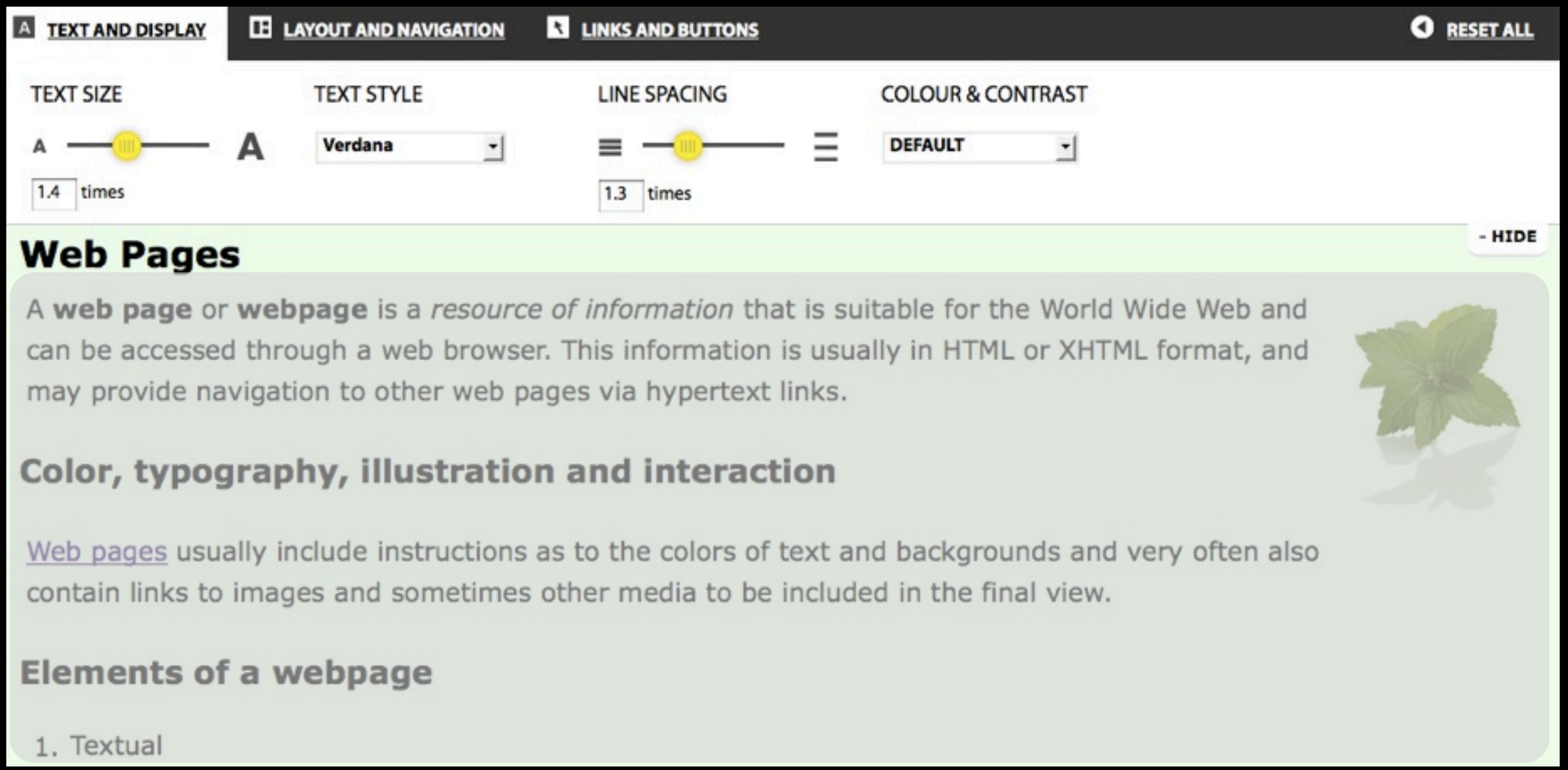
Support many preferences editors, designed for particular audiences, contexts and needs:

a framework for preferences editing

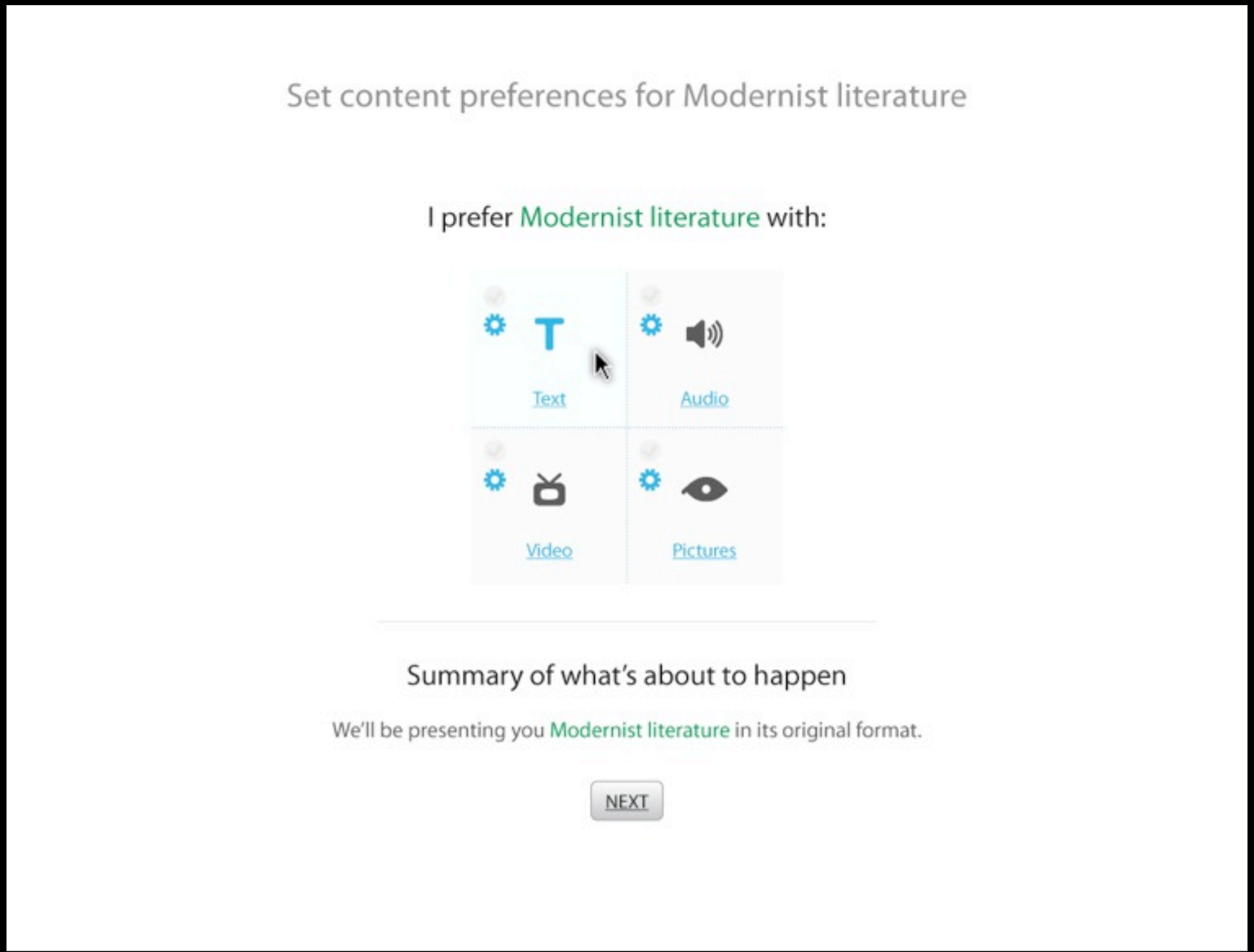
Case Study: UI Options



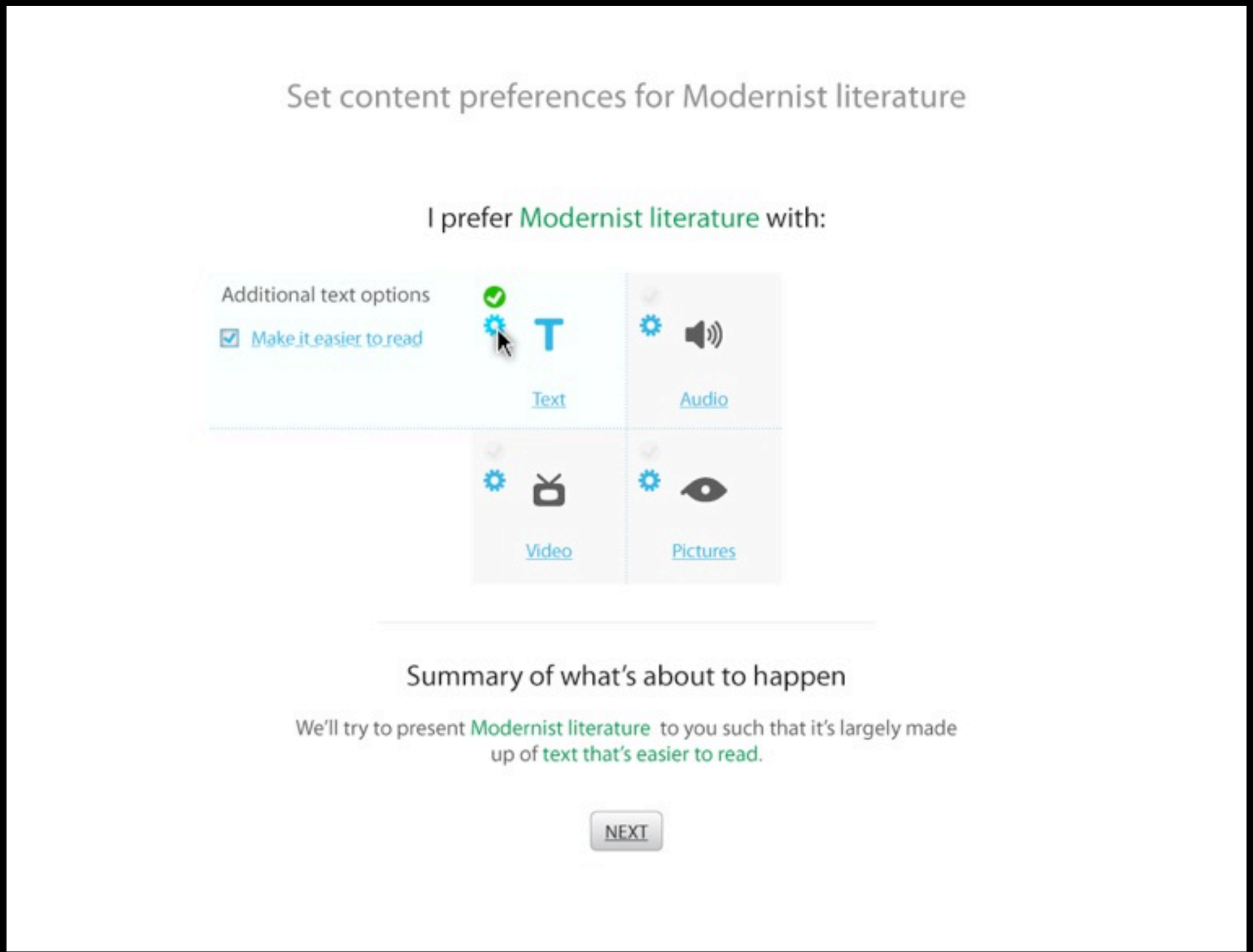
Case Study: UI Options



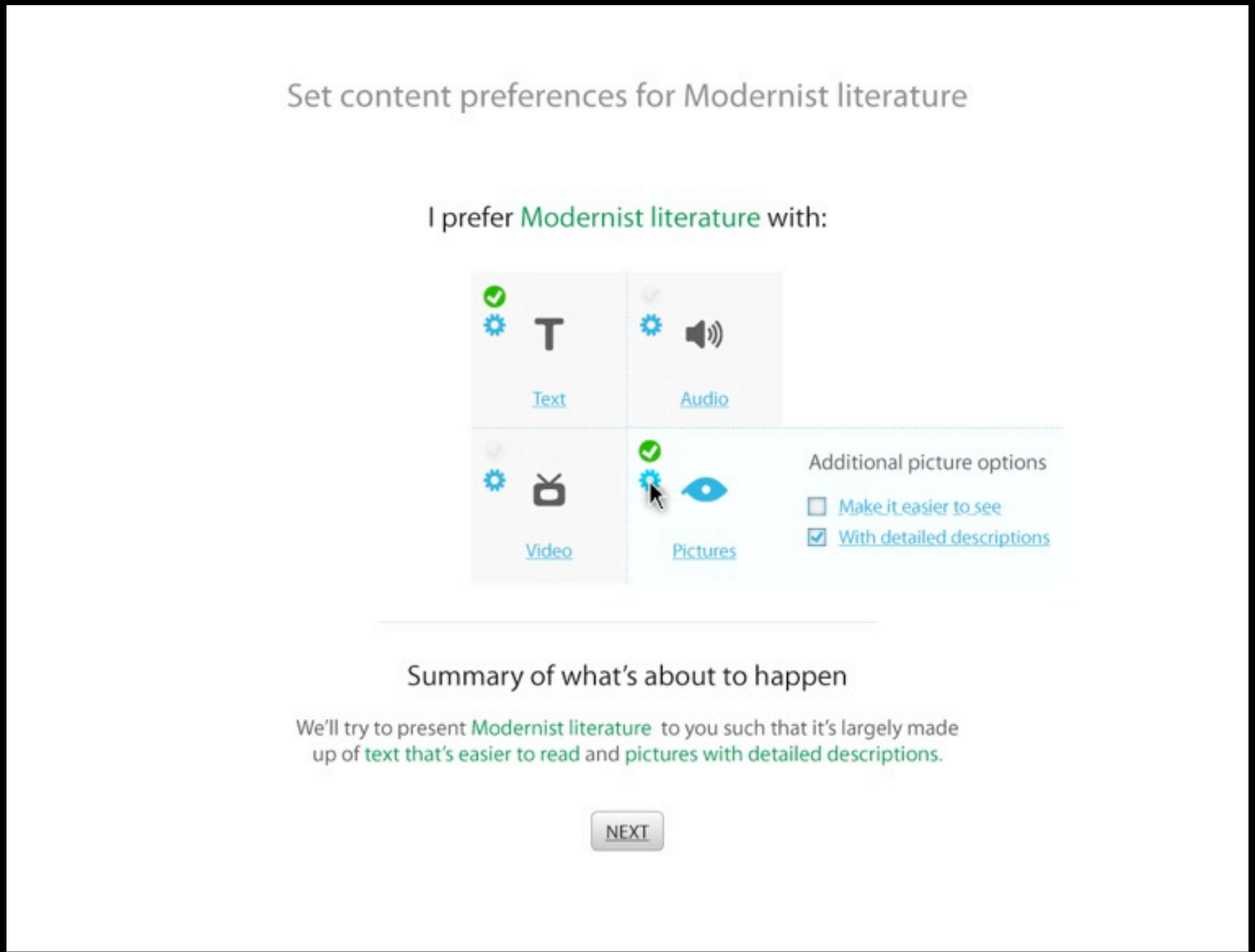
...Learner Options



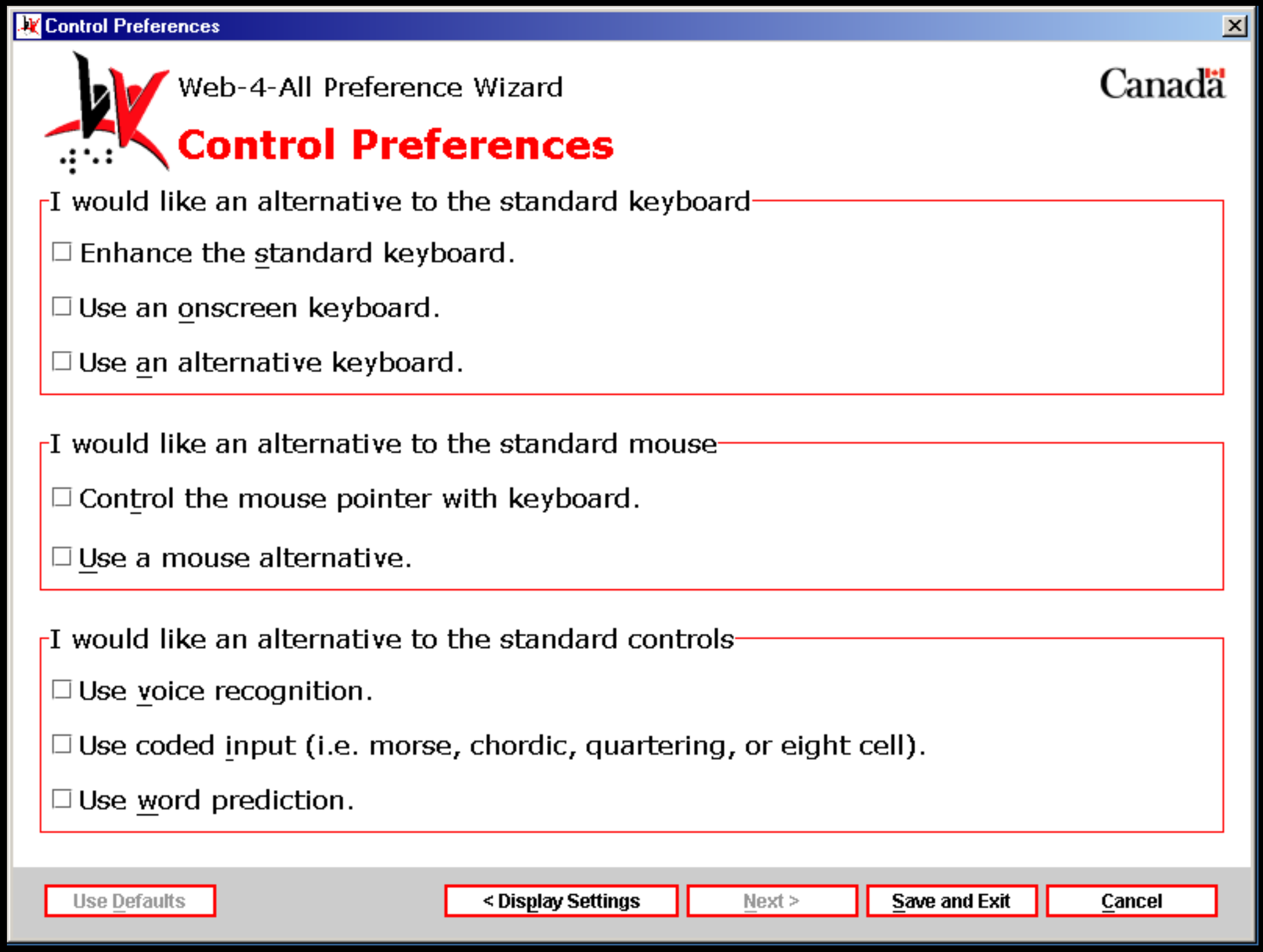
...Learner Options



...Learner Options



...desktop configuration



...and a multitude of others

- Directed vs. free form
- Assisted vs. autonomous
- Making it more fun

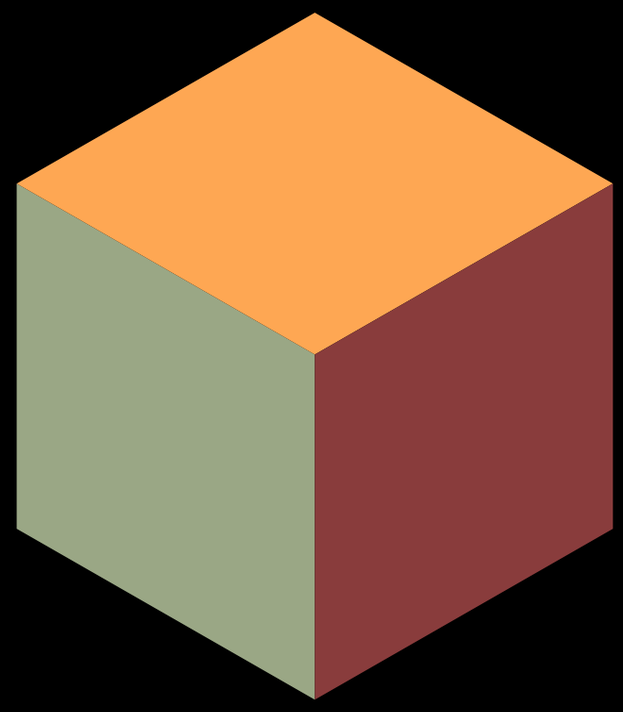
Designed by skilled interaction designers, with users

Preferences Framework

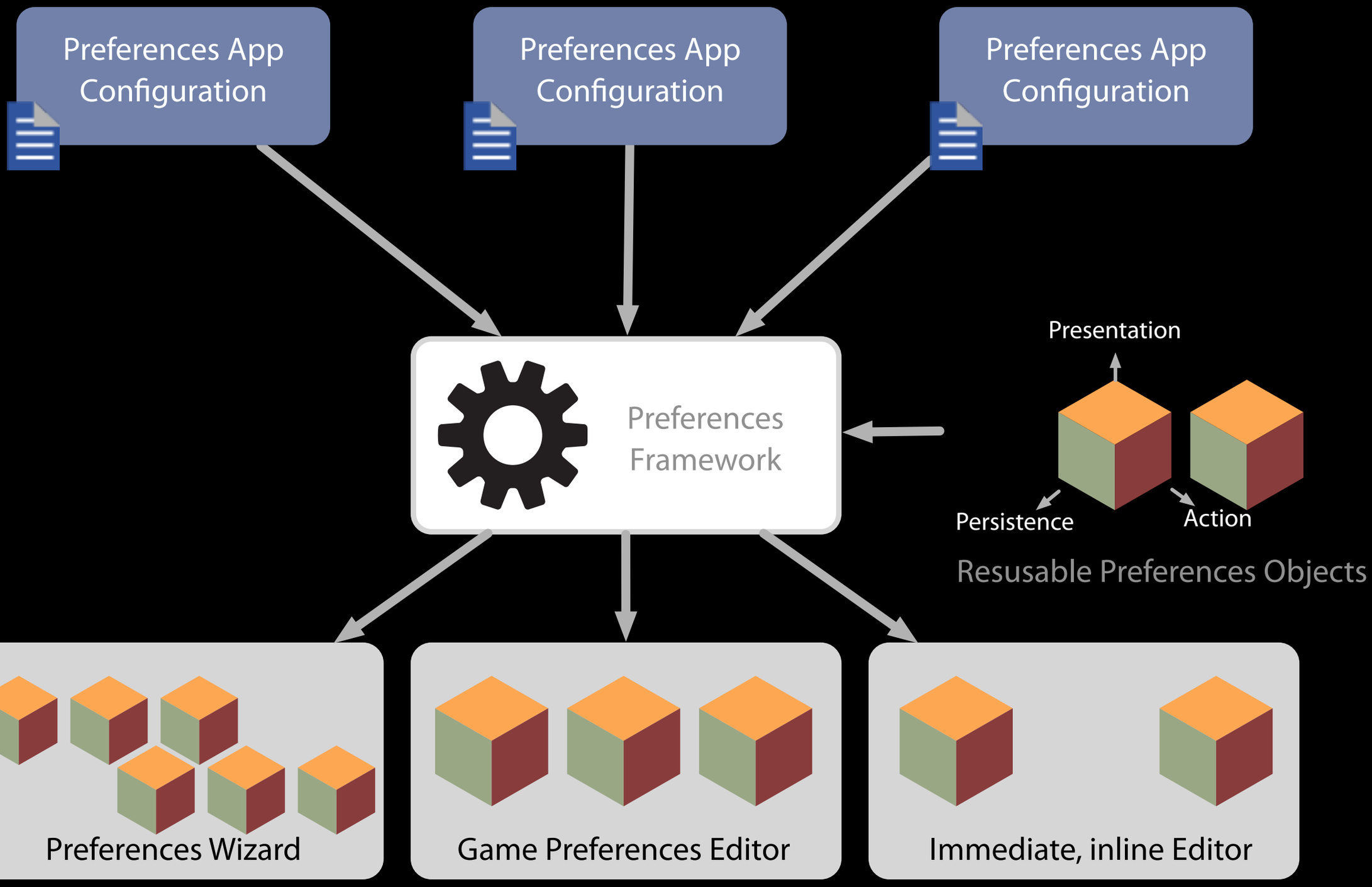
A three-dimensional model for preferences:

- presentation
- persistence
- adaptation

(how the preference is acted upon)



Preferences Framework



Preferences Server

Easy for developers to use

- RESTful API
- JSON-based payloads
- OAuth

Scalable and forward-looking

- Document-based persistence
- Evented, high-concurrency server

Matching & Resolution

User Preferences

+

Device Capabilities = Context

+

Environmental Data

Matching & Resolution

Context

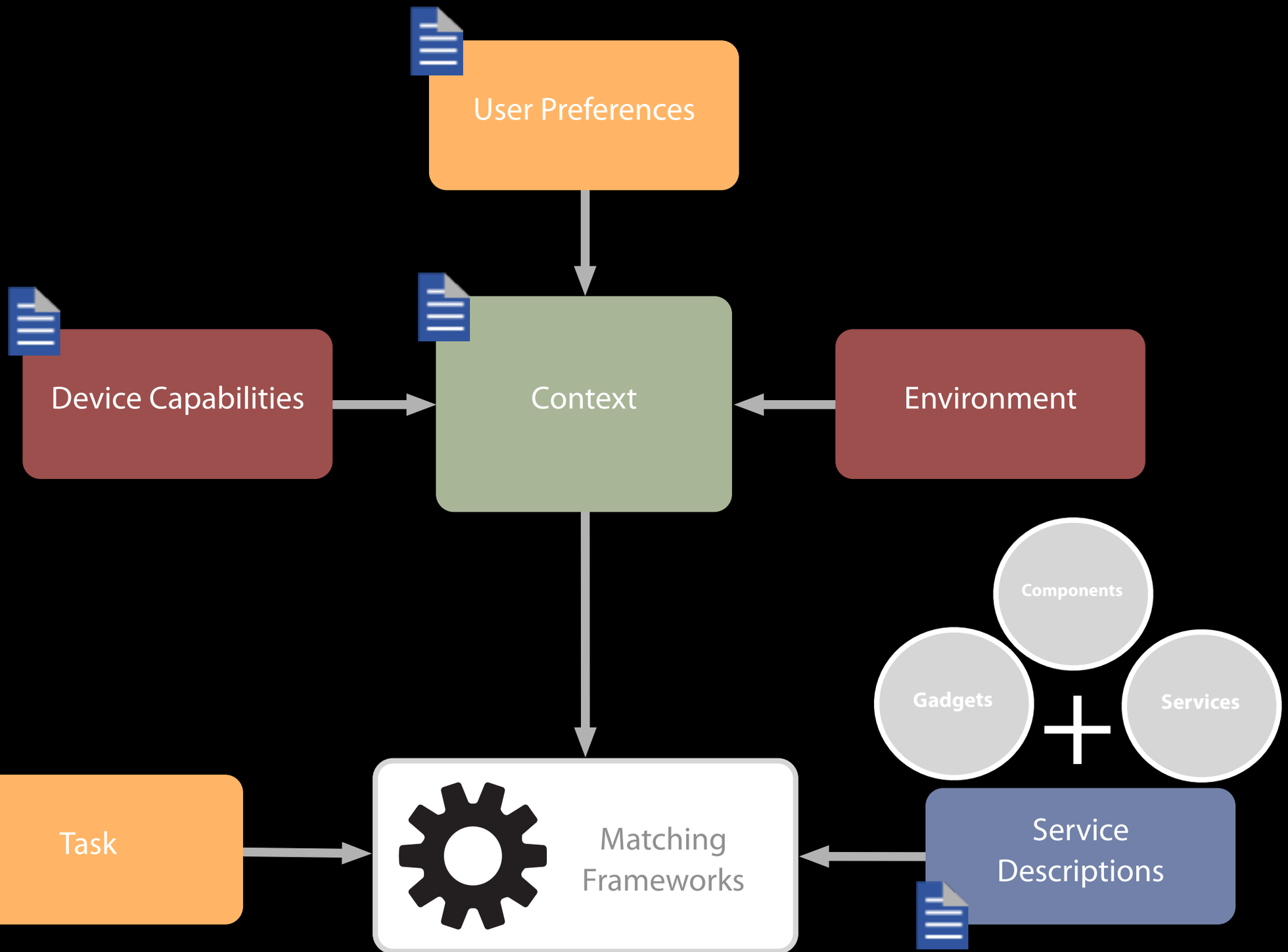
matched with

=

Solution

diverse user
interfaces & services

Matching & Resolution



Matching

Declarative, interoperable formats for representing:

- Preferences
- Device capabilities
- Environment
- Context
- Service & UI capabilities

Standards

Objectives of Standards Strategy

- Facilitate the automatic adaptation of the UI to produce accessible IT in the context in which the user is operating
- Where possible use existing standards and/or support evolving standards that meet GPII needs
- Build standards from open source efforts that meet GPII needs
- Where necessary develop standards in GPII itself

IT Must connect to all Users in the Context in which they Operate

Resources

AFA Resource Capabilities

Alternative Resources

Device Specific Capabilities

Delivery Context

AFA User Preferences

Device Capabilities

Environmental Data

Harmonize and Synchronize Standards for User Personalization

Harmonize and Synchronize

- IMS Global Learning Consortium AfA 3
  - Define Personal Needs and Preferences
  - Define Digital Resource Meta Data in terms of the Preferences
  - Separate Core and Extended vocabulary to facilitate industry uptake
- ISO/IEC JTC1 - SC36 WG 7
  - Take AfA 3 to International Standard
  - Harmonize with ISO 24751 (Individualized adaptability and accessibility in e-learning)
- ETSI ES 202 746 (User Profile Preferences and Information)

Establish Adaptive Services Standards Effort in W3C WAI

- Develop Ontology to the define User's context
  - User Preferences (AfA)
  - Device Capabilities
  - Environment
- Define delivery mechanism for delivering user context using one or more of the following
  - HTML 5 Cross-Domain Local Data Storage to allow Context queries
  - New Browser API to provide Context queries
  - Service API for user preferences
- Coordinate efforts between browser vendors and W3C to define standard speech and ID APIs
  - TTS
  - Voice to Text
  - Identity verification

Question: What delivery mechanisms are acceptable based on trust and privacy?

Apply Standards to Open Source Frameworks and Products

- Context Aware Standards into Open Social
  - Open Social (Schema, metadata, Container, Gadgets API, etc.) to supply resource capabilities and facilitate content adaptation
  - Potentially adapt the Container to use GPII Services (Mapping, Adaptation, etc.)
- Context Aware Standards into Open Education Resources
- AfA User Preferences linked to strategic User Identification Services
  - OAuth
  - OpenID?
- Implement provisions for supplying context in browsers to applications
- Work with web application (e.g. search engine) providers to develop strategy to apply resource meta data to the broader web

Integrating GPII building blocks into the Web Fabric Facilitates Sustainability

Automatic Context Aware Delivery Scenario (Strategic)

RSS/Atom

search

Blog

Open Social Gadget/IWidget with DRD

opensocial

Aggregating server (search, match, adapt, mashup, etc.)

**DC delivered using AJAX*

DC

Browser
Device Cap./Environment/PNP
HTML 5 Storage/ CSSMedia Query

*DC – Delivery Context, **DRD - Digital Resource Description, ***PNP – Personal Needs and Preferences

GPII Standards

- Establish a GPII standards effort in Raising the Floor
- Define cloud-based transformation services

Development Tools

- Build personalization supports into everywhere developers work
- Broad reach, diverse tools: web, desktop, mobile
- Adaptive services for easy integration of advanced accessibility solutions

Integration Points

- Service discovery and delivery
  - Open Social
  - Web Intents
  - Fluid Infusion, jQuery, other toolkits
- Authentication
  - OAuth

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Challenges and Risks

Culture change!

- Today, software isn't designed to be personalized
- Shifting focus from technology to users
- Ongoing disruption of desktop AT market (by mobile, cloud, web)

Challenges and Risks

New software idioms

- Open data over API encapsulation
- Web mashup security
- Flexible user experience designs
- Loose binding to services

Challenges and Risks

Privacy and Security

- User autonomy over preferences
- Data leakage and tracking
- Trust and credibility

Issues Security and Privacy

- Fetching a Profile without giving up identity
- Reliable verification for someone who cannot recall from one day to the next
  - Without risking identify theft with loss of dongle or exposure through cookies
  - e.g. facial or voice recognition
- Need to know – limiting profiles to necessary data
- Inherent leakage of information by interpreting preferences
- Malware screening of marketplace applications

Challenges and Risks

Sustainability

- Beyond project funding
- Infused into development tools and practices
- Evolving with technological shifts

Outcomes

- Applications can adapt to user needs without onerous development effort
- Users can seamlessly move from one device to another (desktop, mobile, web)
- Innovative new assistive technology and adaptive services
- Built into mainstream tools and apps

Questions?

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