Architectures for Inclusion: the global public inclusive infrastructure

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Topics We’ll Cover

- Industry trends
- Goals
- The architecture
- Standards
- Challenges and risks
- Outcomes
- Lots of questions
Industry Trends – Leading toward need for a GPII

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

Windows Desktop

2012 Mobile Tipping Point
Many Platforms

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

Friday, July 15, 2011
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
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

Application

Content + Services

embedded or links

Preferences Editor

personal needs & preferences
AccessForAll/ISO 24751

implemented with

aggregates

Transformation/
Matching Frameworks

rest api

Preferences Server

federates

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In the browser

Application
- Content + Services

Preferences Server
- rest api

Transformation/Matching Frameworks

Browser Extension (or built right in?)

Preferences Editors

Browser preferences API with local data storage

syncs with

accesses

embeds or links to
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

**Web Pages**

A web page or webpage is a resource of information that is suitable for the World Wide Web and can be accessed through a web browser. This information is usually in HTML or X-HTML format, and may provide navigation to other web pages via hypertext links.

**Color, typography, illustration and interaction**

Web pages usually include instructions as to the colors of text and backgrounds and very often also contain links to images and sometimes other media to be included in the final view.

**Elements of a webpage**

1. Textual
   - content with a textual representation
2. Non-textual
   - Static and Animated imagery
   - Audio
   - Video
3. Interactive
Case Study: UI Options

Web Pages

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Elements of a webpage

1. Textual
Learner Options

Set content preferences for Modernist literature

I prefer Modernist literature with:

Summary of what’s about to happen

We’ll be presenting you Modernist literature in its original format.

NEXT
...Learner Options

Set content preferences for Modernist literature

I prefer Modernist literature with:

- Text
- Audio
- Video
- Pictures

Summary of what’s about to happen

We’ll try to present Modernist literature to you such that it’s largely made up of text that’s easier to read.
Set content preferences for Modernist literature

I prefer Modernist literature with:

- Text
- Audio
- Video
- Pictures

Additional picture options:
- Make it easier to see
- With detailed descriptions

Summary of what’s about to happen

We’ll try to present Modernist literature to you such that it’s largely made up of text that’s easier to read and pictures with detailed descriptions.
...desktop configuration

Web-4-All Preference Wizard

Control Preferences

I would like an alternative to the standard keyboard

☐ Enhance the standard keyboard.
☐ Use an onscreen keyboard.
☐ Use an alternative keyboard.

I would like an alternative to the standard mouse

☐ Control the mouse pointer with keyboard.
☐ Use a mouse alternative.

I would like an alternative to the standard controls

☐ Use voice recognition.
☐ Use coded input (i.e. morse, chordic, quartering, or eight cell).
☐ Use word prediction.
...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 App Configuration

Preferences App Configuration

Preferences App Configuration

Preferences Wizard

Game Preferences Editor

Immediate, inline Editor

Presentation

Persistence

Action

Resusuable Preferences Objects
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

= 

Environmental Data

Context
Matching & Resolution

-context

matched with

diverse user interfaces & services

= Solution
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 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
- Blog
- search
- Aggregating server (search, match, adapt, mashup, etc.)
- Open Social Gadget/IWidget with DRD
- *DC delivered using AJAX

*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
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 identity 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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