Modelling Learners Interaction Preferences in dotLRN

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Open Questions

• Built-in support for user modelling
  – Gathering data about users
    • Learning Styles → Felder test
      – Package to be delivered by aDeNu
    • From IMS-QTI questionnaires
    • From interactions
      – Active actions → create!
      – Passive actions → read!
  – Support specifications and standards
    • IMS-AccLIP:
      – models learners interactions preferences
    • CC/PP
      – Models devices capabilities
    • CMI
      – Models learners interactions in SCORM
  – Integration with processing mechanisms
    • Machine Learning → Weka algorithms
    • Multi-Agent systems → JADE agents
    • RDF management → Sesame
IMS LIP has elements …

- `<identification>`
- `<qcl>`
- `<activity>`
- `<affiliation>`
- `<goal>`
- `<competency>`
- `<interest>`
- `<accessibility>`
- `<relationship>`

- “… used to identify the learner …” Vcard
- “qualifications, certificates, licences”
- whole or any part of a course
- can include definition of the activity and its parts
- can include assessment, marks, credits

- IMS RDCEO
- Motivator,
• Originally “preferences” and “capabilities”
• IMS ACCLIP agreed July 2003
  – <accessForAll> replaces <disability>
  – “all accessibility preference information”
• represents in great detail, for any user,
  – assistive hardware preferences
  – assistive software preferences
• good for transfer of user settings
• Similar format that AccMD for the resources (matching)
• now, updating AccLIP + AccMD to changes suggested by ISO
UK application profiles of IMS LIP

xml version="1.0" encoding="UTF-8"?
<rdf:RDF
   xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
   xmlns:dc="http://purl.org/dc/elements/1.1/"
   xmlns:prefcode="http://example.org/prefcode"
   xmlns:source="http://example.org/source"
   xmlns:sourceType="http://example.org/sourceType"
   xmlns:typenm="http://example.org/typenm"
   xmlns:value="http://example.org/value">
   <rdf:Description rdf:about="http://example.org/example">
     <dc:title>DCMI Abstract Model</dc:title>
     <dc:creator>Andy Powell</dc:creator>
     <dc:description>This document specifies an abstract model for DCMI metadata descriptions.</dc:description>
     <dc:source>Source</dc:source>
     <dc:prefcode>Large Font Display Devices</dc:prefcode>
   </rdf:Description>
</rdf:RDF>
CC/PP

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• A CC/PP profile is a description of device capabilities and user preferences. This is often referred to as a device's delivery context and can be used to guide the adaptation of content presented to that device (W3C, 2006)

• CC/PP is based upon RDF (Resource Description Framework).
CC/PP profile structure

- The initial branches of the CC/PP profile tree describe major components of the client. Examples of major components are:
  - the hardware platform upon which software is executing,
  - the software platform upon which all applications are hosted, or
  - an individual application, such as a browser.

- A CC/PP profile describes client capabilities and preferences in terms of a number of "CC/PP attributes" for each component.

[w3C, 2006]
CC/PP profile structure

ex:MyProfile

ex:TerminalHardware

ex:TerminalSoftware

ex:BrowserUA

ex:TerminalBrowser

ex:SoftwarePlatform

ex:DisplayPlatform

ex:Display

rdf:Bag

"3.2"

"4.0"

"Mozilla"

"Symbian"

"EPOC"

"2.0"

"Symbian"

"320"

"200"

[w3C, 2006]

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• The CC/PP framework does not define by itself a vocabulary to represent user or device profiles.

• UAProf, implementation for modelling mobile devices, defines:
  – **HardwarePlatform**: This includes the type of device, model number, display size, input and output methods, etc.
  – **SoftwarePlatform**: Attributes provide information on the operating system software, video and audio encoders supported by the device, and the user’s language preference.
  – **BrowserUA**: A set of attributes to describe the HTML browser application.
  – **NetworkCharacteristics**: Information about the network-related infrastructure and environment. These attributes can influence the resulting content, due to the variation in capabilities and characteristics of various network infrastructures in terms of bandwidth and device accessibility.
  – **WapCharacteristics**: A set of attributes pertaining to WAP capabilities supported on the device.
  – **PushCharacteristics**: A set of attributes pertaining to Push specific capabilities supported by the device.
Implementations of CC/PP (2/2)

• Implementation for universal access to Information systems (Velasco, 2004):
  – **HardwarePlatform.** Includes InputDevices and OutputDevices, where assistive technology elements such as input switches, head-mice, biosensor-control systems, eye-gaze trackers, Braille-lines, etc., may be included.
  – **SoftwarePlatform.** Includes subcomponents to group InputSoftware, and OutputSoftware, e.g., speechrecognition, on-screen keyboard, screen-reader.
  – **UserAgent.** Information about the browser manufacturer and version, markup supported, styling and scripting languages, and MIME-type rendering capabilities. Information about plug-ins and media players linked to the agent is also contained.
  – **NetworkCharacteristics.** Global information about the network to access the Internet application: bandwidth, proxies and firewalls, WAP-related info, etc.
1. The client sends an HTTP request, with an accompanying CC/PP client profile. The client profile may contain references to default profiles describing a range of common capabilities for the client concerned, and values that are variations from the default profile.

2. The HTTP request may pass through a firewall/proxy that (a) imposes constraints on the kinds of content that can be accessed, or (b) can adapt other forms of content to the capabilities of the requesting client.

3. The origin server receives the request and interprets the CC/PP profile. It selects and/or generates content that matches the combined proxy and client capabilities described in the profile.

4. If required, the proxy applies any content adaptations, and any other functions it is designed to perform.

5. The client receives the HTTP response and presents the content it contains.
Request processing in HTTP

[w3C, 2006]
Sesame is an open source Java framework for storing, querying and reasoning with RDF and RDF Schema. It can be used as a database for RDF and RDF Schema, or as a Java library for applications that need to work with RDF internally. (OpenRDF.org, 2006)

- a) read a RDF file,
- b) find the relevant information in it
- c) use that information to process request.
CC/PP applicability to .LRN

• … the right .LRN content for the right target (user+terminal+network)

  – Access for people with functional diversity, making use of specific assistive technologies

  – Access for people using different terminal settings:
    • users with specific Hardware/software settings (display, plug-ins, etc.):
      – Mobile terminals, Digital Television, etc.


CMI (SCORM)
User preferences in SCORM CMI

• Some Relevant attributes
  – cmi.learner_id
  – cmi.learner_name
  – cmi.learner_preference._children
    • (audio_level, language, delivery_speed, audio_captioning, RO)
    • Listing of supported data model elements
  – cmi.learner_preference.audio_level
    • (real(10,7), range (0..*), RW)
    • Specifies an intended change in perceived audio level
  – cmi.learner_preference.language
    • (language_type (SPM 250), RW)
    • The learner’s preferred language for SCOs with multilingual capability
  – cmi.learner_preference.delivery_speed
    • (real(10,7), range (0..*), RW)
    • The learner’s preferred relative speed of content delivery
  – cmi.learner_preference.audio_captioning
    • (state (-1,0,1), RW)
    • Specifies whether captioning text corresponding to audio is displayed
• RUSTICI:
  – SCORM 2004 3rd edition Data Model:
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Brainstorming

- Is the community interested in collaborate?
- In which areas?
  - User modelling
  - Competences
  - Device Modelling
  - Data mining
  - Java integration
  - ...
- Are there developments that can be used?
- Ideas?
- Questions?

http://openacs.org/xowiki/Modelling_Learners