Learning Content Personalisation for Accessibility

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The Open University

This is all about:

- Trying to develop and use technical standards to support accessibility of Learning Technology and thus inclusivity of education (and the web).
- Finding the common parts
- Making the technical standards interoperate to the purpose of inclusivity

What's coming

- Standards, Accessibility & eLearning Standards
- The problem and some reasons its hard
- Some personal standards development experiences
- Individualized Adaptability
  - The Concept
  - What we did and what happened
  - Where we are at now
- Other standards and how things might fit

Standards

A Standard says how something should be

Do these need standards?

yes

Maybe some parts

no

Standard People ?

- Deaf Persons ?
- Blind Persons ?
- Disabled Persons ?
- Cognitively Disabled Persons ?

- What do they Need ?

- Thankfully we are moving away from this idea

One of Many Why's

Distance Education Why: Open University: 2008
Disabled Students

Month	Total of Active Students	Total Disabled Students	% Total Disabled	Total New Students	% New Students	Total Continuing Students	% Continuing Students
Jan-08	174014	9530	5.48%	1277	13.40	8253	86.60
Feb-08	175751	9776	5.56%	1419	14.52	8357	85.48
Mar-08	172370	9692	5.62%	1426	14.71	8266	85.29
Apr-08	180,834	9977	5.52%	1544	15.48	8433	84.52
May-08	183851	10168	5.53%	1637	16.10	8531	83.90

- Disabled people 10-15% general population
- OU students: 5.5% declare a disability – increasing ?
- Microsoft market research: 57% of working age computer users likely to benefit from accessible technology

Another “why” that is really a “when”

Systemic Inertia: When is important

eLearning is growing

What do we standardise

- We need standards for the right pieces to make them work in some context – maybe with something else.
- We don’t need standards that constrain or compete.
- The right standards can make things work together.
- The right standards can provide a focus for a leap forwards
- What are and how do we get the right standards ?

Technical standards for accessibility is hard because

- Huge variety of heterogenous individual varying and dynamically varying requirements
- Huge variety of heterogenous assistive technologies
- Huge variety of (changing) approaches, software, operating systems, API's
- Huge variety of existing standards
- Huge variety of media

- Limited Granularity of Design-Led and Medical Classification Approaches

Some reasons why getting the needed standards pieces is hard

- Because standards enable change (provide a focus for growth of organisations)
- Because they cross organisations
  - Organisations (including standards bodies) have egos, compete and argue over ownership
  - Aligning schedules and organisational structures
- They balance competition and co-operation
- Funding models focus on vendors
- Funding models don't encourage end-users or customers
  - Who do the standards serve ?
  - How can users participate/be represented
- Politics
- Open standards versus proprietary approaches
- Gender of Standards Authors
- Pace of technology change

The problem with Design-led approaches

http://www.warringtoncyclecampaign.co.uk/facility-of-the-month May 2008

Some Useful Accessibility Standards

MySpace

Yahoo

Profiles

- Imagine you want to have just one profile not one for each site.
- Now imagine the site is customisable how you would like it to appear (Yahoo is for colours) and you can say what you want it to look like in the profile (many sites do this)

- Now imagine you have a requirement that is just yours, such as you can't distinguish red from green or you have very low vision (i.e. you are an individual)
- Everyone over 40 is an individual

- How would you get Yahoo and Myspace and Google and Facebook and Twitter and …. to co-operate on the profile ?

- Answer:
  - A Standard.

- This is the problem that we in AccessForAll set out to solve – to enable accessibility preferences that work across systems.

Access For All

- We wanted to enable
  - Location and and selection of resources – *(what can I use)*
  - Adaptation of resources *(so I can use them)*
    - transformation, where not done by device
    - provide adaptations (supplements and alternatives)
  - Tailoring and adaptation of interfaces
    - e.g. the library terminal set up problem

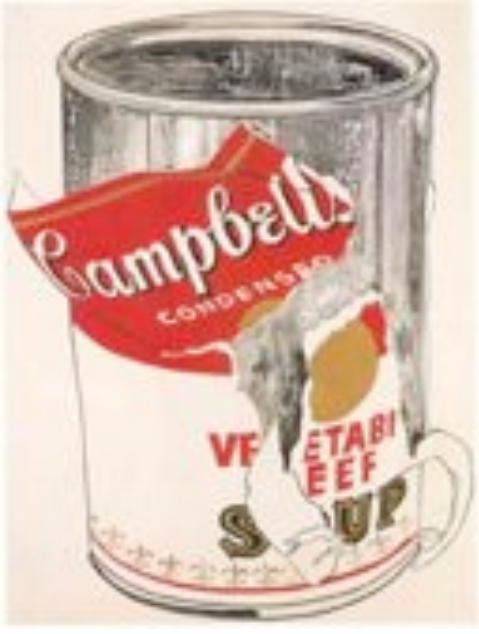
AccessForAll

- Redefine Accessibility as
  - A mismatch of resources to requirements or context
- Context might be – working in a noisy environment, operating machinery, on an exercise cycle with loud music at a Gymnasium …..

To solve, we need

- Description of context (functional requirements of learner – what a learner wants or needs)
- Description of resource capabilities (Metadata on content)
- Then we match them together, transform and deliver

Metadata



What's in it

But also need other stuff like knowing where it is, managing it etc.

Our Standards: The current user profile part

- Functional Preferences
  - Display: how resources are to be presented and structured,
  - Control: how resources are to be controlled and operated, and
  - Content: what supplementary or alternative resources are to be supplied

Display

- ***Display* -** Display technology preferences: how the user interface and content should be presented
  - ***screenReader*** - Display technology that presents text using a speech synthesizer
  - ***screenEnhance*** - Technology that makes the display easier to see. For example, display text in a larger font, and/or with greater contrast. Screen magnifiers are a type of screen enhancer
  - ***textReadingHighlight*** - Highlight the text as it is read by a speech synthesizer
  - ***braille*** - A Braille display is a device that presents text, and other information, using Braille
  - ***tactile*** -Technology that uses touch or haptics as the means of rendering information
  - ***visualAlert*** - Technology that provides visual alternatives for audio alerts
  - ***structuralPresentation*** - Settings for how the structure of the content is displayed

Control

- ***control***
  Technologies that provide for alternative ways of controlling a device
  - ***keyboardEnhanced*** - Accessibility enhancements for a standard keyboard
  - ***onscreenKeyboard*** - Virtual keyboard displayed on a screen used to control other applications
  - ***alternativeKeyboard*** - Hardware that functions like a standard keyboard but is a separate external device
  - ***mouseEmulation*** - Replacement for a standard mouse, such as a keyboard, voice recognition, switch, or other non-pointing device
  - ***alternativePointing*** - Technology that replaces the mouse with a different pointing device, such as a trackball or eyegaze tracker
  - ***voiceRecognition*** - Control settings for spoken commands and dictation
  - ***codedInput*** - Control methods that use a code to select the desired input
  - ***prediction*** - Control enhancements in which the system predicts and/or completes user input
  - ***structuralNavigation*** - Settings related to navigational controls

Content

- ***content***
  Preferences regarding the content, specifying any desired transformations or enhancements
  - Adaptation Preference
    - ***alternativesToVisual*** - Modality preference. How to present visual content in a different modality
    - ***alternativesToText*** - Modality preference. How to present textual content in a different modality
    - ***alternativesToAuditory*** - How to present auditory content in a different modality
  - Colour Coding avoidance
  - Hazard
  - ***Support-tool*** - e.g. dictionary, calculator, noteTaking, spellchecker,mindMappingSoftware, etc.)

The Resource Part

- Access Mode
  - Visual, textual, auditory, tactile, olfactory
- Adaptation Statement
  - What type of thing this is an adaptation for
- Statements about
  - Display Transformability
  - Control Flexibility etc.

From The Inclusive Learning Exchange (TILE – Utoronto:ATRC)

Wednesday, 10 August 2011

Picture of a video being delivered in the eLearning system "The Inclusive Learning Exchange" (TILE) from the Adaptive Technology Resource Centre at University of Toronto. The video has no captions.

Metadata on resource

```
<accessForAllResource>
  <accessModeStatement>
    <originalAccessMode=”auditory”/>
    <accessModeUsage=”informative”/>
  </accessModeStatement>
  <accessModeStatement>
    <originalAccessMode=visual/>
    <accessModeUsage=”informative”/>
  </accessModeStatement>
  <hasAdaptation=”IdentifierofAdaptation”/>
</accessForAllResource>
```


XML code for Metadata on a resource

For a user with partial hearing and poor command of english

Preferences

```
<accessForAllUser>
 <content>
  <adaptationPreference>
   <adaptationType=”caption”/>
   <originalAccessMode=”auditory/”>
   <usage=”required”/>
   <language=”eng”/>
  </adaptationPreference>
 </content>
</accessForAllUser>
```

Metadata on adaptation

```
<accessForAllResource>
 <isAdaptation>
  <isAdaptationOf=”IdentifierOriginal”/>
  <extent=partial/>
 </isAdaptation>
 <adaptationStatement>
  <adaptationType=”caption”/>
  <originalAccessMode=”auditory”/>
  <language=eng/>
 </adaptationStatement>
</accessForAllResource>
```

Wednesday, 10 August 2011

Picture of a video being delivered in the eLearning system "The Inclusive Learning Exchange" (TILE) from the Adaptive Technology Resource Centre at University of Toronto. The same video as on the earlier slide but this one is displaying captions in accordance with what the preferences stated was required.

AccessForAll (A4a)

- Started work around 7 years ago in IMS (Accessibility for Learner Information Package – AccLIP and AccessForAll Meta-data – AccMD)
- Disabled users directly
  - Adaptive Technology Resource Centre, Toronto.
  - US National Centre for Accessible Media NCAM
- IMS Access For All 1.0 July 2004
  - became basis for an ISO Metadata standard

AccessForAll (A4a)

- Final public free ISO standard **Individualized Adaptability and Accessibility in eLearning, Education and Training** ISO/IEC JTC1 SC36 24751 parts 1, 2 and 3 **September 2008**
- Three parts
  - Framework – how to use the parts together
  - Personal Needs and Preferences Profile (PNP)
  - Digital Resource Description (DRD)
- Other parts in construction – later in this p'tion.

Implementations Underway

- Teachers Domain
  - part of US National Science Digital Library
  - Set of online Multimedia physics teaching resources for schools (K12)
  - http://nsdl.org/, http://www.teachersdomain.org/, http://www.teachersdomain.org/courseinfo/, http://www.teachersdomain.org/courseinfo/about/index.html


teachers'domain

Accessibility Features:

Update

Many Teachers' Domain resources have accessibility features to accommodate users with a wide range of abilities. These include audio and text descriptions for blind or low vision users, captions and transcripts for deaf or hearing impaired users, and information about keyboard and mouse control for users with limited mobility. Specify your preferences for these features below.

CC	Captions for Videos: ○ on ◉ off	Preferred Language	English
	Transcripts for Audio Files: ○ on ◉ off	Preferred Language	English
	Audio Descriptions for Videos: ◉ on ○ off	Preferred Language	English
	Text Descriptions for Images: ◉ on ○ off	Preferred Language	English
	Larger Text with High Contrast: ○ on ◉ off	Preview	
	Alert me if a resource requires: ☐ keyboard control	☐ mouse control	☐ full-color vision

European Unified Framework for Accessible Lifelong Learning (EU4ALL)

- Runs for 4 years - started October 2006
- EU IST eInclusion funded overall funding of € 7.4 million, 100 person-years effort, and 13 partners across Europe
- Atos Origin, UNED, Open Uni, Franhofer Institute, York Uni, Soluziona, Tribal, eISOTIS, Giunti, EADTU, CIRPS, CSI, DPITALIA
- Addresses systemic issues in providing access for disabled learners to Life-Long-Learning particularly where this is mediated by technology
  - Where such technology is inappropriately introduced with insufficient support, disabled people face further exclusion from the interlinked worlds of education and work
- The project is focused on distance learning, principally at the Higher Education level

European Unified Framework for Accessible Lifelong Learning (EU4ALL)

- http://www.eu4all-project.eu
- Goals
  - Design an open service-oriented architecture for ALL
  - Develop the software infrastructure for ALL services (including content, support and access services)
  - Provide technical standards/specifications for ALL applications integrated with current and emerging eLearning standards
  - Validate the results in large-scale higher education settings

European Unified Framework for Accessible Lifelong Learning (EU4ALL)

- A Simplified Techie View
  - Content Personalisation
    - Content with User with Device – the big prize, see later
    - Services
      - system delivery
      - mediation of content/education-related services (e.g. interpreter appointments)
  - Example implementations of some services and personalisation
    - Moodle (OU), dotLRN (UNED/ATOS and other partners)
  - Evaluated with real users etc..

EU4ALL

- Implementing some parts of PNP and DRD
- Granularity in Personalisation is a general issue (everywhere, not just EU4ALL)
  - we have some simplified technical scenarios/ use cases based around Media Objects (note that a Learning Object might contain many Media Objects) that address this
- Initial content personalisation prototypes are currently under construction

A Big Prize

- An Architecture integrating Content, User Preferences and Devices
- Content is matched (selected) to both and customised (transcoded) to both.
- Ideally – invariance of content across changing user preferences and changing device context.

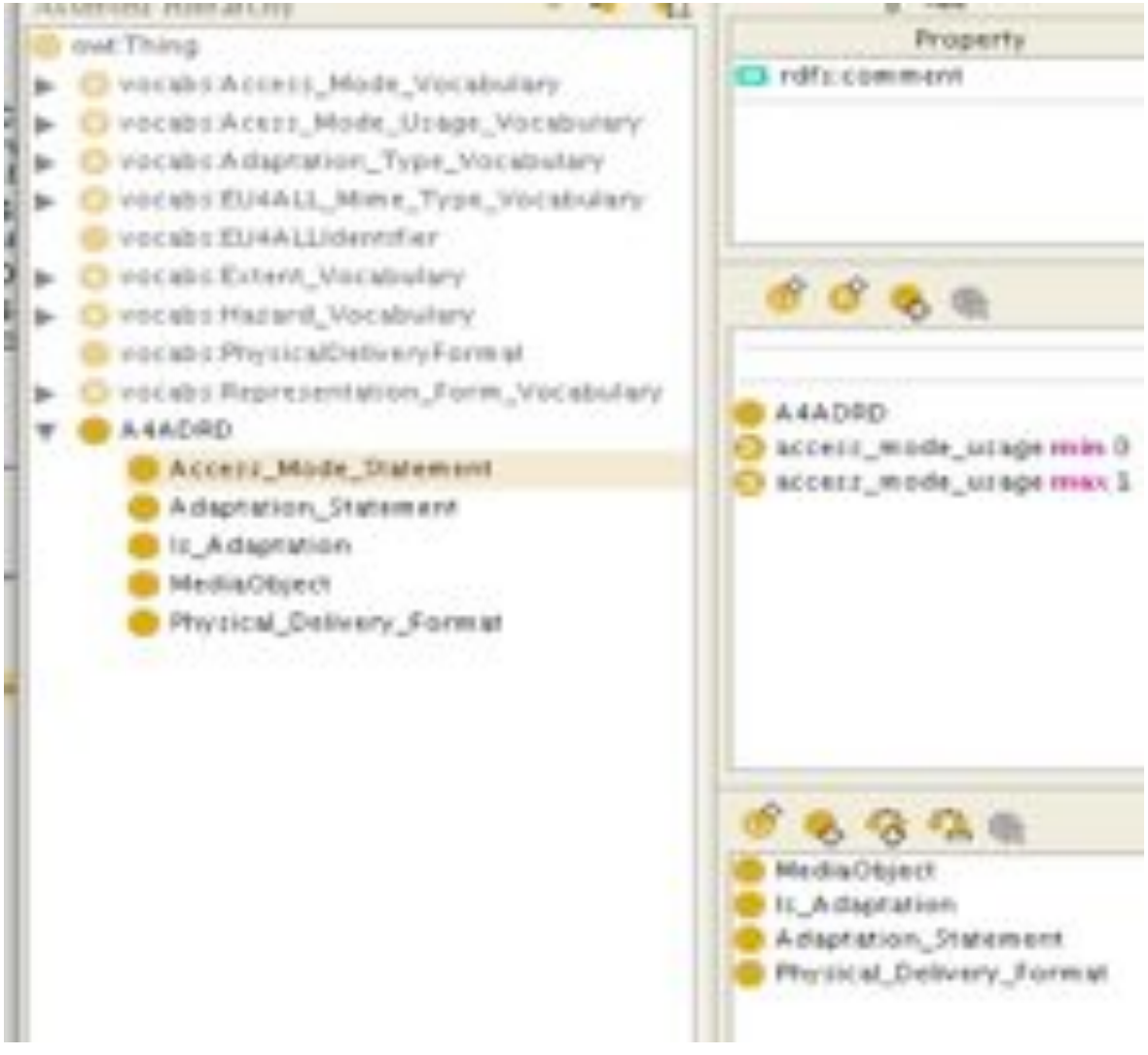
Collaboration

- IMS Accessibility SIG, SC36 (informal so far), W3C Ubiquitous Web Applications group
- Working on a public wiki
  - http://www.w3.org/2007/uwa/wiki/Personalization
- Integration of the ISO/IMS approach and the UWA approach
  - needs integration of device context ontology http://www.w3.org/TR/dcontology/ and ISO model

So far – VERY tentative

- Categorisation of which elements of ISO model are needed on server and which on client
- Simplified CORE model of ISO/IMS DRD and PNP
- Ontology (OWL binding) of that
- Some ideas on technologies to move forwards (far too early to put on a slide)

The Simplified Model



The Simplified Model

- Essentially ..
  - DRD has modality and representation form for original and adaptation
  - PNP says – for Modality X I need instead modality Y
  - For a resource of modality X we find what the user needs from the PNP (in this case Y) then ask the device whether it can render a Y (possibly by transformation). If it can't then we find an adaptation and loop again

Other considerations

- How the assistive technology “ontology” maps to device descriptions (ideally we need harmonised SC36 and UWA descriptions)
- Physical Delivery Format
  - things like audio and video codecs, screen-size .. stuff from MPEG. Work in SC36 Metadata for Learning Resources needs harmonising
- Implementation of granularity solution – access to media objects and modality components
  - IEEE LTSC RAMlet work was promising ..

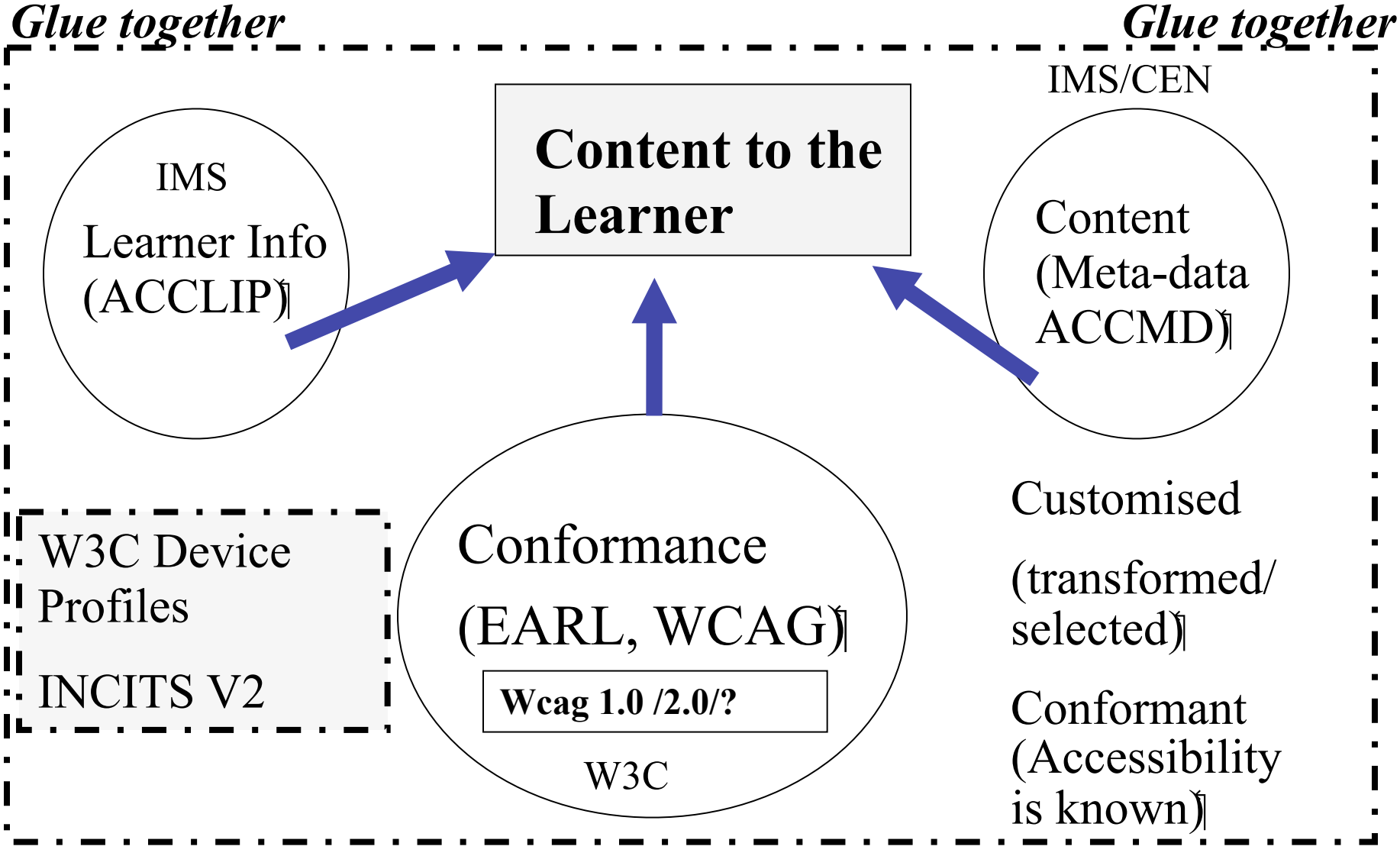
The Near Term Future

- IMS planning next version (2.0 Public Draft Imminent)
  - full version
  - profiled for consistency with ISO
  - CORE profile (Afa Lite)
    - Pulls in assistive technology in modular fashion – a bit like Baselines in WCAG 2.0
    - OWL binding
    - We would like it all to work together

ISO

- New parts under construction
  - Blended learning (editor=me)
    - needs and resource parts for
    - Integration of
      - Offline Data types
      - Services
  - Events and places
  - Language Independence

A Six Year Old Slide



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Slide shows variou standards and specifications relating to accessibility and how they might technically relate

What's all this stuff about Education ?

- Is it really specific to Education ?
  - Context is important in education as is adaptation
- What has been done in the standards for accessibility that IS specific to Education
  - Not a lot.
- What *could* be specific to accessibility of education that needs dealing with
  - Assessment
  - ePortfolios.

The Hardest Things

- Keeping all the singers on the same hymn sheet

- Getting stuff done while the technologies hold still

Stuff I should have talked about

- WCAG 2
- ATAG 2
- JTC1 Special Working Group on Accessibility
  - Summary of user needs (USEFUL TO ALL)
  - Standards Inventory (USEFUL to some)
  - Guidance on mapping standards work to user needs (USEFUL only to standards developers)
- LOM, DC, MLR (Metadata for Learning Resources)
- Need for transparency across media kinds
- MASH-ups
- Interface component swapping, W3C:Aria, The Fluid Project
- CEN BT WG 185 (conformity assessment)
- CEN Metadata for Learning Opportunities

References

- Latest public draft of ISO Individualised Adaptability is on
  - http://jtc1sc36.org/doc/36N1139.pdf also same URL docs 40 and 41
- IMS AccLIP etc. specifications are on
  - http://www.imsglobal.org/accessibility
- I am on
  - A.K.Heath@open.ac.uk
  - AndyHeath@Axelrod.plus.com

Credentials

- Computer Scientist/Educator
- 8 years Learning Technology Standards with focus on Accessibility, particularly integration
- IMS, ISO IEC JTC1 SC36, IEEE LTSC RamLET, British Standards Institute, CEN-ISSS WS-LT, CEN-ISSS DPA, ISO IEC JTC1 SWG-A, CETIS (in past), UK-Open Uni, EU4ALL project, co-chaired IMS ePortfolio group, consultant
- Notably AccessForAll specs and standards and other specs in support of the principle