Promoting accessibility by using metadata in the framework of a semantic-web driven CMS

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Objectives

- To survey how far IMS accessibility specifications cover WCAG, and discuss the convenience of extending it to the whole WAI guidelines.
- To argue how accessibility could be considered as a key issue for promoting reusability.
- To discuss the convenience of using a semantic framework (using MPEG-7 semantic tool, RDF or OWL,…) for describing textual and contextual information.
- To improve ximDEX to support accessibility.

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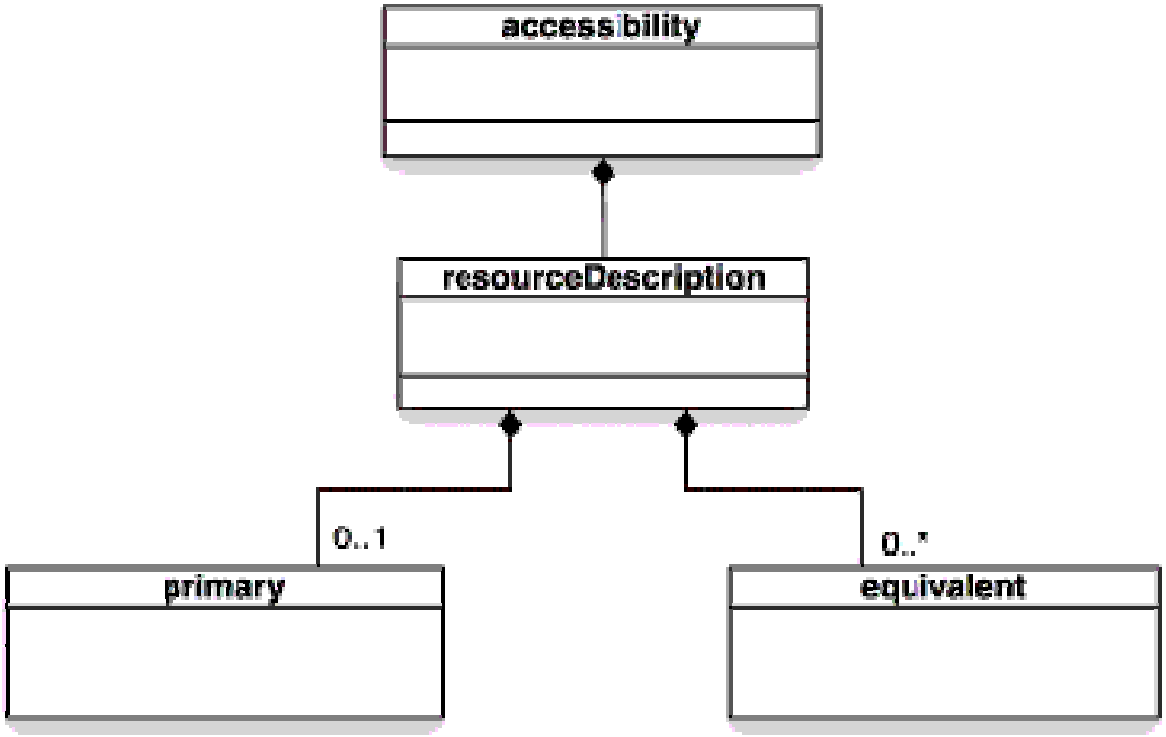
enlarging accessibility notion…

- "The term disability has been re-defined as a mismatch between the needs of the learner and the education offered, i.e. the ability of the learning environment to adjust to the needs of all learners".
- "Nevertheless, the needs and preferences of a user may arise from the context or environment the user is in, the tools available (e.g., mobile devices, assistive technologies such as Braille devices, voice recognition systems, or alternative keyboards, etc.), their background, or a disability in the traditional sense".

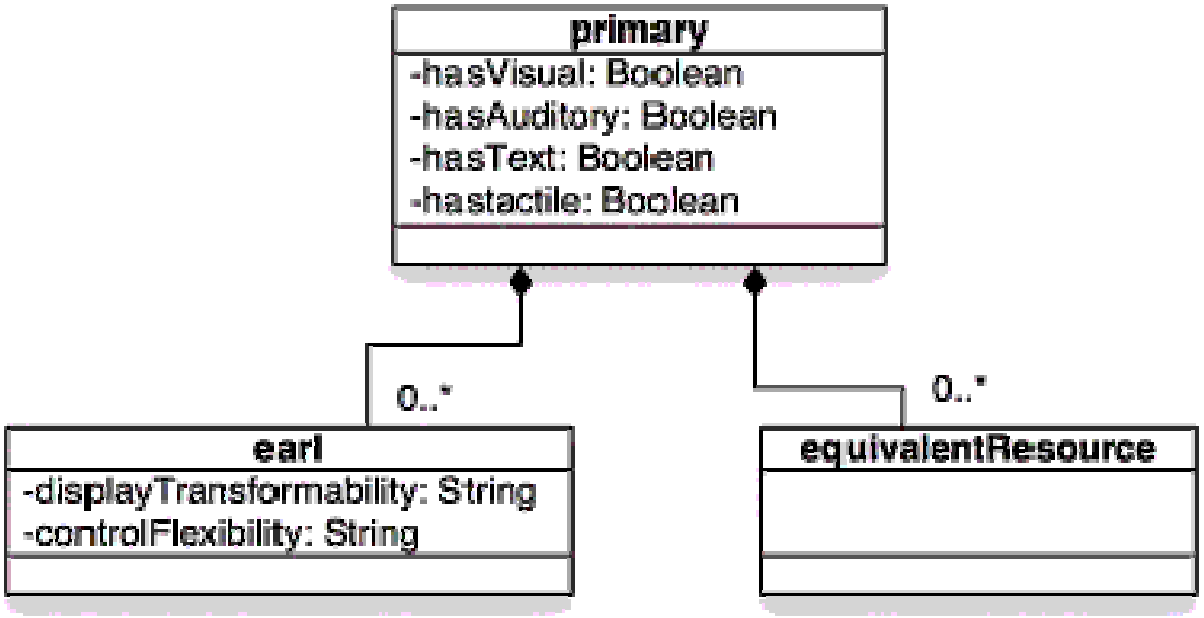
goal of the IMS accessibility specifications…

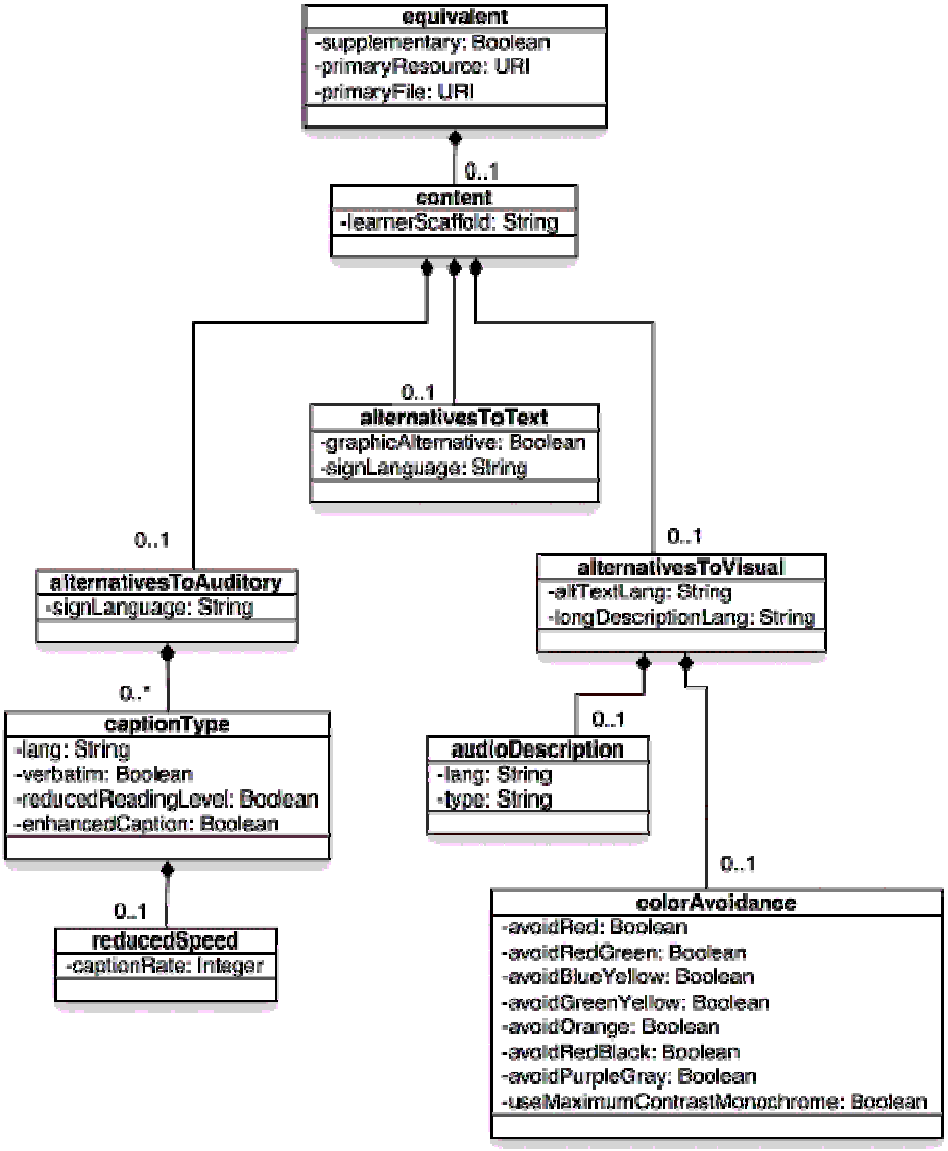
- "To provide functional interoperability to support the substitution or augmentation of one resource with another when this is required for accessibility purposes, as prescribed in the user's profile (e.g., the addition of caption text for a hearing-impaired context), thus allowing interoperating systems to work together to serve the needs of learners with disabilities and others who have ACCMD profiles ".
- ACCLIP + ACCMD

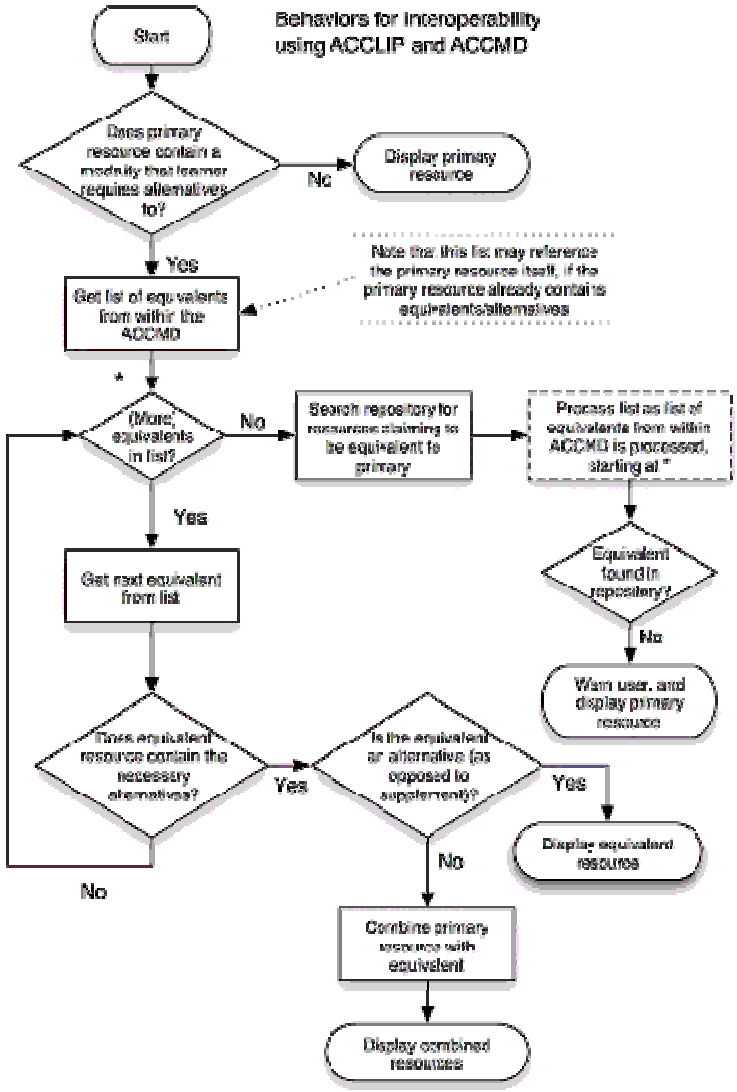
The IMS AccessForAll data model



The IMS AccessForAll data model




equivalent
-supplementary: Boolean
-primaryResource: URI
-primaryFile: URI
0..1
content
-learnerScaffold: String
0..1
alternativesToText
-graphicAlternative: Boolean
-signLanguage: String
0..1
alternativesToAuditory
-signLanguage: String
0..1
alternativesToVisual
-altTextLang: String
-longDescriptionLang: String
0..*
captionType
-lang: String
-verbatim: Boolean
-reducedReadingLevel: Boolean
-enhancedCaption: Boolean
0..1
audioDescription
-lang: String
-type: String
0..1
reducedSpeed
-captionRate: Integer
0..1
colorAvoidance
-avoidRed: Boolean
-avoidRedGreen: Boolean
-avoidBlueYellow: Boolean
-avoidGreenYellow: Boolean
-avoidOrange: Boolean
-avoidRedBlack: Boolean
-avoidPurpleGray: Boolean
-useMaximumContrastMonochrome: Boolean


Start
Behaviors for Interoperability using ACCLIP and ACCMD
Does primary resource contain a modality that learner requires alternatives to?
No
Display primary resource
Yes
Get list of equivalents from within the ACCMD
Note that this list may reference the primary resource itself, if the primary resource already contains equivalents/alternatives
*
(More) equivalents in list?
No
Search repository for resources claiming to be equivalent to primary
Process list as list of equivalents from within ACCMD is processed, starting at *
Yes
Get next equivalent from list
Equivalent found in repository?
No
Warn user, and display primary resource
Does equivalent resource contain the necessary alternatives?
Yes
Is the equivalent an alternative (as opposed to supplement)?
Yes
Display equivalent resource
No
No
Combine primary resource with equivalent
Display combined resources

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The Dublin Core Accessibility Element

- "The DC-Accessibility Working group (DCA-WG) is producing a set of documents that could lead to the creation of a new DC element to be called *DC:Accessibility*"
- "The underlying information model for the new term could be closely related to the ACCMD that describes people's accessibility needs and preferences. Both specifications, for people and for resources, were developed in collaboration with the IMS Global Project and they are maintained by that body"
- "The term *Accessibility* is very easily confused with *Access*. There is a discussion to use a term such as *Adaptability*".
- "There is a concern that what may be achieved in terms of interoperability could be lost through a proliferation of vocabularies"
- "It is clear that any given user might want to have several profiles of needs according to the context (time, location,…)"
- The responsability for accessible content delivery must be taken by the server (shift from earlier approaches depending solely on WCAG/ATAG/UAAG conformance).

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Main objectives of the CEN-ISSS APLR

- "To demonstrate formative ways that the IEEE LOM can be used to document information about the accessibility properties of learning content (learning objects) in standard ways."

- "To develop a basic vocabulary and framework around which software vendors, tool producers and content authors can work in order to provide a greater level of interoperability and applicability of tools."

The activity of the CEN-ISSS LTW APLR is being coordinated and harmonized with other international standards organizations such as IMS, ISO, DC and W3C/WAI

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main differences…

- WCAG 1.0 was highly technology dependent
  WCAG 2.0 represents broad concepts that apply to all web.based content

- WCAG 1.0 was diagnostic-oriented
  (it uses guidelines to group checkpoints)
  WCAG 2.0 is more efficiently organized
  (it uses guidelines to group success criteria)

- WCAG 2.0 is more flexible
  (it may adjust the priority of some checkpoints)

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Some WCAG principles partially covered by ACCMD

- **Principle 1**: **Content must be perceivable**. This means (1.1) there must be text alternatives for all non-text content; (1.2) providing synchronized alternatives for multimedia (captions and audio descriptions); (1.3) ensuring that functionality and structure are separable from presentation.
- **Principle 2**: **Interface elements in the content must be operable**. This means (2.1) Making all functionality operable via a keyboard interface; (2.2) allowing users to control time limits on their reading or interaction; (2.3) allowing users to avoid content that could cause photosensitive epileptic seizures; (2.4) providing mechanisms to help users find content, orient themselves within it, and navigate through it.
- **Principle 4**: **Content must be robust enough to work with current and future technologies**. This means (4.1) using technologies according to specification; (4.2) ensuring that user interfaces are accessible or provide an accessible alternative(s).

Some WCAG principles uncovered by ACCMD

- **Principle 1.4**: Making it easy to distinguish foreground information from background images or sounds.
- **Principle 2.5**: Helping users avoid mistakes and make it easy to correct them.
- **Principle 3**: Content and controls must be understandable. That means (3.1) ensuring that the meaning of content can be determined; (3.2) organizing content consistently from "page to page" and making interactive components behave in predictable ways.

We suggest it is a key issue to extend the information model of th IMS accessibility specifications

- According to the 1st design principle of the WCAG 2.0:
  "there must be text alternatives for all non-text content"

- Textual information is the linking format between accessible and not accessible content

- But, sometimes information in non-textual format can be captioned, although sometimes it must be just described, i.e. it must be contextualized.

- There should be proper support for describing textual and contextual information.

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- **Reusability**: capacity of content to be reused in intra- and inter- contextual scenarios.
- According to the opinion of experts on the field, **some key issues promoting content reusability:**
  - ***Granularity:*** the lowest the better for reusability purposes
  - ***Localization:*** metadata, semantic web and intelligent agents are mainly supporting that aim
  - ***Self-containedness****:* (i.e. context independent) it is difficult to achieve
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  - ***Self-containedness****:* (i.e. context independent) it is difficult to achieve
  - ***Accessibility***

- ***Accessibility*** contributes to enlarging the reusability capacity of content:
  - On one hand, the wider the potential user community is, including disabled people, the wider the chances for reusing content.
  - On the other hand, in order to support accessibility it is useful to organize the information in a textual format and, as a consequence, once the information is in that format it is easier to reuse it further on.

- In order to support content description, several approaches are possible:
  - Natural language-oriented
    - RDF/OWL (ontology)
    - DC (taxonomy, domain vocabularies)
    - IEEE-LOM (taxonomy, domain vocabularies)
  - Narrative-oriented
    - IMS-LD (learning-oriented)
    - MPEG-7 (generic specification for describing multimedia content)
  - GUI-oriented solution
    - XIML

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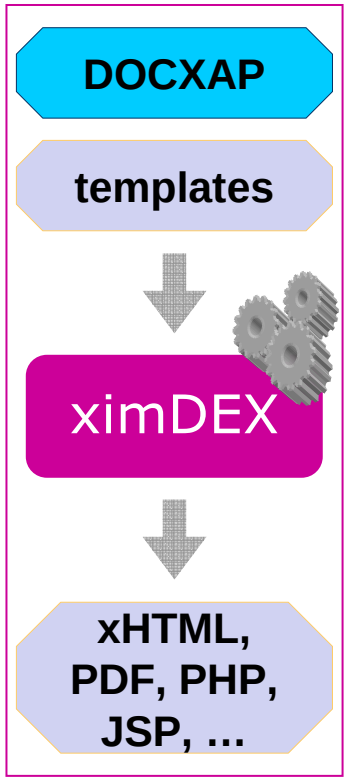
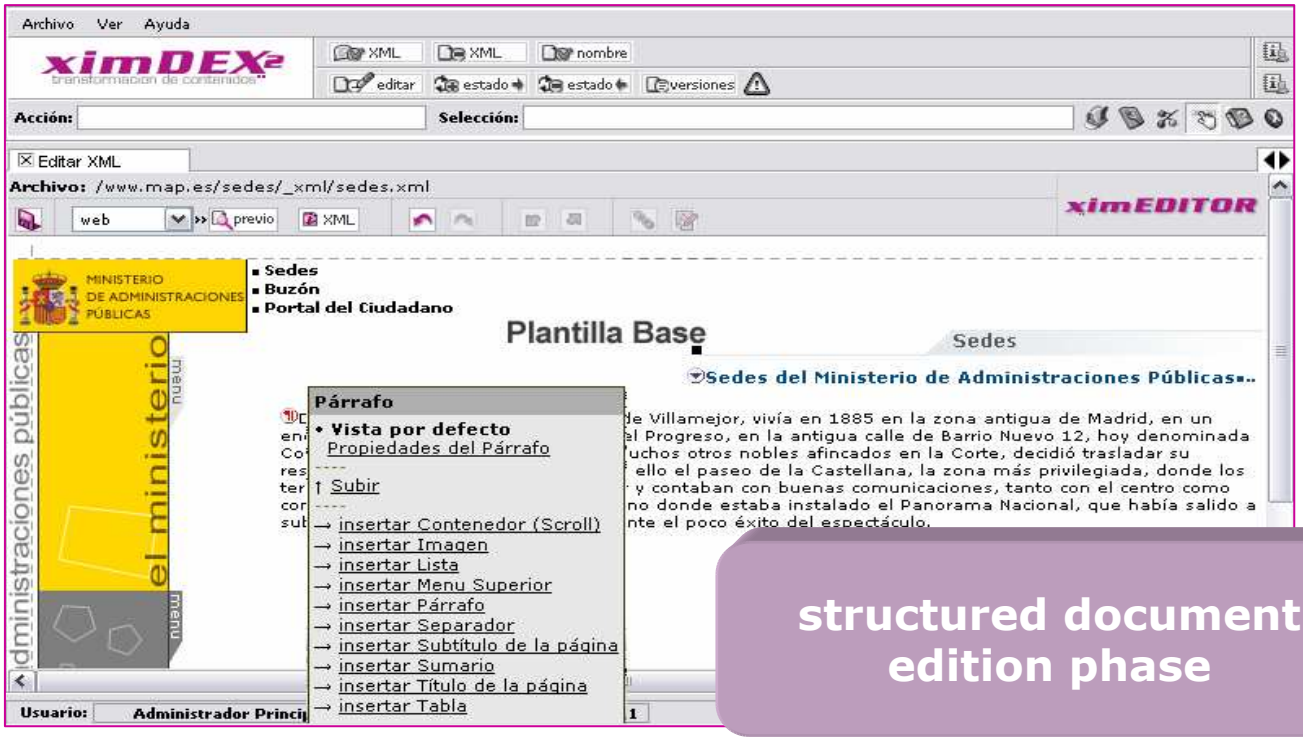
Accessibility built in ximDEX

Applying ximDEX: wysiwyg XML

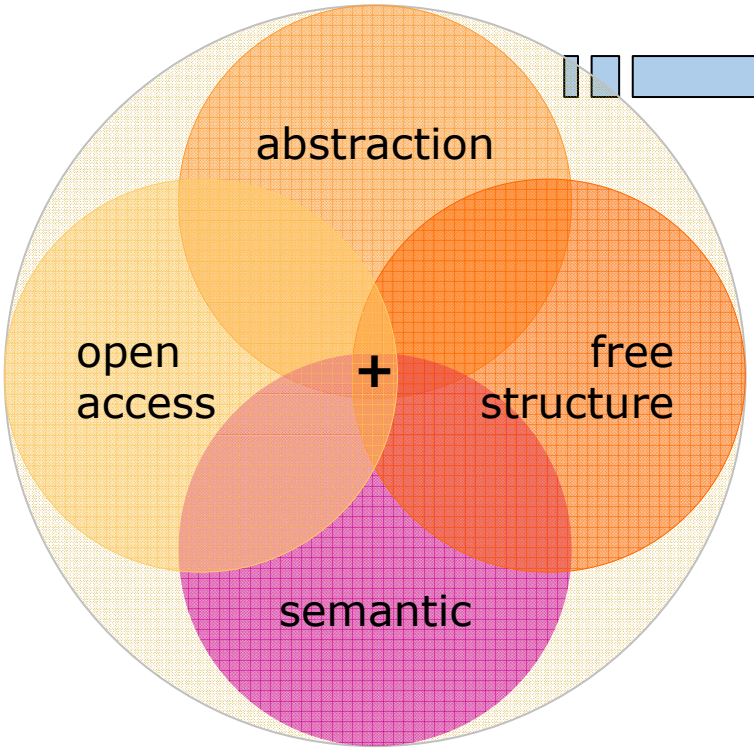
XML *wysiwyg* editors capturing elements of information ...





structured document edition phase

Accessibility built in ximDEX



ximDEX

ximDEX

Documents are structured associating a well defined meaning to every element.

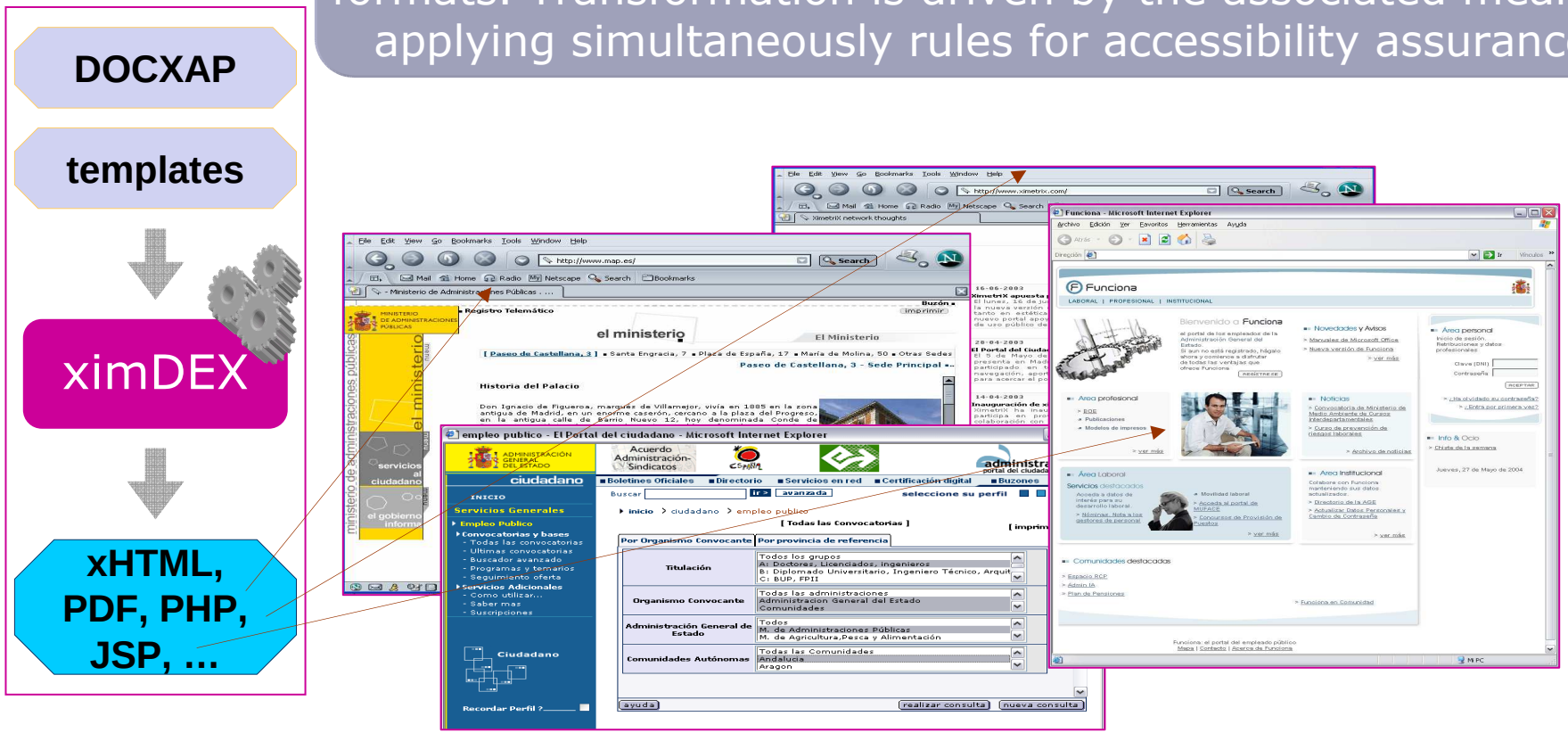
Automatic application of rules encoded into templates allows the generation of contents in the final formats attending to guidelines to be accomplished, (e.g. WAI guidelines)

Generation is driven by the *meaning* of every element of information in the document, its meta-data and the context surrounding the document …

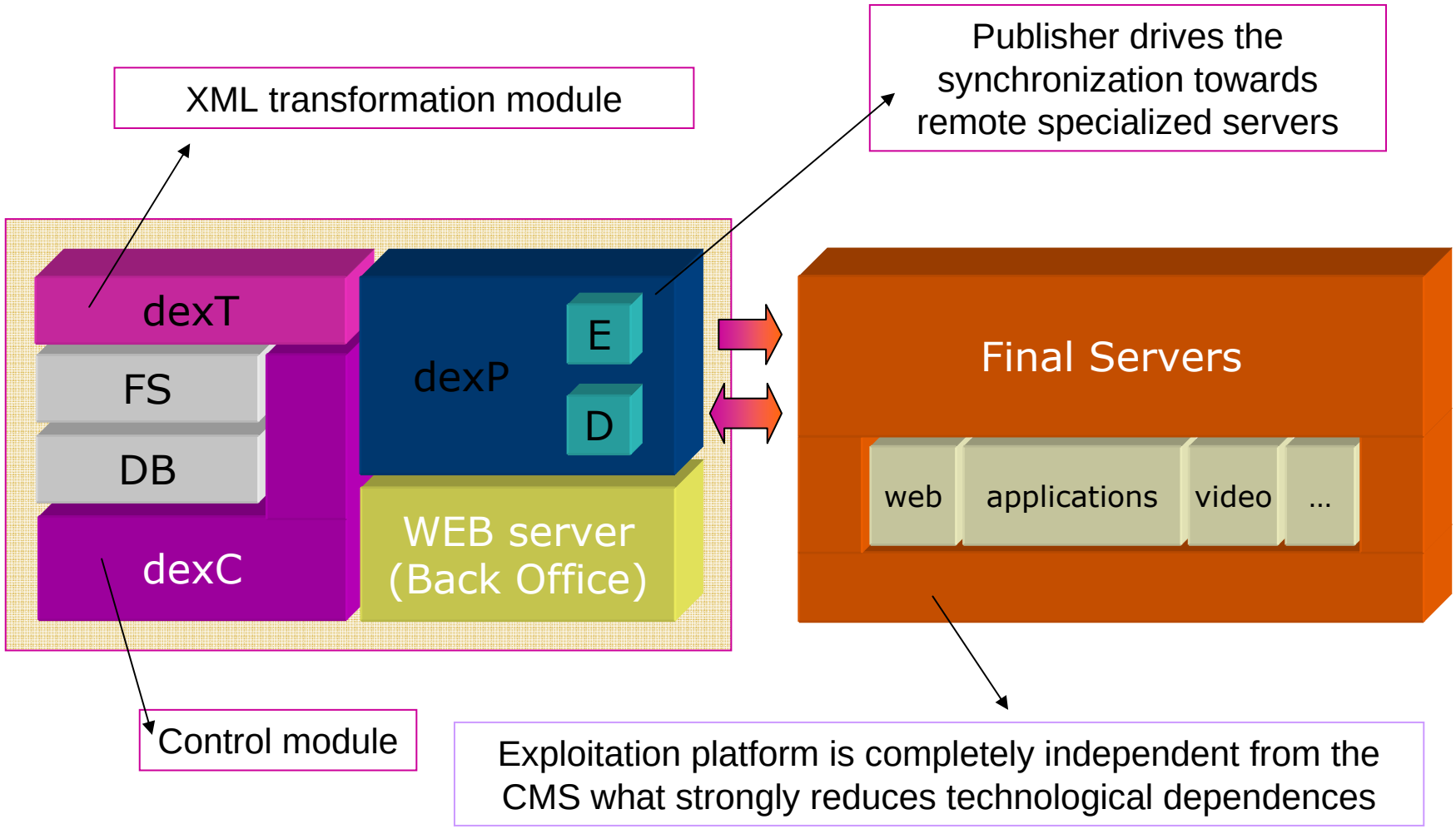
Accessibility built in ximDEX

Applying ximDEX: final applications

Structured documents are transformed via the recurrent application of XML templates to generate content in final formats. Transformation is driven by the associated meaning applying simultaneously rules for accessibility assurance



ximDEX: architecture



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Conclusions

1. It is a key issue to extend the IMS specifications for binding all WAI guidelines.
2. WCAG 2.0 guidelines (more abstract than 1.0), can help as a first step to model content accessibility properties and learner profile in a technology independent way.
3. Textual information is the linking format between accessible and not accessible content.
4. Sometimes information in a non-text format can be captioned, but sometimes it must be just described, i.e. it must be contextualized.
5. There should be proper support for describing textual and contextual information.
6. Describing context using standard semantic specifications could promote both, content accessibility and reusability.

Conclusions

Next steps are to use the semantic CMS ximDEX for testing the best solution between:

- DC Metadata Set and IMS Metadata
- MPEG-7 Semantic Tool
- Applying an ontology oriented approach described in RDF (ximDEX is already prepared)
- IMS-ACCMD (or our own extended version)
- ximl (using that specification for the abstraction of the presentation logic, and for supporting abstract design principles of the WCAG 2.0)

thanks!

contact details…

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