

ACTF Visualization Engines and Alternative Interface Components

Kentarou Fukuda, IBM

- New Technologies, New Standards, and Lack of Tools

ACTF targets to provide building blocks for new technologies and standards.

<i>Evolution of runtime technologies</i>	<i>Current and coming accessibility standards and APIs</i>	<i>Existing accessibility check or repair tools</i>
Traditional HTML	Section 508 , WCAG 1.0& 2.0 , ISO/IEC Guide 71, ISO/DIS 9241-151, etc.	Bobby, WebKing, etc.
Web 2.0 (DHTML / AJAX)	Section 508, WCAG 2.0, WAI-ARIA , ISO/IEC Guide 71, ISO/DIS 9241-151, MSAA (IAccessible2)	?
Flash	Section 508 , ISO/IEC Guide 71, MSAA	LIFT, AccRepair for Flash
Eclipse RCP (SWT)	Section 508 , ISO/IEC Guide 71, SWT Accessibility, MSAA (IAccessible2)	?
OpenDocument Format (ODF)	Section 508 , ISO/IEC Guide 71, ODF 1.1 spec, ODF 1.2 spec.	?
• • •	• • •	????

Runtime technology innovation goes on.

Standards and APIs in **blue bold face** will be standardized or updated in 2008 to 2009.


Lack of tools

Accelerate adoption of new accessibility standards, and accelerate research and development activities for next generation accessibility tools.

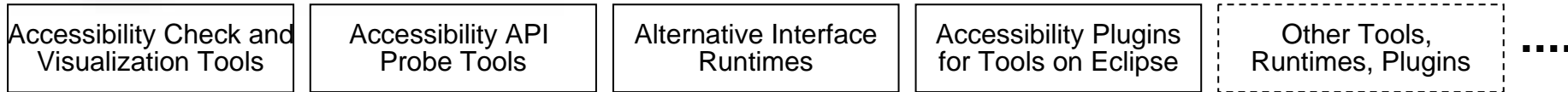
- Provide an extensible and comprehensive framework for accessibility tools.
- Allow developers to build various types of accessibility tools on top of ACTF.
 - ◆ Alternative interfaces for Persons with Disabilities (PwD)
 - ◆ Assistive technology simulation tools
 - ◆ Compliance validation and usability visualization tools
 - ◆ Accessibility check plugins for IDEs
 - ◆ ...
- Contribute to other Eclipse projects
 - ◆ Cooperate with other Eclipse projects as closely as possible.
 - ◆ Help accessibility enhancement of other Eclipse projects.
 - ◆ Work towards making all development and authoring tools on Eclipse generate accessible artifacts.



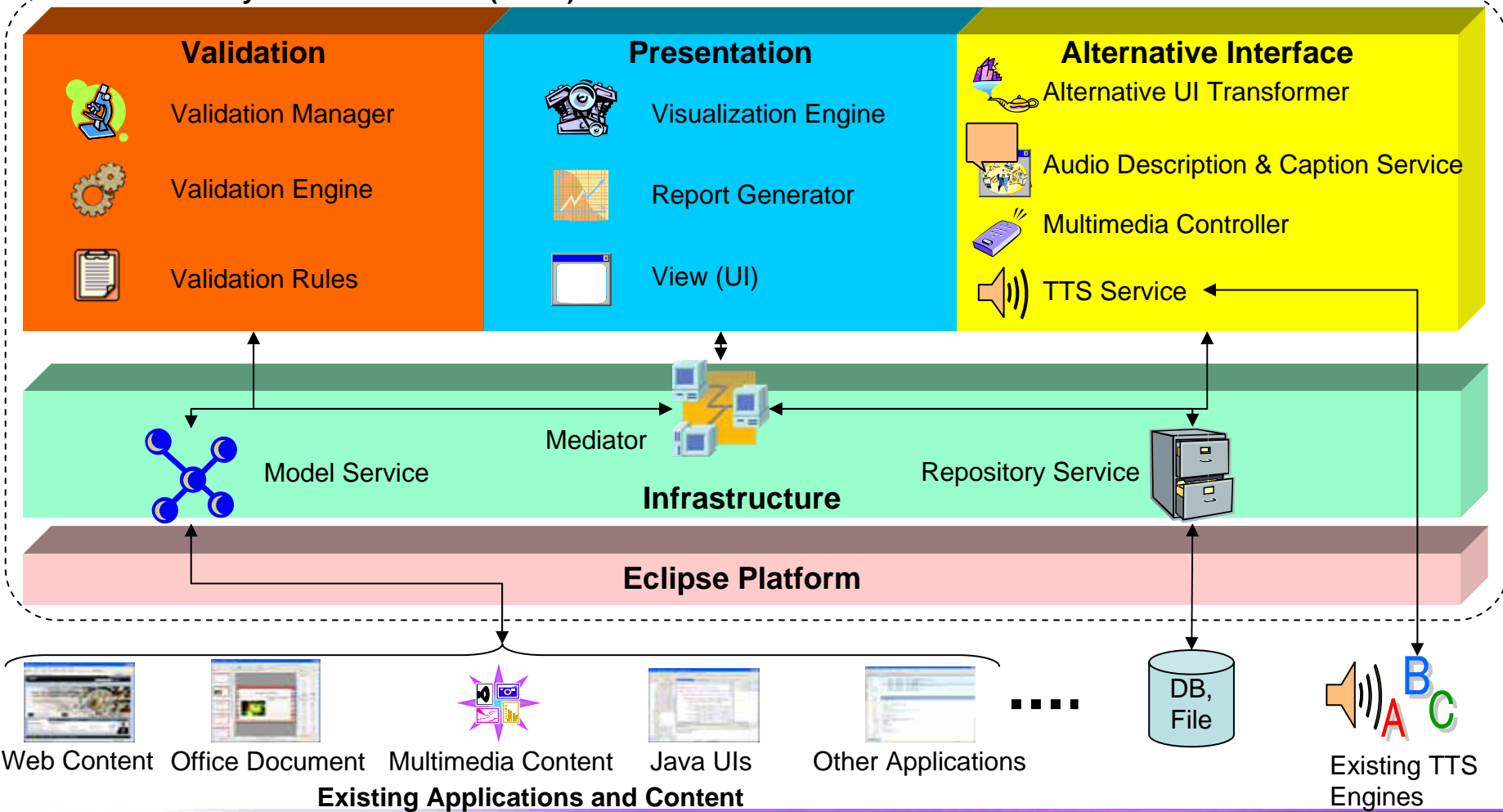
- Project leads
 - ◆ Chieko Asakawa, IBM
 - ◆ Mike Paciello, The Paciello Group
- Mentors
 - ◆ Naci Dai (WTP PMC, etermination a.s.)
 - ◆ Ed Merks (Modeling PMC, IBM)
- Community
 - ◆ 7 Companies
 - ◆ 6 Non-profit organizations
 - ◆ 7 Academia
 - ◆ 2 Open source communities
 - ◆ 2 International consortiums
- Committers
 - ◆ 21 committers from 9 organizations

May, 2007	•ACTF project was proposed to Eclipse.org
Sep, 2007	•ACTF project proposal was accepted
Oct, 2007	•ACTF project was launched
Feb, 2008	•Most of initial contribution was completed
Mar, 2008	•Presentations and first F2F meeting at CSUN •Presentations at EclipseCon 
2Q, 2008	•Build 0.1 release (planned)
1H, 2009	•Projected first release

Tools and Runtimes on top of ACTF

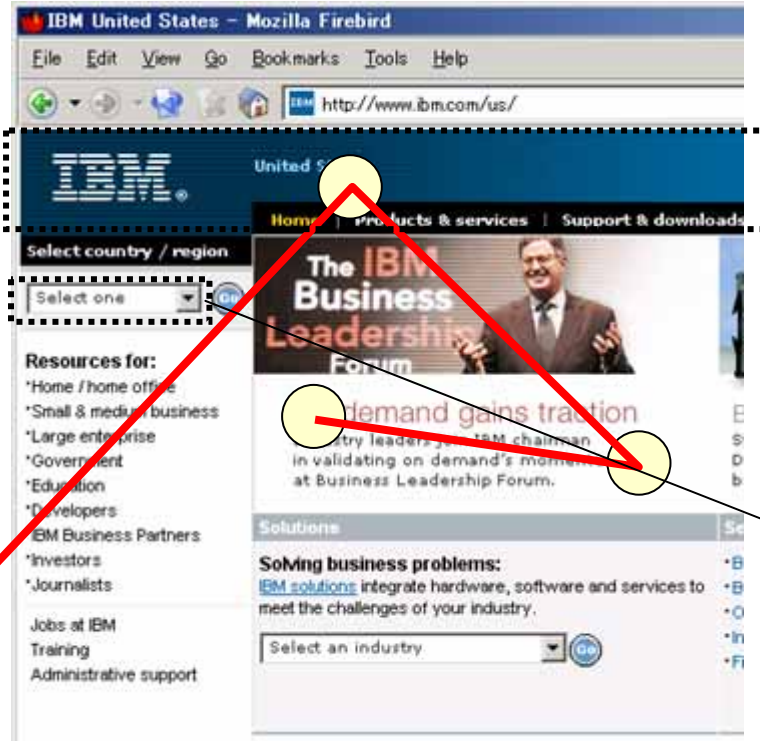


Accessibility Tools Framework (ACTF)



Large Difference between Sighted and the Blind

Sighted



Eye-movement-based exploration with visual cues

Blind

- [IBM.]
- [Skip to main content.] [United States](#)
- (Start of form 1.)
- [Text.]
- [Search: Image Button.]
- (End of form 1.)
- [Home](#) | [Products & services](#) | [Support & downloads](#) | [My account](#)
- [Select country / region](#)
- (Start of form 2.)
- (Start of select menu with 10 items.)
- [Select one](#)[Selected.]
- [Canada](#)[Off.]
- [China](#)[Off.]
- [France](#)[Off.]
- [Germany](#)[Off.]
- [Italy](#)[Off.]
- [Japan](#)[Off.]
- [United Kingdom](#)[Off.]
- [United States](#)[Off.]
- [Full country list](#)[Off.]

Keyboard-based exploration without visual cues

W3C Web Accessibility Initiative (WAI)

- Web Content Accessibility Guidelines - 1999

Canada

- Canadian Human Rights Act
- Ontarians with Disabilities Act – 2001

Europe

- European Union – Procurement of accessible IT, 2004
- UK – Web accessibility, 2004
- Germany – Barrier Free Decree, 2002
- Italy – ICT accessibility & government procurement, 2004
- Switzerland – Public sector Web accessibility, 2004
- Netherlands – Web accessibility, 2003

United States

- Section 508 of Rehabilitation Act - 2001

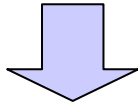
Japan

- JIS standards – 2004

Australia / New Zealand

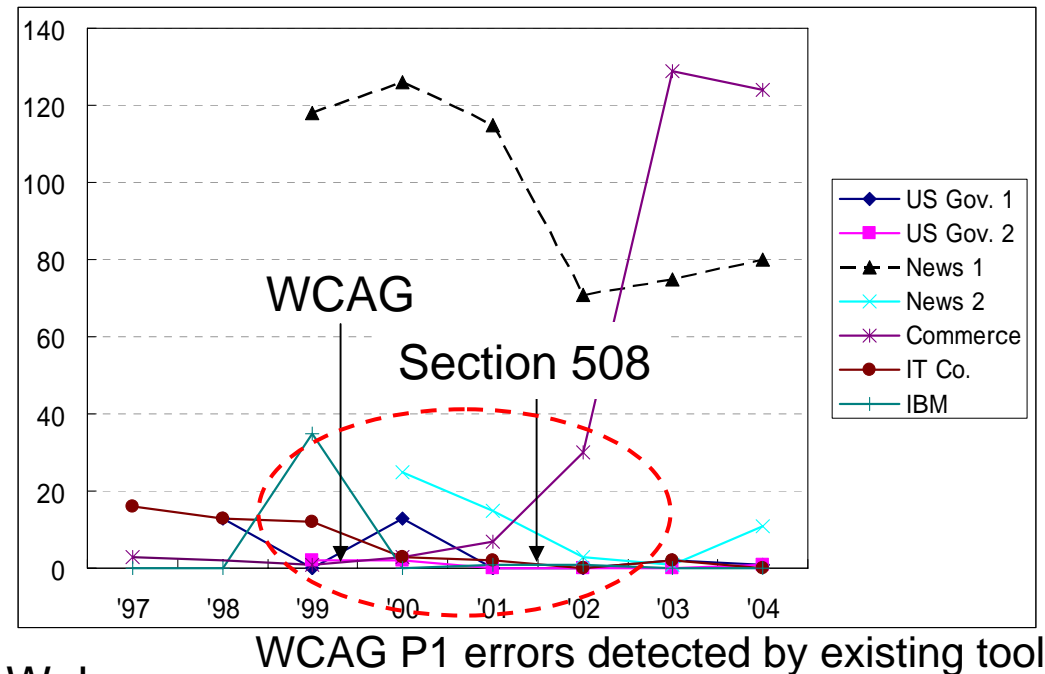
- Australian Banker's Association Industry endorsed eCommerce standards – 2000
- Australian Communications Industry Forum's (ACIF) Guidelines – 2001

- Regulations and Guidelines
 - ◆ Contributing to a steady improvement of accessibility



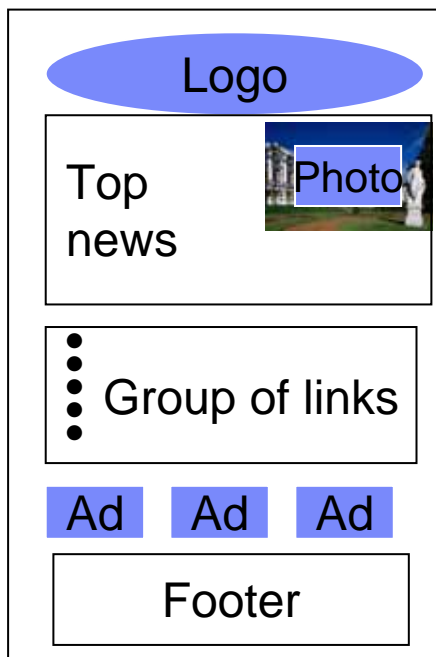
- Usability issues

- ◆ Hard to navigate through the Web
 - difficult to find main content
 - hard to understand the structure of a Web page
- ◆ Hard to listen to the Web
 - inappropriate alternative text
 - space-separated characters

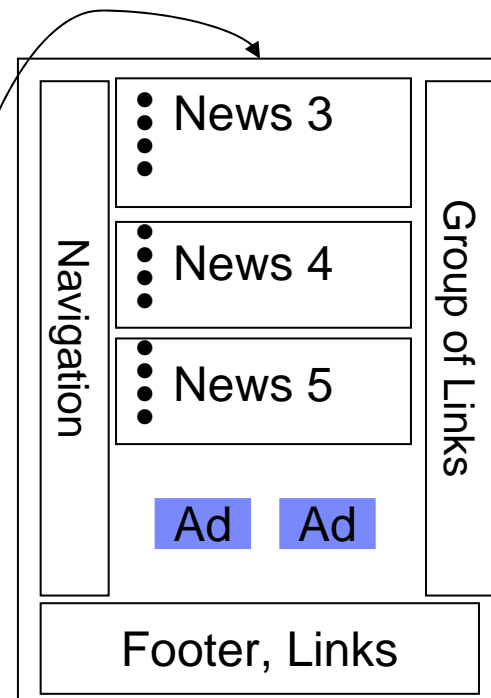
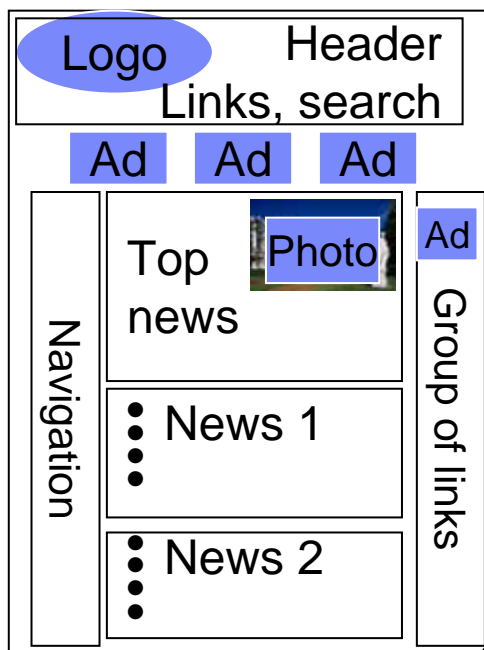


- In the late 1990s, the Web became a new information resource for the blind
- However, because of increasing reliance upon visual techniques, more information is becoming inaccessible.

1996



2005



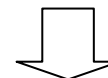
- Ambiguous ALT attributes

- ◆ Images with role

- “Image”, “Photo”, etc.



~~“photo”~~



“Photo of Mt. Fuji”

“Mt. Fuji”

etc.

- ◆ Image links, Form elements

- “Click here”, “Button”, “”(null), etc.

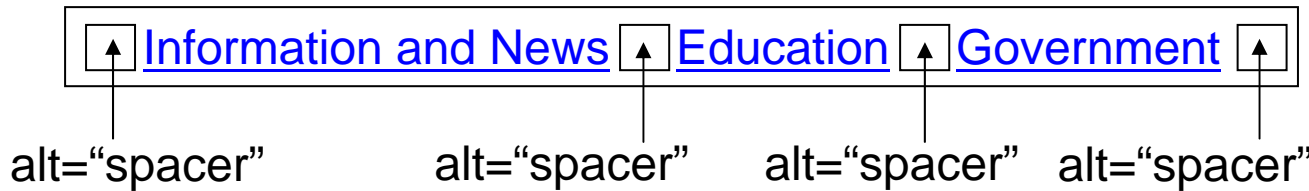


~~“click here”~~ →

“jump to foo.com”

etc.

- Unnecessary ALT attributes
 - ◆ Images for visual effects
 - “spacer”, “shade”, etc.



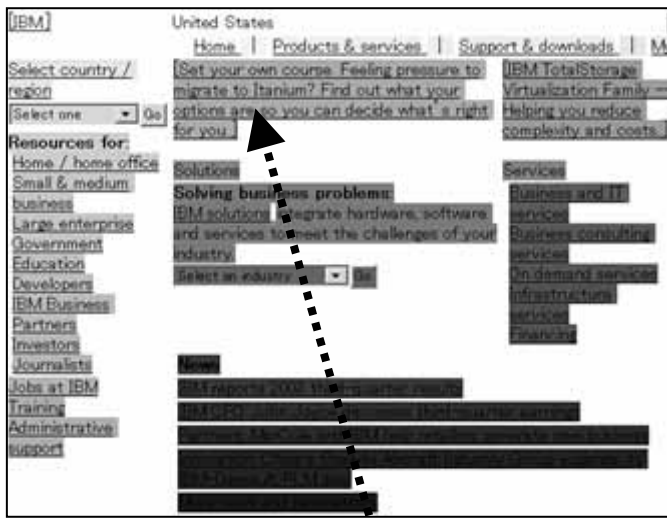
spacer
Information and News
spacer
Education
spacer
Government
spacer

- ◆ Redundant ALT attribute

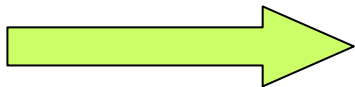
<p>Usual browser</p> <p>Voice browser</p> <p>Search Search</p>	<p>HTML source</p> <pre>⋮ Search ⋮</pre>
--	--

- Provide a visual representation of the PwD users' usability of content or applications.
 - ◆ Blind usability visualization engine
 - ◆ Image simulation engine
 - Low vision simulation
 - Presentation simulation
- Objective
 - ◆ Provide a tool to **learn** about real accessibility issues
 - Encourage authors/designers to check accessibility whenever they are authoring content.
 - ◆ Provide a tool to effectively **demonstrate** accessibility issues
 - Encourage website owners to renovate their pages to be accessible.

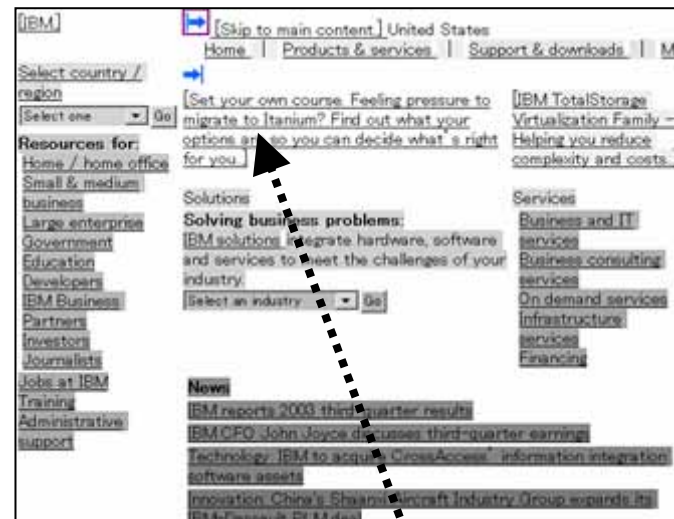
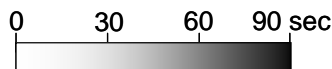
- Objective: “Visualize the non-visible blind usability”
- Approach
 - ◆ Reaching time visualization
 - Simulate voice browser and users’ behavior to calculate reaching time to each element in a page
 - Present the reaching times to each part of a page by using background colors.
 - ◆ Reading text presentation
 - Presenting the text information extracted or generated by standard voice browsers, while retaining the fundamental visual layouts.



Insert “Skip-to-main” link



Reaching time color:



More than **45 seconds** to get to the main content.

Only **3 seconds** to get to the main content.

eclipseCON™ 2008 Blind Usability Visualization Example

Original



Inaccessible

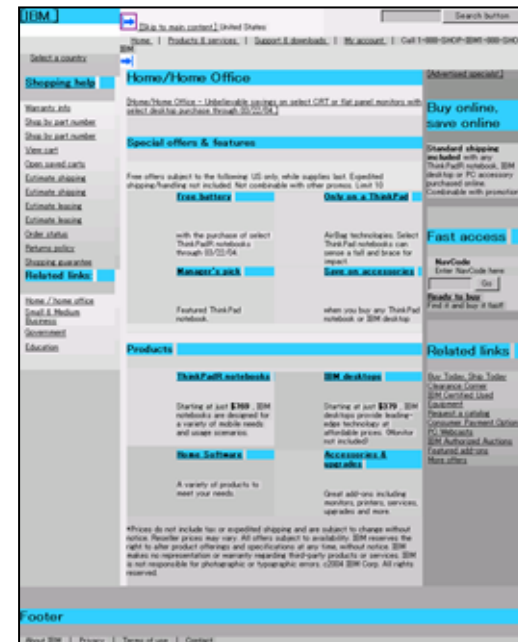


With skip-link



Easy to find main contents

With heading Tags

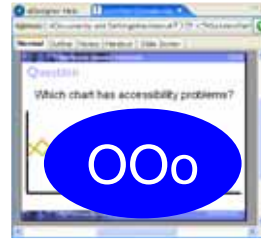


- Headers can use as TOC
- Easy to navigate through the page

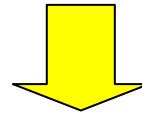


Blind Visualization Overview

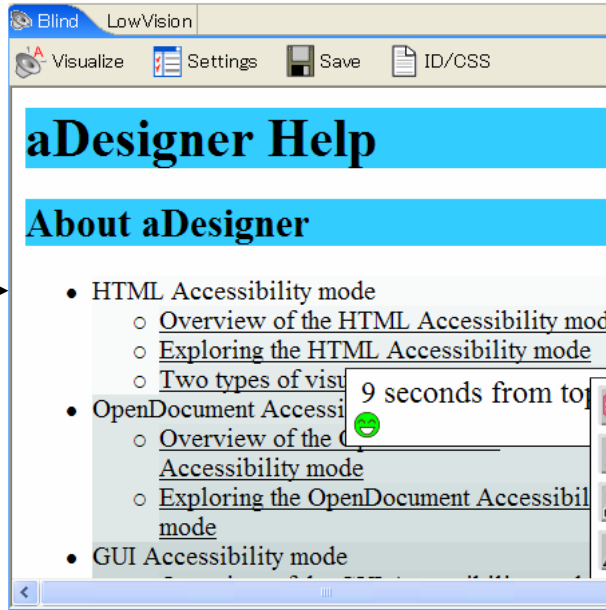
Model Services



Other models (PDF, etc.)



get Model (DOM)

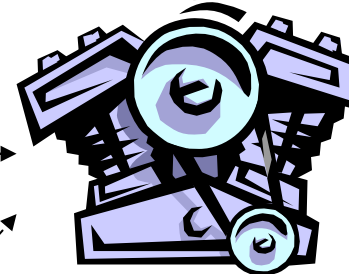


Blind Visualization View

Requests



Blind Visualization Engine



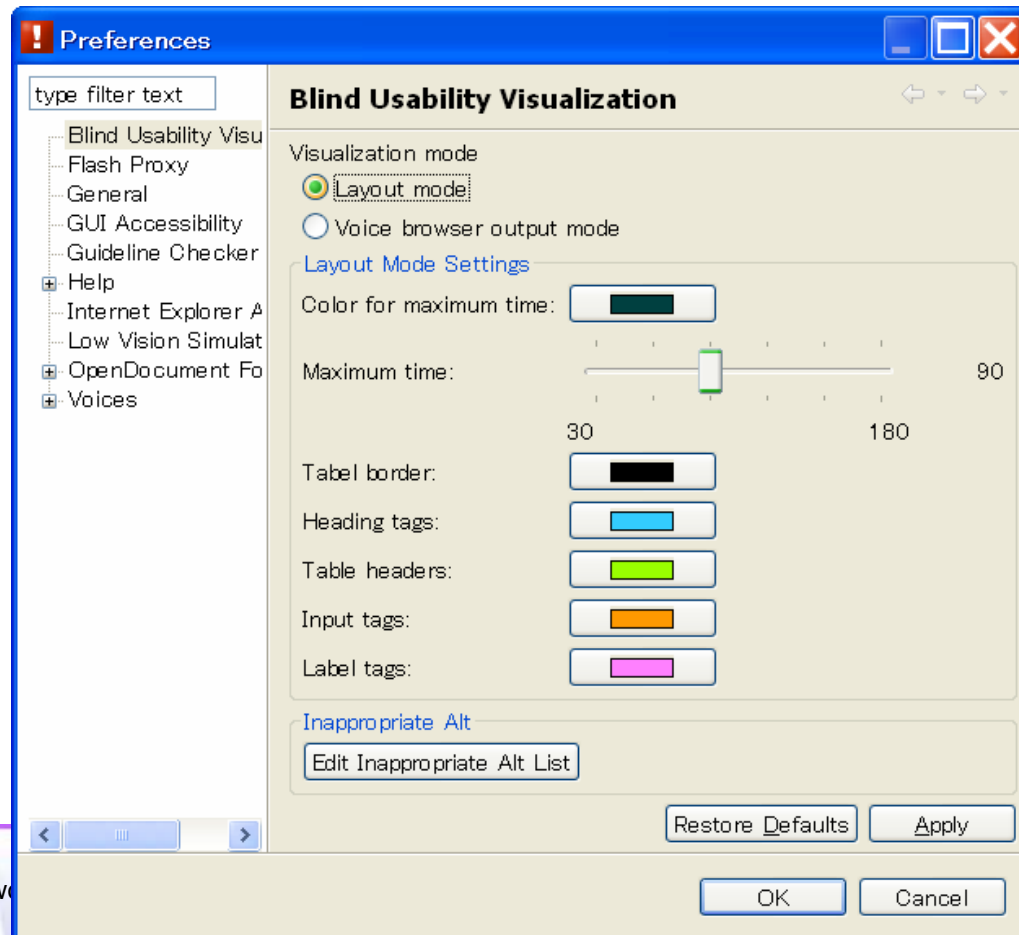
Voice Browser Engine

New Visualization Engine



Preferences Page of Blind Usability Visualization

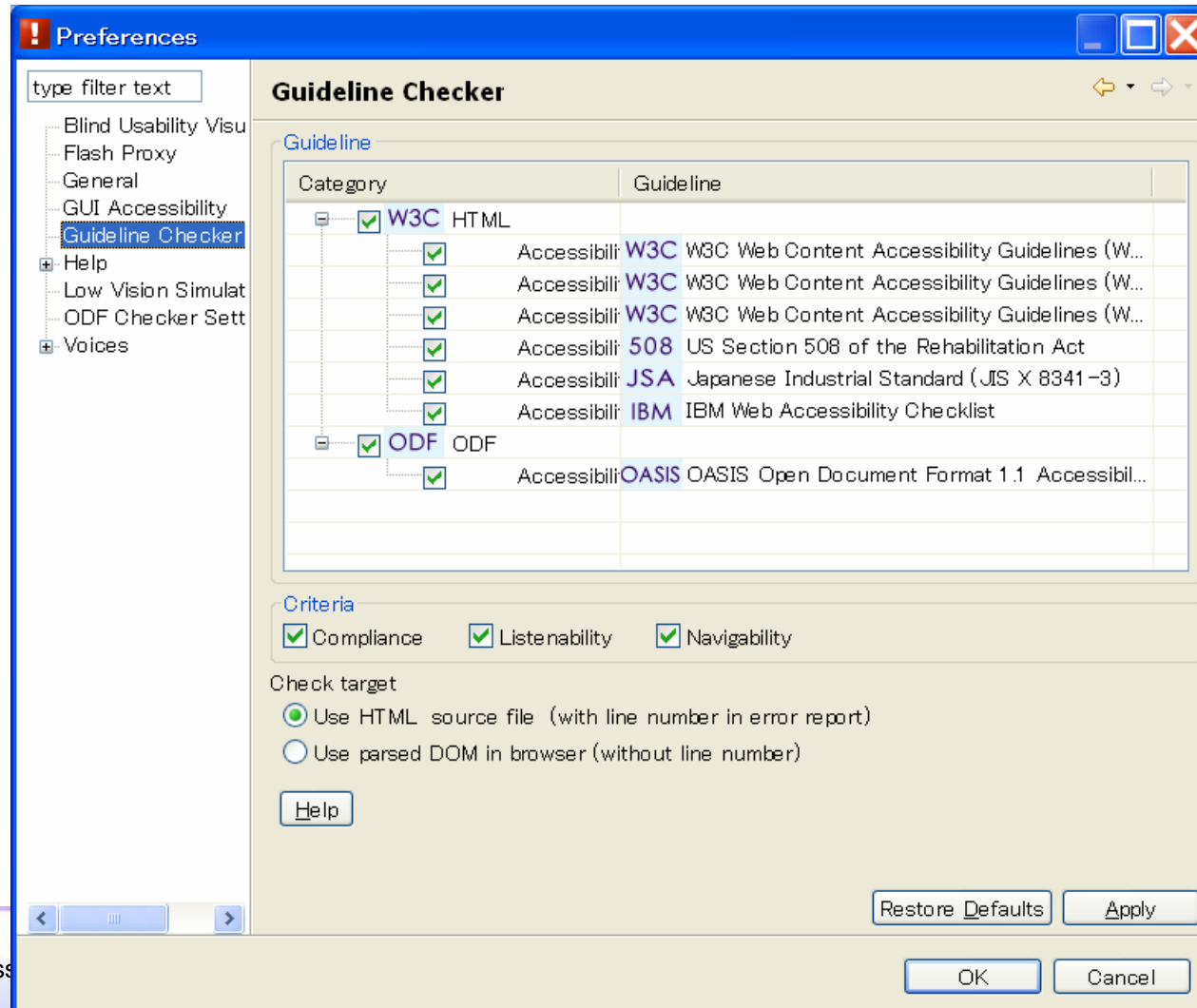
- Users can customize
 - ◆ Mode
 - Blind usability visualization mode
 - Voice browser output mode (text mode)
 - ◆ Colors for visualization
 - ◆ Maximum reaching time that can be allowed
 - ◆ List of inappropriate ALT attributes
 - photo
 - image
 - space
 - 1234.jpg
 - etc.



Blind Visualization Interface / Implementation

- Extension point: **org.eclipse.actf.visualization.blind.blindVisualizer**
- Interface: **org.eclipse.actf.visualization.blind.IBlindVisualizer**
- Abstract Impl.: **org.eclipse.actf.visualization.blind.BlindVisualizerBase**
 - ◆ Provided information for visualization:
IModelService modelService;
IChecker[] checkers = CheckerExtension.getCheckers();
String targetUrl;
 - ◆ Returns:
Document resultDocument;
File resultFile;
PageData pageData;
IEvaluationResult checkResult
int maxReachingTime = 0;
- **Example implementations :**
 - ◆ org.eclipse.actf.visualization.blind.html.BlindVisualizerHtml
 - ◆ org.eclipse.actf.visualization.blind.odfbyhtml.BlindVisualizerOdfByHtml

- Users can select
 - ◆ Guideline
 - WCAG1.0
 - Section 508
 - JIS
 - etc.
 - ◆ Evaluation Criteria
 - Compliance
 - Listenability
 - Navigability
 - ◆ Target DOM
 - Source
 - Live snapshot



- Provide extensible accessibility validation features with initial support for:
 - ◆ Accessibility APIs such as Microsoft Active Accessibility (MSAA) and IAccessible2.
 - ◆ Eclipse SWT
 - ◆ Flash
 - ◆ HTML
 - ◆ Java Swing
 - ◆ OpenDocument Format (ODF)
- Developers can customize validation rules by using XML configuration files or through Java APIs.

**The Accessibility Tools Framework Validation Engine
Today, 14:30, Room 207**

- Navigability

- ◆ Reaching time
- ◆ Existence of headings or skip-links for the main content
- ◆ Ratio of accessible links in the page
- ◆ Structure of FORM elements
- ◆ Structure of TABLE elements

- Listenability

- ◆ Appropriateness of ALT attributes
- ◆ Redundant text
- ◆ Space-separated characters



- Guideline XML

- ◆ Define guideline items
 - Guideline name
 - URL of help page
 - Etc.

- Make validation rule/logic reusable and reduce code/rule clone
- Provide easy customization

- Check Item XML

- ◆ Define mapping between validation items and guideline items
- ◆ Define corresponding criteria for each check item
 - Compliance
 - Listenability
 - Navigability
 - (User original)

- Properties File

- ◆ Define error descriptions in multiple languages

Evaluation Rule Set and Rating Customization

- XML configuration file
 - ◆ enable/disable check item
 - ◆ modify corresponding guideline items
 - ◆ modify corresponding ratings and scores
 - ◆ create new guidelines/rating metrics

guideline.xml

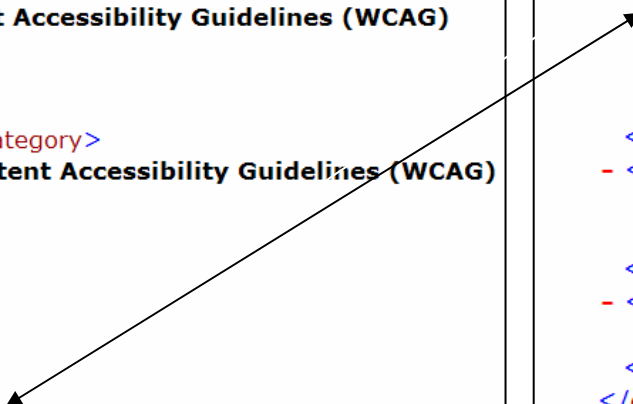
```

<?xml version="1.0" encoding="UTF-8" ?>
+ <!-- -->
- <guideline name="WCAG" order="1">
  <category>Accessibility</category>
  <description>W3C Web Content Accessibility Guidelines (WCAG)
    1.0</description>
  - <levels>
    - <level id="P1">
      <category>Accessibility</category>
      <description>W3C Web Content Accessibility Guidelines (WCAG)
        1.0 (P1)</description>
      </level>
    + <level id="P2">
    + <level id="P3">
      </levels>
    + <mimetypes>
    - <items>
      - <gItem id="1.1" level="P1">
        <helpUrl>http://www.w3.org/TR/WAI-WEBCONTENT/wai-
          pageauth.html#tech-text-equivalent</helpUrl>
        </gItem>
      - <gItem id="2.1" level="P1">
        <helpUrl>http://www.w3.org/TR/WAI-WEBCONTENT/wai-
          pageauth.html#tech-color-convey</helpUrl>
        </gItem>
    
```

checkitem.xml

```

<?xml version="1.0" encoding="UTF-8" ?>
+ <!-- -->
- <checker-config>
  - <checkitem id="C_0.0" type="error">
    - <guideline>
      <gItem name="WCAG" id="1.1" />
      <gItem name="Section508" id="a" />
      <gItem name="JIS" id="5.4(e)" />
      <gItem name="IBMGuideline" id="6" />
    </guideline>
    - <metrics>
      <mItem name="Compliance" score="2" />
      <mItem name="Listenability" score="2" />
    </metrics>
    - <description>
      <desc>Provide ALT attribute for each APPLET</desc>
    </description>
  </checkitem>
  - <checkitem id="C_0.1" type="info">
    - <guideline>
      <gItem name="WCAG" id="1.1" />
      <gItem name="Section508" id="a" />
      <gItem name="JIS" id="5.4(e)" />
      <gItem name="IBMGuideline" id="6" />
    </guideline>
  
```



org.eclipse.actf.examples.adesigner.eval.odf.ODFCheckerInfoProvider.java

```
public class OdfCheckerInfoProvider implements ICheckerInfoProvider {
    private static final String BUNDLE_NAME =
        "org.eclipse.actf.examples.adesigner.eval.odf.resources.description"; //$NON-NLS-1$

    private static final ResourceBundle RESOURCE_BUNDLE = ResourceBundle.getBundle(BUNDLE_NAME);

    public InputStream[] getCheckItemInputStreams() {
        InputStream is = OdfChecker.class.getResourceAsStream("resources/ODFcheckitem.xml");
        return new InputStream[] { is };
    }

    public InputStream[] getGuidelineInputStreams() {
        InputStream is = OdfChecker.class.getResourceAsStream("resources/ODFGuide.xml");
        return new InputStream[] { is };
    }

    public ResourceBundle getDescriptionRB() {
        return RESOURCE_BUNDLE;
    }
}
```

see also: org.eclipse.actf.examples.adesigner.eval.html.HtmlCheckerInfoProvider.java

Simulating the experience of users who have low vision

The original Web page which people without low vision view.

Summary Report

Some parts of this page use color combinations that might be difficult to distinguish from each other.

Too small and fixed size font: 2

Low vision simulation. In this example, Color Vision Deficiency (Deutan) and cataract are simulated.

Problem map that indicates the positions of problems.

Setting panel (Eyesight, color vision deficiencies, crystalline lens transparency)

Preferences - Low Vision

Eyesight: 35/200, 30/40, 20/20

Color Vision Deficiency: Deutan

Original and After simulation color calibration charts.

eclipseCON™ 2008 aDesigner - Presentation Simulation

Check visibility of presentation slides in large conference rooms

OpenDocument Accessibility - aDesigner

File Visualization Favorites Window Help

presen.odp

Address C:\test\presen.odp

Blind LowVision Presentation

Small Meeting Room Large Meeting Room Auditorium

Normal Outline Notes Handout Slide Sorter

Pie Chart Example

Main title

- Large font (32)
- Medium font (24)
- Small font (16)

Summary report Detailed report

Auditorium

of current page is over.

Small Meeting Room



Large Meeting Room

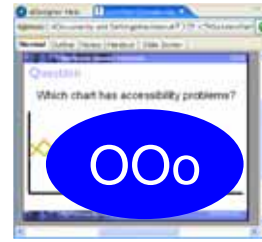


Auditorium



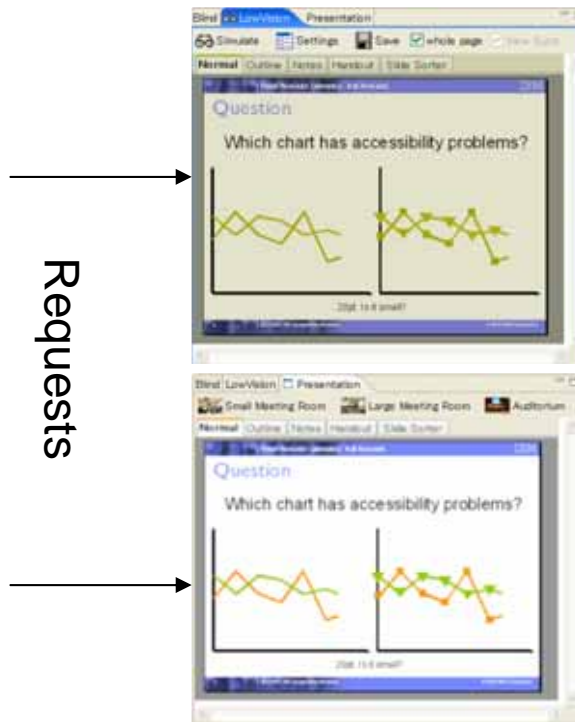
eclipseCON™ 2008 Low Vision / Presentation Simulation

Model Services



Other models (PDF, etc.)

Low Vision



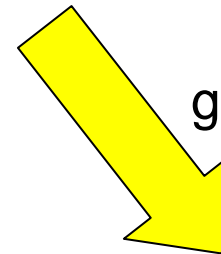
Presentation

Simulation Result

Simulation configuration (LowVisionType)

Simulation Result

Other simulation



get Image (BMP)

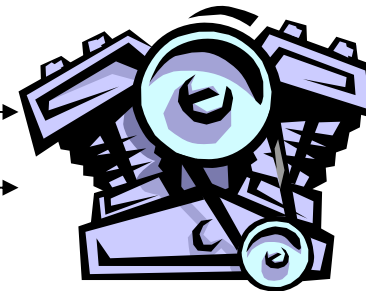


Image Simulation Engine

- Eyesight
- Color vision deficiencies
- Crystalline lens transparency

- Functions

- ◆ **Visualization of blind usability**

- Reaching time and reading text visualization
- Integration with a voice browser engine

- ◆ **Simulation of low vision**

- Weak eyesight, color vision deficiencies, cataracts.
- Detect color combination problems.

- ◆ **Presentation simulation**

- Check visibility of presentation slides in large conference rooms.

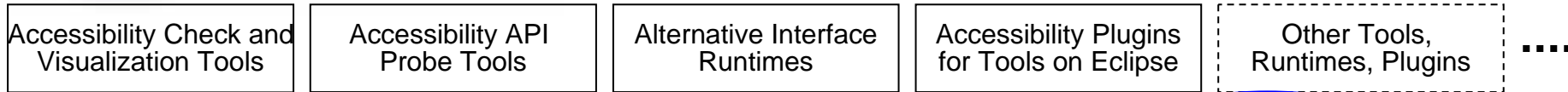
- ◆ **Checking compliance items from the usability point of view**

- Appropriateness of ALT texts and skip-navigation links, etc.
- WCAG, Section 508, IBM CI162, JIS, etc.

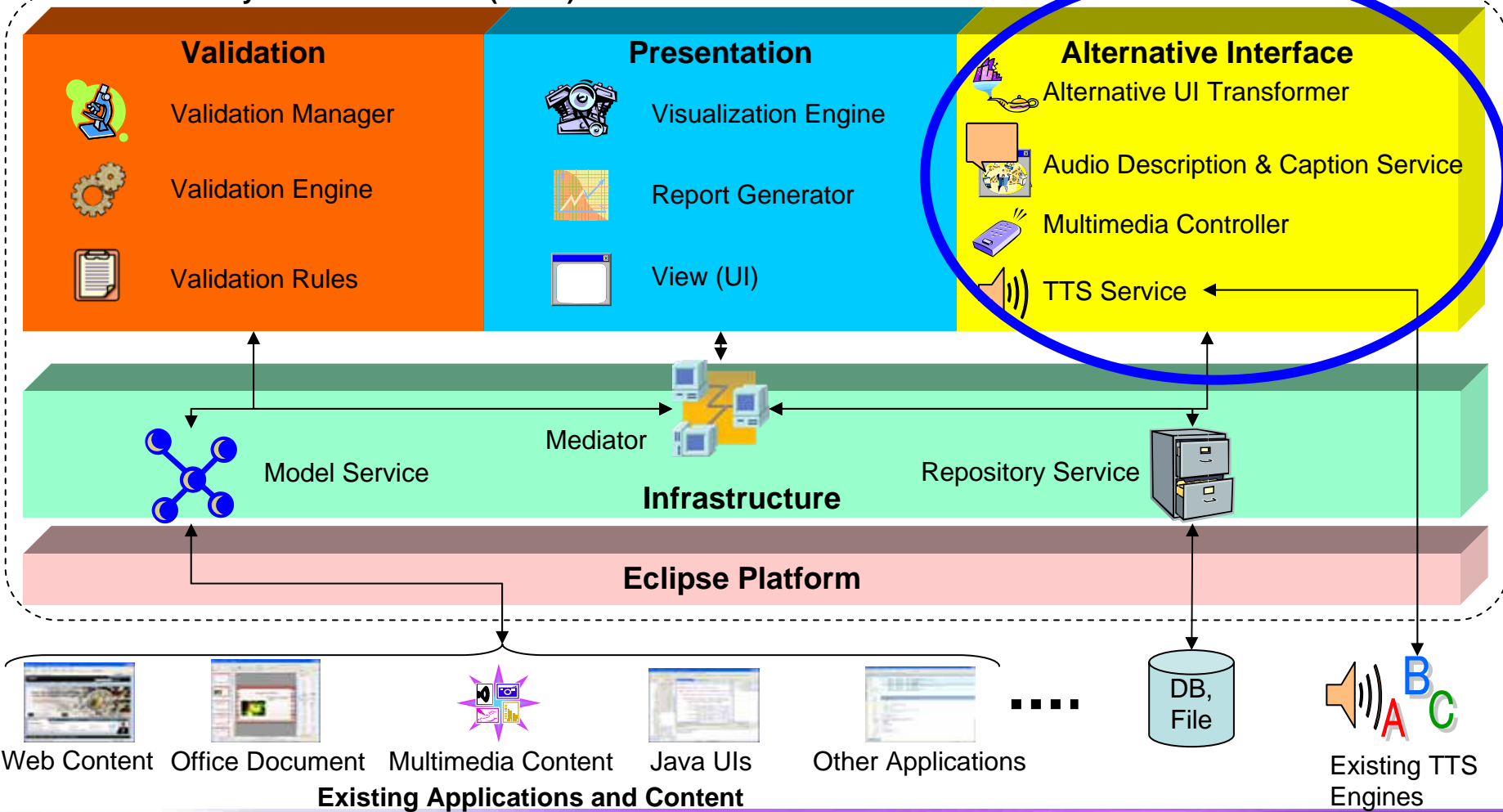
<http://www.eclipse.org/actf/downloads/>



Tools and Runtimes on top of ACTF



Accessibility Tools Framework (ACTF)

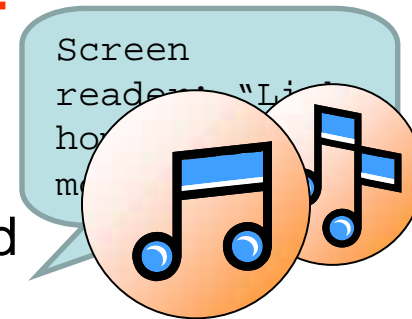


- Provide middleware components for developing accessible alternative user interfaces.
 - ◆ **Multimedia controller**
 - Make multimedia content controllable with unified shortcut keys even if the content does not support keyboard operations.
 - Allow independent adjustment of each sound source.
 - ◆ **Audio description & caption service**
 - Provide audio descriptions and captions to multimedia content by using text metadata.
 - ◆ **Text-to-Speech service**
 - Provide interface to use TTS from the framework. (Currently, we support SAPI.)
 - ◆ **Alternative UI transformer**
 - Support improving the navigating and operating environments by using external metadata without changing the existing applications or content.

- The emergence of multimedia content
 - ◆ Entertainment, News, Education, E-government, ...
 - ◆ **Most of these content are inaccessible for the blind...**

- Major issues

1. Audio of a streaming video **interferes** with a synthesized assistive voice.
2. Streaming videos do not provide **audio descriptions** for non-visual users.
3. **Dynamically changing visual interfaces** can't be perceived non-visually. (E.g. mouse only operation)
4. The **work** to make multimedia content accessible for screen readers is too expensive.



“The first multimedia browser for the blind”

1. Direct audio control

- ◆ Allow users to increase or lower the volume, stop or play, and control audio speed by using simple keyboard commands.

2. User interface simplification

- ◆ Structurally simplify interfaces by converting dynamic visual interfaces into static text-based interfaces

3. Video descriptions with text

- ◆ Infrastructure to provide video descriptions at low cost

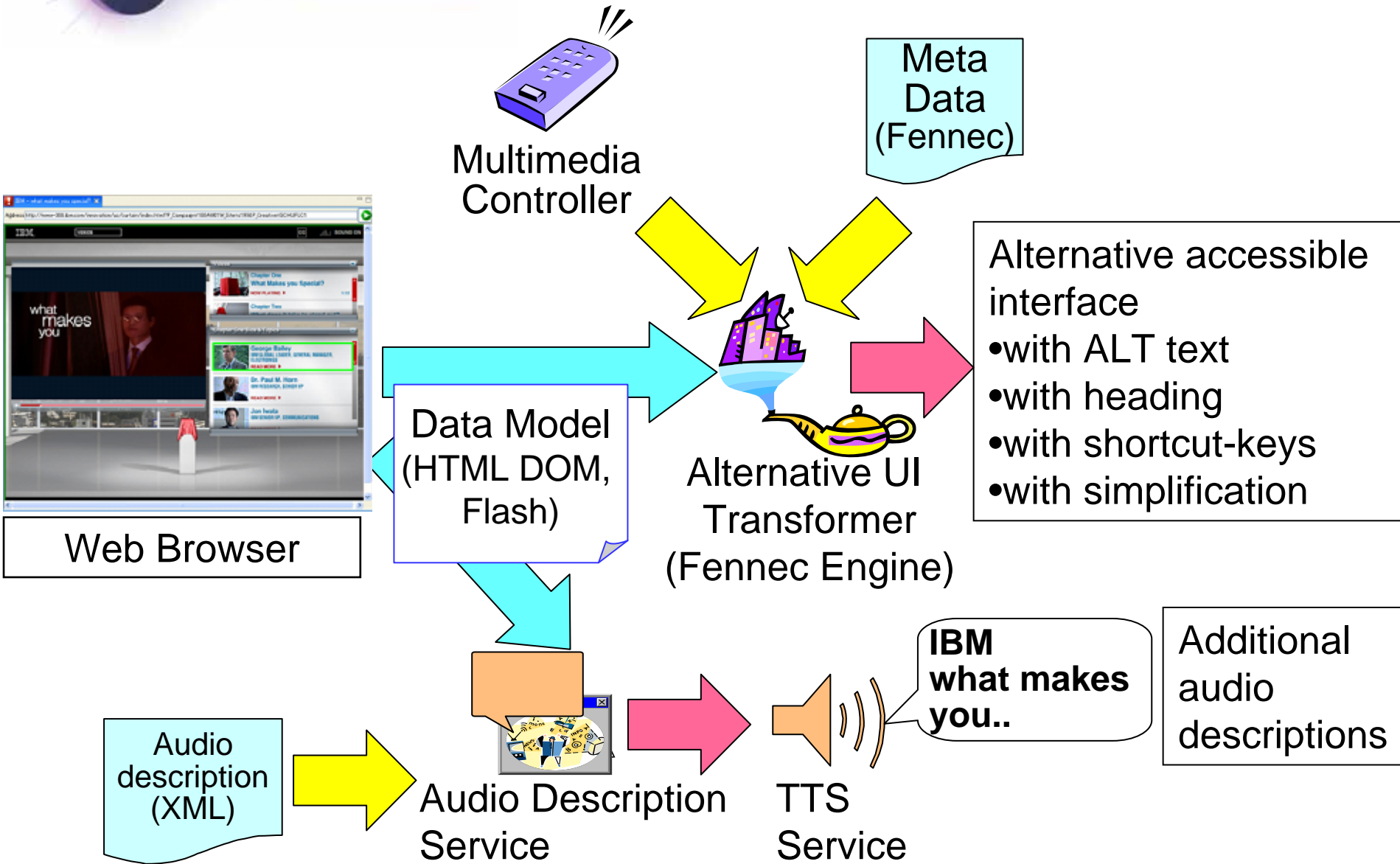
4. Workload reduction

- ◆ Drastically reduce costs to make existing Flash and AJAX content accessible based on new metadata mechanisms.

<http://www.eclipse.org/actf/downloads/>



aiBrowser Overview



- Exemplary tools are downloadable now!
 - ◆ AccProbe (Accessibility testing and debugging tool for applications.)
 - ◆ aDesigner (Accessibility check and usability visualization tool.)
 - ◆ aiBrowser (Alternative accessible interface for multimedia browsing.)
- Release 0.1 will be downloadable in 2Q 2008

Check it out and get involved!!

<http://www.eclipse.org/actf>

Thank you!

Join the long talk!

The Accessibility Tools Framework Validation Engine

Today, 14:30, Room 207

Backup



•Company (7)

- ◆ Actuate Corporation, US
- ◆ Adobe Systems Incorporated, US
- ★ IBM Corporation, US
- ◆ SAP AG, Germany
- ◆ SAS Institute Inc., US
- ◆ Technosite (ONCE Foundation), Spain
- ★ The Paciello Group, US

•Non-profit Organization (6)

- ◆ BrailleNet, France
- ◆ Japan Braille Library, Japan
- ◆ National Center for Accessible Media (NCAM), Media Access Group at WGBH, US
- ◆ Royal National Institute of Blind People (RNIB), UK
- ◆ The Carroll Center for the Blind, US
- ◆ Vision Australia, Australia

•Academia (7)

- ★ Center for Mathematics and Computer Science, Netherlands
- ◆ SIG-Universal Access to the Internet (UAI), Internet Technology Research Committee (ITRC), Japan
- ★ State University of New York at Stony Brook, US
- ◆ Tokyo Institute of Technology, Japan
- ★ University of Manchester, UK
- ★ University of Toronto, Canada
- ★ University of Washington, US

•Open Source Community (2)

- ◆ BIRT Project, Eclipse Foundation
- ◆ Mozilla foundation, US

•International Consortium (2)

- ★ International Webmasters Association/HTML Writers Guild (IWA/HWG)
- ★ Web Accessibility Tools Consortium (WAT-C)

- Release plan
 - ◆ 2Q, 2008: Build 0.1 release
 - ◆ 3Q, 2008: Milestone build 0.1 M1 release
 - ◆ 4Q, 2008: Build 0.2 release
 - ◆ 1H, 2009: Projected first release
- Enhancements currently under consideration include:
 - ◆ Refinement of APIs
 - ◆ Documentation
 - ◆ Support new accessibility guidelines (e.g., WCAG 2.0, WAI-ARIA, etc.)

Visualize the experience of blind users

The screenshot shows the aDesigner interface with a 'Blind' status indicator and a 'Visualize' button. The main content area displays a blind visualization of the IBM website, with text content highlighted in a yellow box. A speech bubble indicates that this text is read out by a voice browser. Another speech bubble explains that lighter background colors indicate faster reach times for voice browsers, while darker colors indicate slower reach times. A third speech bubble notes that a balloon message shows the exact time to reach an element. A fourth speech bubble states that the overall page rating is calculated from three factors: Compliance to accessibility guidelines, Navigability, and Listenability. A fifth speech bubble points to a 'Summary Report' section, which includes a 'Detailed report' table listing accessibility errors.

All Errors (184)	H	C	LI	N	WCAG	Sect.	JS	Line	Problem Description
Error (1)					P3: 13.6	o	5.2(a)	337	Consider providing more intra-page links or
User Check (89)					P3: 10.5		5.3(g)	226	Include non-link, printable characters betwe
Information (94)					P3: 10.5		5.3(g)	285	Include non-link, printable characters betwe
					P3: 10.5		5.3(g)	297	Include non-link, printable characters betwe
					P2: 33		5.2(b)	66	Use style sheets to control layout and pres
					P2: 33		5.2(a)	70	Use style sheets to control layout and pres

Text content that will be read out by a voice browser is visualized in this area.

Lighter background color indicates that it takes less time to reach there by using voice browsers.

The balloon message shows the exact time to reach the element on which the mouse cursor is placed.

Darker background color indicates that it takes more time to reach there by using voice browsers.

The overall page rating is calculated from:
 1: Compliance to accessibility guidelines
 2: Navigability (ease of navigation within the page)
 3: Listenability (ease of listening)

The original Web page which sighted people view.

Summary Report

Detailed Report

The problems of the selected category are listed.

eclipseCON™ 2008 aDesigner - Visual Synchronization

The screenshot shows the aDesigner interface with a web browser window displaying the IBM Business services page. A 'Blind' accessibility simulation is active. A yellow callout box points to a specific error in the 'Summary report' table, which is highlighted in blue. A red box highlights the corresponding error on the web page, and a yellow box highlights the image source path. A tooltip indicates the error is '23 seconds from top'.

When a user selects an error in the problem list, the corresponding error position is highlighted.

C...	Li...	N...	WCAG	Secti...	JIS	IBM...	Line	Problem Description
			P1: 6.3	I	5.4(e)	6		This page has more than ten links wh
C	L	N	P1: 1.1	a, n	5.4(a), ...	7	107	No alternative text for an image butt
C	L		P1: 1.1	a, n	5.4(a), ...	7	135	No alternative text for an image butt
C	L		P1: 1.1	a, n	5.4(a), ...	7	154	No alternative text for an image butt
C		N	P2: 12.3		5.3(b)	7	85	Consider grouping long lists of select
C		N	P2: 12.3		5.3(b)	7	116	Consider grouping long lists of select



- A tool that enables multimedia content to be enjoyed by people with visual impairments -

1. Enable users to adjust volume of an individual source
-to identify assistive voice
-to listen to different sound sources

IBM TV
IT Solutions



Synthesized assistive voice of screen reader



Behind the speaker, a picture of Jazz ...



29 button
31 button



Go to next chapter
Play previous movie

3. Enables users to control multimedia by using pre-defined shortcut keys.

- Play: Ctrl+P
- Stop: Ctrl+S
- Volume up: Ctrl+J
- Volume down: Ctrl+K
- ...

2. Provide audio caption by using text metadata & TTS

4. Provide alternative text information by using external metadata.

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