MyMobileWeb

An open source platform for developing
Mobile Web applications and portals

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MINISTERIO
DE INDUSTRIA, TURISMO
Y COMERCIO

Spirit of
PROGRESS
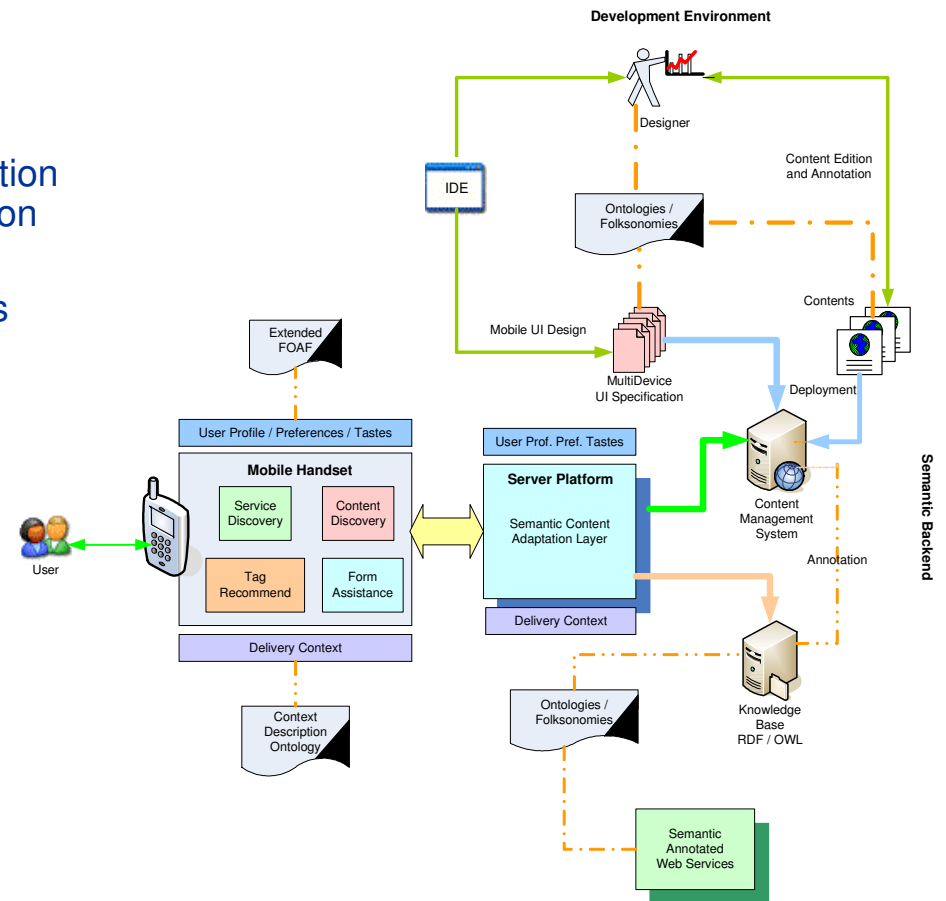
CELTIC
Telecommunication Solutions

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Introduction & Motivation

- Making the Mobile Web a reality it is not only a question of using enhanced devices and browsers

- **Users are expecting more from the Mobile Web**

  — Any application / service / portal adapted and optimized for every device used at a given moment

  — Rich user interfaces enabling higher functionalities while optimizing traffic costs: AJAX, Graphics, Maps

  — Context-Awareness : providing what I need, now, here …

- Application and portal developers are demanding powerful technologies that enable the creation of advanced, **high-quality mobile web applications in time to market without investing a lot of money**

  — Using open and standard technologies

  — Without the need of highly specialized (and hard to find) developers

- **Do we have a technology which will mean for the Mobile Web what Apache meant for the development of the current Web ?**
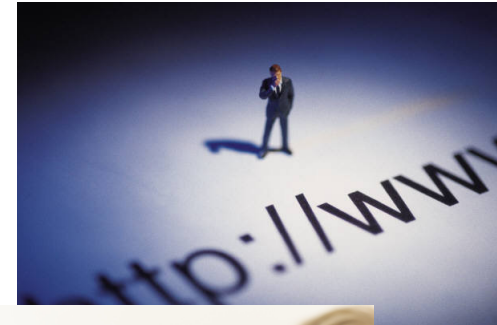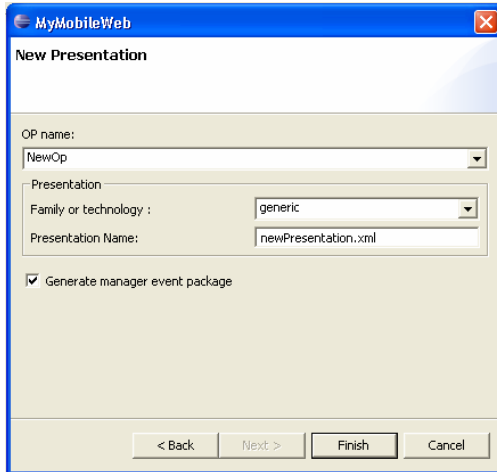
Facing the Challenges : Morfeo-MyMobileWeb

- MyMobileWeb is an **open source platform** enabling fast development of mobile-accessible websites, intending to provide an open source reference implementation of standards for the Mobile Web

- Fully functional version **available today**:
  - IDEAL language enabling declarative description of device independent user interfaces based on abstract mobile components
  - Deployment tools enabling generation of sites supporting adapted content & application rendering without transcoding at runtime
  - Eclipse plugin for programmers
  - Integration with WURFL and standard CMSs

- **Ambitious roadmap** in place:
  - Semantic extensions to IDEAL
  - Delivery Context ontologies and APIs
  - Semantic Browsing Bar enabling content and service correlation plus smart navigation
  - Mobile-aware Search (MyMoSe)

- Scenarios of use
  - High-quality dotMobi portals & apps
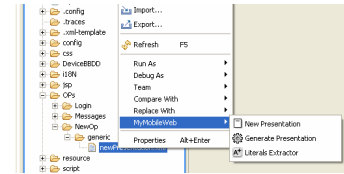 - Context-aware Rich Mobile Web Applications

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MyMobileWeb in 4 steps

Authoring

Deployment

User experience at runtime in different delivery contexts

Example (I) – Table Control


```xml
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet href="table.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb" id="example">
  <mymw:head>
    <mymw:title style="include">P/S Search Res</mymw:title>
  </mymw:head>
  <mymw:body>
    <mymw:p id="p1" layout="vertical" align="center">
      <mymw:table id="myTable" bind="${selectedPS}" optionsbind="${searchPSResult}"
                  keymember="code" paginate="true" style="body selcol0">
        <mymw:th style="headerfont headercolor">
          <mymw:td>Code</mymw:td>
          <mymw:td>Name</mymw:td>
          <mymw:td display="${_MYMW_DEV_BELONGS.PdaDevice}">Date</mymw:td>
        </mymw:th>
        <mymw:tr>
          <mymw:td member="code" />
          <mymw:td member="name" />
          <mymw:td member="date" />
        </mymw:tr>
      </mymw:table>
    </mymw:p>
    <mymw:include content="PSDetail/generic/product/p2"/>
  </mymw:body>
</mymw:document>
```
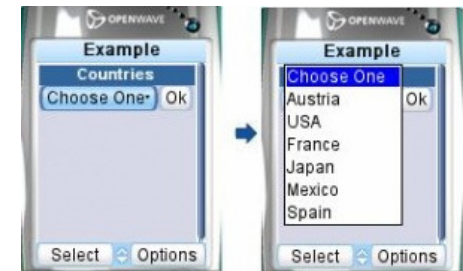
Example (II) - Datefield


```xml
<?xml version="1.0" encoding="UTF-8" ?>
<?xml-stylesheet href="datefield.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb" id="datefield">
  <mymw:head>
    <mymw:title>Datefield</mymw:title>
  </mymw:head>

  <mymw:body newcontext="true">
    <mymw:p id="p1" layout="vertical" align="center" style="nowrap" >
      <mymw:label id="date">Date:</mymw:label>
      <mymw:datefield style="mydate" labelid="date" id="date" bind="${ date }" />
    </mymw:p>
    <mymw:p id="p2" align="center">
      <mymw:submit id="submit" value="Accept" principal="true"/>
    </mymw:p>
    <mymw:include content="Entryfield/generic/example1/foot"/>
  </mymw:body>
</mymw:document>
```
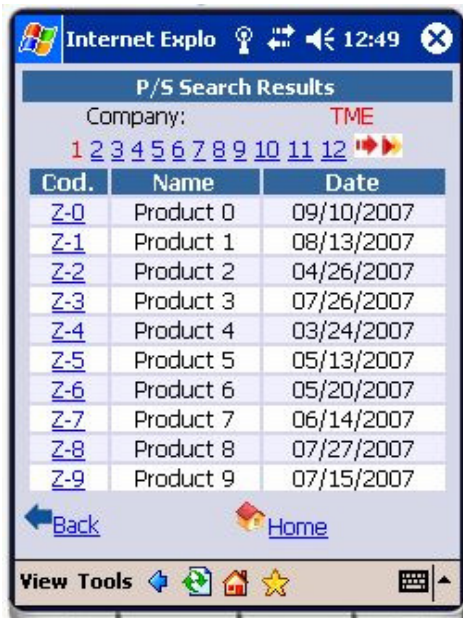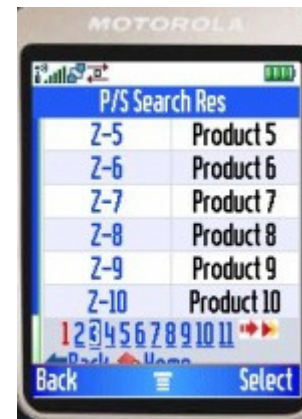
Example (III) – RSSPanel


```xml
<?xml version="1.0" encoding="UTF-8" ?>
<?xml-stylesheet href="feed.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb"
               xmlns:user="http://morfeo-project.org/user" id="feed">
  <mymw:head>
    <mymw:title style="include">White House</mymw:title>
  </mymw:head>
  <mymw:body>
    <mymw:p id="p1" style="expand" layout="vertical">
      <user:rsspanel id="rss" src="http://www.whitehouse.gov/rss/news.xml"
                     paginate="true" />
    </mymw:p>
    <mymw:p id="foot" align="left">
      <mymw:link resourceid="back" id="feeds" style="both">Back</mymw:link>
      <mymw:link resourceid="index" id="index" style="both">Index</mymw:link>
    </mymw:p>
  </mymw:body>
</mymw:document>
```

Available Functionalities

Functionality	MyMobileWeb	
Declarative authoring language (IDEAL)	Y	
High level user interface components	Y	
Data binding	Y	
JSR-170 CMS integration	Y	
Content & application adaptation for multiple DCs	Y	
Automatic pagination	Y	
DDR Simple API support	Y	
Form autocompletion	P	
Eclipse Plugins	P	
Audio / video formats transcoding	N	
Semantic UI annotations	Y	
Mobile AJAX Controls	P	

Y = Yes N = No P = Partial

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What's coming (2008 & 2009)

Functionality	May 2008	Dec 2008	Dec 2009
Mobile AJAX Framework	beta	1st release	2nd release
IDEAL language aligned with DIAL v2	design	1st release	2nd release
IDEAL extensions for rich contents	beta	1st release	2nd release
IDEAL language aligned with RDFa	design	1st release	2nd release
Adaptation Policies for IDEAL	design	1st release	2nd release
XForms client-side implementation	design	1st release	
Correlation algorithms	design	1st release	2nd release
Semantic bar	design	1st release	2nd release
DDR Simple API Impl	beta	1st release	
Delivery Context API	design	1st release	2nd release
Delivery Context Ontology (W3C Rec)	1st release	2nd release	
Location technologies (WP 11)		beta	1st release
Improved (semantic) adaptation engine	design	beta	1st release
Smart Client support		beta	1st release

Mini Video-Zapping Demonstration

- **Zapping-Demo**

  — andalucia.mobi

  — paeria.mobi

  — educamadrid.mobi

  — RSS Reader

  — Advanced Functionalities

    – Automatic form completion, screen orientation, SVG Graphics

  — MyMoSe UI (Mobile AJAX UI that degrades gracefully)

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MyMobileWeb : Contribution to standards

- DDR Simple API . Minimal API for retrieving device properties needed for content & application adaptation
  - http://www.w3.org/TR/DDR-Simple-API/
    - Editors of the spec
  - First open source implementation
    - http://mymobileweb.morfeo-project.org/archives/ddr-simple-api-early-implementation/lng/es
- DDR Core Vocabulary. Essential vocabulary of properties for adaptation in the Mobile Web environment
  - http://www.w3.org/TR/ddr-core-vocabulary/
- DDR Advanced Vocabulary to be submitted to the W3C
- Delivery Context Ontology. Formal model of the Delivery Context (including dynamic and static properties)
  - http://www.w3.org/TR/dcontology/
    - Editors of the spec
- DIAL v2 Device Independent Authoring Language version 2
  - Work in progress next PWD planned for Q4 2008
- Only open source content & application adaptation framework **recommended by mTLD** for the development of dotMobi portals
  - http://pc.dev.mobi/?q=node/208
  - http://dev.mobi/node/83

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MyMobileWeb : A growing developer community

- The MyMobileWeb community of developers is raising every day
  - 4.600 downloads in 24 months (aprox. 200 / month)
- Mailing lists are very active
  - INE, Caixa Galicia, Getronics, Sistran, Saycu, Ingenia, DBS, Indra, ULE, Forth Institute (Greece), Onmobile.net, Univ. Andorra, Cuba, Colombia, Ecuador, Vietnam …
- Book "Mobile Web Development" (Ed. Packt Publishing)
- To stimulate market awareness a **Developer's Certification Program** has been set up
  - Free certification seminar by public announcement and invitation (4 certification processes up to date)
  - Consultancy and training services are also offered
  - There is plan to train third parties as certification authorities
  - 40 developers already certified
- Some .mobi sites based on MyMobileWeb already in place: andalucia.mobi (Junta de Andalucía), paeria.mobi (Lérida Council), educamadrid…
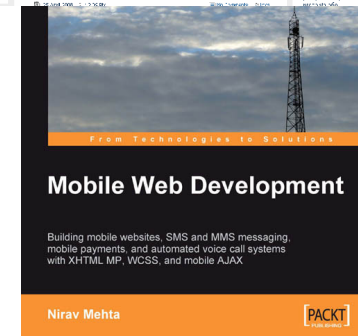
MyMobileWeb : Exploitation Plan (Telefónica)

- Developing the Mobile Web implies indirect revenues for Telefónica
  - More mobile apps → More mobile bandwidth consumption
- Enabling mobile optimized access to services offered to residential customers
  - Personalized Workspace through which individuals can manage their daily life processes (making EzWeb mobile)
    - Management of the Digital Home
    - Management of the Digital Life (intelligent ambients while on the move)
- Enabling mobile optimized web access to solutions that
  - a) Telefónica may develop for some other companies and public administrations
    - Support for B2C Mobile accessible Web Portals (tourism, e-Admin, e-health …)
  - b) Telefónica may use internally to support its own operations and business processes
    - Support for B2E Mobile accessible Web Portals (field service, management dashboards, …)
- Web of Things → Things are assigned an URI enabling access to related Mobile Web accessible information & services
  - Ex. An information panel in the street that announce a theater performance and a user that use the panel to access a mobile site that publish a service to buy the tickets
  - Ex. A tag label in a Switching Center which the field worker can read with his/her mobile to get access to history on previous work actions in field

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MyMobileWeb : Exploitation Plan (SMEs)

- Solution integration using an open standards-based technology
  - dotMobi portals
  - Mobile Web apps

- An open source product without license costs enables a competitive offer and encourage clients to adopt mobile technologies

- SMEs don't need to develop intensive skills on mobile to enter in this traditionally "exclusive" market

- Yaco
  - Product marketing in Andalucia, specially for public administrations

- Germinus
  - Product marketing in Madrid, initially CAM, education department

- Answare
  - Interested in exploiting the product via a standards-based mobile GIS solution.
  - Murcia Region has expressed interest in the resulting product

- iWS
  - Commercialization of solutions for local councils mainly in Cataluña

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MyMobileWeb : Project Structure

Work package	Leader
Project Management	TID (ES)
Reqs and Architecture	TID (ES)
Semantics	Tisco (AT)
IDEAL Language	TID (ES)
Location Technologies	Tisco (AT)
Runtime	TID (ES)
Experimentation	Intelli Solutions (GR)
Exploitation & Dissemination	Tisco (AT)

- Tasks

  — Pending CR to mix tasks 6.2b and 6.3b

  — 13 technological tasks with 4 (30%) leaded by international partners

  — When T4.2b. T7B.3 are transferred to international partners it will be nearly 50% in task leadership

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MyMobileWeb : Partner Main Roles

Partner	Main Roles
TI+D	- Project Management & Technical Coordination - Leader: WPs Architecture, IDEAL language & Runtime
Fundación CTIC	- Main Researcher: WP Semantics & Transcoding module
UPM	- Main researcher on correlation algorithms
UCLM	- Main researcher on IDEAL language & runtime
Yaco Sistemas	- Leader: Business & User Requirements & Spanish Experiments - MyMobileWeb exploitation (tourism portals)
Germinus	- Semantic Bar (*) - MyMobileWeb exploitation (educative contents)
iWS	MyMobileWeb Exploitation (information portals for public administrations)
Answare	- IDEAL rich components (mainly maps) (*) - MyMobileWeb exploitation (mobile maps)
Movistar	Exploitation for Telefónica (Movilforum)
Tisco GmbH (Austria)	- Leader WP Semantics & Location Technologies for the Mobile Web
Technical University Vienna (Austria)	- Main researcher location technologies
Intelli Solutions (Greece)	- Leader Task Requirements & Smart Clients

MyMobileWeb on the Net

■ Web Site, Forge and Wiki at Morfeo

— http://mymobileweb.morfeo-project.org

— http://forge.morfeo-project.org/projects/mymobileweb/

— http://forge.morfeo-project.org/wiki/Plataforma_MyMobileWeb

■ mTLD Developer's Site

— http://pc.dev.mobi/?q=node/208

— http://dev.mobi/node/83

■ Other remarkable

— http://research.nokia.com/files/Haumont-dotMobi.pdf

— Book "Mobile Web Development" published by Packt Publishing

– http://www.packtpub.com/mobile-web-development/book#indetail

MyMobileWeb at Morfeo

Developer's Program

Part I Overview

05/28/2008

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Introduction

- MyMobileWeb is an open source platform that simplifies the development of mobile web applications and portals

  — A low-cost platform (there are no license fees). GPL License moving towards Apache License

  — A modular product, open-standards-based

    – Other open-source technologies are used (WURFL, Batik, Xerces, Xalan, …)

  — All-Java product that only requires a minimal Servlet / JSP container (Tomcat, for example)

- Provides different modules which cover all the basic requirements that must meet a complete and integrated mobile solution, hiding all the complexity related to dealing with multiple delivery contexts

- Includes experimental modules related to the exploitation of semantics in a mobile environment

- Applicability

  — dotMobi applications and portals

  — Mobile solutions intended to work in an uncontrolled environment (multiple devices)

  — Creation of mobile content channels based on JSR-170-based CMS or RSS

  — Offline / online mobile solutions (not covered in this presentation)

Vision

- Mobile Web development should be driven by a 'Channel Model' based on Service Oriented Architectures (SOA)

  — Applications publish business services that are invokable from different channels: traditional Web Channel and Mobility Channel

  — Services are independent of the channel and need not to be duplicated

  — Mobile Channel is different than Web Channel (in general)

    – Markup transcodification is an anti-pattern

    – It has different views (presentations) and navigation schema

    – Both channels can be integrated in the same server and CMS but they are essentially different

    – Aligned with the dotMobi vision

  — Typically a mobility channel only addresses a small percentage of functionality

  — Mobile Channel is composed by

    – Information that users want to access while they are on the move

    – Information that people want all the time

- Rapid Application Development (RAD) of MultiChannel and MultiDevice Services

  — Reduction of time and budget

  — Common development skills (Web, Java, XML ...)

Target Architecture
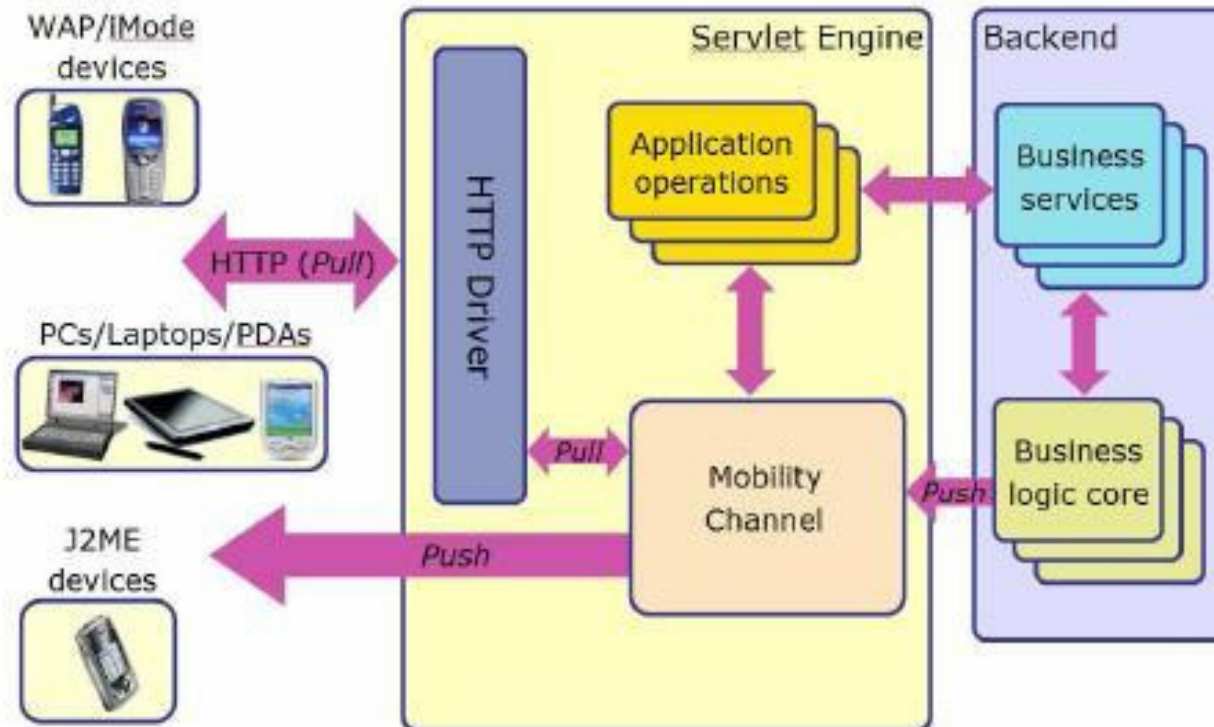
Main Features

- **MyMobileWeb enables device independent development**

  — It is followed a 'flexible authoring' approach

  — Flexible authoring is an authoring style that consists of designing once for all kind of delivery contexts, in addition to, when needed, a combination of adaptation policies and / or customized variants of few resources for specific delivery contexts.

- **Differential aspects against competitors**

  — High performance architecture. During each client request there is no markup transcodification

  — Integrated with WURFL ("de facto standard) for Device Description

  — It works with any Java Servlet/JSP Web/Application Server

  — Automatic code generation for local (Javascript-based) and server-side validations

  — Smart Literal Management (literals can be redefined for specific devices or clusters of devices)

  — Based on the concept of mobile visual controls and declarative user interface language

  — Intelligent management of paging, for each visual control, each container ...

  — Off-the-self (component-based) mobile adaptation of RSS data sources

  — Integrated with JSR-170-based CMS

- **MyMobileWeb also includes modules intended to the development of off-line applications that synchronize with backend systems (not covered in this presentation)**

Development cycle (I)
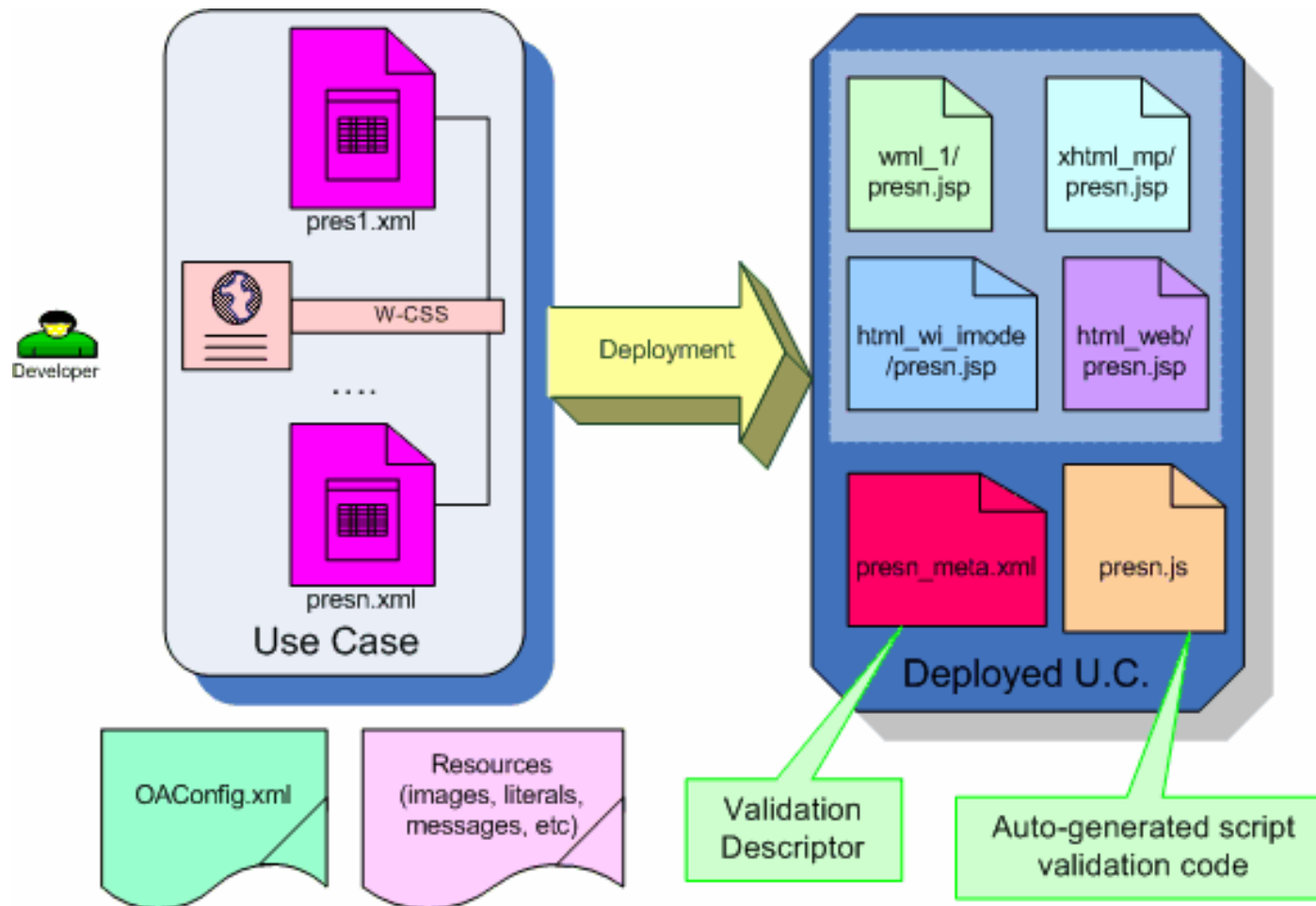
Development cycle (II)

- MyMobileWeb applications are conventional Web J2EE applications that use additional libraries (in WEB-INF/lib)

- Presentation layer need to be defined declaratively using XML + CSS

- A code generation tool need to be run to create

    — JSP pages, that will render the user interface specified in XML

    — Validation descriptors which will be used to perform automatic server-side validations

    — A set of Javascript functions in charge of performing local validations for devices with client-side scripting capabilities

- At runtime, these JSP pages, in collaboration with a set of libraries and components, will be in charge of rendering the presentation according to different delivery contexts

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Development cycle (III)

■ This architecture, based on the pre-generation of pages, provides the best performance, as there is no execution of server-side XSLT code.

■ A JSP page is not generated for each device, only are generated as much JSP's as needed, typically one for each markup technology.

— If there are redefinitions of presentations or styles, then more JSP pages are generated to satisfy the requirements.

■ Besides, developers need to specify:

— Event handlers (Java classes) for the treatment of events triggered by each visual control.

— Application Operations (AOs) (Java classes) that will be in charge, when needed, of getting new data or performing business logic operations (in collaboration with services).

— Application resources, typically tiny images that will decorate the user interface. Developers can provide multiple variants of a resource and MyMobileWeb will select the best instance for each delivery context.

– For more complex scenarios, MyMobileWeb provides an image transcoder component capable of adapting resources dynamically.

Development tools - Eclipse Plugin (I)
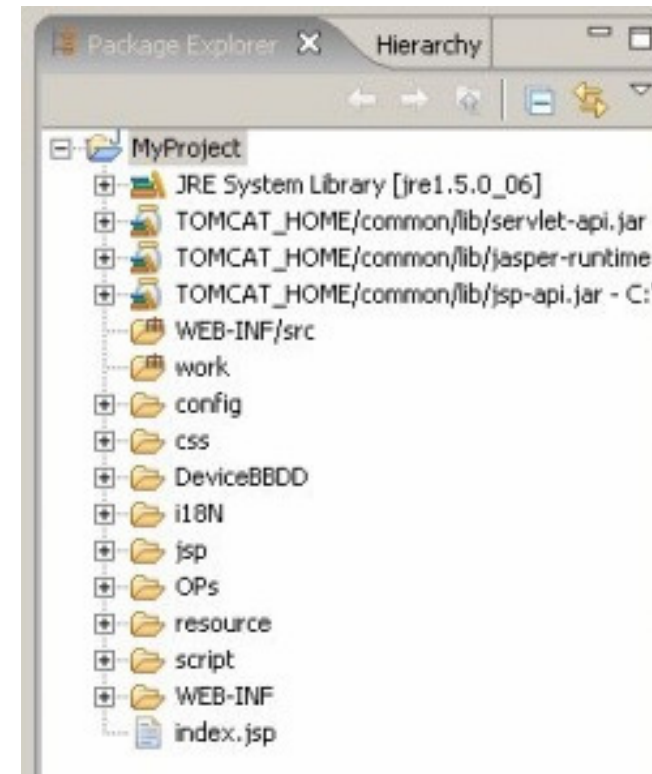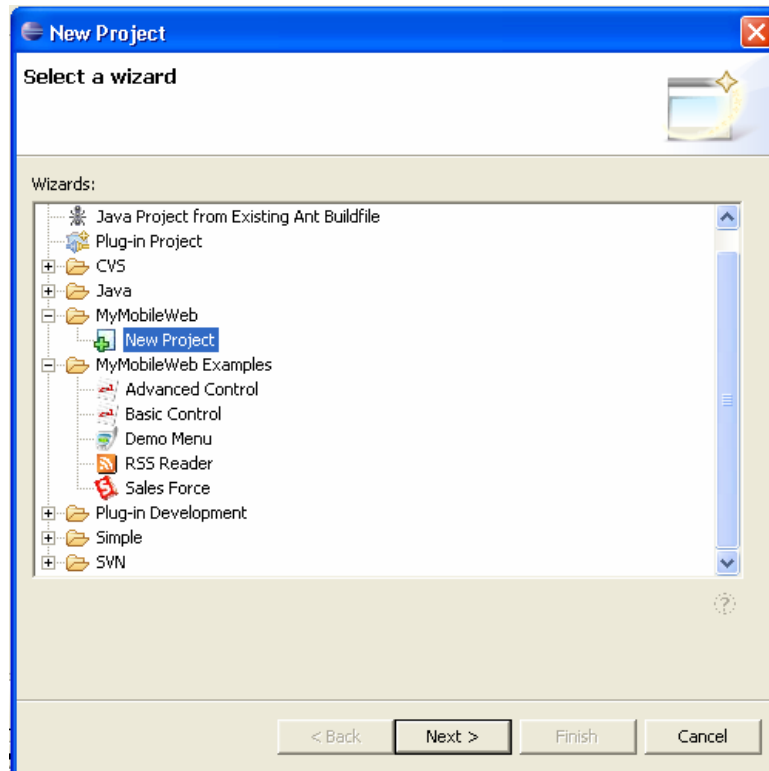
Development tools – Eclipse Plugin (II)
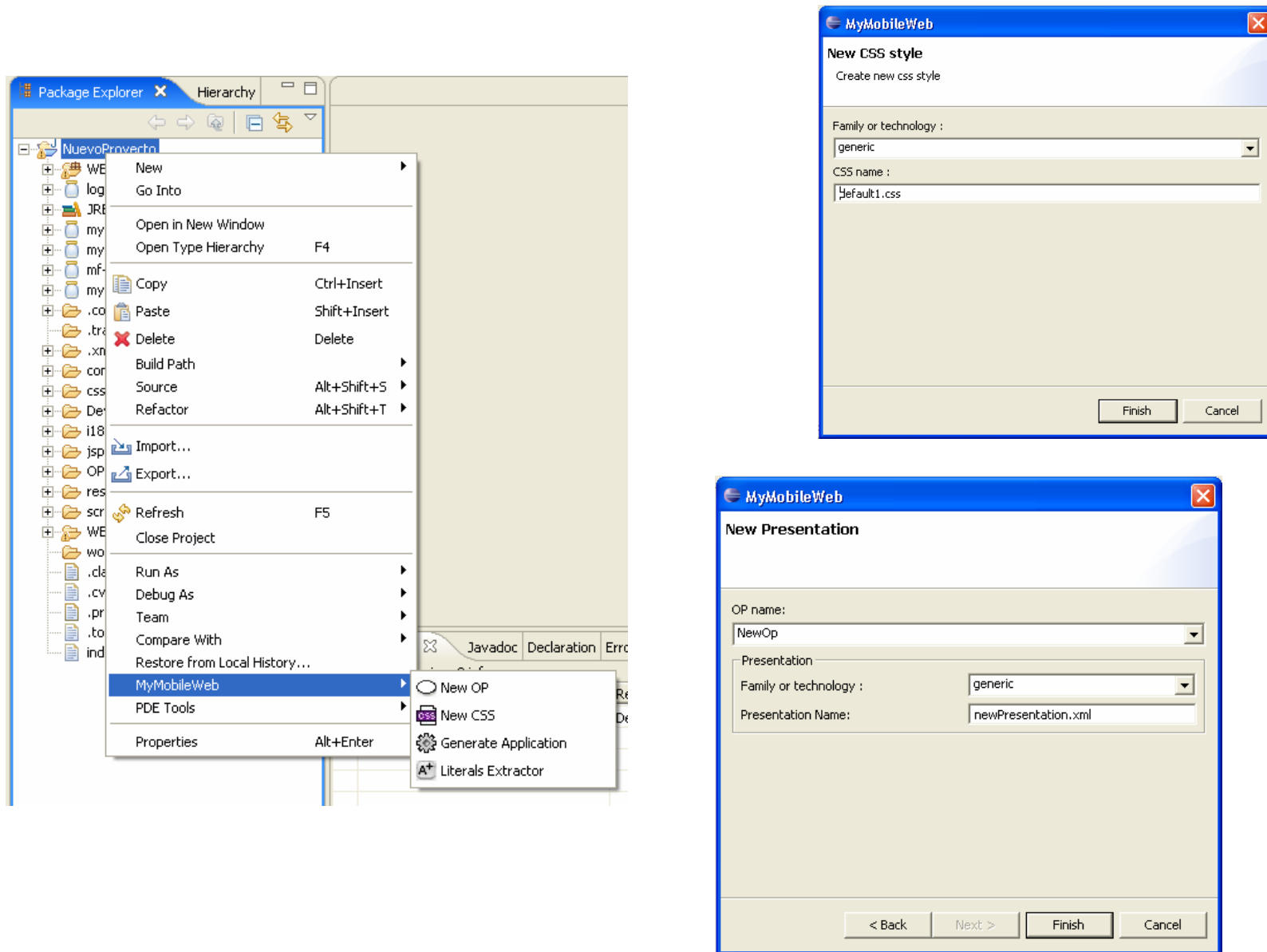
Example (I) - MyMobileWeb XML authored unit

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<?xml-stylesheet href="example1.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb" id="menu">
  <mymw:head>
    <mymw:title class="include">SalesForce</mymw:title>
  </mymw:head>
  <mymw:body>
    <mymw:div id="p1" class="nowrap expand vertical">
      <mymw:menu id="m1" class="mymenu paginate" bind="${menuOption}">
        <mymw:link resourceid="findps" id="cps" longtitle="The find P/S options is implemented"
                   class="consult">Find P/S</mymw:link>
        <mymw:link resourceid="searchclients" id="cc" longtitle="Search Clients in our database"
                   class="clients">Search Clients</mymw:link>
        <mymw:link resourceid="contract" id="contr" longtitle="Do you want to contract one product?"
                   class="contract">Contract</mymw:link>
        <mymw:link resourceid="opinion" id="opin" longtitle="To know our clients"
                   class="opinion">Opinion poll</mymw:link>
        <mymw:link resourceid="exit" id="exit" longtitle="See you soon!"
                   class="exit">Salir</mymw:link>
      </mymw:menu>
    </mymw:div>
  </mymw:body>
</mymw:document>
```

Example (II) - MyMobileWeb CSS style sheet

```
div.nowrap {
    white-space:nowrap;
}
div.expand {
    expand:true;
}
menu.mymenu {
    layout:vertical;
    align:left;
    white-space:nowrap;
    width:90%;
}
menu.paginate {
    paginate:false;
}
```

```
link {
    img-display:both;
}
link.longtitle {
    include:true;
}
link.contract {
    localsrc:149;
}
link.consult {
    localsrc:510;
}
link.clients {
    localsrc:163;
}
```

```
link.exit {
    localsrc:roundarrow2;
}
link.opinion {
    localsrc:chart;
}
menu.title {
    color:white;
    background-color:#336699;
    align:center;
    show-separator:false;
    include:true;
}
```

Example (III) - Rendering in different browsers

Example (IV) - Explanation

- **An XML authored unit defines a user interface view**

  — In the example it is defined a tiny screen with a set of menu options to be presented to the user. The menu is inside a container with vertical layout

  — Each menu option has an identifier, short and long descriptions

- **The final aspect of the menu is controlled by means of a CSS style sheet declared at the top of the authored unit**

  — CSS styles can be redefined for different devices or clusters of devices

- **The data binding is specified by means of the attribute bind which defines the model variable that will be automatically updated with the option selected by the user (link identifier).**

  — When the user selects an option, it will be raised an event that will be treated at the server side by means of handlers provided by the developer.

  — The event handler will find the option selected by the user in the bind variable 'menuOption'.

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High Level Execution Architecture (I)
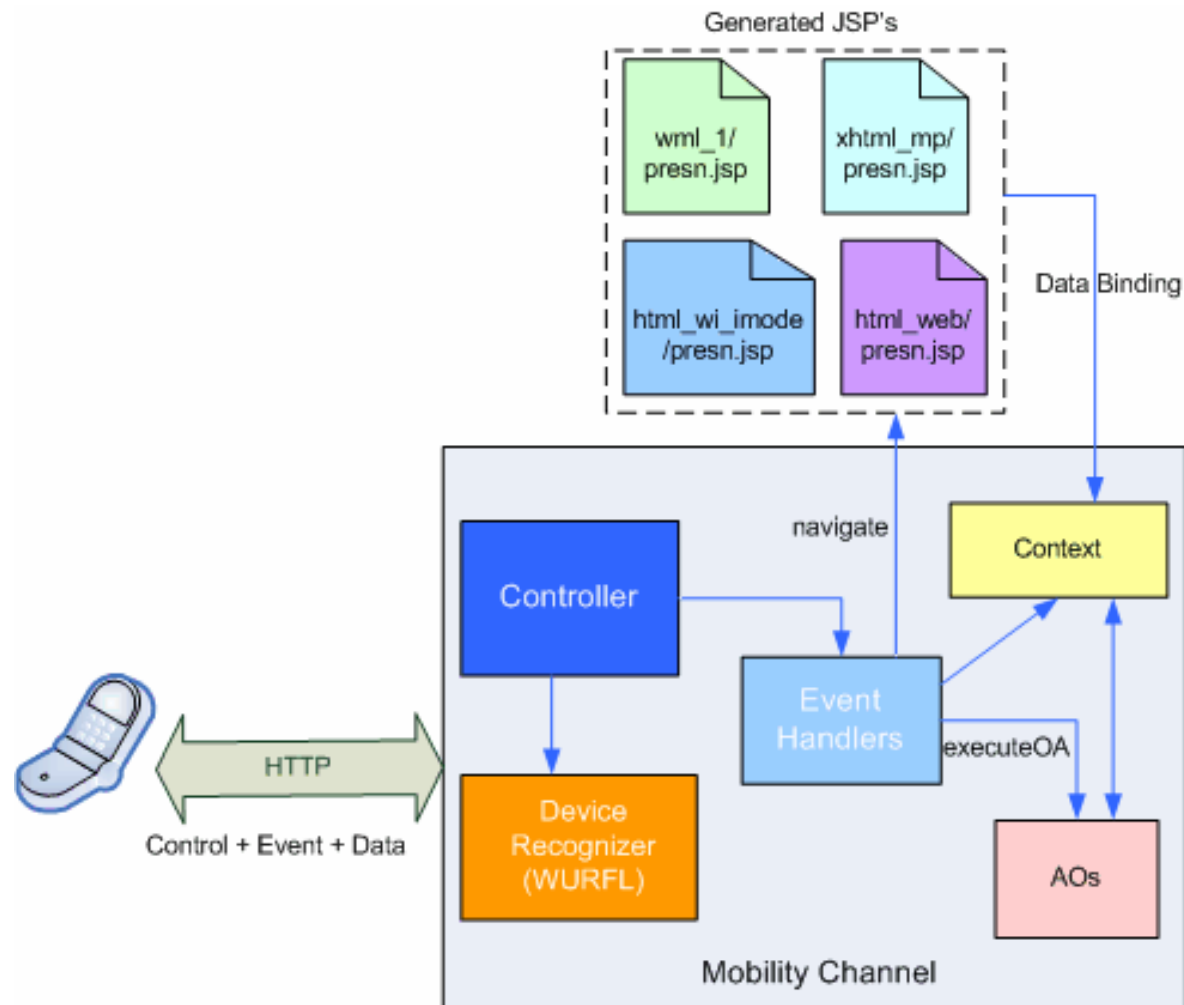
High Level Execution Architecture - Explanation (II)

- At the device side, when a user interaction causes an event to be treated at the server side, it is sent an HTTP request which contains:

  — the identifier of the visual control that raised the event.

  — the event identifier.

  — data that might have been entered by the user.

- At the server side, the request is initially processed by a Controller component, which recognizes the device (if it has not been done previously).

- Then, data is validated, and if validations are ok, data items are stored in the context. The context is a container that holds all the model data items, and it is structured hierarchically in different scopes (application, session, use case, view, etc.).

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High Level Execution Architecture - Explanation (III)

- There are two kind of events sent from the device:

  — Application-specific events.

    – They have to do with the functionality of the application and are treated by specific handlers (methods of well-known Java classes) provided by programmers.

  — MyMobileWeb-specific events.

    – Handled automatically by MyMobileWeb, so application developers need not to worry about them.

      – For example, a next page event is raised when the user is paginating over the contents of a table.

- Application-specific event handlers decide on how to process an incoming request.

  — Typically they will call application operations (AOs) to get more data to be put into the model and, finally, a redirection to the next view (identified by a logical name) will be made.

    – At this point, MyMobileWeb will be responsible of locating the appropriate JSP page according to the delivery context.

      – This JSP page will render the presentation and will resolve all the data and content bindings with the help of runtime libraries.

- All event-handling related operations are accessible through an API provided by the MyMobileWeb MVC framework.

Mobile UI Components (I)

- **MyMobileWeb provides a suite of UI components**

  — A UI component is a user interface element of interaction that provides a well-defined functionality.

  — A UI component is finally rendered via a set of markup tags.

  — A UI component raises events, some of them managed by the application, some of them managed automatically by MyMobileWeb.

  — Any UI component might have a `display` attribute.

    – If the value of `display` is `true` then the control is rendered.

    – If it the value is `false` then the control it is not rendered.

    – `display` attribute can be an expression evaluated over the context.

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Mobile UI Components (II)

- **hr** It puts an horizontal rule as a separator.

- **br** It is a line break in a presentation frequently used for better legibility.

- **label**. It is used for labelling anything in an authored unit. It can contain any text. Using CSS it can be changed the aspect such as `color`, `font`, `underline`, `bold`, etc.

- **image** A control that displays a tiny picture in the screen. In MyMobileWeb images typically are specified by means of an abstract identifier, called `'resourceid'`. The programmer can provide different versions of the same resource and MyMobileWeb is in charge of selecting the best for a delivery context. Also MyMobileWeb provides an image transcoding module that can be used to dynamically transformate images to different formats and sizes as needed. Programmers or designers decide the schema to be used: content selection or transcoding.

- **object** It allows to put any multimedia object in a view. It has similar semantics than the `'object'` tag in (X)HTML.

- **entryfield** This is an input field in which the user can enter any text. It can be disabled or readonly. Developers can specify validations (`required`, `datatype`, etc) to be checked.

- **datefield** It is an input field that accepts a date as input. Depending on the delivery context it can be rendered as a calendar, as a set of input fields or as a wizard

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Mobile UI Components (III)

- **timefield**. It represents an input field that accepts time as input (hours, minutes, seconds). It is parameterized by means of a mask.

- **textarea**. It is an area of free text (possibly with multiple lines). A textarea can also be `readonly` or `disabled`. If a textarea contains so much text for a given delivery context it will be automatically paginated.

- **link**. This is a hyperlink that can be optionally decorated with an image. Using style properties and depending on the delivery context it can be controlled if the image, the text or both are displayed.

- **select**. It allows the selection of one ore more values between a list of them. A select can be rendered as a `combobox`, `radio` buttons, `checkbox`, `menu`, etc. It depends on the style properties and the delivery context. When the user selects something no event is triggered.

- **menu**. It allows the selection of one between several items and, when done, automatically an event is raised. Menus can be rendered in different ways such as a list of links, a combobox sensitive to changes, a combobox plus a button, etc. Menus can have different layouts (`horizontal, vertical, grid`) and menu items could be decorated with an image or even be numbered with direct access through access keys. MyMobileWeb takes care of the pagination of the menu (if needed).

- **submit**. This control triggers an update of the model. When the user activates the control all the data in the current form on screen is posted to the server, starting the process of model (the context) updating, checking validations.

Mobile UI Components (IV)

- **action**. is a control to ask for something from the UI but no context updating occurs. Depending on the delivery context and the device it can be rendered as a button, as a link or even as an option mapped to a softkey (similar to the 'do' tag in WML).

- **list**. Represents data in list mode. Each list item can be decorated using an image or an index number. Lists are paginated automatically according to the delivery context.

- **table**. Represents data in tabular mode. Each column can be clickcable or not depending on the style settings. Tables are automatically paginated if needed. An interesting feature is that programmers can specify the visualization of more or less columns depending on the target delivery context.

- **chainedmenu**. It is a set of depending menus, i.e. the items of one menu depends on the value(s) selected in previous menus. A chained menu is rendered as a wizard in mobile phones and as a set of combos (popup lists) in PDAs.

- **rsspanel**. It is a control that provides the user interface for browsing and reading RSS feeds. The control is capable of dealing with different versions of ATOM and RSS.

- **telephonecaller**. A visual component to trigger a phone call from a user interface page. This control is an abstraction for developers that have not to worry about the different URL formats for specifying a call.

- **phonebookadder**. A visual component to add telephone number to my phone book. This control is an abstraction for developers that have not to worry about the different URL formats for specifying a phone book adder.

Styling

- MyMobileWeb has adopted CSS style sheets as the mechanism for specifying presentation aspects (look and feel, etc.) with respect to visual controls.

  — Each XML presentation file might be linked to one or more style sheets which must follow the CSS syntax.

  — The properties and selectors that can be used are those specified in W-CSS plus some specific extensions defined by MyMobileWeb.

- MyMobileWeb fully supports the cascading pattern for applying style sheets.

  — For instance, developers can specify a default style sheet that will apply to all the XML authored units.

  — Moreover, MyMobileWeb provides default CSS files that are applied when no style is specified by programmers.

- From a device independence perspective, the most important point is the style overriding feature.

  — Using this feature a developer can change specific style properties of an authored unit depending on the delivery context.

  — For example, if a developer realizes that a background color is not readable on a device, she can easily change it for one another more suitable, by means of style overriding and without needing to change anything in the XML authored unit.

Containers

- Visual controls need to be grouped into containers.

- MyMobileWeb provides two types of containers:

  — **div** It is a simple container that can only include visual controls (container nesting is not allowed). The layout can be `horizontal,` `grid` or `vertical`

  - A div is paginated automatically, if it has too many (for a given delivery context) child controls inside it.

  - In that case the perceivable units by the user will be a set of screens chained by means of an interaction wizard.

  — **section** It is a container that allows to switch between different subscreens, similar to 'tabs' in desktop applications.

  - There are different rendering options for a panel container: multiple cards in WML, anchors in XHTML-MP, link to each subscreen, etc. A panel can also include nested 'div' containers.

- MyMobileWeb also provides mechanisms for reusing fragments of user interface definition markup between different presentations.

  — This is accomplished by means of the include tag.

  — The inclusion mechanism is typically used for navigation bars ('back' and 'home' links) common to all the screens that compose an application.

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Layout management

- For achieving device independence, the layout of containers need to be specified using CSS properties.

  — Using this method and the style overriding techniques provided by MyMobileWeb, a developer can alternate multiple layouts depending on different families of devices, tiny mobile phones, smartphones, PDAs, etc.

- For example, in a PDA a designer would like to see a grid layout, because she has plenty of screen space wherereas in a tiny mobile phone she would like to see a vertical layout.

  — Using MyMobileWeb, this can be achieved easily without duplicating any code and without additional effort by the developer.

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Example (I) - Menu control

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<?xml-stylesheet href="menu.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb" id="menu">
  <mymw:head>
    <mymw:title class="include">Example</mymw:title>
  </mymw:head>
  <mymw:body>
   <mymw:div id="p1" class="expand vertical">
        <mymw:menu id="ctr" title="Countries" style="countries" bind="${country}">
            <mymw:link resourceid="austria" id="au" longtitle="It's a landlocked country in Central Europe"
                    class="vertical">Austria</mymw:link>
            <mymw:link resourceid="usa" id="ee" longtitle="It's a country in North America"
                    class="vertical">USA</mymw:link>
            <mymw:link resourceid="france" id="fr" longtitle="His metropolitan territory is located in Western Europe"
                    class="vertical">France</mymw:link>
            <mymw:link resourceid="japan" id="ja" longtitle="It's an island country in East Asia"
                    class="vertical">Japan</mymw:link>
            <mymw:link resourceid="mexico" id="me" longtitle="It's located in Southern North America"
                    class="vertical">Mexico</mymw:link>
            <mymw:link resourceid="spain" id="sp" longtitle="It´s a country located in Southern Europe"
                    class="vertical">Spain</mymw:link>
            <mymw:link resourceid="sweden" id="ja" longtitle="It's a Nordic country in Scandinavia"
                    class="vertical">Sweden</mymw:link>
            <mymw:link resourceid="taiwan" id="me" longtitle="It's an island in East Asia"
                    class="vertical">Taiwan</mymw:link>
            <mymw:link resourceid="thailand" id="sp" longtitle="It lies in Southeast Asia"
                    class="vertical">Thailand</mymw:link>
            <mymw:link resourceid="turkey" id="ja" longtitle="It's a Eurasian country"
                    class="vertical">Turkey</mymw:link>
            <mymw:link resourceid="wales" id="me" longtitle="It's one of the four constituent nations of the UK"
                    class="vertical">Wales</mymw:link>
            <mymw:link resourceid="yemen" id="sp" longtitle="It's on the Arabian Peninsula in Southwest Asia"
                    class="vertical">Yemen</mymw:link>
        </mymw:menu>
    </mymw:div>
  </mymw:body>
</mymw:document>
```
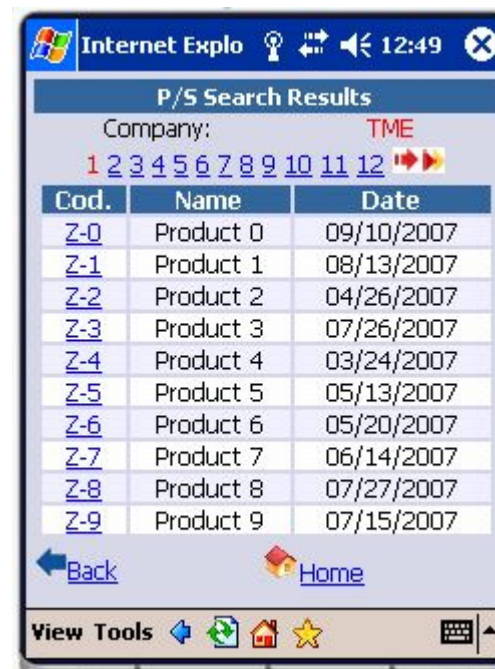
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Example (I) - ... (rendering)
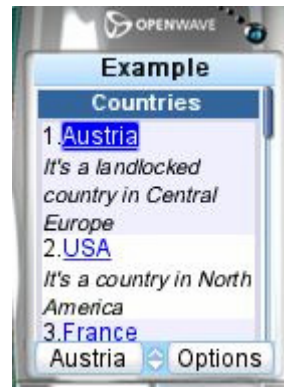
Example (II) - Table Control with binding and pagination

```xml
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet href="example1.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb" id="example">
  <mymw:head>
    <mymw:title class="include">P/S Search Res</mymw:title>
  </mymw:head>
  <mymw:body>
    <mymw:div id="p1" class="center">
        <mymw:label>Company:</mymw:label>
        <mymw:label class="remark">${enterprise}</mymw:label>
    </mymw:div>
    <mymw:div id="p2" class="center vertical">
        <mymw:table id="listPS" bind="${selectedPS}" optionsbind="${searchPSResult}"
                         keymember="code" class="tps paginate">
            <mymw:th class="header">
                <mymw:td>Code</mymw:td>
                <mymw:td>Name</mymw:td>
                <mymw:td display="${_MYMW_DEV_BELONGS.PdaDevice}">Date</mymw:td>
            </mymw:th>
            <mymw:tr>
                <mymw:td member="code" />
                <mymw:td member="name" />
                <mymw:td member="date" />
            </mymw:tr>
        </mymw:table>
    </mymw:div>
    <mymw:include content="PSDetail/generic/product/p2"/>
  </mymw:body>
</mymw:document>
```

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Example (II) - ... (rendering)

Example (III) - Datefield

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<?xml-stylesheet href="datefield.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb" id="example1">
  <mymw:head>
    <mymw:title>Datefield</mymw:title>
  </mymw:head>
  <mymw:body>
    <mymw:div id="p1" class="nowrap center vertical" >
      <mymw:label id="date">Date:</mymw:label>
      <mymw:datefield class="independent" labelid="date" id="date" bind="${ date }" />
    </mymw:div>
    <mymw:div id="p2" class="center">
      <mymw:submit id="submit" value="Accept" principal="true"/>
    </mymw:div>
    <mymw:include content="Entryfield/generic/example1/foot"/>
  </mymw:body>
</mymw:document>
```
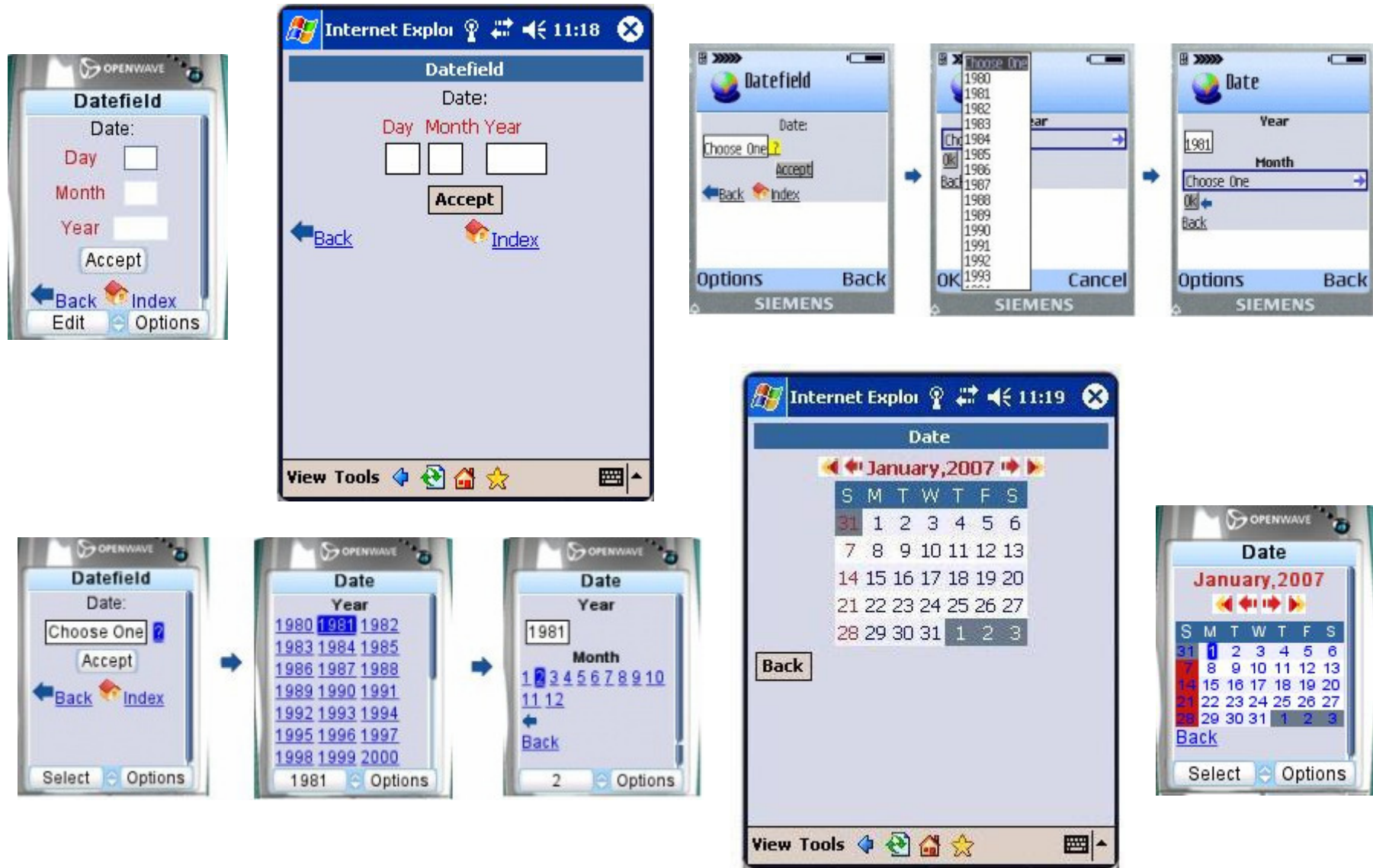
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Example (III) - ... (rendering)

Example (IV) – RSSPanel

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<?xml-stylesheet href="feed.css" type="text/css"?>

<mymw:document xmlns:mymw="http://morfeo-project.org/mymobileweb"
               xmlns:user="http://morfeo-project.org/user" id="feed">
  <mymw:head>
    <mymw:title class="include">White House</mymw:title>
  </mymw:head>

  <mymw:body>
    <mymw:div id="p1" class="expand vertical">
        <user:rsspanel id="rss" src="${feed}" class="mode paginate"/>
    </mymw:div>
    <mymw:div id="foot" class="left">
        <mymw:link resourceid="back" id="feeds" class="both">Back</mymw:link>
        <mymw:link resourceid="index" id="index" class="both">Index</mymw:link>
    </mymw:div>
  </mymw:body>
</mymw:document>
```
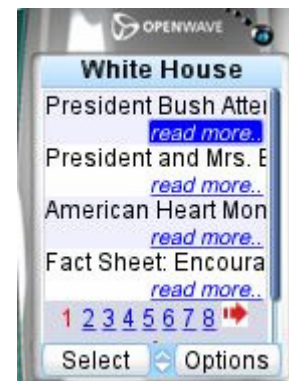
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Example (IV) - ... (rendering)

Who can participate in the MORFEO community?

Anyone who shares our dream and spirit …

"I am no longer captive to history.
Whatever I can imagine, I can accomplish"
Gary Hamel, "Leading the Revolution"

Visit our website !

http://www.morfeo-project.org

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