



Universidad de Deusto  
Deustuko Unibertsitatea



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## Tema 5 – Web 2.0, Future Internet, Semantic Web and Ubiquitous Web

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## 5.1. Web 2.0

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Web 2.0



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feeds **GTD** Podcast  
**Web Standards** Rich User Experience  
**Folksonomies** **Blogging**  
**Web Services** Infoware **The Long Tail**  
**Tagging** **Web 2.0** Life-hacking  
**RSS** Citizen Media **APPS** Perpetual Beta  
**Mash-up** ROI **Ajax**  
**Collective Intelligence** **peer-to-peer**  
 RIQ's  
**Wiki**



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## ¿Qué es Web 2.0?

- Una “palabreja” (buzzword) que hace referencia a:
  - Todo aquello nuevo y popular en la web
  - Web participativa tanto de humanos como de máquinas
  - Cambio en la manera en que la gente ve la web:
    - “Read/Write Web” y la “Web como una Plataforma”
- Acuñado por Tim O'Reilly y Dale Dougherty
  - Observaron que varias aplicaciones web utilizan tecnologías existentes de una manera nueva e innovadora
    - Basada en una industria más madura (economía web sana)

## Revolución Web 2.0

- Repentina renovación de energía en la web
- Nuevas aplicaciones apareciendo cada día
- Grandes empresas mostrando su talento
- Inversión en web start-ups de nuevo
- Pero:
  - No comentamos los errores del 2000
  - Temas de usabilidad/accesibilidad comprometidos
  - Aplicaciones interesantes, pero no modelo negocio

## Web 2.0 como Plataforma

- La Web está pasando de ser un sistema de envío de documentos a ...
  - Una plataforma de aplicaciones
- Simplifica la distribución
- Promociona el modelo de suscripción en vez de la compra de una vez

## Web 1.0 vs. Web 2.0

Web 1.0	Web 2.0
Altavista	Google
Hotmail	Yahoo Mail
Ofoto	Flickr
Mp3.com	iTunes
Geocities	Blogger
MapQuest	Google Maps
Encarta	Wikipedia
Slashdot	Digg

## Requisitos para un Aplicación Web 2.0

- **Datos abiertos**
  - Formatos de datos abiertos
  - Habilidad para usar datos fuera de la aplicación
  - Permite al usuario crearse sus propios datos
- **Arquitectura de participación**
  - Provee un servicio no un producto
  - Incentiva la participación
  - Inteligencia colectiva
  - Fácil reutilizar y mezclar
  - Formar parte de una comunidad
- **Buena experiencia de usuario**
  - Fácil de usar y atractiva
  - Interfaz de usuario rica
  - Funciona como una aplicación tradicional

## Tecnologías Web 2.0 Claves

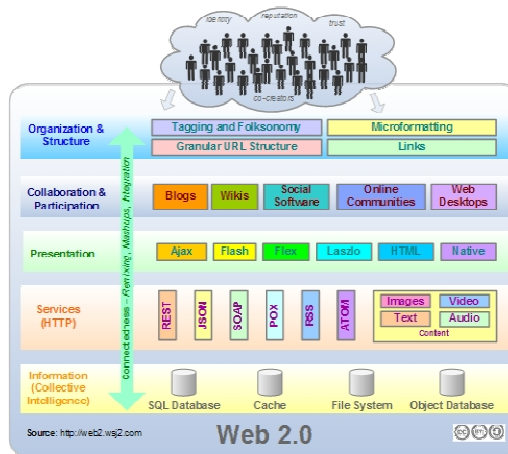
- Apertura de datos a través de APIs y Servicios Web
- RSS
- Ajax
- Estándares web (DOM, XHTML, CSS)

- Aplicaciones AJAX
  - <http://www.ajaxian.com/>
- Desktop Widgets
  - <http://widgets.yahoo.com/>
- Aplicaciones Flex
  - <http://www.adobe.com/products/flex/>
- OpenLazlo
  - <http://www.openlaszlo.org/>
- XUL
  - <http://www.mozilla.org/projects/xul/>
- Smart Clients and Avalon
  - <http://msdn.microsoft.com/winfx/technologies/presentation/default.aspx>

- Un portal Web 2.0 suele presentar las siguientes características:
  - Rico mecanismo de interacción: Ajax, Lazslo
  - CSS
  - XHTML valido o utilización de microformatos (añadir semántica en HTML)
  - Sindicación y agregación de datos basada en RSS y Atom
  - Publicación de Weblogs
  - Mashups
  - REST o XML WebServices APIs

## Yet Another View of Web 2.0

A Stratigraphic View of the People and Elements



# AJAX

- AJAX (Asynchronous Javascript and XML), técnica de desarrollo que genera aplicaciones web más interactivas combinando:
  - XHTML y CSS para la presentación de información
  - Document Object Model (DOM) para visualizar dinámicamente e interactuar con la información presentada
  - XML, XSLT para intercambiar y manipular datos
    - JSON y JSON-RPC pueden ser alternativas a XML/XSLT
  - XMLHttpRequest para recuperar datos asincrónamente
  - Javascript como nexo de unión de todas estas tecnologías



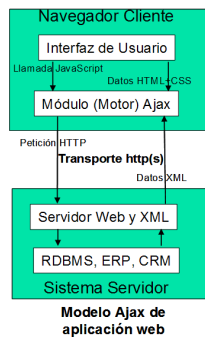
## ¿Por qué AJAX?

- Las aplicaciones web proliferan debido a su simplicidad, pero:
  - Ofrecen una menor interactividad y usabilidad en comparación con las aplicaciones desktop.
  - La interacción del usuario con una aplicación web se interrumpe cada vez que se necesita algo del servidor
- Varias tecnologías han sido diseñadas para resolver este problema:
  - Java Applets, FLASH
- AJAX permite lo mismo pero sin plug-ins

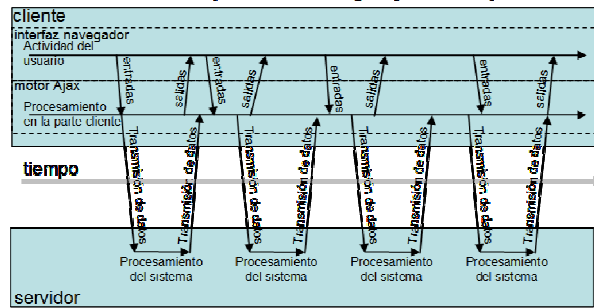
## Características AJAX

- Aplicaciones son más interactivas al estilo desktop
  - *Look and feel* similar a las aplicaciones de sobremesa sin plug-ins o características específicas de los navegadores
- Reduce tamaño de la información intercambiada
  - Muchas micro-peticiones, flujo de datos global inferior
- Libera de procesamiento a la parte servidora???
- Actualiza porciones de la página en vez de la página completa
- Necesario asegurar aplicación AJAX funciona en todo navegador





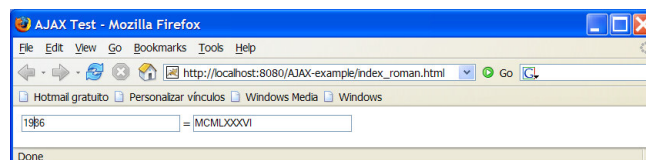
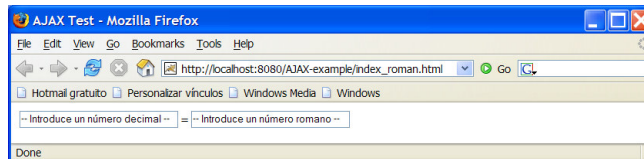
## modelo de aplicación web Ajax (asíncrono)



- Empresas de referencia en la web definen soluciones AJAX:
  - Google
    - Orkut (<https://www.orkut.com/Login.aspx>) es una comunidad virtual que conecta online a gente a través de una red de amigos.
    - Gmail ([www.gmail.com](http://www.gmail.com))
    - Google Suggest (<http://www.google.com/webhp?complete=1&hl=en>) → sugiere valores de búsqueda a medida que escribes caracteres
    - Google Maps (<http://maps.google.com/>)
  - Yahoo!
    - Flickr (<http://www.flickr.com/>) es una aplicación para gestionar y compartir fotos
    - Oddpost (<http://oddpost.com/learnmore>)
      - El equipo de Oddpost ha rediseñado Yahoo! Mail siguiendo la filosofía AJAX
- En definitiva, AJAX es un buena solución técnica con gran aplicabilidad, demostrada por aplicaciones reales complejas.

- Disponibilidad del objeto XMLHttpRequest
- Usabilidad
- Carga del Servidor
- Comportamiento Asíncrono

- Conversor números romanos a árabes



## ■ En el HTML:

```
<input type="text" size="30" id="decimalNum" value
="-- Introduce un número decimal -- "
onkeyup="traducirDecimalARomano();">
<input type="text" size="30" id="romanNum" value
="-- Introduce un número romano -- "
onkeyup="traducirRomanoADecimal();">
```

## ■ En JavaScript:

```
function traducirDecimalARomano() {
  var idField = document.getElementById("decimalNum");
  if (isPositiveInteger(idField.value)) {
    var url = "convert?numDecimal=" + escape(idField.value);
    if (window.XMLHttpRequest) {
      req = new XMLHttpRequest();
    } else if (window.ActiveXObject) {
      req = new ActiveXObject("Microsoft.XMLHTTP");
    }
    req.open("GET", url, true);
    req.onreadystatechange = callback;
    req.send(null);
    return true;
  } else {
    alert("Texto introducido no es un número entero: " +
idField.value);
    idField.value = "";
    return false;
  }
}
```

- En JavaScript:

```
function callback() {
  if (req.readyState == 4) {
    if (req.status == 200) {
      // update the HTML DOM
      var message =
req.responseXML.getElementsByTagName("message")[0];
      var responseElement =
document.getElementById("romanNum");
      responseElement.value =
message.childNodes[0].nodeValue;
    }
  }
}
```

- JavaScript puras:

- <http://prototype.conio.net/>
- <http://script.aculo.us/>
- <http://openrico.org/demos.page>

- Parte Servidora:

- <http://www.getahead.ltd.uk/dwr>
- <http://atlas.asp.net/Default.aspx?tabid=47>

- Un tipo de portal que permite a los usuarios editar, añadir, borrar su contenido de manera rápida y sencilla
  - Herramienta efectiva de escritura colaborativa
  - A través del browser y utilizando una sintaxis muy simple el usuario puede escribir documentos
- MediaWiki es una buena herramienta



- Bitácoras web que recogen artículos periódicos en orden cronológico inverso
- Se concentran en una temática particular:
  - Comida
  - Política
  - Tecnología
- Dan oportunidad a que la gente comente en la bitácora
- Herramientas: Blogger, WordPress



- La sindicación web es una forma de sindicación donde un parte de un portal es hecho disponible para ser usado por otros
- Un portal facilita web feeds:
  - Web feed = documento XML con elementos de contenido (título, descripción) y enlaces a versiones largas del contenido
  - Varios formatos:
    - Rich Site Summary (RSS 0.91)
    - RDF Site Summary (RSS 0.9, 1.0 and 1.1)
    - Really Simple Syndication (RSS 2.0)
    - Atom
- Utilizamos agregadores para subscribirnos a web o podcast feeds
- Promociona un modelo “push” para la web



```

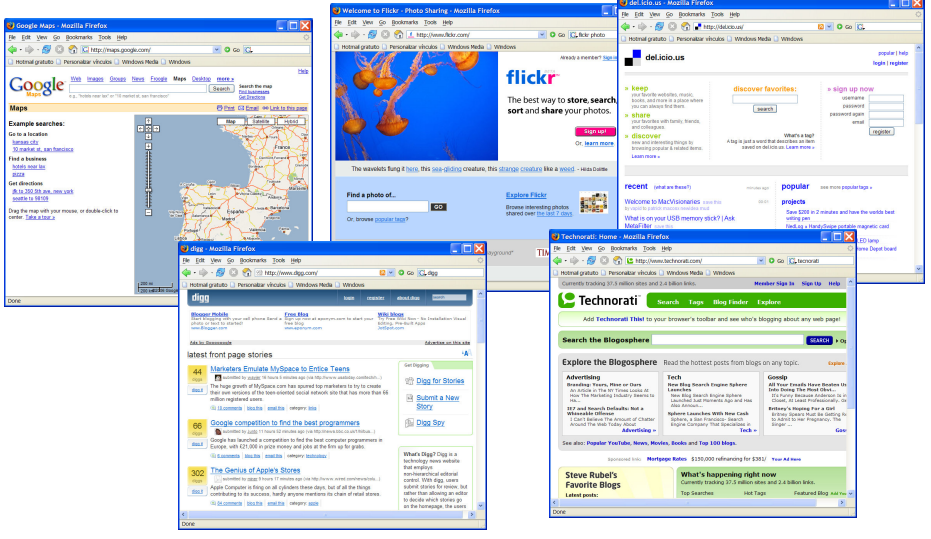
<rss version="2.0">
  <channel>
    <title>Ejemplo de canal</title>
    <link>http://example.com/</link>
    <description>Ejemplo de fuente RSS</description>
    <language>es</language>
    <item>
      <title>1 &lt; 2</title>
      <link>http://example.com/1_less_than_2.html</link>
      <description>1 &lt; 2, 3 &lt; 4. En HTML, &lt;b> y puedes comenzar un enlace con &lt;a href=
      <enclosure url="http://rss.org/mp3s/news1.mp3"
      length="12216320" type="audio/mpeg" />
    </item>
  </channel>
</rss>

```

- Web 2.0 permite ensamblar nuevas aplicaciones “mezclando” funcionalidad de otras aplicaciones Web 2.0:
- Esto es posible gracias a:
  - Disponibilidad de APIs:
    - Google Maps API, permite ligar información de otras fuentes sobre un mapa
    - Otras APIs de eBay, Yahoo, Amazon
  - RSS como una interfaz: es un potente mecanismo de comunicación de cambios en portales y permite integrar datos de diversas fuentes
  - Folksonomías: o anotación comunitaria permite a un portal crear una categorización de sus contenidos de acuerdo a la opinión de sus visitantes.
  - Social networking: es la mejora de una aplicación cuando los usuarios designan su relación con los usuarios del mismo portal o aplicación

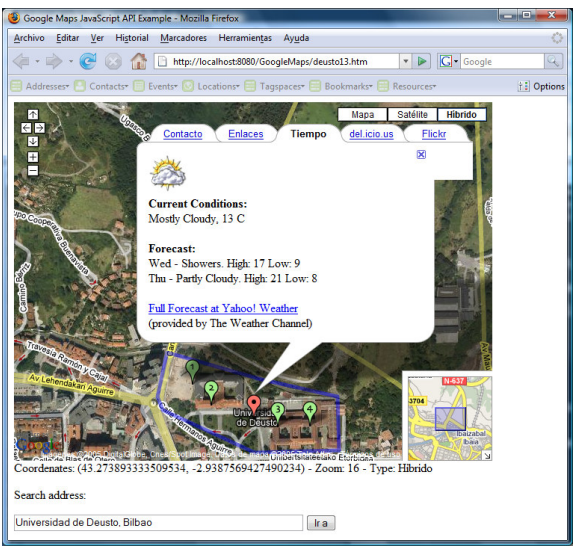
- Mash-up: una aplicación web que combina contenido de varias fuentes en una experiencia integrada
  - <http://www.programmableweb.com/matrix>
- Hay muchos mash-ups basados alrededor de GoogleMaps:
  - <http://googlemapsmania.blogspot.com/>
  - Algunos ejemplos:
    - Tagzania (<http://www.tagzania.com/>)
    - Maplandia.com News Center (<http://www.maplandia.com/news/>)
    - Real-time location of Dublin commuter trains (<http://dartmaps.mackers.com/>)
    - [HousingMaps](#) gets the locations of properties for sale or rent from Craigslist on the fly
    - Cheap Gas (<http://www.mywikimap.com/>)
    - [Chicagocrime.org](#) that taps into Google Maps to display where crimes occur in Chicago (<http://www.chicagocrime.org/map/>)

# Aplicaciones Web 2.0 Famosas



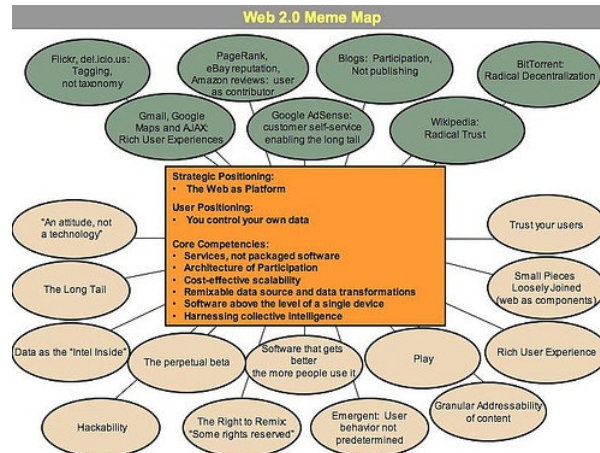
This screenshot displays several popular web 2.0 applications in a browser window. On the left, Google Maps is shown with a map of Bilbao. In the center, Flickr features a photo of jellyfish. To the right, del.icio.us shows a list of bookmarks. Below these, digg.com displays a list of trending stories, and Technorati.com shows a search interface for the blogosphere. The bottom left corner features the MORE logo and 'mobility research lab' text.

# Deusto Mash-up



This screenshot shows a mash-up of Google Maps and weather data. The map is centered on the University of Deusto in Bilbao. A weather popup window displays the following information: 'Current Conditions: Mostly Cloudy, 13 C', 'Forecast: Wed - Showers High: 17 Low: 9', 'Thu - Partly Cloudy High: 21 Low: 8', and a link to 'Full Forecast at Yahoo! Weather (provided by The Weather Channel)'. The bottom of the map shows the coordinates (43.273893333509534, -2.9387569427490234) and the search address 'Universidad de Deusto, Bilbao'. The bottom left corner features the MORE logo and 'mobility research lab' text.





- Web 2.0
  - Blog Dion Hinchcliffe
    - <http://web2.wsj2.com/>
  - Excelente presentación sobre Web 2.0
    - <http://www.squidoo.com/introtoweb20/>
  - Tim O'Reilly – "What Is Web 2.0, Design Patterns and Business Models for the Next Generation of Software"
    - <http://www.oreillynet.com/lpt/a/6228>



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## 5.2. SOA y Web Services

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### Service Oriented Architecture (SOA)



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- Perspectiva de arquitectura software que utiliza servicios para dar soporte a los requerimientos de los usuarios
- Diferentes nodos hacen disponibles servicios que los participantes pueden acceder
- SOA promociona servicios desligados interoperables
  - La interoperabilidad se garantiza a través de la definición de contratos (WSDL)
  - No requiere uso de Servicios Web, aunque es lo normal
- Lenguajes de alto nivel como BPEL o la especificación WS-Coordination permiten orquestar servicios básicos en compuestos representando procesos de negocio



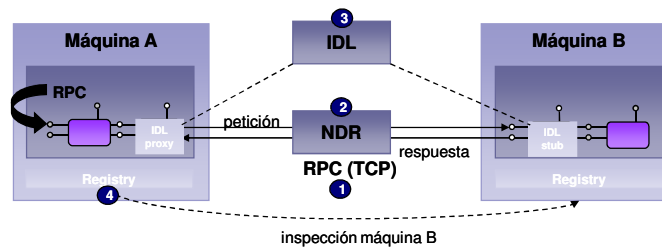
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## Service Oriented Architecture (SOA)

- SOA permite proveer funcionalidad de aplicaciones y su consumo como servicios
- Los servicios pueden ser invocados, publicados y descubiertos
  - Son abstraídos de la implementación mediante una simple interfaz, basada en estándares.
- Conjunto de:
  - políticas
  - prácticas
  - frameworks
  - patrones de arquitectura

## Antes de SOA



- Sin estándares universales no hay interoperabilidad
- Múltiples tecnologías para hacer lo mismo
  - No interoperables entre sí
  - Ligados a una plataforma

	DCOM	CORBA	Java RMI
RPC Protocol	RPC	IIOP	IIOP or JRMP
Message Format	NDR	CDR	Java Ser. Format
Description	IDL	OMG IDL	Java
Discovery	Windows Registry	Naming Service	RMI Registry or JNDI

- Los usuarios no quieren cerrarse a una plataforma
- Es necesaria una arquitectura sin premisas e independiente de ...
  - plataforma
  - lenguaje
  - objetos
  - mecanismos de llamada
- Bienvenido a SOA (Service Oriented Architecture)

- SOA ve el mundo de una forma *distinta*
  - Servicios autónomos
  - Fronteras explícitas, asumir heterogeneidad
  - Plataformas dispares
  - Integración basada en mensajes XML

- Pretende estandarizar el concepto de SOA
  - En Marzo del 2006, el grupo OASIS liberó su primer borrador
    - [http://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=soa-rm](http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=soa-rm)

Término	Definición
<i>Service-Oriented Architecture</i>	Un paradigma para organizar y utilizar funcionalidad distribuida bajo el control de diferentes entidades. Ofrece mecanismos para ofrecer, descubrir, interactuar y usar las capacidades disponibles.
<i>Servicio</i>	Mecanismo mediante el cuál las necesidades de un consumidor son satisfechas con las capacidades de un productor
<i>Orquestación</i>	Mecanismo para la concatenación de servicios
<i>Coreografía</i>	Define mecanismos para la cooperación entre nodos participantes en una arquitectura SOA
<i>Stateless</i>	No depende en ningún estado anterior. Los servicios reciben toda la información que necesitan en la petición.
<i>Directorio</i>	Repositorio que describe los servicios disponibles en un dominio.
<i>Binding</i>	La relación entre un proveedor y un consumidor es dinámica, se establece en tiempo de ejecución.

- SOA promueve la reutilización e interconexión de soluciones IT existentes en vez de empezar desde 0
  - Se ajusta perfectamente a los cambios de mercado
- SOA es una evolución de enfoques anteriores
- El uso de SOA implica la importancia de definir interfaces bien definidas e interoperables
  - Reduce los costes de integración y permite la evolución dinámica

- Según Gartner:
  - *“By 2008, SOA will be a prevailing software engineering practice, ending the 40-year domination of monolithic software architecture (0.7 probability)”*

- Gestión de los metadatos de servicios
- Niveles de seguridad apropiados, ya que se usan servicios externos
  - WS-Security definido para dar respuesta a esto
- SOA y WS-\* está en evolución
  - Pocos profesionales que dominan estas tecnologías

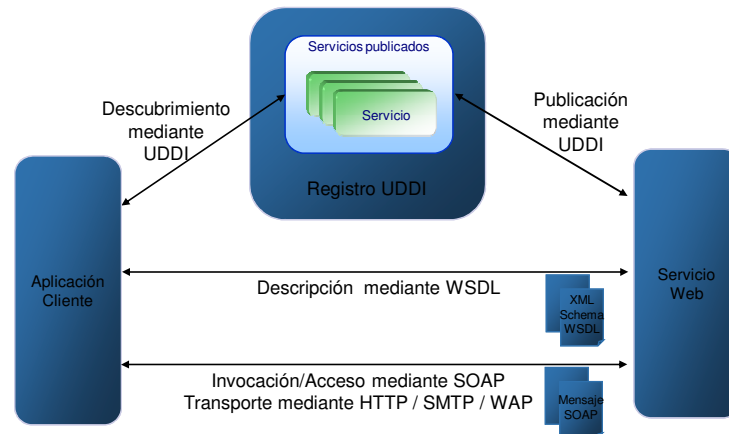
- Los Servicios-Web son la clave de SOA
- Redefinición de las tecnologías distribuidas basada en XML
  - Comunicación vía protocolos de Internet
    - HTTP, SMTP, FTP...
  - SOAP como formato de mensaje
  - WSDL como definición de servicios
  - UDDI como localizador de Servicios-Web

<b>UDDI</b>	Registro de WS
<b>WSDL</b>	Descripción de WS
<b>XSD</b>	Sistema de tipos Portable
<b>SOAP</b>	Protocolo de mensajes
<b>XML 1.0 + Namespaces</b>	Mensajes Serializados

- Protocolos
- Lenguajes de Descripción
- Mecanismos de Descubrimiento

Ver [ws-i.org](http://ws-i.org) para  
mas detalles





- Los WS básicos (XSD, SOAP, WSDL, UDDI) consiguen una comunicación básica
  - Proporcionan intercambio básico de mensajes XML
  - Interconexión de sistemas heterogéneos
  - La compartición de esquemas permite mayores abstracciones
- Pero, la mayoría de las aplicaciones empresariales necesitan **MÁS...**

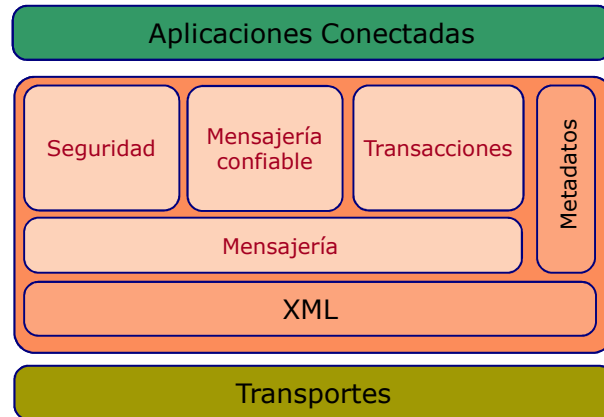
- Los Servicios-Web tienen muchas necesidades comunes
  - Modelo de seguridad 'orientado a mensajes'
  - Mensajería estable y confiable
  - Soporte de Transacciones (entre WS)
  - Mecanismos de Direccionamiento y Ruteo
  - Mensajería Asíncrona
  - Metadatos para 'Políticas' de WS
  - Soporte para datos binarios

- SOAP proporciona un marco de trabajo para gestionar aspectos nuevos
  - Header/Body permiten extensibilidad

```
<soap:Envelope
  xmlns:soap="...">
  <soap:Header>
    <!--Extensibilidad estándar con Cabeceras -->
  </soap:Header>
  <soap:Body>
    <!-- Trabajo -->
  </soap:Body>
</soap:Envelope>
```

- WS-\* (nuevas ESPECIFICACIONES WS) extiende SOAP con cabeceras estándar
  - Hay implementaciones de diferentes fabricantes (IBM, Sun, MS, etc.)
- Especificaciones estándar definidas en:
  - <http://www.oasis-open.org>

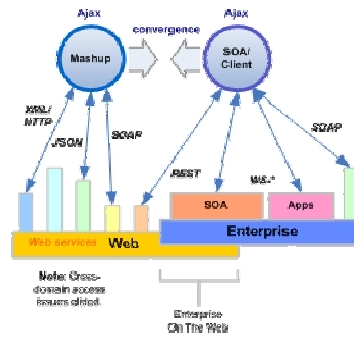
- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>■ <b>Messaging</b><ul style="list-style-type: none"><li>□ WS-Addressing</li><li>□ WS-Eventing</li><li>□ MTOM (Attachments)</li></ul></li><li>■ <b>Reliability</b><ul style="list-style-type: none"><li>□ WS-ReliableMessaging</li></ul></li><li>■ <b>Security</b><ul style="list-style-type: none"><li>□ WS-Security</li><li>□ WS-Trust</li><li>□ WS-SecureConversation</li><li>□ WS-Federation</li></ul></li></ul> | <ul style="list-style-type: none"><li>■ <b>Transactions</b><ul style="list-style-type: none"><li>□ WS-Coordination</li><li>□ WS-AtomicTransaction</li><li>□ WS-BusinessActivity</li><li>□ BPEL</li></ul></li><li>■ <b>Metadata</b><ul style="list-style-type: none"><li>□ WS-Policy</li><li>□ WS-PolicyAssertions</li><li>□ WS-PolicyAttachment</li><li>□ WS-SecurityPolicy</li><li>□ WS-Discovery</li><li>□ WS-MetadataExchange</li></ul></li></ul> |
|---|--|



- **WS-Addressing**
  - Permite el paso de referencias a una implementación de un servicio web
  - Conjunto de propiedades
- **MTOM (Message Transmission Optimization Mechanism)**
  - Método para el envío eficiente de datos binarios
- **WS-Security**
  - Permite la autenticación entre peers
  - Confidencialidad en los mensajes
- **WS-ReliableExchange**
  - Garantiza el envío robusto de mensajes
- **WS-Eventing**
  - Permite un modelo de comunicación publish/subscribe en SOA

- Convergencia Web 2.0 y SOA
  - Web 2.0 = Global SOA
  - Web 2.0 interfaz para SOA
- SOA:
  - Más centralizada, controlada
  - Sin interfaz
- Web 2.0 requiere de SOA

### Web 2.0-style Ajax mashups and SOA/Clients are converging



- WOA
- HTML 5
- RIA
- Cloud Computing

### ■ SOA

- The Next Big Thing: Service-Oriented Architecture (SOA) Takes a New Route

- [http://java.sun.com/developer/technicalArticles/Interviews/routeone\\_qa.html?feed=JSC](http://java.sun.com/developer/technicalArticles/Interviews/routeone_qa.html?feed=JSC)

- OASIS SOA Reference Model

- [http://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=soa-rm](http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=soa-rm)

### ■ WS-\* Specifications

- An Introduction to the Web Services Architecture and Its Specifications

- <http://msdn.microsoft.com/webservices/webservices/building/wse/default.aspx?pull=/library/en-us/dnwebsrv/html/introwsa.asp>

- WS-BPEL Guide

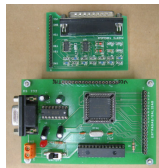
- <http://smartcomps.kgbinternet.com/confluence/pages/viewpage.action?pageId=182>



## 5.3. Practical Case: Deusto WebLab y Deusto Sentient Graffiti

Dr. Diego Lz. de Ipiña Gz. de Artaza  
<http://paginaspersonales.deusto.es/dipina>  
<http://www.morelab.deusto.es>  
<http://www.ctme.deusto.es>

- En la Universidad de Deusto tenemos nuestro propio WebLab
  - Financiado por:
  - Gobierno Vasco
  - Universidad de Deusto
- Lo están utilizando alumnos en prácticas de asignaturas
  - 3º de Ingeniería Técnica Industrial especialidad en Electrónica Industrial, 2º semestre del curso 2004-2005, con PLDs
  - 5º de Ingeniería en Automática y Electrónica Industrial, 1º semestre del curso 2005-2006, con FPGAs
  - 3º de Ingeniería Técnica Industrial especialidad en Electrónica Industrial, 2º semestre del curso 2005-2006, con PLDs



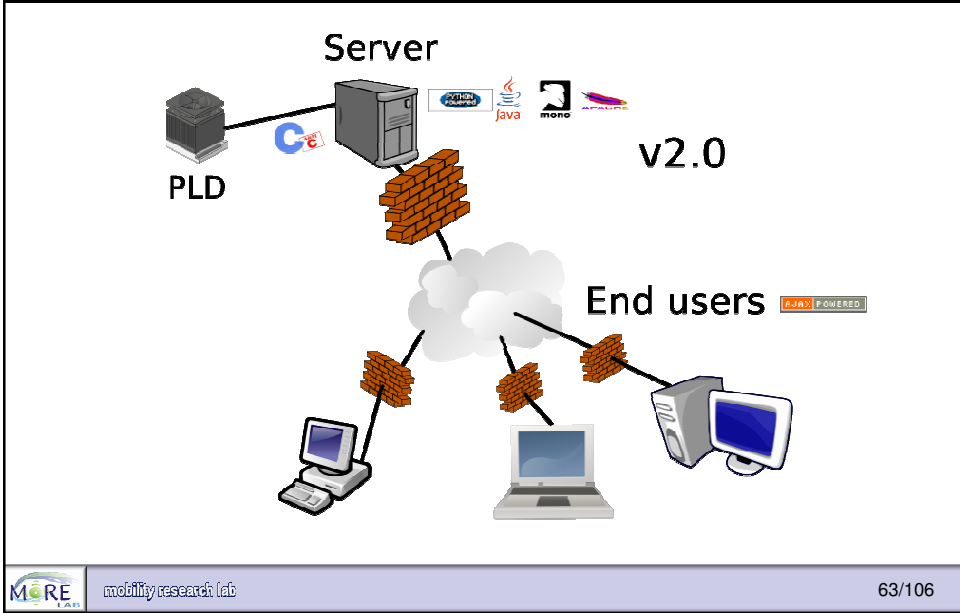
### WebLab PLD DEUSTO

Acceso al WebLab de lógica programable de la Universidad de Deusto:

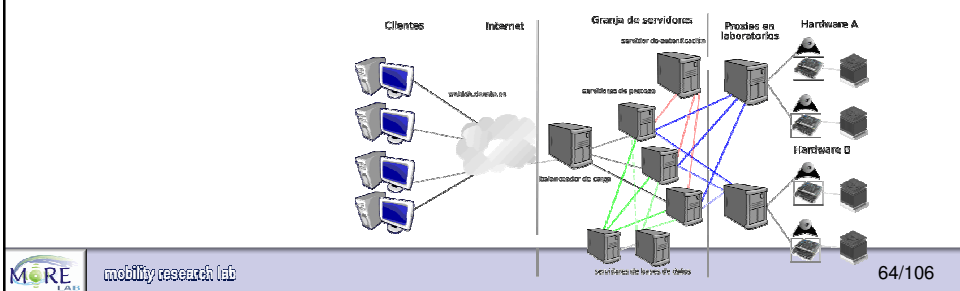


UNIVERSIDAD DE  
DEUSTO



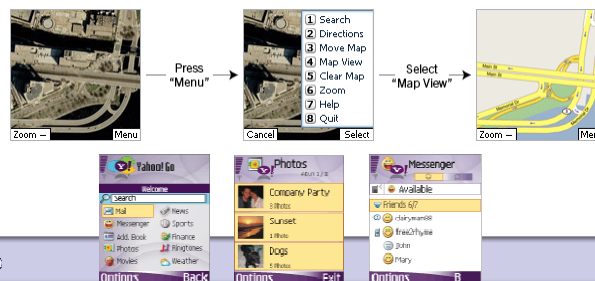


- Presented as a STREP project to VII Framework Program
  - Overall SOLA/Web2.0-based system architecture
  - Semantic Annotation of Remote Labs
  - Management, Security, authentication and charging
  - IDE tool to facilitate the automatic creation of Remote Lab Mash-ups
  - Firmware to make electronic equipment SOLA-aware





- Mobility 2.0 = Mobile Web 2.0
  - Web sites are becoming programmable
  - PROBLEM: We enjoy Web 2.0 in desktop but in mobile devices?
- Some relevant examples:
  - Google's Local for Mobiles (<http://www.google.com/glm/>)
  - Yahoo! Go Mobile (Contacts, Email, Photos, Messenger)  
<http://go.connect.yahoo.com/go/mobile>
  - Moblog clients (Mobile Blogger, KABLOG)



- Mobile Mash-up: a web application adapted to mobile devices combining content from several sources into an integrated experience
  - Traditional mobile phone-based data usage is downstream
  - Mobile Mash-ups can definitely push the upstream usage
- Some cool mobile mash-ups:
  - Mobile Gmaps displays [Google Maps](#), [Yahoo! Maps](#), [Windows Live Local](#) and [Ask.com Maps](#) and satellite imagery on Java ME devices (<http://www.mgmaps.com/>)
  - Shozu = basic blog XML-RPC services + photo upload (<http://www.shozu.com/portal/>)
  - Socialight (<http://socialight.com>) places virtual "sticky" notes anywhere in the real world.
    - A StickyShadow = media (text, picture) + access rights + location
  - Jaiku – bring people closer together by enabling them to share their presence
    - <http://jaiku.com/about>

- Two main models:
  - **Browsing apps**, web apps which take into account limitations unique to mobility (e.g. small device)
    - Client capable of hardly any processing
    - XHTML (ASP.NET Mobile Web Controls & JSF)
  - **Smart Client apps**: downloaded and installed in the device
    - Capable of some processing, storage and intermittent communication
    - J2ME, Compact.NET, Python for Series 60, BREW uiOne, Flash Lite
  - Other minor ones: **hybrid?**, SIM, messaging and embedded apps
- Current problems of mobile space apps:
  - Few mobile services are profitable (broadcast ones)
  - No consensus, same application developed for several platforms

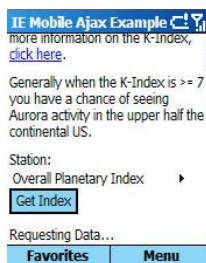
- AJAX is a very important facet of Web 2.0
  - Avoids start-stop cycles thanks to Ajax Engine
    - The AJAX engine emits asynchronous calls to the server
    - The user **does not wait**
  - A combination of a number of existing technologies.
  - Solves two problems:
    - Superior UI experience
    - Standardised form of data retrieval

But NOT so much presence in mobile devices !!!

- Will AJAX replace J2ME, Compact.NET or XHTML as the platform to develop Mobile Applications?
  - AJAX (Asynchronous JavaScript and XML) makes **even more sense in the mobile space as it enables the creation of Web based services that are so fast they seem like local apps**
    - So far limited input and slow network connections prevented wider adoption
    - Now, simply load the AJAX app in the mobile and use XML to exchange data with the server:
      - Bandwidth constraint no problem any longer
      - Transparently update the information on the mobile

BUT WE NEED FLAT RATES AND ACCESS TO PHONE APIS!!!

- All the devices that come with Opera Browser or Windows Mobile 5 support AJAX
  - High range Nokia s60 a s90
  - Nokia 770
- Small Rendering Technology paramount !!!



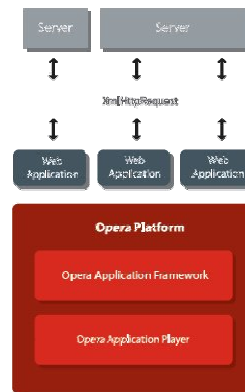
## Hybrid approach: Opera Platform

- AJAX development on mobile devices is possible with the Opera Platform, code named Freedom
  - Based on well-known Web Technologies such as HTML, CSS and JavaScript <http://www.opera.com/platform> (homepage)
    - <http://my.opera.com/operaplatform/links/> (documentation & tools)
- Features:
  - Enables integration between:
    - Handheld devices' local applications
    - Opera Browser environment
    - Operator's online content
  - Allows operators to push their content and services on the handset
  - Hybrid between Browsing and Smart Client apps



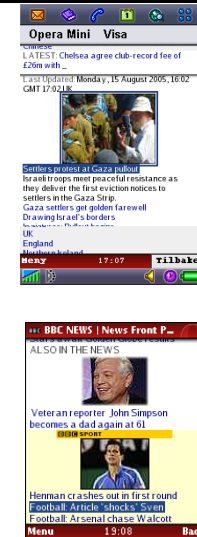
## Opera Platform SDK

- The Opera Platform architecture consists of three parts:
  - **Application Player**, an extended version of the Opera browser, provides web applications with access to native phone functionality such as messaging, calendar, battery and signal status.
  - **Application Framework**, which supports interaction between installed web applications.
    - It also offers predefined UI elements, such as menu systems and dialog boxes to ease application development, according to Opera.
  - **Web applications** created with open standard technologies such as HTML, CSS and JavaScript.
    - Access the phone's functionality through the Opera Platform DOM interface
    - Communicate with servers using XMLHttpRequest



## Opera Mini: Customizing Web Rendering

- Opera Mini is a Java ME web browser for mobile devices
  - Versions for low and high memory phones
- Fetches content through a proxy that runs the layout engine of the Opera desktop browser
  - Proxy uses Small Rendering Technology to reformat webpages
  - Content compressed 70-90% and delivered in OBML



## Google Maps Mashups & Where 2.0

- There are many original mash-ups out there based on GoogleMaps:
  - <http://googlemapsmania.blogspot.com/>
- Some examples:
  - Maplandia.com News Center (<http://www.maplandia.com/news/>)
  - Real-time location of Dublin commuter trains (<http://dartmaps.mackers.com/>)
  - [HousingMaps](#) gets the locations of properties for sale or rent from Craigslist on the fly
  - Cheap Gas (<http://www.mywikimap.com/>)
  - [Chicagocrime.org](#) that taps into Google Maps to display where crimes occur in Chicago (<http://www.chicagocrime.org/map/>)
- Where 2.0 is a conference that gathers people on location-based web apps

## An Interesting Mobile Mash-up Scenario

- “I was sitting in the back of a cab one Saturday evening. I was using Kmaps (<http://kmaps.ulocate.com/>) to pull up listings of the closest restaurants. I choose one based on user posted reviews, directed the driver using an attached Google Maps mash-up, and upon arrival, tagged the map with my precise location so my friend could meet me. My friend wanted to know what the restaurant was serving before he decided to come so I snapped a picture of the menu, uploaded a quick picture and note to my blog with my tagged location and was immediately called by a 3rd friend who had seen the blog post and wanted to come as well”
  - [http://marketspaceadvisory.typepad.com/marketspace\\_advisor/2006/02/adventures\\_with.html](http://marketspaceadvisory.typepad.com/marketspace_advisor/2006/02/adventures_with.html)

## Ubiquitous Web & Geofolksonomies

- Ubiquitous Web (UW) = pervasive web infrastructure in which all physical objects are resources accessible by URIs, providing information and services that enrich users' experiences in their physical context as the web does in the cyberspace
  - Apps dynamically adapt to the user's needs, device capabilities and environmental conditions.
- Making UW reality:
  - Social tagging is a very efficient way of categorizing resources on the web, e.g. del.icio.us
  - GeoFolksonomies = social tagging of geographic locations, e.g. Tagzania, mobile version?
  - AwareFolksonomies = users may associate objects with contextual attributes and metadata
    - If the contextual attributes are met the metadata is made available

- We want to make Ubiquitous Web reality through an Aware Folksonomy:
  - Mixing social tags, location, profiles, preferences, Semantic Web
- **Goal:** enable the edition, discovery and navigation of virtual post-it notes placed in the Deusto campus
  - A post-it note is an XML document with some contextual attributes (profile of creator, location, time interval, attributes (tags))
  - An inference engine will in real-time match the mobile device owner's context against the available post-it notes at his location
  - Should work both indoors (RFID) and outdoors (GPS)
  - Should enable transparent handoffs between Wi-Fi and GPRS
- Hardware requirements: Wi-Fi, GPRS/UMTS, GPS, RFID

- Web Map Service (WMS) produces a map from a URL
  - map = portrayal of geographic information as a digital **transparent** image file (.GIF o .PNG)
  - URL indicates what information is to be shown on the map:
    - portion of the earth
    - desired coordinate reference system
    - output image width and height
  - Specification managed by Open Geospatial Consortium (OGC)
    - [http://portal.opengeospatial.org/files/?artifact\\_id=5316](http://portal.opengeospatial.org/files/?artifact_id=5316)
- Overlay Custom Maps over Google Maps
  - <http://blog.kylemulka.com/?p=287>
  - <http://johndeck.blogspot.com/>
- Automatic Tile Cutter (retrieves .PNGs from Google Maps Tile Server)
  - [http://mapki.com/index.php?title=Automatic\\_Tile\\_Cutter](http://mapki.com/index.php?title=Automatic_Tile_Cutter)
- Geocoders: assigning geographic coordinates (e.g. latitude-longitude) to street addresses

## Conclusion

- Arrival of Web 2.0 dynamic asynchronous interfaces to mobile devices will make us forget WAP's bad experience
- Mobile Mash-ups can foster up-stream data usage
  - Mobile operator's can significantly increase ARPU
- Mobile Mash-ups can be really helpful and are finally reality with available mature platforms
  - Hybrid browsing/smart client platforms seem the future
- What about Mobile Context-Aware Mash-ups research opportunities?

## References

- Mobile web 2.0: AJAX for mobile devices
  - Ajit Jaokar Blog: <http://opengardensblog.futuretext.com>
- Russel Beattie Notebook
  - <http://www.russellbeattie.com/notebook/>
- Mobility 2.0
  - C. Enrique Ortiz' Mobility Weblog – <http://www.cenriqueortiz.com/weblog/>
- Annotate your own multimedia map
  - <http://www.engadget.com/2005/03/08/how-to-make-your-own-annotated-multimedia-google-map/>
- Simple Google Maps example in Python
  - [http://gpswanderer.blogspot.com/2005\\_04\\_01\\_gpswanderer\\_archive.html](http://gpswanderer.blogspot.com/2005_04_01_gpswanderer_archive.html)
- Python for Series 60
  - <http://www.forum.nokia.com/python>
- XML APIs for creating mashups
  - <http://www.programmableweb.com>
- W3C MWI & Mobile Web 2.0
  - <http://blog.webservices.or.kr/hollobit/presentation/ngweb2006-hollobit.pdf>






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Deustuko Unibertsitatea



A Web 2.0 Platform to Enable Context-Aware Mobile Mash-ups  
<http://www.smartlab.deusto.es/dsg>


Dr. Diego López de Ipiña, Raúl de Benito y Rubén Abuín



European Conference on Ambient Intelligence  
November 7-10, 2007 - Darmstadt, Germany


**AmI-07**

Outline



Universidad de Deusto  
Deustuko Unibertsitatea

- Motivation
  - Research aim
- Mobile Ubiquitous Web 2.0
- Sentient Graffiti
  - Concept
  - Software Architecture
  - Platform features
  - Application types and examples
- Conclusion



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## Motivation



- Aml aims to adapt the behaviour of a context-aware environment *intelligently* to the user preferences and habits
- Current situation:
  - Environments heavily instrumented with sensors and actuators
  - Mobile devices enable interaction anywhere at anytime
    - User-controlled (explicit) & system-controlled (implicit)
- **Is Aml possible without heavy environment instrumentation?**
  - YES, IT SHOULD if we want to increase Aml adoption!!!



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## Research Aim



- **Aim**
  - Lower the barrier of developing and deploying context-aware applications in *uncontrolled* global environments
- **HOW?**
  - Converging mobile and ubiquitous computing with Web 2.0 into **Mobile Ubiquitous Web 2.0**
    - Adding context-aware social annotation to physical objects and locations in order to achieve Aml



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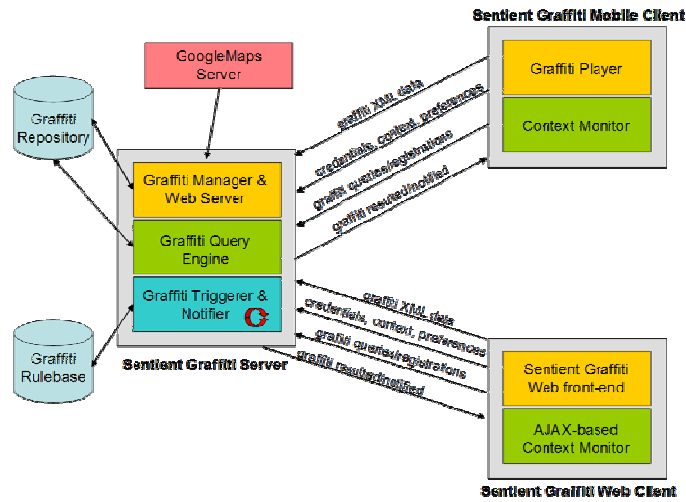
- **Current capabilities of mobile devices**
  - Ideal intermediaries between us and our environment
- **Web as a platform: Web 2.0 mobile mash-ups**
  - Allow discovery & consumption of services anywhere/anytime
- **Ubiquitous Web/Internet of Things paradigm**
  - Physical world entities integrated into web of information and services
- **Context-Aware Folksonomies of objects & places**
  - Provide efficient discovery, filtering, and consumption

- **What does it do?**
  - Annotate every physical object or spatial region with info or services
    - Both indoors and outdoors
  - Filter annotations associated to surrounding resources based on user context and keyword filtering
  - Enable user interaction with the smart object and spatial regions both in a PUSH and PULL manner
- **Requirement**
  - Participation in a community of users interested in publishing and consuming context-aware empowered annotations and services

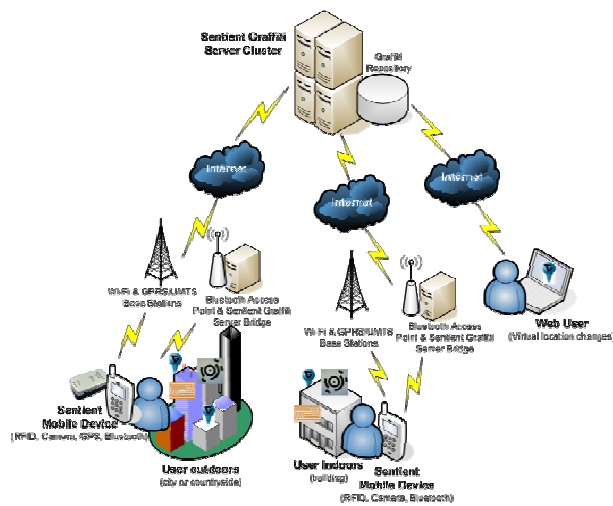
- **Virtual Graffiti**
  - XML file = content + keywords + context (who, when, where, viewers, range, time & date period, times)
- **Graffiti Authoring & Bookmarking**
  - Web and mobile front-ends, mobile context sensing
- **Graffiti Filtering, Triggering and Querying**
  - Pull and push context-based graffiti availability
- **Graffiti Consumption and Archiving**
  - Garbage collection & Past context-retrieval
- **WikiGraffitis**
  - User participation with comments and content enhancements
- **Graffiti Domain**
  - Groups of related keywords

- **User's view**
  - Graffiti annotation
    - Descriptions, keywords, contextual attributes
  - Graffiti discovery and consumption
    - TRIP (<http://paginaspersonales.deusto.es/dipina/tripweb>), RFID, NFC, GPS
- **System's view**
  - Context-Aware Folksonomy
    - Tag/keyword-based
  - Context-Aware Mash-up
    - GoogleMaps + our server back-end

# DSG Architecture



# Sentient Graffiti Deployment



## Platform Features: HTTP API



- **Goals:**
  - Model every physical object (identified by TRIP or RFID tag) or spatial region (GPS or Bluetooth proximity) whose information or services may be consumed
  - Provide only the annotations associated to surrounding resources available under users' current contextual conditions or desired filtering requirements
  - Facilitate explicit user-controlled interaction with the smart object and spatial regions encountered by a mobile user or a web user
- An **HTTP API** which gives access to the SG infrastructure is available to third-party developers who can use the Java SE and ME-compatible library provided to program against it:
  - **PULL-mode methods:**
    - LOGIN\_USER, GET\_GRAFFITIS, GET\_GRAFFITIS\_BY\_TRIP, GET\_GRAFFITI\_DETAILS, GET\_MAP\_TILES, SET\_USER\_LOCATION, SET\_USER\_FILTERS, SAVE\_GRAFFITI, CANCEL\_GRAFFITI, LOGOFF
  - **PUSH-mode methods:**
    - ACTIVATE\_PUSH\_MODEL, NOTIFY\_GRAFFITIS



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## Platform Features: Inference Engine



```
{
  graffiti (?graffiti_id, ?graffiti_title, ?graffiti_desc, "GPS",
    ?graffiti_creation_date, ?graffiti_content) and
  graffiti_location(?graffiti_id, ?graffiti_location, ?graffiti_viewing_range) and
  graffiti_tags(?graffiti_id, ?graffiti_tagSet) and
  graffiti_visibility_restriction(?graffiti_id, ?graffiti_viewing_restrictions) and
  user (?user_id) and
  test (validUserFilter(?user_id, ?graffiti_viewing_restrictions)) and
  ( user_location_restriction(?user_id, ?user_location, 0) or
    (user_location_restriction(?user_id, ?user_location, ?user_viewing_distance) and
      test(validDistanceFilter(?user_location, ?graffiti_location,
        ?user_viewing_distance))
    )
  ) and
  user_tag_restrictions(?user_id, ?user_tagSet) and
  test(validTagFilter(?user_tagSet, ?graffiti_tagSet))
}
=>
{
  notifyEvent(SG$ShowGraffitiForUser(?user_id, ?graffiti_id));
}
```



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## Multi-modal Interaction



- Sentient Graffiti simplifies human-to-environment interaction through **four mobile mediated interaction modes**:
  - **Pointing** – the user points his camera phone to a bi-dimensional visual marker and obtains all the graffitis associated with it
  - **Touching** – the user touches an RFID tag with a mobile RFID reader bound to a mobile through Bluetooth (or NFC mobile) and obtains the relevant graffitis
  - **Location-aware** – mobiles equipped with a GPS in outdoor environments obtain the relevant nearby graffitis in a certain location range
  - **Proximity-aware** – the device retrieves all the graffitis published in nearby accessible Bluetooth servers when it is in Bluetooth range



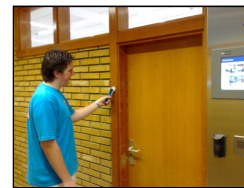
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## Sentient Graffiti &



- **Near-Field-Communication (NFC)** is a combination of contact-less identification and interconnection technologies enabling wireless short-range communication between devices and smart objects.
  - Range about 20 cm, 13.56 MHz band
  - Enables 3 types of services:
    - Service initiation and configuration
    - P2P (peer to peer) data sharing and communication
    - Payment and ticketing
  - **Key enabler for the upcoming Internet of Things**
- **How does Sentient Graffiti leverage from NFC?**
  - **Touching interaction through NFC**
    - MIDP 2.0 Push Registry and NFC are combined to prevent users from starting mobile client before interacting with RFID augmented objects
  - **Proximity-aware interaction through NFC**
    - Nokia NFC 6131 and Bluetooth SG servers are bound by simply touching an RFID tag with a mobile



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# Sentient Graffiti Web Client



The screenshot displays the Deusto Sentient Graffiti web client interface. It features a top navigation bar with the site title and language options (English, Castellano, Euskara). The main content area is divided into several panels:

- Graffiti Information:** A form for creating or editing graffiti, including fields for title, description, location, and visibility settings.
- Graffiti Domain Information:** A section for managing domain-specific graffiti, with fields for name and description.
- Search Filter:** A panel for filtering graffiti based on various criteria.
- Map:** A satellite map showing the location of graffiti tags on the Deusto campus.

At the bottom of the interface, there is a footer with the MORE LABS logo, the text "mobility research lab", and the slogan "A Web 2.0 Platform to Enable Context-Aware Mobile Mash-ups".

# Sentient Graffiti Web Client



This screenshot shows a detailed view of a graffiti tag on the Deusto Sentient Graffiti web client. The interface includes a top navigation bar with the site title and language options (EN, ES, EU). Below the navigation bar, there is a menu with options: "Menú Principal", "Editar Perfil", "Lista de Tags", "Administración", and "Salir".

The main content area features a satellite map of the Deusto campus. A graffiti tag is visible on the map, with a pop-up window displaying the following information:

- Title:** Web 2.0, Mobile Devices and Ubiquitous Web
- Description:** A Conference given by Dr. Diego Lz. de Ipiña Gz. de Arbizu at Blogak 2.0
- Author:** Diego Lopez de Ipiña at Blogak 2.0
- Actions:** Review comments (0) and Contact admin

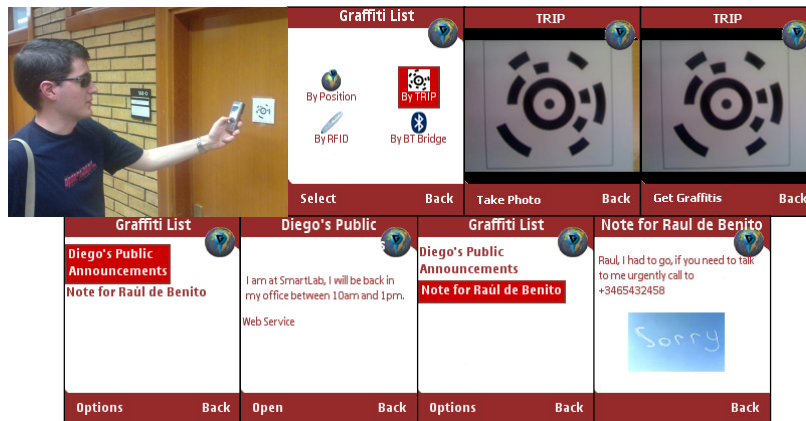
At the bottom of the interface, there is a footer with the MORE LABS logo, the text "mobility research lab", and the slogan "A Web 2.0 Platform to Enable Context-Aware Mobile Mash-ups".



## SG Application Types & Examples

- **Available prototypes:**
  - **Marker-associated Graffitis:** Virtual Notice Board
    - Public/private graffitis, expiration time, remote review, user participation
  - **Bluetooth-range Graffitis:** University Services Booth
    - Individual, group and private graffitis, tag-based (OPEN\_DAY)
  - **Location-range Graffitis:** Bus Alerter
    - Third-party SG clientes
- **Other possible applications:**
  - City Tour: Bilbao\_tourism Graffiti Domain
  - Conference: AmI-07 → feedback, expiration after conference
  - Publicity: Graffiti expiration after N times
  - Friend meetings
  - Disco/stadium/office blogs

## Marker-associated Graffitis: Virtual Notice Board



# Bluetooth-range Graffitis: University Booth



	<b>Graffiti List</b> By Position By TRIP By RFID By BT Bridge Select Back	<b>Graffiti List</b> <b>Digital Informatio Booth</b> <b>We're at the Cafeteria</b> Options Back	<b>Digital Informatio Booth</b> Here you can access services and information relative to the Faculty of Engineering Web Service Open Back
	<b>SG UD</b>  Universidad de Deusto Entrar	<b>SG Menu</b> Menú: <a href="#">Inf.General</a> <a href="#">Consulta de notas e-mail</a> <a href="#">Noticias</a> <a href="#">Cátedra Telefónica</a> <a href="#">Móviles</a> <a href="#">Ayuda</a>	<b>Graffiti List</b> <b>Digital Informatio Booth</b> <b>We're at the Cafeteria</b> Options Back



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# Location-Range Graffitis: Bus Alerter



<b>Deusto Sentient Graffiti</b> EN ES EU Main Menu User Tag List Administration Logout	
	<b>Filters</b> 129 domains: Tags: BILBAO_TRANSPORT Bluetooth Address Location Range (m) 100 Options Back
	<b>Sentient Graffiti</b> Graffiti List Map New Graffiti Settings Select Exit <b>University Bus Stop (22)</b> Unibertsitate (22) Codigo Seleccionado: 124 Hora actual: 16:03:59 Línea: 11-Deusto-Aburi Tiempo Restante: 19' Línea: 71-San Ignazio-Miribilla Tiempo Restante: 9' Back
Logged in as: Rubén Abujón	



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## Third-Party Mobile Application using Sentient Graffiti HTTP API



## Conclusions

- Sentient Graffiti is a **platform which promotes a more extensive adoption of Aml in global environments** (cities, cars, hospitals, homes) without imposing deployment and maintenance hassles, offering the following features:
  - **Context-aware** to filter and select most appropriate smart objects' content and services for users
  - Encourages the **creation of third party context-aware mash-ups** through its HTTP API
  - Based on **standard web technologies** lowering its adoption barrier
  - Enables **multi-modal interaction between users and environment** through generic mobile client
  
- **Further work:**
  - Evaluate SG in a mobile social software community
  - Adopt Semantic Web context modeling

**A Web 2.0 Platform to Enable Context-Aware Mobile Mash-ups**

<http://www.smartlab.deusto.es/dsg>

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Faculty of Engineering (ESIDE), University of Deusto, Bilbao, Spain

**DEMO AVAILABLE**

SmatLab website: <http://www.smartlab.deusto.es>

MoreLab Research Group: <http://www.morelab.deusto.es>

Cátedra de Telefónica Móviles: <http://www.ctmd.deusto.es>



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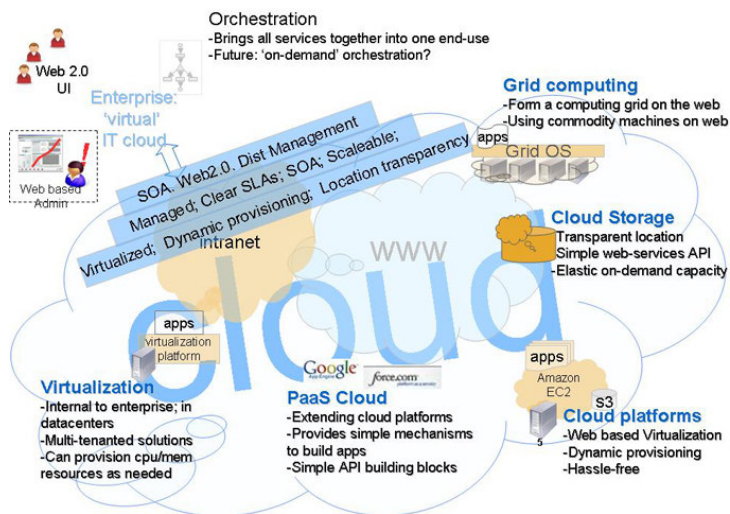


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## 5.4. – Web Semántica y Servicios Web

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- Revisar Apéndice-C sobre Web Semántica.



- HTML 5 provides a number of new [elements](#) and attributes that reflect typical usage on modern [Web sites](#).
  - Some of them are [semantic](#) replacements for common uses of generic block (<div>) and inline (<span>) elements, for example <nav> (website navigation block) and <footer>.
- Some deprecated elements from [HTML 4.01](#) have been dropped for authoring use, including purely presentational elements, such as <font> and <center>, whose effects are handled by [CSS](#).
  - There is also a renewed emphasis on the importance of [DOM scripting](#) in Web behavior.
- The HTML5 syntax is no longer based on [SGML](#) despite its markup being very close. It has, however, been designed to be backward compatible with common parsing of older versions of HTML.

- Future Internet
- System of Systems
- WOA
- Web 3.0
- HMTL 5.0
- Mobile RIA + Cloud Computing
- Semantic Sensor Web

- [http://blogs.progress.com/soa\\_infrastructure/weboriented\\_architecture\\_woa/](http://blogs.progress.com/soa_infrastructure/weboriented_architecture_woa/)
- **Referencias:**
  - [http://www.businessweek.com/technology/content/aug2008/tc2008082\\_445669\\_page\\_3.htm](http://www.businessweek.com/technology/content/aug2008/tc2008082_445669_page_3.htm)
  - [http://blogs.progress.com/soa\\_infrastructure/weboriented\\_architecture\\_woa/](http://blogs.progress.com/soa_infrastructure/weboriented_architecture_woa/)

- **RDF:**
  - [http://www.javaworld.com/javaworld/jw-12-2005/jw-1205-wicked\\_p.html](http://www.javaworld.com/javaworld/jw-12-2005/jw-1205-wicked_p.html)
- **OWL:**
  - A No-Nonsense Guide to Semantic Web Specs for XML People
    - <http://www.betaversion.org/~stefano/linotype/news/57/>



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## Tema 5 – Web 2.0, Semantic Web and Ubiquitous Web

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