

# Towards Accessible Semantic Web Applications

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# Introduction

- Introduction

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- The rapid development of information technologies is changing the way service providers interact with their users.
- The people with disabilities are being excluded, they have problems of accessing information services.
- Other excluded users:
  - The disabilities as a function of age
  - The people in adverse conditions

# Introduction

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- The integration of accessibility into technologies follows the principle “Universal Design”.  
Must it to be unique?
- Standardization and normalization very relevant works like.
  - WAI, Web Accessibility Initiative



- Legislation:
  - <http://www.w3.org/WAI/Policy/Overview.html>

# Motivations

## Are the information technologies ready?

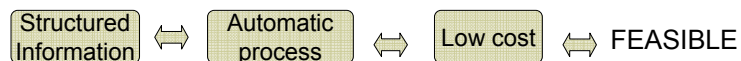
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- Statement of Accessibility on Web applications
  - Not follows the principle “Universal Design”.
  - Seems accessible, but only in part of the site or sometimes in time.
- To obtain a complete accessibility is ‘expensive’.
  - If not included: because introducing accessibility is very ‘expensive’, unfeasible or on-going work.
  - If it is included, it has a maintenance with high costs (manual process) and difficult supporting.

# Objectives

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- The problem: The information isn't structured and the process cannot be automated.



- Developing Web applications.
  - The Design Methodology like User Sensitive Inclusive Design. User Centered Design.
  - Developing on standards
    - Reduced maintenance costs
    - Benefit from accessibility designs

# Objectives

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## ■ Two problems to solve:

1. To structure information.
2. Automate the publication process in an accessible way.

Our proposal is based on **Semantic Web**.

# Proposal

## based on Semantic Web

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## ■ To use the formalism of ontologies to reach both purposes:

1. To structure information: **Knowledge Ontology** based on a domain
2. Automate the publication process in an accessible way: **View-Model**

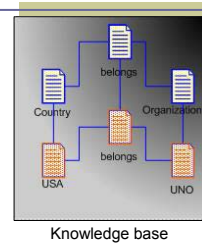
To create a view over the knowledge ontology model, that it's done through other ontology.

# Proposal

## Knowledge Ontology

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- The intention of the ontology is to express a reality, but not visualizing nor including accessibility criteria.



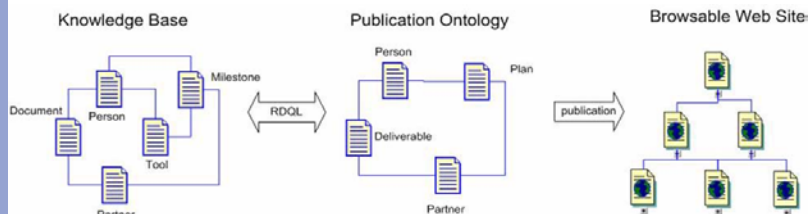
- In our proposal it's necessary therefore:
  - To obtain accessibility by extending the model of the knowledge ontology.
  - To obtain a visualization of the ontology by using the view-model

# Proposal

## View-model

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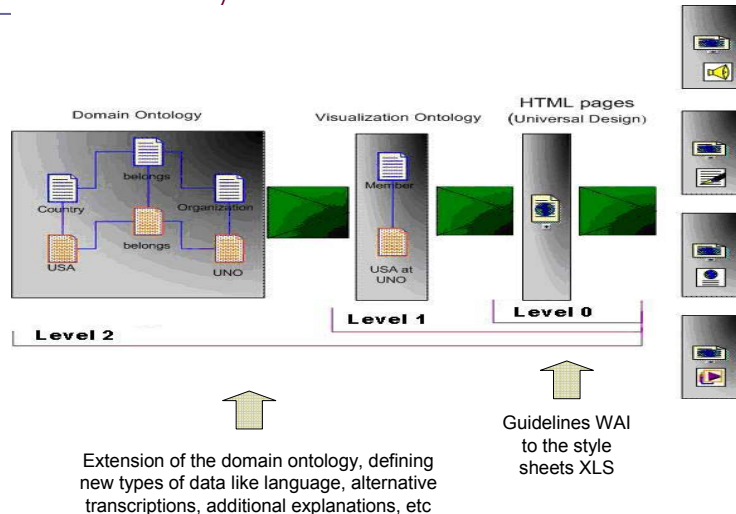
- An auxiliary ontology with purpose of visualization.
- In the view-model is defined what information is to be published defined in the knowledge ontology.



# Proposal

## Accessibility in levels

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## Case Study: *Real Instituto Elcano* de Estudios Internacionales y Estratégicos

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- We are applying those principles to the Portal for International Affairs: Real Institute Elcano.
- The Real Instituto Elcano is a Think Tank.
  - Examples:
    - Royal Institute for International Affairs (UK)
    - The Heritage Foundation, EE.UU.
    - Institute of Public Affairs, Australian
- In this portal, there is a Semantic application, and we are developing a prototype according to our proposal to introduce accessibility.

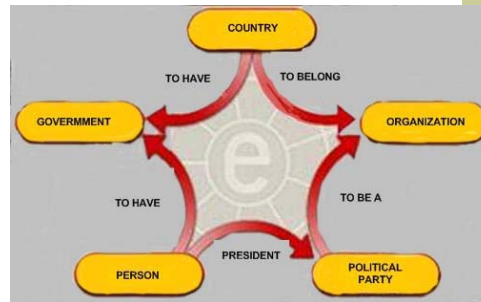
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## Case Study:



*Real Instituto Elcano*  
*de Estudios Internacionales y Estratégicos*

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- This application has the exposed architecture: a knowledge domain of International Affairs, and a view-model.

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## Application cases

### 1.

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- When using IMG, specify a short text equivalent with the "alt" attribute and provide additional information by the "longdesc" attribute.

- Object flag



- Semantic: What country belongs it?



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# Application cases

## 1.

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RESULTADOS DE LA BÚSQUEDA:

Se han encontrado 1 resultados.

The code:

```

```

Países

Nombre: España

Nombre Capital: Madrid

Bandera:



Superficie: 504,782 [Bandera del país España]

Ejército de España

Economía de España

Sociedad de España

Acontecimientos Relacionados: Guerra de Iraq

Continente al que Pertenece: Europa

Organizaciones a las que Pertenece:

- International Organization for Standardization
- Organización Marítima Internacional
- Organización Hidrográfica Internacional
- Confederación Internacional De Sindicatos Libres
- Corporación De Las Finanzas Internacionales
- Agencia De Energía Internacional
- Organización De Trabajo Internacional
- Agencia Internacional De Energía Atómica
- Organización de Naciones Unidas
- Organización Internacional De La Aviación Civil
- Organización Del Comercio Mundial
- Cámara De Comercio Internacional
- Misión De La Administración Del Interino De Naciones

# Application cases

## 2.

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- For data tables, identify row and column headers, use TD to identify data cells and TH to identify headers.
- For data tables that have two or more logical levels of row or column headers, use markup to associate data cells and header cells.
- There are special problems to users of screen readers.



# Application cases

## 2.

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Frase Entendida: Obtener Pais cuyo atributo Nombre tiene como valor España

RESULTADOS DE LA BÚSQUEDA:

Se han encontrado 1 resultados.

Paises

Nombre Pais	Capital	Superficie	Continente
España	Madrid	504,782	Europa

Búsqueda por temas | [Hazme una pregunta](#)

The code:

```
...
<TABLE summary="This table shows Information about the country Spain"...>
<TR>
  <TH id="header1">Name country</TH>
  <TH id="header2">Name Capital</TH>
  <TH id="header3">Area </TH>
  <TH id="header4">Continent</TH>
  <TH id="header5"> Government</TH>
  <TH id="header6">Political Party</TH>
  <TH id="header7">Countries frontier</TH>
</TR>
<TR>
  <TD headers="header1">Spain</TD>
  <TD headers="header2">Madrid</TD>
  <TD headers="header3">504,782</TD>
  <TD headers="header4">Europe</TD>
  <TD headers="header5">Result_Query_government (Spain)</TD>
  <TD headers="header6">Result_Query_Political Party (Spain)</TD>
  <TD headers="header7">Result_Query_Countries frontier (Spain)</TD>
</TR>
</TABLE>
...
```

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# Application cases

## 2.

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A speech synthesis process reads this table:

Resumen: This table shows Information about the country Spain:

**Name country:** Spain, **Name Capital:** Madrid, **Area:** 504,782, **Continent:** Europe, **Government :** Result\_Query\_government (Spain), **Political Party:** Result\_Query\_Political Party (Spain), **Countries frontier:** Result\_Query\_Countries frontier (Spain)

If markups to associate data cells and header cells are not used, a speech synthesis process will read this table:

**Name country:** Name **Capital:** Area: **Continent:** Government : **Political Party:** **Countries frontier:**  
Spain, Madrid, 504,782, Europe, Result\_Query\_government (Spain),  
Result\_Query\_Political Party (Spain), Result\_Query\_Countries frontier (Spain)

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# Application cases

## 3.

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- When content developers mark up natural language changes in a document, speech synthesizers and braille devices can automatically switch to the new language, making the document more accessible to multilingual users.
  - In HTML use the "lang" attribute.

# Application cases

## 3.

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RESULTADOS DE LA BÚSQUEDA:

*Se han encontrado 4 resultados.*

The code:

Acuerdos	
Nombre del acuerdo	.....
Objetivo del acuerdo	.....
Tipo de acuerdo	.....
Fecha	.....
Sinónimo	.....
Referencias Documentales	.....

```
<html lang="es">
....
....
<tr>
<td>Nombre del acuerdo</td>
<td lang="en">United Nations Framework Convention on
Climate Change</td>
</tr><tr>
<td>Objetivo del acuerdo</td>
<td lang="en">to achieve stabilization of greenhouse gas
concentrations in the atmosphere at a low enough level to
prevent dangerous anthropogenic interference with the climate
system</td>
</tr><tr>
<td>Tipo de acuerdo</td>
<td>Medioambiental</td>
</tr>
....
```

# Conclusions

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- The number of people excluded of the information technologies is growing.
- There is a need of developing methodologies for offering accessible applications on low cost.
- Our proposal based on Web Semantic offers a technological opportunity for establishing an automatic and methodological approach for accessible Web applications.

# Conclusions

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- In this work:
  - The exposed architecture consist on a Knowledge Ontology to structure information, and a view-model that separates the Semantic Model from the visualization and automate the publication process in an accessible way .
  - To apply accessibility in levels according to guidelines WAI and aligned within the Universal Design paradigm.
  - To develop accessible web portal on low cost and automatic bases.



Thank you for your attention