# Access-eGov

## Access to e-Government Services
## Employing Semantic Technologies

**Instrument:** STREP
**Thematic Priority:**
SO 2.4.13 Strengthening the integration
of the ICT research effort in an enlarged Europe

# D7.2 Guidelines for Semantic Mark-Up of e-Government Resources

| FP6-2004-27020 **Access-eGov** | |
| --- | --- |
| **Access to e-Government Services Employing Semantic Technologies** | |

# D7.2 Guidelines for Semantic Mark-Up of e-Government Resources

| | | | |
| --- | --- | --- | --- |
| **Work package:** | WP7 | **Task:** | T7.2 |
| **Date of submission:** | December 5, 2006 | | |
| **Lead contractor for this deliverable:** | German University in Cairo (GUC) | | |
| **Authors:** | Stefan Ukena (GUC)<br><br>Ralf Klischewski (GUC) | | |
| **Version:** | 1.0 | | |
| **Revision:** | Final Draft | | |
| **Dissemination level:** | Project Internal | | |

**Project partners**:

Technical University of Kosice (TUK), Slovakia (Coordinator); University of Regensburg (UR), Germany; German University in Cairo (GUC), Egypt; Intersoft, a.s. (IS), Slovakia; EMAX S.A. (EMA), Poland; Kosice Self-Governing Region (KSR), Slovakia; Cities on Internet Association (COI), Poland; e-ISOTIS (ISO), Greece; Municipality of Michalovce (MI), Kosice; City Hall of Gliwice (GLI), Poland; State Government of Schleswig-Holstein (SHG), Germany.

**Abstract**:

D7.2 provides guidelines for the creation of semantic mark-up and semantic annotation of e-government services as key administrative resources provided to citizens and businesses. Semantic mark-up is used to make semantic annotation — i.e. information about services — available to Semantic Web applications. The guidelines describe the creation of semantic annotation and mark-up for electronic and non-electronic services using the Access-eGov Annotation Component, including necessary steps for the preparation of service-related Web-content (in the case of non-electronic services). The guidelines will be used to prepare the pilots and field test and serve as the basis for the development of the Annotation Component as well as a comprehensive method for semantic mark-up.

**Document Sign-off**

| Nature of Sign-off (Reviewed/Approved/Submitted) | Name | Role | Participant short name | Date |
|---|---|---|---|---|
| Reviewed | Ralf Klischewski | TL | GUC | 3.12.2006 |
| Approved | Karol Furdik | WPL | IS | 4.12.2006 |
| Submitted | Tomas Sabol | PM | TUK | 5.12.2006 |

**Document Change Record**

| Date (d/m/y) | Version | Contributor(s) | Change Details |
|---|---|---|---|
| 10/10/2006 | 0.3 | Stefan Ukena | Initial version |
| 20/11/2006 | 0.4 | Stefan Ukena, Ralf Klischewski | Rewritten draft including requirements for developers |
| 30/11/2006 | 1.0 | Stefan Ukena, Ralf Klischewski | Final draft (including role specification) |

**Files**

| Software Products | User files / URL |
|---|---|
| Microsoft WORD | |

**Content**

# 1 Introduction

This document describes the Access-eGov guidelines for the semantic mark-up of e-government resources as far as needed within the scope of the project, especially the pilots and field test. Since Access-eGov aims at accessing services, the guidelines provided here primarily focus on the semantic description of e-government services, their attributes and the resources they require for execution. Technically speaking, the semantic description of each service will be found in a structured service profile, which serves as the semantic annotation of an existing service, and any online publication of a service may be marked-up so that its semantic annotation can be found and automatically be evaluated for supporting users' needs.

The development of this method for semantic mark-up will be an ongoing effort throughout the pilots and field test as follow-up activities to the deliverable D7.2. The present guidelines provide directions to information providers and a description of the necessary semantic annotation tools leading to requirements for subsequent development towards the pilots and field test. The guidelines reflect the current state of the method and are based on the deliverables D2.1 (State-of-the-Art-Report) and D2.2 (User Requirements and Development / Test Recommendations). The guidelines fulfil the D7.2 objective as described in the Access-eGov Technical Annex, i.e. providing a method for identification of relevant resources, and the semantic mark-up based on a given resource ontology and with respect to the interoperability challenges of future applications. Management of the resource ontology life cycle is covered partly as far as it concerns the support by the newly to be developed components, namely for ontology import, use and usage evaluation. The creation and selection of appropriate ontologies is in the focus of D7.1, and tool support should be based on available ontology editors (see also footnote #1).

User partners (and other information providers) should follow these guidelines to perform the annotation for the pilots and field test (WP8). Developers will use the technical and methodological requirements arising from these guidelines as input for T7.1 (Development of Public Administrations Resource Ontologies), T7.3 (Semantic Mark-Up Framework) and WP4 (Development of basic components for management of e-gov service mark-up). The development of the method will continue during the pilots and field test. The resulting method, including general directions for information providers outside the project, will be elaborated further in D9.2 (Overall Methodological Framework).

Semantic mark-up and annotation is part of the information providers' effort to migrate their web content and existing services to the Semantic Web. The core of this migration is the mark-up and annotation of selected informational elements through adequate tools and services. This will be described in chapter 2: based on the annotation user scenario (D2.2) a use case analysis focuses on an Annotation Author using the envisioned Annotation Component, exemplified by selected electronic and traditional (i.e. non-electronic) services from Schleswig-Holstein and the existing responsibility finder. However, from the information providers' point of view, the semantic mark-up and annotation must be embedded in an overall migration management that will be discussed step by step in chapter 3. As a result, an information provider will be able to:

§ define the scope and goals of migration;

§ select method, models, and tools for annotation according to the given IT infrastructure;

§   annotate e-government services based on common Semantic Models[1];

§   test and "debug" (trace) semantic annotation.

For the subsequent research and development this deliverable provides a description of:

- general properties of common Semantic Models needed for service annotation;

- methods and tools to perform the migration, based on the existing IT-infrastructure;

- required functionality of Annotation Component with regard to creation, registration, and testing of semantic annotations.

Chapter 4 summarizes the requirements for the technical development along with follow-up activities that will guide the refinement of these guidelines into a method for semantic mark-up. The deliverable includes also a glossary (chapter 5) and the references (chapter 6).

---

[1] Because these guidelines focus on the annotation of web content from an information provider's point of view, the design of the ontologies and a description of the ontology editor are beyond the scope of this document. They will be addressed in T7.1 (Development of Public Administration Resource Ontologies).

---

# 2 Service Annotation

## 2.1 Semantic Mark-Up vs. Semantic Annotation

This chapter provides an in depth description of the annotation of services either in the form of electronic services (e-services) or non-electronic services (also called "traditional service"). In the context of Access-eGov, services are always related to the field of government. Thus, a service in Access-eGov is either an e-government service or a traditional government service that an administrative entity provides to either a citizen or a business. Intra-government services (i.e. government-to-government services) are not the primary focus within the context of Access-eGov. Access-eGov provides access to both kinds of services (electronic and traditional) via a single point of access chosen by the e-government service user. In the case of traditional services, citizens / businesses can obtain information about the service but cannot initiate (execute) the service.[2] The latter is only possible for electronic services. Thus, a service in the context of Access-eGov can be any assistance, help or benefit that an administration provides to either citizen or business that can be described by its inputs, outputs, and other properties.

In order to make a service accessible through the Access-eGov platform, the inputs, outputs, and other properties must be formally described using *semantic annotation*. The Merriam-Webster Online Dictionary[3] defines "annotation" as "a note added by way of comment or explanation". In the context the Semantic Web (cf. [Berners-Lee, Hendler & Lassila 2001]) "annotation" usually refers to *semantic* annotation, i.e. enriching digital content with information about its meaning and context in such a way that this semantic annotation is readable by machines. Semantic annotation enables software agents to process the content of web pages and other digital resources in a way that is meaningful to human users. The goal is to ensure that humans and machines "understand" the same information in the same or at least a similar way. Technically, semantic annotation is regularly applied to web pages in the form of *semantic mark-up*. Semantic mark-up can be viewed as a semantically enhancement of regular HTML-mark-up.

Using semantic mark-up, the content of a web page can be semantically described in a machine-readable way. A number of different annotation tools have been developed for different purposes, some of them also for the special purpose of semantic annotation for the Semantic Web, like the *SHOE Knowledge Annotator[4]* or the *OntoMat Annotizer[5]*. (Cf. [Handschuh & Staab 2003])

While these tools allow for the annotation of HTML and other kinds of documents they cannot be used to semantically annotate services, which require a special kind of annotation. Within Access-eGov the semantic annotation is captured in a *Service Profile*, which is a formal description of a service's inputs, outputs and other properties. While the technical focus is on semantic annotation the results should lead to semantic mark-up: i. e. when a user is offered one or more services (e.g. via links on a web-page), any of these services presented to the user should have an *in situ* reference to its semantic annotation (i.e. via a URI on the same Web-page).

---

[2] For non-electronic services, administrations may offer form's fill-in and download. Depending on the nature of the form (HTML-based or file-based, like PDF) Access-eGov can provide access to them either similar to an electronic service (in the case of HTML-based forms) or as additional information or "attachments" to a non-electronic service (in case of file-based forms).

[3] http://www.m-w.com

[4] http://www.cs.umd.edu/projects/plus/SHOE/KnowledgeAnnotator.html

[5] http://www-db.stanford.edu/OntoAgents/

In this chapter we will first give a short introduction to service annotation (section 2.2) and some prerequisites that must be taken care of before starting with Service Profile creation (section 2.3). The rest of the chapter (section 2.4) explains how to use the Annotation Component to publish services, create service profiles and validate their usability afterwards.

To illustrate some points of this chapter we will sometimes refer to two examples of e-government services. One is an example of a non-electronic service like the ones that appear in the field test. The other example is an electronic service like the ones in the pilots:

- **Example 1:** The first service is the *application for a passport*. This is an example of a non-electronic service where the service cannot be executed electronically. Here, the citizen can use Access-eGov to find the responsible administration in his area, including information about opening hours, necessary documents and service fees.

- **Example 2:** The other example is the *reservation of a customized license plate*. This is an example of an electronic service, which can be executed over the internet from start to finish. A citizen can use this service to reserve a license plate with an individual combination of characters. The citizen can search for available combinations of characters and then reserve an available combination by supplying her name and address. The reservation is free of charge but a service fee must be paid either by credit card over the Internet or in person at the administration office if and when the custom license plate is issued.

## 2.2  Introduction to Service Annotation

The goal of annotating a service for use with Access-eGov is to enhance the options of citizen and businesses for automatically finding the services they need for the task (their goal) at hand. This is achieved by publishing a *Service Profile*[6] and thus making it available through Access-eGov. A Service Profile is a machine-readable semantic description of a service. It consists of a number of properties that describe the service, its inputs and outputs and other characteristics. For the pilots we assume that Service Profiles will only be created by using the annotation tools (namely the "Annotation Component") provided by the Access-eGov platform. Service Profiles that are created in this way are called *Internal* Service Profiles. For the field test Service Profile may also be created by using external tools. Profiles that were created by using tools other the Access-eGov-Annotation-Component are called *External* Service Profiles. This guide will focus on the creation of Internal Service Profiles.

Service Profiles play a central role when a citizen searches for a service with the help of the Access-eGov-platform. The Service Profile contains relevant information that the Access-eGov-platform needs to identify and locate specific services that match the citizen's request.

E.g. in the passport example (Example 1) the Service Profile will contain information about the administration that issues the passport, its opening hours, any required documents and fees (the service's input) and also the kind of document that is issued (the service's output) etc. In particular, the Service Profile is used by the Access-eGov platform to semantically match the formal description of a citizen's Goal to the formal description of a service's capabilities, i.e. its Service Profile. With respect to example 1 this means that a formal Goal should specify a passport document as required output. A citizen that searches for services that match this goal will then be presented the services that produce a passport document as an output. A Service Profile for example 2 would contain similar information. In addition, because the service could be executed and would produce a document with the reservation as an output, the Service Profile would also define the output (the electronic reservation) of the service in example 2.

---

[6] We will denote terms that have a special meaning by using capital letters. A description of these terms can also be found in the glossary at the end of this document.
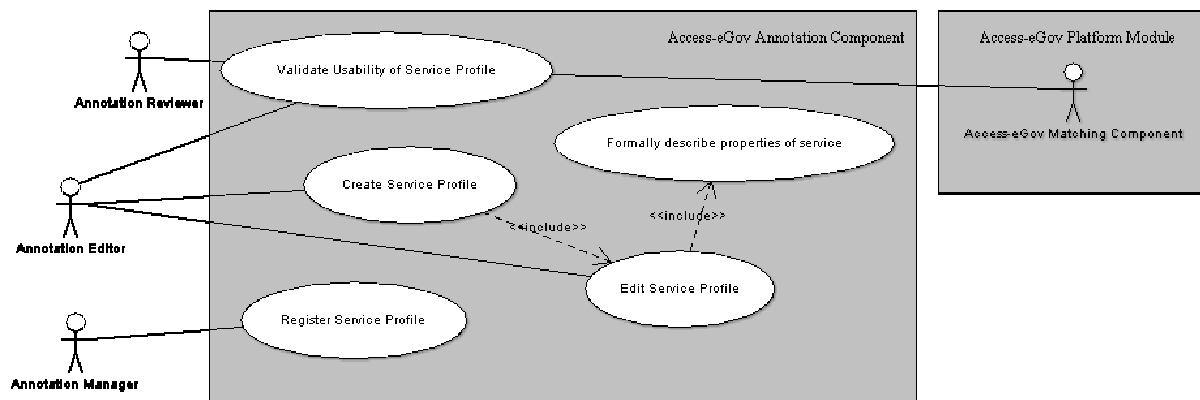
**Figure 1** *Annotation Component* **Use Cases related to Service Profiles.**
**Note that the Access-eGov *Matching Component* is also part of the Access-eGov system.**

Service Profiles are usually created by the provider of a service. The person responsible for creating and maintaining a Service Profile is called Annotation Author.[7]

Figure 1 shows a use case diagram of the Annotation Component. An Annotation Author may use the Access-eGov Annotation Component to create and edit all Service Profiles that she is responsible for. As mentioned above, this guide will focus on the creation of Internal Service Profile, i.e. Service Profiles that are created with the help of the Annotation Component. A future deliverable (D9.2) will address the issue of creating External Service Profiles.

After having created the Service Profile, the service provider needs to make sure that the newly published services can be accessed by citizens. This is what is referred to as "usability validation" of a Service Profile in this guide. Service Profile validation is supported by the Annotation Component by way of showing which (formal) citizen Goals semantically match a certain Service Profile, which technically is achieved by relying on the Access-eGov Matching Component (cf. Figure 2).

---

For both example services this would mean to look up the formal Goals that should match the services. An appropriate Goal for example 1 would have a required output of a "passport document". Searching for this Goal should display the example 1 service as a result. Similarly, for service example 2 the Goal would require a "document of reservation for a custom license plate" as an output.

---

An important part of every Service Profile is the formal description of the service's inputs and outputs.[8] These inputs and outputs, possibly together with constraints (i.e. pre-conditions and post-conditions) are used by Access-eGov to dynamically identify services that match a certain citizen's requirements. This is achieved by semantically matching the formal description of a citizen's goals with the Service Profile (more specifically the inputs and outputs and any constraints over them). Based on the inputs and outputs the system will determine which services the citizen needs to execute in order to achieve her goal. (Cf. Figure 2)

Figure 2 shows a use case diagram of a citizen (or business user) trying to find a specific service. The Access-eGov system will need to identify which objective the citizen is trying to

---

[7] Other roles include the Annotation Reviewer (having read-only access to Service Profiles for reviewing purposes), the Annotation Manager (being allowed to register Service Profiles, see below), and the User Manager (responsible for assigning roles (permissions) to users of the Annotation Component). A list of roles can be found in section 3.7.

[8] The terms "input" and "output" are to be understood in the general sense of the terms and not in any special way as defined by standards such as WSMO or OWL-S. The exact meaning of the terminology to describe inputs and outputs and its relation to other terminologies (such as WSMO) has yet to be determined within the project. For the purpose of the present deliverable a general description was deemed sufficient.

chieve. This will result in the identification of a formal representation of the citizen's objective, which is denoted by the term *Goal*. The formal Goal can be used to identify which services are able to achieve the formal Goal. This is done by semantically matching the formal Goal with the formal description of the service, i.e. the Service Profile.
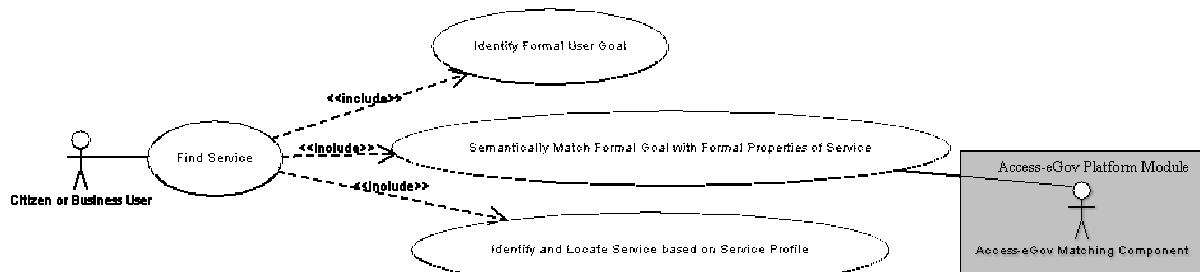


**Figure 2 Find Service Use Case**

## 2.3  Prerequisites for Service Annotation

### 2.3.1  Ontology Life-Cycle Management

For many of the properties of a Service Profile the Annotation Author must choose from a set of predefined ontologies. All ontologies must adhere to a yet to be defined standard for Access-eGov ontologies, which will be based on the WSMO suite of languages. This will ensure a certain level of semantic interoperability within the Access-eGov system. Access-eGov will provide a set of *Generic Ontologies* that will define concepts such as "Responsibility" etc. Based on these Generic Ontologies the Access-eGov ontologies will be created by using these concepts like a vocabulary. Administrations can either built their own domain ontologies, mapping them to concepts from the Access-eGov Generic Ontologies, or they may refine an existing domain ontology that was created by another administration or provided by Access-eGov. These Access-eGov Ontologies will define concepts such as "Marriage", "Civil Registry Office" etc. The task of creating and editing ontologies is beyond the scope of the Annotation Component. For the pilots and field test this will be done using specialized ontology editors. Ontologies are created by Ontology Authors and registered with the Access-eGov system by Ontology Managers (see section 3.7 for an overview of roles).

Administrations that want to ensure maximum semantic interoperability need to agree upon a common set of ontologies for use in their Service Profiles. For example, to ensure state-wide semantic interoperability within Schleswig-Holstein, the state administrations and communal administrations must agree on a common set of ontologies for use in Service Profile that are created by Schleswig-Holstein's Annotation Authors. Administrations may refine (specialize) concepts from this common set of ontologies to adopt them to their local needs if necessary.

Technically an Annotation Author can choose to use any Access-eGov Ontology to define a Service Profile. In practice, an Annotation Author should pre-select the ontologies from the common set of ontologies that her specific administration has decided to use. By pre-selecting a set of ontologies, these ontologies will be used by default when manipulating Service Profiles.

### 2.3.2  Language Selection

The initial versions of the Access-eGov Generic Ontologies and Access-eGov Ontologies will use English as the common language. As these parts of these ontologies will also be used to

populate the user interface, translated versions will need to be created by local administrations by refining (specializing) concepts of the Access-eGov Generic Ontologies or Access-eGov Ontologies.[9][10]

An Annotation Author can select a *preferred language* for the ontologies that she uses. As a result, the ontology concepts will appear in the preferred language (if available). In addition, language dependent properties of a Service Profile will be assigned in the language of the Annotation Authors preferred language, indicating that the property value is written in that language.

## 2.4 Using the Access-eGov Annotation Component

This section describes how the Access-eGov Annotation Component will be used by Annotation Authors to create, edit and register Service Profiles, and to validate their usability. Based on this description the Annotation Component will be developed in subsequent work packages.

The Access-eGov Annotation Component is the central tool for an Annotation Author to create, edit and register Service Profiles. An Annotation Author has to log in to the Annotation Component to access her personalized Annotation Component-home-page. "Personalized" refers to the overview of the information an Annotation Author will receive: She finds an overview of important information about the Service Profiles, which she is *responsible for* and also about Access-eGov in general. This information includes (but is not limited to)

1) an overview of her services that were determined (either automatically or by an Annotation Reviewer[11]) to have an *Invalid* Service Profile,

2) announcements about changes to the Access-eGov ontologies that are relevant (have an impact on the annotation) for her Service Profiles,

3) recent news / announcements about changes of the Access-eGov platform. Some of these messages are created automatically but usually these messages are created by a human agent.[12]

From here the Annotation Author can also access all relevant functions of the Annotation Component, like viewing and editing Service Profiles of her services or registering newly created Service Profiles.

### 2.4.1 Structure of Service Profiles

The Access-eGov Annotation Component can be used to manipulate Internal Service Profiles, which is the focus of this guide. The part of the Annotation Component for manipulation of Service Profile is called the *Service Profile Editor*. It can be invoked from the Annotation Component Home Page by either selecting an existing Service Profile for editing or by creating a new Service Profile.

---

[9] If an ontology is only used in one pilot or field test, the project partners may decide that only a localized version of the ontology will be created.

[10] We assume that a 1:1 mapping from English concepts to local concepts and vice versa is always possible.

[11] A user that has the role of an Annotation Reviewer is allowed read-only access to Service Profiles of Annotation Authors for the purpose of reviewing the Profile. An Annotation Reviewer can also send notifications to groups of Annotation Authors based on certain criteria (e.g. all Annotation Authors of a certain administration). Section 3.7 lists all roles.

[12] For example, if one of the Access-eGov ontologies was changed this change may impact some Service Profiles. The person responsible for changing the ontology (having the role of an Ontology Manager) will want to inform some or all Annotation Authors and Annotation Reviewers about the nature of the change.

The Service Profile Editor gives a structured view of the Service Profile that the Annotation Author wants to edit. The view contains different sections for different kinds of information:

1. **Service inputs and outputs (forms, documents, and other artefacts and fees)**: In general, services may require and / or have inputs and outputs (possibly including constraints). Examples of inputs and outputs are: Services may require information and / or they might provide information in the form of documents or forms. *Forms* ontology will be used to describe these kinds of (both mandatory and optional) input and output of a service. For inputs and outputs that cannot be described with the *Forms* ontology (for example, an artefact like a license plate), Access-eGov will provide a special ontology that can be used to describe these special kinds of inputs and outputs.

   Because the inputs and outputs are used by the Access-eGov system to dynamically determine which services are required by a certain citizen (based on the formal description of citizens' goals), the Service Profile Editor supports the simplified definition of these inputs and outputs. To create a Service Profile that matches certain formal Goal, an Annotation Author can select the formal Goal and let the Service Profile Editor automatically define the appropriate inputs and/or outputs. This will ensure that the service (based on the input's and output's definition in the Service Profile) semantically matches the selected Goal. However, the formal Goal is not directly associated with the Service Profile so that changes to either the formal definition of the Goal or the Service Profile may result in the service not being found.

   Because a service can only be found if the input's and output's formal description semantically match a Goal, the Service Profile Editor will inform the Annotation Author if there is no Goal that semantically matches the current Service Profile's inputs and outputs. In this case the Annotation Author must either change the input's and/or output's description to semantically match a Goal or she must request that a new Goal needs to be created to semantically match the current inputs and outputs.

2. **Non-functional properties**

   - **Availability**: For non-electronic services this includes office hours, contact information and physical accessibility constraints. For electronic services this describes aspects like quality of service, technical constraints etc.

   - **Responsibility Information about the administration(s) that provide(s) the service**: Spatial responsibility, temporal responsibility and subject-matter responsibility: Two administrations may offer the same service, but only one administration is responsible for providing the service to a particular citizen. The responsibility of an administration can be divided into at least the following kinds:

   § *spatial responsibility* describes the geographical area within which an administration is responsible for providing a certain service,

   § *temporal responsibility* describes the time during which the administration is responsible to provide a service, e.g. after a reform of law the responsibility of an administration may change: the responsibility before the reform is different from the responsibility beginning with the reform of law (this should *not* be confused with the office hours, which is the time during which the service is provided to citizens),

   § *subject-matter responsibility* describes the subject-matter related area of responsibility of an administration (for example, the civil office in Germany is *subject-matter responsible* (German: "fachlich zuständig") for marriages, but not for income taxes).
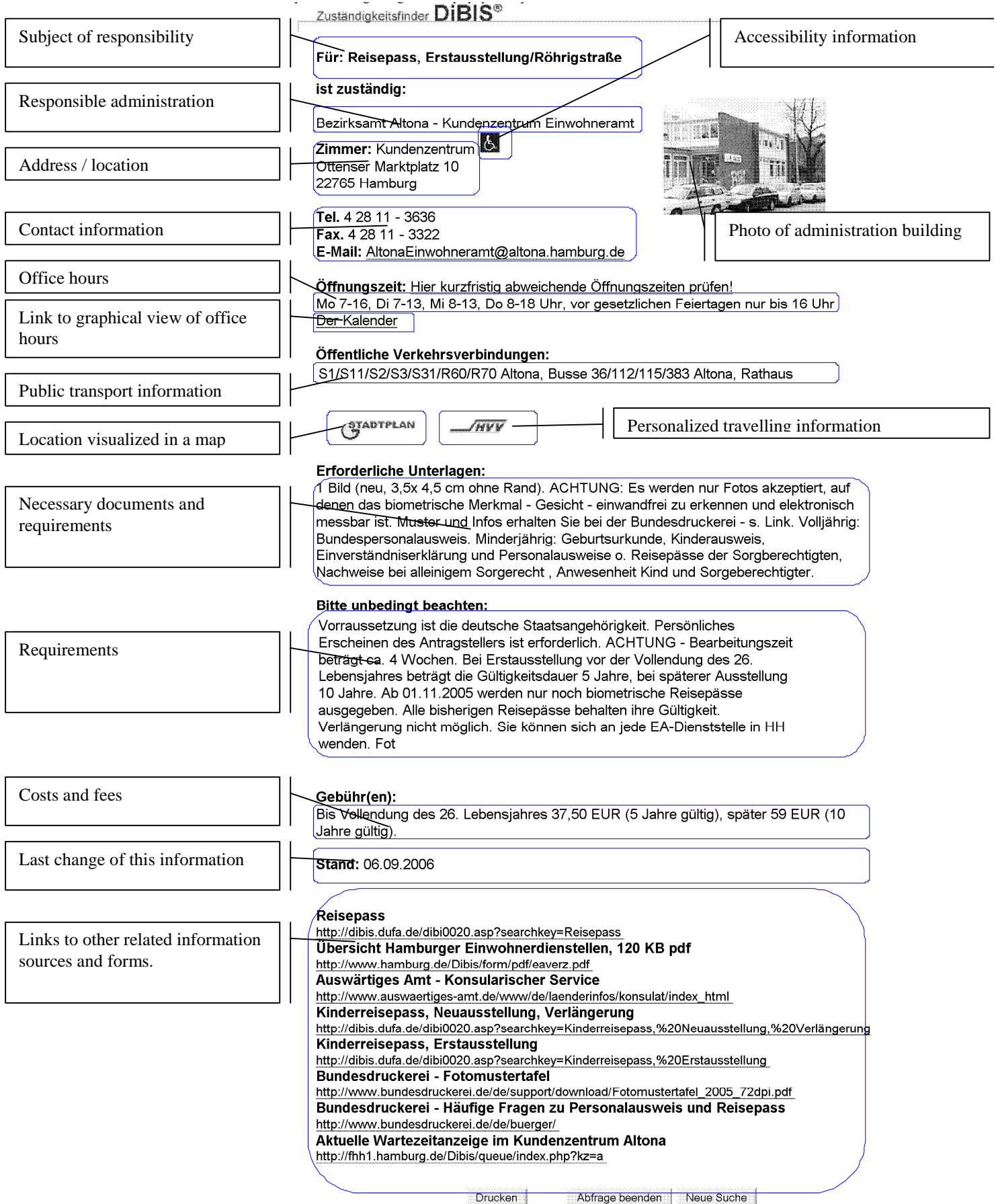
Access eGov

Zuständigkeitsfinder **DiBIS®**

| | | |
|---|---|---|
| Subject of responsibility | **Für: Reisepass, Erstausstellung/Röhrigstraße** | Accessibility information |
| Responsible administration | **ist zuständig:** | |
| | Bezirksamt Altona - Kundenzentrum Einwohneramt | |
| Address / location | **Zimmer:** Kundenzentrum<br>Ottenser Marktplatz 10<br>22765 Hamburg | |
| Contact information | **Tel.** 4 28 11 - 3636<br>**Fax.** 4 28 11 - 3322<br>**E-Mail:** AltonaEinwohneramt@altona.hamburg.de | Photo of administration building |
| Office hours | **Öffnungszeit:** Hier kurzfristig abweichende Öffnungszeiten prüfen! | |
| Link to graphical view of office hours | Mo 7-16, Di 7-13, Mi 8-13, Do 8-18 Uhr, vor gesetzlichen Feiertagen nur bis 16 Uhr<br>Der-Kalender | |
| Public transport information | **Öffentliche Verkehrsverbindungen:**<br>S1/S11/S2/S3/S31/R60/R70 Altona, Busse 36/112/115/383 Altona, Rathaus | |
| Location visualized in a map | STADTPLAN    /HVV | Personalized travelling information |
| Necessary documents and requirements | **Erforderliche Unterlagen:**<br>1 Bild (neu, 3,5x 4,5 cm ohne Rand). ACHTUNG: Es werden nur Fotos akzeptiert, auf denen das biometrische Merkmal - Gesicht - einwandfrei zu erkennen und elektronisch messbar ist. Muster und Infos erhalten Sie bei der Bundesdruckerei - s. Link. Volljährig: Bundespersonalausweis. Minderjährig: Geburtsurkunde, Kinderausweis, Einverständniserklärung und Personalausweise o. Reisepässe der Sorgberechtigten, Nachweise bei alleinigem Sorgerecht , Anwesenheit Kind und Sorgeberechtigter. | |
| Requirements | **Bitte unbedingt beachten:**<br>Vorraussetzung ist die deutsche Staatsangehörigkeit. Persönliches Erscheinen des Antragstellers ist erforderlich. ACHTUNG - Bearbeitungszeit beträgt ca. 4 Wochen. Bei Erstausstellung vor der Vollendung des 26. Lebensjahres beträgt die Gültigkeitsdauer 5 Jahre, bei späterer Ausstellung 10 Jahre. Ab 01.11.2005 werden nur noch biometrische Reisepässe ausgegeben. Alle bisherigen Reisepässe behalten ihre Gültigkeit. Verlängerung nicht möglich. Sie können sich an jede EA-Dienststelle in HH wenden. Fot | |
| Costs and fees | **Gebühr(en):**<br>Bis Vollendung des 26. Lebensjahres 37,50 EUR (5 Jahre gültig), später 59 EUR (10 Jahre gültig). | |
| Last change of this information | **Stand:** 06.09.2006 | |
| Links to other related information sources and forms. | **Reisepass**<br>http://dibis.dufa.de/dibi0020.asp?searchkey=Reisepass<br>**Übersicht Hamburger Einwohnerdienstellen, 120 KB pdf**<br>http://www.hamburg.de/Dibis/form/pdf/eaverz.pdf<br>**Auswärtiges Amt - Konsularischer Service**<br>http://www.auswaertiges-amt.de/www/de/laenderinfos/konsulat/index_html<br>**Kinderreisepass, Neuausstellung, Verlängerung**<br>http://dibis.dufa.de/dibi0020.asp?searchkey=Kinderreisepass,%20Neuausstellung,%20Verlängerung<br>**Kinderreisepass, Erstausstellung**<br>http://dibis.dufa.de/dibi0020.asp?searchkey=Kinderreisepass,%20Erstausstellung<br>**Bundesdruckerei - Fotomustertafel**<br>http://www.bundesdruckerei.de/de/support/download/Fotomustertafel_2005_72dpi.pdf<br>**Bundesdruckerei - Häufige Fragen zu Personalausweis und Reisepass**<br>http://www.bundesdruckerei.de/de/buerger/<br>**Aktuelle Wartezeitanzeige im Kundenzentrum Altona**<br>http://fhh1.hamburg.de/Dibis/queue/index.php?kz=a | |

Drucken     Abfrage beenden     Neue Suche

**Figure 3 Structure of a typical DiBIS-Web-page with service related content**

Depending on the legal requirements in effect, the administration that is responsible for providing a particular service to a particular citizen can depend on any of the three kinds of responsibility or a combination thereof.

- **Other properties**, like security restrictions, quality of service etc.

For some of this information the Annotation Author must choose the appropriate values by browsing and choosing from an ontology (inputs and outputs, spatial and subject-matter responsibility). Other values must be entered manually (fees, office hours / availability, address and contact information, physical accessibility constraints). Once this information has been manually entered it can later be re-used in other Service Profiles.

In order to provide access to a large collection of services an administration may decide to create a custom Mapping Component. In principle, each service in the collection must have its own Service Profile. In practice, these Service Profiles will be very similar which lends itself to semi-automatic annotation. Using the Service Profile Editor an Annotation Author could then define (or extend) a Service Profile for such a Mapping Component and automatically assign this Service Profile to the Mapping Component's whole collection of services (or a subset thereof). Properties that cannot be defined this way, must be manually edited by the Annotation Author.

Figure 3 shows a typical Web-page containing service related information from the DiBIS responsibility finder. The structure of the Web-page is highlighted to show the input, output and non-functional properties which could be used by the Annotation Author during the creation of a Service Profile. The necessary documents and requirements as well the costs and fees of the service shown in figure 3 will need to be formally represented as inputs, outputs (possibly including constraints) and other properties.

## 2.4.2 Service Profile Creation and Editing

To publish a service via Access-eGov the Annotation Author first has to annotate the service by creating a Service Profile for the service by using the Access-eGov Annotation Component. This will automatically ensure that the service is known to the Access-eGov platform and that the Service Profile is validated. After the Service Profile has been created it can be published by *registering* it (see next section).

The Service Profile contains all relevant information about a service that Access-eGov needs to make effective use of the service. As noted above, the term *service* in the sense used in this guide can refer to electronic as well as non-electronic (also called "traditional") services. Both kinds of services (electronic and non-electronic) need to be semantically described by different (but similar) kinds of Service Profiles. It is up to the Annotation Author to choose the right kind of Service Profile when creating a service.

To create a Service Profile the Annotation Author selects the option "Create new service profile" from within the Annotation Component. She will then provide a URL which either points to an electronic service or to a Web-page that contains information about a traditional (non-electronic) service.[13] The Annotation Component will then require the Annotation Author to manually provide all mandatory information for the Service Profile via the Annotation Component's user interface.

By creating a Service Profile in this way the Service Profile will be *assigned* to the Annotation Author who created it, making the Annotation Author the *responsible Annotation*

---

[13] Again, we do not consider registering External Service Profiles here. In case of External Service Profiles one would have to provide a URL to the External Service Profile.

*Author* for this service. As a result, the Annotation Author will be able to annotate this service (or edit the annotation), and she will receive all messages by Access-eGov (about inconsistencies etc.) pertaining to this service's Service Profile.

## 2.4.3  Service Profile Registration

To publish the Service Profile and thus make the service available through Access-eGov, a user having the role of an Annotation Manager has to *register* the newly created Service Profile. This can be either done during Service Profile creation[14] (by selecting the appropriate option) or after the Service Profile has been created from the Annotation Component's Home Page by selecting "Register Service Profile". This option will show all of the Annotation Manager's Service Profiles that she is responsible for[15] and have not yet been registered. The Annotation Manager is then allowed to select a Service Profile for registration. After the Service Profile has been registered the service is automatically available through the Access-eGov platform.

## 2.4.4  Service Profile Usability Validation

Validation of Service Profiles is necessary to ensure that searching for services as well as service composition and orchestration deliver satisfactory results for citizens. When a new Service Profile is created, the Annotation Component will automatically inform the Annotation Author if the Service Profile matches any existing Goal and allow viewing the list of Goal that it matches (i.e. allows performing a *reverse* semantic match of Goals and Service Profiles). This is a simple way for Annotation Authors to check if and how the service can be found by e-government service users.

Automatic validation of Service Profiles requires the definition of Consistency Constraints for Service Profile properties. Consistency Constraints can automatically be checked by the Access-eGov system; any inconsistencies of a Service Profile will be reported to the Annotation Author responsible for the service. Besides automatic validation of Service Profiles, Access-eGov must support manual validation (or *review*) by users having the role of an Annotation Reviewer. Annotation Reviewers have read-only permissions to Service Profiles. For example, an administration may require that newly created services must be reviewed before they can be registered. For this purpose the Annotation Component will support a simple workflow for approval management of Service Profiles. [16]

Some kinds of inconsistencies can only be detected at execution time of the service. For example, a service may define a certain output but in fact returns something else. This is a kind of inconsistency that can hardly be discovered before execution of the particular service. This kind of inconsistency is not only related to the Service Profile but also to the service itself. If Access-eGov encounters such an inconsistency the responsible Annotation Author will be notified.

---

[14] To register a Service Profile during Profiles creation, the Annotation Author must also have the role of an Annotation Manager.

[15] The list of Service Profiles includes those that the Annotation Manager has created herself (if she also has the role of an Annotation Author) plus the Service Profiles created by Annotation Authors who were *assigned* to her by a User Manager.

[16] This can, for example, be achieved by assigning different permissions: One Annotation Author is allowed to create & edit Service Profiles but not allowed to register Service Profiles. Another Annotation Author is allowed to register the Service Profiles created by the first Annotation Author.

# 3  Annotation Process and Management

From the information providers' point of view, the semantic mark-up and annotation must be embedded in an overall migration management that will be discussed step by step in this chapter. As a result, an information provider will be able to:

§  define the scope and goals of migration;

§  select method, models and tools for annotation according to the given IT infrastructure;

§  annotate e-government services by creating service profiles;

§  test usability of resulting service profiles.

We will first describe how a migration project starts by analysing existing content defining migration scope and goals as well as defining a step-by-step migration process (section 3.1). Next, we will describe the migration context, including methods, tools, IT-infrastructure and a required common Semantic Models (section 3.2 and 3.3). Section 3.4 and 3.5 put the core activities of preparing, annotating and testing service profiles (based on chapter 2) in the overall context of a migration project. Section 3.6 summarizes to what extent the tools and services provided by Access-eGov are able to complete the semantic mark-up and annotation and what remains in the responsibility of the information provider.

## 3.1  Project Initialisation and Migration Goal Definition

Migration of Web content to the Semantic Web is basically a one-time effort (albeit it needs a constant follow up to assure and maintain the quality of the semantic descriptions). Therefore, the sequence of the required activities can be framed as a migration project, which is subject to project management. Figure 3 provides an overview of the steps as well the methods and tools necessary for supporting each step (represented by squares, ellipses and triangles, respectively). Prior to any migration project a cost-benefit analysis should have been carried out, which is not in the focus of this deliverable.

Any (migration) project must start with a proper initialisation including defining the scope and aim, project time span, the supply of required resources, and the responsibility for the success of the project. It is recommended that the main project activities are planned in advance, following a clear path and a logical order of steps as indicated in the migration process model provided in Figure 3. This migration process model will also serve as a baseline for the general directions for information providers to be elaborated further in the overall methodological framework (D9.2).

Most critical in the beginning is the appropriate definition of scope and aim. It is easily said that e.g. all original e-government services of a specific municipality should be covered, or only those which the municipality mediates on behalf of the state or national institutions. But what this means in detail – for example: "What is considered as "service", and what is the expected depth of semantic annotation?" – requires an analysis of the existing service portfolio as well as further specification of the migration outcome before the needed resources (work effort, time, tools, etc.) can actually be determined. Therefore, the specification of the migration goal based on the analysis of the existing service descriptions is singled out as the first major activity after project initialisation. Within the overall methodological framework (D9.2), public institutions and especially Annotation Authors will be provided with migration scope guidelines based on the experience of the trails working with the descriptions and specifications indicated in section 2.4 (inputs, outputs and additional non-functional aspects).
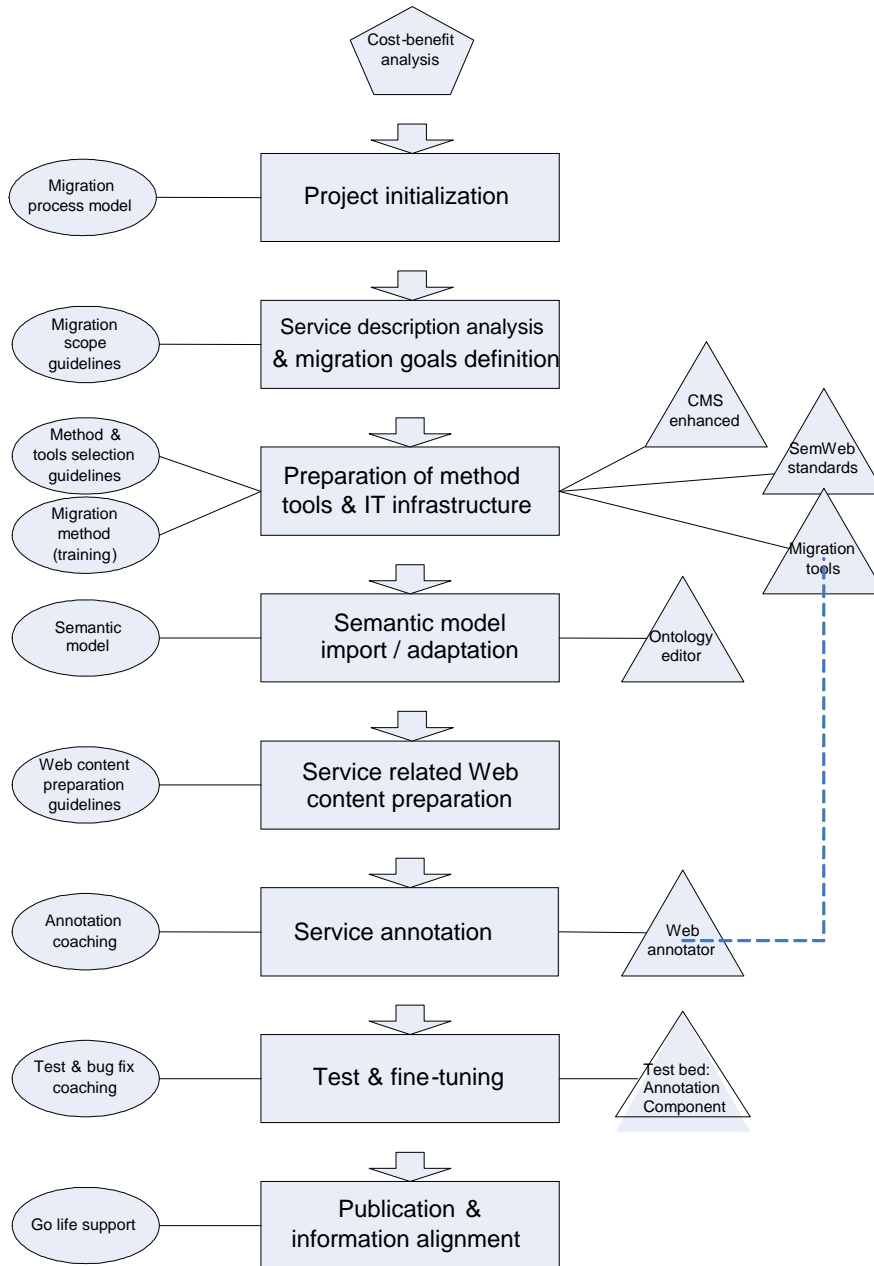
**Figure 4 Schematic representation of the annotation process (squares) including supporting methods (ellipses) and tools (triangles).**

## 3.2  Preparation of Methods, Tools and IT-infrastructure

Administration can use Access-eGov Annotation as a migration tool for migration of existing content and creation of new semantic annotations as described in chapter 2. For the annotation of service related Web-content the Web-pages must be accessible in a way that is similar to static Web-pages. For example, the current implementation of DiBIS uses the same URL for all its Web-pages. When a user searches for information about a service, the resulting Web-page will always have the same URL. The content of the resulting Web-page is dynamically created, presumable based on a session cookie and the user's input. Thus, the URL cannot be used to access the same content after the session has ended. This also means that the Web-page cannot be used during annotation with the Annotation Component. For cases like this,

the Annotation Component offers a technical interface that can be used to make the service related Web-content available for annotation. In this case the administration needs to create a custom Mapping Component that will make the content accessible to the Annotation Component, thus enabling the re-use of the existing service information. (The development of such a Mapping Component is the responsibility of the administration and is beyond the scope of the Access-eGov project.)

Table 1 lists the different ways that semantic annotation and semantic mark-up can be created depending on the existing IT-infrastructure for Web-pages. Semantic annotation (i.e. a Service Profile) for a specific service (or services) can be either created by using the Access-eGov Annotation Component[17] or by creating a (custom) Mapping Component that has direct access to a database from which it can (semi-)automatically create the necessary information.

| | Semantic Annotation | Semantic Mark-Up |
|---|---|---|
| **Static Web-pages** | Either the Access-eGov Annotation Component or a (custom) Mapping Component can be used to create the semantic annotation. The semantic annotation is automatically stored inside Access-eGov. | The Access-eGov Annotation Component can be used to add semantic mark-up to the source-code of a static Web-page. The Web-page with the semantic mark-up must be stored on the administration's web-server. |
| **Dynamic (CMS-enhanced) Web-pages** | Access-eGov Annotation Component can only be used if the Web-pages have unique URLs (like static Web-pages). Otherwise a (custom) Mapping Component *must* be used. The semantic annotation is automatically stored inside Access-eGov. | The Access-eGov Annotation Component can be used to create semantic mark-up of the service in focus that can be used to enhance the source-code of a dynamic Web-page. The marked-up content must be added to the administration's web-site.[18] |

**Table 1 Access-eGov methods and tools for semantic annotation and semantic mark-up for use with static and dynamic Web-pages.**

In order to make the semantic annotation publicly available to other Semantic Web applications, administrations need to add semantic mark-up (based on the Semantic Web standard RDF) to their Web-pages. Depending on the nature of the web-pages and the administration's existing IT-infrastructure in general (i.e. whether they use static web-pages or a CMS which dynamically creates the Web-pages) different ways to apply the semantic mark-up must be chosen. After having created the semantic annotation, semantic mark-up needs to be added to any existing Web-pages that reference, refer to or mention the service in

---

[17] Again, we do not consider the creation of External Service Profiles here. These could also be created by using third party software like an external editor.

[18] For information about the different ways of adding semantic mark-up see for example [Handschuh & Staab 2003b]

order to fully exploit the potential of the Semantic Web. The Access-eGov Annotation Component can be used to add semantic mark-up to the source-code of a Web-page. The Annotation Component will return a semantically marked-up version of the Web-page that can be stored on a Web-server. For dynamic Web-pages the same procedure applies, however, a CMS could also be extended to use the marked-up source-code to automatically apply the mark-up to the original Web-page.

The administration must decide which methods and tools are the most appropriate for their own existing IT-infrastructure. This includes the decision, whether a custom Mapping Component and/or an extension for the CMS to apply semantic mark-up can and should be developed, or whether the Access-eGov Annotation Component can and should be used. Beyond the description in this guideline, further guidelines for selection of methods & tools including a method for migration will be provided in D9.2 based on the experience from the pilots and field test. Administrations or IT-service-providers may choose to offer training on this subject.

## 3.3  Import and / or Adaptation of a Semantic Model

As described in chapter 2, semantic annotation heavily relies on the use of semantic models, usually in the form of ontologies. Access-eGov will provide a semantic model that consists of a number of ontologies which are called the *Access-eGov Generic Ontologies (AGO)*. The AGOs will define concepts that administration can use to annotate their services. Concepts will include a number of specific goals, complex goals, specific properties of services, different kinds of responsibility etc. Because the AGO cannot meet the needs of every administration, an administration can choose to create their own ontology. Such an ontology is called an *Access-eGov Localized Ontology (ALO),* which are also regarded as being part of the Access-eGov semantic model, because all ALO are based on concepts from the AGO. To ensure semantic interoperability across the Access-eGov platform, all administrations must use the same set of AGOs but they are free to additionally use individual sets of ALOs, which must have a mapping to one of the AGOs.

An ALO can be created by refining existing concepts of an AGO. These concepts can also be taken from an existing semantic model that the administration uses. Any existing semantic model that will be used as an ALO should either define concepts related to services and their properties or related to the goals of users with respect to services. The reason for this is explained below.

Two of the most important categories of concepts that the Access-eGov ontologies specify for service annotation are: 1) concepts defining user goals, and 2) concepts defining service properties. User goals are defined in a Goal-Ontology. Such a formal Goal is defined by specifying, which requirements must be met to achieve the Goal (see section 2.2 for an example). The requirements are formally expressed using specific concepts that define inputs and outputs (and possibly constraints) of a service, e.g. documents and fees.

1) The relationship between citizen's goals and services as well the problem of matching citizen's goals to services is a known problem, which has been investigated in the literature (cf. e.g. the Government Enterprise Architecture (GEA), [Peristeras & Tarabanis 2006]). Using a formal representation of the citizen's goals and the service's outputs a solution has been suggested (see [Goudos, Peristeras & Tarabanis 2006]). The Semantic-Gov project[19] exploits the abstract GEA-model and defines a mapping to WSMO constructs to make

---

[19] Semantic Gov FP6-2004-IST-4-027517, http://www.semantic-gov.org

effective use of WSMO's semantic matching properties, which can also be of use for development of the Access-eGov platform. (Cf. Wang et al 2007)

2) Input and outputs are defined in special ontologies. These ontologies are not only used to define the requirements for Goals but are also used to define the service profile of a service. By using the description of inputs and outputs in both the definition of Goals and of service profiles, Goals and services can be automatically matched by the Access-eGov Matching Component when a user searches for a specific Goal.

Besides the Goal- and input/output-ontologies, Access-eGov will provide ontologies that define concepts, which are related to other properties of services. For example, a user may want to locate services, which he can pay for by a credit card or which provide a certain level of data-encryption. These properties are called *non-functional* properties of services. Responsibility can also be considered as a non-functional property of a service. In general, citizen's only want to locate services offered by administration whose (temporal, spatial and subject-matter) responsibility corresponds to the citizen's current needs. When looking for a service to issue an ID document, a Polish citizen is not interested in services offered by foreign administrations. The Access-eGov Matching Component will therefore not only perform a semantic match based on the chosen Goal and inputs/outputs but also based on the citizen's preferences with regard to non-functional properties like responsibility.

## 3.4  Service Related Web Content Preparation and Service Annotation

For non-electronic services, administrations will want to use existing descriptions of the service on their Web-site for service profile creation. Administrations need to identify and locate the Web-pages that contain all necessary information about a particular service. For example, in the DiBIS case each service is described on a dynamic single, well-structured Web-page. A single DiBIS-Web-page lists many of the properties that are needed for a service profile (see Figure 3). Though being well structured, the current implementation of DiBIS is technically not usable by the Access-eGov Annotation Component for the creation of Service Profile (cf. section 3.2). The development and use of a custom Mapping Component is needed to make DiBIS' content available to the Annotation Component. Alternatively, the DiBIS application could be redesigned so that it uses static-like URLs, which can be bookmarked and accessed independently of user's input and session cookies.

Having identified (and made accessible to the Annotation Component) the service related Web-content, the content should be reviewed with respect to its use in the annotation process. To use a piece of information, a Web-pages source-code must be structured in such a way that each piece of information corresponding to a service property can be uniquely identified by the Access-eGov Annotation Component; for example by using HTML-tables or XHTML-class-tags. Content that is not structured in such a way is more difficult to re-use for semantic annotation and requires more manual work by the Annotation Author.

The creation of semantic annotation with the use of the Access-eGov Annotation Component (serving as the Web annotator) is described in chapter 1. During the pilot and field test a certain degree of annotation coaching should be made available to the Annotation Authors based on these guidelines. Depending on the experience from the pilots and field test, D9.2 will provide additional guidelines for the preparation of service related Web-content.

## 3.5  Test and Fine Tuning

Test and fine tuning of service annotation is mainly concerned with validation of the service profile's usability with respect to citizen's searching for services. As mentioned above, when a citizen searches for services, the search is performed by using a formalized specification of the citizen's intent (the formalized goal) and her formalized personal preferences. The formalized goal and the formalized preferences are used by the Access-eGov Matching Component to identify the services that semantically match these search criteria. The matching is performed dynamically, based on the service profile (the input, outputs and other properties) of a service. Usability validation means, that an Annotation Author checks whether a service can be found using a certain combination of goals and preferences. More specifically, the Annotation Component serves as a test bed and as such supports the Annotation Author in validating the usability of service profiles by allowing the Annotation Author to perform a *reverse* semantic match (see also section 2.4.4). In addition, the Annotation Component can be easily used to change a service profile in such a way that it correctly matches a certain goal or user preference. Usability validation should be performed by the Annotation Author after a new service profile was created. It may also be necessary to re-validate existing service profiles if one of the ontologies was changed.

The Access-eGov platform is capable of identifying certain kinds of inconsistencies if suitable *consistency constraints* have been defined which specify restrictions on the properties of Service Profiles. The annotation Author will be automatically notified if a service profiles violates any of the defined constraints.

Annotation Authors will also be notified about errors that occurred during run-time if the Access-eGov platform was able to detect such inconsistencies (see section 2.4.4 for an example).

## 3.6  Publication and Information Alignment

After a service profile has been created and registered, the service is automatically made technically available through the Access-eGov platform. Depending on the chosen strategy of the administration, semantic mark-up will also be available via the administration's Web-site. However, administrations will need to provide a way for users to access the e-government service registered through the Access-eGov platform. To this end administration can either choose to integrate the Personal Assistant Component or develop and use a custom client application.

The Access-eGov Personal Assistant Component provides a Web-based user interface to search and execute services registered with Access-eGov. Administrations and IT service providers can set up their own Access-eGov Personal Assistant Component making it either available as a stand-alone Web-site or integrate it into an existing Web-site.

Alternatively administrations and IT service providers can choose to develop and use custom client, which uses the functionality via a Web-service interface. This way, users of existing applications (like responsibility finders) can profit from the additional functionality of Access-eGov without the need to adapt to a new user interface.

During the Access-eGov pilots and field test specifically targeted go-life support will be necessary for participating administrations. Administrations deciding to adopt the Access-eGov technology for their Web-sites will find additional go-life support in the project deliverables (namely in D9.2).

## 3.7 Overview of Roles in the Annotation Process

In the last sections we have explicitly and sometimes implicitly described a number of user *roles* that the Access-eGov system must in some way take into consideration. Some of these roles (like the Annotation Author) are directly related to the Annotation Component while others are not. The following tables summarize the roles that are relevant for an administration, including the roles' responsibility, their use of IT systems, and comments (if applicable). Table 2 lists the roles that are technically supported by the Annotation Component of Access-eGov system. Table 3 lists roles that are relevant for annotation process within a migration project (e.g. the Project Manager role) that are beyond the scope Access-eGov systems development.

| Role | Responsibility | System use | Comment |
|---|---|---|---|
| Annotation Author | Creates and edits annotations (Service Profiles). | Uses the Annotation Component to create and edit Service Profiles that she is responsible for. | |
| Annotation Manager | Registers Service Profiles. | Uses the Annotation Component to register Service Profiles that she is responsible for (which were created by the same or different users). | |
| Annotation Reviewer | Review Service Profiles (read-only access). | Uses the Annotation Component to review Service Profiles created by other users. | Must be able to send notifications to other users about the state of the review ("approved", "correction needed" etc.). |
| Ontology Manager | Registers ontologies to use by other users and the Access-eGov system. | Uses Access-eGov core functionalities to register an ontology. Uses the Annotation Component to notify users about the changes in an ontology. | Registering an ontology makes it available to the Access-eGov system and its users. |
| User Manager | Manages user roles of Annotation Component. | Uses Access-eGov core components to manage roles and user groups. | The User Manager can assign roles (permissions) to users. One person may have several roles, e.g. the User Manager can *assign* one or more Annotation Authors to an Annotation Manager (or Reviewer), i.e. the same person is allowed to register (review) the Service Profiles of the assigned Annotation Author(s). |

**Table 2 Roles supported by the Access-eGov system**

| Role | Responsibility | System use | Comment |
|---|---|---|---|
| Project Manager | The PM is responsible for the overall project of migration to the Semantic Web, including the definition of the scope of migration. | | |
| Content Analyst | Analysis the structure of service related Web-content based on the scope of migration. | Uses exiting Web sites and applications. | |
| Content Author | Creates and edits service related Web-content. | Uses external tools, like a CMS or other authoring tools. | |
| Ontology Author | Creates and edits ontologies. | Supported within Access-eGov, but not through the Annotation Component (cf. D7.1). | After creating the ontology they must be made available to the Access-eGov system (registered) by an Ontology Manager. |
| IT Administrator | Maintains the IT tools and infrastructure. | Uses all IT tools and infrastructure of the organisation (and beyond, if needed). | This includes the responsibility for making databases available to Access-eGov via a custom Mapping Component. |

**Table 3 Important roles in the annotation process beyond the scope of Access-eGov system development.**

These roles are designed for analytical purposes, in order to support the development of Access-eGov tools and methods. In practice, one person may have several roles, e.g. the User Manager can assign one or more Annotation Authors to an Annotation Manager (or Reviewer), i.e. the same person is allowed to register (review) the Service Profiles of the assigned Annotation Author(s).

# 4 Development Requirements and Follow-Up Activities

In the following Table 4 we summarize the requirements for development of the annotation component that arise from these guidelines. This extends the list of development requirements already stated in D2.2 (numbered in 3 sections, which is why numbering here starts with 4.1).

| Req.# | Requirement | Priority E=Essential D=Desirable | Originator | Comments |
|---|---|---|---|---|
| 4.1.1 | The user roles that use the Annotation Component defined in section 3.7 (Table 2) are supported (Annotation Author, Annotation Manager, Annotation Reviewer, User Manager, Ontology Manager) | E | D7.2 | The role Ontology Author does not use the Annotation Component. |
| 4.1.2 | Ontology Managers can register ontologies, thus making them available to Access-eGov, and notify users about ontology changes. | E | D7.2 | |
| 4.1.3 | Annotation Authors can create and store Service Profiles | E | D7.2 | |
| 4.1.4 | Annotation Managers can register Service Profiles, thus making the service available through Access-eGov | E | | |
| 4.1.5 | Annotation Authors are supported in validating service profile usability by forward and reverse semantic matching. | E | D7.2 | Already during creation of a Service Profile the Annotation Author should be able to see which Goals (or Complex Goals) match the Service Profile. The Annotation Author also needs to be notified if no Goal matches the Service Profile. |
| 4.1.6 | Service Profiles can be identified by URIs and are accessible from non-Access-eGov applications. | E | D7.2 | Information about Service Profiles must be publishable on Web-pages by using Semantic Mark-Up in the form RDF. |
| 4.1.7 | A Web service interface is available that can be used to make content available for annotation. | E | D7.2 | Administrations will use this Web-service-interface by developing a custom Mapping Component for their content. |
| 4.1.8 | A Web-service interface is available that takes a Web-page as input and returns either the same Web-page containing semantic mark-up for a specific service (or services) or only the mark-up as an output. | E | D7.2 | |
| 4.1.9 | Annotation Reviewers can review Service Profiles and use the notification facility to inform one or more Annotation Authors. | E | D7.2 | Annotation Authors need to be informed about changes to ontologies (if these changes have an impact on their service profiles), about problems with their service profiles (which may be determined by human reviewers) etc. The notification facility must therefore allow messages to be sent based on specific goals, preferences, service profiles and / or recipients. |
| 4.1.10 | A simple workflow for Service Profile approval is available. | E | D7.2 | The workflow should support a simple approval process, where new Service Profile needs to be approved by a different user before it can be registered. |

| 4.1.11 | Consistency constraints can be defined for service profile properties, service profiles will be automatically validated based on these consistency constraints and inconsistencies will be reported to the responsible Annotation Author. | D | D7.2 | |

**Table 4 Requirements arising from this deliverable (Requirements in D2.2 were numbered using 1.1, 2.1, and 3.1, which is why numbering here starts with 4.1)**

The tools that are developed within Access-eGov should meet the requirements and should correspond to the description of the tools as stated in this document. If, for whatever reason, the tools cannot be developed to reflect this description, care should be taken to update the tool's description in these guidelines in order to keep the guidelines and the implementation "in sync". Furthermore, drawing on the experience from the pilots and field test, these guidelines for semantic mark-up will be extend to be an integral part of the overall methodological framework (D9.2). We therefore propose follow-up activities to ensure that these guidelines are up-to-date with respect to the development of the tools and the development of the method for semantic mark-up:

- **Follow-up activities with respect to the implementation of tools:** At the end of Trial 1 and 2, software developers and the authors of D7.2 need to verify that the description in D7.2 and implementation of the tools match.

- **Follow-up activities with respect to the method for semantic mark-up:** During Trial 1 and 2, user partners should document problems encountered when following the guidelines. At the end of Trial 1 and 2 authors of D7.2 and D9.2 should collect this documentation and modify / extend the guidelines accordingly.

# 5 Conclusions

In this document, we outlined the guidelines for semantic mark-up of e-government resources as far as it is needed within the scope of the Access-eGov project, especially in the pilots and field test. The provided guidelines primarily focus on the creation of structured service profile, which is a machine-readable representation of the semantic description of e-government services, their attributes and the resources required for service execution.

Semantic mark-up and annotation functionality will be provided by the Annotation Component. The way how to use this component to publish services, create service profiles and validate their usability afterwards is described in Section 2. Two examples of e-government services were given to illustrate the proposed way of semantic annotation and mark-up on a "traditional" non-electronic as well as on a fully electronic service. Use cases for creation and maintenance of service profiles and for finding proper services were specified.

Section 3 deals with the migration of Web content to the Semantic Web. It includes a definition of scope and goals of migration, selection of method, models, and tools for annotation according to the given IT infrastructure, annotation of e-government services by creating service profiles, and testing of usability of the resulting service profiles. All these issues are discussed in detail, in the background of a schematic representation of the annotation process, its supporting methods and tools.

The semantic annotation heavily relies on the use of semantic models — ontologies. The *Access-eGov Generic Ontologies (AGO)* were identified as a source of concepts that administrations can use to annotate their services. Concepts will include a number of specific goals, complex goals, specific properties of services, different kinds of responsibility etc. The AGO can be modified to meet some specific requirements of a given administration into the *Access-eGov Localized Ontology (ALO),* which is also regarded as being part of the Access-eGov semantic model. According to this division, *functional* and *non-functional* properties of services were specified, together with their role and usage in the annotation process.

The user roles that are relevant for a the management of semantic annotation, including the roles' responsibilities and usage of system components (tools), were identified and presented in Table 2 and 3. Firstly, there are roles that are technically supported by the Annotation Component. In the second table, there are roles that are beyond the scope Access-eGov systems development but they are relevant to annotation process within a migration project.

Finally, the requirements for development of the annotation component were summarized and follow-up activities for further development were specified.

# 6 Literature

**[Access-eGov 2005]**  Technical Annex to Access-eGov, contract no. FP6-2004-27020.

**[Access-eGov 2006]**  Annotation Scope Definition for the Access-eGov Project.
Download from:
http://www.accessegov.org/acegov/uploadedFiles/webfiles/cffile_11_30_06_11_48_03_AM.doc

**[Berners-Lee, Hendler & Lassila 2001]**    Tim Berners-Lee, James Hendler und Ora Lassila: "The Semantic Web", Scientific American, May 17, 2001.

**[Goudos, Peristeras & Tarabanis 2006]**    Goudos, S. K., Peristeras, V., Tarabanis, K.: "Mapping Citizen Profiles to Public Administration Services Using Ontology Implementations of the Governance Enterprise Architecture (GEA) model",  in: Abecker, A., Mentzas, G. and Stojanovic, L. (eds.), *Semantic Web for eGovernment,* Proceeding of Workshop at the 3rd European Semantic Web Conference (June 12, 2006, Budva, Serbia & Montenegro), download from
http://www.imu.iccs.gr/semgov/index_files/Proceedings.html

**[Handschuh & Staab 2003a]**        S. Handschuh and S. Staab (eds): *Annotation for the Semantic Web*, Volume 96 of Frontiers in Artificial Intelligence and Applications, IOS Press, Amsterdam, 2003.

**[Handschuh & Staab 2003b]**        S. Handschuh and S. Staab: "Annotation of the Shallow and the Deep Web", in: S. Handschuh and S. Staab, *Annotation for the Semantic Web,* Volume 96 of Frontiers in Artificial Intelligence and Applications, IOS Press, Amsterdam, September 2003.

**[Meyer 1998]** B. Meyer: "Design by Contract", Technical Report TR-EI-12/CO, Interactive Software Engineering, Santa Barbara (Calif.), 1988. Revised version in D. Mandrioli and B. Meyer (eds.): *Advances in Object-Oriented Software Engineering*, Prentice-Hall, 1991, pp. 1-50.

**[Peristeras & Tarabanis 2006]**      Peristeras, V., Tarabanis, K.: "Reengineering Public Administration through Semantic Technologies and a Reference Domain Ontology", in: Proceedings *AAAI Spring Symposium "Semantic Web Meets eGovernment"* (Stanford University, March 27-29, 2006), Technical Report SS-06-06, AAAI Press, Menlo Park, CA,  2006, pp. 56-63.

**[Wang et al 2007]**    Xia Wang, Tomas Vitvar, Vassilios Peristeras, Adrian Mocan, Sotirios Goudos and Konstantinos Tarabanis: "WSMO-PA: Formal Specification of Public Administration Service Model on Semantic Web Service Ontology", to appear in: Hawaii International Conference on System Sciences (HICSS), Jan. 3-6, 2007, Hilton Waikoloa Village Resort, Waikoloa, Big Island, Hawaii. Download from: http://www.semantic-gov.org/index.php?name=Web_Links&req=visit&lid=63

# 7  Glossary and List of Abbreviations

**AGO**                      Access-eGov à Generic Ontology

**ALO**                      Access-eGov à Localized Ontology

**Annotation Author**        The role of the person responsible for creating the à Semantic
                             Annotation for a à service (by using the à Annotation
                             Component). See section 3.7 for a complete list of user roles.

**Annotation Component**     The Access-eGov software component, which is used by
                             administrations to create, edit and register à Service Profiles.

**Annotation Manager**       The role of the person responsible for registering à Service
                             Profiles in order to make them available to citizens / business
                             users via Access-eGov. See section 3.7 for a complete list of user
                             roles.

**Annotation Reviewer**      The role of the person responsible for reviewing à Service
                             Profiles. See section 3.7 for a complete list of user roles.

**CMS**                      Content Management System

**Complex Goal**             A Complex Goal is a formal description of an objective that a
                             citizen wants to reach and which cannot be described by a single
                             atomic à **Goal**. Formally, a **Complex Goal** is an Access-eGov
                             specific extension of WSMO, which consists of one or more
                             (atomic) Goals. One possible use of Complex Goals is the formal
                             description of life events. Like (atomic) Goals, Complex Goals
                             are described in a à Generic Ontology for Goals.

**Consistency Constraint**   A consistency constraint is a logical expression that constrains the
                             allowed values of one or more properties of a à Service Profile.
                             (D7.2, section 2.4.4)

**Generic Ontology**         This is an ontology defined by Access-eGov providing generic
                             concepts such as "Responsibility", "Opening Hours" etc.
                             Administrations should use the concepts from these Generic
                             Ontologies to define their own Access-eGov à Localized
                             Ontologies. The Access-eGov Generic Ontologies ensure a
                             certain level of semantic interoperability within the Access-eGov
                             system. (D7.2, section 2.3.1)

**Goal**                     A goal specifies those objectives that a client might have when
                             consulting a service, including functionalities that a service
                             should provide from the user's perspective.

**Localized Ontology**       This kind of ontology is defined by an administration by refining
                             (specializing) or mapping new concepts to an existing Access-
                             eGov à Generic Ontology. (D7.2, section 2.3.1)

**Semantic Annotation**      Semantic Annotation in the form of à Service Profiles is used to enable Access-eGov to process information about services, which can then be used to find, locate and orchestrate services for users. Semantic Annotation is made available to other Semantic Web agents by applying à Semantic Mark-Up to Web-pages.

**Semantic Mark-Up**      Semantic Mark-Up is used to publish information about à Service Profiles (i.e. à Semantic Annotation) within Web-pages. Access-eGov provides Semantic Mark-Up in the form of à RDF.

**Ontology**      In computer science an ontology is a way for representing the meaning of concepts. Within the à Semantic Web ontologies are used to express the meaning of information through the application of à Semantic Annotation. An ontology consists of terms (concepts) and relations between those concepts, sometimes also including constraints and rules.

      The term is borrowed from Philosophy where it is used in a different sense (the main difference being that in Philosophy, an ontology is language independent).

**RDF**      Resource Description Framework, a family of W3C recommendations for simple knowledge representation.

**Responsibility**      With respect to e-Government services, at least three kinds of responsibility can be distinguished: spatial, temporal and subject-matter responsibility. (D7.2, section 2.4.1)

**Service**      Access-eGvo defines an (e-Government) service as follows (see also [Access-eGov 2006]):

- A relationship between a service provider (administration) and a service consumer (businesses / citizens).
- A service is of offered by an administration to fulfil a need of a business / citizen.
- The service-relationship has certain implications for both parties (providers and consumers). These implications can be described as two "interfaces" that specify the service's pre- and post-conditions similar to the familiar concept of "design-by-contract" [Meyer, 1988]:
  § The input interface describes the preconditions, e.g. the necessary documents etc.
  § The output interface describes the service result, e.g. a certificate of approval etc.

      Access-eGov provides access to both electronic and traditional (non-electronic) services. In the case of traditional services citizens / businesses can obtain information about the service but cannot initiate (execute) the service. The latter is only possible for electronic services. Intra-government services are not in the focus of Access-eGov. A service is formally described by creating a à Service Profile.

**Service Profile**          A Service profile specifies what a service provides from the user's perspective and is used by the public administration to advertise services. Service profile consists of non-functional and functional properties. (D3.1, p. 36)

Access-eGov requires à Semantic Annotation to be in the form of service profiles. Service profiles can be created by using the Access-eGov Annotation Component as described in these guidelines or by using external tools.

**Service Profile Editor**   The part of the à Annotation Component that is used to create, edit and register à Service Profiles.