

# FREMA: e-Learning Framework Reference Model for Assessment

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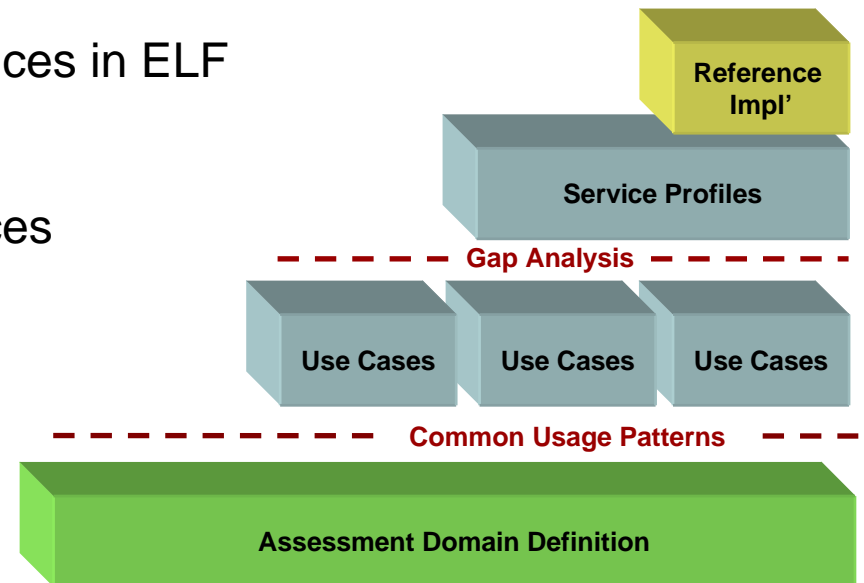


# Background

- What is FREMA?
  - JISC funded Project between Southampton, Strathclyde and Hull
  - Part of the e-Framework effort
  - Aim to produce a Reference Model of the e-Learning Assessment Domain
  - To aid interoperability and aid in the creation of Assessment Services for the e-Framework
- What is a Reference Model for Assessment?
  - Assessment is a broad and complex domain
  - Not enough to describe and define a set of services
  - Need a proper audit trail of decision making
  - Start by defining the domain
  - Work up through use cases to services (and example implementations)

# Anatomy of FREMA Reference Model

- Domain Definition
  - Overview of the domain, and how projects and standards fit within it
- Identifying Common Usage Patterns
  - Scoping the FREMA Project
- Developing Use Cases
  - Formal descriptions of usage patterns
- Gap Analysis
  - Mapping of Use Cases to the Services in ELF
- Service Profiles
  - Formal descriptions of those services
- Example Implementation
  - Of key/core services
  - Examples
  - Validation
  - Resource



# Semantic Wiki

- Used to build a semantic wiki (a wiki in which all the pages and links are typed)
- Can model all the levels of the Reference Model
- Enables Smart Searching and Analysis
  - Semantic Search
  - Dynamic Gap Analysis
  - Concept maps
- Open editing, but with Administrator controls

The screenshot shows the 'Main Page' of the FREMA Semantic Wiki. The browser window title is 'Main Page - Frema2Wiki - Microsoft Internet Explorer'. The address bar shows the URL: [http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Main\\_Page](http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Main_Page). The page features a navigation menu on the left with links like 'Main Page', 'Community portal', and 'Recent changes'. A central sidebar lists 'FREMAWiki Sections' including 'Concepts', 'Models and Frameworks', 'Organisations', and 'Patterns'. The main content area includes a 'Welcome to FREMA' section with a detailed description of the Reference Model for the JISC e-Learning Framework (ELF), and a 'Concept Maps' section with links to 'Entity Concept Map' and 'Process Concept Map'. The page is styled with a blue and white color scheme and includes standard web browser navigation buttons.



Concept Maps - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Wordpad New Tab Bluetooth

Address <http://www.frema.ecs.soton.ac.uk/db/wikiConceptMaps.php?type=process> Go Links

Instructions

**Organisations**

- [APIS](#)
- [ASSIS](#)

**Service Descriptions**

- [Rendering a QTI 1.2 /2.0 Item v\(1.0\)](#)
- [Rendering and Response Processing a QTI 2.0 item v\(1.0\)](#)

**Software**

- [TOIA AMS v\(1.0\)](#)
- [APIS Viewer v\(1.0\)](#)
- [ASSIS QTIrun v\(1.0\)](#)
- [ASSIS Player v\(1.0\)](#)

**Systems**

- [APIS System](#)

Done Internet



[category](#) [discussion](#) [edit](#) [history](#)

## Category:Domain Standards

To create a new domain standard, go to the main [Standards](#) page.

### Articles in category "Domain Standards"

There are 22 articles in this category.

- navigation
- [Main Page](#)
  - [Community portal](#)
  - [Current events](#)
  - [Recent changes](#)
  - [Random page](#)
  - [Help](#)
  - [Donations](#)

search

- toolbox
- [What links here](#)
  - [Related changes](#)
  - [Upload file](#)
  - [Special pages](#)
  - [Printable version](#)
  - [Permanent link](#)

#### B

- [BS7988](#)

#### I

- [IMS AccessForAll Metadata Specification v1.0](#)
- [IMS Content Packaging v1 \(Domain\)](#)
- [IMS Content Packaging v1.1 \(Domain\)](#)
- [IMS Content Packaging v1.1.1 \(Domain\)](#)
- [IMS Content Packaging v1.1.2 \(Domain\)](#)
- [IMS Content Packaging v1.1.3 \(Domain\)](#)

#### I cont.

- [IMS Content Packaging v1.1.4](#)
- [IMS Metadata v1.2.1 \(Domain\)](#)
- [IMS Metadata v1.2.2 \(Domain\)](#)
- [IMS Simple Sequencing v1.0](#)

#### M

- [MathQTI](#)

#### O

- [OSID](#)

#### Q

- [QML](#)
- [QTI v1.0](#)

#### Q cont.

- [QTI v1.2](#)
- [QTI v2.0](#)

#### S

- [SCORM v1.2](#)
- [SCORM v2004 \(Domain\)](#)

#### T

- [TOIA/COLA Metadata Application Profile v1.2](#)
- [Template:Domain Standards](#)

#### U

- [UK Leap v1.0](#)

[Category: Standards](#)

QTI v2.0 - Frema2Wiki - Microsoft Internet Explorer

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Address [http://denebola.ecs.soton.ac.uk/wiki/index.php?title=QTI\\_v2.0](http://denebola.ecs.soton.ac.uk/wiki/index.php?title=QTI_v2.0) Go Links >>

152.78.68.176 talk for this ip log in / create account



article discussion edit history

## QTI v2.0

navigation

- [Main Page](#)
- [Community portal](#)
- [Current events](#)
- [Recent changes](#)
- [Random page](#)
- [Help](#)
- [Donations](#)

Question and Test Interoperability Specification created by IMS. Aimed primarily at content providers, it is an XML based content format for describing items and assessments.

The latest version is Version 2.0, which covers related topics such as content packaging, learning design and simple sequencing. Note that v2.0, unlike v1.0, does not cover aggregating items into complete assessments.

Entities
<a href="#">technical</a>
Processes
<a href="#">Author</a>

search

Go Search

toolbox

- [What links here](#)
- [Related changes](#)
- [Upload file](#)
- [Special pages](#)
- [Printable version](#)
- [Permanent link](#)

### Related items

This domain standard is specified by the following frameworks:

- [IMS Question & Test Interoperability \(QTI\) Specification](#)

This domain standard used in the following software:

- [APIS Viewer v1.0](#)
- [ASSIS QTIRun v1.0](#)
- [LisMultipleChoice v0.91](#)
- [PyAssess](#)
- [Roboprof](#)
- [SPAID Content Packager v1.0](#)
- [SPAID Metadata Tagger v1.0](#)

### Links & Documents

- [QTI v2.0 Homepage: http://www.imsglobal.org/question/index.cfm](http://www.imsglobal.org/question/index.cfm)

Previous Version	QTI v1.0	Next Version
	<a href="#">QTI v1.0</a>	<a href="#">QTI v2.0</a> <i>This is the latest version</i>

Facts about QTI v2.0 — Click + to find similar pages. [View as RDF](#)



Editing QTI v2.0 - Frema2Wiki - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Mail Print View Source Home Bluetooth People

Address [http://denebola.ecs.soton.ac.uk/wiki/index.php?title=QTI\\_v2.0&action=edit](http://denebola.ecs.soton.ac.uk/wiki/index.php?title=QTI_v2.0&action=edit) Go Links >>

Log in / create account

[article](#) [discussion](#) [edit](#) [history](#)

## Editing QTI v2.0

**Warning:** You are not logged in. Your IP address will be recorded in this page's edit history.

**B**

Question and Test Interoperability Specification created by IMS. Aimed primarily at content providers, it is an XML based content format for describing items and assessments.

The latest version is Version `[[version:=2.0|2.0]]`, which covers related topics such as content packaging, learning design and simple sequencing. Note that v2.0, unlike v1.0, does not cover aggregating items into complete assessments.

== Related items ==

This domain standard is specified by the following frameworks:

- \* `[[is specified by::IMS Question & Test Interoperability (QTI) Specification]]`

This domain standard used in the following software:

- \* `[[used in::APIS Viewer v1.0]]`
- \* `[[used in::ASSIS QTIRun v1.0]]`
- \* `[[used in::LlsMultipleChoice v0.91]]`
- \* `[[used in::PyAssess]]`
- \* `[[used in::Roboprof]]`
- \* `[[used in::SPAID Content Packager v1.0]]`
- \* `[[used in::SPAID Metadata Tagger v1.0]]`

== Links & Documents ==

- \* `[[Image:web.gif|Web Document]]` QTI v2.0 Homepage:  
`[[Website:=http://www.imsglobal.org/question/index.cfm]]`

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navigation

- Main Page
- Community portal
- Current events
- Recent changes
- Random page
- Help
- Donations

search

Go Search

toolbox

- [What links here](#)
- [Related changes](#)
- [Upload file](#)
- [Special pages](#)

Done Internet



# Analysis Tools: Gap Analysis

Summative Assessment - Frema2Wiki - Microsoft Internet Explorer

Address: [http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Summative\\_Assessment](http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Summative_Assessment)

Service Description (part)	Software Providers	Software Consumers
Generating Fixed Response Questions in QTI 1.2/2.0 format v1.0	Roboprof	JELFAD Player v1.0
Marking a Java Assignment v1.0	AJM v1.0	JELFAD Player v1.0
Rendering and Response Processing a QTI 2.0 item v1.0	ASSIS QTIRun v1.0	ASSIS Player v1.0
Searching e3an Item Bank (Basic) v1.0	Basic Search Web Service v1.0	Item Bank Searching Front End v1.0
Searching e3an Item Bank (Semantic) v1.0	Semantic Search Web Service v1.0	Item Bank Searching Front End v1.0
Searching e3an Item Bank (Similar) v1.0	Similar Search Web Service v1.0	Item Bank Searching Front End v1.0
Tagging an Item with Metadata in the SPAID Item Bank v1.0	SPAID Metadata Tagger v1.0	

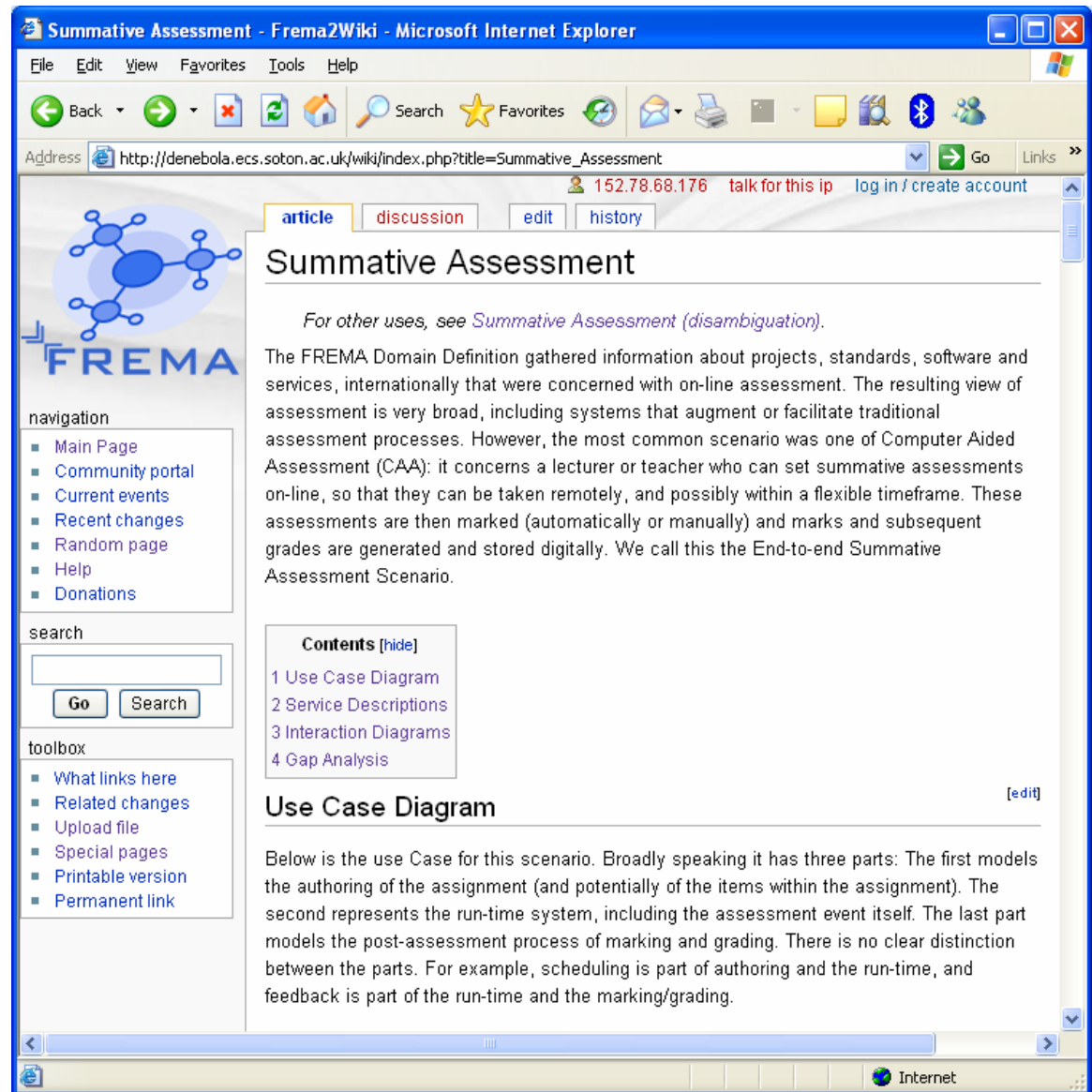
  

Service Description (full)	Software Providers	Software Consumers	Software Implementers
Assign Assessment Service v1.0			
Assign Cohort Service v1.0			
Author Assessment Service v1.0			
Author Item Service v1.0			
Grade Assessment Service v1.0			
Mark Assessment Service v1.0			
Moderate Assessment Service v1.0			
Notify Service v1.0			
Schedule Assessment Service v1.0			
Take Assessment Service v1.0			
Track Service v1.0			
Validate Assessment Service v1.0			
View Feedback Service v1.0			

Internet

# Service Usage Model

- Describes a scenario in which services work together
- Use Case Diagram
- Set of Abstract Logical Service Expressions
- Interaction Diagram



The screenshot shows a Microsoft Internet Explorer browser window displaying a wiki page titled "Summative Assessment" on the Frema2Wiki site. The browser's address bar shows the URL: [http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Summative\\_Assessment](http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Summative_Assessment). The page features a navigation menu with options like "article", "discussion", "edit", and "history". The main content area includes a heading "Summative Assessment" followed by a paragraph: "For other uses, see *Summative Assessment (disambiguation)*. The FREMA Domain Definition gathered information about projects, standards, software and services, internationally that were concerned with on-line assessment. The resulting view of assessment is very broad, including systems that augment or facilitate traditional assessment processes. However, the most common scenario was one of Computer Aided Assessment (CAA): it concerns a lecturer or teacher who can set summative assessments on-line, so that they can be taken remotely, and possibly within a flexible timeframe. These assessments are then marked (automatically or manually) and marks and subsequent grades are generated and stored digitally. We call this the End-to-end Summative Assessment Scenario." Below this is a "Contents" section with a list of links: "1 Use Case Diagram", "2 Service Descriptions", "3 Interaction Diagrams", and "4 Gap Analysis". The "Use Case Diagram" section is partially visible, starting with the text: "Below is the use Case for this scenario. Broadly speaking it has three parts: The first models the authoring of the assignment (and potentially of the items within the assignment). The second represents the run-time system, including the assessment event itself. The last part models the post-assessment process of marking and grading. There is no clear distinction between the parts. For example, scheduling is part of authoring and the run-time, and feedback is part of the run-time and the marking/grading." The browser's status bar at the bottom indicates "Internet".



# SUM: Structure and Organisation

Image:Serviceprofiles.JPG - Frema2Wiki - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Image:Serviceprofiles.JPG> 152.78.68.176 talk for this ip log in / create account

file discussion edit history

## Image:Serviceprofiles.JPG

Image File history Links

Summative End-to-End (FREMA)

navigation

- Main Page
- Community portal
- Current events
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- Donations

search

Go Search

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

Author Assessment		Author Item		Schedule Assessment		Mark Assessment	
Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations
- Create - Modify - Copy - Delete - Store - Preview - Validate - Export	- Assessment - Repos' - Metadata Tagger - Preview - Assessment	- Create - Store - Copy - Delete - Validate - Preview - Export	- Item Repos' - Metadata - Tagger - Preview Item	- Schedule - Assessment - Book facilities - Record - Notify	- Student - Information Service - Assessment - Repository - Track - Notify	- Generate Item Mark - Generate - Assessment Mark - Profile - Generate Feedback	- Store Marks
Validate Item		Assign Assessment		Take Assessment		Grade Assessment	
Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations
Validate Accuracy and Completeness (Item fields, metadata)	Item Repos' Validate Metadata	- Assign Students to Assessment	- Assign Students to Cohort	- Manage - Assessment Session - Present Items to - Candidate According - to Assessment - Instructions - Record Usage Data	- Authenticate - and Authorize - Schedule - Track	- Retrieve Moderated - Marks Profile for a - Candidate - Allocate Grade - According to Marks - Scheme	- Store Marks - Moderate - Grade - Record Grade
Validate Assessment		Assign Cohort		View Feedback		Moderate Assessment	
Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations
- Validate Accuracy and Completeness - Validate - Pedagogical Quality - Record Verification - Outcome	- Authenticate - and Authorize - Assessment - Repository - Metadata - Tagger	- Assign Students to Cohort	- Student - Information - Service	- Retrieve - Feedback - Retrieve - Moderated Marks - Render Feedback	- Authenticate and - Authorize - Store Marks	- View Assessment - Mark Profile - View Analysis - Generate - Candidate/Group - Mark Analysis - Generate - Assessment Analysis	- Authenticate - and Authorize - Store Marks
Notify		Track		Metadata Tagger		Grading (FREMA) ...	
Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations	Responsibilities	Collaborations
- Notify (Participants) of - Assessment Schedule - Notify (Participants) of - Assessment Feedback		Record Assessment - Events (assign, - schedule, mark, - moderate, grade)		- Create - Manage - Validate	- Metadata Repos' - Validate Metadata	- Store Marks	- Record Grade - Moderate Grade
Common Services		Repositories		Preview (FREMA) ...			
Authenticate - and Authorize	Validate - Metadata	Assessment - Repository	Item Repository	Metadata - Repository	Preview - Assessment	Preview - Item	Other Reference - Models ...
					Student Info' - Service		

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# Service Expression

Take Assessment Service v1.0 - Frema2Wiki - Microsoft Internet Explorer

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Address [http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Take\\_Assessment\\_Service\\_v1.0](http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Take_Assessment_Service_v1.0) Go Links

152.78.68.176 talk for this ip log in / create account

article discussion edit history

## Take Assessment Service v1.0

Service Responsibility and Collaboration Card

Take Assessment Service v1.0	
Responsibilities	Collaborations
<ul style="list-style-type: none"><li>Manage Assessment Session<ul style="list-style-type: none"><li>Confirm candidate</li><li>Confirm location</li><li>Open/close assessment</li><li>Candidate sign on</li><li>Choose assessment</li><li>Confirm start/finish of test</li><li>Display &amp; confirm acceptance of rubric</li><li>Enforce test constraints (time limit, sequence etc)</li></ul></li><li>Present items to candidate according to assessment instructions&lt;<ul style="list-style-type: none"><li>Render item</li><li>Render hints</li><li>Record response</li><li>Process response</li><li>Choose assessment</li><li>Enforce item constraints (time limit, retries etc.)</li></ul></li><li>Record usage data</li></ul>	<ul style="list-style-type: none"><li>Schedule Assessment Service v1.0</li><li>Authenticate and authorise</li><li>Track</li></ul>

Done Internet

- Logical, abstract description

# SUM: Functionality

Image:Wsi2.jpg - Frema2Wiki - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://denebola.ecs.soton.ac.uk/wiki/index.php?title=Image:Wsi2.jpg> Go Links

152.78.68.176 talk for this ip log in / create account

file discussion edit history

## Image:Wsi2.jpg

Image File history Links

navigation

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search

Go Search

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

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Internet

- Workflow and processes
- Semi-formalised as a UML Interaction Diagram

# Scenario: Technical Developer



## Will, Technical Developer

*'I want to lookup use cases and scenarios to help me design my application. This will help me to define my footprint in the assessment domain. I see there are some web services I could re-use but some are missing. What standards can I use when writing my own web services to ensure that I can interoperate with the web services I've chosen?'*

The collage consists of several overlapping browser windows from Microsoft Internet Explorer. The windows show various pages from the FREMA website, including:

- Category: Domain Standards**: A page with a navigation menu and a search box.
- Summative Assessment**: A page with a navigation menu and a search box.
- Use Case Diagram**: A page with a navigation menu and a search box.
- Service Descriptions**: A page with a navigation menu and a search box.
- Gap Analysis**: A page with a navigation menu and a search box.
- Take Assessment Service v1.0**: A page with a navigation menu and a search box.
- Image: Wsi1.jpg**: A page showing an image of a person.
- E3an Web Service v1.0**: A page with a navigation menu and a search box.