

Project Name: Analysis of the reports submitted by Member States on the implementation of Directive 2008/1/EC, Directive 2000/76/EC, Directive 1999/13/EC and further development of the web platform to publish the information

Task 6 - Technical Handbook

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1. Introduction

1.1 Document Purpose

This document aims to provide a technical overview as to the design, development and deployment of the Content Management System and Data Query Tool deliverable of the IRIS II project. It is designed to allow future technical IT experts to gain an understanding of the work in order to allow for future support or enhancements.

1.2 Project Stakeholders

The IRIS II project was conceived and developed to take into consideration the requirements of five stakeholder groups, referred to as S1 – S5. Specifically these groups are defined as follows:

- Members States, Competent Authorities, Policy Makers, Environment Protection Agencies, Environmental Inspectorates, Other Government Bodies within Member States **[S1]**;
- European Industrial Associates – various including some from – Business Europe, CEFIC, CONCAWE, CEPE, Eurofer, Cembureau, Eurelectric also for WID – Eurits, FEAD, Cewep **[S2]**;
- Advanced Users of Reported Data – e.g. Research Communities (primarily at cross European Level) **[S3]**;
- European Commission DG Environment (EC DG ENV, DGJRC Seville) and the European Environment Agency (EEA) **[S4]**;
- EU NGOs (e.g. EEB) and Interested Citizens with the Member States **[S5]**.

The anticipated interaction between each of the aforementioned stakeholder groups and the various functions provided by the IRIS II project elements have been illustrated through a series of use case scenarios included in section 2 of this document.

2. Format of the Tools

The IRIS II project comprised two main elements – the Content Management System and the Data Query Tool. This section of the technical handbook will discuss each element, providing an overview of which technologies were employed and use cases to illustrate likely scenarios for project stakeholder interaction.

2.1 Content Management System

Several formal objectives of the IRIS II project related to the revision and enhancement of the existing IRIS website. Specifically:

- Improving the look and feel of the IRIS website;
- Extending the existing website functionalities by summarising, compiling and adapting the contents of the existing website and the reports to be made under this contract.

Furthermore, numerous technical and user requirements were identified for the Content Management System:

Technical requirements:

- Supported by the EEA, comply with their [software standards](#) and conforms to SEIS principles;
- Integrate effectively with SQL Server 2005 and the GBR query tool;
- Support plug-in search mechanisms;
- Permission based user access;
- Complies with European accessibility requirements – W3C, E-GIF;
- Supports branding and design compliant with EEA design guidelines and to [Eionet design standards](#).

User requirements:

- Compatible with EEA supported browsers;
- Supports the ability to manage content, images, multi-media, text, files and links;
- User friendly (minimum training);
- Easy to update web pages and does not require additional technologies.

Taking these objective and requirements into consideration, AEA deduced that [SilverStripe](#), an open source web Content Management System would be the most suitable solution to fulfil the project requirements. This project uses SilverStripe version 2.4, which was the latest release at the time of development.

A number of bespoke customisations in addition to the adaptation and application of the existing Eionet theme have been made to the SilverStripe CMS. These customisations have been made in an upgrade safe manner, extending and overriding default SilverStripe functionality as required and will be discussed in greater depth in section 5 of this document.

2.2 Data Query Tool

Several formal objectives of the IRIS II project related to the development of the Data Query Tool. Specifically:

- Constructing a comprehensive set of databases by analysing, harmonising and standardising numeric and non numeric data reported by the member states under different reporting requirements;
- Implementing a suitable tool for numeric data and standardised data.

Furthermore, numerous technical and user requirements were identified for the Data Query Tool:

Technical requirements:

- Supported by the EEA, comply with their [software standards](#) and conforms to SEIS principles;
- Integrates effectively with the other technologies;
- Framework should support and encourage best practises such as object oriented design and modularity.

User requirements:

- Supports the functionality outlined in Use Case 1 (excluding the CMS functionality);
- Allow for an efficient and effective user experience (e.g. fast and responsive to submissions/requests for data).

From the offset, the strategy had been that the Data Query Tool would be built using a framework. Given the requirement that the source code for all European Commission projects is made open source, the decision was taken to use the PHP based [Zend Framework](#). This is an open source application framework, which follows object oriented and best practice programming concepts. This library also forms the basis for the AEA framework, with which the AEA development team have worked extensively.

The design and development approach taken with Zend Framework to implement the Data Query Tool will be discussed in greater depth in section 5 of this document.

2.3 Use Case Scenarios

Use Case 1 – Home and News

This use case applies to all users, S1 – S5. The user visits the site and the home/news page is displayed as the default page. The feedback from the current site survey suggests that future users are interested in news reports in the area of Integrated Pollution Prevention and Control (IPPC). The news page will display reports in descending date order, with the latest news appearing first.

S1 to S5



IRIS II Website – Home and News page displayed as default

Use Case 2 – Frequently Asked Questions

This use case applies to all users, S1 – S5. The frequently asked questions portion of the website will comprise a single web page. It has been suggested that it includes a list of all frequently asked questions at the top of the page, with each question linking to the respective question and responses further down the page through the use of hyperlinks and anchors.

This approach will maximise the website usability and accessibility for all potential users by not relying on JavaScript to fully function.

S1 to S5



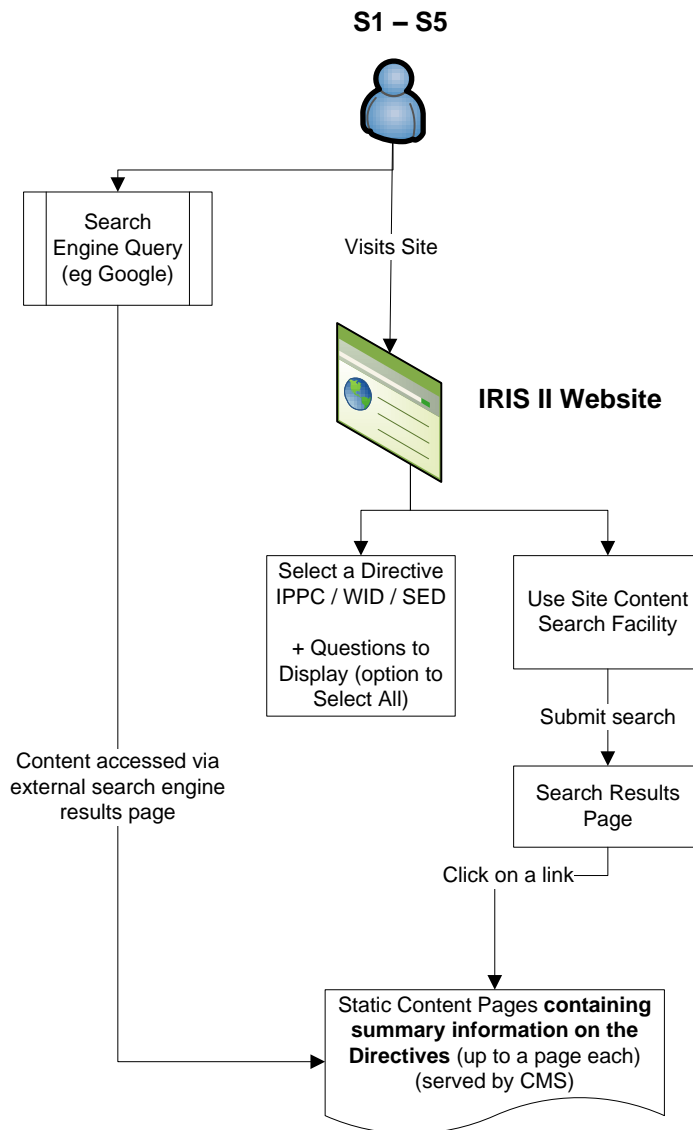
IRIS II Website - News page displayed as default

FAQs

Use Case 3 – Search Functionality

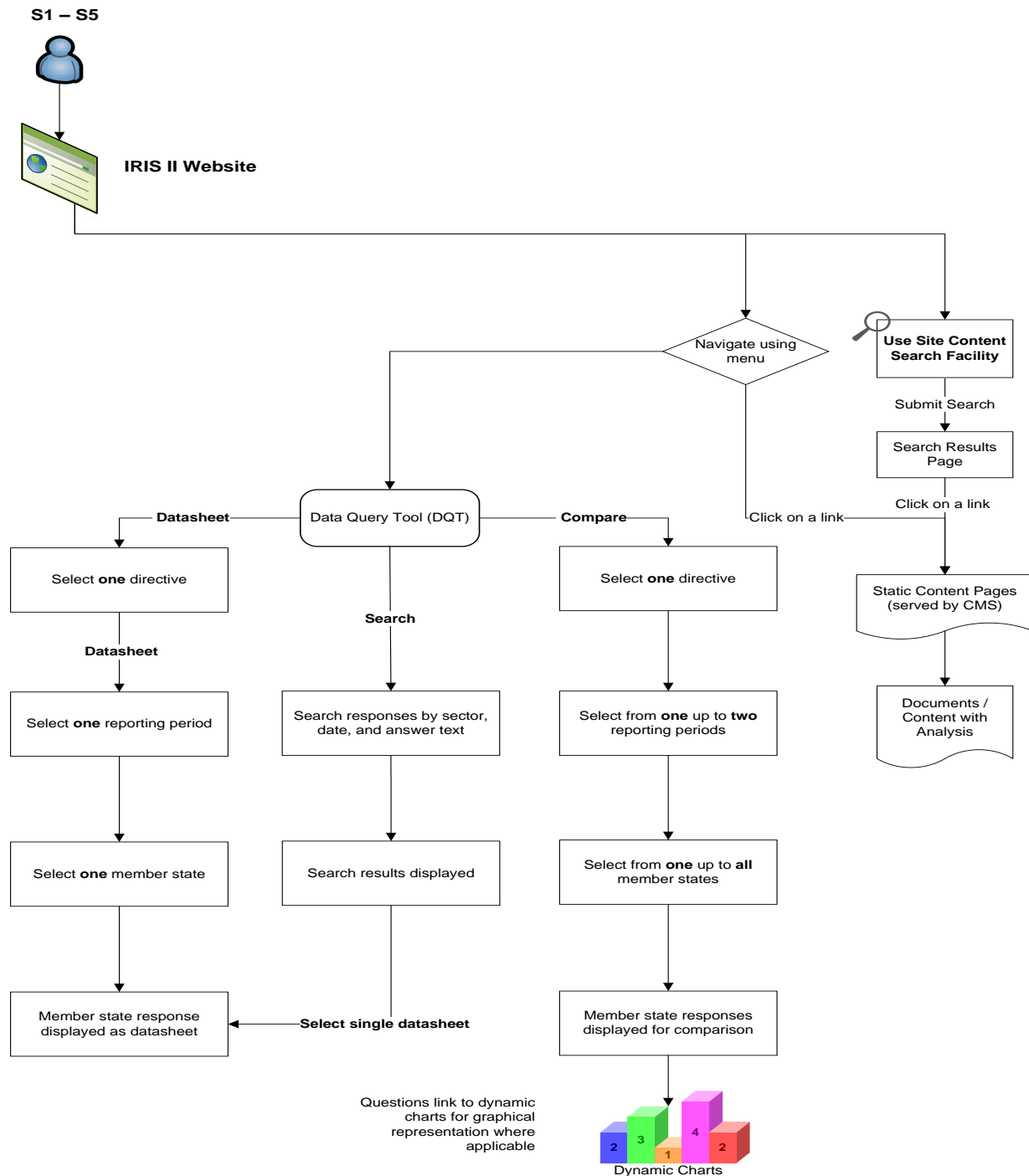
This use case applies to all users, S1 – S5. The user will be able to access static content pages which contain information about each of the directives (IPPC, SE and WI). These pages will contain links which will guide the user to further information about each directive. As with most of the content on the IRIS II site, there will be four different ways in which a user will be able to access these pages:

- Through the use of a search engine query. This will direct the user straight to the static content page, which relates to the query entered by the user. The indexing of these pages by public search engines will allow this route of access to function.
- By visiting the website and using the left hand navigation to select a static content page.
- By selecting the relevant page from the website site map. The site map is accessible from all pages via the left hand navigation menu.
- Through the use of the website search facility, located within the header of all pages. Upon entering a search query, the user will be directed to a page displaying relevant search results.



Use Case 4 – Data Query Tool

This use case applies to all users, S1 – S5 and illustrates how a user could access information on the translated member state responses to the questionnaires associated with each directive. It is envisaged to be one of the main uses of IRIS II. The survey responses suggest that the most likely users to benefit from enhanced data analysis are stakeholder groups, S1 and S2, although the information is accessible to all.



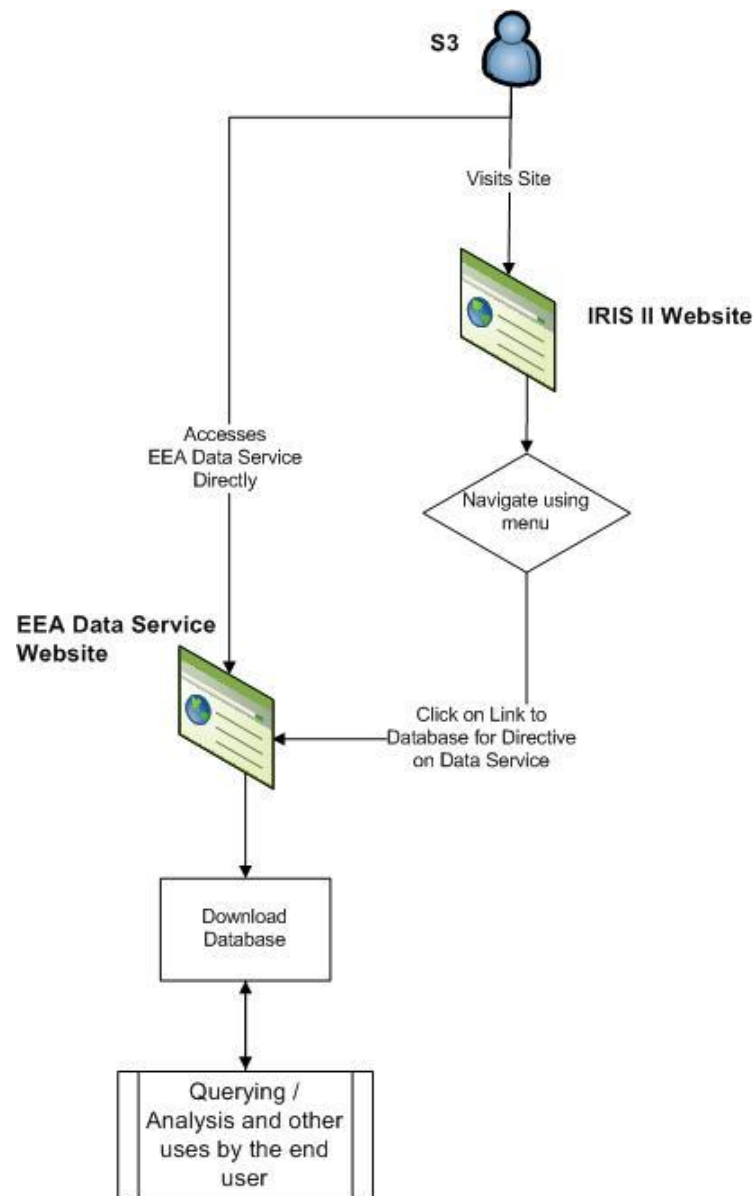
Use Case 5 – Data Service

This use case applies to stakeholder group S3. Advanced users will be able to download a copy of the Data Query Tool databases, thus allowing for further querying and analysis of the reported data beyond the

functionality provided by the Data Query Tool. The databases will be available for download from the EEA Data Service in comma separated value (CSV) file format.

The CSV files will be made available in two different formats for each directive (ELV/BAT data will be provided as standalone CSV files separate from the IPPC data):

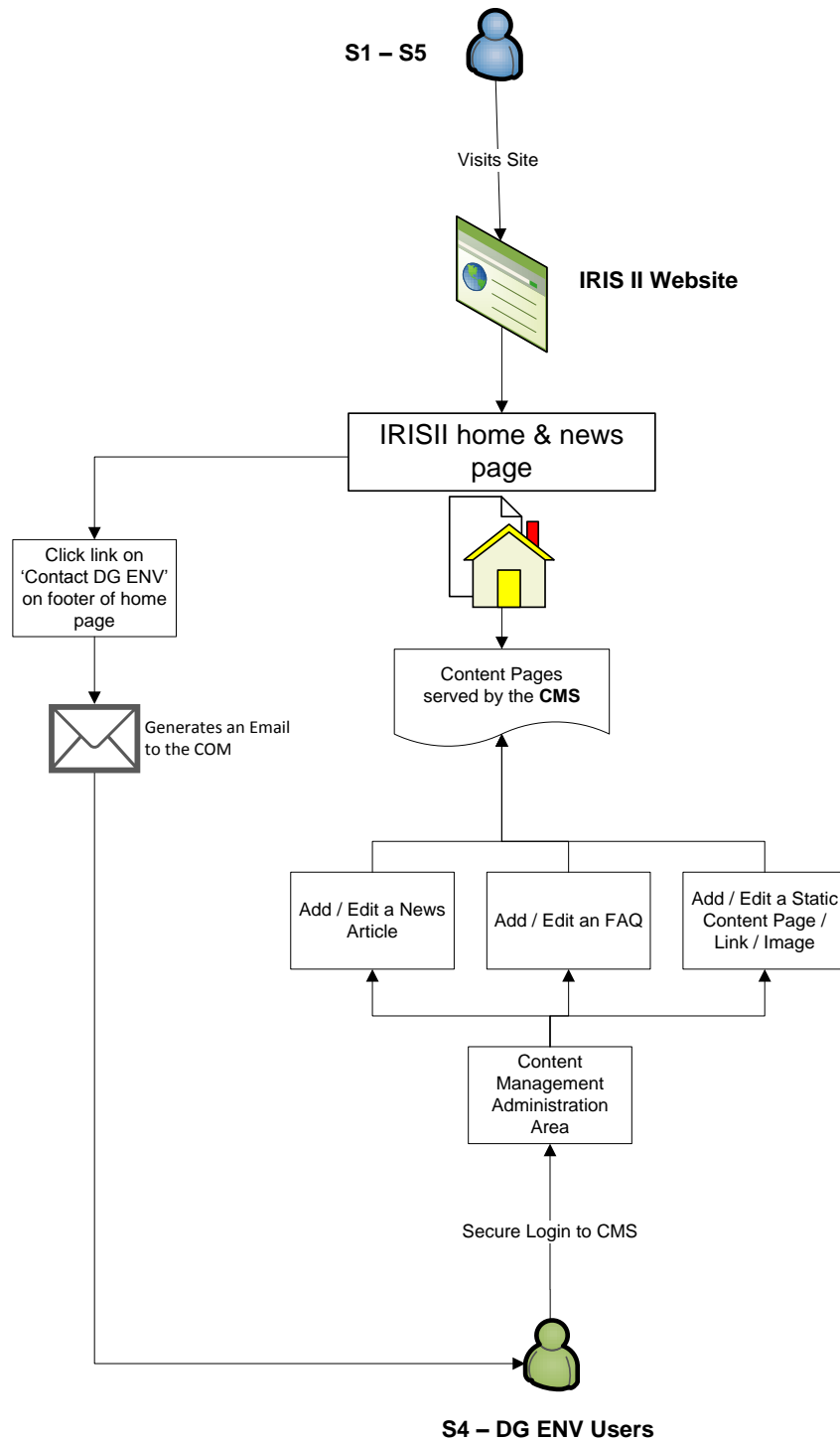
- An export to CSV of each table from the database. This will allow users with knowledge of databases to import the data into and query a database of their choosing;
- A de-normalised export to CSV of the complete database. This will allow users with knowledge of a spreadsheet package to import and filter the data in a package of their choosing.



Use Case 6 – CMS Administration

This use case applies to stakeholder group S4. EC DG ENV users will be able to engage with stakeholders through updating the content of the IRIS II website. The facility to add, edit and remove content, including

images, multi-media, text, files and links will be accessible only to authenticated users. When adding or removing a page, the website site map will automatically update.



3. Content of the Tools

3.1 Content Management System

The IRIS II website was populated using both new and existing content transferred from the original IRIS website.

The task of transferring the existing IRIS website content was not a straightforward copy and paste task, due to the non-compliant nature of the website source code. The sheer volume of content (nearly 500 individual pages) also raised issues with the amount of time it would take to manually transfer the content and bring the content up to modern web and EEA standards.

The task of copying and saving the existing website content, including pages, images and documents, to local files was accomplished through the development of a PHP web crawler. This program, when provided with a list of website URLs performed the following functions:

- Copy content found at the target URL to a local file using the Unix shell command *wget*;
- Save the copied content to a local file, but within the directory structure of the new IRIS II website, as per the agreed site map;
- Parse local files containing HTML content, deleting all unnecessary mark-up (e.g. menu's, header, footer) and rewriting all hyperlink URLs and image file paths to correspond with the directory structure of the new IRIS II website.

Unfortunately, the vast majority of the images on the original IRIS website were only accessible via a single access URL, thus it was not possible to transfer these using the web crawler. Each image falling into this category was instead manually saved to a local file.

Due to the inconsistency of the existing website HTML, it was not possible to fully automate the updating of the content. The removal of redundant content and updating of URL paths was automated during the aforementioned web crawling process, however the remaining content was thoroughly updated and corrected by hand, with the textual and image content of each page being replicated in a consistent and compliant HTML format. With the IRIS II website adopting the Eionet theme, it was also necessary to resize many of the original images to fit within the smaller content area of the new website template.

When finished, the content was added to the Content Management System, where it was sympathetically styled to complement the Eionet theme.

3.2 Data Query Tool

The reported data used to populate the Data Query Tool was provided in various different formats, including XML, MS Excel spreadsheet and MS Access Database. It was necessary to develop several methods to extract and transform the data from the various source formats provided into a structure which was compatible with the database schema developed to store the member state responses. The Data Query Tool database schema is discussed in detail in section 4.2 of this document.

The approach and actions taken to extract and transform the data for each directive has been described and is further illustrated by figure 2 below:

Integrated Pollution Prevention and Control

There were member state responses from two previous reporting periods for the IPPC directive that needed to be transformed and added to the Data Query Tool database. The data for both reporting periods was available in MS Excel format:

- 2003-2005 – Downloaded from the original IRIS website;
- 2006-2008 – Exported from [ReportNet](#) as HTML files and opened with MS Excel.

A grid template, as illustrated by figure 1, was created in MS Excel for each reporting period. This template comprised a row of questions from the respective reporting period and a row for each member state response. A macro was then created to copy the data from the original MS Excel spreadsheets into the template devised.

The template file can be found at:

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/ippc/2008_1_IPPC.xlsx

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Question ID	q-1-table	q-1-row	q-1-1	q-1-1-	q-1-1-	q-1-1-	q-1-1-ffyes	q-1-1-	q-1-1-	q-1-1-ffyes	q-1-1-ffyes	q-1-1-	q-1-1-	q-1-1-	q-1-1-	q-1-1-ffyes	q-1-1-ffyes	q-1-1-ffyes	q-1-1-
2	Question			1.1. Have any	Remarks, if any			Reference to			National	Regional					Amendmen t of existing	New legislation	Other	
3	Country Code																			
4	AT			Yes	Federal						TRUE	TRUE					TRUE			
5	BE			Brussels:	Brussels:			Brussels:			Brussels:-	Brussels:					Brussels:-	Brussels:	Brussels:-	
6	BEB			Yes	Following			Decree of				TRUE						TRUE		
7	BEF			No	No						FALSE	TRUE					FALSE	FALSE		
8	BEW			Yes								TRUE					TRUE			
9	BG			Yes	Amendmen						TRUE	TRUE					TRUE			

Figure 1 - IPPC 2006-2008 data import template

To complement the grid template, a PHP import mechanism was developed. This program, when provided with a template file path performed the following functions:

- Iterated through each member state reading in their complete response;
- Transformed the member state response from a flat list of answers into a complete question hierarchy, nested by question (e.g. question 1.1 is a sub-question of question 1);
- Inserted the question hierarchy into the database schema, adhering to the SQL [nested set model](#).

The import mechanism can be found at:

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/ippc.php

Integrated Pollution Prevention and Control (ELV/BAT)

There were also member state responses from two previous reporting periods for the ELV/BAT portion of the IPPC directive that needed to be transformed and added to the Data Query Tool database. The data for the reporting periods was available in MS Excel and XML formats:

- 2003-2005 – Downloaded from the original IRIS II website;
- 2006-2008 – Exported from [ReportNet](#) as XML files.

The data from the 2003-2005 reporting period was imported using a similar method as described for the IPPC data.

To import the data for the 2006-2008 reporting period, an XQuery script was written to transform the XML from the relatively flat XML structure in which it was exported from ReportNet into a full nested XML tree. The XQuery script and source XML files were run through an XSLT/XQuery Java based processor called Saxon9.

The XQuery script can be found at:

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/xquery/iris_merge.xq

Another bespoke PHP import mechanism was developed to parse the XML files produced by the XQuery transformation. This program, when provided with an XML file path performed the following functions:

- Iterated through each XML node extracting the question identifier and member state answer;
- Transformed the hierarchical XML structure into a complete question hierarchy, nested by question (e.g. question 1.1 is a sub-question of question 1);
- Inserted the question hierarchy into the database schema, adhering to the SQL [nested set model](#).

The import mechanism can be found at:

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/elvbat.php

Solvent Emissions

There were member state responses for one previous reporting period for the SE directive that needed to be transformed and added to the Data Query Tool database. The data was provided by the IRIS II project partners, [VITO](#), in MS Access format.

To extract the data from the MS Access database, it was first imported into a MySQL database using a desktop application called [Navicat](#). This was to enable PHP to access both the source and destination databases. Another PHP import mechanism was developed. This program performed the following functions:

- Queried the VITO database for each member response;
- Matched each individual answer to its respective question within in a complete question hierarchy, nested by question (e.g. question 1.1 is a sub-question of question 1);
- Inserted the question hierarchy into the database schema, adhering to the SQL [nested set model](#).

The question hierarchy template file can be found together with the import mechanism at:

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/se/ResponseArray.php

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/se.php

Waste Incineration

There were member state responses for one previous reporting period for the WI directive that needed to be transformed and added to the Data Query Tool database. The data was available in MS Excel format:

- 2006-2008 – Exported from [ReportNet](#) as HTML files and opened with MS Excel.

The data was then imported using the same method as described for the IPPC data.

The template file and import mechanism can be found at:

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/wi/2000_76_WI_RS.xlsx

https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/data_import/wi.php

Data Import Diagram

The data import process for each directive and their respective reporting periods has been illustrated by figure 2 below. The diagram displays where the source data originated, the steps taken to transform and add the data to the database and the methods by which the data can be accessed.

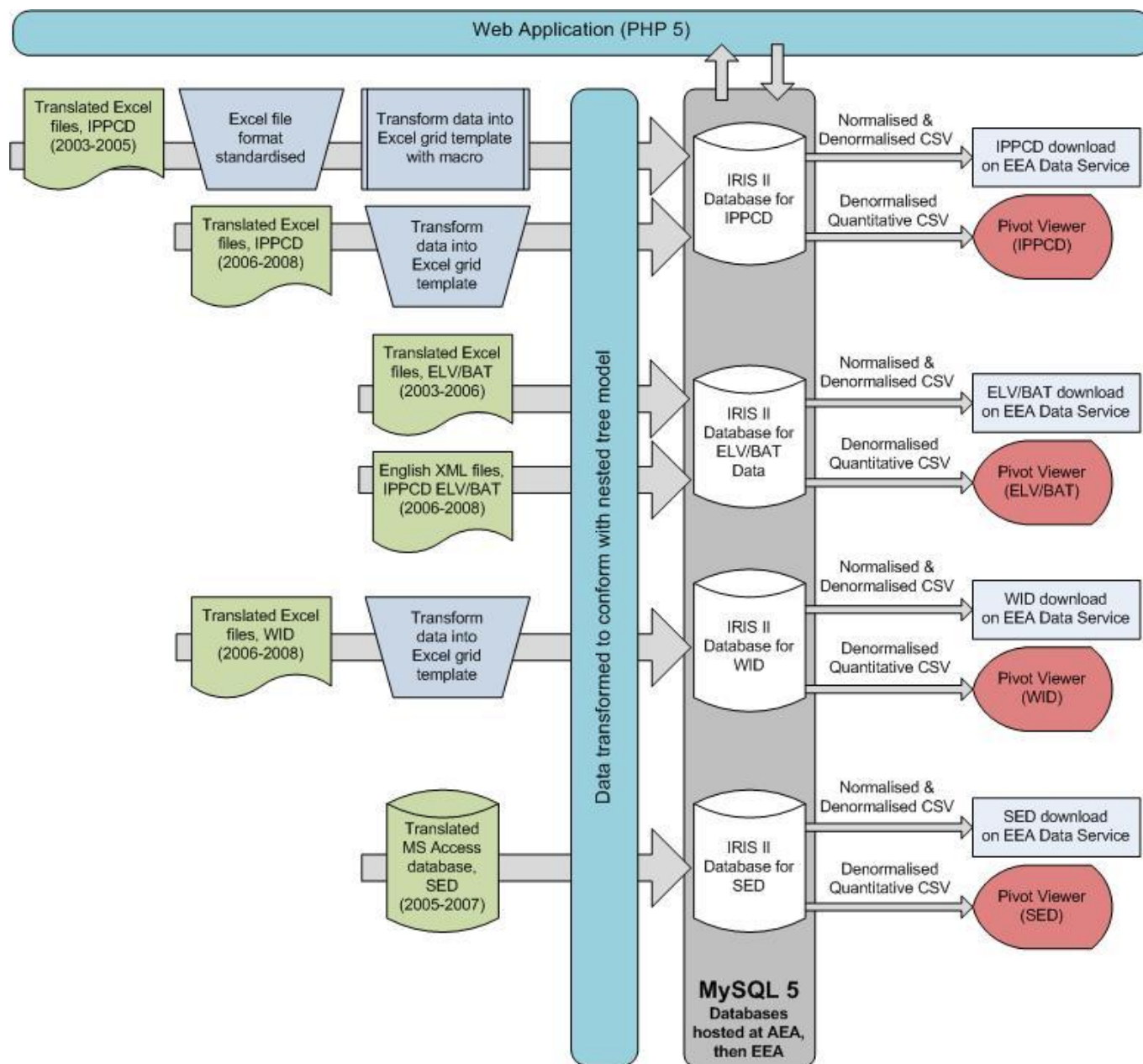


Figure 2 - Data import process for Data Query Tool

4. Database Overview

A dedicated database has been created for each component of the IRIS II project; the Content Management System, the Data Query Tool, and the General Binding Rules query tool, which was ported from .NET to PHP as part of the content transfer from the original IRIS website.

This section of the technical handbook will touch upon all three databases, but will focus primarily on the data query tool database.

4.1 Content Management System Database

The database schema for the SilverStripe CMS is generated automatically when installing the application - see section 6 of this document. Further information regarding the CMS database schema can be found within the [SilverStripe documentation](#).

4.2 Data Query Tool Database

The Data Query Tool database schema was designed to store the hierarchical structure of the directive questionnaires, thus yielding the benefit that it is not necessary to use a fixed table structure to store the responses for each questionnaire, as the hierarchical structure can assume any shape. Moreover, questionnaire questions can be easily added and removed from the hierarchy as required. When considering the nature of the data involved with this project, it was decided that the optimal solution was to use the SQL [nested set model](#).

Nested Set Model

The hierarchy of data contained within a nested set is depicted by figure 3 below. The hierarchical structure is maintained because parent questions encompass their children. This format is represented in a database through the use of left and right values, as seen in the *question_hierarchy* table included in figure 5 below.

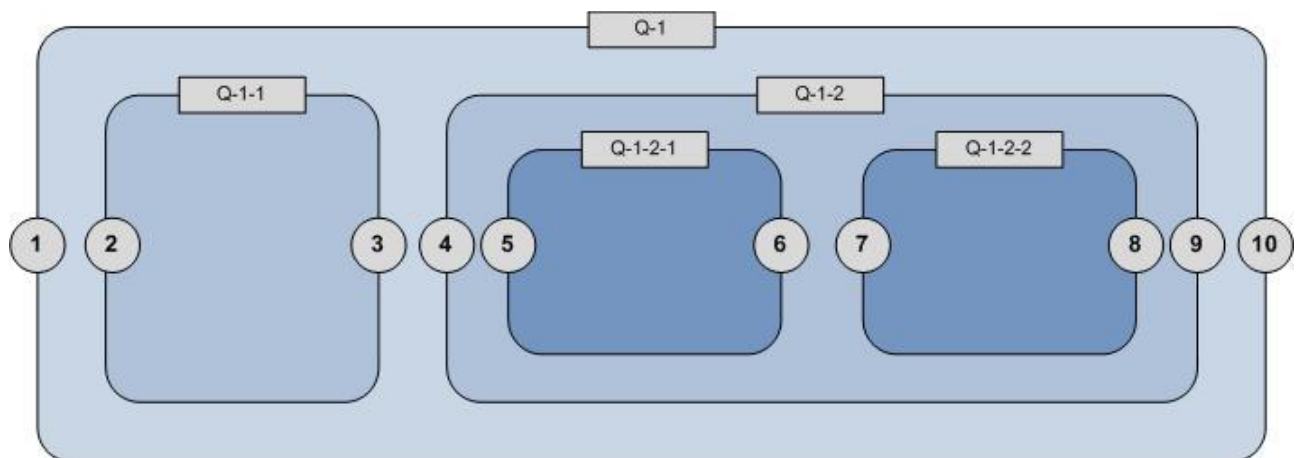


Figure 3 - Example of a nested question set

The same hierarchy of data seen in figure 3 can be represented as a nested tree as depicted by figure 4 below.

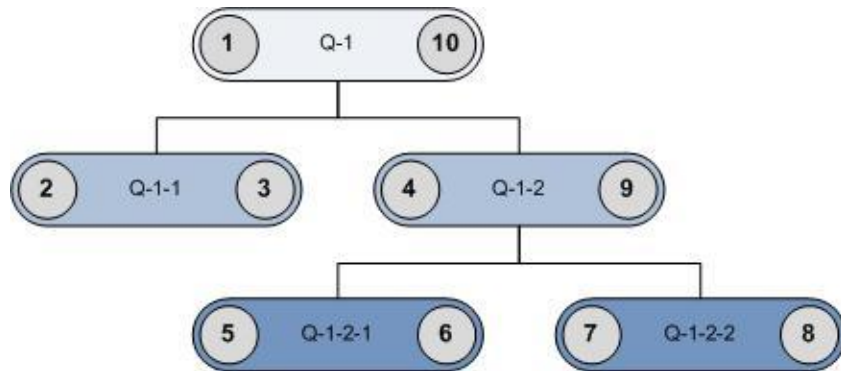
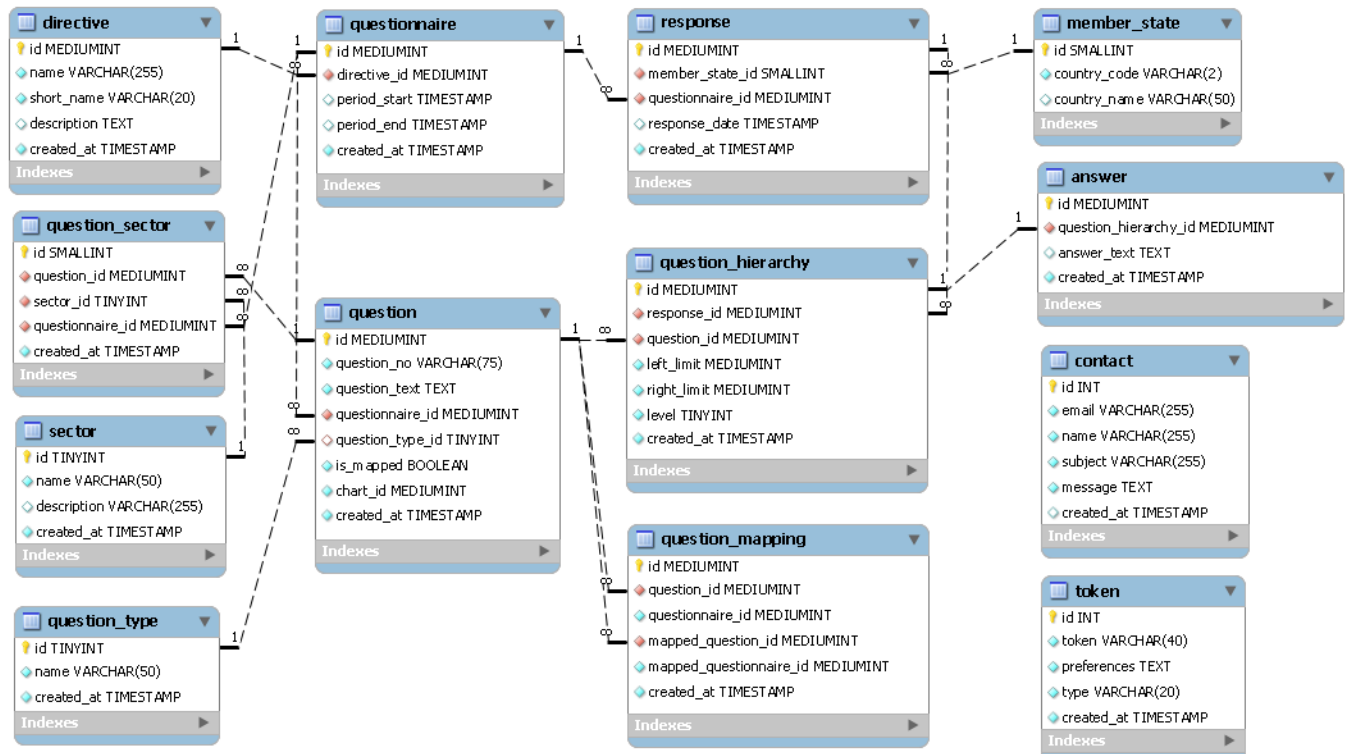


Figure 4 - Example of nested question tree

As mentioned previously, the hierarchical structure can assume any shape. It is therefore possible to add questions to the nested tree at any position, as required, to reflect changes made to the structure or format of a directive questionnaire. This can be achieved, because the hierarchy is stored in the database as a series of individual nodes, with the position of each node within the tree determined by the node's left and right limit values. This concept further lends itself to the prospect of combining all the directive databases into a single data structure, as the *question_hierarchy* table would be capable of supporting the current and future formats of any and all directive questionnaires.

The Data Query Tool database schema is illustrated by figure 5 below.



Data Dictionary

This section comprises a data dictionary describe the database schema outlined previously.

Answer Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
question_hierarchy_id	MEDIUMINT	NN, UN	Foreign key to question hierarchy table
answer_text	TEXT	Default(NULL)	Member state response to question identified by question hierarchy node
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Contact Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
email	VARCHAR(255)	NN	User email address
name	VARCHAR(255)	NN	User name
subject	VARCHAR(255)	NN	Subject of contact request
message	TEXT	NN	Message of contact request
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Directive Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
name	VARCHAR(255)	NN	Full directive name
short_name	VARCHAR(20)	NN	Abbreviated directive name
description	TEXT	Default(NULL)	Description outlining directive purpose
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Member State Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
country_code	VARCHAR(2)	NN	Follows ISO 3166-1 alpha 2 code.
country_name	VARCHAR(50)	Default(NULL)	Country name used to filter responses by member state

Question Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
question_no	VARCHAR(75)	NN	Question number
question_text	TEXT	NN	Question text
questionnaire_id	MEDIUMINT	NN, UN	Foreign key to questionnaire table
question_type_id	TINYINT	UN, Default(NULL)	Foreign key to question type table
chart_id	MEDIUMINT	NN, UN	Foreign key to chart table
is_mapped	TINYINT	DEFAULT(0)	Boolean to indicate whether the question has mappings to other reporting periods
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Questionnaire Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
directive_id	MEDIUMINT	NN, UN	Foreign key to directive table
period_start	TIMESTAMP	DEFAULT(NULL)	Timestamp to record reporting period start date
period_end	TIMESTAMP	DEFAULT(NULL)	Timestamp to record reporting period end date
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Question Hierarchy Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
response_id	MEDIUMINT	NN, UN	Foreign key to response table
question_id	MEDIUMINT	NN, UN	Foreign key to question table
left_limit	MEDIUMINT	NN, UN	Integer to record left limit of current node in nested set
right_limit	MEDIUMINT	NN, UN	Integer to record right limit of current node in nested set
level	TINYINT	NN, UN	Foreign key to questionnaire table
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Question Mapping Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
question_id	MEDIUMINT	NN, UN	Foreign key to question table
questionnaire_id	MEDIUMINT	NN, UN	Foreign key to questionnaire table
mapped_question_id	MEDIUMINT	NN, UN	Foreign key to question table
mapped_questionnaire_id	MEDIUMINT	NN, UN	Foreign key to questionnaire table
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Question Sector Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
question_id	MEDIUMINT	NN, UN	Foreign key to question table
sector_id	TINYINT	NN, UN	Foreign key to sector table
questionnaire_id	MEDIUMINT	NN, UN	Foreign key to questionnaire table
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Question Type Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
name	VARCHAR(50)	NN	Question type name
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Response Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
member_state_id	SMALLINT	NN, UN	Foreign key to member state table
questionnaire_id	MEDIUMINT	NN, UN	Foreign key to questionnaire table
response_date	TIMESTAMP	DEFAULT(NULL)	Timestamp to record final data response was submitted or modified on ReportNet
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Sector Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
name	VARCHAR(50)	NN	Sector name used to filter responses by sector
description	TEXT	Default(NULL)	Sector description
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

Token Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
token	VARCHAR(40)	NN	Unique token used to lookup user preferences
preferences	TEXT	NN	Serialized array of user datasheet, compare or search preferences
type	VARCHAR(20)	NN	Type of preferences stored – datasheet, compare, search
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

4.3 GBR Query Tool Database

The General Binding Rules query tool was original developed by [VITO](#) for the original Industrial emissions Reporting Information System (IRIS) website. This tool was written using the .NET framework. When transferring the tool over to the IRIS II website, the tool was ported over to use the PHP based [Zend Framework](#). At the same time the database schema was updated to better conform to the format of the CMS and Data Query Tool database schemas.

There exists little documentation for the General Binding Rules query tool. The documentation provided to the EEA can be found at: <https://svn.eionet.europa.eu/repositories/DotNet/IPPC%20Vito/>

The GBR query tool database schema is illustrated by figure 6 below.

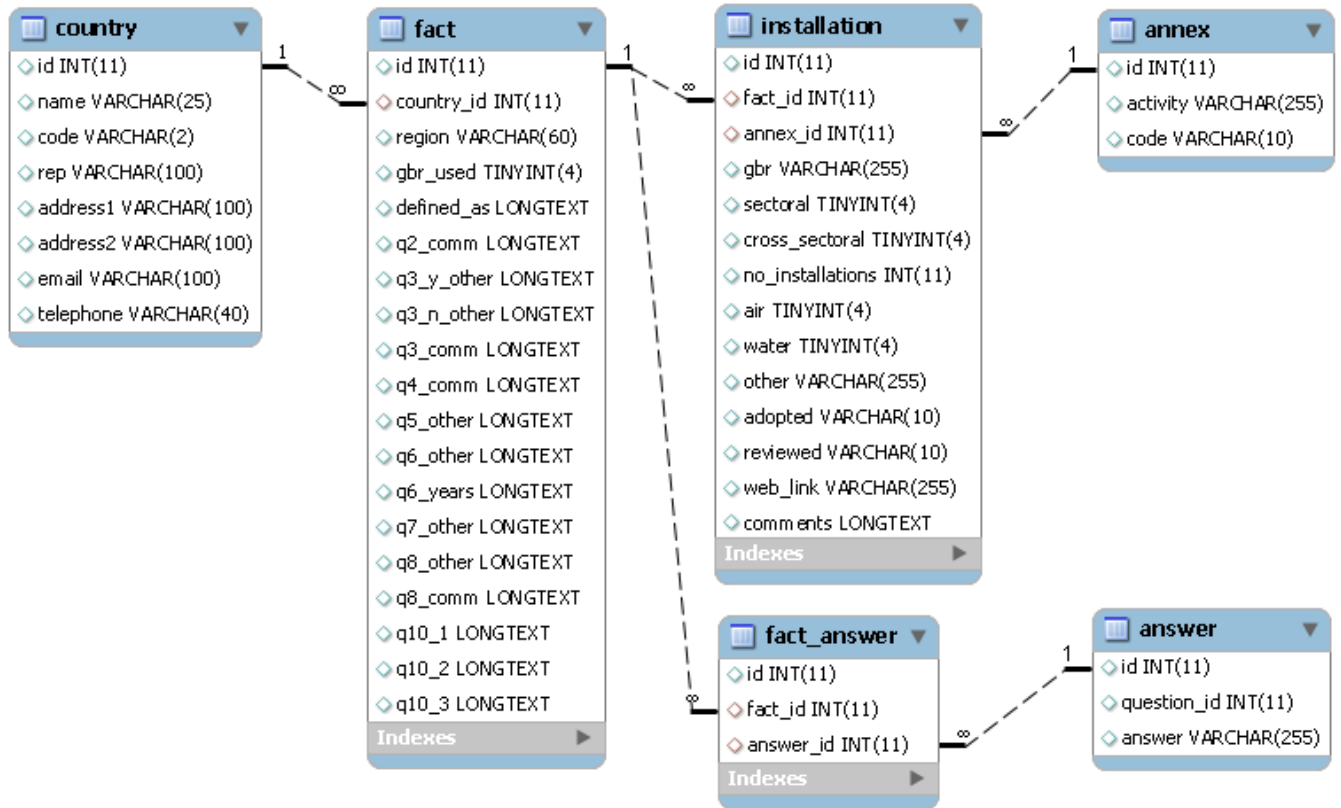


Figure 6 - General Binding Rules query tool database schema

5. Creating the Tools

5.1 Content Management System

As discussed previously, [SilverStripe](#) was used to implement the Content Management System portion of the IRIS II project. The Content Management System was deployed with only a few small customisations.

Eionet Theme

An objective of the IRIS II project included updating the IRIS website, integrating it more closely with the Eionet brand. This included updating the look and feel of the website to more directly resemble [Eionet](#) and the other sub-sites hosted under the Eionet domain.

This was achieved by taking the existing Eionet website template and adapting it for use with SilverStripe. This not only involved the replacement of all Zope template placeholders with the SilverStripe equivalent, but also the modification of the template structure to accommodate an extended left hand navigation structure.

The final IRIS II website template, with customised left hand navigation is illustrated by figure 7 below.



The screenshot displays the Eionet website interface. At the top, there's a header with the Eionet logo and the title 'Industrial emissions Reporting Information System (IRIS)'. Below this is a navigation bar with links for SERVICES, REPORTNET, TOOLS, and TOPICS (ETCS). A breadcrumb trail indicates the current location: 'You are here: Eionet » Home » IPPC Directive » Analysis » Implementation Reports » General Legal and Institutional Framework » Per Member State » Austria'.

The left-hand navigation menu is expanded for 'IPPC Directive', showing sub-links like 'Background Data', 'Analysis', 'Permitting Status', and 'Implementation Reports'. Under 'Implementation Reports', 'General Legal and Institutional Framework' is selected.

The main content area is titled 'General Legal and Institutional Framework - Austria'. It includes a note: 'The data available does not include the data from the most recent 2006 – 2008 reporting period.' Below this is a table with the following data:

Category of Data	General legal and institutional framework
Report Type	Summary reports per Member State
Reporting period	2003-2005
Member State	Austria

Below the table, there's a section titled 'General Legal and Institutional Framework' with a sub-heading 'National legislation and permitting system'. The text describes the transposition of the IPPC Directive into national law, mentioning the Emission Trading Directive and Public Participation Directive.

Figure 7 - Eionet Theme

The EEA currently implement [Nutch](#), an open source search engine based on Lucene, to provide search functionality for the Eionet websites. Following consultation with the EEA, it was advised that we use alternative search engine due to the poor performance of Nutch. Specifically, Google was suggested.

For this reason, the IRIS II website implements Google Custom Search API for its search functionality. The search integration is largely contained within the custom Page_Controller.php file.

Authentication Integration

The Content Management System authentication process has not been integrated with the Eionet LDAP service. Instead, the Content Management System handles user authentication, performing lookups against the CMS database. This decision was taken because the IRIS II website will be managed and used solely by the European Commission, rather than a distinct Eionet user group.

5.2 Data Query Tool

The Data Query Tool application was built using [Zend Framework](#) version 1.11. The default functionality provided by the Zend Framework was extended through the creation of a secondary library called Iris. This secondary library extends upon the base functionality provided by the Zend Framework and included the implementation of a custom Model layer to manage application-database interactions.

SilverStripe Menu Integration

The Data Query Tool and SilverStripe CMS are two distinctly separate applications. In an effort to seamlessly integrate the functionality provided by the two components, the Eionet theme was applied to them both. It was also necessary to persist the navigation structure so as to not disorientate the user whilst they moved between the two components.

To achieve this, a custom Zend view helper was written to complement a controller customisation made to the SilverStripe CMS. The view helper queries a SilverStripe controller action for the left hand navigation, passing a page identifier to specify which page should be considered active. SilverStripe then responds with a block of HTML, corresponding to the navigation structure for the requested page. On the SilverStripe side, the controller action finds and overrides what the CMS perceives to be the current page with the requested page, before rendering the left hand navigation view template, as illustrated by figure 8 - right.

- [Home](#)
- [News](#)
- [IPPC Directive](#)
- [IPPC \(ELV/BAT\) Directive](#)
- [SE Directive](#)
- [WI Directive](#)
- [General Binding Rules](#)
 - [Member States Summary Information](#)
 - [GBR Query Tool](#)
 - [Case Studies Download](#)
- [FAQs](#)
- [Sitemap](#)

Figure 8 - SilverStripe Left Navigation action output

XML and XSLT

The datasheet element of the Data Query Tool allows a user to view a complete member state response to a single reporting period. Given the hierarchical structure of the data within the questionnaire, it seemed appropriate to utilise two technologies suited to representing and manipulating hierarchical data structures – XML and XSLT.



A source XML file is dynamically generated by querying the database for all questions and answers for the chosen reporting period and member state. The query result is then transformed from a flat to a nested array structure, before being converted into XML. A custom XSLT file was written for each reporting period. A stylesheet is then applied to the source XML file to produce the datasheet output. The format of the XML is discussed further in section 7 of this document.

6. Installation of IRIS II

6.1 Content Management System

The installation of the SilverStripe Content Management System can only be performed by a member of the EEA development team. The source code must be committed to the [EEA SVN repository](#). The repository is publicly accessible for reading, however import and commit privileges require a valid Eionet account, which is created by the [Eionet helpdesk](#).

The installation documentation provided to the EEA can be found at:
<https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/cms/INSTALL.txt>

Once the CMS has been deployed to live it should not be re-deployed in any circumstances other than with AEA approval

6.2 Data Query Tool

As with the CMS, the installation of the Data Query Tool can only be performed by a member of the EEA development team. The source code must be committed to the [EEA SVN repository](#).

The installation documentation provided to the EEA can be found at:
<https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/app/docs/INSTALL.txt>

7. Technical Formats

7.1 XML

The datasheet element of the Data Query Tool allows a user to view a complete member state response to a single reporting period. This same data is also made available in XML format for all directives.

The XML document is comprised from a series of nested question elements, each with an id attribute to relate the element value back to a single question. Each XML document also includes some basic meta data at the head of the file, namely the directive, reporting period, member state name and country code. An example of the XML output can be found in Annex 3 of this document.

7.2 RDF

In order to fully comply with the EEA and SEIS (Shared Environmental Information System) guidelines, the Data Query Tool was required to provide an RDF implementation for any data not already on CDR. Of the four directives and six reporting periods covered by the IRIS II project, an RDF implementation was required for:

- Integrated Pollution Prevention and Control 2003-2005;
- Integrated Pollution Prevention and Control (ELV/BAT) 2003-2005.

The RDF output for a member state response to one of the above reporting periods can be viewed by appending *rdf* to the end of a datasheet token. E.g.

/dqt/datasheet/f08a92100ccd690dd273ec1b68032675ddee863d/rdf. When the RDF output is validated using an RDF parser, the validation results look similar to figure 9 below. An example of the RDF output can be found in Annex 4 of this document.

Your RDF document validated successfully.			
Triples of the Data Model			
Number	Subject	Predicate	Object
1	http://www.w3.org/RDF/Validator/run/1295885702246	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://rdfdata.eionet.europa.eu/ippc/ontology/meta
2	http://www.w3.org/RDF/Validator/run/1295885702246	http://rdfdata.eionet.europa.eu/ippc/ontology/countryName	"Austria"
3	http://www.w3.org/RDF/Validator/run/1295885702246	http://rdfdata.eionet.europa.eu/ippc/ontology/countryCode	"AT"
4	http://www.w3.org/RDF/Validator/run/1295885702246	http://rdfdata.eionet.europa.eu/ippc/ontology/forCountry	http://ec.europa.eu/eurostat/ramon/rdfdata/countries/AT
5	http://www.w3.org/RDF/Validator/run/1295885702246	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://rdfdata.eionet.europa.eu/ippc/ontology/q-1-h2

Figure 9 - RDF Validation Results

8. Test Plans and Test Processes

AEA with our partners VITO are developing a new version of the Industrial emissions Reporting Information System (IRIS) for the European Commission (EC), working with the European Environment Agency (EEA). The development includes:

CMS

- Transferring defined content to the new version of the IRIS site
- Using the EEA Eionet template to re-brand and style transferred content and new content
- Proposing a new menu structure
- Developing the means to allow the EC to modify content easily

Database

- A standard database type for IPPC, ELV/BAT, WID reported data that allows for future reporting period to be included and allows for modification by the EC
- Standardising and harmonising IPPC 2003 - 2005 reported data with 2006 – 2008 and combining this data into one database
- A database for WID
- A database for ELV/BAT

Data Tools

- Data service, the provision of the above databases in various formats for download
- Data Query Tool (DQT) that allows reported data to be queried, searched and compared
- Datasheets that contain all reported data in a questionnaire format on a per directive, per member state basis, searchable.
- Pivot viewer that allows reported data to be displayed in a chart or table format. This has been modified and an alternative is currently under agreement.
- GBR

Each element of the development has to comply with the EEA's software standards¹ and our own testing regime².

Document Purpose

To define the tests required, those not required, and the approach to each test for the project teams agreement.

Test Objectives

To ensure the following:

- overall system meets the EEA software standards
- meets the requirements laid out in the ITT (referred to below)
- meets the functional and non-functional requirements laid out in the functional specification

¹ <http://www.eionet.europa.eu/software/swstandards>

² http://wiki.aeat.com/Developer_Testing

Scope

In Scope

CMS, database and data tools

Features and Items

CMS

1. Test the content has been migrated to the new version of the IRIS site successfully, including all replacement functionality
2. Where applicable test the content has been modified effectively
3. Ensure all new content is displayed as per the CSS and mark-up
4. Testing the content editing functionality - add, editing and deleting data
All tests above on final platform

Database

5. Test all data has been migrated successfully from the transfer s/sheets and XML output into the database
6. Test data is standardised and harmonised effectively (VITO)
7. Test all databases are in a standard format?

Data Tools

8. Test data can be downloaded from the data service successfully and restored into the software cited
9. Test that the data Query Tool (DQT) that allows reported data to be queried, searched and compared, carry out test on final platform as well.
10. Test that the datasheets contain all reported data in a questionnaire format on a per directive, per member state basis, searchable, carry out test on final platform as well.
11. Test the replacement GBR tool contains the same data as before, carry out test on final platform as well.

Ensure Each element of the development has to comply with the EEA's software standards³ and our own testing regime⁴.

Test all aspects against the test script based on the agreed functional specification

Testing Types

- Execution / Functional Testing
- Non-functional testing
- Peer review
- Technical Review

³ <http://www.eionet.europa.eu/software/swstandards>

⁴ http://wiki.aeat.com/Developer_Testing

Out of Scope

Unit testing: We didn't do test driven development due to the nature of the EC methodology. With the exception of the data query tool it is largely off the shelf and also the nature of the development is so small it was deemed unnecessary.

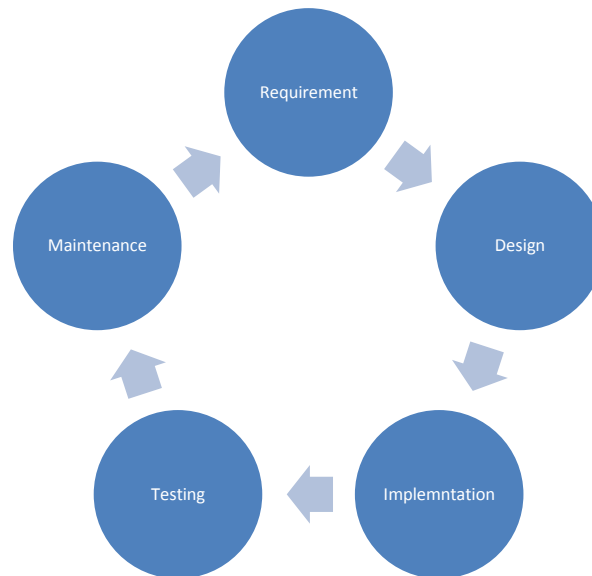
Performance Testing: We can carry out limited performance testing as we do not host the system. We will ensure that code is optimised as far as possible. This will be tested through the per review and technical review.

Validation testing of the databases: This testing has been carried out by our partner VITO.

Test Lifecycle

Model

The nature of the project required the approach outlined in the following diagram.
Figure 1.0



During the bid phase the requirements were gathered and through the Task 1 - Methodology work, firmed-up, with a high-level solution defined. This was followed by the development of specifications for each aspect of the site for agreement and development (Implementation) Task 2 and Task 4. Testing has taken place during development and the solution will be tested on the test platform and on the final platform, hosted by the EEA.

Definition

The test lifecycle for the project is defined in full below. For future releases of the system, all test phases may or may not be applicable.

Test Type	Description and Deliverables	Source (Testable Documentation)	Responsibility	Environment
Execution / Functional testing	<ol style="list-style-type: none"> 1. To create a test script based on the Functional specification delivered to the customer, to test each aspect against this. 2. To demonstrate the CMS has been transferred effectively using the Wget output. 3. Stylist to test that the CSS and mark-up has been applied and is rendering effectively in IE7 and FFox 3.0 4. EC to test they can add, edit and delete data effectively (covered under 1 as well) 5. To test the transfer of data from ReportNet and translations to the data bases and data service 	<ol style="list-style-type: none"> 1 and 2 - test script 3 Wget output 4 Test script 5 e-mail 	<ol style="list-style-type: none"> 1 and 2 Andrew Monteith (test script development) 3. Rob Simpkins 4. Rob Simpkins and Sharon Critchley 5. EC 5. Andrew Monteith 	final
Non-functional testing	<ol style="list-style-type: none"> 6. To develop a test script based on the EEAs software standards 	Test script	1 and 2 Andrew Monteith (test script development)	Final
Peer review	<ol style="list-style-type: none"> 7. To carry out a peer review on crucible ensuring all the coding and databases are correct 	Crucible output	Tom Jowitt	Staging and final
Technical Review	<ol style="list-style-type: none"> 8. To carry out a technical review on crucible ensuring all the coding and databases are correct 	Crucible output	Ollie Cronk	Staging and final

Test Deliverables and Artifacts

A significant number of test deliverables and artifacts will be required. The list is provided below in broad chronological order but may be subject to change as the project progresses.

All testing outputs are available on <http://wiki.aeat.com/IRISII#Testing> & http://wiki.aeat.com/IRIS_II_Testing

The test scripts from activities 1, 5 and 6 is available at Q:\Sales & Delivery Operations\Projects\Current\Air\ED46877_IRISII_Leverton\Planning\Task 4\Testing

Test Tools

Defect management will be performed using the pre-existing utility Gemini.

Pass / Fail (Acceptance) Criteria

When test fail the step in the test script they'll be logged on Gemini for fixing. Once all test are clear.

Release Management

The Release Manager will be the EEA, they're responsible for ensuring all aspects deployed to the SVN are uploaded effectively to the final platform, we will then test from this point.

Notification & Escalation Process

As defined in the proposal, issues should be escalated via Gemini and assigned to the "site support"

Change management

As defined in the proposal, changes should be escalated via Gemini and assigned to "site support".

9. Guidance Documentation and Specification

9.1 Content Management System

Comprehensive user documentation for SilverStripe Content Management System can be found on the SilverStripe website at: <http://userhelp.silverstripe.org/>

The user help covers the following areas:

- [Introduction and logging in](#);
- [Basic overview](#);
- For website content editors:
 - [Create and edit content](#);
 - [Work with images and documents](#);
 - [Manage your site](#);
 - [Understand web content best practices](#);
 - [Create and use blogs](#);
 - [Set content owners and review dates](#);
 - [Create and use forms](#);
 - [Create and use forums](#);
 - [Understand workflow](#);
 - [Learn to work with multiple sites](#);
- For website administrators:
 - [Change and manage user accounts](#);
 - [Manage roles and permissions](#);
 - [Use workflow with roles and permissions](#);
 - [Set up and administer security for multiple sub-sites](#).

9.2 Data Query Tool

Additional user documentation explaining the various features offered by the Data Query Tool and how to use these features has been provided separately to this document. For further information pertaining to the use of the Data Query Tool, please consult the document titled: **Data Query Tool User Guide**.

The user guide covers the following areas:

- Welcome to the IRIS II Data Query Tool
- Datasheet
 - Datasheet Selection
 - Datasheet View
- Search
 - Start Searching
- Compare
 - Comparison Selection
 - Comparison View
 - Start Comparing

10. Suggestions for Further Development

10.1 Data Visualisation

The completion of the chart implementation on the Data Query Tool is a primary candidate should any further development take place. The foundations for this feature have already been laid through the development of the front-end chart interface and backend functionality. The database also includes three tables (chart, chart_option and chart_series), which are used to store the chart preferences and data.

Data Dictionary

The data dictionary definitions for the three aforementioned database tables have been included for completeness below, should this feature be implemented in the future.

Chart Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
type	VARCHAR(20)	NN	Chart type. E.g. Bar, Pie
title	VARCHAR(255)	NN	Chart title

Chart Option Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
chart_id	MEDIUMINT	NN, UN	Foreign key to chart table
name	VARCHAR(50)	NN	Name of chart option
value	VARCHAR(255)	NN	Value of chart option
before_data	TINYINT	NN, UN	Boolean to indicate whether option should be applied to chart before or after data

Chart Series Table			
Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
chart_id	MEDIUMINT	NN, UN	Foreign key to chart table
name	VARCHAR(255)	NN	Series name for rendering on chart output
query	TEXT	NN	SQL query executed to retrieve series data
param_bindings	VARCHAR(255)	NN	Comma separated list of required SQL query parameter bindings

During the chart feasibility study, it became apparent that some of the charts included in the directive reports could not be dynamically reproduced using the data contained within the database. This was because the report charts were based on interpreted data, as opposed to raw responses.

In order to support the presentation of *fixed charts* rather than dynamic charts, it is suggested that the aforementioned `chart_series` table be extended to include a *fixed field*. This field would contain a JSON encoded data string, which if present would be used in preference to any query specified. This data could then be plotted on the charts using the existing functionality.

10.2 Ajax Search

The Data Query Tool already includes the facility to search member state datasheet responses. This existing functionality could be extended to through the addition of AJAX, thus providing the following:

- Ability to submit search queries asynchronously;
- Asynchronously update select field options based on the values selected in other fields. This would help to reduce the likelihood of empty result sets;
- Help to tie the search element in with the compare element, which already implements AJAX.

11. Operational Details and Maintenance

11.1 Deployment

The IRIS II Content Management System and Data Query Tool are hosted with the EEA. The EEA deploy applications to their servers using the source code committed to their SVN repositories. The IRIS II SVN repository is located at: <https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/>

The Data Query Tool database is relatively small (20Mb) and will change approximately once every three years. For these reasons it has been included in the EEA SVN repository together with the source code. The GBR Query Tool database is also relatively small (1.3Mb) and will not be updated. This too has been included in the EEA SVN repository.

The CMS database is fairly large and will change on a regular basis; as will the assets directory. For this reason, neither was included in the EEA SVN repository and instead both were sent separately.

11.2 Maintenance

The European Commission will be responsible for maintaining the Content Management System. An administrator account will be allocated to the EC, through which they can create and assign privileges to further accounts as required.

The Data Query Tool should require no maintenance other than the insertion of data from further reporting periods as they become available. As described in section 3.2, the Data Query Tool was populated with content using several custom import mechanisms, depending on the format of the source data. These existing mechanisms can be re-used, if the structure of the questionnaire for subsequent reporting periods remains identical to those already imported. If the structure of the questionnaires changes, the existing import mechanisms will need to be modified accordingly or others created.

Timescale of maintenance.

11.3 Process for Change

The IRIS II website content can be managed and updated via the Content Management System. Guidance covering the process for doing this can be found in section 9.1 of this document.

Changes to the underlying source code of the Content Management System and Data Query Tool can be administered through the following process:

- Check the source code out of the EEA project SVN repository:
<https://svn.eionet.europa.eu/repositories/PHP/trunk/IRIS2/>
- Make the necessary changes to the source code. All issues should be entered into Trac, the EEA bug and issue tracking system: <http://svn.eionet.europa.eu/projects/DotNet/wiki/IRIS2>

- Commit the changes made to SVN, entering a meaningful commit comment. If the changes were made to resolve a Trac issue, the issue number should also be entered into the SVN commit comments to aid traceability for future developers.

Annex 1: Member State Fact Sheets

To be finalised.

Annex 2: Survey Responses

To be finalised.

Annex 3: Example XML Output

```
<?xml version="1.0" encoding="utf-8"?>
<questionnaire>
  <directive>
    <name>Integrated Pollution Prevention and Control</name>
    <period>2003 - 2005</period>
  </directive>
  <memberState>
    <name>Austria</name>
    <countryCode>AT</countryCode>
  </memberState>

  <question id="q-1-h2">
    <question id="q-1">
      <question id="q-1-1">
        Federal government:
        IPPC Directive was transposed by amending sectoral laws on installations,
        grouping and coordinating permit procedures. Changes took place within
        2003-2005 to transpose the Emission Trading Directive and Public
        Participation Directive.
        -Waste Management Act (AWG) 2002, last amended in 2004
        -Trade, Commerce and Industry Regulation Act (GewO) 1994, last amended in
        2003
        -Mineral Raw Materials Act (MinroG) 1999, last amended in 2005
        *Water Act (WRG) 1959, last amended in 2003 (does not contain its own
        specific licence regime)
        -Pollution Prevention from Steam Boiler Act enacted in 2004

        Provincial Law:
        Carinthia, Upper Austria & Vorarlberg created their own IPPC
        installation Acts within 2000-2002. The latter amended the Act in 2004.
        Burgenland, Lower Austria, Salzburg, Styria & Vienna have enacted
        IPPC installation Act within 2003-2005.
        In Lower Austria and Tyrol implementation is made via sectoral law for the
        electricity industry sector, which were amended in 2005.
        The Acts do not apply to matters where existing laws are exclusively a
        federal matter.
      </question>
      <question id="q-1-1-Amendment">X</question>
      <question id="q-1-1-New">
    </question>
    <question id="q-1-1-DataSource">MS Report</question>
    <question id="q-1-1-2-PreviousReportingPeriod">
      <question id="q-1-1-2-Changes">Yes</question>
      <question id="q-1-1-2-Summary">
        The majority of the changes were made during the first implementation
        period. Any changes during 2003-2005 were the result of Directive
        2003/35/EC on Public Participation and Directive 2003/87/EC on Emissions
        Trading. In addition, new laws were enacted,
        - Pollution Prevention from Steam Boiler Act in 2004
        - Air Pollution Control Act amended in 2003
        - IPPC installations Act for the remaining provinces ( Burgenland, Lower
        Austria, Salzburg, Styria & Vienna )
      </question>
    </question>
  </question>
</questionnaire>
```

```
and the Electricity Act for Tyrol and Lower Austria was amended
</question>
</question>
</question>
...
```

Annex 4: Example RDF Output

```
<?xml version="1.0" encoding="utf-8"?>
<rdf:RDF
  xmlns:rdf=http://www.w3.org/1999/02/22-rdf-syntax-ns#
  xmlns:rdfs=http://www.w3.org/2000/01/rdf-schema#
  xmlns="http://rdfdata.eionet.europa.eu/ippc/ontology/">
  <meta rdf:about="">
    <countryName>Austria</countryName>
    <countryCode>AT</countryCode>
    <forCountry rdf:resource="http://ec.europa.eu/eurostat/ramon/rdfdata/countries/AT"/>
  </meta>

  <q-1-h2 rdf:about="">
    <q-1 rdf:parseType="Resource">
      <q-1-1>Federal government:
        IPPC Directive was transposed by amending sectoral laws on installations,
        grouping and coordinating permit procedures. Changes took place within
        2003-2005 to transpose the Emission Trading Directive and Public
        Participation Directive.
        -Waste Management Act (AWG) 2002, last amended in 2004
        -Trade, Commerce and Industry Regulation Act (GewO) 1994, last amended in
        2003
        -Mineral Raw Materials Act (MinroG) 1999, last amended in 2005
        *Water Act (WRG) 1959, last amended in 2003 (does not contain its own
        specific licence regime)
        -Pollution Prevention from Steam Boiler Act enacted in 2004

        Provincial Law:
        Carinthia, Upper Austria & Vorarlberg created their own IPPC
        installation Acts within 2000-2002. The latter amended the Act in 2004.
        Burgenland, Lower Austria, Salzburg, Styria & Vienna have enacted IPPC
        installation Act within 2003-2005.
        In Lower Austria and Tyrol implementation is made via sectoral law for the
        electricity industry sector, which were amended in 2005.
        The Acts do not apply to matters where existing laws are exclusively a
        federal matter.
      </q-1-1>
      <q-1-1-Amendment>X</q-1-1-Amendment>
      <q-1-1-New> </q-1-1-New>
      <q-1-1-DataSource>MS Report</q-1-1-DataSource>
      <q-1-1-2-PreviousReportingPeriod rdf:parseType="Resource">
        <q-1-1-2-Changes>Yes</q-1-1-2-Changes>
        <q-1-1-2-Summary>
          The majority of the changes were made during the first implementation
          period. Any changes during 2003-2005 were the result of Directive
          2003/35/EC on Public Participation and Directive 2003/87/EC on
          Emissions Trading. In addition, new laws were enacted,
          - Pollution Prevention from Steam Boiler Act in 2004
          - Air Pollution Control Act amended in 2003
          - IPPC installations Act for the remaining provinces ( Burgenland,
          Lower Austria, Salzburg, Styria & Vienna )
          and the Electricity Act for Tyrol and Lower Austria was amended
        </q-1-1-2-Summary>
      </q-1-1-2-PreviousReportingPeriod>
    </q-1>
  </q-1-h2>
</rdf:RDF>
```

</q-1-1-2-PreviousReportingPeriod>
</q-1>
...

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