A European Community of SMEs built on Environmental Digital Content and Languages

D4.5: smeSpire Database

Work package	WP4 - TRANSFER
Task	T4.2: Exploitation
Deliverable number	D4.5
Dissemination level	PU
Version/Status	1.2/Final
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Due date	30/04/2014
Actual delivery date	20/05/2014

1 Document change log

Version	Date	Changed by	Changed Sections	Changes made
1.0	18.03.2014	Umberto Di Staso (FG)	All	Document Created
1.1	22.04.2014	Umberto Di Staso (FG)	Chapters 7,8	Update
1.2	20.05.2014	Giacomo Martirano (EPSIT)	All	Slight revisions

2 Acronyms and abbreviations

Abbreviation	Name
BM	Business Model
DoW	Document of Work
EC	European Commission
EU	European Union
GIS	Geographic Information System
ICT	Information and Communication Technology
INSPIRE	Infrastructure for Spatial Information in Europe
ISA	Interoperability Solutions for European Public Administrations
LMO	Legally Mandate Organisation
SME	Small and Medium Enterprise
WP	Work Package
BPC	Best Practice Catalogue

3 Key terms and definitions

Geo- ICT
GeoICT comprises all the ICT based products and services that are related to the collecting, transforming, storing and diffusion of location specific (x,y,z) information or services.

INSPIRE
INSPIRE stands for Infrastructure for Spatial Information in Europe. It is an initiative led by European Commission aiming the implementation of harmonised geographic information over 34 themes, and network services for discovery, view, access and transformation. INSPIRE initiative became a European Directive in 2007 (2007/2/CE).
Detail available at: http://inspire.jrc.ec.europa.eu/

SME
SME stands for Small and Medium-sized Enterprises – as defined in EU law (EU recommendation 2003/361). Micro, small and medium-sized enterprises are defined according to their staff headcount and turnover or annual balance-sheet total.

- A medium-sized enterprise is defined as an enterprise which employs fewer than 250 persons and whose annual turnover does not exceed EUR 50 million or whose annual balance-sheet total does not exceed EUR 43 million.

- A small enterprise is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million.

- A microenterprise is defined as an enterprise which employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million.

More information available at: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

4 Introduction

This deliverable reports the activities performed during the two years project duration in the frame of the activities of Task 4.2 – Exploitation related to the smeSpire database.

During the two years of the project, a significant part of the Task 4.2 activities was focused on the design, development, implementation and test of the smeSpire database and of the related web application, which constitute one of the main pillars of the smeSpire overall exploitation strategy.

The strategic idea underlying the smeSpire database is that Europe still lacks of a comprehensive directory of geo-ICT SMEs. Therefore, a structured repository of geo-ICT SMEs data (like legal name, points of contact, localization, competencies, etc.), combined with functionalities made available by means of a web application (like simple or advanced search) represent a key asset for the project, even beyond its lifetime, useful to map competencies of the geo-ICT SMEs across Europe and allowing also many other uses.

Even though SMEs are key-players in the GeoICT sector, it was decided to extend the smeSpire Community beyond GeoICT Small and medium Enterprises: Public Authorities, Agencies, Universities, Associations, large companies and even individual consultants have been invited to be part of the smeSpire Network and benefit from the project results.
Therefore, the smeSpire database contains the details of all the typologies of members of the smeSpire Network.

A very important result achieved was the thorough analysis of the three ISA Core Vocabularies (People, Locations, Businesses) and the integration of their data models into the smeSpire database overall data model.
Even though this integration was not required in the DoW, it has been considered strategic in order to establish synergies with and to implement re-use best practices of other EU related initiatives.

In addition, efforts dealing with the integration of the smeSpire database and related web application with the other important result of the project represented by the smeSpire Best Practice Catalogue (developed in the frame of WP3) and the Training Platform (developed in the frame of WP2) have been spent, both from a technological point of view and from an end-user usability/accessibility point of view.

In the next sections all the steps needed to achieve these final results have been described.

5 Design and implementation of the smeSpire Database and related web application

The new challenges of globalization, which have led to the geographical fragmentation of supply chains and establishment of multinational companies leading the governance of supply chains themselves, and issues related to the current economic crisis, have brought to the fore the importance of collaboration in the network of small and medium-sized enterprises (SME), which are model of excellence and challenge for the future. In fact, the typical weakness of SME do not reproduce in the reticular systems vertically or horizontally integrated, through the enhancement of knowledge and skills, managerial and organizational measures necessary to manage a real economy, a finance and a society that have become much more complex than even the recent past.

That's why having a set of data, collected and organized under a European standard, is the first important step to exploit smeSpire project.

In this way, is guaranteed an increase of knowledge of the affected stakeholders involved. For this reason, the consortium has spent a lot of time to design a specific website architecture that allow stakeholders to view, search and manage information contained in the SmeSpire Database.

A sketch of the features set, that the SmeSpire Database web application offers to each stakeholder involved in the program, is shown in Figure 1.
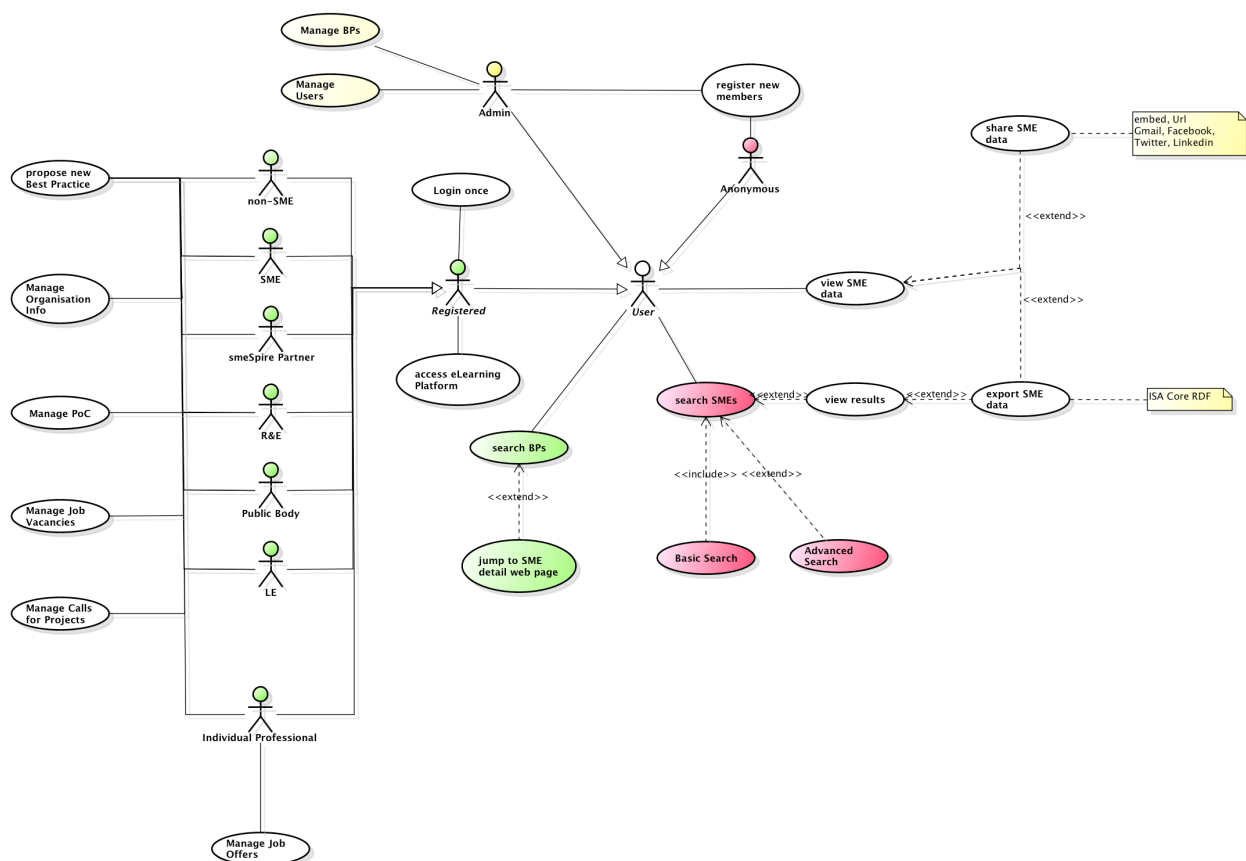

Figure 1 – Uses cases diagram

5.1 smeSpire Database web application user roles

In smeSpire database application are defined three categories of user roles, which are described below.

Anonymous user/Non registered user has the following rights:
- Views the public list of participants;
- Has access to basic search function;
- Can visualize the detailed webpage related to a specific SME;
- Can be redirected to the Best Practice Catalogue web application.

User role **Registered user** has the following rights:
- Views the public list of participants;
- Has access to basic search function;
- Has access to advanced search function;
- Can visualize the detailed webpage related to a specific SME partner;
- Can be redirected to the Best Practice Catalogue web application;
- Can update/modify its own profile.

User role **Administrator** has the following rights:
- Edits and Manages information related to each SME;
- Manages SmeSpire Database web application configuration;
- Has access to basic search function;
- Has access to advanced search function;
- Views the public list of participants;
- Can visualize the detailed webpage related to a specific SME;
- Can be redirected to the Best Practice Catalogue web application;
- Can register new organisations.

The following table presents a summary of the SmeSpire Database web application users and corresponding rights according to the assigned role.

User profile	Rights								
	Register new users	View list of participants	Basic Search	Visualize SME details	Redirected to the BPC web application	Advanced Search	Update its own profile	Configure web application	Manage registered users
Administrator	v	v	v	v	v	v	v	v	v

Anonymous user/ Non registered user		v	v	v	v			
Registered user		v	v	v	v	v	v	

Table 1 – SmeSpire Database website user rights

5.2   Description of the smeSpire Database web application use cases

In order to clarify the use case diagram and better understand the general functionalities to be offered by the smeSpire database and its related web application, several use cases have been defined. The most significant are detailed in the tables below.

Use case: smeSpireDB_UC_ID1	
Component	smeSpire database
Name	Advanced Search (smeSpireDB_UC_ID1)
Description	The registered user searches for applicable partners to be contacted in order to set-up a consortium to bid for a tender related to the provision of geo-ICT services.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user accesses the DB through the website dedicated page.
Post condition	The user prints and/or saves a list of the entities satisfying the search criteria.
Basic flow	
1	The user logs-in into the DB through the website dedicated page.
2	The user selects the "Advanced Search" functionality.
3	The system asks the user to select one or more entries in a search form: Geo-ICT Activities Distance between the user headquarter Previous involvement in EU Project …
4	The system returns (showing on the screen) a list of entities satisfying the search criteria.
5	The system asks if the user wants to print and/or save the search results.
Quality requirements	
Performance	The user receives a response from the system in less than 20 seconds.

Use case – smeSpireDB_UC_ID2	
Component	smeSpire database

Name	Manage PoC (smeSpireDB_UC_ID2)
Description	A registered user is going to change his/her institution's contact point on the portal.
Actor	The user, represented by a manager of an entity (public or private) is changing the contact point.
Precondition	Accessing a personal space the user is going to click on edit button in order to change the contact point.
Postcondition	N/A
Basic flow	
1	The user enters the personal space and clicks on the edit icon located near the PoC summary table
2	The user edits the specific fields about the details that he/she wants to change.
3	The system gives the possibility to edit the following fields: Full Name Surname First Name Patronymic Name Alternative Name Birth Date Gender Email Telephone Role
4	The system returns with the same page with field in "red", if mandatory information required has not been completed.
5	The system returns with a notification message about the successful changes.
6	The system closes the modification page and the navigation continue in the user personal page.
Alternative flow	
…	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID3	
Component	smeSpire database
Name	View SME Data (smeSpireDB_UC_ID3)
Description	The registered/non registered user is going to explore the smeSpire database in the view web page.
Actor	The user, represented by a manager of an entity (public or private) interested to explore the web site and to consider the opportunity to join the smeSpire network.
Precondition	The user accesses the DB through the website dedicated page.

Postcondition	The user prints and/or saves the public profile of the partner of interest.
Basic flow	
1	The user enters the smeSpire database navigation webpage.
2	The user scrolls the list of the members of the smeSpire network.
3	The user clicks on the "view details" button that is associated with each member of the network.
4	The system returns (showing on the screen) a detailed page with all the public information of the selected SME.
5	The system asks if the user wants to print and/or save the search results.
Alternative flow	
…	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID4	
Component	smeSpire database
Name	Basic Search (smeSpireDB_UC_ID4)
Description	The non registered user is going to searching for a specific SME.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user accesses the DB through the website dedicated page.
Postcondition	The user prints and/or saves the public profile of the partner of interest.
Basic flow	
1	The user enters the smeSpire database navigation webpage.
2	The user selects the Basic Search input box.
3	The user starts to digit letters related with the SME company name.
4	The system returns (showing on the screen) a list of entities satisfying the search criteria.
5	The system asks if the user wants to print and/or save the search results.
Alternative flow	

...	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID5	
Component	smeSpire database
Name	Redirect to smeSpire partner Best Practice Catalogue (smeSpireDB_UC_ID5)
Description	The registered/non registered user wants to observe the Best Practice list related to a specific member of the smeSpire network.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user accesses the DB through the website dedicated page.
Postcondition	The user prints and/or saves the public profile of the partner of interest.
Basic flow	
1	The user enters the smeSpire database navigation webpage.
2	The user selects the Basic Search input box.
3	The user starts to digit letters related with the SME company name.
4	The system returns (showing on the screen) a list of entities satisfying the search criteria.
5	The user checks by the BP availability icon if a set of Best Practices is available for the searched SME.
6	The user clicks on the BP availability icon.
7	The system will redirect the navigation on the Best Practices Catalogue web application.
Alternative flow	
...	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID6	
Component	smeSpire database
Name	smeSpire Partner Location (smeSpireDB_UC_ID6)

Description	The registered/non registered user wants to locate on an interactive map the position of a specific SME.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user accesses the DB through the website dedicated page.
Postcondition	N/A
Basic flow	
1	The user enters the smeSpire database navigation webpage.
2	The user selects the Basic Search input box.
3	The user starts to digit letters related with the SME company name.
4	The system returns (showing on the screen) a list of entities satisfying the search criteria.
5	The user clicks on the details button to visualise the detailed webpage of the selected SME.
6	The user can visualise the position of the selected SME on an interactive map located in a specific portion of the webpage.
Alternative flow	
…	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID7	
Component	smeSpire database
Name	Redirect to smeSpire partner Best Practice detailed webpage (smeSpireDB_UC_ID7)
Description	The registered/non registered user wants to study the Best Practices related to a specific SME.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user accesses the DB through the website dedicated page.
Postcondition	N/A
Basic flow	
1	The user enters the smeSpire database navigation webpage.

2	The user selects the Basic Search input box.
3	The user starts to digit letters related with the SME company name.
4	The system returns (showing on the screen) a list of entities satisfying the search criteria.
5	The user enters on the smeSpire partner detailed webpage using the specific "show detail" button.
6	The user scrolls the detailed webpage until the section regarding the Best Practices list was reached.
7	The user clicks on the title of the interested Best Practice.
8	The system will redirect the navigation on the Best Practices Catalogue detailed webpage.

Alternative flow	
...	N/A

Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID8	
Component	smeSpire database
Name	Manage Organisation Info (smeSpireDB_UC_ID8)
Description	A registered user is going to change his/her institution's information on the portal.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	Accessing a personal space the user is going to click on edit button in order to change the organization pulic information.
Postcondition	N/A
Basic flow	
1	The user enters the personal space and clicks on the edit icon located near the Organization summary table
2	The user edits the specific fields about the details that he/she wants to change.
3	The system gives the possibility to edit the following fields: Phone eMail Po Box Locator Designator Locator Name

	Address Area Post Name Admin Unit L1 Admin Unit L2 Post Code Website URL Facebook URL Twitter URL LinkenIn URL
4	The system returns with the same page with field in "red", if mandatory information required has not been completed.
5	The system returns with a notification message about the successful changes.
6	The system closes the modification page and the navigation continue in the user personal page.
Alternative flow	
…	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID9	
Component	smeSpire database
Name	Manage Job Vacancies (smeSpireDB_UC_ID9)
Description	The registered user wants to insert a new Job Vacancy.
Actor	The user, represented by a manager of an entity (public or private) interested to publish a Job Vacancy.
Precondition	The user accesses the DB through the website dedicated page.
Postcondition	N/A
Basic flow	
1	The user enters the personal space and clicks on the edit icon located near the Job Vacancies summary table
2	The user fills the specific fields about the Vacancy that he/she wants to insert.

3	The system gives the possibility to insert the following fields:
	
	    Profile
	    Description
	    Years of Experience
	    Duration
	    Salary

4	The system returns with the same page with field in "red", if mandatory information required has not been completed.
5	The system returns with a notification message about the successful changes.
6	The system closes the page and the navigation continue in the user personal page.
Alternative flow	
…	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID10	
Component	smeSpire database
Name	Manage Calls for Projects (smeSpireDB_UC_ID10)
Description	The registered user wants to insert a new Call for Projects.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user accesses the DB through the website dedicated page.
Postcondition	N/A
Basic flow	
1	The user enters the personal space and clicks on the edit icon located near the Calls summary table
2	The user fills the specific fields about the Call that he/she wants to insert.

3	The system gives the possibility to insert the following fields:
	
	    Project Name
	    Description
	    Deadline
	    Duration
	    URL

4	The system returns with the same page with field in "red", if mandatory information required has not been completed.
5	The system returns with a notification message about the successful changes.
6	The system closes the page and the navigation continue in the user personal page.
Alternative flow	

...	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID11	
Component	smeSpire database
Name	Manage Job Offers (smeSpireDB_UC_ID11)
Description	The Individual Professional registered user wants to add a new Job Offer.
Actor	The user, Individual Professional, interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user, registered as Individual Professional, accesses the DB through the website dedicated page.
Postcondition	N/A
Basic flow	
1	The user enters the personal space and clicks on the edit icon located near the Job Offers summary table
2	The user fills the specific fields about the Offer that he/she wants to insert.
3	The system gives the possibility to insert the following fields: Profile Description Years of Experience Level Duration Curriculum Vitae
4	The system returns with the same page with field in "red", if mandatory information required has not been completed.
5	The system returns with a notification message about the successful changes.
6	The system closes the page and the navigation continue in the user personal page.
Alternative flow	
...	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

Use case: smeSpireDB_UC_ID12	
Component	smeSpire database
Name	Register new members (smeSpireDB_UC_ID12)
Description	The user wants to register into the system.
Actor	The user, represented by a manager of an entity (public or private) interested into the participation to a tender related to the provision of geo-ICT services, aiming to set-up a consortium in order to fulfil the technical requirements of the tender.
Precondition	The user accesses the registration web page.
Postcondition	N/A
Basic flow	
1	The system gives the possibility to insert the following fields: Organisation/Institution/Name Street Name Number City Country ZIP Phone eMail Website Profile of the Organisation Person of Contact Information Sectors of Interest Username Password
2	The system returns with the same page with field in "red", if mandatory information required has not been completed or the captcha is wrong
3	The system returns with a notification message about the successful registration, and an eMail with credentials will be send to the specified eMail
Alternative flow	
…	N/A
Quality requirements	
Performance	The user receives a response from the system in less than 10 seconds.

5.3 The ISA Core Vocabularies

One of the most important results achieved by partners during the design activity is related to the adoption of the "Interoperability Solutions for European public Administrations" standard to describe people, locations and business information.

This programme funds initiatives to foster the efficient and effective cross-border electronic interactions between European public administrations. The final objective of this programme is targeted towards improving the semantic interoperability of European e-Government systems. It addresses these by encouraging the sharing and reuse of semantic assets. The ISA Programme[1] intends to build consensus on a number of e-Government Core Vocabularies for public sector information exchange.

In this chapter, a part of the contents is a re-arrangement of the official documentation regarding the ISA programme, available at: http://joinup.ec.europa.eu/.

The metadata and reference data used in electronic public services across Europe more often have a very specific context. Attaining consensus on common metadata and reference data for these electronic services is a critical step towards semantic interoperability. Unfortunately, consensus building is hindered by the diverse cultural, multi-lingual, legal, and organisational contexts of these e-Government services. To alleviate this problem, consensus building should start at a higher level of abstraction that surpasses the contexts of individual electronic public services, and thus the cultural, lingual, legal, and organisational differences of individual countries. These concepts are what we describe as **Core Vocabularies**.

The Core Vocabularies defined here present concepts and terms that can be used to describe three things that are closely related:

- People
- Locations
- Businesses

This is obviously a very short list, one that excludes many other domains that are no less interconnected such as, accounts and payments, projects and processes, buildings, education and healthcare organizations. Any of these, and many others, could have been included and considered. However, it was decided to focus, initially at least on these three areas, as there was evidence from some public sector data repositories and broader discussions that these were the highest priority areas. Furthermore, the links between them are particularly strong so that the three create a single coherent set.

In developing these three core vocabularies the ISA working group consciously limited its work further. The vocabulary for describing a person relates to the natural person, i.e. the individual as opposed to any role they may play in society or the relationships they have to other people, organisations and property; all of which contribute significantly to the broader concept of identity. In describing businesses, the working group focussed solely on legal entities, that is, trading bodies that are formally registered with the relevant authority and that appear in business registers. The broadest vocabulary is that for location which covers places, addresses, and geographical geometries.

5.4 SmeSpire Database structure

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[1] 1 http://ec.europa.eu/isa/

Taking into account the ISA core vocabularies, the current stage of development of the SmeSpire Database is shown in the ER Diagram of Figure 2, where in yellow are represented the Entities derived from the ISA core vocabularies.
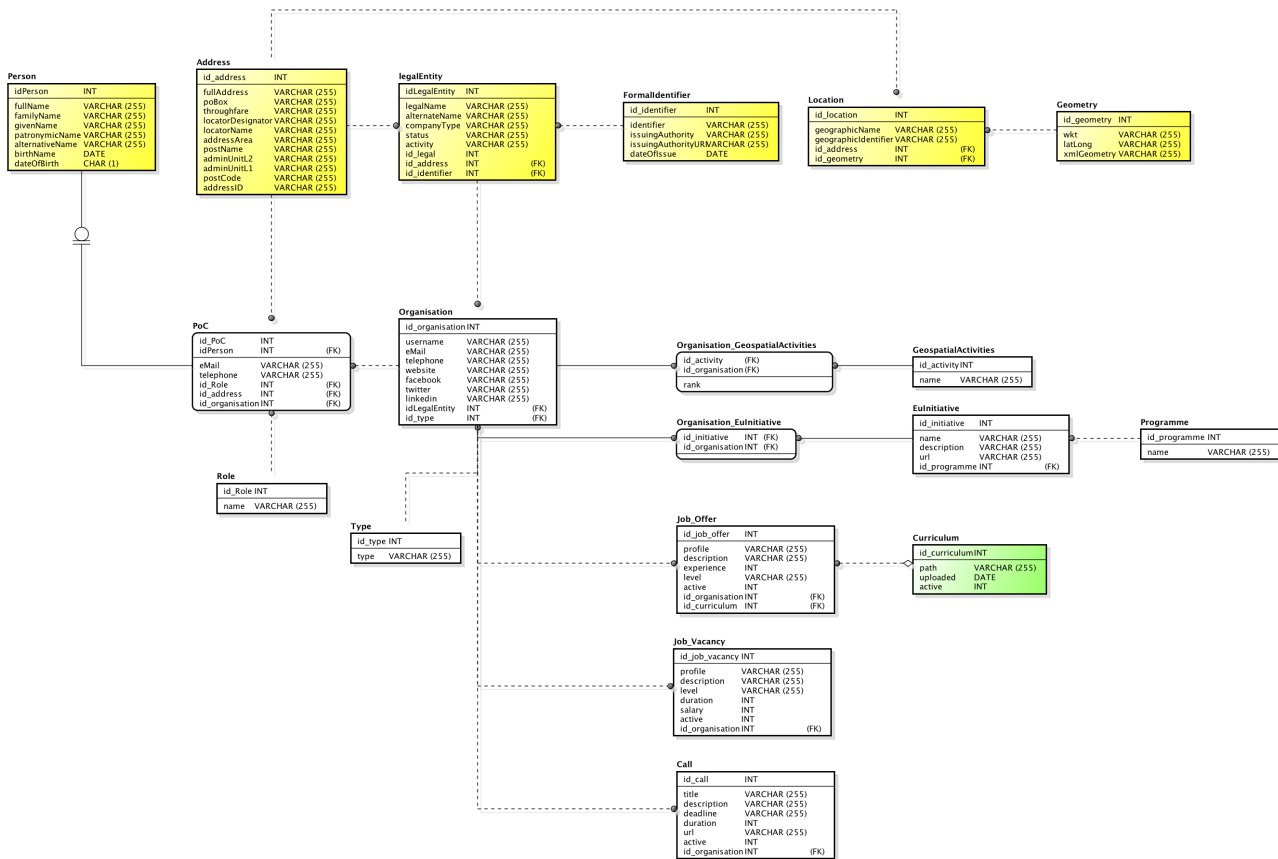

Figure 2 – SmeSpire Database ER Diagram

The second step after having a general view of the diagram, is analyzing the individual parts of it:

1. **Person Class**: The Person Class is a sub class of the more general "Agent" class that encompasses organisations, legal entities, groups etc. An "Agent" is any entity that is able to carry out actions.
   For avoidance of doubt, the word "relationships" is used throughout this document in its technical sense. The concern here is with the key aspects that define the natural person.

   ID Person
   The person relationship can be used to link any resource to a Person Class.

   Full Name
   The attribute "Full Name" contains the complete name of a person as one string. In addition to the content of Given Name, Family Name and, in some systems, Patronymic Name, this can carry additional parts of a person's name such as titles, middle names or suffixes like "the third" or names which are neither a given nor a family name.

   Given Name

A given name, or multiple given names, is the denominator(s) that identify an individual within a family. These are given to a person by his or her parents at birth or may be legally recognised as "given names" through a formal process. All given names are ordered in one field so that, for example, the Given Name for Johan Sebastian Bach is "Johan Sebastian".

Family Name
A family name is usually shared by members of a family. This attribute also carries prefixes or suffixes which are part of the Family Name, e.g. "de Boer", "van de Putte", "von und zu Orlow". Multiple family names, such as are commonly found in Hispanic countries, are recorded in the single Family Name field so that, for example, Miguel de Cervantes Saavedra's Family Name would be recorded as "Cervantes Saavedra".

Patronymic Name
Patronymic names are important in some countries. Iceland does not have a concept of "family name" in the way that many other European countries do, for example. In Bulgaria and Russia, patronymic names are in every day usage, for example, the Sergeyevich in "Mikhail Sergeyevich Gorbachev".

Alternative Name
Any name by which an individual is known represents his or her alternative name. Many individuals use a short form of their name, a "middle" name as a "first" name or a professional name. For example, the British politician and former UN High Representative for Bosnia and Herzegovina, Jeremy John Durham Ashdown, Baron Ashdown of Norton-sub-Hamdon, is usually referred to simply as "Paddy Ashdown" or "Lord Ashdown".

Gender
A code specifying the current gender of a person. ISO 5218 specifies 4 categories in widespread use:
0 = not known;
1 = male;
2 = female;
9 = not applicable.

Date of Birth
A date that specifies the birth date.

2. **Legal Entity Class:** This is the key class for the Business Core Vocabulary and represents a business that is legally registered. In many countries there is a single registry although in others, such as Spain and Germany, multiple registries exist. A Legal Entity is able to trade, is legally liable for its actions, accounts, tax affairs etc.
   This makes legal entities distinct from the concept of organisations, groups or sole traders. Many organisations exist that are not legal entities yet to the outside world they have staff, hierarchies, locations etc. Other organisations exist that are an umbrella for several legal entities (universities are often good examples of this). This vocabulary is concerned solely with registered legal entities and does not attempt to cover all possible trading bodies.
   Legal Entity is a sub class of the more general "Agent" class that does encompass organisations, natural persons, groups etc.

ID Legal Entity

The legal entity relationship can be used to link any resource to a Legal Entity Class.

Legal Name
A business might have more than one legal name, particularly in countries with more than one official language.

Alternative Name
Some jurisdictions recognise concepts such as a trading name or alternative forms of a legal entity's name. The Alternative Name property can be used to record such names but should not be used to record translations of the primary legal name. Where more than one legal name exists and where they have equal standing but are expressed in different languages, identify the language used in each of the multiple legal names.
It is notable that some jurisdictions consider the use of any name other than the primary Legal Name as "suspicious".

Company Type
This property records the type of company. Familiar types are SA, PLC, LLC, GmbH etc. At the time of publication, there is no agreed set of company types that crosses borders. For example, the term "SA" is used in Poland and France, although they mean slightly different things. The UK's LLP and Greece's EPE provide further example of close, but not exact, matches.
That said, each jurisdiction will have a limited set of recognised company types and these should be used in a consistent manner. It is to be hoped that further work can be carried out in this area in the near future.

Status
Recording the status of a company presents the same issue as its type. For example, the terms "insolvent", "bankrupt" and "in receivership",are likely to mean slightly different things with different legal implications in different jurisdictions.

Activity
The activity of a company should be recorded using a controlled vocabulary.

ID Legal Identifier
An authority within a given jurisdiction confers the legal status of a business. The Legal Identifier is therefore a fundamental relationship between a legal entity and the authority with which it is registered. The details of the registration are provided as properties of the Formal Identifier class. There is no restriction on the type of legal identifier. In many countries, the business register's identifier is the relevant data point. The tax number often fulfils this function in Spain.
A legal entity must have a legal identifier.

ID Identifier
The identity relation connects an asset to any identifier officially released for that resource, different from the one which confers legal status on it.
Legal Entities, people, organisations and other Agents may have any number of identifiers (but only one legal identifier). For example, in many jurisdictions, a business will have one or more tax numbers associated with them, which do not, by themselves, confer legal entity status. An individual may be issued with identifiers for everything, from social security to club membership.

The identifier relationship must not be used to link to the identifier issued by the authority that conferred legal entity status on a business.

ID Address
In almost all jurisdictions, legal entities must register a postal address. This may or may not be the actual address at which the legal entity does its business, it is commonly the address of their lawyer or accountant, but it is the address to which formal communications can be sent.

3. **Formal Identifier Class**: it represents any identifier issued by any authority, whether a government agency or not. It captures the identifier itself and details of the issuing authority, the date on which the identifier was issued and so on.

ID Identifier
The formal identifier relationship can be used to link any resource to a Formal Identifier Class.

Identifier
The role of the Formal Identifier Class is to provide and contextualise the identifier. A formal Identifier Class without the actual identifier cannot be considered as being defined and therefore this property is mandatory.

Issuing Authority URI
If the Issuing Authority has a recognised URI it should be used. There are three principal advantages to this over providing the name as text.

• it is significantly less error-prone;

• if stored in RDF, it is only stored once, no matter how many records point to it;

• further information can be found about the authority by following linked data items.

Issuing Authority
An issuing authority can be identified by its name as well as its URI. As this field takes a string, there is a considerable room for an error, so publishers are urged to use a consistent form of the name.

Date of Issue
The date on which the identifier was issued.

4. **Location Class:** ISO 19112 defines a location as "an identifiable geographic place". With this in mind, "Eiffel Tower", "Madrid" and "California" are all locations and this is a common way of representing locations in public sector data, i.e. simply by using a recognised name. Such identifiers are common although they can be highly ambiguous as many places share the same or similar names.
In addition to a simple (string) label or name for a Location, this vocabulary defines three further ways in which it can be identified:

- by URI (such as a GeoNames or DBpedia URI);

- by address;

- by geometry, that is, a point, line or polygon expressed using coordinates in some coordinate reference system.

The latter two are defined using the Address and Geometry Classes.

ID Location
The location relationship can be used to link any resource to a location Class.

Geographic Name
Again quoting from ISO 19112, a geographic name is a "spatial reference in the form of a label or code that identifies a location. "Spain" is an example of a country name; "SW1P 3AD" is an example of a postcode. Both are geographic names.
The country codes defined in ISO 3166 are further examples of geographic names.
The "place" may be an abstract location such as a jurisdiction, as opposed to a physical location. The geographic name might be a recognised name, such as "Paris", which may or may not be ambiguous in context, or it might be descriptive (such as "Rhine km 203"). Although geographic names are always useful, it is recommended that an additional method should be used to identify a location.

Geographic Identifier
A URI that identifies the location.
GeoNames.org provides stable, widely recognised identifiers for more than 10 million geographical names that can be used as links to further information.
For example, http://sws.geonames.org/593116/ identifies the Lithuanian capital Vilnius. Unfortunately these URIs cannot easily be automatically deduced since the URI scheme uses simple numeric codes. Finding a GeoNames identifier for a Location is almost always a manual process. Where such identifiers are known or can be found, it is recommended to use them.

Where the Location Class is used to identify a country, if the geonames URI is not known, the recommendation is to use DBpedia URIs of the form http://dbpedia.org/resource/ISO_3166-2:XX where XX is the ISO 3166 two-character code for the country [DBpedia].

The use of a URIs has added advantages:

A. it can be used by automated systems to look up additional data (linked data);

B. a triple store will store only one copy of the URI, whereas if a string is used, a copy of that string is stored for each and every person in the database. Thus, in large data sets, the saving on memory capacity and the improvement in transmission efficiency can be substantial.

ID Address
The "address" relationship associates any resource with the Address Class. There is no cardinality restriction on the relationship when used to link a Location with an Address. In other words, a single location may be associated with multiple Address classes.

ID Geometry

The "geometry" relationship associates any resource with the Geometry Class. There is no cardinality restriction on the relationship when used to link a Location with Geometry. In other words, a single location may be associated with multiple Geometry classes.

5. **Address Class**: The representation of addresses varies widely from one country's postal system to another. Even within countries, there are almost always examples of addresses that do not conform to the stated national standard. At the time of publication, work is progressing on ISO 19160-1 that defines a method through which different addresses can be converted from one conceptual model to another.

   For this specification we have drawn heavily on the INSPIRE Address Representation data type [INADR]. The relevant properties, all of which can be found in the INSPIRE Address Representation Class, are detailed in the following sections, but in brief they are:

   - PO Box (a specialisation of locator designator)

   - Thoroughfare (a road, a waterway etc.)

   - Locator designator (a building number, entrance number etc.)

   - Locator name (a proper name for a building or room within a building)

   - Address area (usually a city area or village)

   - Locality (usually a town)

   - Admin unit (usually a county or state)

   To this very granular set of properties we add two further properties:

   - full address (the complete address as a formatted string)

   - addressID (a unique identifier for the address)

   ID Address
   The address relationship can be used to link any resource to an Address Class.

   Full Address
   The complete address is written as a string, with or without formatting. Use of this property is recommended as it will not suffer any misunderstandings that might arise through the breaking up of an address into its component parts.

   PO Box
   The Post Office Box number. INSPIRE's name for this is "postalDeliveryIdentifier" for which it uses the locator designator property with a type attribute of that name. This vocabulary separates out the Post Office Box for greater independence of technology.

   Thoroughfare
   Quoting from the INSPIRE guidelines, a thoroughfare is: "an address component that represents the name of a passage or way through, from one location to another. A thoroughfare is not necessarily a road; it might be a waterway or some other feature.

   Locator Designator

The locator designator is defined by the INSPIRE guidelines as "a number or a sequence of characters that uniquely identifies the locator within the relevant scope(s). The full identification of the locator could include one or more locator designators." In simpler terms, this is the building number, apartment number, etc. For an address such as "Flat 3, 17 Bridge Street", the locator is "flat 3, 17".

Locator Name
Again quoting the INSPIRE guidelines, locator name is defined as: "Proper noun(s) applied to the real world entity identified by the locator. The locator name could be the name of the property or complex, of the building or part of the building, or it could be the name of a room inside a building".
The key difference between a locator and a locator name is that the latter is a proper name and is unlikely to include digits. For example, "Shumann, Berlaymont" is a meeting room within the European Commission headquarters for which locator name is more appropriate than locator.

Address Area
Taking the definition from INSPIRE, the address area is "the name or names of a geographic area or locality that groups a number of addressable objects for addressing purposes, without being an administrative unit." This would typically be part of a city, a neighbourhood or village.

Post Name
It is the key postal division of the address, usually the city. INSPIRE's definition is "one or more names created and maintained for postal purposes to identify a subdivision of addresses and postal delivery points".

Admin Unit Level 2
The Admin Unit Level 2 is the region of the address, usually a county, state or another area that typically encompasses several localities.

Admin Unit Level 1
The uppermost administrative unit for the address, almost always a country.
Best practice is to use the ISO 3166-1 code but if this is inappropriate for the context, country names should be provided in a consistent manner to reduce ambiguity. For example, either writing "United Kingdom" or "UK" consistently throughout the data set and avoid mixing the two.

Post Code
The post code (a.k.a postal code, zip code etc.). Post codes are common elements in many countries' postal address systems and, therefore, often a particularly important piece of data.

Address ID
The concept of adding a globally unique identifier for each instance of an address is a crucial part of the INSPIRE data spec. A number of EU countries have already implemented an ID (a UUID) in their Address Register/gazetteer, among them Denmark.
It is the address Identifier that allows an address to be represented in a format other than INSPIRE whilst remaining conformant to the core vocabulary.

Table 2 shows an example:

fullAddress	15 Acacia Avenue New Town Edinburgh UK EH1 1AA
locatorDesignator	15
thoroughfare	Acacia Avenue
addressArea	New Town
postName	Edinburgh
adminUnitL1	UK
postCode	EH1 1AA
addressID	http://address.example/id/uk/eh11aa

Table 2 – Example of structured Address

6. Geometry Class: The geometry relationship can be used to link any resource to a Geometry Class.

ID Geometry
The geometry relationship can be used to link any resource to a Geometry Class.

wkt
A WKTLiteral representation of geometry is defined in the evolving GeoSPARQL specification [GEOSPRARQL].
A WKTLiteral is a string consisting of an optional URI identifying the coordinate reference system followed by one or more spaces (Unicode U+0020 character) as a separator and a Well Known Text (WKT) string as described in ISO 19125-1 [ISO 1925].
For WKTLiterals, the initial URI identifies the spatial reference system for the geometry. The Open Geospatial Consortium maintains a set of CRS URIs under the http://www.opengis.net/def/crs/ namespace. This leading spatial reference system URI is optional and in its absence, the following spatial reference system URI is assumed: http://www.opengis.net/def/crs/OGC/1.3/CRS84.

RDF Example:
<http://www.opengis.net/def/crs/EPSG/0/4326/>
Point(33.95 -83.38)"^^<http://www.opengis.net/def/dataType/OGC-SF/1.0/WKTLiteral>

(This example gives both the coordinate reference system and the point itself as a string which is then data typed).

Lat/Long
A comma separated lat/long pair as defined in WGS84.

XML Geometry
Several XML-based methods exist for defining a geometry, which typically refers to a location on the Earth's surface. These XML dialects offer self-contained methods of describing a location and current key examples include GML [GML] and the W3C's Point of Interest specification [POI] for which specific sub relations are provided.
The xml geometry relationship can link either a Location Class or a Geometry Class to the XML Literal.

7. **EU Initiative Class**: The EU Initiative Class provides the structure used to represent the set of EU initiatives, for example European Projects, related to each SME.

   ID Initiative
   The EU Initiative relationship can be used to link any resource to a EU Initiative Class.

   ID Programme
   Reference to the Programmes table.

   Name
   Name of the Initiative.

   Description
   Description of the Initiative.

   URL
   Reference URL to the web page EU Initiative.

8. **Programme Class**: The Programme Class is a simple class that contains the set of names of the EU Projects available. It works in pairs with the EU Initiative table.

   ID Programme
   The Programme relationship can be used to link any resource to a Programme Class.

   Name
   Name of the Programme, generally an acronym.

9. **GeoSpatial Activities Class**: The GeoSpatial Activities Class is a simple class that contains a set of Geo Spatial Activities related to each organization.

   ID Activity
   The GeoSpatial Activities relationship can be used to link any resource to a GeoSpatial Activities Class.

   Name
   Name of the Activity.

10. **Person of Contact Class**: The Person of Contact Class provides all the data that are needed to join information related organizations and the Person Class.

    ID PoC
    The PoC relationship can be used to link any resource to a PoC Class.

    Email
    Person of Contact email. This could be different from the organization email.

    Telephone
    Person of Contact telephone number. This could be different from the organization telephone number.

ID Role
Identifier code that specifies the relationship between the PoC Class and the Role Class.

ID Person
Identifier code that specifies the relationship between the PoC Class and the Person Class.

ID Organization
Identifier code that specifies the relationship between the PoC Class and the Organization Class.

11. **Role Class**: The Role Class provides a set of possible set of Roles related to the Person of Contact Class. For example, a Role could be CEO, Owner or Employee.

ID Role
The Role relationship can be used to link any resource to a Role Class.

Name
Name of the Role.

12. **Organisation Class**: The Organization class provides information related the Organization.

ID Organization
Identifier code of the Organization. Using this code it is possible to retrieve the major part of the information related to each organization.

Username
Organization Username. This data will be used during the authentication phase.

Email
Organization email.

Telephone
Organization telephone number.

ID Legal Entity
Is an identifier code that specifies the relationship between the Organization Class and the Legal Entity Class.

ID Type
Identifier code that specifies the relationship between the Organization Class and the Type Class.

13. **Type Class**: The Type Class provides a set of possible set of SME Types related the Organization. For example, a Type could be SME, LE or Non-SME.

ID Type
The Type relationship can be used to link any resource to a Type Class.

Type
Name of the Type.

14. **Job Offer Class**: The Job Offer Class is designed to store the set of relevant information that an "Individual Professional" has to specify to indicate his/her INSPIRE-related skills.

ID Job Offer
The Job Offer relationship can be used to link any resource to a Job Offer Class.

ID Org
Identifier code that specifies the relationship between the Job Offer Class and the Organization Class.

Profile
Name of the Role.

Description
Verbose description of the skills of the registered user in the specified context.

Experience
Monthly-based experience in the specified context.

Level
Level of knowledge acquired.

ID Curriculum
This value will be used as a reference to the curriculum table.

Active
Parameter that identifies if the Job Offer is currently published or not.

15. **Curriculum**: The Curriculum class is designed to allow "Individual Professional" registered user to upload and store its own curriculum vitae in PDF format.

ID Curriculum
The Curriculum relationship can be used to link any resource to a Curriculum Class.

Path
Physical path to retrieve the uploaded PDF file.

Uploaded
This parameter specifies the date in which the Curriculum Vitae was uploaded.

Active
Parameter that identifies if the Curriculum Vitae is currently published or not.

16. **Job Vacancy Class**: The Job Offer Class is designed to store the set of relevant information that an "Individual Professional" has to specify to indicate his/her INSPIRE-related skills.

ID Job Vacancy
The Job Vacancy relationship can be used to link any resource to a Job Vacancy Class.

ID Org
Identifier code that specifies the relationship between the Job Vacancy Class and the Organization Class.

Profile
This parameter specifies the name of the profile, which the organization is searching for.

Description
Verbose description of the skills required for that particular job.

Level
Required skills level.

Duration
Duration of the contract.

Salary
This parameter indicates the annual salary.

Active
Parameter that identifies if the Job Vacancy is currently published or not.

17. **Call Class**: The Job Offer Class is designed to store the set of relevant information that an "Individual Professional" has to specify to indicate his/her INSPIRE-related skills.

ID Call
The Call relationship can be used to link any resource to a Call Class.

ID Org
Identifier code that specifies the relationship between the Call Class and the Organization Class.

Title
Title of the Call.

Description
Verbose description of the aims of the Call.

Deadline
The Deadline parameters indicate the last date in which an interested organisation can submit its partnership proposal.

Duration
Duration of the project in months.

Url
Additional Url for more information about the Call.

<u>Active</u>
Parameter that identifies if the Call is currently published or not.

6 Sharing data

One of challenges during the design phase of the SmeSpire Database was the communication and the synchronization between the SmeSpire Database web application, the Best Practice Catalogue web application and the Training Platform. As Figure 2 shows, the entire database structure was designed to store and manage data that will be used by the three different web applications. This choice allows the independent development of the web applications, but using the same source of registered users and credentials.

Although the common source of data allows the execution of complex query used to retrieve any possible information regarding the set of members joined in the network and the related best practice, there were some issues that have been solved to allow the perfect communication between the applications, in particular, the sharing of the set of registered user (Joomla table "user") and the paradigm to be used to allow the communication between SmeSpire Database and Best Practice Catalogue web applications.

6.1 Sharing Joomla User Table

The technological challenge mentioned in the previous section is related in particular to the sharing of the Joomla table that contains the information of the registered user between the applications.
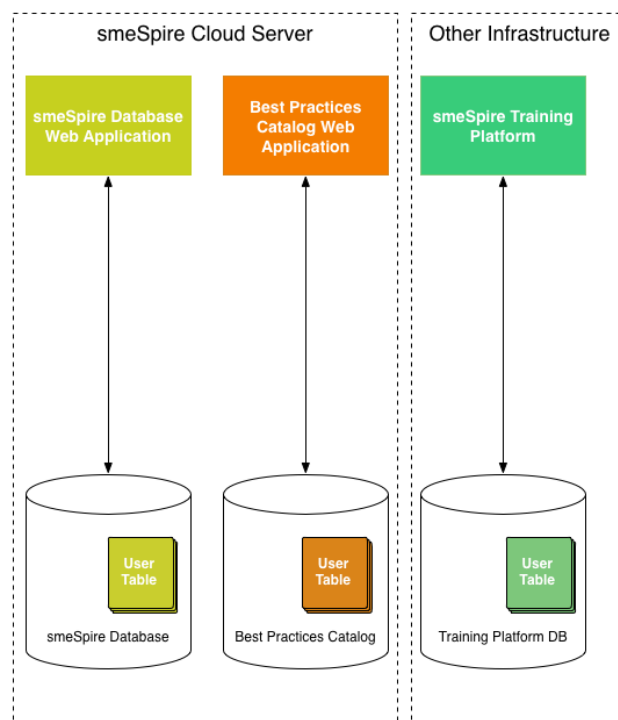

Figure 4 – Web Applications Classical Structure

The proposed solution for the synchronization of the web applications is the following:
    (a) Drop the tables related to the management of the users in the BPC database.

Figure 5 – Drop Tables in Database BPC database

(b) Create a view of the users table from the smeSpire database to the BPC database.
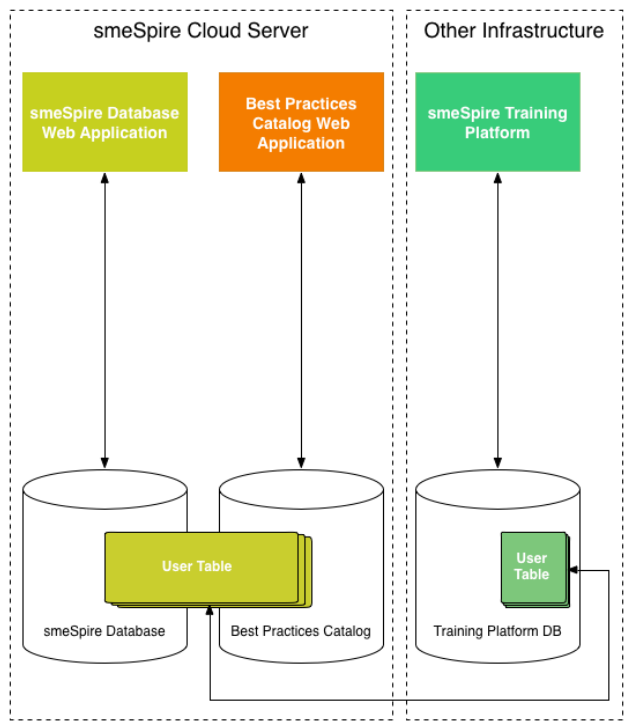

Figure 6 – Sharing user table conceptual schema

This is the SQL query in order to create the view tables involved in the management of the user sessions:

```
CREATE VIEW joomla_users AS SELECT * FROM joomladatabaseA.joomla_users;
CREATE VIEW joomla_session AS SELECT * FROM joomladatabaseA.joomla_session;
CREATE VIEW joomla_usergroups AS SELECT * FROM joomladatabaseA.joomla_usergroups;
CREATE VIEW joomla_user_notes AS SELECT * FROM joomladatabaseA.joomla_user_notes;
CREATE VIEW joomla_user_profiles AS SELECT * FROM joomladatabaseA.joomla_user_profiles;
CREATE VIEW joomla_user_usergroup_map AS SELECT * FROM
joomladatabaseA.joomla_user_usergroup_map;
CREATE VIEW joomla_viewlevels AS SELECT * FROM joomladatabaseA.joomla_viewlevels;
```

Finally, a specific PHP plugin was installed in the training platform web application (Moodle), to allow the interconnection between the two users table.

6.2 Smespire Database Web application / Best Practice Catalogue Web application Communication Paradigm

Another technological issue that has been solved was related to the communication paradigm that allows the two web applications to ask specific content visualization. Specifically, it could be possible that a user requests the set of best practices belonging to a specific SME (SME Database web application -> Best Practices Catalogue web application) or requests the page containing the information of a SME that has been involved in a Best Practice (Best Practices Catalogue web application -> SME Database web application).

To offer this functionality the two web applications have to allow a specific external call that is processed internally and returns the correct webpage.
For the Best Practices Catalogue web application point of view, the structure of the HTTP request that allows the visualization of the set of Best Practices related to a specific SME is the following:

${BPC_URL}/practices-by-organisation/${ORGANISATION_ID}
where:
* ${BPC_URL} is URL to BPC website root
* ${ORGANISATION_ID} is the ID of the organisation (id_organisation from table Organisation)

The structure of the HTTP request that allows to visualize the detailed webpage regarding a Best Practice in the BPC website is the following:

${BPC_URL}/practices /${ORGANISATION_ID}/
where:
* ${BPC_URL} is URL to BPC web application root
* ${ORGANISATION_ID} is the ID of the organisation (id_organisation from table Organisation)

On the other hand, the SmeSpire Database web application HTTP request used to get the detailed page about a specific SME, is the following:

${SMEDB_URL}/smes-database?id=${ORGANISATION_ID}
where:
* ${SMEDB_URL} is URL to SmeSpire Database web application root
* ${ORGANISATION_ID} is the ID of the organisation (id_organisation from table Organisation)

7 Statistics

The following diagram shows the smeSpire Database registration time-series during the two-years project duration. The registrations started in November 2012, in correspondence to the launch of the online survey conducted during the WP1 – Study. The first version of the smeSpire Database was delivered six months later. The registrations to the smeSpire database are still in progress. At the time of writing, the smeSpire Database includes **524** registered users, reported in the following tables and graphs

- Figure 5 represents the monthly-based subscription chart, starting from November 2012. November 2012 was the period in which the consortium started to recognize subscriptions;
- Figure 6 and 7 show how the 524 members of the smeSpire network are distributed over the European countries;
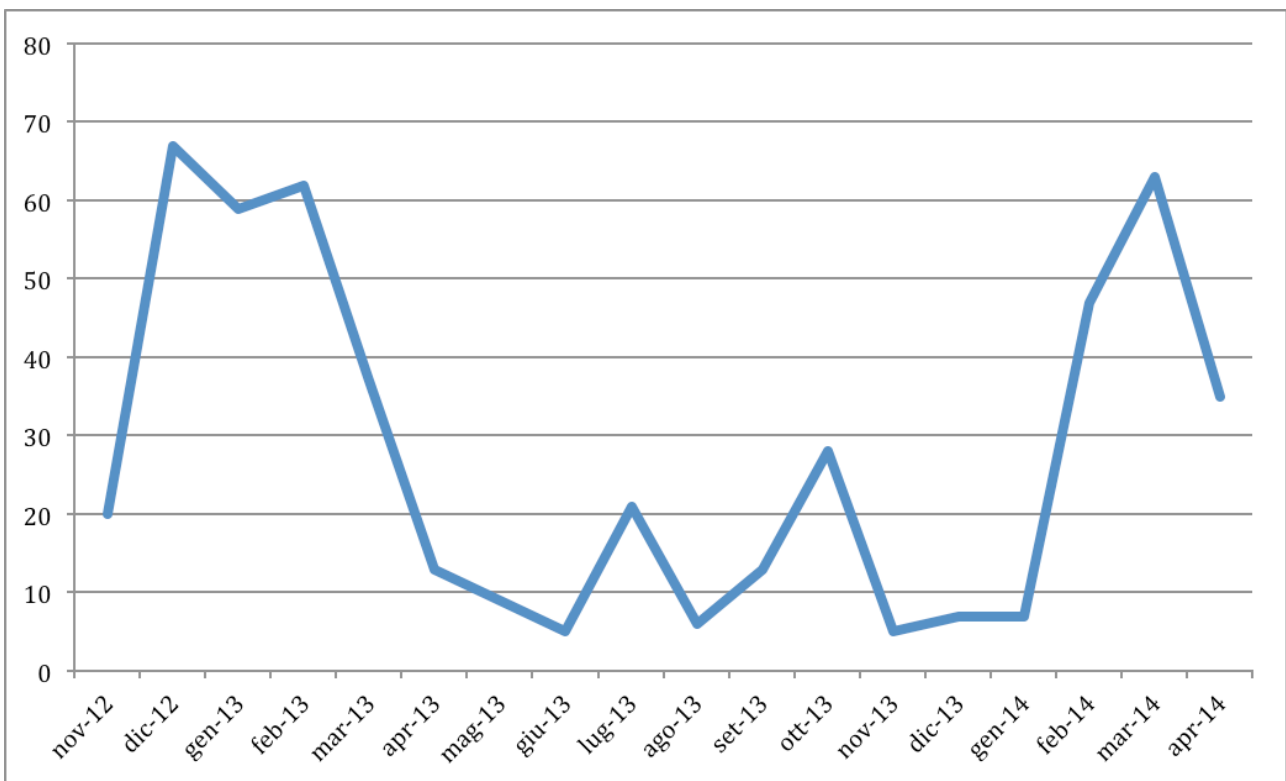- Figure 7 and 8 show the types of the network members.

Figure 5 – Monthly based registrations chart

Country	Network members (# SMEs)
Albania	2
Belgium	18
Bulgaria	11
Croatia	5
Cyprus	10
Czech Republic	16
Estonia	1
Finland	2
France	18
Germany	60
Greece	37
Hungary	13
Ireland	5
Italy	97
Lithuania	35
Luxembourg	2
Malta	6
Netherlands	6
Portugal	3
Romania	2
Slovakia	54
Slovenia	4
Spain	44
Sweden	3
United Kingdom	45
Serbia	3
Macedonia	6
EU countries	508
other countries	16
total	524

Figure 6 – smeSpire Network Country-Based Table
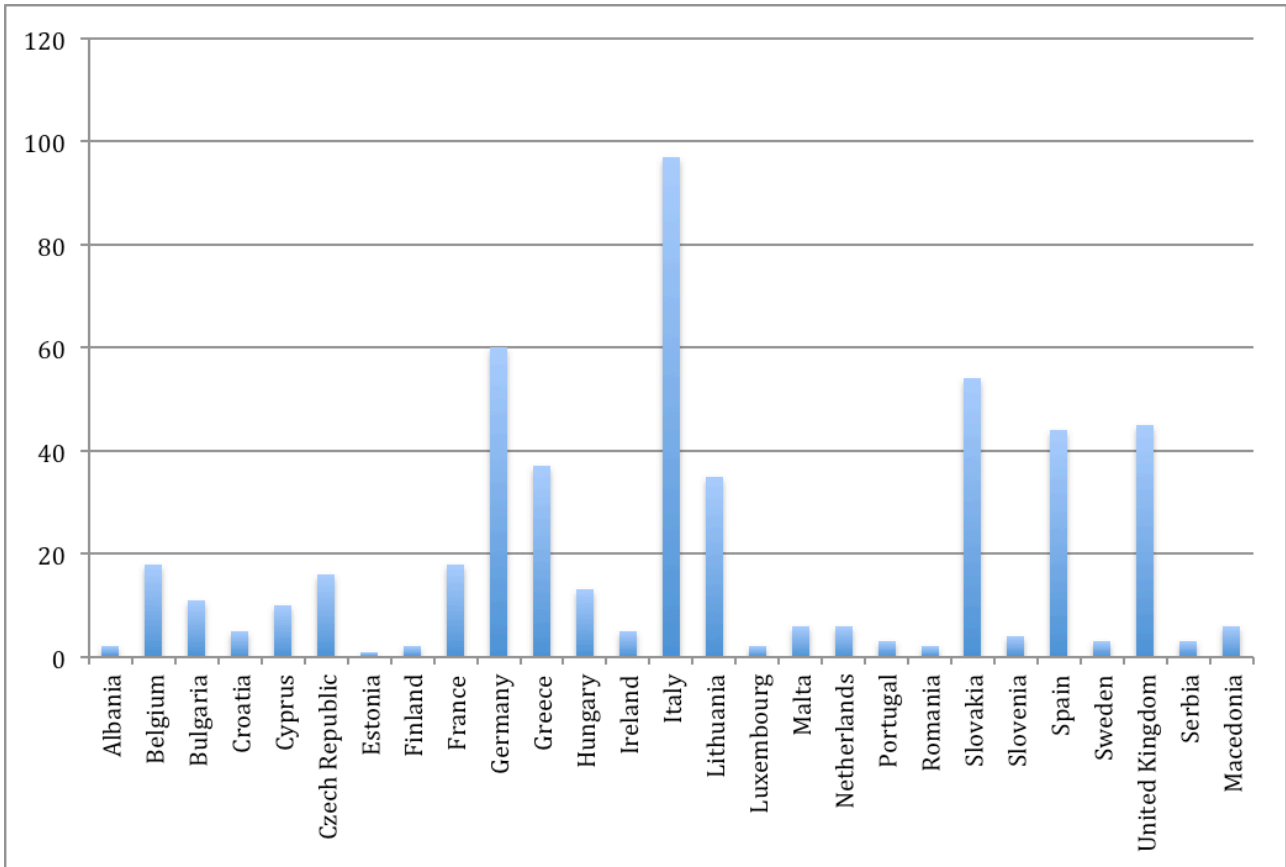
Figure 7 – smeSpire Network Country-Based Graphical Representation

Type	Network members (# SMEs)
SME	406
LE	4
Public body	32
Individual professional	27
Research & Education	33
Association, NGO, No profit organization	8
non-SME	14
total	524

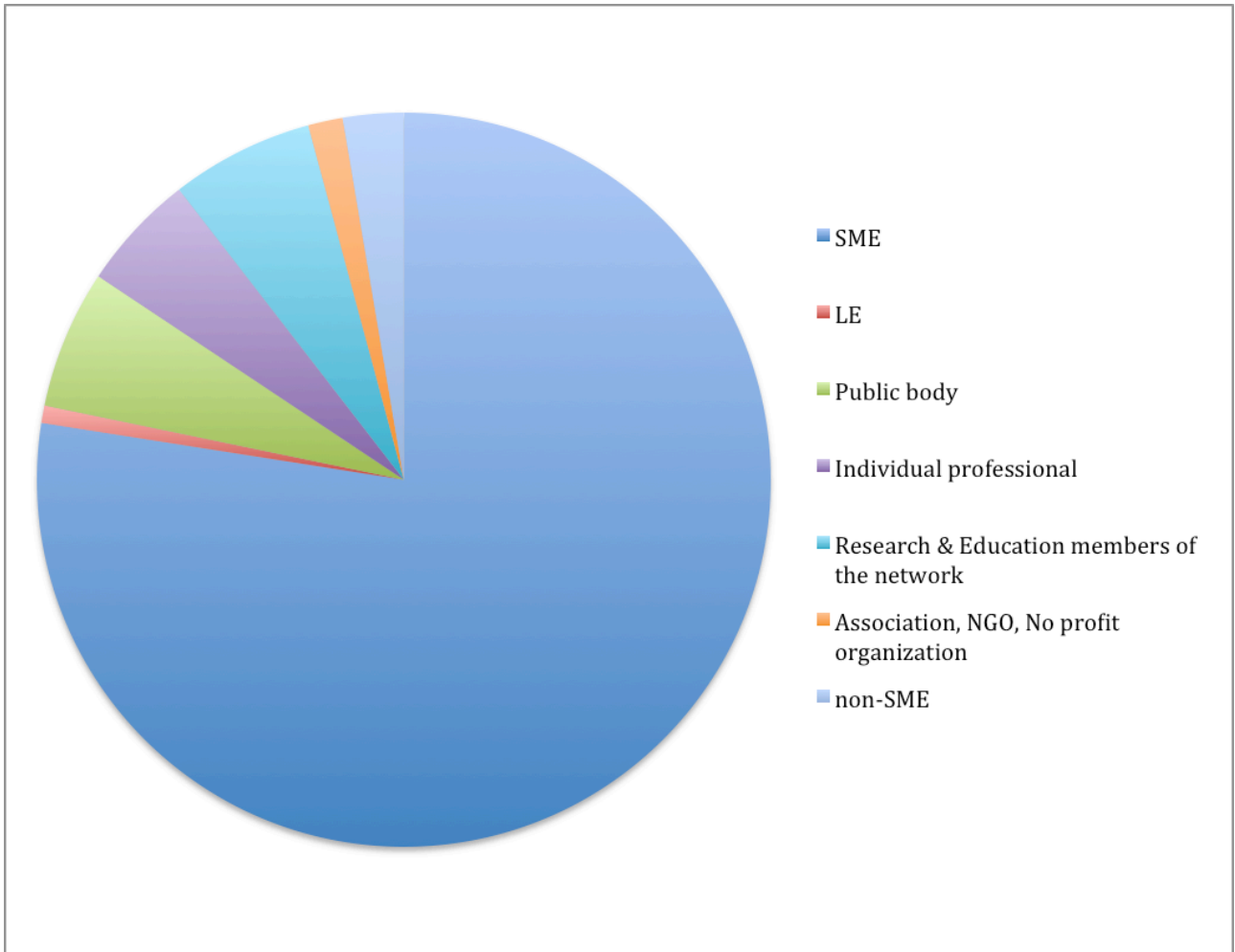Figure 8 – smeSpire Network Type-Based Table

Figure 9 – smeSpire Network Type-Based Graphical Representation

8 Recommendations for smeSpire Database Exploitation

Exploitation of the project results will be the main activity that will continue after the project natural end. The complete exploitation strategy has been reported in the deliverable D4.2.1 and 4.2.2 but, in this chapter, a set of recommendations focused on the database are reported.
Improvements can be identified in three different categories:

1. Database structure;
2. Information accessibility and discovery;
3. smeSpire Network exploitation.

8.1 Database Structure

The online survey conducted during the WP1 allowed the smeSpire consortium to get information that was used as input for the creation of the deliverable D1.1 – Study Report Guidelines.
For privacy reasons, this collected information has not been included in the current version of the database and its structure was designed focused on public domain data.
Allowing the smeSpire Database to store and manage this information, more advanced business analysis could be performed.

8.2 Information accessibility and discovery

Related to the previous database structure improvements, information accessibility and discovery can be improved allowing stakeholders with different user profiles to execute and visualize results of the new business analysis queries defined in the previous section.
Another important improvement can be achieved presenting results not only in a tabular way but, based on the executed query, in a graphical way whenever applicable.
Exporting data in XLS format could allow user to merge queries results with its own datasets to create new information.

8.3 smeSpire Network exploitation

Knowing the contact details and the profiles of a large amount of small and medium enterprises focused on vertical domains can be of great importance for other Geo-ICT related European and commercial projects: the smeSpire Network can therefore be involved to launch a set of questionnaires that will be used to get feedback, suggestions and opinions, or disseminate/exploit project results through the use of the smeSpire other communication channels.

9 Conclusions

In this document the activities related to the smeSpire Database performed within Task 4.2 during the two years project duration have been reported.

The complete structure that was designed for the SmeSpire Database has been reported and explained.

The exploitation strategy used to exploit the results achieved so far was to create a web application, called SmeSpire Database web application, enabling the different users to explore and manage stored information regarding the members of the smeSpire network.

In the chapter 5 a set of use cases have been formalized and reported, describing the set of actions and rights that each kind of user: Anonymous, Registered and Administrator is allowed to complete.

The integration methodology with the Best Practice Catalogue web application and the Training Platform web application has been reported in chapter 6.

Statistics on the registrations time series and on the composition, both in terms of country and typology of organization, have been presented in chapter 7.

It has to be pointed out that one of the most important results achieved during the database design and implementation, even though not required in the DoW, is the adoption of the core vocabularies (to describe people, locations and business information) of the ISA Programme. This achievement is complemented by the dedicated new functionality implemented in the web application, allowing the network members to export in rdf format their company profile compliant with the above mentioned core vocabularies.