

# Project “egov\_INNO”

“E-government services and tools from regional governments and regional development bodies to support and coordinate the regional research and innovation capital”

## Innobarometer System Architecture

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## ***1. Introduction***

### **1.1 Purpose**

The “Innobarometer” is an on-line platform that collects information about entrepreneurship and innovation, to be used for the construction and presentation of indices regarding the region of Western Greece and Apulia.

Innobarometer focusing on the collection of questionnaires from SMEs within two regions and on including several data from various sources in the EU and in two countries.

After the feedback coming, innobarometer is expected to provide important benefits for the two regions as follows:

- important mean for the two regions to help them on the effort to support entrepreneurship
- support efforts to evaluate regional business support policies
- support the regional chambers of commerce on their need to be able to measure the business needs in the covered areas
- provision of a new way to enhance R&D activities in the field of innovative entrepreneurship in the two regions
- provision of information services for the general public and local SMEs in respect with regional innovation potential and experiences.

## 1.2 System Overview

It includes the following functionalities:

- (a) an online questionnaire to collect periodical feedback on entrepreneurship and present important information based on it,
- (b) automated and semi-automated collection of information on entrepreneurship and innovation indicators from various sources (e.g. Eurostat, national statistic organizations, EC),
- (c) extract of useful information, indicators and graphs based on the collected data from b),
- (d) a repository of good practices on e-tools for entrepreneurship support. Users will be able to view the progress of selected indices over time at an aggregated level (in both table and graph format) or view selected indices at a particular point in time (in both table and charts).

## 2. System architecture and functionalities

### 2.1. General overview

In software architecture, there may be many layers between the hardware and end user. The front is an abstraction, simplifying the underlying component by providing a user-friendly interface, while the back usually handles business logic and data storage. Innobarometer is composed of a MySQL database, the backend and the frontend and a Linux OS server. The server hosts the application, the database stores application's data, the backend communicates with the server for each request and the frontend presents the

information to the user. Innobarometer has developed with different user permission levels. For each logged in user provides different and specific functionalities.

## 2.2. Database Design

Innobarometer uses one MySQL database to store the information into tables. For collection of information on entrepreneurship and innovation there are multiple tables. For each data, with various indicators, there is one specific table with elements depending on the source. For the questionnaire the table structure is given from the LimeSurvey library, that is used for the survey.

## 2.3 MVC Architecture

The Model View Controller (MVC) is a software design pattern commonly used for developing user interfaces which divides the related program logic into three interconnected elements. This is done to separate internal representations of information from the ways information is presented to and accepted from the user. This kind of pattern is used for designing the layout of the page.

**Model** : The central component of the pattern. It is the application's dynamic data structure, independent of the user interface. It directly manages the data, logic and rules of the application.

**View** : Any presentation of information such as a chart, table and content. Multiple views of the same information are possible, such as a bar chart for management and a tabular view for accountants.

**Controller** : Accepts input and converts it to commands for the model or view.

Besides the division of the application into these components, the model view controller design defines the interactions between them.

-The model is responsible for managing the data of the application. It receives user input from the controller.

-The view presents the model's data to the user in a particular format.

-The controller exists between the view and the model, responds to the user input and performs interactions on the data model objects. The controller receives the input, optionally validates it and then passes the input to the model.

## 2.4. Roles and Permissions

Innobarometer has multiple user roles with different permissions per user. There are four main roles.

- Admin users have full access to all functionalities.
- Region users have access to Inserts, Exports, Charts, Questionnaire, Repository.
- Chamber users have access to Exports, Charts, Repository.
- Researcher user has access to the Repository.

## 3. Software Description

### 3.1. Software Elements

**Server** : The application is implemented and hosted in a Linux OS server with proper configurations.

**Database** : App is composed of a MS SQL database to store application's data. MySQL is an open-source relational database management system (RDBMS). The design of the database is based on tables and relations between them, depending on the needs. Different tables have been created to store specific data collection.

**Backend** : For the development of the backend part we use the Laravel PHP web development framework. Laravel is a free, open-source PHP web framework, created by

Taylor Otwell and intended for the development of web applications following the model view controller (MVC) architectural pattern and based on Symfony. The whole application for the back-end part is written in PHP general-purpose scripting language.

**Frontend** : The frontend consists of the logged in and non logged users area. Frontend provides specific functionalities, depending on the user's permission level. We use Bootstrap Framework and programming languages such as HTML, CSS, Javascript for development. Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS and (optionally) JavaScript-based design templates for typography, layouts, buttons, navigation, and other interface components.

**Libraries** : For the purpose of the project we use some libraries. To present our data into tables format we use the Tabulator JavaScript library. Tabulator allows us to create interactive tables from any HTML Table, JavaScript Array, AJAX data source or JSON formatted data. For the purpose of the questionnaire we use the LimeSurvey Open Source tool for online surveys. To present our data into charts we use Chart JS library. Chart.js is a Javascript library that allows designers and developers to draw all kinds of charts using the HTML5 canvas element.

## *4. Application Functionalities*

Innobarometer provides many functionalities to the user. We present in short all of them.

- Insert data from various sources with specific indicators stored in different tables.
- Export data, presentation in table format and the ability to export and download whole information.
- Charts in some of the tables, to present useful graphical information to the user.
- An online questionnaire to collect periodical feedback on entrepreneurship and provide important information.
- A repository of good practices on e-tools for entrepreneurship support.

In the next chapter we analyse further all functionalities.

## **4.1 Inserts**

Innobarometer collects information from five main sources, AADE, Eurostat, Arti, Regional Viewer and Ekthete. From these sources we have selected specific data and indicators that provide useful information about entrepreneurship. So each of this source is separated into different data tables. Some of them are in Eurostat "Population region", "Gross domestic product", "Employment (thousand persons)". Using the "Inserts" function, the user is able to import data to a database in two ways. The first way is with a file, and the second through Web Service API, in case the source provides API.

## **4.2. Exports**

Using the "Export" function, the user is able to see the whole imported data for each table. To present this information into table format we use Tabulator JavaScript library. Each table has columns with indicators that provide useful information. For each column there is a search bar that lets the user search with specific criterias depending on their needs. Also the user can export and download this information in various formats.

## **4.3 Charts**

Innobarometer also provides some of this information in graphs. To present these charts we use the Chart JS library. For each data table we can create additional graphs with useful information.

## **4.4. Questionnaire**

For this purpose we use the LimeSurvey library. Lime Survey is an open source online survey tool to create online questionnaires. We host LimeSurvey on the application's server. This online questionnaire collects periodical feedback on entrepreneurship and presents important information based on it. However, we gather responses in a natural way with printed format.

## 4.5. Repository

In this function logged in users are able to upload useful files with good practices on e-tools for entrepreneurship support. Besides that, the general public, users that are not logged in, will be able to view the repository's files and the progress of selected indices over time (in both table and graph format) or view selected indices at a particular point in time (in both table and charts).