

# BiGS – GuíaSalud Intelligent Library

## Analysis of needs

### Scope and Objectives

Health Sciences Institute in Aragon (IACS) has planned a Public Procurement of Innovation (PPI) whose objective is the evolution and improvement of the GuíaSalud website, through the use of new technologies.

This project consists of the complete and fully functional development of a renewed website for GuíaSalud with a user-centered visual design and tools for intelligent analysis of semantic data. In short, it is a functional website for the various stakeholders and interest groups of GuíaSalud (professionals, patients and the public, Clinical Practice Guidelines and OPBE developers, management bodies and management other collaborators) able to provide:

- Access to scientific information to support evidence-based decision making (DBE).
- Introduce the possibility to browse and compare between the different contents offered in GuíaSalud.
- Platform for the inclusion of Clinical Practice Guidelines (CPG) in the Catalogue and for the more intuitive CPG Public Exhibition.
- Integrate new areas for effective teamwork (ATC) within the GuíaSalud website.
- Complete integration with a new platform for online training.
- Efficient administration of the contents by the technical staff of GuíaSalud (Catalogue management and various products, dissemination, etc.).
- Concrete information on demand by the user through an intelligent search engine.
- An independent APP (standalone) where the intelligent search engine has the leading role and the possibility of accessing the contents in a simplified way.

The development of this innovative web will generate the opportunity to put in the hand of different users evidence-based information and also the possibility to interact, compare, share and work in teams.

The project can be divided into five interrelated work packages that make sense once connected and consolidated:

**WORK PACKAGE 1. Analysis and prototyping:** Definition of optimal web architecture, objectively improving the user experience.

**WORK PACKAGE 2. Content management:** Development and implementation of semantic web, fully adaptive (responsive), integrating all information and modules, both the current GuíaSalud website, and future.

**WORK PACKAGE 3. Integration, semantic web and data exploitation:** Adaptation of the entire GuíaSalud document management system (from the current website or different sources) to data models that propose an efficient solution (documents, graphs, hybrids, etc.) to build the core of the new semantic web.

**WORK PACKAGE 4. Intelligent search engine:** Based on Natural Language Processing (NLP) that works on all the content available in the GuíaSalud website.

For the entire project, the estimated budget is: €79,000 (excluding VAT). However, proposals that exceed the estimated value will also be accepted.

This activity is carried out within the Ministry for Health, Social Services and Equity funding framework for the development of activities in the Annual Work Plan of the Spanish Health Technology Assessment (HTA) Network.

## Work Packages

The new GuíaSalud website is an innovation as a whole. The main disruptive element is the incorporation of artificial intelligence techniques, machine learning and language processing. All work packages composing the project will use innovative methods that ensure the highest quality:

**Prototyping and web architecture** will focus on the user, capturing the evolution of people in their ways of interacting with the web rises new patterns in design, digital content and their ordering. In this scenario it is key to perform a usability tests and user experience (UX) analyses.

**Adaptation to semantic web**, which provides a greater approximation between the user and the machine, making processes such as validation of materials, feedback reports or teamwork adapt to the user's thinking and maximize their efficiency.

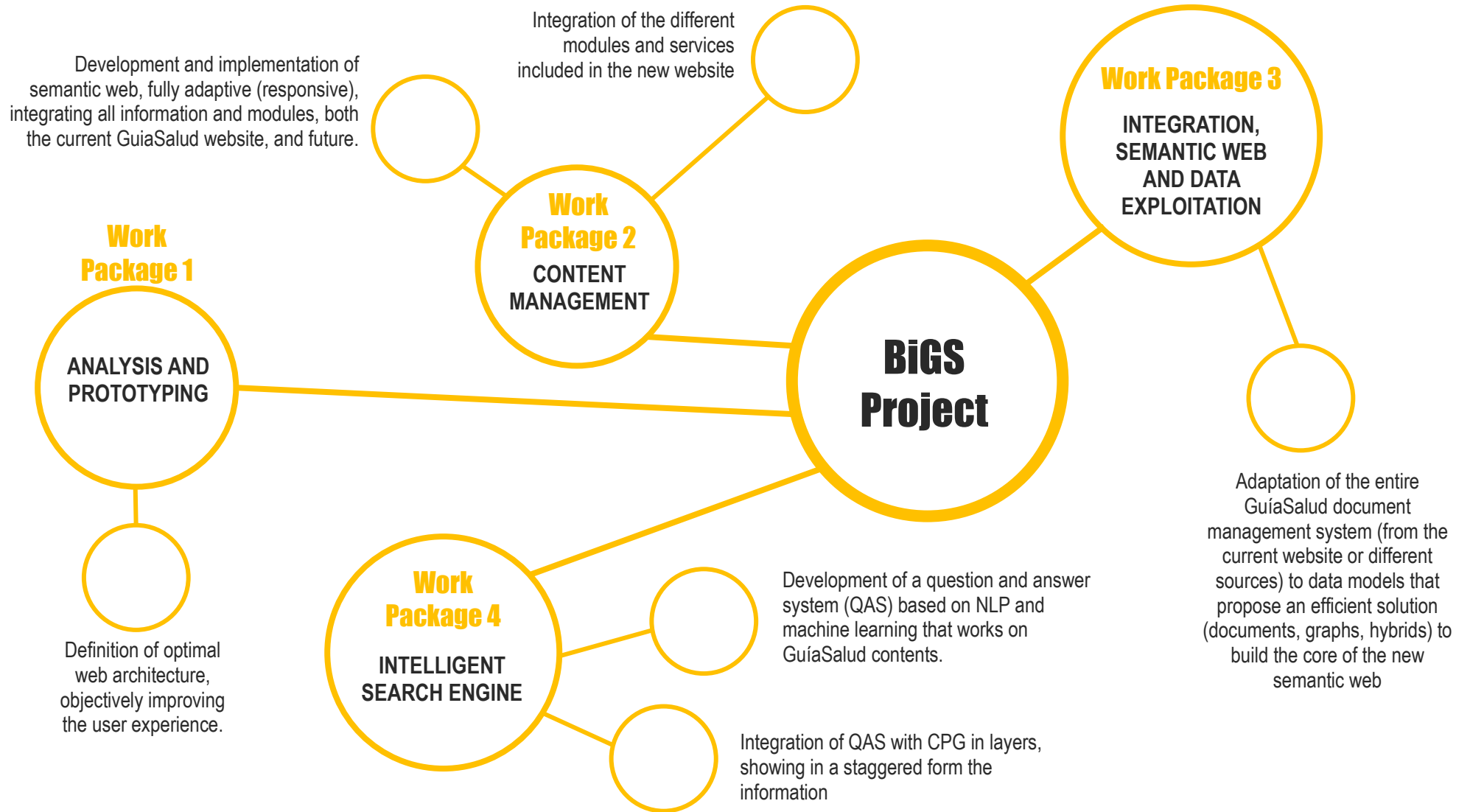
Creation of a **semantic database with all the information units in GuíaSalud**, using a classification system proposed from GuíaSalud, with a format that allows the development of a smart search engine and is capable to learn. This database will be the "brain" of the whole system, giving the possibility to access concrete contents and compare different materials.

The development of an **intelligent search engine using natural language processing (NLP)** techniques is expected to be one of the main features of the new GuíaSalud website. It is a system that can accelerate access to evidence-based content more accurately, since the system enriches the quality of search results through both user-driven learning and machine learning.

Assembling all these parts into a new GuíaSalud website has a potential impact on the accessibility of information on health, efficiency and quality of care. More specifically, the intelligent systems to be implemented can improve decision making processes, both from a professional and a patient point of view. Therefore, the new GuíaSalud website is a valuable and innovative element in itself, consolidating even more as the reference portal of evidence-based content in Spanish.

# Work Packages

## BiGS Project



## GENERAL REQUIREMENTS

In addition to the specifications detailed below in this document, it will be generally valued:

- No significant recurring costs on post-installation licenses or specific maintenance fees.
- Modules that are integrated in the GuíaSalud website should have access to the user's database to conform an ecosystem.
- Future maintenance plan, support and training for the GuíaSalud website team.

## WORK PACKAGE 1. Analysis and prototyping: Definition of optimal web architecture, objectively improving the user experience.

### Usability goals:

To maximise user performance (success of tasks, duration of task, reduction of errors, maximize efficiency).

Minimization of problems / errors

### Main needs:

#### - User-centered prototype.

- Analysis and improvement proposals to optimise the user experience.
- Based on the objectives and GuíaSalud user profiles, statistics of use, and target audience, to elaborate a proposal based on a novel semantic web.
- Emphasis on aspects such as accessibility, utility and user interaction.
- Test with real users that correspond to the potential user profile of GuíaSalud.

#### -To make the site map.

- Restructuring of site contents
- Wireframes, mockups and prototypes development, sufficient for the subsequent implementation.

#### - Visual design. High-fidelity prototyping.

- Adapted to different platforms and devices (computer, smartphones, tablets, etc.).

## WORK PACKAGE 2. Content management: Development and implementation of semantic web, fully adaptive (responsive), integrating all information and modules, both the current GuíaSalud website, and future.

### Positioning Goals:

To maximise number and efficiency of visits .

To optimise SEO

To maximise website quality and credibility index (Page Authority, Domain Authority, others).

To maximise social networks interactions.

To update and enhance brand image.

Goals for efficient management of GuíaSalud website. New system to reduce number of tasks and duplications in:

Management of different user profiles.

Introduction of dynamic content.

Management of different formats of contents.

Internal Processes (CPG Catalogue Management and Public Exposure)

Goals for operability and interoperability of GuíaSalud website:

New areas for shared work (ATC).

Access from other systems

### Main needs:

- Web development that incorporates all the functionalities and behaviour required by the previous phase.

- Adaptive (responsive), for any device.
- SEO optimisation fully developed for all pages.
- Compliance with all applicable existing regulations (for example that regarding accessibility or personal data protection).
- Social Networks integration
  - ♦ Possibility of interaction, sharing content in social networks.
  - ♦ To integrate social network content in the website.
- Dynamic content templates (news, events, etc.).
  - ♦ Simple content introduction.
  - ♦ Check dates usage.

- ♦ Synchronisation with the calendar.
  - Forms for different services or procedures
  - Modular and scalable system architecture.
  - ♦ Open source, interoperability: Possibility of evolutionary maintenance that adapts to future needs.
  - ♦ Easy and intuitive management of system contents (administration, updating, forms, etc.).
- Integration and configuration of Google's statistics service.
- New ways to for communicating with users
- Newsletter (or new concepts of periodic diffusion) with dynamic content (i.e. RSS).
  - Modifiable manually (static information input).
- System for user profile accounts with different authorizations, accessible from all modules to be integrated.
- Flexible, cross-platform ATC integration.
- Task manager format: Quick visualization of projects in which the user participates.
  - Possibility to set dates for reminders and notifications via email.
  - Possibility PDF, images, documents and spreadsheets attachment.
  - Possibility to integrate with Office Online to modify documents and spreadsheets, introduce of comments, etc.
  - Availability of a messaging/notes/comments system between users of each project.
- Module for CPG Catalogue management.
- New application form for CPG inclusion in the Catalogue for CPG developers with the possibility of attaching documents.
  - Possibility for the data entered in the form to be turned over to the GuíaSalud database and CPG metadata, to speed up its revision and completion.
- Module for hosting an e-learning platform based on gamification.
- Updated module for CPG Public Exposure.
- New registration form for interest groups (GI) more effective, where statement document can be attached. Possibility of electronic signature support.
  - Online space for the IG to be able to provide comments on CPG during the Public Exposure phase.
  - Module where all the comments made on a CPG by the GI and the GEG's are stored, as a list where the users can filter by CPG, GI or part of the CPG to which the comment refers.



**WORK PACKAGE 3. Integration, semantic web and data exploitation: Adaptation of the entire GuíaSalud document management system (from the current website or different sources) to data models that propose an efficient solution (documents, graphs, hybrids , Etc.) to build the core of the new semantic web.**

Goals for information integration:

To organise the information more efficiently

To maximise information units integration.

**Main needs:**

- Adaptation and incorporation of semantic content to GuíaSalud website.
- Integration of information sources throughout the website: Database (BDA).
  - - Integration of the different information units (CPG within the CPG NHS Programme Framework, CPG from the Catalogue, OEBP, “Do not do” recommendations, Methodology).
  - Flexible system with possibility to incorporate other sources of information with different formats (Health Technology Assessment reports and "do not do" recommendations) and languages (English).
  - Content classification system structured and adapted to GuíaSalud needs, able to learn how to classify new contents that are introduced in the system, classification by meaning and not by textual content.
  - Effective internal search engines that ease information units management, using boolean operators and filters by ID Number, GPC status, etc.

## WORK PACKAGE 4. Intelligent Search Engine: Based on Natural Language Processing (NLP) that works on all the content available in the GuíaSalud website.

### Search goals:

To maximise capability for resolution of specific decision-making situations.

To maximise number of searches considered effective.

To maximise the degree of coincidence with respect to search queries.

### Main needs:

- Buscador inteligente basado en tecnologías del lenguaje (modo asistente).

- The system must understand questions and queries formulated in both natural and simplified language.
- It must be able to support queries made by voice and enable voice responses in these cases.
- It should be able to identify and understand queries made in Spanish (from Spain and Latin America) as well as in English.
- The search engine must be able to trace objects, as well as texts, images or diagrams within the information units to provide more accurate responses.
- Must offer content extraction (responses) in two non-exclusive formats:

**Direct and concrete extraction**, based information units available in the GuíasSalud website (Clinical Questions and recommendations from CPG within NHS Programme, CPG within NHS Programme and its different versions, CPG from Catalogue, OEBP, "do not do" recommendations, etc.).

- ♦ Responses offered must be adapted to the user who carries out the consultation (patient or professional) if there is a version of the CPG for different profiles.
- ♦ Questions should be answered in the same language as they are formulated, although more detailed contents (i.e. Full text CPG or Health Technology Assessment Reports) will be displayed in the original elaboration language of (Spanish or English).
- ♦ It should, if appropriate and content is available, respond explicitly, for example, in the case of quantitative variables.
- ♦ If necessary and applied to the question, the system could graph the information in a way that produces a more visual response to the user.
- ♦ Interoperability of output data, ability to copy, export, share, etc..

- ♦ If the response offered comes directly from a CPG recommendation, the strength of the recommendation (strong or weak) should be indicated.
- ♦ Search results should indicate where the extracted content comes from (what part of the CPG, what CPG, what specific material for patients, etc.).
- ♦ It should be correctly integrated with the layered CPG format, with the possibility of having information about the context, relevant clinical considerations and more information.

**Reference Retrieval** to the most significant information units that match the search query.

- It must identify the status of the information retrieved; GuíaSalud products have an expiration date.
- In general, it is necessary that the information retrieval allows the user to filter as in a faceted search engine: a) in which kind of information source the search is done (CPG, “do not do” recommendations, time limits, etc.); b) what type of information is displayed (text, images, tables, etc.).
- Possibility of searching by information units based on their content, according to the classification system determined by GuíaSalud in the previous steps.
- It must allow the interaction of the user on the validity of the response provided, indicating whether it was useful and adequate.
- According to all user interactions, the search system must be able to learn both to identify the type of user and to offer better answers according to the query (machine learning).
- Signed-up users in GuíaSalud website must be able to have a search history and store contents of interest (favorites, read later, etc.).
- Must have an evolutionary maintenance for adaptation to the needs that may arise (incorporation of new contents, documents with different formats, different languages, etc.).

- Standalone APP as QA assistant, which facilitates access to response and original contents retrieved in a simplified way from any device.