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Case study in Health industry for early stage innovation

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Abstract: This paper outlines a Technology Foresight (TF) process, an ICT platform to support it and their validation in a case study. TF is a systematic and participative process, based on the accumulation of intelligence which main objective is to provide organizations and territories with visions about the future that ease strategic and innovation planning. The platform provides 1) a collaborative environment for TF experts, 2) a data integrator and common repository from heterogeneous sources, 3) a module for automatic key indicator extraction and 4) dashboards to support report creation. Key indicator values are obtained from Open Data sources: technical (academic publications and patents), economic and social. The TF process and platform are identified as a key tool in the M4Future, innovation model of Mondragon Corporation. The context selected for the case is in the health sector and the companies involved Oiarso (client, disposable medical products) and Prospektiker (TF provider), both companies from Mondragon.

Keywords: Technology Foresight; Strategic Innovation, Intelligent Platform; Key indicator extraction; Decision support; Open Data; Dashboards; Health sector's case study;

1 Introduction

Technology Foresight (TF) is a systematic and participative process, based on the accumulation of intelligence which main objective is to provide organizations, territories and firms with visions about the future that ease strategic and innovation planning. The process includes the identification of breaking trends, relevant key indicators and sources of information, the participation and collaboration of experts on the analysis of data and the generation of reports offered to clients to support their strategic and innovation management.

Some of those tasks in this process are repetitive and tedious for the TF provider. The amount of time spent on some stages is high and could be automatized and optimized. Starting a TF process implies the activation of surveillance mechanisms and the creation of alerts for the object of the study. The process requires to manage enormous quantity of data. The size and the complexity of the datasets, and the heterogeneous nature of information from different data sources add complexity to the tasks. All these information need to be gathered and processed/analysed to derive knowledge and support decision-making. TF experts demand tools for that analysis. At the end of the process, reports must be created and offered to clients. These reports must be customized and take time and effort. The process has to be dynamic and collaborative for both the TF providers and the clients.

This paper presents a process and a platform to address these problems. The work is aligned with Mondragon Corporation[1] initiative M4future and has been sponsored by the Basque Government (GAITEK[2] programme) under the name INNES, INtelligence for Strategic INNovation.

This article describes the research work and the results for INNES. These are the definition of the Technology Foresight (TF) process followed, the platform to support it and the validation of both in a case study. A case study on the health sector was selected to test the process and the platform.

The structure of the article is as follows. A description of the research context is presented first. After that, the Technology Foresight process approach followed and the description of the case study are outlined. Next the platform and its characteristics are described. Preliminary results obtained in a contrast meeting with companies from Mondragon Corporation in the Health sector are presented. Finally, conclusions extracted from the implementation of the approach are included.

2 Research context

The work presented in this paper is part of Mondragon Corporation´s M4future initiative. Mondragon Corporation is the top Basque business group, seventh in Spain and a global

[1] Mondragon Corporation. *Basque Business group with cooperatives in four areas: Finance, Industry, Distribution and Knowledge,* http://www.mondragon-corporation.com/, accessed April 2015.

[2] GAITEK *Basque government Programme for projects oriented to new products and services* https://app3.spri.net/ayudaspri/paginas/ficha.aspx?idprograma=501, accessed April 2015.

benchmark for cooperative. With 256 sites, 94 foreign production plants and 9 corporate offices, this business group works in the areas of Industry, Finance, Distribution and Knowledge.

Since its origin, Mondragon has had an innovative nature. It is clearly stated in it corporate philosophy and is one of its corporate values. As result of recent developments, a new corporate innovation model based on interrelationship, cooperation and knowledge sharing between professionals with different profiles has been established: M4Future[1].

M4Future is the Innovation-Development-Knowledge integrated corporate model of Mondragon Corporation that works to turn innovation into an economic growth driver. The objective is to create employment in strategic sectors and to introduce innovation in products, services, business models and markets, always applying corporative basic principles and values.

M4Future governance team leads the model through the whole innovation process and monitors suitable relationship between the different parties involved in the work programmes. Three committees (IPC – Executive Committee, ESC-Steering and empowerment Committee and ISC-Innovation Support Committee) lead the operative innovation process, comprised of the Innovation, Steering and Empowerment and Innovation Support Cycles, For each cycle, processes, methodologies and tools have been defined

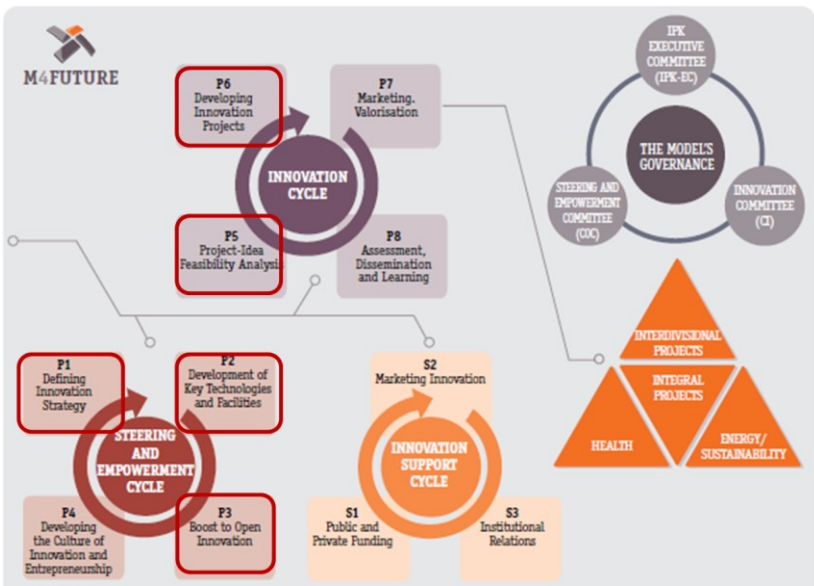

Figure 1 M4Future, Mondragon corporative Innovation model.

M4Future main processes are represented on Figure 1 and outlined next:

- P1-Defining Innovation strategy: contributes to business transformation.

[1] M4FUTURE. *Innovation Model of Mondragon Corporation business group.* http://www.mondragon-corporation.com/responsabilidad-corporativa/modelo-innovacion/, accessed April 2015.

- P2-Development of key technologies and facilities: identifies and develops technologies, knowledge and mechanisms for training and equipping companies.
- P3-Boost to Open Innovation: establishes alliances and promotes idea generation processes.
- P4-Development of a culture of innovation and entrepreneurship: generate context and suitable mechanisms for encouraging a culture geared to innovation and entrepreneurship.
- P5-Project idea: Provides feasibility analysis of ideas to obtain sustainable competitive advantages.
- P6-Developing Innovation projects: implementation, monitoring and validation of priority projects, and the factors that determine their success for commercialisation.
- P7-Commercialisation Valuation: Design and validation of the business model and corporative structure for evaluating implements innovation projects.
- P8-Evaluation of the results, dissemination and training: develop specialised knowledge through sharing practical experience.

Mondragon Corporation identified that for P1, P2, P3, P5 and P6, Technology Foresight is a key element. Technology Foresight is a systematic process that analyses the current state and the prospects of scientific and technological progress to identify strategic areas of research and emerging technologies where to focus investment efforts and thus obtain the greatest economic and social benefits. The aim of the Technology Foresight is to facilitate decision-making.

Aligned with the initiative M4future, a group of cooperatives decided to launch a project that would research on the possibilities to enhance TP. This project was led by Prospektiker[1], ISEA[2] and University of Mondragon[3] (onwards MU). The main characteristics of the organizations involved in the research group are:

- Prospektiker (1987) is an independent company, which specializes on foresight and Foresight strategic studies to detect innovation, ideas and facts that may be considered portenders of the future. To discover strong tendencies, impacts whose effects penetrate every level of society and the commitments and to take on the role of sentry over the many economic, technological, social and cultural factors to change, identifying key problems for the future, as well as strategies that may be adopted to confront these problems. Prospektiker leads INNES project and is part of the case study.

[1] Prospektiker, *Company specialized on foresight and Foresight - strategic studies for the public and private sector in Mondragon Corporation,* http://www.prospektiker.es/ accessed April 2015.
[2] ISEA. *Innovation and entrepreneurship Centre, specialized in the Services Sector*. *Technology*. http://www.iseamcc.net/, accessed April 2015.
[3] Mondragon, University of. *Faculty of Engineering, University of Mondragon.* http://www.mondragon.edu/en/phs/, accessed April 2015.

- Innovation in Advanced Business Services ISEA S. Coop is a private and non-profit innovation and entrepreneurship Centre, promoted by the Division of Engineering and Business Services of Mondragon. The mission of Isea is to improve the competitiveness of this sector by empowering Technological Development, Innovation and Entrepreneurship of new business activities.
- MGEP-MU-MU is the Higher Polytechnic School of Mondragon University, i.e. the Engineering Faculty. The three main activities are Teaching Engineering, Training to the industry and Research. Its research model allows us to achieve scientific levels of excellence, developing a collaborative strategy with companies, where mutual confidence and objectives multiply the efficiency of resources. In this sense, the technological transfer and innovation continue to be a differential factor of MU.

The research work started in 2012. The project was sponsored by the Basque Government in 2013 under the name INNES and the objectives defined for the project are:

- Analyse the TF and identify in which phases of the process ICT solutions will provide support by means of increase collaboration, reduce time and automatize certain tasks.
- Provide a common platform where to accommodate the solutions identified.
- Specify a taxonomy for health technologies and concepts through existent vocabularies and knowledge databases.
- Test/validate the overall solution with a real case study

3 Technology Foresight Process

TF is used in the management of Research and Development (R+D) to support investment decisions in technology and together with the technological surveillance form part of the Technology Watch System of a company. As reflected in the norm UNE 166006:2006[1] Ex Management of R+D+innovation (Technology Watch System), a Technology Watch system is an organized, selective and permanent process, to capture information from outside and inside the organization about science and technology. All of this in order to select, analyse, disseminate and communicate the information, and to turn it into knowledge, making decisions with less risk and anticipating change. This way, Technology Watch and TF represent key tools in the R+D+i process.

The information that must be watched comes from different domains and formats:

- Patents, utility models, industrial designs.
- Legislation and Regulations.
- Socio-economic situation in target countries.

[1] UNE 166006:2006 *R+D+i Management: Technological Watch System http://www.aenor.es/aenor/normas/normas/fichanorma.asp?tipo=N&codigo=N0036140#.VUoxWvntmkY,* accessed April 2015.

- Scientific and technical news on specialist journals, and scientific events.
- Doctoral theses and scientific and technical publications.
- Sector news (and other sectors that can have interference with).
- Information on grants and subsidies.
- Products, prices, quality and sale conditions of competitors.
- Trade Shows: emerging industries, new competitors, distribution strategies, new products, etc.
- Direct personal contacts with competitors, suppliers, research centres, universities, etc.

In its simplest form, it is a process of adding value to information, analysing and producing knowledge in an intelligence way (Kahaner, 1997). The most representative associations worldwide in TP, identifies five steps in the process. Those stages can be seen on Figure 2 and are described below:

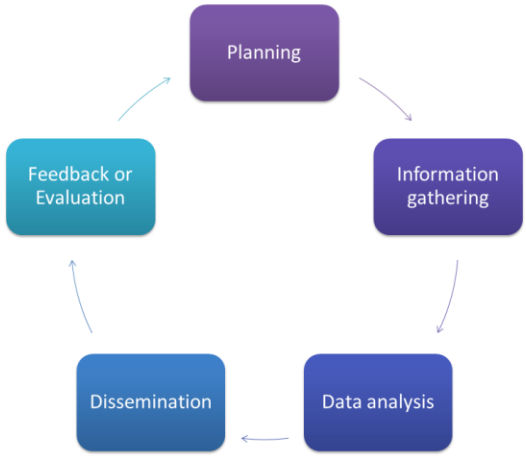

Figure 2 Stages of TF process.

- Planning: work with decision making agents to discover and define the TF requirements.
- Information gathering: includes source identification; keyword or taxonomy definition, search, data access and data extraction.
- Data analysis: data interpretation and compilation of recommended actions.
- Dissemination: deliver the findings to decision making responsible.
- Feedback or evaluation process: taken into account the response of decision makers and gather the new requirements to continue with the process.

4 Case study

The use case selected for the study focussed on the health sector and the companies involved were Oiarso[1]. S.Coop.,as the client for the TF analysis and Prospektiker, as the provider of those services. Both companies are cooperatives from Mondragon.

Oiarso manufactures and sells disposable medical products: enteral, parenteral, gynaecology, ozone therapy and infusion equipment among others. In addition, Prospektiker specializes in Foresight - strategic studies.

Oiarso needed to identify market niches in this area and ask Prospektiker for a Foresight study. Using this context as a reference, but thinking in a global way, an intelligent platform has been built to optimize the process of TF, and to easily generate Foresight reports. This platform should be flexible to accommodate other sectors (energy, manufacturing …) and should be a valid tool where Prospektiker could offer Foresight services to other companies with different needs.

With the Technology Foresight (TF) process in mind, the work of the project concentrated on applying the process to the case study and at the same time identifying which activities were susceptible to be supported by ICT solutions. The TF process followed for the case study is summarised in Figure 3 and is explained in the following paragraphs.

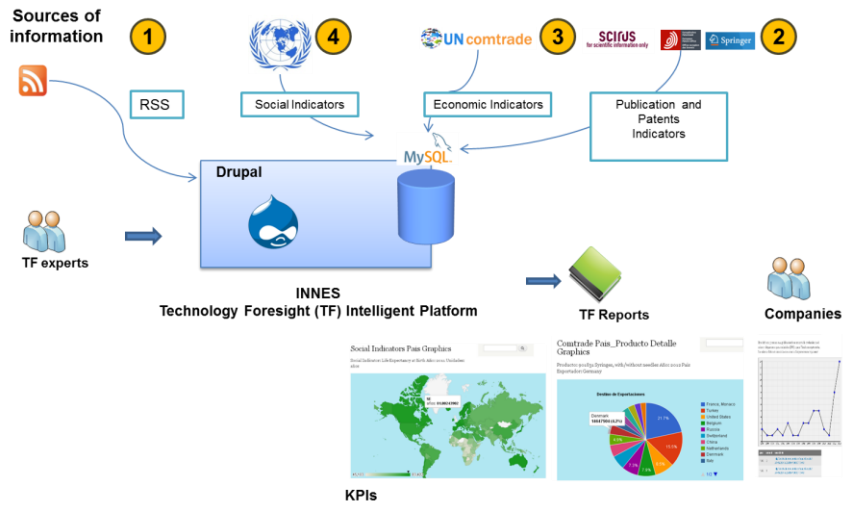

Figure 3 INNES Technology Foresight process for case study

Strategic Foresight Analysis and Definition of Foresight Variables. In this first step, experts from Prospektiker analysed the sector and wrote a report that included the Foresight variables and their description, the most relevant sources of data for the sector and the key terms or vocabulary (taxonomy). These Foresight variables are defined as

[1] Oiarso. *Health sector's company in Mondragon Corporation (Bexen medical products)* http://www.bexenmedical.com/index.php, accessed April 2015.

key factors to be considered for the future evolution of the case study. The variables identified were:

- Demographic trends and aging:, associated with an increased demand for Parenteral Nutrition
- Evolution and growth in the incidence of certain chronic diseases such as cancer, AIDS and Gastro-intestinal disorders (GI)
- Diversification of the portfolio of products of competing companies
- Evolution of software used for the preparation of Parenteral Nutrition in hospitals
- Tendency toward lower homemade medicines, Parenteral Nutrition pharmaceutical laboratories in hospitals, and Standardized Parenteral Nutrition commercially prepared.
- Increased presence of pharmaceutical companies in preparing Parenteral Nutrition, and Multi-cameral products in competitive offers.
- Trend towards automation in the development of drugs in general and specifically Parenteral Nutrition.
- Growth of Home Parenteral Nutrition.
- A list of competitors was also defined.

Experts also identified the terms that synthesizes or represents a particular technological field or domain constituting a taxonomy or vocabulary. The vocabulary was enriched with terms obtained from classifications made by other experts (input from a proven scientific community). The Controlled vocabulary[1] form Engineering Village[2] was used.

During this stage, experts perform most of the tasks with little support from ICT tools, apart from the help of browsers or information search engines.

Analysis of Data Sources and the Technologies for Information Extraction. The actions in this stage were to analyse the data sources identified in the report and to select the technological means to automatically extract value information from them. The main sources of information identified were two; the web sites selected by Prospektiker in the report and Open Data sources that offer data about publications, economics and social indicators. Prospektiker´s report identifies about 50 different data sources and classifies them according to the Foresight variables and the vocabulary. In the report, data sources are tagged with key words.

Open Data sources provide technical data (academic publications and patents) extracted from Springer[3], Elsevier[1], Scirus[2], and Espacenet[3], economical trading information from Comtrade[4] , and social indicators from United Nation´s web portal[5].

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[1] Controlled vocabulary. *One thing lead to another.* http://www.controlledvocabulary.com/, accessed April 2015.

[2] Engineering village. *International academic publishing company.* http://www.engineeringvillage.com/, accessed April 2015.

[3] Springer. *International Publisher editor in Science and Technology*. http://www.springer.com/, accessed April 2015.

The overall objective was to identify and select relevant content from those data sources in the form of news, publications, patents, alerts, links, quantitative data in different formats, competitor information, etc. For the different sources of information, several possibilities to extract information were also identified and later used: Really Simple Syndication (RSS), web-scraping techniques, Application Programming Interfaces (APIs), Extraction Transform and Load (ETL) processes or web services.

Automatize the Extraction of Information the objective in this stage was to extract information from each of those heterogeneous data sources, extract automatically data from external databases. Different data parsers were constructed applying the technologies identified in the previous step.

Two approaches were followed for data collecting. On the one hand alerts or feeds were placed on data sources offering syndication in such a way that when the site announce new content on their premises, a summary of that content reach the technological platform build for INNES. That summary and the link for the original content were extracted.

The other approach consisted on launching queries against data sources to collect quantitative data and links about Foresight variables and the vocabulary build during the first stage of the process. This approach focussed the data extraction in three different areas; publications and patents, economic information (trading) and social indicators.

Figure 4 shows the extraction process followed for publication and patent data. The automatic extraction of data from publications and patents had Espacenet, Springer and Scirus (closed at this moment) as the sources of information. Automatic queries and data extraction considered those rich vocabularies and Foresight variables as search terms. The access to those sources of information is automatic, seeking information relevant to the domain, and extracting large volumes of information. This task performed manually would be a long and tedious process while released as an automated process based on the use of APIs and HTML Scraping techniques, guarantees the availability of large volumes of relevant information. For this first use case, numerical data (number of publications and patents per year, country and term) and direct access to consultations (links to search URL) has been provided.

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[1] Elsevier. *International academic publishing company in medical and scientific literature*. http://www.elsevier.es/, accessed April 2015.

[2] Scirus. S*cience-specific search engine for ScienceDirect Elsevier.* http://www. http://www.sciencedirect.com/scirus/, accessed Sep 2014.

[3] Espacenet. *A free access database of over 90 million patents.* http://worldwide.espacenet.com/, accessed April 2015.

[4] Comtrade. *International Trade statistics database* . http://comtrade.un.org/, accessed April 2015.

[5] United Nation´s web portal, *United Nations International organization*. http://www.un.org/en/index.html, accessed April 2015.

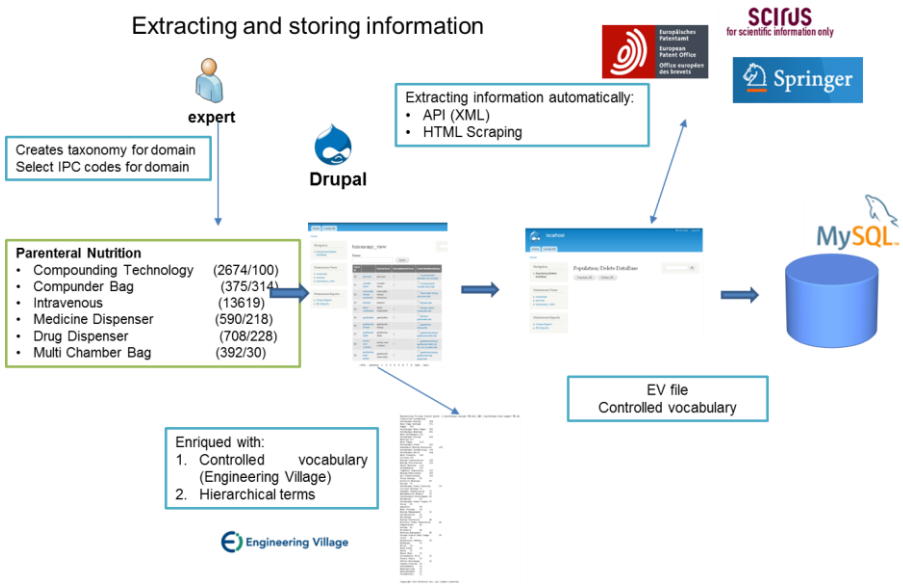

Figure 4 INNES data extraction process for publications and patents

For economic information, the Database Trade Statistics of the United Nations (UN Comtrade) was used as the source of information. Comtrade contains detailed data and statistics on trading reported by the authorities of the 200 countries or trading areas of the world from 1962 to the present. Comtrade classifies products under categories grouped into families (health, food, ...). Some categories are subdivided into more specific subcategories in a hierarchical tree that expands depending on the products. Experts identified the domain for the case study by selecting the codes of products related. For example the code 9018.31-39 associated with "Syringes, needles, canulae, catheters" was selected. The information behind those codes is offered on a website in different formats (web services, database queries or Comma-Separated Value or CSV format). Data in CSV format for those codes was collected automatically from that website through an API and ETL techniques were applied for data extraction into the platform.

The United Nation´s web portal was used for the extraction of social indicators information. This portal offers different indicators classified in many groups; energy, environment, population/demography, health, work, education and housing. For this project, experts selected three indicators; population growth, life expectancy and number of cases of HIV/AIDS detected. Similar to UN Comtrade these data are presented in different formats (extensible Markup Language or XML, CSV…), can be downloaded automatically and latter manage to extract relevant information.

Storage, Categorization and Presentation of Data Information collected form the different external sources needs to be gathered in a common repository where experts and consumers access those data and further explore on them. The objective at this stage was to store, categorise and correctly present data to users. Experts also had an opportunity to organise data before preparing reports to their customers. This stage runs in parallel to the stage of data collection so new content was gathered automatically form the syndicated

data sources. That content was supervised by experts that stored, edited or deleted it according to its relevance with the Foresight analysis.

The approach followed consisted on collecting all data extracted in the platform database. Content was categorised automatically using two criteria. Depending on the data source, information was categorised according to the Foresight variables. A second automatic tagging system was deployed using the vocabulary defined by experts. The system identified terms from the vocabulary in the content and tagged that content accordingly.

Information was presented to users in a website with a friendly interface. Additional tools were offered in the platform to ease content access and management. Mainly a content search engine and a content operation toolbox were provided. The search engine offered filters to find content by category or by term. The content toolbox enables the edition and conversion of data from a specific format to another. For example, new content gathered through syndication was offered as an alert that in some cases was later converted to relevant data with additional information inserted by experts.

Analysis and Publication of Information: The last stage in the process consisted on analysing the information collected and building the reports for the customers and decision makers. Experts accessed data available in the platform and supported by the analysis tools available created Foresight reports. Dashboards were created to support data analysis. Those dashboards presented data related to publication/patent, economic and social indicators in graphs (charts, maps), tables, diagrams and text. Analysts studied those dashboards to extract knowledge from them. Publication of information was delivered to customers through the website, by means of bulletins or through email. The platform enabled the possibility to generate reports dynamically. Analyst used the tools provided to generate reports. Decision makers requested additional reports customized to their company`s needs.

4 INNES Platform

The TF process presented in this paper is supported by a platform that adapts to its needs. The platform provides the following advantages:

- A collaborative environment for TF experts, where experts define key data sources, key taxonomy, alert types and classify relevant information.
- A data integrator and a common repository for content gathered from heterogeneous sources.
- A module for automatic key data extraction from external sources.
- Dashboards to support data analysis
- Tools for data publication and report creation.

The platform has been built on Drupal[1]. Drupal is a powerful open source Content Management System (CMS). One of Drupal´s main assets is its flexibility and

[1] Drupal, *Drupal open source CMS*, https://www.drupal.org/, accessed April 2015.

modularity. Drupal is like a Lego kit. Skilled developers have already made the blocks or modules that Drupal users need to create their sites; news site, an online store, a social network, blog, wiki, or something else (in our case, an TF platform).

Drupal's core includes basic community features like blogging, forums, and contact forms, and can be easily extended by downloading other contributed modules and themes. Drupal also provides a set of APIs that bring the possibility of creating new functionalities programmatically and has a very active community that develops and offers a wide variety of modules.

Several Drupal community modules were used to construct the platform. The most significant ones and their application in INNES are outlined next:

- Feeds[1]: Feeds is a pluggable module for importing or aggregating content into Drupal. Provides parsers to map external content to the formats defined in the platform (Drupal nodes). The module is prepared to accommodate RSS feeds, Atom feeds, OPML files, CSV files and XML or HTML documents. It has been used to accommodate content coming from the external data sources.
- Rules Autotag[2]: The Rules Autotag module takes a lightweight approach for autotagging full-text content by matching taxonomy terms. It has been used to automatically categorise content according to the defined vocabulary.
- Node Convert[3]: Node Convert gives the ability to convert one content type (node) from its current format to another node type. It has been used to convert alerts into valid content for the platform.
- Google Charts[4]: Google Chart Tools module provides a simple API to build custom interactive SVG charts. The API was used by a custom-made module to build dashboards in the platform.
- Forena[5]: Forena is database report writing software built on the Drupal platform. Forena Reports is built of the idea of using SQL to get data out of a database and use XHTML and CSS to format it into web reports. It is designed to leverage existing knowledge of HTML, CSS, SQL and JavaScript to help you create rich interactive web reports. It has been used to create reports.

Custom modules with specific functionalities were also constructed. Several web technologies were applied (HTML scraping and API consumption) to create all the functionalities. One of these modules deals with the massive extraction of data from

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[1] Feeds Drupal. *Feeds module from Drupal* https://www.drupal.org/project/feeds, accessed April 2015.

[2] Rules Autotag Drupal. *Rules Autotag module from Drupal* „ https://www.drupal.org/project/rules_autotag, accessed April 2015

[3] Node Convert Drupal. *Node convert module from Drupal* ,https://www.drupal.org/project/rules_autotag, accessed April 2015

[4]Google Chart Drupal. *Google Charts module from Drupal* „ https://www.drupal.org/project/google_chart_tools, accessed April 2015

[5] Forena Drupal. *Forena module from Drupal* , https://www.drupal.org/project/forena, accessed April 2015

publications and patents data sources. The module automatically creates queries (IPC code, term, year, country …), builds URLs with those queries, sends the query to the source, collects the information provided by the source (quantity and link to source) and stores it in the database. The extraction process takes some time and it is conducted once the Foresight variables, vocabularies and IPC codes are well defined (only once for a specific domain). The other module is a graphical dashboard that presents data in charts and tables. This module uses the Google Charts API to represent data.

5 Preliminary results

INNES has enabled the integration of different services to automate the process of TF into a single platform. The platform provides a common space that eases TF providers monitoring, analysis and reporting tasks and supports decision making of TF customers in the context of innovation.

This platform has been applied in a study in the health sector (parenteral nutrition). Significant information sources have been identified and data from publications, patents, economic and social indicators have been automatically extracted and shown in dashboards.

A survey was conducted to validate the work done. A contrast meeting was arranged and companies from Mondragon Corporation in the Health sector (Mondragon Health[1], Kiro Robotics[2], LKS[3], along Prospektiker and Oiarso) were invited. A demo was developed and showed in this contrast meeting. Each company answered the questions in the survey.

The survey was divided in five different sections. One section addresses the overall evaluation of the prototype and the rest focussed on specific components of the platform. General questions contemplated ease of usage, interest from the company in using the prototype, evaluation of the prototype in relation to the companies work and expected coverage of the intelligence requirements. Five questions related to the objectives of the specific components were also formulated in each section; clear objectives, ease of usage, appropriate functionality, usage of similar tools or processes and a box open to suggest new functionality. Finally, special attention was put in identifying the challenges preventing an agile transferring of the results and the acceleration measures proposed.

In general the evaluation was positive. The benefits of the platform were defined as very useful (maximum score of 5) and easy to use (4 out of 5). Most of the companies declare not to have a tool with similar functionalities and, in some cases, they identified potential new functionalities. For example, to include automatically new terms for surveillance as the system learns about the domain. Prospektiker defined a Business plan for the exploitation of the process and platform.

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[1] Mondragon Health. *New Businness for Health and Healthcare Sectors in Mondragon Corporation.* http://www.mondragon-health.com/?lang=en, accessed April 2015.

[2] Kiro Robotics. *Technology companie that specializes in the automation of machinery for the hospital sector.* http://www.kiro-robotics.com/, accessed April 2015.

[3] LKS. *Management consultancy*. http://www.lks.es/I/AA/CG.aspx, accessed April 2015.

6 Conclusions

The objectives of the project have been achieved. The process for Technology Foresight (TF) and the platform have been designed and developed, automatizing some of the repetitive and tedious tasks. Moreover, a validation of the platform has been conducted by means of a real case study on the health sector.

The process includes the definition of the surveillance objective and Foresight variables, the analysis of data sources and the possible technological ways to extract information from them. The platform provides support in the extraction, gathering and data processing stages to derive knowledge and to create reports offered to clients in their strategic and innovation management decisions.

To achieve that, a taxonomy for the health sector has been created and many tools for extraction of information from heterogeneous sources in real time and graphics to support business intelligence have been developed.

The innovation brought by the project are summarized as:

- To have a useful solution to manage large amount of heterogeneous data coming from different sources.
- To have the tools to extract, gather and process information that in turn will derive into knowledge, help taking decisions and save time in an innovation context.
- The integration into a single platform of different services to automate the process with alerts, content categorization, extracting information for publication in a visual way.
- The development of spaces for collaboration for technological Foresight experts to share alerts, surveillance contents, reports, etc.

The actual objective as a research team is to further investigate on these issues and technologies, and to transfer the findings to the companies in Mondragon, through the M4future model, and to society in general.

The results of this research work (INNES process and platform) can be offered as a service and a tool together with the set of methodologies and tools available in Mondragon M4Future initiative.

The process and the platform are valid for other case studies and sectors. That is, they are flexible to accommodate other experiences or Foresight analysis with different scopes.

The research work is complementary to previous collaborative research MU, ISEA and other agents from Mondragon. The research focussed on providing methodologies and tools to support collaboration, basic technology watch and idea management in the early stages of the innovation process. Innoweb is an example. Innowave is an IMS tool (Idea Management System), the platform to support idea management offered as a service and a tool. The developed platform is based on social computing, real-time Web and semantic technologies. More information in *(Perez, Larrinaga, Lizarralde and Santos, 2013)*. The results of this research work should be integrated with the set of solutions proposed in

this article. This integrated solution will be transferred to the Corporation and be included in the M4Future model.

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