



## > Semantic Web Use Cases and Case Studies

### Case Study: iLaw—Intelligent Legislation Support System

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#### Introduction (Background)

This project on improving legislation has been implemented to resolve pending issues raised by non-systematic investigation into legal data and time-consuming analyses. These issues present the need for building a systematic legislation support system that will allow a comprehensive analysis of legal information anywhere, as well as legal information services of different countries, prior to implementing the aforementioned project. In particular, advances in information technologies such as information retrieval have enabled searching of legal information worldwide in various languages. However, even legal experts spend a great deal of time and efforts to look up such information, which necessitates a professional system to ensure easy use of the vast information available. Also, there is strong need to establish an intelligent legislation support system that is appropriate for rapid and accurate legislative information analysis, and to maximize the use of legal information by applying the latest technologies including Semantic Web and text mining technologies. Our goal is to play a leading role in legal domain by developing the aforementioned system when even advanced countries in terms of legislation such as the US, Japan, and EU countries have yet to build a legislation support system using Semantic Web technologies in a primary level.

#### General Description

The Ministry of Justice (MOJ) of Korea has been implementing a project to develop a highly-advanced legislation support system since 2007 in order to perform its role as the “law firm of the Government,” and has been offering services to government ministries and agencies since September 2010. With the launch of this system, high-quality legal services are provided to government departments, enabling them to review bills or legal cases in a wider, more comprehensive legal framework. In particular, the information map service, which was originally designed by MOJ Korea, in this system allows users to compare legislations enacted at home and abroad and their levels (see [Figure 3](#)), and the multi-faceted information service organically shows related terms with hierarchical information connected with a given legal term (see [Figure 4](#)). In addition, the trends information service provides information on laws, cases, academic papers, and civil complaints in a time series manner (see [Figure 5](#)). All of these services offered by the newly developed system are designed to enhance the level of legislation.

#### Challenges

Services that help users to perform macroscopic, in-depth, and comparative analyses of legal information must be provided. Because most legal information, excluding academic papers, which are bought by MOJ Korea annually, is provided from outside services, the information must be guaranteed to be available in the system in near real-time. Also, a method to obtain equivalent terms of a given query in different languages must be devised so that various services abroad can be utilized and analyzed for a single query. This necessitates an intelligent information structure that will link and manage various kinds of legal information.

#### The Solution

The system should deal with various kinds of information (e.g. <http://caselaw.lp.findlaw.com>, <http://juris.bundesgerichtshof.de>, <http://law.e-gov.go.jp>) on laws and cases of the US, 23 EU countries, and Japan as well as Korea. To get the information accurately, we used several foreign dictionaries with the sizes of 150,398 terms for English, 5,067 for German, 7,792 for French, and 14,103 for Japanese. We also extracted 115,198 related terms from 171,696 domestic law articles, 49,503 from 57,246 domestic cases, and 86,914 from 60,213 domestic academic papers.



- Equivalent translated terms in different languages including English, German, French, and Japanese (obtained by search from 1) equivalent terminology dictionaries, 2) a Korean thesaurus, and 3) Google translation API.)
- Hierarchical information including broader terms, narrower terms, and synonyms.

Each service was implemented in a widget format to increase information accessibility, and can be activated/deactivated by the user (see [Figure 2](#)). Separate service pages were also created for each service in order to provide the information in detail.



Figure 2. Screenshot of an integrated search result. Each service such as Information Map Service and Multi-faceted Information Service is provided in a widget format, and can be activated/deactivated by the user. The results of the services are controlled by a user’s query. ([A larger version of the figure is also available](#))



Figure 3. Screenshot of Information Map Service. It displays search results from different countries' legislation services for a given query and its related terms. It allows comparison of legislation levels among different countries. Currently, it gives results from the Federal Government of the U.S., EU, Japan, the United Kingdom, Germany, and France. ([A larger version of the figure is also available](#))

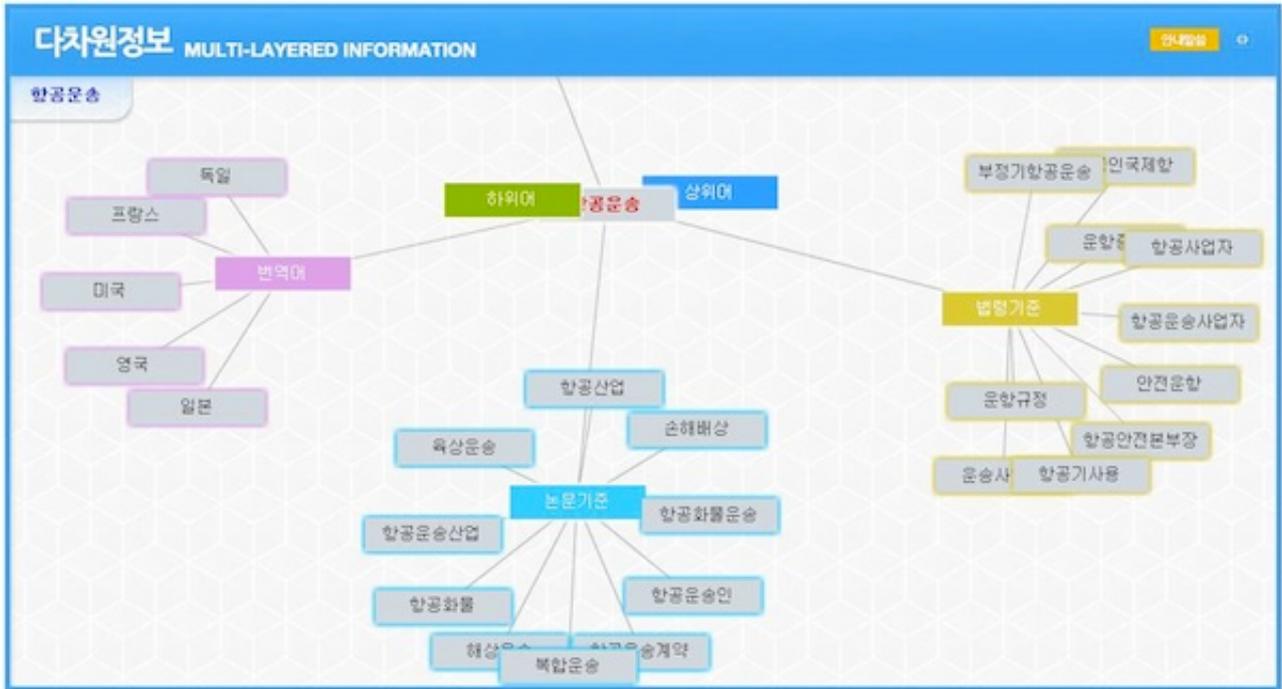


Figure 4. Multi-faceted Information Service. It provides related terms extracted from laws, cases, and academic papers, as well as broader and narrower terms offered by the thesaurus for a given legal term. Users can navigate or re-search by clicking/double-clicking the related terms. (A larger version of the figure is also available)

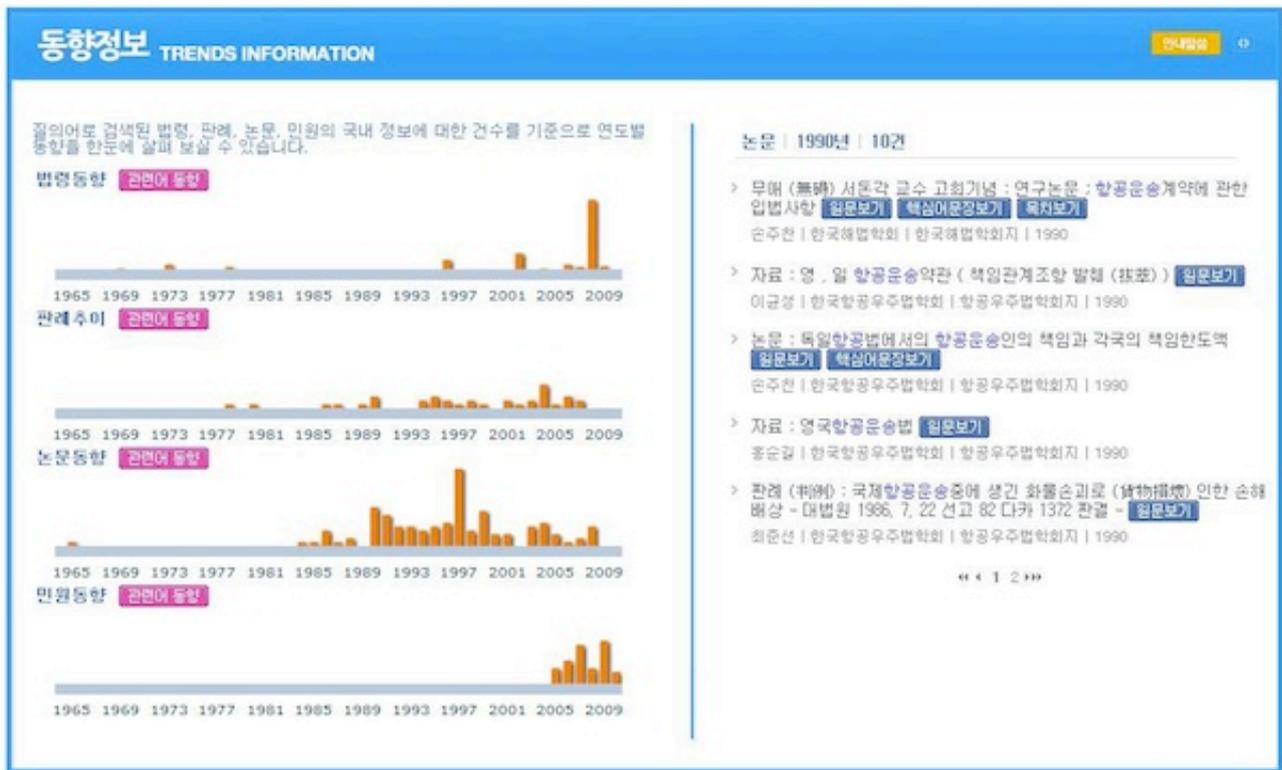


Figure 5. Trends Information Service. It allows users to determine information’s precedence by showing information on laws, cases, academic papers, and civil complaints in a time series manner. The right side of the figure shows search results for each resource. (A larger version of the figure is also available)



Figure 6. Related Terms Trends Service. It displays time-series related terms of a given legal term. Users can click another related term and see updated trend including the term. In particular, Figures 6 and 7 are services provided using user-defined rule-based reasoning. (A larger version of the figure is also available)

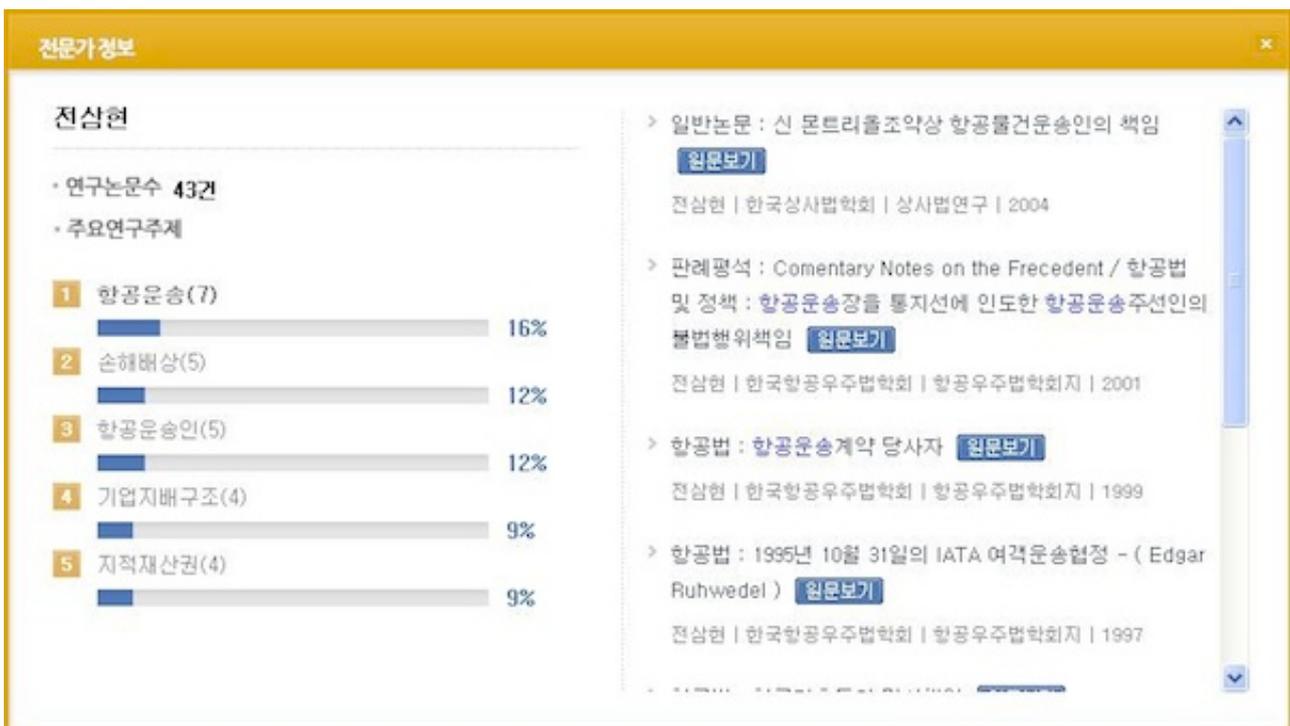


Figure 7. Expert Information Service. It recommends (a) legal expert(s) related to a given legal term in parallel with the expert(s)' main research areas and publications. (A larger version of the figure is also available)



Figure 8. National Legislation Map Service. It extracts sentences that include the search query and country information while comparing their frequency of occurrence. Both X-axis and Y-axis contain related terms. When a user selects a pair of related term, the service shows a set of frequency of occurrence for each country. ([A larger version of the figure is also available](#))



Figure 9. Keyword Sentence Display Service. It presents to users only the sentences that include the search query and the countries so as to provide summarized search of academic papers in an efficient manner. Legal experts have only to look up the sentence list instead of reading full texts for finding their interests. The right side of the figure indicates the statistics of countries mentioned in retrieved papers. ([A larger version of the figure is also available](#))

### The Future

In the future, the domestic and foreign services to be linked with this service need to be expanded. The quality of the thesaurus must be further enhanced in order to provide accurate equivalent terms between languages. Also, the service will be provided to legal experts, law students, and the public at home and abroad. More legal contents should be secured and serviced, through cooperation with legal service providers in Korea and abroad.

### Key Benefits of Using Semantic Web Technology

- With Semantic Web technologies, diverse and heterogeneous legal information such as laws, cases, and academic papers are effectively expressed and handled by a single, ontology-based knowledge expression system.
- It contributes to advancement of services being offered, by providing information on related terms trends and experts using reasoning-based knowledge expansion. It also helps realize a through process from text documents to semantic services in conjunction with search and information extraction techniques
- It provides intelligent services for the latest information by monitoring, collecting, extracting, converting, compiling, and inferring revised and additional external information in near real-time.
- It serves as a foundation to build an information management system designed to proactively respond to changes in legal information at home and abroad, thereby contributing to enhanced national competitiveness and image.

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