

Project Highlights

Project Title: A Distributed Information Management Framework (REGNET) for Environmental Laws and Regulations

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Project Description

There has been a push by the executive office that government agencies put more emphasis on compliance assistance in lieu of enforcement to encourage companies to comply with regulations. It is well recognized that the complexity, diversity, and volume of Federal and State regulations are detrimental to businesses and also hinder public understanding of government. In addition to the regulations, supplementary and supportive documents (such as preambles, interpretation guides) are also an important part of regulatory information. The objective of REGNET project is to develop a formal information infrastructure for regulatory information management and to facilitate compliance assistance. The experimental scope of this project covers Code of Federal Regulations (CFR) Title 40: Protection of the Environment. Implementation examples focus on the regulations and selected supplementary documents, covering hazardous waste, drinking water and the management of used oil.

A Framework for Regulatory Information Management

The sheer volume and complexity of regulatory information, coupled with its scattered distribution across many different sources, makes any attempt to understand and interpret such information a daunting task. Other factors, such as the high density of inter-referencing within a regulation code and intra-referencing between regulatory documents and the heavy reliance on acronyms, contribute to reducing the readability of the documents that can be located. In this research, we have created an XML-based document repository containing federal and state regulations and supplemental documents. A parsing system has been built to transform the environmental regulations from HTML into the XML framework. The XML-based framework is document centric and includes XML tags for each level of regulation text – for example part, subpart, section or subsection – that mirrors the standard structure of regulations. This repository also includes a suite of concept hierarchies that enable users to browse documents according to the terms they contain. In addition, tools have been developed to add metadata to the regulation framework, which include concept tags, reference tags and definition tags (see Fig. 1).

With regulations emanated from diverse sources, it is often difficult to find and compare similar provisions from different sources. We have conducted a preliminary study on comparing similarities between sections from different regulations. In addition to traditional text-based comparison techniques, we take advantage of the structural organization of the regulatory documents, (self- and cross-) references and their distributions, and the “bounded” terminology set to further enhance comparative analysis of regulations. To illustrate, Fig. 2 reveals the (almost exact) similarity discovered between sections from Parts 141-143 of 40 CFR and Division 4 of 22 CCR (California Codes of Regulations) on regulations related to drinking water.

A Framework for Regulatory Compliance Assistance

In this research, we have developed a prototype compliance assistance infrastructure that builds upon the XML regulation framework and takes advantage of the regulation metadata described earlier. Besides the concept, reference and definition tags, we add logic and control processing metadata into the XML regulation framework. Each logic or control processing metadata is associated with a specific regulation provision. In current work, provisions related to used oil management (40CFR260 and 40CFR279) have been manually tagged with logic and control process metadata.

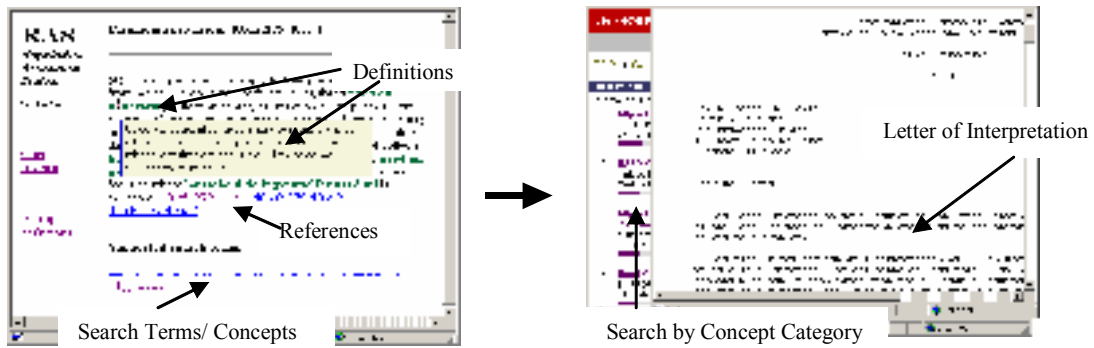


Figure 1: Definition, Reference and Concept Tags

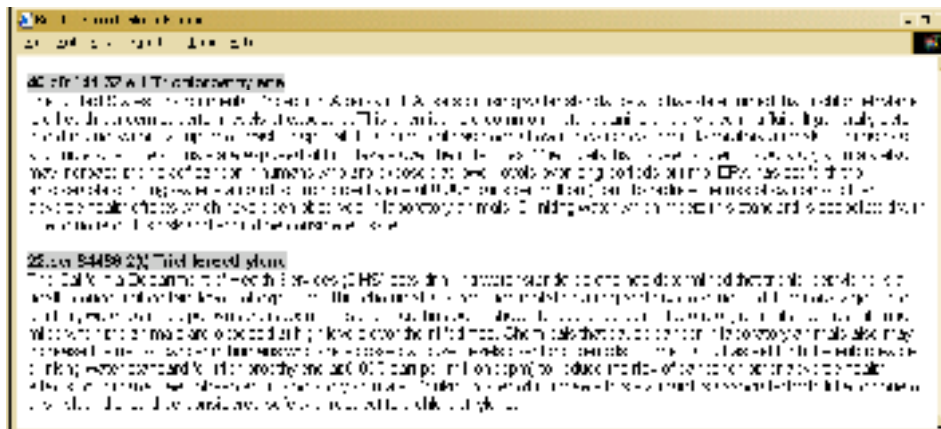


Figure 2: Comparison of Similar Sections in 40CFR and 22CCR on Drinking Water Regulations

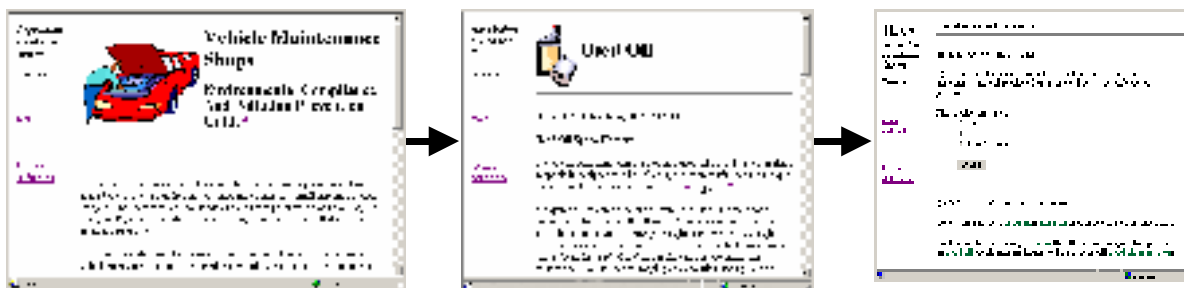


Figure 3: Linking Specific Application to the Compliance Assistance System

One essential feature of this web-based regulation assistance system (RAS) is that it helps to guide the user through the regulations. In addition, one can easily build a compliance system for specific application utilizing the RAS system and the repository as a back end. Fig. 3 illustrates a demonstration system built for vehicle maintenance shops to check compliance with the used oil provisions.

Collaboration and Outreach

While this research focuses on the development of an IT framework for regulatory information management and compliance assistance, the researchers have also been actively participating in the social and legal aspects of regulation compliance, enforcement and rule-making process. The researchers have participated in a number of workshops sponsored by Stanford's Law School, Harvard's Kennedy School of Government, EPA's Office for Enforcement and Compliance Assistance related to IT and regulations. These activities have led to the better understanding of the complexity in regulatory processes and the urgent needs of IT tools that could be useful by the public. We have also received software and hardware grants from Semio Corp and Intel Corp., respectively, to support this research project.