
Water Expert is a tool to support water & wastewater utilities, and water resource managers. Using a combination of mobile, desktop and web-browser applications, Water Expert provides recommendations based on industry-wide established policies and procedures for technical, financial and managerial functions. Water Expert understands and responds to most relevant federal policies, and can be dynamically expanded to include others, as well as local and state regulations as needed. It comes standard with applications such as a geographic information system, hydraulic modeling, customer relationship management, asset management and more, that can be used to help drive its recommendations and actions. Third-party applications can similarly be linked into Water Expert, either replacing or augmenting its standard tools.

Water Expert is a web-based expert system that provides an integrative framework for collecting user-supplied information (referred to as "user-facts") to execute against a rule-base and global fact-base. The rule-base and the global fact-base constitute the global knowledge-base against which all users user-facts are matched through a pattern-matching inference engine. The combination of user-facts, rules and global-facts define the domain within which the expert system can provide recommendations to the user. Consider a water utility interested in determining the most effective treatment technology for treating a Benzene contamination in their distribution network. As Activated Carbon is the most effective treatment technology against Volatile Organic Chemicals, and Benzene is a Volatile Organic Chemical, these are considered to be global facts. The inference engine therefore recommends Activated Carbon as an appropriate treatment technology. Additional rules could indicate that the presence of high concentrations of hydrocarbons in PVC pipes could lead to pipe failure, in which case, if the user indicated they had PVC pipes in their system, a further recommendation would be issued that their pipes be checked.

Water Expert is a set of web services integrated into an Content Management System (CMS). The CMS is used as the integrating, user, data entry and results analysis interface. Built onto the core CMS/DBMS construct are distributed server-side applications that are executed, transparent to the user, based on the type of content being rendered. The key server-side application is the pattern-matching inference engine, providing both forward and backward chaining reasoning. Additional server-side applications include a map rendering Geographic information System (GIS), hydraulic network simulation program, mathematical typesetting, Customer Relationship Management (CRM) modules, and host of other digital applications.

Presenter:
Andrew Ernest
anernest@eng.ua.edu
The University of Alabama

Co-authors:
Andrew Ernest1, Jana Fattic2, Joseph Gutenson1, Abdoul Oubeidillah1, and Xaoyin Zhang1
1The University of Alabama
2Western Kentucky University