Why Web Sites Must Get Smarter

WHITE P A P E R

Easy to build and implement, Knowledge Automation Expert Systems bring interactive decision-making expertise to Web sites. Emulating consultations with a company's top experts, here is a look at proven technology that goes beyond pages of information. From product selection to customer support, Web sites can now provide automated, customized, specific recommendations and answers to prospects, customers and employees, whenever needed.

New Online Interactive Systems Deliver Customer Specific Recommendations and Advice

The Web has become the primary communication channel with customers and employees for most businesses and government agencies. The Web makes it easy to make a vast amount of data widely available. But people are after answers, not just more content that may not be relevant to their situation. Search engines allow quick access to thousands of pages of information related to a subject. However, most real-world decisions require more than information, they require expert knowledge on how to use and understand the data to make decisions.

Information by itself does not provide answers

Most Web site visitors don't have the time or desire to research a subject in enough detail to be able to make prompt, informed and correct decisions on even moderately complex issues. They just want the answer to their specific question and most Web sites today don't offer this advantage. Given the choice, a person will ask an acknowledged expert for recommendations rather than researching on their own.

The Web contains large amounts of incorrect and out-dated information, or personal opinion. Search engines unfortunately make it easy to find the bad along with the good, and make no distinction. It is up to the user to read and decide what is accurate and relevant.

For many businesses, FAQ lists are a common approach to this problem, but the visitor must read through a long list of questions and they only work well if the user's situation is an exact match to one of the questions. Often even a seemingly minor variation can lead to very different advice. Another approach is "Case-based" systems, which attempt to find relevant matches with previous situations in a database (sometimes referred to as a "knowledge base"). This presents the same problems as searching on the Web. Typically a relatively few key words are used to index and search the many possible cases, and there's no guarantee that the case recommended will correct the problem.

Interactive access to top-level expertise

New technology allows Web sites to provide automated interactive consultations, as if the visitor were talking to human experts, to provide specific recommendations and advice. **This allows knowledge, rather than just data to be directly delivered to the visitor**.

Traditional search techniques require that the visitor **"ask"** the questions. They then have to read and interpret the results. If their questions are not precise, or use words that do not exactly match the site content, the user will get overwhelmed with data, or perhaps nothing at all. If the user is so confused that they do not even know what to ask for, they will not get anywhere.

With a knowledge automation approach, the system asks the questions and the user only has to **answer** them. This is much easier for the user, since they don't have to create queries or decide on search terms. Simply answering questions is far easier, faster and much less prone to error. The user does not have to understand why the question is being asked; they just have to answer it. Part of building a well-designed knowledge automation system is to make sure that the questions asked are ones that the intended end user can quickly and unambiguously answer.

The knowledge automation system asks the user questions to determine what specific recommendations are appropriate. Based on their answers, it will ask follow-up questions to drill down in potentially relevant areas. Once the knowledge automation system has combined the user's answers with its underlying decision-making logic, the **Inference Engine's** analysis can make precise, fully reasoned recommendations.

The difference between the two approaches is tremendous

A knowledge automation system is like going to the doctor, answering some questions and being given a diagnosis. The "data" approach is like being handed a medical textbook and told to figure it out.

While most daily decisions are not as complex as medical diagnosis, they are still complicated enough to require some level of detailed knowledge that may not be generally available. Most people do not want to learn all the details of the many things they have to deal with daily. Examples: If you have a problem with your computer, you don't want to learn about how it works, you just want to know what to do to fix it. If you are buying a product, you don't want to have to study all the possible options, you just want to know which ones are the best match to your needs. If you have a regulation you must comply with, you don't want to know all the rules, just how it applies to your situation.

Knowledge automation systems make it possible for Web sites to provide expert advice and recommendations about specific domain areas. This allows site visitors to get authoritative situation-specific answers very rapidly. Common tech support issues can be resolved by answering a few questions. Customers making a purchasing decision can get advice tailored to their requirements - encouraging them to make the purchase. Employees can get authoritative answers on how company or government regulations apply to them. Routine or repetitive tasks can be automated. Systems can be used anywhere prompt, consistent decision-making is needed.

More than just rapid ROI

The need for expert knowledge is universal, and can be a company's biggest asset. It does not have to be deep or profound to still be beneficial for day-to-day decisions. Enabling employees and customers to rapidly and efficiently make correct decisions has a tremendous and immediate payback. Reducing and preventing errors can produce an even greater benefit. Dupont, a long-time user of knowledge automation, has found that for every $10,000 they spend to build and field a knowledge automation system, they save a $1,000,000.   The user interaction with knowledge automation systems on Web sites brings repeat traffic, and promotes quicker

purchasing decisions. Also for many companies, providing online expertise has tapped into important new revenue streams.

Based on proven technology

While relatively new in Web-based implementation, the underlying techniques and technology is well proven and widely used. "Knowledge automation" is based on the evolution of rule-based "expert systems" which first appeared in the 1980s. The core technology has been used in tens of thousands of high value, and often mission critical, systems. While expert systems did not make machines "think", an unrealistic goal in the 1980's, they have proven very effective as a way to describe and automate the steps in human decision-making processes. Over the last few years, Web based implementations of knowledge automation systems have proven to be ideal for expertise dissemination.

The "smarts" inside the knowledge automation system is an underlying "inference engine" - a program that processes decision-making logic and user input in complex ways that mirror the expert's thought process. The actual logic in the system is built in a development environment that allows the expert to enter the various rules and steps that are used to make decisions in a form very similar to the way one would explain it to another person. A large part of building a knowledge automation system is identifying the individual decision steps and converting them into a form that a computer can use. Modern development tools make it easy to build the rules in a system quite rapidly, with most systems built in 2 weeks to 2 months. Even complex systems with confidence values and many aspects to a problem can be created efficiently. Systems can also be readily integrated into existing databases, allowing the knowledge automation system to obtain data directly from existing sources rather than asking the user. Some systems can even run in the background performing monitoring functions.

Decision consistency and preservation

Developing and fielding a knowledge automation system has the added benefit of decision consistency. In defining the logic in rules, the exact steps and procedures are consistently followed in the same way, resulting in user input always producing the same best recommendation. All relevant factors are always considered in the decision. An obscure regulation or special case is not overlooked by the logic. Instead the system will determine if it applies and use those rules when appropriate. Also, the decision-making steps and rules are defined in a way that both preserves them and allows others to review them for accuracy and completeness. If there is a new option or product, a change in policy or other updates, changes to the system are easily incorporated and immediately available. Users always get a correct, current and authoritative answer that they can act on.

Web delivery

One of the breakthroughs in knowledge automation systems is Web delivery, making them available worldwide, whenever needed. Java is the preferred portable approach to run complex programs on the Web and there are 2 main ways to deliver systems - applets and servlets. The applet approach runs the knowledge automation system on the client machine. It is very easy to field, highly scalable and capable of also being run standalone. The servlet approach is run on a company server communicating

with the user via dynamically built HTML forms to ask questions and present data. The servlet approach is a little more complicated, but allows the full range of HTML for sophisticated interfaces, tight integration with other server functions and access to other programs. Both delivery modes use the same system produced in the development environment.

Where knowledge automation expert systems are most effective

For established, conventional organizations as well as new Web-centric business models, these types of systems make it very desirable and practical for firms to capture expertise in interactive systems. Applications can be run from Web sites, intranets and client-side. They capture expertise and disseminate knowledge to handle decision support projects, automate routine tasks, assist in selection processes, analyze data streams, enhance customer/product support, and ensure policy and compliance - any area where consistent, logical decisions are needed.

♦ **Problem-Solving Diagnostics**

When experts identify malfunctions or interpret complex data, they quickly look for symptoms indicative of particular problems. The knowledge of how to handle these problems is ideal for conversion into a knowledge automation advisory system. There are usually many domain experts throughout a business enterprise. They are often asked to answer the same common questions over and over. Knowledge automation systems free up experts by making this knowledge accessible by employees or customers that need it. This allows the experts to handle more complex problems and projects. These systems are also beneficial in capturing and codifying the problem-solving expertise of top employees that may be retiring or changing jobs.

♦ **Regulatory Compliance**

Regulations are generally documented in a form very similar to the IF/THEN form of business rules. This makes them easy to convert into the rule form of a knowledge automation system. Regulatory expert systems insure that <u>all</u> possible relevant regulations are considered and all policies followed consistently. These systems provide significant cost savings by helping companies stay within industry compliance, protect employees, avoid fines or legal expenses, and potential bad publicity.

♦ **Product Selection / Recommendation**

Selecting which products best meet a customer's needs and requirements can be a very complex process. But it is one that can be expressed in logical rules relating to customer requirements and product specifications. It gives customers access to top sales expertise in making a purchasing decision. Unlike case-based or "learning" approaches, knowledge automation systems can handle conflicting requirements and always give a recommendation of the best fit, even when all customer desires can not be simultaneously met. Advisory systems also make it possible for staff to identify cross-selling

opportunities and be able to sell a much broader, more complex product line. Maintenance and updating these types of systems is easy through simple changes to a spreadsheet.

♦ **Decision Support & Knowledge Management**

Business intelligence and advice is a strategic part of many companies' assets, and a key competitive advantage. Many types of decisions and recommendations can be converted into interactive knowledge automation systems. They provide business users with the ability to access, analyze, and share information stored in a company's databases and other data sources. Advice is deployed much faster within a company, and outside the business to customers, partners, and suppliers. This makes the knowledge and expertise of the best people widely available to others, and is an ideal way to disseminate specialized skills with minimal training. They are also effective at helping groups reach consensus in decision-making processes.

♦ **Configuration**

Configuring complex equipment or problems having many pieces is very difficult. Determining which pieces are required and which are incompatible requires detailed knowledge and analysis. This is an ideal problem for a knowledge automation system, which can guarantee valid and complete configurations. The system can also explain the reason for its recommendation. Different aspects can come into play at the same time, for instance: inventory, current pricing and customer requirements. The knowledge automation system also enables comparison using "what if" scenarios.

♦ **Customer/Product Support**

These problems are in most ways similar to diagnostic problems, but often go beyond the diagnosis of a malfunction and include following a precise sequence, or specific policy and procedures. Many other types of "help desk" software only guess at a possible solution. The knowledge automation approach will consistently give the best recommendation based on specific logic. Only pertinent questions are asked instead of forcing a customer to go through a long FAQ list to come up with a solution. Knowledge automation systems incorporated into help desks bring less experienced staff up to speed quickly without repeated training or interruptions. They also ensure everyone's answers are consistent. Online customer help systems provide a more personalized environment and interface, and their automation helps free advisors to provide value-added "emotional" support.

♦ **Background Monitoring**

In addition to being interactive, the logical processing power of knowledge automation systems can be run in the background to monitor data streams. They can be constantly analyzing the data streams (often real-time) for developing problems, special opportunities, or other information that should be immediately brought to someone's attention. They are especially useful for identifying very uncommon problems that few know how to recognize, which can have serious consequences.

- ♦ **Inconsistency/Fraud Detection**

    Knowledge automation systems can check data against policies and procedures to detect inconsistencies that may indicate problems like fraud or other irregularities. An example is credit card fraud. The ability of knowledge automation systems to handle complex logic allows such systems to be much "smarter", both in detection and in recognition of illegitimate actions that can then trigger other systems.

- ♦ **Smart Questionnaires**

    Knowledge automation systems can make interactive questionnaires more intelligent. The logic of a system leads to asking only pertinent questions that have been determined to be relevant, due to answers already provided. No irrelevant questions are asked. This presents the system user with a more personalized and customized interaction, and it also saves time. This produces a far superior user interface. In addition, the data can be analyzed as it is collected, and the system can provide appropriate follow-up forms or reports on the fly. Knowledge automation systems can even be incorporated into emails.

Conclusion

Ideally, people would have immediate contact with human experts in every area of specialty that they might need, 24 hours a day. But this can't happen, and many decisions can't afford, or wait for access to, an expert.

Most organizations have ways to disseminate <u>data</u>. Deploying knowledge automation systems allows the direct delivery of <u>knowledge</u> - "know-how", advice, and recommendations, rather than just information. This enables people to solve complex decision-making problems without having to learn the underlying logic or needing specialized training. This is the power that knowledge automation systems provide – direct delivery of knowledge to the people that need it.

Make Your Web Site Smart

Contact an EXSYS representative today to discuss your ideas, find out about our many customer case studies, plan application strategies, and discover the best approaches for efficient and effective expert system projects.

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