Expertise — what is it?
Expertise is the ability of one human within an organization to outperform a similarly educated and informed peer group in discrete, repetitive tasks involving decision-making and risk assessment. Expertise is best measured by the degree to which an individual’s performance provides proprietary advantage to his organization. Bright people with exceptional ways of accomplishing tasks which do not provide proprietary advantage to an organization may be innovators or eccentrics, but they are not experts.

Expertise is easy to recognize because all experts perform remarkably consistent types of tasks regardless of their area of expertise. The tasks most characteristic of experts are listed below in three groups:

I. Minimal Tasks
These tasks are explicitly defined, as in underwriting or policy manuals. They require that an individual have a basic level of understanding and follow procedures. They define minimal performance in the field. An expert does all of these tasks, but so does everyone else who keeps his job:

- repetitive decision making and risk assessment
- understanding the organization's existing policy
- utilizing outputs from existing decision support systems
- making decisions appropriately within policy mandates

II. Integrated Tasks
These tasks require integration of Group I tasks into a wider view of organizational requirements. All good performers begin to perform these tasks as they gain experience; experts may do them better, but are often relieved from doing them so that they can focus on more important tasks:

- developing and enhancing existing policy
- developing and enhancing decision support systems
- training and supervising others in compliance with policy and in the use of decision support systems
- interacting with outside agents of the organization
- interacting with customers
- interacting with superiors
- interacting with peers
- interacting with subordinates
- interacting with systems
- seeking additional information to resolve data inconsistencies

III. Distinguishing Tasks
These tasks are based upon a person’s ability to reason beyond pre-existing policies and logic in order to deal with the unique features of the particular example being looked at. This skill is called Judgment. The perception of a person’s being an expert is tied to his performance of tasks requiring Judgment:

- appropriately identifying and making decisions on examples which should be treated as exceptions to existing policy
- appropriately identifying and making decisions on examples which are outside of the scope of existing policy
- appropriately identifying and making decisions on examples which are outside of the expert's previous experience
- making decisions beyond the scope or capacity of existing decision support systems
- making decisions in locations remote from organization facilities
- making decisions when critical information is missing
- making decisions during periods when normally available decision support systems are not functioning
- training and supervising other people in decision making and risk assessment
- changing decision making strategies in response to changes in external business and economic environments
- changing decision making strategies in response to changes in internal strategic, product and marketing requirements
- adjusting decision making strategies to compensate for regional peculiarities and risks
- adjusting decision making strategies to compensate for personal relationships
- questioning the sufficiency, validity and consistency of supplied information
- sensing the presence of intentional misrepresentation within information provided
- reporting and sharing information with all interested parties and systems at times appropriate to their needs
- seeking additional information in order to resolve logical inconsistencies

Expertise — what does it have to do with underwriting?
The degree to which the performance of these tasks is essential.
to any given business function is an indicator of the degree to which that business function is dependent on expertise.

The above classification should strike a familiar chord to underwriters. Every one of the tasks listed has an analog in common underwriting practice. This observation is the foundation of the interrelated beliefs that underwriting functions involve expertise and that Expert Systems can be utilized effectively in the underwriting process.

Different underwriters have different experience and skill levels, and, as a result, have different value to their organizations. Their unique value is generally proportional to the number of Group 3 tasks they perform.

Expertise — is it part of an Expert System?

In considering automating the underwriting function, it is important to explore the fact that people from different disciplines often have different expectations about what an "Expert System" can and should do. Failure of organizations to have adequately explored this issue has been responsible for some rather spectacular past fiascos with Expert Systems.

Computer technologists tend to focus on explicit logic decision making as the critical component of Expert Systems. They perceive that systems should exercise previously defined logical relationships — such as those in the underwriting manual. Technologists, if left to their own devices, will usually design and build systems that focus on Group I tasks during a development phase and address only the communication tasks from Group II as a second phase. Such systems can be written using either Expert System or conventional technology.

Underwriters and Underwriting managers tend to expect an Expert System to assume full responsibility for all Group I and Group II tasks so that application processing, decision making, and integration with people and other systems are all fully automated at the same time. They expect Expert Systems to make decisions on explicit logic, but to be able to keep track of more complexly interrelated logical relationships than can be included in the underwriting manual or remembered by a human. These systems are usually best generated using rule-based Expert System technology. Group III tasks are seen as desirable future enhancements.

General managers might expect underwriting Expert Systems to fulfill all tasks from Groups I, II, and III, and to demonstrate an awareness of corporate priorities. They tend to see Expert Systems' highest potential value in the distribution of the best underwriters' Group III skills as a "new standard" of underwriting. They expect an Expert System to extrapolate to appropriate conclusions in situations it has not seen before just as human underwriters do.

It is now technically possible to fulfill all of these expectations, but the methods, costs, time and benefits of building an expert underwriting system will differ widely depending on which expectations are accepted as system requirements. Whether a completed system looks like an expert or not depends upon the expectations of the observer.

Judgment Processing

Our emphasis in recent years has been in building underwriting Expert Systems which emulate the full scope of human underwriter activity, including Group III judgmental tasks.

Judgment is a difficult function to emulate. It requires a system to use associative reasoning and to be able to extrapolate freely from past experience. These functions can not be represented by rules or even be fully explained by a human underwriter who can demonstrate them.

For these reasons, our systems are based upon a technique called inductive learning, in which the system builds and refines its own logic by working as a junior associate with a human expert underwriter. The logical structure which the system builds through this process is referred to as a Judgment Base, and has the ability to reason associatively and to extrapolate as its human "Mentor" would.

A system of this type is not expected just to reach "yes or no" decisions. It evaluates the adequacy, suitability, consistency and reliability of data. It evaluates all classes of risks encountered in the application and in ancillary data sources (MIB data and APSs for example). It will decide whether to issue, rate, solicit additional information, or recommend an alternative product. It may refer an application back to its human Mentor for resolution of specific unusual issues when it needs help. It is expected to be able to carry out a dialog with all related systems and humans effected by the underwriting process. It is expected to be capable of carrying out the full scope of underwriting activity without human intervention and to serve as a teacher for its less experienced human associates. It is intended to emulate the highest standard of human underwriting performance in the company within which it functions.

Expert System — something practical?

The building of a system of this scope is a fascinating process. The following is a description of a typical experience in building a life insurance underwriting system.

Company "A" (COA) Life Insurance Underwriting System Development

Phase I

COA is a pseudonym of a general life company in the U.S. They were interested in proving the feasibility of automating the underwriting of applications for uncomplicated low face value policies.

Judgment software was installed on three standalone PCs. Three underwriters — none of whom had previously been a computer user — were selected as Mentors and trained in the use of the Judgment Processor. Each of these underwriters then taught the Judgment Processor to evaluate applications from their own point of view. No engineers or analysts were involved at this stage of the project. The systems were taught as the Mentors performed their normal underwriting functions, with the system working alongside. Each Mentor devoted about an extra hour a day to his Mentoring tasks. Within 5 weeks, each of these systems was able to emulate the underwriting decisions of its Mentor in a blind comparison of unselected cases.

COA concluded at this point that fully automatic underwriting of life insurance applications without human involvement
was feasible and desirable, that the percentage of applications which a completed system could be expected to handle was high enough to justify the development effort and would be dependent upon the amount of teaching given to the system, that the acquisition and interpretation of medical history information would be a critical issue, and that the future deployment of the system, particularly if it were allowed to deliver real time underwriting decisions to the field, could have profound effects upon COAs business.

Phase II
COA spent the next 6-9 months studying the strategic impact that the now envisioned underwriting Expert System could have on the company’s growth. It concluded that it should build the system, that it would be deployed at first at the home office but would be deployable in the field, that its target application would be applications with limited face amounts which did not require APS but that these restrictions would be removable in the future, that a full time Project Manager would be assigned, and that a single Mentor would be assigned to teach the system as part of her normal underwriting responsibilities.

Phase III
In less than 6 months, the system learned and demonstrated the ability to perform the scope of underwriting tasks it was asked to do. Medical history information was processed through a limited natural language system capable of deciphering applicants’ misunderstood, misspelled and oddly sequenced descriptions of their medical histories into appropriate terminology and risk assessments. A local area network (LAN) was installed which linked the Project Manager, the Mentor, data entry clerks, processors, and other underwriters in a “Production Teaching” configuration. In this configuration, real applications were entered into the system by clerical staff, the system made its underwriting decisions and submitted them for review by human underwriters, and the Mentor could continue to teach the system. Continuous monitoring and evaluation of the performance of the system was carried out.

At the conclusion of this phase, a decision was made to deploy the system, using it as the data entry point for the processing of all of COAs applications. It would continue to refer policies a human underwriter whenever it decided that an APS was necessary.

Phase IV
The system is fully deployed on an expanded LAN physically located in the underwriting department and interfaced to external systems. All application data is entered directly into the Expert System. Insurance in force and MIB data are requested from other systems and added to the application. It is then routed to the appropriate “underwriter” — for some products to the Expert System itself and, for others, to a human. When the underwriting process is completed, appropriate data is automatically transferred to policy administration and servicing systems on the company’s mainframe.

In this deployment, the system processes approximately 75% of all policies submitted to it for underwriting with no human interaction after data entry. For certain products, human underwriters evaluate less than 10% of all applications.

This phase has been evaluated in production for over 3 years. The scope of underwriting activity it performs is continually expanding; this is achieved by part time effort of the Project Manager and Mentor. MIS involvement has been limited to systems integration efforts. Some new data entry staff has been added to support the system, but even including these people, underwriting efficiency has at least doubled.

The expert system’s approval limits have been raised several times. It now functions and is reviewed on the same basis as any other senior underwriter. It has an exceptional approval ratio and claims paid performance.

The decision has been made to extend the scope of the expert system to include specific medical risk underwriting, and it is currently being taught to do this. In support of this, the system will accept and interpret information directly from Attending Physician Questionnaires.

COAs experience illustrates eight key points in the successful deployment of underwriting Expert Systems:


2. The use of Expert Systems for underwriting is practical and cost efficient; they can be developed by non-technical users and be ready for deployment in 4-6 months.

3. Expert systems can be developed to utilize the underwriting philosophy and practices of a company’s own best underwriters.

4. Expert systems can be expected to provide economic and marketing advantages to early users.

5. Increased use of Expert Systems in underwriting seems inevitable.

6. It is critical that all points of view be included in setting the requirements and specifications for an underwriting Expert System, particularly with respect to three issues:
   a. the level of underwriting autonomy the system will be required to have;
   b. the level of expertise the system should be required to have;
   c. the impact that successful deployment will have on business practices of the company.

7. Expert Systems look like real experts only when they are capable of performing all (Groups I, II, and III) of the tasks normally performed by human experts and can do so within the operating environment in which the human works.

8. Technology to meet all of these requirements currently exists; the limiting factors in their deployment is the ability of organizations to integrate them into traditional business activities.