

AES: SunAmerica's Appointment Expert System

Richard Levine, Gary MacKinnon, Frank Angrisani, and Lew Roth

SunAmerica is a major financial services company that primarily sells fixed and variable annuity products. Its assets (owned or under management) currently total approximately 11 billion dollars.

SunAmerica was confronted with the industrywide problem that all agents, broker-dealers, and corporations must be appointed to the State Board of Insurance in each state for each product line to be sold. Fixed-rate annuity products are state regulated, variable-rate annuity products are state and federally regulated, and appointment regulations for each state are unique. The process was paper and labor intensive and, subsequently, error prone.

Additionally, SunAmerica was in the process of moving its administrative operations from Atlanta to Los Angeles. As part of the move, reductions in office staff, including the Licensing Department, were planned, and most of the Los Angeles staff would be hired locally. Years of in-house appointment expertise would be lost with the closing of the Atlanta office. Therefore, the appointment expert system (AES) was an excellent solution to capturing and codifying the expertise before it was lost and allowing the small and untrained Los Angeles staff to maintain appointment processing in the growing company.

In addition, AES took an internal process that averaged two weeks to

perform and reduced it to two days. This process is often an agent's first impression of the insurer's service and can influence the agent's attitude toward the insurer's products. Because high-speed, high-quality service is often the margin of difference when agents choose an insurance carrier, AES provided SunAmerica with a significant achievement in retooling its appointment procedure, thereby gaining strategic advantage.

In this chapter, AES refers to the core expert system, and the term *licensing system* refers to the aggregate of AES and the software that connects to the associated systems, printer, and appointment processor terminal. AES was jointly developed by SunAmerica and Inference Corporation in less than a year, starting with a proof-of-concept model and ending with a fully deployed production system. Inference Corporation built the core expert system, and SunAmerica built the connectivity to the associated systems and supplied the domain expertise.

The Appointment Process: A Business Perspective

Appointment requests are received from agents, broker-dealers, agencies, and corporations through a *preliminary data sheet* (PDS), the SunAmerica appointment request form. PDS requires the applicant to indicate the type of appointment desired (for example, individual or corporate), corporate affiliation, demographic information, character data, and current licensing information for the state(s) in which the appointment is requested.

The submitted forms are read by an imaging system in the mail room and indexed. The documents can be accessed from the imaging system by all internal offices. In the Licensing Department, two terminals are set up at each appointment processor's desk, one tied in to the imaging system, the other connected to AES.

The appointment processor types the pertinent data from the imaging system into the licensing system. The appointment data-entry screens are window and form based, allowing the user to map data into forms in the licensing system that essentially correspond in a one-to-one manner with physical forms received from the agent or the state's licensing departments. (Currently, the pattern-recognition talents of a human appointment processor are necessary to transfer data from the imaging system into a machine-readable form for the licensing system. When the technology allows, even this tiresome task will be automated.)

After data entry, AES is invoked to reason on the submitted data for compliance with the pertinent regulations. Input errors and data or form omissions are brought to the attention of the appointment processors for immediate corrective action. If some errors cannot immedi-

ately be corrected, AES is again invoked with a request to write the missing requirements onto SunAmerica's work queue system for followup. Later in the day, staff members will "work the queue," attempting to solve the open issues by phoning or writing to the agent or state.

When no errors remain, AES will order a check to be generated by the check disbursement system (CDS) by providing CDS with the state-required fee amount, name and address of the state insurance agency, and the payee of the check. The checks are run in batch mode and delivered the next day to the Licensing Department. The appointment processor then reactivates AES, which informs the appointment processor which state appointment form to load into the Smart Printer. AES then automatically completes the form with the appointment-specific data and provides additional instructions, such as having the form signed or notarized.

The Smart Printer is key to the labor-saving benefits of the system. The software built for the system allows the printer to automatically print over 100 different state forms and minimizes the chances of typographic errors that would result in state rejections of applications.

The form is matched with the previously ordered check and mailed to the state for approval. Depending on the state, the agent is either appointed at this time or must wait for an acknowledgment from the state. In either case, when all conditions are met, AES communicates with the automatic letter generation system to send a congratulatory letter informing the agent of the appointments for particular states and products that s/he can now sell.

The Appointment Process: A Technical Perspective

An expert system solution to the appointment problem was clear from the beginning because of the extreme variability between appointment requirements coupled with the need to frequently modify the procedures as states change their requirements. Indeed, an individual appointment process is relatively straightforward, consisting primarily of filling out and submitting proper forms and fees to the state. The amount of reasoning on an appointment is minor. However, any error in the forms or fees can cause delays of weeks. The real problem is classifying the appointment into the right appointment category so that the procedures that pertain to this category are properly applied. Some of the issues of the classification problem are outlined in the following paragraphs.

Each state has its own language and semantic definitions for agent appointments, so that part of the solution was to create abstractions of

the state's definitions and then attempt to fit the states into these categories. The states themselves make no attempt to cooperate with each other in the definitions, so it was not unusual for us to not only add categories but also to redefine existing categories and the rules that applied to them as we learned more during development. Some of the state variability is outlined in the description that follows:

What is an appointment? Nominally, an appointment is not a license. A *license* typically represents an ability to sell a type of insurance. An *appointment* represents the ability to sell a particular insurance company's insurance products. In most states, these elements are two separate concepts, with the licensing component preceding the appointment component. In some states, the licensing and appointment are one and the same, and the term appointment is not even used by the state.

What is an agent? In general, an *agent* can be a corporation, an individual working independently, or an individual working for a corporation. (Some states add the concepts of general agent, solicitor, or broker-dealer, which we won't define here except to say that they are exceptions and, typically, need special case handling.) An agent (particularly a corporation) can have different names in different states. An individual can be licensed differently as an individual, a corporation, or an individual within a corporation among the various states in which s/he does business. All states appoint individuals as agents. Some states do not recognize corporations as entities that can be appointed and require that the members of the corporation get individual appointments. In some states, the employees of the corporation are carried on the corporation appointment; in others, they must be separately appointed. In some states, the requirements for a license do not parallel the requirements for an appointment; for example, in some states, corporations are licensed but not appointed.

Where is the agent? Agents must get *resident appointments* in the state in which they are a resident and *nonresident appointments* in any other states. In general, an agent is resident in the state where s/he lives and has an office. Complications arise when the agent works in a different state from where s/he lives. Corporations, however, can obtain resident appointments in more than one state.

What can the agent sell? In general, precedence requirements exist for an agent to sell a particular brand of insurance in a particular state. One relatively simple requirement is that the agent be licensed to sell the type of insurance. In addition, if this state is a nonresident state, the agent typically is required to be successfully appointed in his(her) resident state first. Often, a letter of certification from the resident state addressed to the nonresident state is required for proof of the resident appointment. An appropriate fee must accompany this request.

Some types of insurance require that the agent be licensed successfully and appointed in other certain types of insurance before appointment in this type is allowed. If the agent is part of an agent hierarchy within an agency, the agents above this agent must typically be successfully licensed and appointed.

When can the agent sell? This question is really two questions. One concerns when the agent can solicit business, the other when the agent can receive commissions from sales. For each of these areas, there are several milestones that are significant, with the significance varying between the states. The milestones are the internal processing of the paperwork by the insurance company; the mailing of the forms from the state; a fixed time in days after the forms are mailed; and, finally, the receipt of an acknowledgment by the state. In some states, no paperwork needs to be sent to the state at all, and the agent can do business as soon as the insurance company internally processes the paperwork.

How long can the agent sell? Appointments are typically for one or two years or an indefinite period of time. Renewals or terminations can happen automatically at the end of this time, depending on the state, and the insurance company must take some action if it desires some other outcome.

What is the fee? Typically, fixed fees are required for an appointment. In some states, the fee is based on each product; in others, it is based on appointments. For nonresident appointments, some states retaliate against other states' nonresidence fees, so that the fee charged is the higher of the two. One state is reciprocal, and charges whatever the other state charges. For these nonresidence situations, sometimes the resident state is determined by where the agent lives. In others, it is where the insurance company is located. Also, some fees are dependent on the time of year the appointment is made.

Where can the agent sell? Most states appoint and license agents on a statewide basis. Some states require separate appointments for individual counties or cities within the state.

Where are the forms sent? Most states have one address for applications. Some states have different addresses for different product types. Others have different addresses for appointments and terminations.

Miscellaneous: Some states require that the forms be handwritten; others require a number two pencil be used; most require that the forms be typed. Some require a notary signature. Some require the agent's signature. For some lines of insurance, the states require various types of federal licenses.

What is an agent's address? The variability of the appointment process even applies to mundane issues such as the agent's address. Typically, an agent has three addresses: residence, office street address, and office

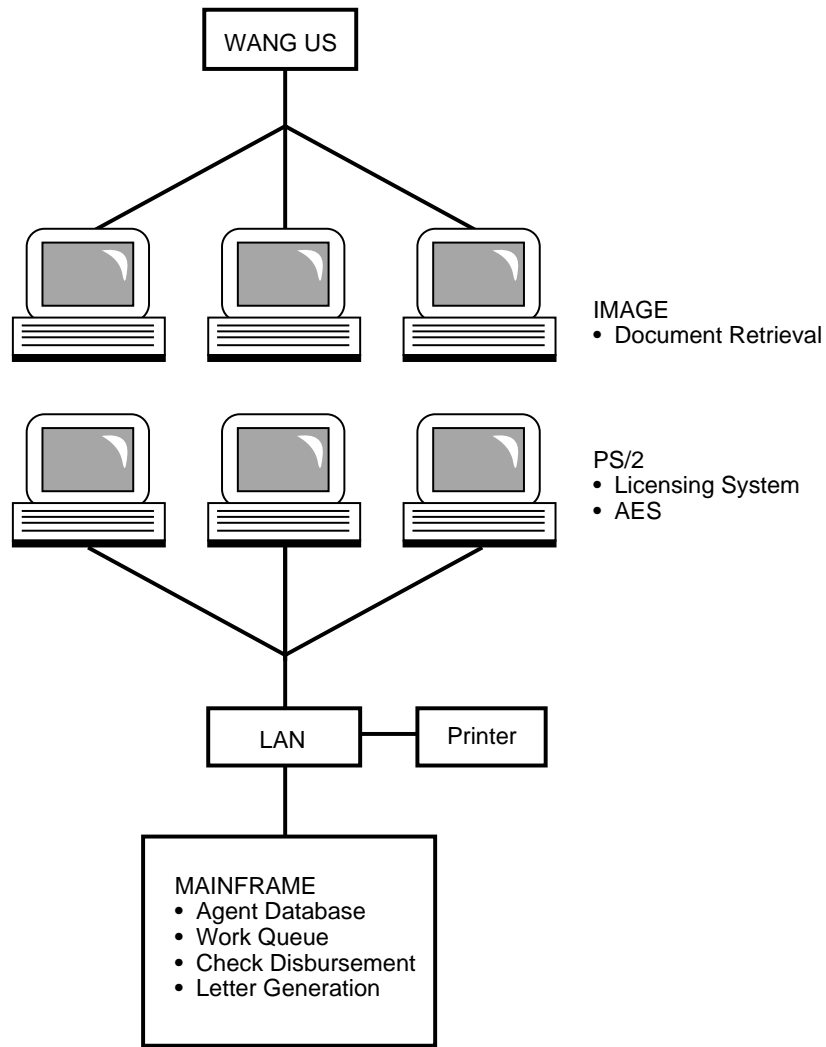


Figure 1. System Architecture.

mailing address. When a form requires an address, a selection from these three, based on state requirements, must be made.

Although not complete, this listing represents more than half of the current variations found in the appointment process. Undoubtedly, the list will grow as time goes on, and states invent new complications. The technical challenge was to find a way to accommodate these variations in an architecture that was sufficiently transparent to be maintained by the insurance company staff and flexible enough to readily accommodate changes to state regulations.

System Architecture

As described earlier, two major software systems are used together in the processing of appointments, although at this time, they are not physically connected. The first is an imaging system that holds images of all documents associated with an agent. This information includes licenses, applications, and other forms and correspondence. The second system, the licensing system, contains machine-readable data associated with an agent (figure 1).

The licensing system itself resides on approximately 10 IBM PC model 80s running OS2 with 16 megabytes of memory. The personal computers are connected on a local area network, which serves primarily as a gateway to the mainframe and the Smart Printer as well as a distribution vehicle for software upgrades. In regard to the licensing system, the personal computers do not talk to each other except by passing data through the mainframe.

Each workstation is connected to a mainframe computer that serves as a gateway to other systems used by the licensing system:

First is the *agent database system*. This system contains information about the agent and the current status of the appointment, including missing information or documents.

Second is the *work queue tracking system*. Problems associated with processing an appointment are recorded and tracked on this system.

Third is the check disbursement system. This system writes a check on receiving an electronic request from AES.

Fourth is the automatic letter generation system. This system automatically writes congratulatory and other letters on receiving an electronic request from AES.

Software Architecture

One approach that was initially considered was to represent the state data as tables and have processing done as table lookups. This ap-

proach would yield a working system but at an enormous loss of flexibility and maintainability. For example, the state addresses could nominally be placed in a table of length 50. However, this length is not sufficient. The addresses currently vary along at least two other dimensions because of exceptions in a few states: type of product and type of action (appointment or termination). One can conceptualize other dimensions that states can add in the future, such as type of agent (corporate or individual) or resident versus nonresident. Adding or removing these dimensions as they came and went would require extraordinary modifications to the tables.

Instead of placing the appointment procedures into tables whose access keys represent the appointment situation, each appointment procedure is represented as an ART-IM (ART-IM is a commercially available expert system development language from Inference Corporation) schema that not only describes the particular procedure but also contains all the information identifying where it is applicable. The advantage of this approach can be shown with an example: If the state of Ohio splits its insurance address from one into two, depending on whether the agent is a corporation or an individual, then the one data schema in the system is copied by the programmer into two schemas, one with each address; the one requirement limiting the applicability to the state of Ohio is amended to add a second requirement based on agent type. This change is relatively simple and can readily be made by a programmer who is not versed in the overall system architecture but is given a simple maintenance manual.

The following example is a typical procedure schema in the system written in pseudocode:

```

Schema Mississippi-individual-appointment-procedure
  tasks           Appointment
  states          MS
  companies       Anchor or Sun
  agent-types     Individual
  resident?       ANY
  product-types   ANY
  required-output-forms MS-life-form-1
  fee-schema      MS-appointment-fee
  required-internal-forms appointment-acknowledgment
  mail-schema     MS-address

```

In English, this schema states that if this entry is an appointment (not a termination or a renewal), the state is Mississippi, the insurance company is either Sun Life of America or Anchor National Life (subsidiaries of SunAmerica), the agent is an individual, s/he is a resident or is not, and it is for any type of product s/he is requesting, then the

form MS-life-form-1 must be submitted to the state, the fee information in the schema MS-appointment-fee applies, an appointment acknowledgment is expected from the state, and the address information in the schema MS-address applies. This procedure is only one of many that apply to this situation. Other procedures specify license requirements, details on how to fill out form MS-life-form-1, and so on.

Given this general data architecture, an agent appointment is processed by AES by first formulating a schema describing the task at hand. This task is next broken into subtasks because agents typically want to be appointed in more than one state for more than one insurance line. The description of these subtasks includes type of agent, resident status, state for appointment, and types of insurance products. An example of a subtask in pseudocode follows:

```
Schema Subtask-1234
agent-type    individual-in-corporation
task-type     appointment
company       Anchor
product-type  fixed
state         MS
resident?     no
```

The heart of the system is a rule engine that uses ART-IM's pattern-matching language to match procedures with the subtasks they apply to. Conceptually, the procedures themselves direct the process. They appear to always be on the lookout for subtasks to match and attach themselves to this subtask.

When the matching process completes, the procedures that attached themselves to a subtask are gathered and converted into actions to be taken by the system, such as requesting a check made out to the state or printing application forms to be sent to the state.

The deployed AES system contains over 2500 permanent schema and about 100 rules. Some additional schemas, for example, representing subtasks, are created and deleted at run time.

Operation and Maintenance

AES processes between 100 and 200 appointments each day. There are approximately 10 appointment processors, each with their own terminals. The one printer is shared between them.

State and federal regulations, forms, and fees change frequently. Each month, listings of state regulation changes are received through an industry service that tracks the regulations. Because AES is a vehicle for process and regulatory compliance, changes must be made imme-

diately to avoid state appointment rejection and subsequent rework. Although the original system was built by Inference Corporation, system maintenance is handled by the in-house SunAmerica management information system staff, usually within 48 hours, including coding changes, model office testing, user approval, and production release. AES has run successfully since August 1990, and numerous updates to state regulations, forms, and fees were processed during the first five months of production.

Innovations

AES innovations include the use of expert system technology to facilitate a corporate relocation without a transfer of staff, the only real-time expert system deployed for insurance appointment processing, and a system that encompasses a PS2-OS2 expert system deployment working with image processing.

Payoff

AES has enabled SunAmerica to solve an industrywide problem, retool the appointment process, and achieve the following successes: (1) as a high-speed appointment service, a reduction in processing time from 2 weeks to 2 days; (2) a reduction of appointment staff by 70 percent; (3) the elimination of rework and the optimization of time to obtain appointments because of state rejection of applications; (4) a reduction in training requirements; (5) the automation of regulatory compliance; and (6) the fast assimilation of state regulation changes.

Acknowledgments

The authors want to acknowledge the invaluable contribution of expertise from Carol Ann Howard, formerly of SunAmerica. The authors also want to thank the following knowledge engineers for their professionalism and hard work in writing a unique system under tight time constraints: Elizabeth Ralston; David Subar; and especially, Mark Clark, Eric Hestenes, Barbara Starr, and Gary Vrooman.