Enterprise Technology Projects and the Role of the Actuary

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About the Authors

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Enterprise Technology Projects and the Role of the Actuary

Abstract

As technology advances rapidly, insurers may be faced with difficult choices in either maintaining large legacy systems that are based on older generation technologies and designs that are becoming outdated or migrating such systems into new technologies. Implementing new technologies can be revolutionary for an insurer in requiring the development of new skills, new system and process designs, and new ways of doing business. Choices regarding technology thus require strategic business decisions.

The paper will describe the approach that The St. Paul Companies is using to successfully redesign commercial lines policy processing and to migrate the supporting systems from a legacy mainframe environment into a client server environment. The client server system uses an object oriented design, a new generation programming language and indexed table relational data storage techniques. The resulting system has received significant recognition.[1] The paper will focus on business issues rather than technical systems considerations. The role that actuaries play in such an enterprise project will be discussed.

INTRODUCTION

Property and casualty insurers can enhance their competitive advantage by implementing improvements in the efficiency and productivity of core business processes, such as policy issuance and claims management. An essential component of many business processes is systems. In the late 1990s, client server technologies, which often utilize Windows-style desktop designs, provide the tools for replacing rigid legacy systems with highly flexible, efficient, user-friendly systems. The resulting improvements in productivity can be significant.

In this paper, the term "enterprise project" will denote a project that reengineers or otherwise significantly improves a core business process. Projects that create such large-scale improvements require a substantial commitment of time and resources, and can thus be a considerable strategic investment for an insurer. Enterprise technology projects involve more than the redesign of systems. Such projects may involve a rethinking of products, services, workflows and processes, as well as the systems that support the business.

[1] *In 1999, the system received a Computerworld/Smithsonian Laureate medal. The award recognizes those "whose visionary use of Information Technology produces positive social, economic and educational change." A case study related to the system has been placed in the Smithsonian Permanent Research Collection.*

Enterprise technology projects require the creative and cooperative application of business and technical disciplines within the company. Actuaries can play an important role in providing expertise in many areas such as data analysis, data strategy, the mechanization of complex computational algorithms, and product design and pricing. Actuaries can also benefit from participating in the redesign of core business processes. Such processes often extend well beyond the scope of traditional actuarial responsibilities but are fundamental to successful company operation.

In reengineering a core process, the issues that must be addressed include:

- How does the project support the business strategy?
- How should the project be initiated? What are the key questions to ask, and what data might be helpful in answering such questions?
- If a new processing system is required:
  - Should it be implemented in one large step to minimize the number of operational changes or in stages to begin realizing benefits in advance of full project completion?
  - Does the system need to be built by the company, or is a vendor system available that can meet business and technology requirements?
- Is there an advantage to updating or redesigning products at the same time that the new processing system is being built?
- How can an existing book of business be migrated from the old to new process with minimal disruption? What are the transition issues?
- What skills are needed to successfully execute such a project, and what role should actuaries play?

There are many ways to approach an enterprise technology project. This paper provides an overview of the way in which a national property and casualty insurer is addressing these issues and is successfully redesigning commercial lines policy processing in a client server environment.

BACKGROUND

In the mid-1990s, the USF&G companies, which are now a part of The St. Paul Companies, had a commercial lines book of business with direct premiums in excess of $1 billion. The major lines of business were General Liability, Auto, Property and Workers Compensation. In addition to the major lines, the company also wrote numerous other commercial lines, such as Businessowners, Crime and Inland Marine.

As a part of the overall business strategy, the company had established key initiatives that included a marketing focus that was directed at targeted commercial lines segments Different capabilities were needed for success with the different target segments For example, certain of the targeted middle market segments required specialized coverages and services, while success with small commercial customers required efficient processing and competitive pricing

Other key strategic initiatives included modernizing systems The company was beginning to explore the benefits and challenges of migrating core business processes from rigid legacy mainframe systems to client server platforms Commercial lines policy processing was a primary area under consideration The benefits of client server technologies were becoming evident through small, specialized systems that were being developed in user-friendly, Windows-style environments However, at that time, client server technologies had not been widely utilized in the insurance industry for large-scale enterprise systems such as policy processing systems, and the prospect of migrating such systems from legacy to new technologies presented many challenges

SITUATION ANALYSIS

Building a policy processing system would be a challenging project for a new insurer that has not yet begun operation However, the business and logistical issues and decisions involved with building such a system are more complex when processes and systems are already in place and an existing book of business must be maintained as the new system becomes operational Thus, in order to determine whether to undertake the redesign of commercial lines policy processing, as well as how best execute such a large project, an analysis of the existing situation was done as a first step A team that included actuaries, underwriters and system architects worked to analyze the following areas

BUSINESS	TECHNOLOGY	PROCESS
Distribution of book of business	Review of legacy systems	• Policy issuance
• Frequency with which forms and coverages are written	• Advantages and challenges with new client server technologies	• System usage
Competitive product analysis	Available vendor systems	System maintenance
Input from producers		
Business strategy		

Business Analysis

Distribution of book of business

The team needed to thoroughly understand the existing commercial lines book of business. An important step was to review the distribution of business by line, state, customer size and product mix. This information would have important implications for whether to undertake the project and how best to execute it.

The distribution of premiums by line of business was generally consistent with the distribution for the industry as a whole – General Liability, Auto, Property and Workers Compensation were the largest lines. The distribution by line of business could impact the project in various ways, such as:

- A new system could be built by starting with the largest premium volume line. The next step would be building for the second largest line, etc. Thus, the project would be executed and the book migrated on a premium volume basis. However, if the largest volume lines have a high degree of coverage and rating complexity or significant differences by state, such as is the case with Auto, then the initial phase of system development might be particularly complex, adding to the risk of project failure or delay.

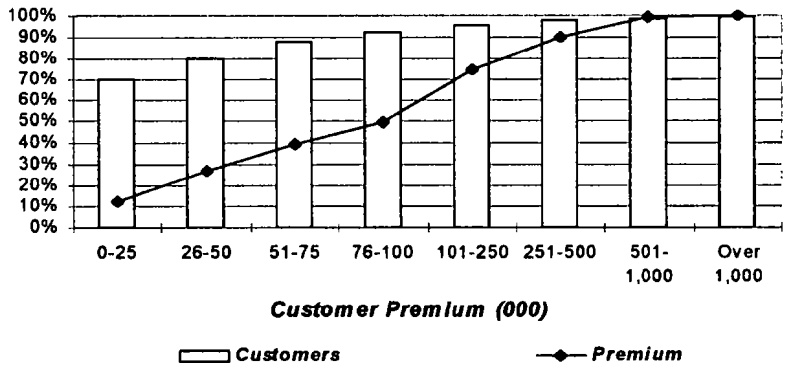
  Also, the company had traditional mainframe policy processing systems for the largest lines, so the short-term incremental benefit from starting with one of the largest lines could be small.

- The new system could be developed first for a smaller premium volume line which did not have legacy system support. This would provide an initial incremental processing benefit. If a line could be identified which had low relative complexity of coverage and rating, then this could allow the project team to get the new system productional more quickly and to gain experience with new technologies with less risk of failure.

The company wrote business in all states, and while premium volume for some states was large, business was not heavily concentrated in any particular states. The project could thus start with the largest states and progressively add smaller states. However, implementation for the largest states would require processing capability for several lines. This would be a large "deliverable" for the first stage of the project.

The distribution of customers by total customer premium was analyzed, and the results were similar to those shown below.

Cumulative Percentage of Commercial Lines Customers and Premiums by Customer Premium Size



The company generally defined small commercial customers as those with property and casualty premiums under $50,000, no unusual or prohibited exposures, and no requirement for premium audit or loss control services. Middle market customers were those that did not fit the small commercial definition. For underwriting reasons, certain business segments were defined as middle market regardless of premium size.

The analysis showed that while the larger portion of premiums came from customers which fit the definition of middle market, the majority of customers, policies and premium transactions came from small commercial. This was both compelling and a bit surprising. Underwriters and actuaries often have their attention drawn to the exceptions or unusual situations, such as the largest accounts, complex programs such as large deductibles, new products, or industry segments which have unique pricing or coverage considerations. Products for small commercial tend to be standardized and premiums per policy are low, so there may be limited awareness of small commercial.

Based on premium volume, the company had generally thought of its book of commercial business as a middle market book, yet the largest portion of the customers fit the definition of small commercial. Profitability for writing small commercial requires efficient processes. This suggested that a focus on small commercial, which is a focus on transaction volume and processing activity, might be the place to begin the project.

The analysis also revealed that most customers had exposure in only one state. This was understandable in light of the preponderance of small customers. This fact could have implications for the manner in which a new system would be implemented. If a significant

portion of customers have multi-state exposure, then functionality for most or all states would have to be completed before the system could be used in production for a line of business. However, if the majority of customers have exposure in only one state, it makes the possibility of introducing the system on a state-by-state over time more feasible. This would result in a more manageable project and could reduce the chance of large-scale failure or significant delay.

Review of existing products

Products had been added incrementally over time as the need arose. A thorough review of the entire inventory of products had not been undertaken for some time, but the project provided the incentive to do so. Data was retrieved from the corporate databases, and the frequency with which the many available forms and coverages were sold was analyzed.

It was determined that approximately 120 types of commercial lines policies were available, each with its own declarations, coverage forms and endorsements. It was found that a significant number of forms were sold infrequently and that a small subset of available products accounted for much of the coverage written. For example, for Businessowners, the Basic, Broad and Special policy forms were available, but Special was sold to a large majority of BOP customers. This raised the issue of whether it was really necessary to sell the Basic and Broad forms and to maintain system support for such a small component of the book of business. Would the Basic and Broad form customers buy the Special form? The need for specific products was reexamined in light of the target marketing strategy.

There was also a significant amount of similarity among some of the products. It raised questions about the need for all of the products and the cost/benefit of maintaining system support for all products. Did underwriters need all of, or even most of, the similar products? Was the company "competing against itself"?

Given the large percentage of customers that was defined as small commercial, a competitive analysis of products and services was conducted for competitors that were identified as "best of breed" for small commercial. One finding was that proprietary package policies were growing in importance in the marketplace and that these products tended to provide standardized coverage options.

Discussions were conducted with agents regarding which aspects of product and service were most important. In general, competitive price was identified as being more important than having a broad product offering, especially for small commercial. The survey also indicated that agents favored insurers with responsive, modern processes for writing business.

Technology Analysis

Legacy Systems

A review of the design and functionality of the policy processing systems architecture was undertaken. The company had two major traditional mainframe policy processing systems that supported General Liability, Auto, Property and Workers Compensation. It was generally felt that the systems had performed adequately in the past. However, there was concern that the systems would not be flexible enough to respond quickly to changes in marketing strategy. Making modifications as new products were developed was difficult and costly, and thus system support was sometimes not added for new products. Business units often looked for cheaper, faster alternatives for introducing new products, such as having actuaries create rating spreadsheets for use by production underwriters.

In addition to the major lines, the company also wrote numerous other commercial lines, such as Businessowners, Crime and Inland Marine. Technology support for policy processing was limited for these lines, and often relied upon manual issuance or small systems that had either been purchased or created internally. These smaller systems did not generally interface with corporate databases, so "double entry" was required to rate a policy and then record the premium transactions in the corporate database.

There were also numerous secondary legacy systems which handled functions related to policy processing, such as keeping track of new business quotes and assigning customer numbers so that all policies for a specific customer could be identified. The secondary systems had been built as separate applications rather than incorporating the functionalities directly into the policy processing systems because it was easier and cheaper to build limited-focus applications rather than to introduce significant modifications into the large policy processing systems. These various secondary systems had been designed and programmed at different times and each had a different "look and feel". This made training and usage difficult. Information was not always transferred from one system to another, so repeated entry of information, such as customer or policy number, was sometimes necessary.

The legacy systems required rigid, sequential workflows. For example, data input screens could often only be completed in a specified sequence. The legacy systems lacked sophisticated Help functions and did not interface well with the popular desktop programs that were being adopted within the company.

Client Server Systems

The company had begun to utilize client server technologies for small-scale systems. The actuaries were among those who had made significant use of desktop applications such as spreadsheets, small databases and desktop publishing. Such Windows-based technologies offer flexible, scalable environments that provide useful end-user functionality that is not

available in mainframe legacy environments. Client server technologies allow the user to work in interrupt-driven situations in which the user can move from screen to screen and task to task without loss of data or functionality. Such systems can be designed to be workflow neutral and thus allow the system user to handle multiple operations and customer transactions within the system simultaneously while also working outside of the systems to address interruptions and urgent requests for quick service or information.

Client server environments leverage object oriented technologies[2]. The design of "objects" that can be reused as a system is expanded is an important advantage of this technology. This allows the creation of versatile systems that are easily modified and expanded by making use of existing objects to create new functionalities. Once a library of objects is created, subsequent system development can proceed in an efficient manner. For example, by decomposing rating formulas for one line of business or coverage into discrete computational units, the opportunity exists to reuse the units and thus leverage a library of formula templates, or objects, for rating new lines or coverages. Form libraries, underwriting rules and processes such as printing can also be built for one product using objects that can then be reused for other products.

The general functionality of Windows-style systems with tabs, Help screens and drop-down menus is becoming familiar to a growing number of people. Such systems are generally more intuitive and are easier to learn and use than traditional mainframe legacy system designs. Ease of use promotes productivity.

Available Vendor Systems

An external survey was conducted to assess the commercial lines policy processing systems which were available from vendors. At that time, the products supported by vendor systems tended to be industry standard products. Significant changes would have to be made to the vendor systems to support proprietary products. Expandability of vendor systems was also a concern. Finally, if a vendor system were to be purchased, detailed knowledge of the system would reside outside of the company. Building the system creates the knowledge internally.

Process Analysis

The existing process was assessed with regard to efficiency and productivity levels. If the existing process was not yielding satisfactory results, could it be modified in a manner that would yield more long-term benefit than undertaking a large redesign project?

[2] Object oriented designs are widely used for client server systems and are supported by programming languages such as Smalltalk and C++. An in-depth discussion of this topic is beyond the scope of this paper. However, many useful references and texts on this subject are available.

A large sample of hardcopy customer files was reviewed to evaluate the end result of the policy issuance process and the issues with using the legacy systems. Systems maintenance processes were separately evaluated. Areas under review included:

POLICY ISSUANCE	SYSTEM USAGE	SYSTEM MAINTENANCE
• "End to end" processing time	• Complexity of system and user "learning curve"	• Time and steps required to implement revised rates
• Backlog of work	• Double entry of input	• Time and steps required to implement product changes
	• Coordination between systems and manual steps	• Backlog of requested revisions

The file analysis was a detailed manual effort but provided useful information. The legacy view of processing focused on screen-to-screen response times. However, rather than focusing on the time it took to do each specific step in policy processing, the team focused on end-to-end processing times. This measures the total time for the workflow that encompasses receipt of customer information, preliminary screening, underwriting, rating, quoting, issuance, delivery and entry of information for written customers into data systems.

Relatively few customers were handled entirely within the two primary policy processing systems because lines of business and coverages other than those supported by the systems were often a part of the total product provided. Thus, there were often manual steps or use of multiple systems in policy processing, and this slowed the process.

Revisions to manual rates could be electronically uploaded in some cases, but revised rates often had to be manually entered into the systems. Changes to forms often required programming changes to the systems, which resulted in prioritization and delays. Business units sometimes did not even try to get new products into the systems, but rather looked for other mechanisms within the policy issuance workflow.

Conclusions from the Situation Analysis

Commercial lines policy processing was a complex process that was not the result of an overall coordinated design but rather had evolved in stages over many years as systems were modified and/or added to address specific business or processing needs. The legacy systems had served the company reasonably well in the past for the major lines of business. However, the various systems were difficult and costly to maintain, and as a result, the systems could not be modified quickly in response to new products and other changes as

the marketing strategy was refined. Many policies for smaller volume lines or unsupported products had to be issued manually. The secondary legacy support systems served important functions, but added to the complexity. Overall, the network of legacy systems and other applications, such as spreadsheets, that supported policy processing would not provide a competitive advantage in the future. Making major revisions to the legacy systems to upgrade functionality would not be a viable long-term solution.

The process was not producing results that indicated a high level of efficiency and productivity.

- In the production offices, end-to-end processing generally took significantly more time than was deemed acceptable. There were backlogs of policies to be issued. The systems were not easy or intuitive to use. New system users had a long "learning curve" to become productive and to coordinate systems with manual processes in order to complete work on customer accounts.

- Implementation of rate revisions and other product changes in the systems required multiple steps, prioritization and a significant amount of lead-time. There was a large backlog of requested enhancements to the systems.

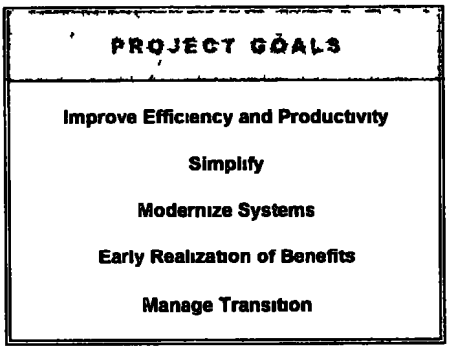
It was recommended that policy processing should be redesigned and that client server technologies could effectively address many of the shortcomings of the legacy systems as well as introduce valuable new functionalities. However, simply attaching a Windows-style "front end" would not work because there were too many separate legacy systems and the workflows within those systems were too inflexible. A new system would have to be built or purchased, but a vendor system that was flexible and scalable enough for the company's long-term needs was not found. The company's Information Services Department would therefore enhance their client server technology skills in order to handle the large-scale project.

Commercial lines premium volume was not concentrated in any particular line, state or industry segment. However, a large portion of customers fit the company's definition of small business, which was a segment of the book of business for which the company felt that it needed to be more efficient in order to compete profitably. The number of available products exceeded what was needed to be competitive in the marketplace, especially for small business.

After conducting a cost/benefit analysis based on best estimates for building with the new technologies and long-term cost savings from increased productivity and efficiency, it was affirmed that a project would be undertaken to reengineer policy processing and the supporting systems.

GOALS OF THE PROJECT

Technology would be at the heart of the project However, the project would be approached in a broader context as a business process redesign effort The ultimate goal was to improve the competitive position of the company, and anything that could have a positive impact would be considered during the project



Improve Efficiency and Productivity

In conjunction with system development, the operational environment would be examined Lengthy processing and underwriting workflows would be reengineered without sacrificing risk quality and price Goals were set for processing times for steps such as rating/quoting (several minutes) and end-to-end policy processing (several days) A threefold increase in transactions completed per user per day was targeted System screen response times were also important, but the flexible nature of the system would make this less a consideration than total processing time

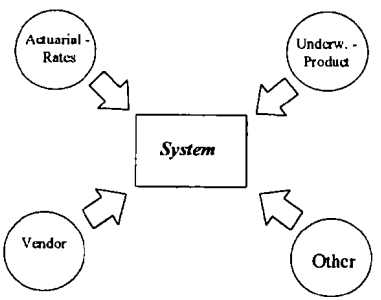
All of the information that was needed to process policies would be embedded in the system Menus and Help screens would make detailed information, such as codes and available coverages, readily available to the users in a Windows format This information, coupled with system edits, would minimize processing errors It was anticipated that errors that did occur would be the result of a user trying to do something that was not supported, such as setting up system diaries improperly Detection of such errors and subsequent discussions with users could suggest future system enhancements

It had taken as long as three months for users to become reasonably productive in using the legacy systems The goal for the new system was to have users become functionally proficient after one week of training Overall, policy processing was to be fundamentally improved

Simplify

Simplification would be achieved in many areas related to policy processing. Products sold infrequently would not be supported by the system, at least in early stages of the project. Key proprietary products would be reviewed with simplicity and processing in mind.

The number of steps required for making product updates to the system would be reduced by providing change capability directly to areas requesting changes. Actuaries would make rate revisions directly to the rate tables and underwriters would add new forms directly to the form library. Some external information, such as updates to Boeckh® property cost valuation information or U.S. zip codes, would also be loaded directly into the system. Many changes to the system would be table driven and put into production within two weeks.



Modernize Systems

A new client server system would merge the various legacy functionalities into one application with one "look and feel." The system would be developed with a Windows-style user interface using an object oriented design that would be scalable and flexible in response to product changes and system expansion. The database would be relational and would be capable of handling large volumes of transactions and many concurrent users. The database would also connect to critical systems and databases that remained in the legacy mainframe environment, but the legacy interface would be hidden from users.

Early Realization of Benefits

The magnitude and scope of the project were large with strategic implications for the company. It was therefore decided to introduce the new system in stages. This would have several benefits including:

- The system would become operational and process business much sooner than if the company waited for project completion.

- The technology was new and relatively untested for enterprise projects. Staged implementation would allow the project team to gain experience with the technology and fine-tune the system design based on real-world feedback from the early stages of the project.

- The processing power and data storage capabilities of client server technologies increases steadily, in some cases exponentially, over time. Staged implementation would allow the project to take advantage of technology improvements as the system expanded.

Staged implementation provided the opportunity for regular successes on the project and decreased the possibility of large-scale failure.

Manage Transition

Reengineering a policy issuance process while maintaining an existing book of business presents challenges that creating a policy issuance process in a start-up situation does not present. Service to existing customers and producers must be maintained as the changes are introduced. If products are revised, converting on renewal allows the insurer to provide a change in coverage notice to customers.

BEGIN WITH SMALL COMMERCIAL

The situation analysis demonstrated that a large portion of the customers fit the company's definition of small commercial, and a large portion of policy processing transactions was associated with these customers. Small commercial tends to be transaction intensive with low average premiums per policy, so long-term profitability requires creation of low-cost processes that capture detailed customer information but require limited underwriting.

The goal of product simplification works well for small commercial. These customers tend to have relatively few unique coverage requirements in comparison to larger customers. Standardized coverages and template-driven underwriting are appropriate for many small customers, and customer need for services is significantly less than for larger customers. From a strategic perspective, small commercial is one of the fastest growing segments of the U. S. economy.

In order to realize benefits from the process redesign as quickly as possible, it was decided to begin where there was the most standardization, the largest volume of policies and transactions and the greatest need for processing efficiency – small commercial. An additional advantage would be that development of some of the functionality that is

needed primarily for larger customers, such as premium audit, could be postponed. This would simplify the early phases of the project.

The package product, such as Businessowners, is an important product for small commercial. The company did not have legacy system support for the small package, so it was a logical place to begin the project. The product has liability and property components, so starting with the package would build the foundation in the new system for expansion to other liability and property lines.

BUILD THE FOUNDATION

A full-time dedicated project team was formed which included actuaries, underwriters, business analysts and system architects. In the initial phase of the project, the team considered many issues such as the following:

- In the first stage of system implementation, how important is it to support all classes of business for the package product? Can the actuaries identify a subset of classes for support that will simplify the first stage of the project yet support a significant portion of the book of business?

- Would it be preferable for the package product to be an industry standard product, such as ISO Businessowners, or a proprietary product?

The question of whether it would be expedient to support a subset of classes in the first stage was addressed by analyzing premium volume, projected growth and historical profitability by class for the company and industry. Business strategy was also considered. For example, if the company wants to grow in Workers Compensation, which small commercial classes have Workers Compensation as an important line? Finally, common characteristics among the classes were considered. Which classes have similar rating and/or coverage requirements?

After analyzing the available information, the team decided that the first phase of the project would focus on retail, wholesale, specialty contractor and habitational classes. This provided support for a significant portion of the existing book of business while simplifying the first phase deliverable. This was done to create an initial project milestone that could be achieved relatively quickly. It would also provide an initial real-world test of the new technology. This proved to be beneficial because early experience with the new technology was utilized as the system was expanded.

The team also decided that a proprietary package product would be developed. This would allow more product control. The team would have more ability to customize the product for the supported classes and for processing efficiency. Simplified language and proprietary rating could be designed. In the future, it would allow actuaries to identify

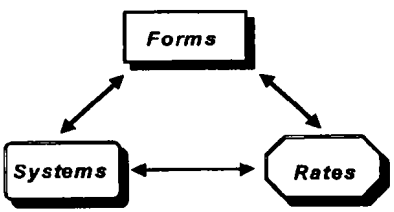
and respond quickly to rate needs as credible experience began to emerge. The company was willing to take on any added filing work in order to have product control.

The new product and system would be introduced for a few states at a time. Such implementations were called "releases." This would allow the actuaries to develop rates and make filings on a scheduled basis and would allow transaction volume within the system to increase at a steady, manageable rate.

Iterative Design Process

The initial phase of the project was a "start from scratch" effort which would build the foundation for all further development. The team worked closely to design new package product, rating methodology and processing system in parallel. Having identified the classes to be supported, only coverages that were needed for those classes would be included in the early releases. A proprietary rating methodology would be devised, and a user-friendly client server system would be built. The system would be built in an object oriented design that would facilitate steady future expansion as the system and supported products grew. The system would be programmed in an object-oriented language called Smalltalk.

The members of the team were encouraged to challenge and rationalize all aspects of the new product and system. It was felt that this interactive, multi-discipline team approach was an important reason for the success of the early phases of the project. An iterative design process evolved in which the various components of the project were considered simultaneously.



For example:

- System considerations impacted the design of the forms. The more coverage options that are required, the more complex and costly the system must be. Underwriters had to reaffirm the need for product options. Coverages sold infrequently for the supported classes might not be included. Company data demonstrated that numerous available coverages, such as "Molten Materials Endorsement," were rarely needed by the customers in the supported classes, and so were omitted from the early releases.

- Rate and rating formula complexity impacted system design. For example, for a specific coverage, do differences by state indicate that a library of rating formulas is needed, or will one or several generic formulas work for most states? What table structure works best for rates?

- Forms and rates impacted the design of objects in the system. For example, what coverage elements or rating components are common to all insureds? The optimal design of objects was an iterative process in itself.

Forms

Strategic considerations, competitive analyses and feedback from producers resulted in the decision to create a low frills package product. Along with property and liability coverages, the new product would provide some inland marine, crime and other coverage options as part of the basic product rather than as separate forms. Some commonly available liability coverages, such as Owners and Contractors Protective Liability and Liquor Liability, were not provided and certain property occupancies were not supported. Manuscript endorsement capability was limited.

While more complex than the typical small commercial package product, the new product would significantly reduce the number of supported forms in the first phase of the project. If infrequently sold coverages were requested, they could be handled outside of the system.

Rates

The actuaries were responsible for pricing the new multi-coverage product. New product pricing took into consideration pricing for the ISO Businessowners product, pricing for the prior company program and filed competitor package programs. It provided the opportunity for actuaries to work with underwriters to identify important rating variables and design a rating structure that reflected only those variables. It also provided the opportunity to review existing rate relativities by class and make revisions as appropriate.

Product simplification resulted in some coverages that had been optional under the prior package program now being included as mandatory, as well as rates that previously had been flat additive charges now being included as multiplicative components of the base premium. In each case, the actuaries had to be creative in pricing. For example, in determining rates for mandatory coverages that had been optional under the prior program, considerations included:

- To what extent do all supported classes have the exposure?

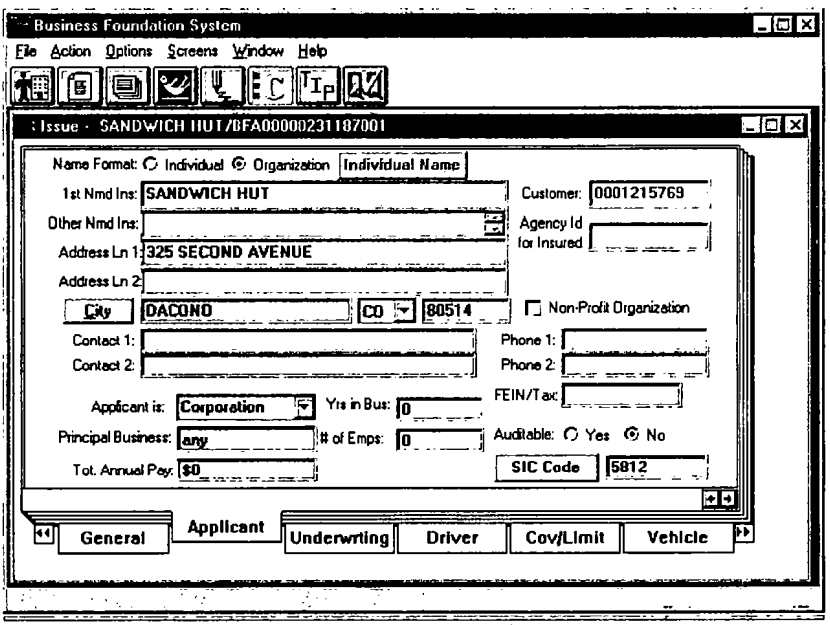
- Is the prior rate appropriate for all classes?

- If the prior optional rate was an additive amount, should the new mandatory rate be a multiplicative component of the base rate, and if so, how should the conversion be made?

The actuaries worked with the underwriters to set initial class rate levels to achieve profitability and competitive goals. The rate level impact for renewal business that was converting to the new product was an important issue. Would rates for the new product be set in order to achieve an overall rate change or to be revenue neutral? Given the coverage and rating algorithm changes from old to new product, how would the overall rate impact for converting business be calculated?

System

Business analysts were taught to create specifications for object-oriented Windows-style systems. System architects and programmers perfected their skills with the Smalltalk language and the client server relational database. A user-friendly Windows-style system would be designed which would be intuitive and easy to use, thus presenting fewer barriers by skill type and allowing people with a wide variety of backgrounds to be trained to use the system.



Example of client server screen design.

The actuaries would be involved in various aspects of system design and use:

- A "rating engine" for the new product had to be designed. There were many issues and details involved in translating the rate structure into a table-driven system structure for storing rating rules and rating values on either a written date and effective date basis (depending upon state). The precise sequence of rating and rounding steps had to be determined for the various coverage options. Important state differences had to be considered.

  The decomposition of the rating formulas also led to definitions for some of the system objects. Each step in a rating algorithm includes a reference to a data element or intermediate result. In an object oriented design, these steps are combined into larger formulas and stored in the database. The rating engine reads the formulas from the database and resolves all formula elements into real data or other formulas. Once all formulas are resolved to the lowest level, the specified calculation is performed. The team found that the actuaries were best at designing formula hierarchies and rating objects.

- Actuaries helped to determine data fields that would be captured in the system. The project presented an opportunity to consider data elements that might be useful for future analysis.

- The client server environment interfaced well with desktop spreadsheets and other packages that were used for product development and actuarial analyses. This allowed ongoing processes to be established which gave actuaries a key role in system maintenance and use.

  - The actuaries wanted to minimize the number of steps and potential for interpretation errors that might arise with entering rates and formulas into the system. The actuaries therefore learned enough of the Smalltalk language that they could provide system programmers with formulas coded in the language. Thus, business analysts did not have to translate rating formulas for the programmers.

  - The actuaries would provide rates in Microsoft® Access tables, which would then be checked, tested and loaded directly into the system. The tables allow for easy update of computational data elements such as rates as well as reference data elements such as class codes and territory codes. In general, efficient table design is a critical component of system design in a client-server environment, and the actuaries played an important role in table design.

    Allowing direct access to the system for those making revisions resulted in "time to market" for approved rate and product changes generally being kept to two weeks. This was a significant improvement over the multiple step, project prioritization processes that were required in the legacy environment.

- The production database that held policy-level customer information would be replicated into a relational database on a regular basis. This replicated database would allow ongoing data retrieval and analysis by actuaries and systems users without impacting production. The actuaries learned to use Rapid-SQL, a structured query language, to extract data from the system for analysis. Along with their own analyses, actuaries utilize their knowledge of table and algorithm design to resolve many rating issues that arise in production.

The team created interfaces between the client server relational database and the corporate databases that remained in the legacy mainframe environment. Coding was established to facilitate future ratemaking and other analysis. Mappings of proprietary coverages into bureau codes were determined for reporting to statistical agencies.

Features that would not be needed initially for the new product were not built. For example, premium audit functionality would be postponed because this is used most often with middle market customers. Endorsement processing was kept simple because small commercial customers do not tend to make significant mid-term changes.

TRANSITION ISSUES

If an existing book of business must be supported during the reengineering of policy processing, transition issues are an important consideration. Electronic conversion of an entire book of business from an old to new system in one large processing step would be a very difficult if there are no product changes. However, product and coverage changes make electronic conversion not a viable option. Coverage changes must be introduced over the renewal cycle so that disclosure notices can be sent to insureds in advance of renewal.

The actuaries had to address transition issues that result from migrating an existing book of business to a new product, such as the following:

- As new product pricing is established for each state, how can unintended price dislocations be avoided? Can old and new product rate comparisons be automated to quickly identify large rate changes? Should a premium transition rule be included with new product filings in order to limit rate changes for each renewal customer to a specified range?

- It will take several years for new product experience to emerge which will be credible for rate level and other analyses. How should results for the new product be monitored during the transition phase?

- As credible experience does emerge, can it be combined with experience from the prior product, or are coverage differences between the old and new product large?

- If conversion to the new product is intended to be mandatory for supported classes, should corporate data be monitored to assure that conversion is occurring? Are the underwriting guidelines for conversion clear and being executed properly?

- If the intention was for the conversion to achieve a certain revenue effect, how can the effect be measured as the book actually converts?

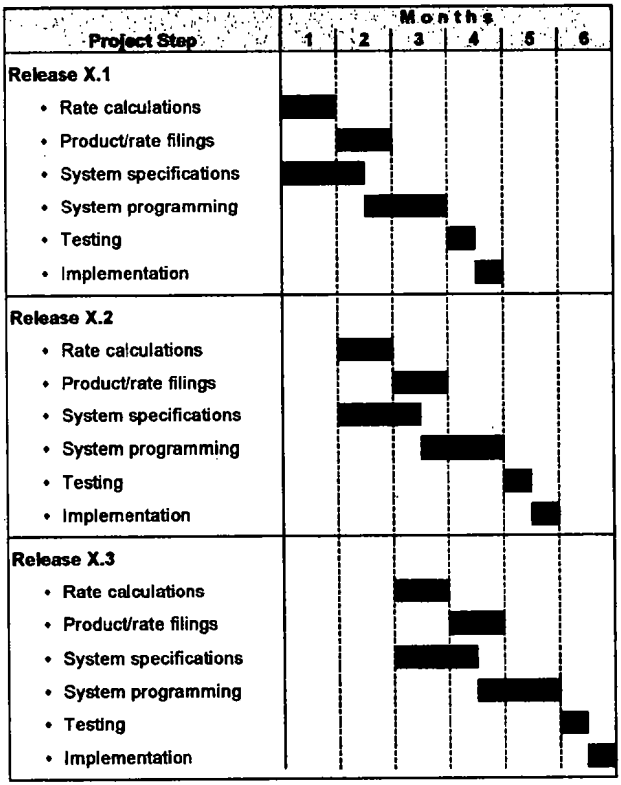
There were many transition issues for system users. Those who had become adept at using the legacy systems had to learn a new process, workflow and system "look and feel." Change in general, and technology in particular, can be intimidating, and some of the users who were very knowledgeable and comfortable with the legacy systems struggled to adjust to a new paradigm.

ONGOING IMPLEMENTATION

The first releases introduced revolutionary change. New processes and workflows were put in place and were accompanied by significantly higher productivity expectations. The new product had to be explained to agents and production underwriters. The new system was installed in production offices, and policy processing technicians were trained in the use of the system. System architects had to fine-tune the performance of the new system as usage increased. Actuaries began to monitor data.

Once the foundation product and system were ready, the dedicated team established a demanding implementation plan. Rapid, staged implementation required ongoing parallel development of several releases. In the early phases, system releases were introduced monthly. Each release of the system introduced the package product in several new states. The actuaries thus had an aggressive schedule of calculating state rates, making filings and updating the system. The goal was to stay ahead of the system programmers. Details, such as mine subsidence coverage, windstorm coding, Fair Plan notices, taxes, and required forms, vary by state. As a result, for each release, system screens had to be created or modified, forms added to the system, and rates and formulas developed.

The plan was for each release to take four months from beginning to end and that a new release would be implemented each month. A small part of the project plan would have looked as shown below. Project management and coordination became particularly important in keeping rapid parallel development on schedule.



EXPANSION OF SMALL COMMERCIAL

The foundation product and system were designed with expansion in mind. The first releases of the system were kept focused to provide early successes upon which to build and to gain experience with new technology. However, in keeping with the team's parallel development approach, the product and system enhancement phase began before the foundation was implemented for all states.

Enhancements would be adaptive changes within the system rather than the revolutionary changes brought about by the early releases. Programmers and users, including actuaries, were now familiar with the system design and technology, so the "learning curve" for

enhancements would be significantly less. Programmers could make use of experience gained in working with the new technology in production. It was expected that the reusable objects that were designed in the early phases of the project would simplify subsequent development efforts.

Enhancements generally fell into two categories: product expansion and system feature expansion. Enhancements were implemented as needed as a part of the ongoing releases.

Product expansion

It was expected that agent and customer demands would result in pressure to broaden the package product and supported classes. Actuaries worked with underwriters to analyze historical experience for classes that were not initially supported and thus determine if expansion to include specific classes fit the business strategy. Underwriters considered which coverage options were needed as the supported classes expanded.

As a part of the parallel development process, the team began work on Commercial Auto. Business analysts who were knowledgeable regarding Auto were added to the team and were taught to create specifications for object-oriented design. The existing Auto product would be utilized. However, as with the package product, simplicity and necessity remained important guidelines. The team drew upon data analysis and underwriting expertise to determine which classes and coverages were needed for small commercial. Inclusion of classes that were written infrequently for small commercial, such as garage or zone-rated, or options such as composite rating, was postponed until a later project phase. Such business could be written manually or in the legacy systems for a while longer if necessary.

Several actuaries were added to the team to support Auto. The actuaries worked with the business analysts and programmers to design a rating engine and learn the processes for entering and retrieving information.

Feature enhancements

Feature enhancements were identified by the project team and by system users. Some of the enhancements were functionalities that had been postponed until needed. Enhancements included edits built into the front end of the system to identify policies that required special attention. Edit criteria included policies with renewal price changes outside of an expected range or those with classes that presented special underwriting considerations. Expanded manuscript endorsement capability and a limited amount of premium audit functionality were also added.

It is also noteworthy that the system architects regularly evaluated performance and design. Such aspects of the system as object design were reviewed. If experience with the

system in production suggested that the design of certain objects was proving to be less than optimal, the objects would be redefined ("refactored" is the technical term) to improve performance.

INTERNET CAPABILITY

The internet is introducing revolutionary changes in property and casualty insurance industry. The internet is a free, nonproprietary channel for information distribution and commerce. It thus raises long-term strategic issues regarding product distribution and sales. At this writing, much of the internet commerce activity in the industry has been focused on marketing personal lines directly to customers.

The project team recognized the long-term potential of the internet for small commercial. An initiative was undertaken to add e-commerce capability to the system at a time when little commercial lines business was being sold on the internet. The client server technology and environment in which the policy processing system was built are compatible with internet development tools, and thus the system facilitated web enablement. It is unlikely that the legacy systems would have supported ecommerce as effectively as the client server system.

The functionality of the system was extended directly to selected agents through secure access to a website. The system includes embedded underwriting templates that guide agents as they complete policy processing remotely. In developing ecommerce capability, agent input was solicited so that the internet application would meet expectations and requirements.

The ecommerce initiative proved to be another incremental success for the project team.

EXPANSION TO MIDDLE MARKET

Support for the entire commercial lines book of business is the long-term plan for the client server system. Support for middle market is a significant phase that remains to be completed. Middle market actuaries and underwriters had begun providing assistance to the project team as Auto and then Workers Compensation specifications were being written. Thus, the project began to broaden in scope within the company as line of business knowledge beyond the team's expertise was required.

Middle market commercial customers require a wider variety of coverage options, program options (such as composite rating, retro rating) and services than are needed to write small commercial. The client server system was built to be expandable, but the early releases were focused on the needs of small commercial. Thus, the system did not support numerous products required by middle market customers.

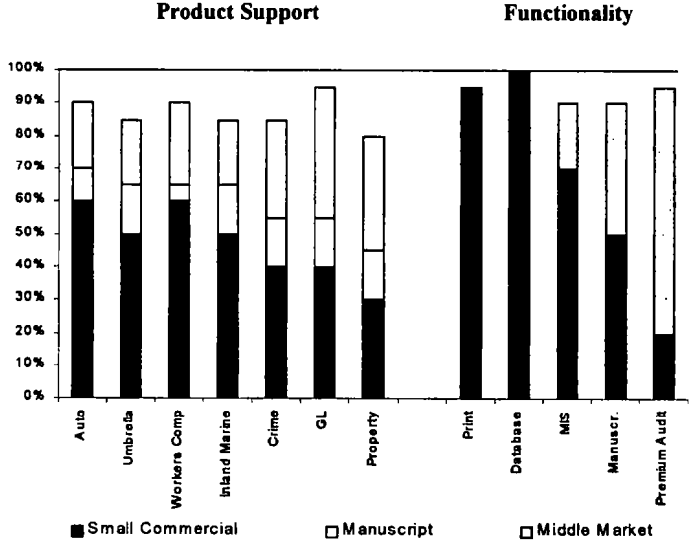
The middle market actuaries and underwriters did an abbreviated situation analysis of their book of business and products. The degree to which the system supported middle market needs was considered. At this writing, the precise degree of product and functionality support that will be needed by middle market is still being assessed. It is expected that the system will provide a good foundation for middle market support.

For product support, additions will be needed. For example, the liability and property functionalities that are already in the system for small package will have to be expanded to include various features of the industry standard General Liability and Property forms. Auto will be expanded for garage and other classes not needed for small commercial. It is expected that the system object design and the team's experience with client server technologies will facilitate this expansion.

Most of the necessary processing functionalities already exist. Databases, forms printing, some reporting capabilities and other features have already been created. Middle market will make full use of these features.

For illustration, the development of the system may evolve in a manner similar to that shown below. Small commercial provided the foundation for the system in terms of coverage and functionality supported. Manuscript endorsement capabilities extend the product support opportunities within the system. Middle market will develop the remaining product and functionality support that is needed for commercial lines.

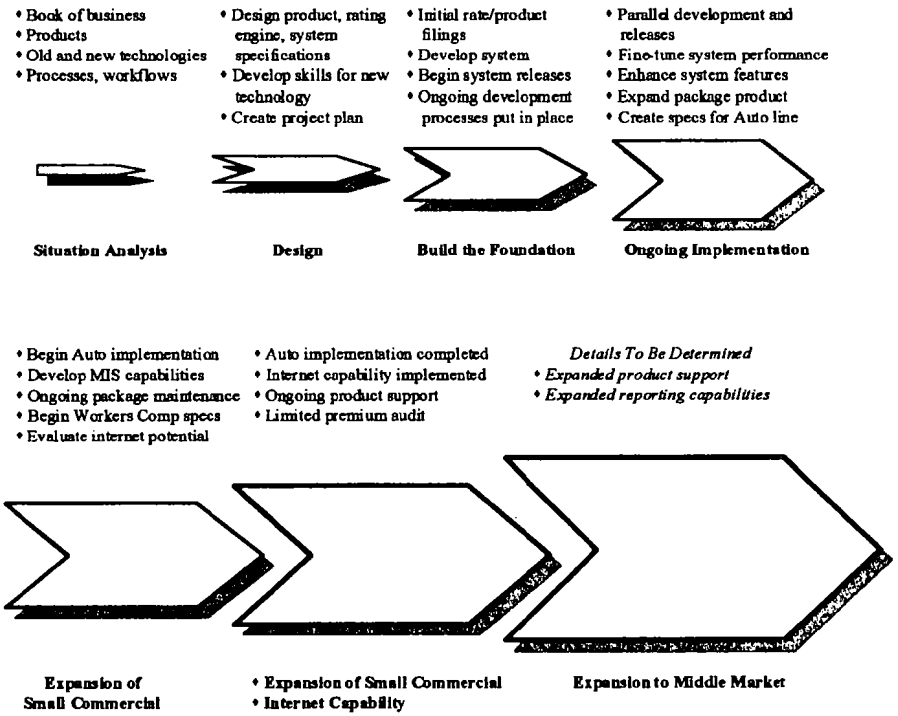
System Support for Commercial Lines



It is anticipated that building 100% support may not be practical. The marginal cost of support for the most infrequently sold products may never be justified. It may also not be practical to program all required management information system (MIS) reports within the system. Actuaries may have to compile information to complement system reports.

Expansion for middle market will be a logical continuance of the adaptive changes that have been ongoing since the early phases of the system. With the addition of middle market, the conversion of the enterprise legacy system will be accomplished. The overall project is summarized below.

Project Overview



FINAL COMMENTS

Enterprise technology projects are not just about technology. Such projects are strategic initiatives that must be viewed in light of the business goals and processes that the technology supports. Project success may require rethinking products, services, workflows, technology platforms, distribution channels and other aspects of the business. Considerable change will be introduced into an organization as a result of such projects.

The project described in this paper continues as a successful work-in-progress. For the part of the commercial lines book that is currently supported, efficiency goals have been realized. The client server technologies work well. The system has been recognized several times for excellence in supporting business goals. The project team continues to expand and refine the system, as well as investigate the potential of ongoing improvements in technology. As the project progresses, the team's knowledge and skills in working with new technologies on a large scale increases.

As stated at the beginning of the paper, there are many ways to approach a project of this size. The approach discussed above suggests:

- Begin with a thorough analysis of the existing situation. Attention is often drawn to the exceptional cases rather than the common ones. Actuaries can be very helpful in pointing to the important issues.

- If a project is to be undertaken, and especially if it involves new technologies, plan the project in realistic, deliverable phases. A steady stream of small successes builds confidence in the long-term viability of the technology and project. It allows the team to gain beneficial experience and reduces the chance of large scale failure.

- Consider beginning where the processing volume is the greatest. If developing a new claim processing system, consider starting first with the high volume, low complexity claims, such as those for auto physical damage. Implement functionality for complex claims as an expansion.

- A large, dedicated, multi-discipline team will be needed. The team must be willing to learn new skills and be enthusiastic about technology and change, both of which can be intimidating.

- Highly coordinated project and change management is critical to success.

Traditional mainframe systems remain powerful tools that may continue to play an important role among insurer systems. However, as client server technologies continue to evolve and improve, insurers are presented with viable alternatives. Large-scale client server systems have been developed. As technical professionals, actuaries can play a critical role in assisting their organizations to recognize the capabilities of new technologies and to implement revolutionary changes.