TAking Control of the Actuarial Modeling Process
Insurance companies have been increasing their reliance on financial risk modeling software for years. Between intensified governance, reporting requirements, demand for better projections for management, and company desire to achieve better integration with asset modeling, today’s actuarial models are pressured to do more than ever before.

Can One System Do It All?

Open vs. closed systems
With actuarial models being used for more purposes, a mismatch in priorities is occurring between the various types of models. Pricing and ALM models require greater flexibility and transparency, whereas valuation and economic projection models require more precision and prioritize governance. Along these lines, traditional modeling platforms tend to fall into one of two camps: “open” systems and “closed” systems, with open systems tending to be more transparent, and closed systems having stronger governance. Historically, companies have needed to choose between the two, weighing the pros and cons of each. With an open system, the company gains the flexibility to design the models as they see fit, build company-specific tests, or model new product features, management actions or policy holder behavior that might not yet be covered by a closed system. On the other hand, the closed system brings security to the model, knowing that other companies are using (and validating) the same code base on which a model is running.

The need for multiple platforms
When a company evaluates all these needs, they often come to the conclusion that multiple modeling platforms are needed. Historically, companies in the U.S. have used a combination of open and closed systems that are not generally calibrated or consistent with each other. While each of the systems accomplishes the goals for their individual task, together they are a sub-optimal choice for the insurer. With multiple systems, companies incur higher actuarial costs (both in terms of external consultancy fees and internal actuarial costs), vendor costs, internal IT and infrastructure costs. In addition, they lack consistency between models, and typically have a less efficient path to the adoption of new products, or major changes to existing products or assumptions.

Ideally, a company would be able to run a valuation model that meets its governance needs, and its projection models could then use the same valuation code base. Users would know that there is no difference between the projected reserves and the reported reserves unless the user chose to simplify the inputs made to the projection model. At the same time, they should have the flexibility to model the product chassis however they want, without waiting on a vendor or sacrificing accuracy for the sake of a “generalized” model. This would ensure that all the company’s models are consistent, and substantially reduce the overhead necessary to maintain multiple systems and models.
The modern platform

Rather than choosing different systems for each purpose, none of which truly meet the needs of the enterprise, insurers should focus their search on a modern platform. A modern platform provides governance across the entire solution, without sacrificing transparency, and is much more than just a calculation engine. Most importantly, a modern platform provides insurers with all the tools they need to manage their business, from pricing to valuation to capital management, without outsourcing all of the key development and understanding, keeping control where it belongs, with the insurer.

The question is, can one system truly do it all?

Prioritizing Flexibility and Governance

The typical line of thinking has been that flexibility and governance are competing priorities. The more you open up a system, the harder it is to control what is happening within the model. With increased flexibility and control comes increased security risks. One can easily end up with a convoluted home-grown process that separates the model designers and coders from the staff that runs the model and the staff that uses the output.

Governance should not be viewed as a one-size-fits-all system. Pricing models, for example, need to be more flexible to give pricing actuaries the ability to design, test, refine and retest them. Valuation models, on the other hand, should have robust governance built around them, with strict procedures to segregate production models from test models. Other models typically fall somewhere in between those two extremes. Companies should adopt a strong risk control framework, and then decide what aspects should apply to each of the various modeling functions.

One of the more important pieces of model governance is the ability to identify, justify and quantify model changes from period to period. In order for users to be comfortable with modifications made to the model, they need to be able to run the model before and after the changes, and validate that the impact is in line with their expectations. Ideally, modeling software will have some comparison functionality that highlights the code differences between two models, allowing the users to pinpoint where changes have been made.

If that is not possible, then a detailed and filterable change log should be kept of all the software changes, allowing a user to find only the model changes that apply to his before and after models. If the change log is not detailed enough, then the user might not fully understand the changes that apply to his model. And if the log is not filterable, then the user could be overloaded with information that does not apply to his model, causing him to overlook an important modification.

The True Meaning of Transparency

Transparency means exactly that – allowing the end users to see what is going on. Yet most actuarial software vendors claim that they are “transparent,” even those that offer closed systems.

Closed system providers base their transparency claims on providing reports and documentation of calculations without allowing the user to see inside the closed system. The problem with these systems is that the reports and documentation become obsolete as soon as a calculation is updated, requiring ever-increasing vendor resources to keep them up to date – and considerable time and frustration from users having to validate that the documentation actually reflects what is happening in the code. Many of the calculations have grown too complicated to lend themselves to simply providing a static report or written documentation.

Model assumptions

Beyond just reproducing calculations, transparency also applies to the assumptions going into a model. With a closed system, the vendor needs to either tailor the system for each client, which is unsustainable, or implement features in a generic enough way that any user can use them. While this sounds simple enough, in practice what this means is that the system has countless toggles and switches, often nested several layers deep within products and tables. This design means that in order to truly know what your model is doing, you need to understand what every switch does behind the scenes, assuming you are proficient enough to find where all the switches are.

Closed software vendors have historically countered this with pre-built audit reports that show the applied assumptions and the results of the calculations. This can allow clients to replicate the calculations for a single policy, but as models get more complex, the task becomes more difficult. The calculations on the audit reports become exponentially more detailed and sometimes hard to derive, and when the model has code changes, the users have to identify where the change is implemented in the audit spreadsheets.
Model and data visibility
Actuaries are smart, and are trained to work with incomplete data. Working with what they have and rationalizing results is part of what actuaries need to do on a daily basis. While this work is required in cases where they truly do not have access to the underlying model or data, their actuarial system should not fall into this category. Everything happening in the system is defined through code and assumptions, and documentation and spreadsheets can only take you so far. At the end of the day, nothing beats seeing actual formulas when it comes to understanding what is happening within a model, both for understanding the calculations themselves as well as the assumptions used in those calculations. Documentation and reports or examples are poor substitutes for true transparency.

To further illustrate the difference, imagine two scenarios:

1) You are presented with a fish tank with tropical fish swimming inside of it. You are standing in front of the glass tank and can see everything happening in the tank in real time.

2) You have the same fish tank in front of you, but you have a black curtain all around it and are not able to see the contents of the tank. Instead, you have a five-page document describing the color of the fish, the number of fish, perhaps a stock photo of the type of fish, a description of the color of gravel used and the types of plants, etc.

Number 2 is a poor substitute for number 1, especially when it comes to analyzing and understanding a situation. For example, if you were asked about the health of the fish in each scenario, you could answer much more confidentially in scenario 1. Scenario 1 allows you to see context (e.g., is a fish swimming slower than the others, or are its scales fading?) compared to scenario 2, where you must know exactly what questions to ask or what detail to look for, which likely isn’t known to you at the time. It also allows you to see the events unfolding real time, instead of relying on information about the fish, which might not be up-to-date. Fully transparent systems are similar to scenario 1, providing full and unconstrained access to the calculations, allowing a user to have complete context with which to perform analysis and make decisions.

Transparency allows a company to gain security in their calculations, and critically, makes it easier to explain its models to auditors. Actuaries can see exactly where modifications have been made and trace the effects of those changes.

The Best of Both Worlds – A True Partnership
Changes to the actuarial calculation engine fall into two broad categories: (1) company-specific product designs and reporting metrics, and (2) regulatory changes that apply industry-wide. Users need software that provides enough vendor support for the ever-shifting regulatory environment, but is open enough to allow users to modify the product chassis and implement innovation designs.

Challenges of vendor dependency
Every insurer has unique aspects to their business, whether an innovative new product design or a cutting-edge dynamic utilization algorithm. Complete dependence on a vendor means that instead of diving in and testing out these new ideas, insurers are forced to get in the line, hoping their modeling platform will support their idea before a competitor beats them to market. This can stifle innovation and ultimately lead to competitive disadvantages in pricing and capital management. To get around this, insurers who are waiting in line with the vendor end up building spreadsheets on the side or making top-side adjustments, completely bypassing any controls and defeating the purpose of paying a vendor to support them.

DON’T WAIT IN LINE
Have you even been standing in line to check in for a flight, family in tow, slowly dragging your luggage forward one spot at a time as the ticket agent processes the people in front of you? Just as you get to the front of the line, a group of business travelers walk to the front of the elite line, and you are forced to wait as they tend to the more “important” customers. You’re hoping you’ll get through in time to get some food into your angry kids without missing your flight, or worse, getting “bumped” to a different flight. This is what it is like being fully dependent on a vendor to support your growing actuarial modeling needs – hoping a bigger or louder client doesn’t jump in and bump your enhancements back in the line.
The worst case scenario is that the vendor cannot or will not implement the desired model changes. Vendors must weigh multiple clients' needs when deciding what changes will be implemented, and if a requested change causes too many issues (in either runtime, settings or confusion) with their client base, they can deny the company’s request. This forces the company to either adopt a new system (and all the overhead that comes with a software change), or design their changes outside of the software in a spreadsheet or database application. Neither of those options is very desirable.

Even in a case where the vendor can support the change, once the code is in the vendor’s software, it is typically available to all their clients. Software vendors often cannot maintain separate builds of their software for individual companies, as the maintenance overhead would become overwhelming. This results in a condensed period of time in which the company that requested the new features can be the only ones in the market, in some cases even tipping off savvy competitors who can infer new product designs from system changes.

Sharing the wealth
While it is important that actuaries have the control and flexibility to design and model their products how they wish, there are times when conforming to industry standards are preferable. Vendors that maintain software typically have a good understanding of how their clients are implementing model changes by the service requests that are made. They can get a consensus on how to implement new regulations and have a broader understanding by seeing multiple points of view. This in turn allows clients to see how new standards are being implemented by their peers. In addition, because the new change affects multiple companies, there is a larger pool of testers which should reduce the probability of a calculation error slipping through. Finally, because the change will apply to a larger pool of clients, the change should be at the top of the vendor’s priority list, so a client will not have to worry about prioritization.

Hence, for regulatory or standards changes, a vendor maintained-solution is preferable.

When it comes to enacting regulatory changes, actuaries have typically been very open with regard to methodologies. Actuaries can go to Society of Actuaries (SOA) meetings and listen to discussions and presentations about the ambiguity of a new piece of legislation or reporting standard. Because of this, companies are not losing any competitive advantage by sharing interpretations and methods with modeling software vendors. The entire industry benefits as standards become more homogenized. It becomes easier for external parties (such as state regulators, auditors and stock analysts) to absorb the information, since they are more comfortable that the methodologies are industry standards. This should reduce the company’s time and resources to get those external parties comfortable with the results. It also gives management greater security knowing that the methods implemented by the actuarial staff can be more easily defended.

More Than Just a Calculation Engine

While the actuarial calculation engine sits at the center of the actuarial modeling process, it is only one piece. After all, actuarial models are only as good as the assumptions that go into them (i.e., “garbage in, garbage out”).

As the complexity of models increases, and insurers use the same model across multiple functions within their companies, it is crucial that they have a robust, transparent and controlled process for managing assumptions. Similarly, extracting meaning from the vast array of output produced as part of the expanding number of scenarios processed has far exceeded the capabilities of spreadsheets and local databases. Today’s modern actuarial models now require enterprise-level data management tools.

User roles
Central to any well-governed process is the clear definition of user roles. These roles should provide well-defined segregation of duties so that the users who modify the code or make changes to the assumptions are not the users that validate those changes and promote them into production. Defining user roles is also a way to delineate responsibilities across modeling departments. For example, valuation actuaries should not have access to the pricing model, and vice versa. This allows the company to greatly reduce the exposure that each model has to potential security breaches. It also helps to better define job descriptions and make it clear which user(s) are responsible for each function.

Just as important as determining and enforcing user roles is the ability to document and monitor changing roles over time. Companies should have periodic reviews of each employee’s role and determine if those roles are still required. Actuarial rotation programs, promotions and shifting responsibilities can all lead to potential risks if the roles are not properly maintained. For example, requesting details on access to models and assumptions is a standard auditor request, and Sarbanes-Oxley requires this type of information be maintained for seven years.

Given this level of importance, a modern, enterprise-level actuarial platform should have user management integrated directly into the solution itself, rather than relying on separate tools or outside management of access.
Assumptions management

With impending regulations requiring more robust reporting around assumption management, this facet of actuarial modeling is becoming more important. As crucial as the assumptions are to a model, they have managed to fly under the radar for quite some time. Companies have had to develop their own systems for assumption management, typically with a lesser priority and resource commitment than that of the calculation engine. The end result is often an assumptions management process that is very manual and typically falls short of meeting the governance requirements today’s actuaries face.

A complete assumptions management solution needs to have the same level of transparency and governance that a calculation engine has. It should store historical assumptions individually, be able to group and store a collection of assumptions into a specific purpose (e.g., CFT vs. Pricing), have a robust change control process with approvals and documentation, and allow users to run any of their models with varying sets of assumptions.

A highly governed calculation engine is worthless if users cannot validate which assumptions are going into the model. Unless the two pieces are in sync, it is very hard to convince management and auditors that a model is consistent with prior reporting periods. Additionally, it is critical that a company can reproduce prior runs quickly. Actuaries should not waste time trying to track down which version of each assumption was used for a specific run.

Finally, the assumption management platform should provide built-in reporting functionality. The platform should seamlessly generate an experience report for assumptions to comply with upcoming legislation. It should also provide summary reports that help management keep track of the myriad of assumptions a company maintains. These reports can detail how frequently the assumptions have been updated, what business units are using the same assumptions, and which assumptions are actually being used in production.

Data management

The need to meet regulatory requirements and improve internal risk management is also now driving the prioritization of data from these models and turning that data into actionable information. With wider adoption of the public cloud and freely available, inexpensive computing power available to crunch through the calculations, insurers are placing greater emphasis on data. The time available to perform runs is shrinking, while the granularity of data insurers are seeking is constantly growing.

Actuarial models are complex by themselves, and within companies, can sometimes be viewed as some sort of “Black Magic” entity inaccessible to senior executives. A data management framework should make that data accessible to the relevant stakeholders and give those stakeholders confidence to act on that information knowing it has been part of a controlled process.

Actuarial software tends to provide output with a generic name in a proprietary format. It is up to the users to develop a naming convention for the output, and then document what assumption set was used, what calculation engine was used, and any other identifying information about the output (such as run date, run user, valuation date, etc.). The data management platform should automatically handle this process. The output should be converted to a more usable format (typically a database), have a log generated to tie the data back to the assumptions and model that created it, and store the metadata about the run. This will allow users to accurately and quickly retrieve all the information about a historical run.

Once the data is stored, a system must be established to allow users to access the data based on their needs. There are a variety of potential levels of access, and a good data management system should cover them all. Front-line actuaries might need access to the raw output and accountants will need specific aggregated values from the runs, while executives will need a way of seeing high-level summaries they can dig into if they desire.

If the data has been stored in a database application, getting access to the front-line actuaries is easy. The challenge arises in protecting the results while allowing the actuaries to do their jobs. If a one-time post model adjustment is necessary, the data management system should allow for a manual adjustment to be made to a copy of the data. A log entry would then be created, mapping the new modified output to the original output.

A system that is not well-governed would allow a user to directly modify the raw data and corrupts the entire process. Additionally, if the adjustment is a recurring calculation, then it should be moved to the model (if the model allows it), or automated as part of the data management process. The latter option is not recommended, since the data management process then becomes part of the “actuarial model” and is subject to all the requirements of the calculation engine.

For accountants, chief risk officers or senior actuaries that just need a summary view, the data management system should produce custom, pre-built reports. These reports should be available in different formats such as paper reports, extracts
to be imported into another system/ledger, or web-based reports. The reports should generate automatically and notify the end users when they have been updated.

A data management platform should also provide an analytics view. This will allow executives and senior management to obtain company-wide information at a glance, while letting them drill down into the data should they need a more granular level of detail to support a decision. This will also allow users to build a variety of analytical reports for use in presentations and marketing.

While it might be a challenge, the best data management system should also link to the company’s assumption setting process. Assumption setting actuaries should be able to see the impacts that various assumption changes have on projected values, monitor assumption fit over time, and make changes if necessary.

**Process automation**

Bringing all the calculation engine’s pieces together is the role of process automation. Actuaries have always strived to automate processes and tasks for good reason. It allows actuaries to focus on analysis rather than worry about menial, repetitive tasks. It also removes the chance for human error while running the processes, at the same time speeding up the entire system as tasks are not waiting on the actuary.

While the utopian end-to-end automated process is rarely achievable in practice, a good automation process will allow for the exceptions. The process should allow for straight-through processing as well as user intervention to input, approve, correct or verify settings/results before running the next task. A key component to this is managing the process and giving all users transparency into where they are in the process. In essence, good automation or workflow software will behave as an electronic project manager.

Users should also have defined roles in the process. The system should grant or restrict permissions to various functions based on the user’s role. This allows a separation of duty, keeping a user who generates monthly interest rate tables from promoting that table into production. And the user who reviews that table and promotes it is not allowed to make changes to that table.

Often, companies will use their IT departments as a de facto process automation system. They will put certain functions in the hands of the IT staff so that actuaries cannot influence them and the systems remain separate. While this is a serviceable model, it has some downsides. The biggest issue is the mismatch of priorities between the IT and actuarial departments. Due to the rarity of actuarial software, IT staff who are knowledgeable of the process are very rare, and are typically trained on only company-specific setups. This will usually result in the involvement of one or two key IT staff who understand the entire process. If those individuals are promoted, or devoted to another project, it greatly hampers any changes that need to happen with the process. If that is the case, a company might have to implement a “temporary” fix that occurs outside of the process control. These fixes are highly dangerous as they are rarely temporary, and they become a large potential weakness in the company’s model governance framework.

Ideally, the process automation should be customizable by those responsible for the process. Again, the users who have the ability to modify the process should be restricted from other tasks by their roles. This will ensure that there are no issues with prioritizing changes to any part of the model process. It also keeps the process expertise within the actuarial department, enabling actuaries to maintain a firm grasp of exactly what happens in each step.

**A Modern Platform for the Modern Actuary**

As with most things in life, actuarial system needs are rarely black and white, “open” or “closed.” The truth lies in the grey, where the best of open and closed systems are integrated to truly meet the needs of today’s actuary. Blending these different paradigms does not have to mean making sacrifices, however. With the right system architecture and a true vendor partnership, the mutual goals of transparency and governance can be achieved, not just within the calculation engine, but across the entire actuarial modeling solution.

The best vendor partnerships work because each partner focuses on what they do best. A vendor should be relied on to keep the technology of their platform current, share the knowledge and experience of working with a broad, global base of clients, and provide expertise and tools that allow the insurer to build and understand their models. They should facilitate rather than hamper innovation.

This should allow insurers to really focus on designing cutting-edge products, without spending time and effort managing their platforms. They should be able to rely on their vendor to keep up to date with emerging regulatory changes, but have the freedom to design their products how they desire – while truly understanding the risks and assumptions in their models.

The standard views of actuarial systems do not work in today’s world; in fact, they become more outdated every year. For insurers to thrive, a new paradigm is needed: a modern platform that truly meet the needs of the modern actuary.
About FIS’ Solutions for Insurers

FIS™ empowers insurers across life and annuity, health, property and casualty business lines with solutions that support their end-to-end process needs. Our integrated products and services enable companies to increase system and process efficiency, control costs, manage risk and capital better, improve business decisions, design more competitive offerings, and engage successfully with their customers. We provide comprehensive support across the functional ecosystem, including actuarial and risk, finance and accounting, investments, reporting and compliance, policy and claims management, and member services. FIS partners with insurance firms at over 1,500 sites in more than 65 countries, helping them to stay ahead of change and meet their goals.

About FIS

FIS is a global leader in financial services technology, with a focus on retail and institutional banking, payments, asset and wealth management, risk and compliance, consulting and outsourcing solutions. Through the depth and breadth of our solutions portfolio, global capabilities and domain expertise, FIS serves more than 20,000 clients in over 130 countries. Headquartered in Jacksonville, Florida, FIS employs more than 55,000 people worldwide and holds leadership positions in payment processing, financial software and banking solutions. Providing software, services and outsourcing of the technology that empowers the financial world, FIS is a Fortune 500 company and is a member of Standard & Poor’s 500® Index. For more information about FIS, visit www.fisglobal.com