Life insurance modeling platforms: Changing landscape

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Platforms used by insurance companies for life insurance models have been evolving for many years. But the speed and magnitude of these changes has significantly increased in recent years, mostly due to increasing model requirements and technological IT advances. In this paper we consider the general trends in the industry and look at the markets to understand the direction they are heading in.

Introduction

In recent years, many insurance companies have been modernizing their life insurance modeling platform. This is not a new phenomenon because, since the beginning of modern life insurance modeling using computers, both the models as well as their software platforms have been evolving. But recently, both the speed and impact of the IT technological changes have been affecting many areas of business, providing tools for increasingly easy industrialization of processes and massively increasing the computing power available. On the other hand, introduction of new reporting standards and increasing regulatory demands require more from the models on the functional side—both in terms of more sophistication and the volume of calculations.

This paper starts with a brief outline of the life insurance models and history of their evolution. It then discusses some of the important developments in IT technology—cloud computing and graphics processing unit (GPU) computing—and highlights shifts in general attitude toward modeling. Finally, it presents the results of a survey we have conducted among our clients across several markets to gauge the amount and direction of changes actually happening with respect to the life insurance modeling landscape.

Life insurance models

Over the years models in life insurance have grown into very sophisticated systems combining liability projections, asset valuations and cash flows, portfolio management, management decision rules, business planning, and risk quantification and management.

One of the key building blocks remains the liability cash flow projection model, which computes the reserves and best estimate cash flows of the whole portfolio of policies—whether on a policy-by-policy basis, as it was done originally, or on a grouped basis at the model point level. This was sufficient as long as the products modeled were traditional life insurance with limited options and links to the market conditions. As products and reporting requirements evolved to include profit sharing and minimum guarantees dependent on the market interest rates, models had to evolve as well.

This led to integrating liability cash flow projections with asset and portfolio management models, leading to asset-liability management (ALM) models. These models allow an interaction between the asset portfolio, market conditions, and the liability projection, and any discretionary management actions resulting from those interactions. They are typically run using thousands of stochastic simulations representing different possible paths of the future economic developments in the markets. It allows estimation of the time value of options and guarantees (TVoG) inherent in the increasingly sophisticated insurance products. This, however, means more complex model architecture and substantially higher computational requirements.

This trend continued as risk-based capital requirements become more widespread. Most regions required models to be extended to be able to compute various shocks. With time, more and more elements have been added and integrated with the models—such as pricing and profit-testing, business planning, and forward-looking risk assessments with the life models. Most recently, the new International Financial Reporting Standard (IFRS) 17 for insurance contracts has put forth additional requirements for life models—in functional terms, but also in terms of integration and automation of the results of different periods of reporting. Each of these incremental changes adds up, and as a result more and more insurance companies have been considering modernizing their modeling solutions or changing them altogether.

These changing requirements along with the general evolution of technology and architecture of IT systems have also triggered developments in the way life insurance models are viewed. The traditional view of the model as more of an isolated computational module is being replaced by a more appropriate and contemporary view of the model computations being just one step in a complex process of data flow leading up to reporting that can be well understood, audited, and ultimately reliably drive decisions. In order for this process to work properly, it is best if it is automated and industrialized. The model is part of several data pipelines coming from different sources—like a policy admin system, asset portfolio details, a current set of best estimate assumptions, accounting ledger, etc. This data needs to be standardized for automation and data quality assurance. Overall, the reporting processes must be quicker and more reliable than they had been in the past, so any manual steps should be minimized or better yet eliminated.

This also means the computations in the model should best be rid of as much manual interaction as possible. Each reporting objective requires a complex set of runs with strictly defined dependencies between inputs. A proper audit trail is required to ensure that the results can be tracked back to inputs and the version of the model that was used for calculations. As a consequence, the line between actuarial models and IT software is becoming thinner, and their development is increasingly using more and more concepts from IT DevOps, such as coding guidelines for clear and understandable code, code versioning for better auditability, automated testing for reliability, separation of development, testing, and production environments, etc. As data is a critical component of the calculations, versioning of all data inputs is also becoming an important aspect. A convergence between modeling solutions and modern software can be also seen in an increasing number of web-based platforms—whether for controlling the runs and versioning or modern visualizations for reporting. There are also other actuarial models in life insurance, besides projection and ALM models, but the focus on this paper is on the latter.

Evolution of life model platforms

Modeling mortality and annuities is not a new topic: already in the 230 A.D., Romans issued an annuities table, “Ulpian’s Life Table,” based on a likely 5% tax applied to each annual payment.[1]

Then in 1662 John Graunt published the first life table (qx), based on records of birth and death in London collected starting from 1592.[2]

Until the late 1960s, actuaries used either printed versions of the mortality tables and commutation functions, based on different technical rates, or started to use calculating machines to help for the evaluations, like the “Friden calculating machine” used by Wendell Milliman in 1950.

FIGURE 1: THE FRIDEN STW 10 CALCULATING MACHINE, 1950

Friden Calculator. Ridai Museum of Modern Science, Tokyo University of Science, Shinjuku-ku, Tokyo.

Then insurance companies purchased large mainframes in the ‘60s and ‘70s, like the popular ICT 1904 issued in 1970 in the UK.

The language typically used for contracts management would be Cobol, but for calculations Fortran, designed in 1957, was a popular choice and could make most of the performance these machines could offer. Coding in Fortran, which was done on punch cards, was not so easy for actuaries, however, and the access to the computers was very limited, so calculations had to be anticipated a lot, all ending in a very low productivity.

Then the ‘70s and ‘80s came with the personal computer revolutions. The first spreadsheet solutions, Visicalc for Apple II, then Microsoft Multiplan, designed for CP/M and DOS, became a hit in the actuarial world. They were quickly replaced by Microsoft Excel, initially designed for the Apple computers (!).

The visual “language” of Microsoft Excel became very popular in the actuarial industry, becoming the reference international coding language similarly to English becoming the language of reference spoken all over the world.

[1] Frier, Bruce W. "Roman Life Expectancy: Ulpian's Evidence," Harvard Studies in Classical Philology 86 (1982), 213–51.

[2] Graunt, John; Wilcox, W (1939). Natural and political observations made upon the bills of mortality. Baltimore: The Johns Hopkins Press. Retrieved on January 23, 2023 from https://archive.org/details/naturalpolitical0000grau

But if Excel was fine to apply calculations to a small portfolio, it quickly showed its limitation in terms of performance and handling of size. While some actuaries tried to directly code in Fortran, Pascal, or C (the two latter being more advanced languages, finalized in the early '70s), they quickly reached limits in productivity, due to the highly technical nature of the languages.

Therefore, in the late '80s, Milliman launched MG-ALFA®, a revolutionary concept. the idea was to have all the architecture of the models already coded in C, and then the actuaries just had to code the final formulas (also in C). This concept was quickly followed by Moses (which became Risk Agility, sold by Willis), Prophet (today designed as "FIS Insurance Risk Suite" by FIS). Since then, several more proprietary platforms have appeared on the market.

These solutions are already known as "low code," compared to Microsoft Excel, which is considered "no code" due to the language simplicity, and Fortran/C/Pascal, being "full code."

They are still popular today but, due to the increase of the actuarial modeling needs, are all migrating to the cloud in a full software-as-a-service (SaaS) model. To boost performance, they propose a new virtualized version of parallel computing, like the Milliman Compute module, a new service in the Integrate\MG-ALFA suite, enabling the launch of calculations on more than 100,000 cores by instantiating temporarily the required Virtual Machines, on the Microsoft Azure Cloud.

In parallel, a new trend emerged in Europe in 2017, as insurance companies desired more freedom in the architecture of the models and coding.

Therefore, some of them switched back to "full code." Yet Fortran, C, and Pascal are generally not the solution of choice, considered too complex.

While before 2010 Java was the most popular, since 2020 companies focus mostly on C# or Python.

- They would typically choose Python if they want the actuaries to be the owners of the models. However, the base language is very slow and requires compensating with either specialized optimized libraries or with sufficient computing power (CPUs and/or GPUs) for high performance.
- Or they choose C# if they want pure performance (even if C# remains slower than native C). But in this case the model design is usually too technical for actuaries, and the control of the models is generally lost to IT departments.

One outsider might also come: Rust, designed in 2010, offers nearly the same performance as C, but with more coding easiness, making it less complex than coding in C#.

FIGURE 2: COMPUTE MODULE

Finally, Milliman launched a new concept in 2018: Milliman Mind, a “no code solution” for the design (the visual language is based on Microsoft Excel), then converted automatically and running in “full code” e.g., C#/C++. This enables having the highest coding productivity for actuaries, combined with the best performance at run time.

This hybrid concept is gaining popularity, and some competitor companies like Coherent launched their own “no code solutions.”

Therefore, actuaries have today the widest range of possibilities, ranging from “no code” to “full code”, or the hybrid “no/full code solutions,” depending on their needs.

Recent technology developments

For many years, there has been a steady increase in computing power, following the so-called Moore’s law. This conjecture claimed that computing power, as expressed in the density of transistors in the computing units (processors), will approximately double every two years. In the more recent years, the speed of these changes at the level of individual computing units has become disputable. Instead, we have seen the rise of two other technologies that allow access to great computing powers—cloud computing and graphics processing units (GPUs).

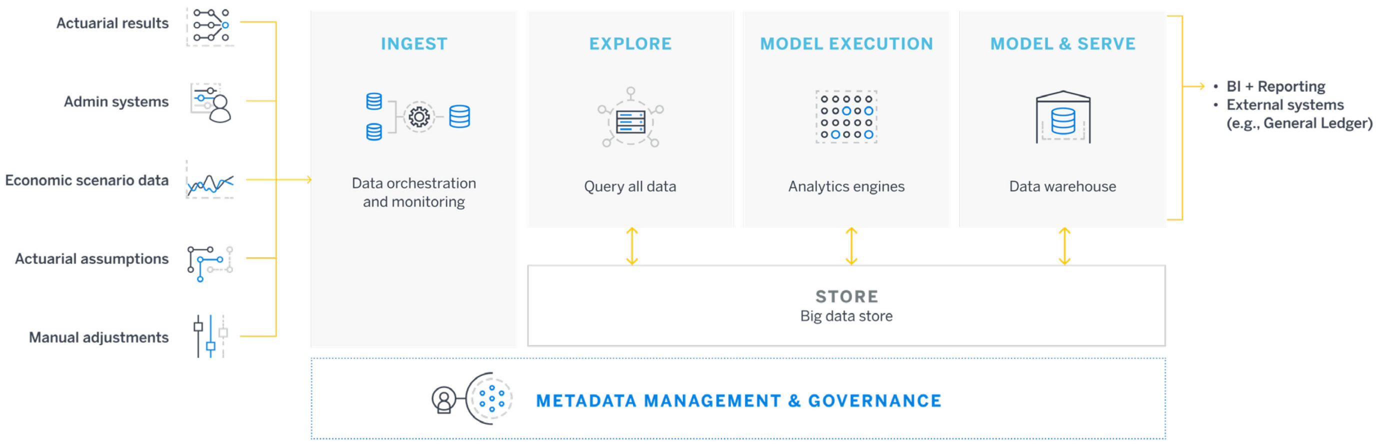
CLOUD COMPUTING

The actuarial model is much more than just the math. The regulator views the processes used to gather data for models, and downstream analytics on results, as part of the modeling process. The end-to-end production of financial results must be built and run in a way that demonstrates control and satisfies auditors in a timely manner. The regulatory frameworks are increasing in complexity, requiring more advanced modeling techniques, which in turn require more computational power. This evolution of modeling coincides with the evolution of cloud computing, and cloud computing has the potential to alleviate the burden on actuarial teams, empowering them to do more with less.

The journey to the cloud often starts with computation. The insurance industry might not always have been on the leading edge of computing but, with insurers being some of the earliest adopters of digitalization, it’s no surprise that they were some of the first financial institutions to embrace cloud computing. The economic rationale behind the shift to the cloud for high-volume computing is simply that the capital investment required by the insurer to handle the regulatory requirement is too high. If investments are made, the utilization of the investment is low, as insurers do not need tens, let alone hundreds of thousands, of CPUs daily throughout the whole year, but rather in short peaks. In the example in Figure 3, there were between zero and 128,000 cores used, with a utilization rate of 93% over three days. Assuming you had purchased 128,000 cores, in the same three-day period you would have used 384,000 core days. whereas the new elastic cloud solution only used 72,000 core days, a saving of 312,000 core days. In some cases, cloud-based infrastructure can still be rather costly, but with an appropriately designed flexible cloud solution, it can make better economic sense to rent IT hardware by the minute in the cloud than purchase the asset, even on a lease agreement.

A potential risk with cloud computing is that everyone needs to run computations at the same time. So far, capacity has not been a limiting factor, with cloud solutions offering the ability to run computations in any chosen region. The ability to run in any region is a cheaper solution and has the same benefit of hedging the risk of resource scarcity that may arise if supply chains remain strained post-COVID-19.

FIGURE 3: MODEL EXECUTION PROCESS



The data gravity of the cloud environment attracts other use cases. Here the driving force is inertia. Data has mass, it's expensive and slow to move, especially back on-premises, so the complex analytics required on the huge output data set benefits greatly from cloud approaches to data storage and analytics. A similar economic argument can be made for data storage as with computation. Most of the data kept is to satisfy audit and reproducibility use cases and thus yields minimal value daily. The investments required to store petabytes of data in the cloud is minimal, and analytics is infrequent and spikey, which suits a similar serverless model for computation as described for model execution. As data is online, it provides opportunity to collaborate with others on shared data sets. This opens the actuarial data for more use within the insurer, but also allows more data sources for modeling—for example leveraging industry data for experience analysis. Access to more data facilitates machine learning use cases, which may be applicable in pricing new products or understanding policyholder behavior. Furthermore, reinsurance and strategic alliances could be implemented faster because data could be securely shared without being physically moved.

The cloud data migration doesn't stop with results. Model inputs are often sourced from moribund on-premises systems, where complex analytics is limited. Leveraging a new data pipeline for feeding the actuarial models, built on a scalable cloud data lake, unlocks value from the data sources, and the coupling to results provides opportunities for end-to-end analytics previously unachievable due to data silos of outdated investments.

The benefit of an end-to-end cloud solution is that it allows for optimization to reduce time to insight. Speed is important. The faster the models, the less you pay for the cloud-leased hardware, and the sooner information is available to domain experts, the faster you can react to changing market conditions. The most mature cloud-based actuarial teams are now focusing on optimizing their working day timetables as well as looking for new ways to innovate to drive value to the policyholder.

The pace of cloud adoption varies from country to country, which is often driven by regulation. For example, the General Data Protection Regulation (GDPR), the EU's data protection law, requires data sovereignty. Cloud providers have removed these roadblocks by providing local data centers, sometimes under local jurisdiction, known as sovereign clouds.

Cloud vendors are building higher-value SaaS solutions, which enable the actuarial teams to do the job themselves. This reduces the communication gap between those doing the work, and those who need the outcomes of the work, which, if done well, ultimately delivers value more quickly with more accuracy. This is a broad trend, not just one being experienced by actuaries, and the marketing buzzword of the big software vendors is the cloud-enabled democratization of IT.

An interesting observation regarding this trend is that the goal is to simplify and empower users, without forcing them to become software engineers. The germane cognitive load of actuarial science is significant, which limits the ability of software engineers to penetrate the domain to add value. There is a growing frustration with actuarial solutions to provide more robust user experiences that accelerate, not limit, innovation. The question that should be asked is whether the tools to empower actuaries are programming languages and software engineering techniques, or improved modeling tools. The opportunities for vendors are to fill the gap to ensure that the limited actuarial talent is unlocked to solve for the issues pervasive to insurers, who are relieved of repeatedly implementing complex modeling systems from the cloud building blocks.

The economic argument for SaaS solutions is very much the same as for the cloud. You can lease, by the minute, software that services your needs without large up-front capital investment. The realization, however, is that there is no such thing as buy versus build. There is only building. The trick, when defining a cloud strategy, is to decide who to partner with—an IT vendor, or an actuarial vendor. The answer lies in the analysis of the existing strains within an insurer. If there's a challenging relationship between actuarial and IT, then a new IT partner may not make the most sense. There would be a lot more to be gained from partnering with those who understand the problems germane to actuarial science, and leverage tools that enable the industry at large to innovate together, reducing the economic impact of rework by maximizing leverage.

GPU COMPUTING

Another technology that has gained massive popularity in recent years is GPU computing. GPU stands for graphics processing unit, as originally they were computational units installed in computers dedicated to speeding up graphical calculations. Over the years, they have evolved, however, into general computing devices capable of massive parallelization. A typical laptop has eight cores in its CPU and servers would typically have 32 or 64 cores for parallel calculations, but a standard household-level GPU will nowadays have anywhere between 4,000 and 10,000 cores. This gives an opportunity for massive performance gains in computations that can be sufficiently parallelized. It can be taken even further with computers having multiple GPUs or grids of GPUs. Most cloud providers also have specialized machines with GPUs, so these two technologies can be combined. The massive rise of GPU popularity can be largely attributed to two applications—machine learning and cryptocurrency mining. Computations in both these fields can benefit from parallelization to extreme degrees.

There are some drawbacks to GPU computing, however. The architecture of a GPU and the way it processes data are different from a CPU, requiring specialized code. The main GPU producers have at first provided two frameworks for this, CUDA and OpenGL, but they require high-level IT development skills to create efficient code. This has later become easier, as nowadays there are libraries in most languages that allow using GPU potential without the prerequisite of knowing CUDA or OpenGL. But more importantly, not all calculations can be parallelized to that extent. If there are dependencies between calculations, they will limit these benefits. In short, GPU cores are very good in performing many simple and similar matrix-based calculations on a single large amount of data. When the proportion of data transfers to computations or the number of dependencies in the calculation chain increases, the benefits of the GPU decrease. Similarly, when there are many various types of calculations required or when there are aggregations of data required, this will also make using GPUs more difficult.

For all those reasons, the popularity of GPUs in life insurance modeling is still limited. Some solutions and individual in-house models explore this possibility, as the potential gains are big. There are, however, some solutions that have decided to abandon this path and focus on more efficient CPU usage. As the survey results will show, despite growing interest in this technology applied to life insurance models, it remains a niche for now.

Market trends

SURVEY SETUP

In order to assess the nature and direction of the changes in the market, we have set up a short survey that we then asked to be completed in several markets, mainly European and Asian.

The survey has been centered around the concept of recent significant changes in the modeling landscape and has three main branches:

- No significant changes in the modeling landscape: Questions are focused on the current environment.
- Changes are being considered or planned: Questions are focused on comparing the current environment with the target one after the changes.
- Changes have already been implemented: Questions are focused on comparing the current environment with the one before the changes

The answers provided have been collected in two main ways—from our contacts in the insurance companies directly or from Milliman consultants involved in projects at a given insurance company and, thus, with sufficient knowledge to fill in the information in the survey on its behalf. In a limited number of cases, we have only collected information representative for a given market provided by local Milliman consultants.

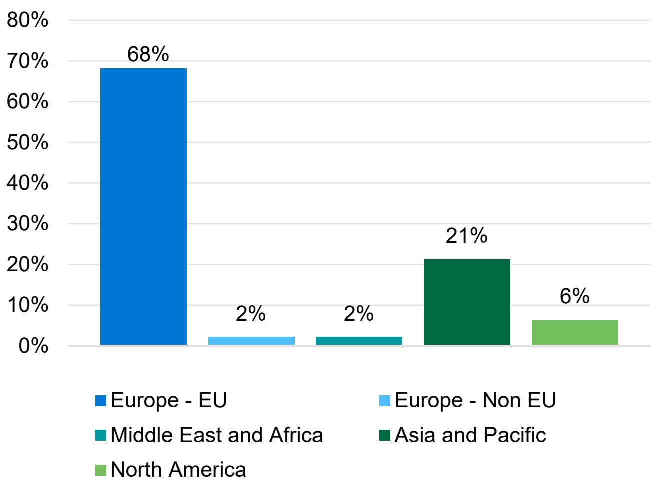
The percentages shown in the results are always the number of responses relative to the total number of responses in the given group. That means, when comparing percentages of before model change and after model change groups, that the bases might be (and usually will be) different.

SURVEY RESULTS

Respondent profiles

As noted above, the overwhelming majority of the responses came from Europe, with responses from Asia in a distinctive second place. There were several responses from the United States and the Middle East, but it is clear that the results presented further are mostly representative of Europe and Asia.

FIGURE 4: DISTRIBUTION OF RESPONSES PER REGION



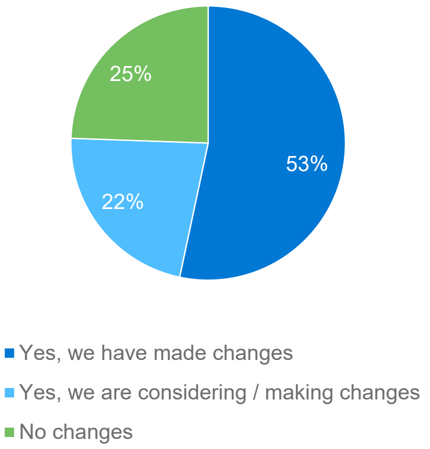
Our respondents were almost equally distributed between companies of different sizes, from more than EUR 1 billion to well above EUR 100 billion in assets under management.

The majority of the responses (87%) came from insurance groups and the rest from standalone insurance companies. In the groups, almost 60% of respondents indicated they use locally managed models, while almost 40% have models centralized by the group. The remaining few have a mixture of both.

Changes in modeling landscape

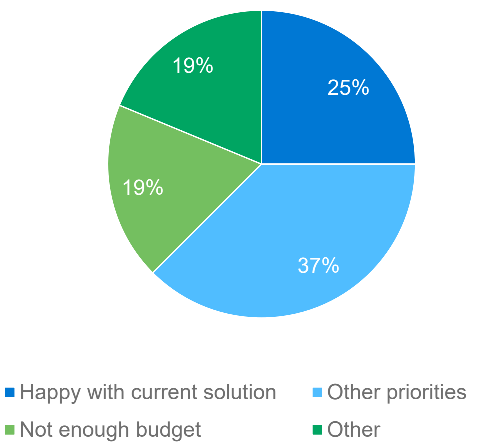
In the fundamental question of the survey, regarding substantial changes in the life modeling landscape in the last three years, half of respondents indicated that they have made such changes. Another 20% indicated that they are either considering such changes or in the process of implementing them.

FIGURE 4: CHANGES IN MODELING LANDSCAPE IN THE LAST 3 YEARS



Among the remaining 25%, which recorded no significant changes in their modeling platforms, around one-quarter of them indicated that they are happy with their current solutions. In some cases, this was due to major changes that happened a little earlier than the three-year horizon assumed in the question.

FIGURE 5: REASONS FOR NO CHANGES IN THE LAST 3 YEARS

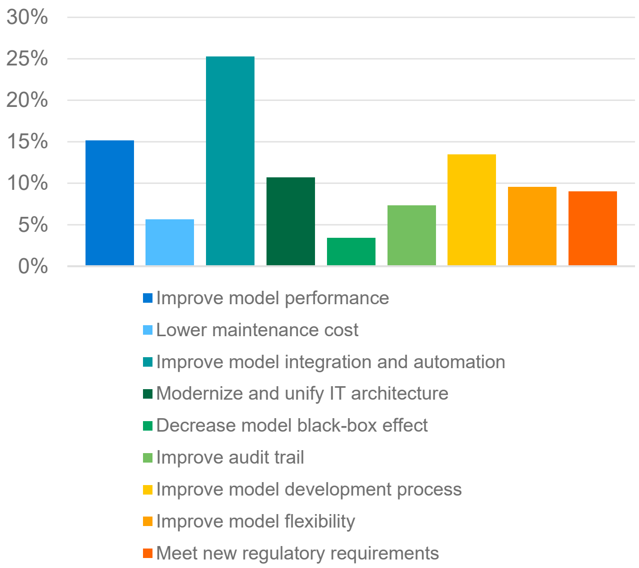


In most cases, the lack of changes has been caused by either other priorities, like IFRS17 implementation (in 37% of answers) or by not enough budget to perform the changes, while acknowledging that some changes should happen (19%).

Objectives driving the change

While there are many objectives that could trigger the changes, it seems that in fact there are three main ones. The answers are presented jointly for companies that already completed the change and ones still in the midst of the change process.

FIGURE 6: OBJECTIVES TRIGGERING THE CHANGES



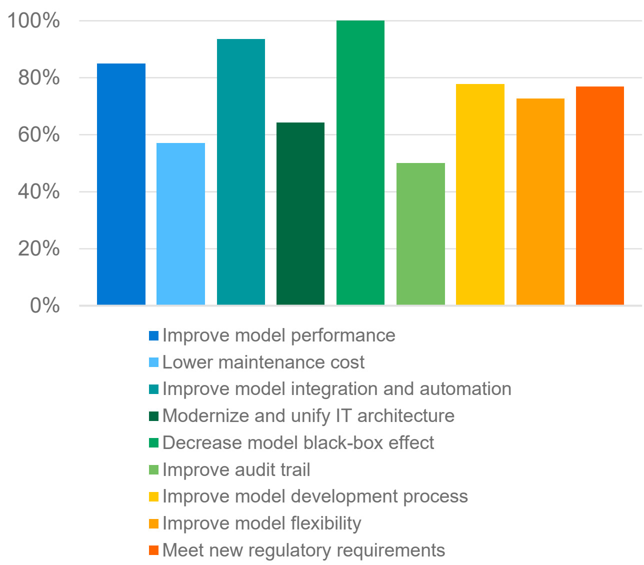
The three main objectives indicated by the respondents were:

- Improve model integration and automation (25%)
- Improve model performance (15%)
- Improve model development process (13%)

What might come as some surprise, lowering the maintenance cost of the modeling platform is one of the least popular goals considered when changing the modeling platform.

For the companies that have already completed their changes, we also asked about the rate of achieving their objectives that corresponded to the main reasons for changes.

FIGURE 7: OBJECTIVE ACHIEVEMENT RATE FOR COMPLETED CHANGES

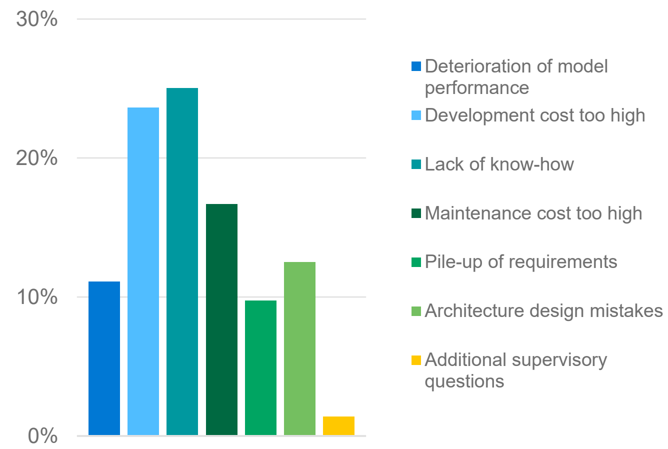


The achievement rate for the three main goals listed above is very good, being 94%, 85%, and 78%, respectively. The results also confirm that it is a difficult objective to lower maintenance costs. Even in the minority that set out to trying to do it, the success rate was barely above 50%.

Risks

Starting a big change process like that is linked to a number of risks. According to the respondents, the main risks considered at the start of the process are shown in Figure 8. The answers are presented jointly for companies that already completed the change and ones still in the change process.

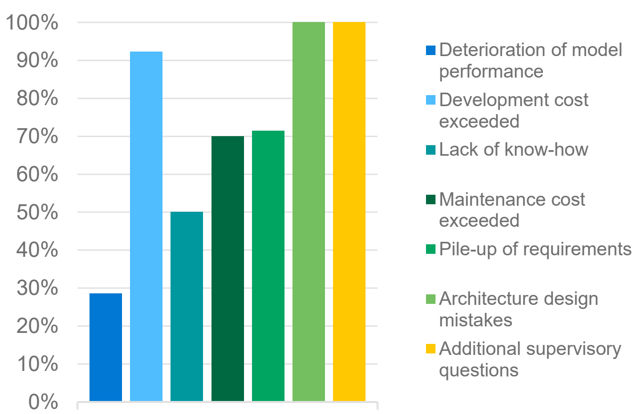
FIGURE 8: MAIN RISKS CONSIDERED AT THE START OF CHANGE



The main concerns relate to exceeding the planned cost of developing and integrating the new solution, lack of sufficient knowledge to complete the change, and maintenance costs of the new solution that are too high.

Similarly to the previous question, we also asked companies that have completed their changes which of the risks actually materialized during the project.

FIGURE 9: RISK REALIZATION FOR COMPLETED CHANGES



What immediately catches the eye is the fact that model performance has been impacted negatively due to the changes in the platform in only a handful of cases. And there were already relatively few companies that had considered it a risk at all.

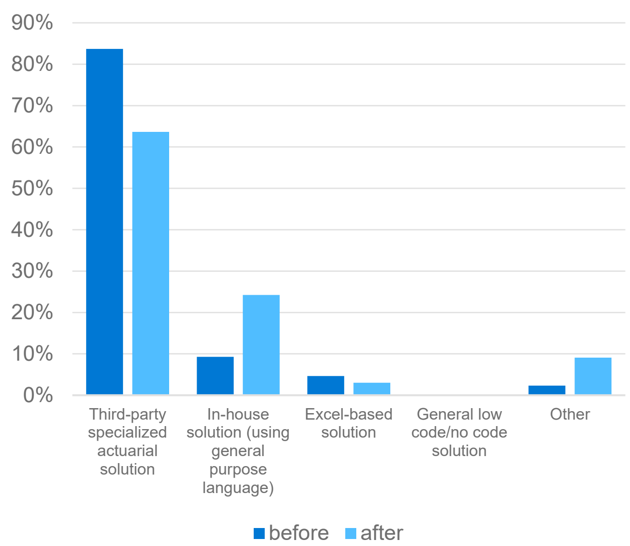
Costs exceeding budgets was indeed a justified concern, however, as in a vast majority of cases this was the case. The other risks that materialized in all expected cases concerned additional inquiries from the supervisor (an isolated case) and mistakes in the architecture design process of the new model platform.

In all cases the changes were, however, completed successfully, even if there were some issues along the way.

Model platforms

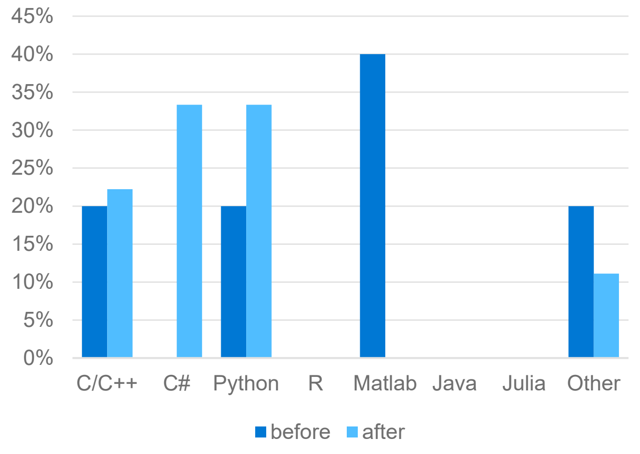
Even though there is an increasing level of consideration for building in-house models using general programming languages and open-source libraries or platforms, a vast majority of the respondents still decided to use a third-party specialized modeling platform for their new projection models. Note that the before also includes responses where no change has occurred in the last three years.

FIGURE 10: TYPES OF PLATFORMS USED FOR LIFE MODELS



However, there is a noticeable difference comparing the situation after the changes and before the changes, so there is a visible trend to move from third-party to in-house solutions. Figure 11 shows the relative popularity of different languages used for the in-house models, before and after changes.

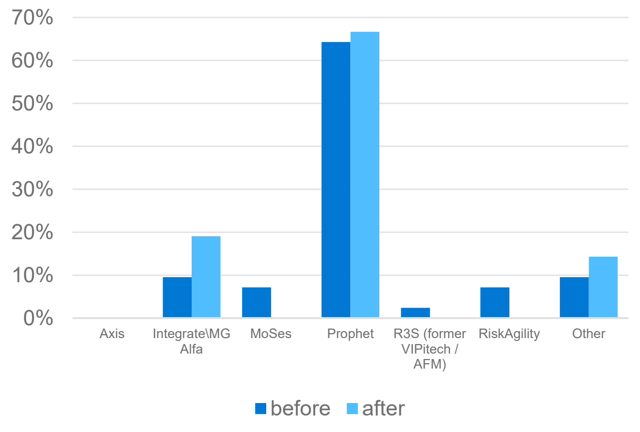
FIGURE 11: PROGRAMMING LANGUAGES USED FOR IN-HOUSE MODELS



In the few cases, where respondents had already used in-house models in the past, Matlab seemed to be relatively popular. Based on responses that we received, it has been replaced by free languages such as C# and Python, which are both the most popular ones nowadays. C++ also remains used, as it is still the fastest language available (although with Rust slowly gaining popularity as its potential safer replacement).

As shown in Figure 10 above, in most cases the responses indicate using proprietary modeling software. Figure 12 shows the distribution among the most popular software packages used by the respondents. Here it can be seen that geographical distribution of the responses, as indicated earlier, has a clear influence on the outcome.

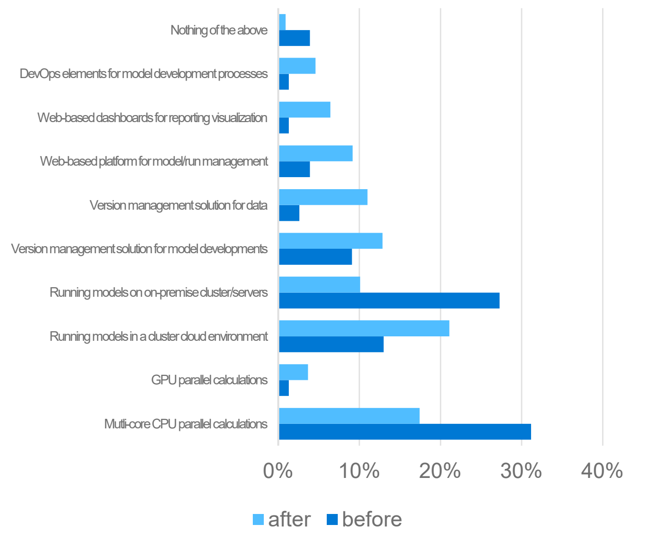
FIGURE 12: PROPRIETARY MODELING SOFTWARE USED



Technologies used

As briefly described in the earlier sections, there have been many developments in technology and IT available for modeling. We see in the responses that there is a clear evolution embracing most of those technologies when modernizing modeling platforms.

FIGURE 13: TECHNOLOGIES USED IN LIFE MODELING SOLUTIONS

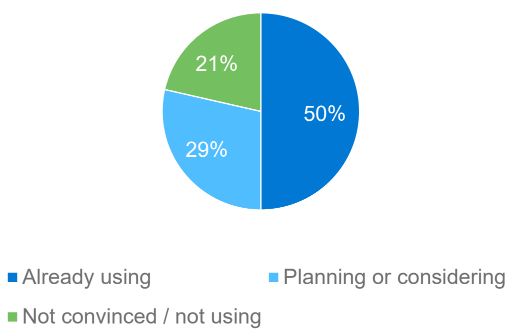


Many solutions had already used multicore processing and multiple local on-premises servers to make calculations more efficient. When changing the modeling solutions, most respondents have included the new technologies provided by their IT groups—both hardware- and software-related. This includes cloud computing, version management, and web-based interfaces. The use of GPUs for massively parallel computing is still a niche in life models, but even this has become significantly more popular than in the older solutions.

Cloud computing

Cloud computing has proved to be a tectonic shift in the IT world and has dramatically changed the landscape of software. As explained above, it has also been gaining popularity in solutions for life projection models. But the adoption of this technology is also wider than just projection models.

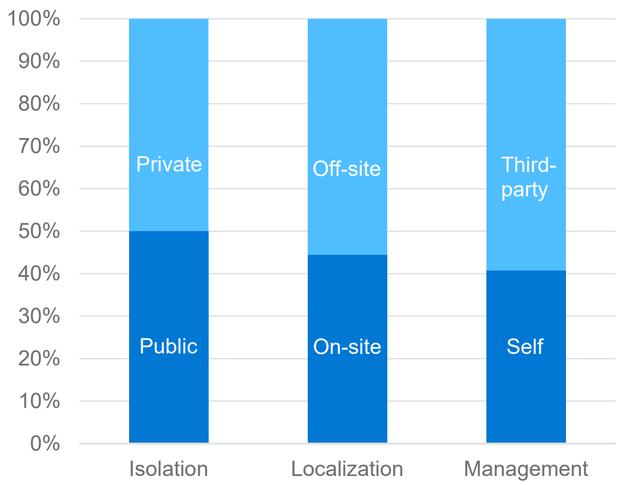
FIGURE 14: ADOPTION OF CLOUD COMPUTING IN LIFE INSURANCE



Half of the responses received indicate that they are already using cloud computing in their life insurance modeling. More than a quarter are planning or at least considering using it and only 21% are still hesitant.

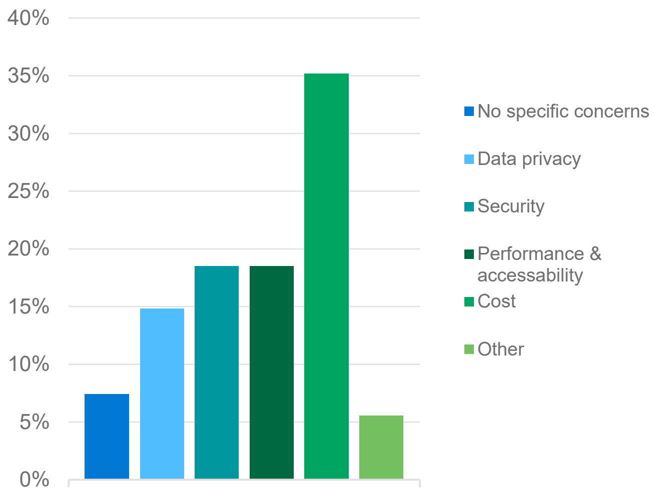
As explained in the section dedicated to cloud computing, there are many different types of cloud services offered on the market. It seems, however, that there are no clear preferences from insurance companies—the split is very balanced in each category.

FIGURE 15: PREFERENCES REGARDING CLOUD SERVICE TYPES



Even with such a high adoption rate, there are some concerns regarding cloud solutions. An overwhelming majority of responses indicated that cost is the main concern.

FIGURE 16: MAIN CONCERNS REGARDING CLOUD SERVICES



Apart from that, the two most popular responses concerned accessibility and performance of the machines in the cloud. and IT security—meaning the potential of unauthorized access to those machines or loss of data.

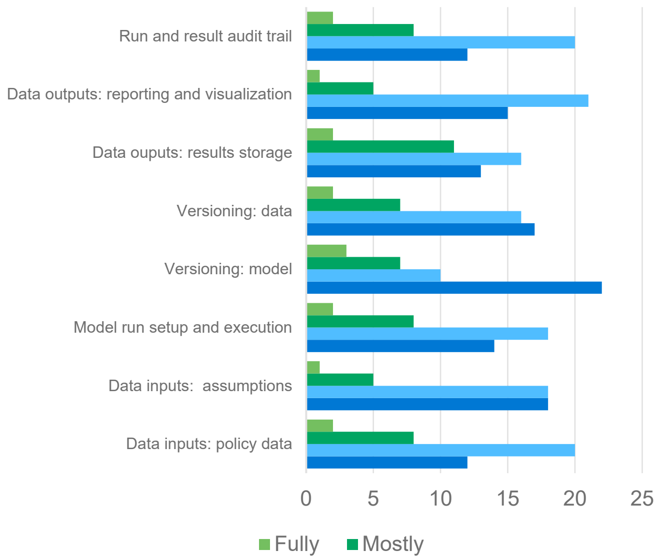
Data privacy topics seem to be less important than the above three points. However, their relevance increases within the responses from the EU, where the GDPR enforces strict data privacy protection measures. These issues are nowadays taken into account by most cloud-service providers and their services are GDPR-compliant.

Process automation and data solutions

As automation and integration of processes is one of the key aspects in modernizing the modeling landscape, we have also asked about their levels in different steps of the modeling processes.

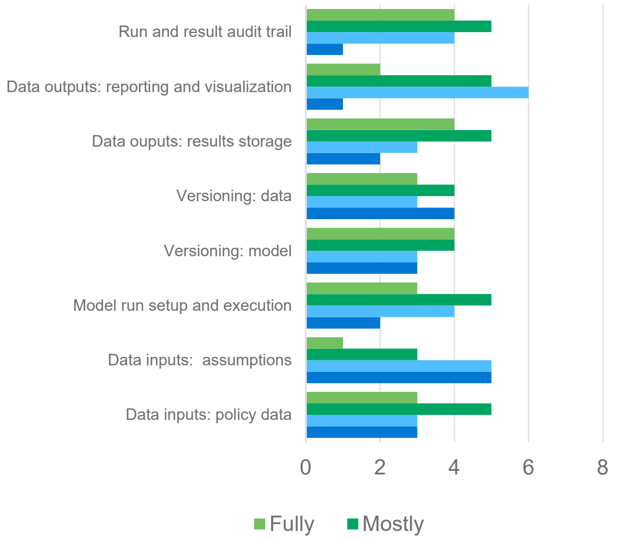
Based on the responses received, there is a clearly visible difference between the levels of automation before and after changing the modeling platforms. This is not at all surprising, given as well the earlier answer indicating that more automation in the processes was one of the main objectives to achieve with the changes. Comparing Figures 17 and 18, it can be seen that, across all elements of the processes, there was a substantial drop in steps with no automation. The most progress has been made in the reporting, model versioning process, and run audit trail, while the most work remains to be done in the data inputs and versioning of data that is fed into the models.

FIGURE 17: AUTOMATION LEVEL OF DIFFERENT PROCESS ELEMENTS (BEFORE OR WITHOUT CHANGES)



Putting the last point aside, for all steps in the processes more than 50% of responses indicate that they are fully or mostly automated and integrated, compared to just above 20% before.

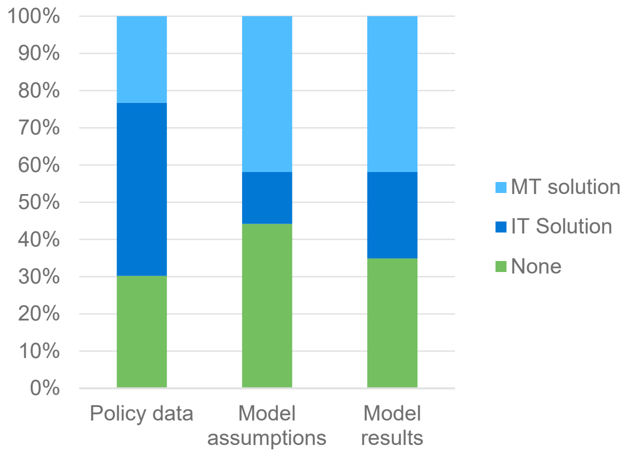
FIGURE 18: AUTOMATION LEVEL OF DIFFERENT PROCESS ELEMENTS (AFTER CHANGES)



These results show that a lot of attention and work has been put into automation during changes in modeling platforms. But they also show there is still room for improvement left. And while the results show that model performance is an important factor, increased automation is even more crucial. It both speeds up the whole process and reduces operational risks related to any manual actions needed to link different steps in the process.

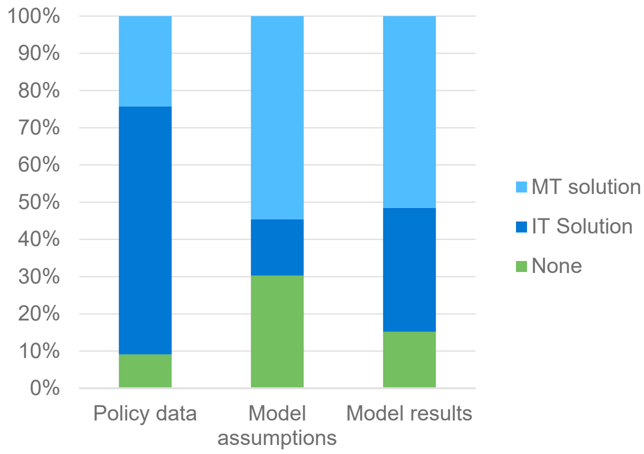
A basis that is required for automation is having proper data solutions in place. There are three main groups of data coming in or out of the models—policy data, assumptions, and results. In the question dedicated to this we have made a distinction among three possibilities. The first is no specific solution, which typically means manual creation of inputs or outputs in text or Excel files. The second is a more sophisticated solution developed and managed by the modeling team (denoted MT in the graphs), and the third is a proper IT data solution developed by the IT team—such as a data warehouse or data lake.

FIGURE 19: DATA SOLUTIONS USED (BEFORE OR WITHOUT CHANGES)



In Figures19 and 20, we see that policy data was the area where most respondents already had some kind of a solution in place. Due to changes in the modeling platform, this has been improved even further, and less than 10% of responses now indicate no solution.

FIGURE 20: DATA SOLUTIONS USED (AFTER CHANGES)



In line with the previous question, most progress seems to have been done in the model results area, where now more than 80% of responses indicate some kind of solution. Again, confirming the results of the previous question, the most room for improvement is in the area of model assumptions, even though some progress has occurred there too.

Conclusions

In recent years, we have seen the evolution of IT technology and software architecture impact much of the software we are using in companies or our everyday lives. These advancements have also enabled change in the life insurance modeling platforms, as did the increasing functional and reporting requirements.

Based on the survey, it's clear that insurance companies are indeed taking this opportunity and modernizing their modeling solutions. The main drivers for the changes are attempts to automate and industrialize processes around the models and improve their performance. In order to do so, these new solutions are adopting new technologies and methods from IT software and, in turn making the border between IT and actuarial models narrower. While there is clear progress in achieving these objectives, there are still areas where some work needs to be done.

The change process is a complex one and not without risks. Embarking on this road should be preceded by good planning, setting objectives, and considering different mitigation measures for those risks. As the survey responses show, in most cases at least some of these risks materialize. Despite that, most of the respondents are happy with the changes they have made, with an average rating of 72%.

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