

The Evolution of Actuarial Technology



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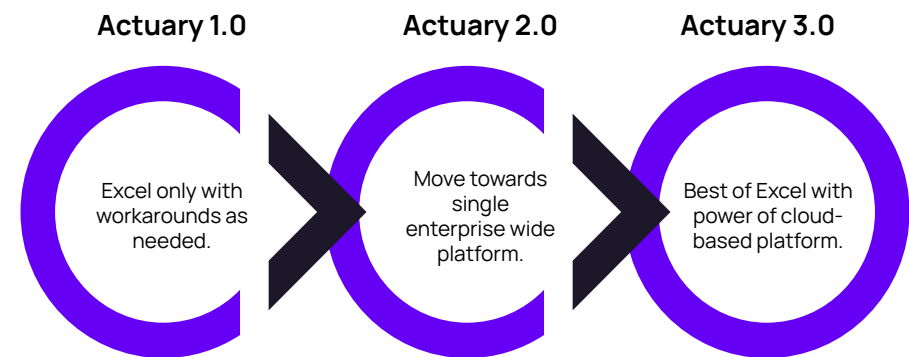
The Evolution of Actuarial Technology

Excel was launched in 1985 and actuaries quickly adopted it as their software tool of choice, relying on its flexibility to create complex business logic and models. According to the [Casualty Actuarial Society's First Annual Technology Survey](#), over 94% of actuaries reported that they use Excel daily.

For as long as actuaries have relied on Excel, they have also learned how to circumvent Excel's limitations. Only a minority of actuaries reported interest in becoming more proficient in programming languages like Python or SQL. Over 80% saw time as the biggest barrier to learning new technologies.

However, over the last few decades as models have become increasingly more complex and regulatory restrictions more onerous, a heated debate has emerged as to whether Excel is the right tool.

We see the transformation of actuarial technology evolving in three phases:





Actuary 1.0

Excel dominated the actuarial world. The actuarial profession evolved with limited reliance on programming skills as actuaries were self-sufficient in creating complex business logic and models in Excel. When limitations arose, actuaries learned to create workarounds. Ultimately, those workarounds and limitations led to too many mistakes and inadequate processing time to be sustainable.

Actuary 2.0

As the insurance industry has become more complex, Excel's limitations became more acute. The industry continues to grapple with financial transformation out of Excel. New regulations, like Risk-Based Capital, IFRS17, and US GAAP LDTI, pushed insurers to adopt a single, enterprise-grade actuarial software to replace Excel and encompass the entire actuarial process.

While this idea resonated with many insurance companies, the reality has been far more complex and difficult to implement. While some aspects of the actuarial process moved to cloud-based, enterprise platforms, other components remained in Excel as the vision of a "single platform" was unreachable for most insurers.

Actuary 3.0

Coherent believes that neither Excel on its own, nor a forced system that eliminates Excel entirely, is feasible long-term. To achieve complete actuarial financial transformation, actuaries must use Excel for its intended use while automating other pieces of the process to bring much-needed scale, control, and governance.



Actuaries and Excel

-A Love-Hate Relationship

Almost every actuary uses Excel on a daily basis. It is the “go-to” choice when solving complicated problems. Excel is readily available, easy to use, and capable of creating remarkably complex actuarial models. It is flexible and a known entity that just about every actuary is comfortable using. Actuaries have frequently described Excel as a jack of all trades, master of none, with [one actuary saying](#) the spreadsheets are “okay at many things, but don’t really shine at anything.”

Since Excel is the easiest place to do complicated things, actuaries have grown dependent on it to do heavy lifting beyond what it was designed to do. By using Visual Basic for Applications (VBA), actuaries became self-sufficient in writing programs in Excel without relying on IT departments or specialized programming skills. This was the domain of Actuary 1.0.

But Excel has limitations. And while the limitations are known, there is still considerable debate in the actuarial field on whether the strengths of Excel outweigh the [drawbacks](#).

“Running Excel models in production on local machines is no longer ‘leading-edge,’ if it ever was.”

[Stephan Mathys, Small Talk, March 2021](#)



“On average, 86% of spreadsheets contain significant errors.”

[Survey conducted by Ray Panko](#)

Actuarial 1.0: Limitations of Excel

Limited processing power: Local installation of Excel limits scalability and makes it difficult to run and control complex models quickly.

Lack of version control and governance: Multiple versions of the same spreadsheet model are often in use at the same time.

Limited automation to replicate formulas reliably: [A survey found 86% of spreadsheets](#) contain significant errors.

Difficulty meeting regulatory requirements: Regulations are constantly evolving, with the current wave of change led by accounting standards IFRS 17 and US GAAP LDTI. Excel lacks tracking of calculations for auditability.

Security risk: VBA macros are a target for malware and ransomware.



The Need for a New Solution

As the number of errors in Excel-based actuarial models increased, there was a growing anxiety about finding a better solution. More complex models inherently led to more human error in manual spreadsheets with complex formulas and large amounts of data. Shared models, lacking version control, easily led to one person overwriting formulas that impacted other parts of the model.

While enterprise-wide actuarial modeling systems seemed promising for replacing Excel, enforcing the use of a single-solution tech stack had many unanticipated challenges.

70% of actuaries believe that the cloud delivers faster and more advanced analytical capabilities.

- Society of Actuaries Survey
Source: [Cloud Computing White Paper by Society of Actuaries](#)

Actuarial 2.0: limitations of enterprise-wide actuarial systems

Limited customization. Relative to Excel, actuaries felt limited in their ability to create models and business logic for their specific needs.

Limited support for certain data types and extreme events. Excel-based models for pre-processing irregular data or modeling rare and catastrophic events were still needed.

Lack of transparency. Without understanding exactly how the model was built, actuaries often found it difficult to interpret the results and make informed decisions. This was especially true for closed systems, where actuaries had to rely on the software vendor to code new functionality.

Slow cycle time for new model creation: The cycle of actuaries creating prototypes in Excel for IT to code into actuarial software became frustrating and tedious for actuaries who preferred to do it themselves in Excel.



Ultimately, the reality for insurance companies sunk in. They simply didn't have the right staff with the right specialized skill sets to make a single platform work. A single, enterprise-wide solution for the entire actuarial process was as unfeasible as relying entirely on Excel alone to produce scalable, controlled results.

The insurance industry needs a modern, "best-in-class," component-based solution. A solution that enables Excel to do what it does best – defining business logic – and brings in other components to complement what Excel does not do well – automation, control, and scale. In other words, use the best solution for the task at hand and then connect the pieces with the right connectivity and workflow tools.

A best-in-class solution enables actuaries to focus on what they do best – creating complex models without requiring specialized coding skills. Connected systems that enable actuarial models to integrate into broader IT processes and are simple and easy to use. The insurance industry needs a solution that reflects how actuaries work while eliminating the limitations of Excel.



Coherent Spark Enables the Vision of Actuary 3.0

Coherent Spark provides a “best of both worlds” solution, harnessing the flexibility of Excel and the power of enterprise-grade cloud computing. It was designed to solve the ongoing debate of whether actuaries should continue to use Excel. Excel’s staying power, despite repeated attempts to shift to enterprise-wide solutions, is directly related to its unmatched ability to quickly create complex business logic. Coherent Spark leverages Excel to create and deploy models on the cloud with seamless connectivity to the broader IT infrastructure.

Coherent Spark solves the challenges inherent in relying on Excel only, actuarial systems only, and the manual workarounds designed to connect the two.

A single, enterprise-wide solution for the entire actuarial process was as unfeasible as relying entirely on Excel alone to produce scalable, controlled results.

Actuary 1.0 and 2.0

Model complexity and scalability

Fragmentated systems and lack of transparency

Accuracy, risk, and errors

Actuary 3.0

Spark provides flexibility of Excel with enterprise grade platform capabilities for running and managing models

Spark automates spreadsheets and integrates with RPA and other tools without specialized IT teams

Spark provides version control and auditability



Designed to scale with control

Powerful cloud infrastructure enables a 99% reduction in run time and 80% faster testing directly in the Spark platform. All while still creating business logic in Excel.



Easy integration

Spreadsheets become automated workflows with optional integration into existing systems without outside developers or in-house specialized coding skills. A no-code solution for Actuary 3.0.



Accuracy and governance

Logging, tracking, and observability features eliminate human error while creating a full audit history and auto-generated documentation.

Coherent provides the flexibility for actuaries to automate, build, and test Excel-based models directly in the Spark platform or integrate Excel-based models into other actuarial systems. Either way, it's an extremely simple, easy-to-learn process for actuaries and IT professionals.



Creating Scalable, Enterprise Business Software Just Got Easier

With Coherent Spark, actuaries can create business logic and prototypes in Excel as they have always done. Spark automatically converts those spreadsheets into a connected, centralized component of your actuarial process.

You get the flexibility of Excel with the performance, security, version control, and auditability of enterprise systems.

How does it work?

Step 1



Build

Step 2



Tag

Step 3



Upload

Step 4



Return

Step 5



Analyze

Convert

your existing Excel model into enterprise-grade code instantly. Simply tag inputs and outputs and upload your model. No other coding is required, so actuaries maintain the independence they want by using Excel and are not dependent on other teams or vendors for specialized skills.

Control

the model with features like automated version history and assumption testing. Easily test thousands of combinations of your business logic directly in the Spark platform before you launch. Simulate assumption changes across millions of calculations to support your strategic decision-making.

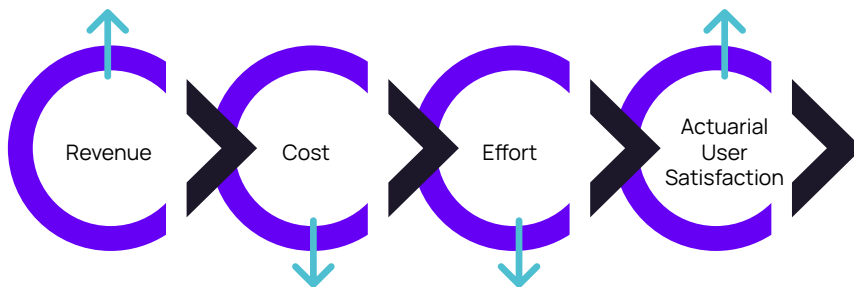
Connect

your model with your actuarial software and other platforms as needed. Dramatically accelerate the run time for complex models while gaining the controls and features expected of an enterprise-grade platform.

Coherent Spark requires no coding skills beyond Excel and enables your actuaries to maintain control of the model development process in a secure, centralized enterprise-based platform. The platform can be used independently for building, modeling, and testing or connected with other pieces of your actuarial technology stack.

Unlocking the Value of Enterprise-Grade Modeling

Cloud infrastructure enables scalability but Coherent Spark's ability to maintain flexibility in Excel means you have full transparency into your model logic without a specialized programming language. This provides accuracy and auditability which leads to real business results including:



Revenue uplift: Automation means your teams can build, maintain, and go to market with new products quicker. Market impacts like rising rates can be easily incorporated into the model, so that pricing can be managed with speed and precision. This enables more rapid sales conversion and revenue uplift. The more updates you regularly make in your Excel workbooks, the more revenue you can potentially generate with Spark. In addition, by reducing or eliminating human error in manual spreadsheets, you can capture lost revenue opportunities from mistakes.

Cost savings: Coherent reduces or eliminates the need for developers or actuaries without specialist IT skills, to program actuarial models. It also reduces software maintenance costs.

Effort: Actuarial effort is reduced in model creation, model testing, and software development. In addition, the effort associated with re-work due to fixing Excel errors is eliminated.

Actuarial user satisfaction: Your actuarial team can finally breathe a sigh of relief that the decades-long Excel debate has ended. Actuarial satisfaction will increase with the ability to retain the flexibility and autonomy of Excel while eliminating all the known limitations of Excel.

Coherent Spark enables the 3.0 Actuary to work in a new way. Actuaries can quickly build better models, test and deliver new products, mitigate risk, and drive positive ROI. All while using Excel and not needing specialized programming skills. An easy lift for actuaries.



Case Study

Stochastic modeling at a Global Insurance Company

Actuarial Challenge

- Complex stochastic Asset-Liability Excel model for valuing cost of guarantees under new capital regulations in international jurisdictions
- Included scenario generation sub-models that created a large set of possible future economic outcomes
- Runtime of 8.5 hours for 1,000 scenarios
- Significant use of user-defined functions in VBA made documentation and verification difficult
- Unsure whether to invest 100s of hours to code the model into the actuarial system and test it

Coherent Spark Solution

- Replaced the VBA
- Created templates to enable easy review of stochastic results
- Created model governance
- Externalized assumption set in asset-liability model with automated connectivity to pull the right assumptions

Coherent Spark Results

- Reduced run time for 1,000 simulations from 8.5 hours to 2 minutes
- Reduced dependency on expensive legacy actuarial systems
- Enabled better model testing, control, and assumption management



Case Study

Automated modeling process on the Cloud

Client Challenge

- A large global insurer was setting up an actuarial reporting process with three separate Excel models that needed to be linked in an automated process.
- The legacy actuarial system required complex actuarial programming and a manual process to connect the models.
- One model required millions of computations and simulations that were unfeasible in Excel and too slow for a desktop-based system.

Coherent Spark Solution

- Spark converted the existing logic of all three models into a single, automated, cloud-based process, dramatically scaling the computational power to handle the large volume of simulations at speed.
- Millions of simulations ran automatically with the control needed to ensure that the right simulation sets were used in the right circumstances.

Coherent Spark Results

- Controlled, automated end-to-end process with validated version control.
- Reduced run-time by 99%, enabling rapid re-runs to test alternative scenarios and data sets.
- Enabled actuarial team to easily make changes to the models, simulations, and processes without special programming.
- Provided a great complement to the insurer's legacy actuarial system for certain modeling processes that were not well suited to that system.



Ready to see how Coherent Spark can transform your actuarial models?

The Actuary 3.0 vision is to create an actuarial transformation through which actuaries can independently create, manage, and run scalable, automated, cloud-based models without specialized programming skills. In other words, enabling actuaries to maintain the flexibility of Excel while simultaneously eliminating the inherent limitations of Excel.

Coherent Spark does exactly that by turning complex spreadsheets into automated workflows in seconds. Actuaries can build and test Excel-based models directly in the Spark platform or connect the workflows to enterprise-wide processes. Actuarial models created in Excel now have scale, control, and governance without relying on legacy systems or specialist programming skills.



Explore Spark

Here are a few ways to learn more:



Check out our
demo video



Request a demo for a
guided tour of Spark



Try out Spark yourself
in our demo sandbox
and see it in action