

# New Wrinkles in Spreadsheets

**IF YOU WERE TO CANVASS WORKING ACTUARIES** as to what single software package they use the most in the course of their duties, a majority would probably answer spreadsheets. If you questioned only younger actuaries, you might even find some who are unable to imagine how the profession functioned before the advent of spreadsheet software.

It's easy to see why. Spreadsheet software offers the flexibility to visualize and manipulate large data sets coupled with the ability to develop sophisticated calculation algorithms using an array of built-in formula libraries.

But despite their widespread use, spreadsheets aren't the perfect software for actuarial work. As a provider of web-based spreadsheet technologies and services, I am very aware of technical challenges and other issues that still exist. For one, it's difficult to integrate actuarial spreadsheet models with web-based enterprise insurance applications. This forces insurance organizations to rewrite their sophisticated models into traditional programming languages to achieve enterprise-level integration—often an expensive and time-consuming task. Lack of security and inadequate version control are other weaknesses of current spreadsheet software.

## A Quick Historical Overview

The term “spread sheet” was first used in accounting. It referred to the organization of data in columns and rows on a large sheet of paper or across facing pages of a bound ledger. The concept of a computerized spreadsheet for use in business accounting was first introduced in 1961 by Richard Mattessich, then a professor at the University of California, Berkeley. Between 1969 and 1976,

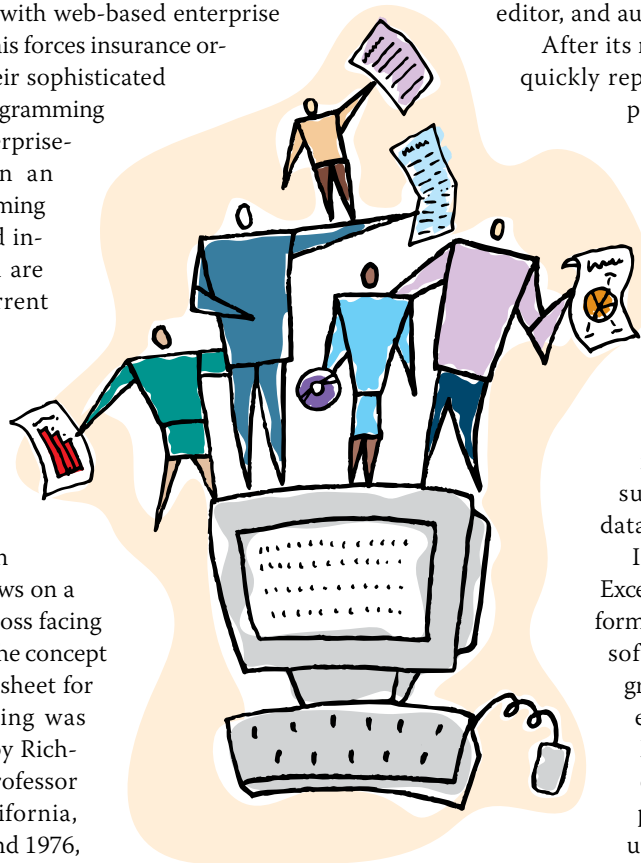
the first efforts at manageable and resourceful spreadsheet software appeared, including LANPAR (Languages for programming Arrays at Random) in 1969, Autoplan/AutoTab in 1968, and APLDOT in 1976.

VisiCalc, developed by Dan Bricklin and Bob Frankston in 1978, was the first commercial spreadsheet software. VisiCalc included the most essential features that current spreadsheet software is based upon, such as an interactive user interface, formula editor, and auto-calculations.

After its release in 1982, Lotus 1-2-3 quickly replaced VisiCalc as the most popular spreadsheet software. One of the major advantages of Lotus was that it was developed for the IBM PC platform. The spread of PC computers led to an inevitable popularity of the Lotus software among business users. It also included more powerful features such as charts, macros, and database integration.

In 1985, Microsoft developed Excel for the Apple Macintosh platform. It was the first spreadsheet software with a menu-driven, graphical interface that supported mouse-based operations. Excel was released in a second version for the Windows platform in 1987, but it wasn't until the release of the seventh version, also known as Excel

95, that it began to dominate the commercial spreadsheet software market. Today, it's the clear market leader with an estimated 90 percent market share.



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## Use of Spreadsheet Software in Insurance

Since its initial commercialization, spreadsheet software has been a popular tool within insurance organizations, particularly in actuarial departments. Actuaries must deal with large and complex data sets. They need to apply sophisticated and proprietary data analysis techniques to process claim and premium history. Those analyses have to be repeated frequently to gain a better understanding of the company's performance and risk tolerance. Results are then fed into other proprietary models to produce information for making decisions on critical functions, such as pricing and reserving. Spreadsheet features, such as pivot tables, database querying, and the macro language Visual Basic for Applications (VBA), allow actuaries to analyze large data sets using built-in formula libraries.

Specific areas of insurance practice that rely heavily on actuaries' use of spreadsheet software include:

› **Rating and Quoting**—In most insurance organizations, underwriters, sales agents, and brokers use spreadsheet-based rating and pricing tools that are developed and maintained by actuaries.

› **Underwriting**—Underwriting decisions require complex if-then-else rules. While there are numerous rules-engine software products available on the market, they typically lack the almost unlimited flexibility that spreadsheet software provides. With spreadsheet software, it's possible to build practically any algorithm and combine it with if-then-else rules. Actuaries can build underwriting models in spreadsheets without having to learn the different proprietary language that most rules-engine software requires.

› **Calculating Reserves**—Reserving is a complex process requiring sophisticated modeling and calculations. Spreadsheet software is commonly used in building reserve models. The many challenges and complexities in reserving, especially with upcoming principles-based reserving requirements, make spreadsheet software the ideal platform for building reserve models.

› **Predictive Modeling**—Predictive modeling is becoming increasingly popular in the insurance industry. It calls for mining large data sets and applying multivariate



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models to predict future trends by gaining a better understanding of the data, with the goal of making more effective underwriting and pricing decisions in the future. As the popularity of predictive modeling increases, actuaries are faced with the challenge of selecting the tool sets to build such models. Although there are numerous commercial software packages specifically marketed for predictive modeling, spreadsheets remain the No. 1 choice for most actuaries because they provide the highest degree of flexibility and offer the fastest learning curve.

### Issues and Limitations

Despite its popularity, one of the greatest challenges that actuaries face in using spreadsheet software is the need to integrate the sophisticated algorithms built into spreadsheet models with other enterprise applications.

For example, rating algorithms need to be integrated with web-based quoting systems that are used by brokers and underwriters. In most cases, those complex rating algorithms are especially difficult for anyone with limited actuarial background to understand. Despite those complications, many insurance companies choose to rewrite rating algorithms in traditional programming languages in order

to integrate them with quoting systems. This can be a long and expensive process.

It starts with actuarial units writing specification documents, describing in extreme detail how rating algorithms work. These specification documents are then delivered to the IT department, where software developers must analyze the algorithm before coding can start. Considering that most software developers are not equipped with the skills and experience to understand complex insurance calculations, this process typically takes time. After the code is complete, it's delivered to a quality assurance (QA) team for testing. Given the analytical nature of this code, business units, in conjunction with QA teams, will typically have to get involved in testing. Usually the testing process gets longer and more reiterative as algorithms get more complicated. After all inconsistencies are resolved, business units sign off on the application, and it's finally ready to be rolled out.

Once their models are rewritten in any programming language other than a spreadsheet, actuaries lose the control and flexibility of making changes and getting them out quickly to users. Because they are forced to follow IT processes of change management that are often long and expensive, actuaries can no longer update their models in a timely manner to stay competitive. As a result, speed to market for the whole organization suffers.

Other problems arise when spreadsheet software is used by actuaries for multidimensional data analysis. Built-in online analytical processing (OLAP) capabilities (known as pivot tables in Excel) are utilized by actuaries to analyze and visualize large data sets. Those features allow actuaries to quickly view and summarize any large data set with different dimensions and perform complex calculations without being a database or software developer. However, as the amount of data collected by insurance companies grows exponentially, traditional desktop-based distribution using OLAP analysis capabilities is no longer an effective solution. The data size requirements and increasing complexity of OLAP analysis require online tools and powerful server environments.

Version control presents a different set of issues. Spreadsheet files are typically distributed by the duplication of

files onto each user's desktop. As multiple people start working on the same file, version control becomes a major challenge. Managing multiple spreadsheet versions becomes a time-consuming and costly task for any company. Accessing spreadsheets on shared network folders is a popular way to reduce the version control problem. However, this allows only one person to work on the same file at a time. Hence this approach fails with frequently accessed spreadsheets.

The lack of strong security measures is another limitation of current spreadsheet software. Actuarial spreadsheet models often contain proprietary algorithms and sensitive company or customer data. Distributing those files, even with password protection, doesn't always provide the level of security that insurance organizations need.

**New Technologies**

As comfortable as today's actuaries are with using spreadsheet software, are spreadsheets going to be able to maintain their predominance as the application of choice? A deciding factor may lie in the ongoing development of new technologies, including:

› **Web Services**—Software is increasingly available that allows actuarial spreadsheet models to be integrated with enterprise insurance applications via web services. This can eliminate the time-consuming and expensive process of rewriting actuarial models. It also keeps actuaries in control of their models and recaptures the ability to roll out changes quickly.

› **Web-Based OLAP**—There are software products on the market that can convert an existing spreadsheet model, including pivot tables and spreadsheet calculations, and turn it into a web-based tool. This ap-

proach provides a centralized delivery of data and OLAP capabilities while ensuring reuse of existing spreadsheet models.

› **Online Spreadsheet Software**—Other promising options include products that facilitate real-time collaboration of spreadsheet files over the Internet or a company's intranet. Online spreadsheet software allows access to spreadsheets among multiple users while keeping the file on a secure server. Since all users work on the same file, version control is no longer an issue. Online spreadsheet software also addresses security issues since spreadsheets are never copied to local user desktops.

To the degree that these and other emerging technologies are capable of solving the problems actuaries currently encounter while using spreadsheet software, it's less likely that they'll be giving it up anytime soon. ●

# Does your lawyer understand:

- ✗ The difference between Schedule P and a Schedule B?
- ✗ IBNR estimates based on the BF method?
- ✗ Reinsurance commutations?
- ✗ Viatical settlements?
- ✗ The ASOPs?

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