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Are Spreadsheets Sabotaging Your Accuracy?

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Many firms are addicted to using spreadsheets for many applications, including forecasting, trend analysis and other actuarial requirements. They are afraid to let go. Spreadsheets are ubiquitous, relatively easy to use, and can be very sophisticated, but they are often uncontrolled, poorly designed and inadequately maintained. There are real risks associated with the use of spreadsheets. By following a few practical suggestions spreadsheet use can be made safer.

THE EVOLUTION OF THE SPREADSHEET

In 1979, Dan Bricklin and Bob Frankston published the first modern PC-based electronic spreadsheet called VisiCalc. While previous row/column programs existed, the modern WYSIWYG ("what you see is what you get") interface in VisiCalc created a user-friendly, functionally rich solution that some credit with launching the PC business revolution.

Lotus 1-2-3 took over the spreadsheet lead in the early 1980s with additional innovation and functionality. The current spreadsheet leader, Microsoft Excel, was introduced in 1985 and was originally developed to support the Apple Macintosh. In 1987, Excel was introduced for the "IBM PC," and by the early 1990s Excel had surpassed Lotus 1-2-3 in both feature/function and sales.

Spreadsheets might have begun as basic row/column calculators, but they quickly matured into feature-rich software. They include sophisticated, built-in mathematical functions and programming language capabilities.

Power users began to use spreadsheets for larger scale business solutions; they were tackling tasks as diverse as financial statement analysis and actuarial projections. As the problems being addressed by spreadsheets grew, so did the spreadsheets themselves. It is not uncommon to find spreadsheets with thousands or even tens of thousands of cells. Today, the complexity of some spreadsheets rivals or even exceeds that of applications created in standard programming languages.

RISKY BUSINESS

Spreadsheets are the ultimate "end-user" business application. They are typically built by individuals or groups, and not information technology professionals. As such, it is unusual to find a spreadsheet that has been designed, developed and tested using the rigorous methods in use by professional software engineers.

Today, many mission-critical functions are being supported by spreadsheets that have been developed without formal methodologies. The business risk is not fully understood by most corporations. As the functions being supported by spreadsheets become more critical, so does the urgency to manage the development so that the decision makers can rely upon the results generated by those complex programs.

SPREADSHEET LIMITATIONS

The use of spreadsheets to perform complex business functions exposes a business to a number of risks and limitations.

Raymond Panko at the University of Hawaii proved that spreadsheet errors are common and result in meaningful, harmful impacts. His studies of spreadsheets in use by companies of many different sizes have found error rates from 24 percent to over 85 percent. Error levels of this magnitude can clearly have a measurable and non-trivial impact on decisions that are based on the inaccurate results produced by those spreadsheets.

He defined two categories of errors. Quantitative errors produce incorrect values elsewhere in the spreadsheet. Qualitative errors are flaws of design that may later cause errors through incorrect input or modifications that do not maintain the integrity of the original spreadsheet.

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SPREADSHEETS MAY BE EVERYWHERE, BUT WE MUST LEARN TO CONTROL AND MANAGE THEM LIKE ANY OTHER TECHNOLOGY ASSET. ANYTHING LESS WILL INVITE PROBLEMS AND ERRORS IN OUR DATA AND DECISIONS.

Quantitative errors were categorized into three main types: mechanical (incorrectly keyed data, formulas, or pointing to an incorrect cell), omission (something important is left out) and logic (incorrect formulas due to errors in reasoning). In addition, there are life cycle errors that occur as spreadsheets are updated, modified and enhanced. These errors can be introduced long after the spreadsheet was designed and the original testing was completed.

The fact that these types of errors exist in spreadsheets is not surprising given the ad hoc nature in which most spreadsheets are created and maintained. Issues such as security, documentation, version control and validation are neglected or not even considered. Also, without a formal testing/feedback system, spreadsheet end users might not realize the extent to which output data is inaccurate.

DIFFICULT TO MAINTAIN

Even if the initial version of a spreadsheet is created successfully, it often will not remain that way through future revisions, iterations and/or enhancements.

Two important elements are the lack of documentation and the inevitable migration of employees to new job duties or even companies. Professional software developers budget for and invest significant time in the documentation of their systems. This is a necessary prerequisite to allow the system to be maintained and to allow ongoing support even if the original solution's authors are no longer available. Spreadsheet documentation is a rarity, and training replacements for developmental personnel is almost nonexistent.

Furthermore, spreadsheet programs are almost exclusively built based on the education, experience and expertise of a single user, department or firm. Compare this to more mature business applications, built over many years by professional software firms. Such applications include the "best practices" of hundreds or even thousands of end users. No in-house development can match that level of input.

Data control is the final area of concern for most organizations. Few spreadsheets identify the source information (when created, using what data, from what time period, and on what version of the spreadsheet) on all reports. In all cases, it must be possible to replicate the exact results, or the system will be suspect. And in most cases it is.

WHAT CAN WE DO?

The very first step is to determine if the spreadsheet is really needed. Many early sheets were created because the actuarial systems of that day were not adequate to meet the needs of decision makers. Now that has changed, review every spreadsheet with your software vendors and see which ones might be replaced using standard software that is properly tested and maintained.

If you must continue to use the spreadsheet, carefully test how well it works. Create a simple, but complete set of input data that will test all of the assumptions built into the spreadsheet. Then predict the expected results. Run the data through the spreadsheet and then reconcile the output. Any errors must be traced down and corrected.

This process may take a number of iterations. When a properly operating spreadsheet is developed, give it a version/release number and then "lock it down." Do not let anyone change anything without permission. Even when a change is necessary, until it is able to run the test data accurately (enhanced to account for any new functionality or changes to the spreadsheet), it cannot be used by others. Once approved, it receives the new version/release number and the old version is taken off the system.

Second, make sure that every spreadsheet report shows the version/release number on the top of every page. It should also be required to report the source of the input data and what periods it covers (including months, days and years).

CONCLUSION

Based on the limitations of spreadsheets, and the ongoing potential problems from undocumented, untested and uncontrolled spreadsheets, the continued use of spreadsheets to manage mission-critical functions is an unacceptable risk for 21st century firms. In too many cases, spreadsheets may be sabotaging their accuracy.

The stakeholders of every organization should insist that corporate executives take greater responsibility for the output and use of spreadsheets that impact client decisions. Now that we know the old methods are broken, we accept the risk if we do not correct them. ▼