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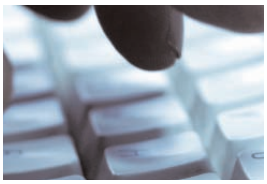

To Err Is Human; To Correct, Divine

by Mary Pat Campbell

How error-riddled are your spreadsheets? How much can a simple Excel flub cost your company? When you do make a mistake, how likely are you to catch it?

Though we often work with specialized software, Excel is the central tool for most of us, easily adaptable and giving us results faster than much more complicated and targeted programs. However, the danger for material error is there, and the bad news is it's wellnigh impossible to escape error. Even worse, Excel errors can cause large financial damage: at the European Spreadsheet Risks Web site, they've got a page of spreadsheet error horror stories. As an example: a Canadian power company took a 24-million-dollar loss in 2003 when a cut-and-paste error led to a mispriced bid. This is not a one-off event: as of September 2007, the EUSPRIG has 89 news stories, dating back to 1995, of substantial spreadsheet errors. Minor mistakes don't show up in newspapers.

Of course, we're experts, so our spreadsheet errors are rare—right? Let's go to the research and see.

Ray Panko, a professor at the University of Hawaii and a researcher into error rates in spreadsheets, has found that in audit research of spreadsheet errors, 94 percent of spreadsheets reviewed had errors, and about 5 percent of cells in the reviewed spreadsheets contained errors. Some of these errors are immaterial, such as minor typos, but the most insidious type of errors are the ones least likely to be found: omission errors, where something is missing; and logic errors, where the model or calculation is just plain wrong. We are very unlikely to discover the errors in our own thinking (the source of logic errors), and it's very hard to see that something is not there without explicitly looking for it.

We may think, "Sure, those studies show high error rates, but that's because they're looking at the spreadsheets of a bunch of schmoes ... most likely MBA students." OK, yes, some of the research subjects were MBA students, but in controlling for expertise level, error rates were similar for novices and experts. Even when the spreadsheet task was greatly simplified, the cell error rate was 2 percent for a very artificial situation, as opposed to operational spreadsheets from real businesses. Spreadsheets used in business often were much more complicated, involving links to other files and macros doing a great deal of the calculations.

The reason for novice error rates is simple: they don't know what they're doing. But what about us experts? The problem there is we may underestimate the likelihood of error.

It's hard to detect what you don't expect. If you do only the most cursory of error checks, because you are confident about what you've done, it's highly unlikely that you'll discover that you set up your model incorrectly. Someone else may not catch the error because they don't know enough about the spreadsheet to understand when you've made a mistake. So it's a bind: other people might be more inclined to consider the possibility of an error, but they are unable to find it from ignorance; you would be able to find it, but you're overconfident about your work.

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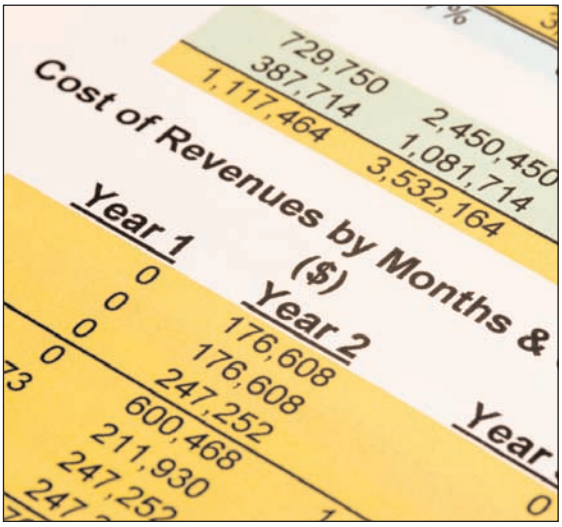
The good news is that there are ways to mitigate the errors, and to reduce your chances for error. At the end of the article, I've provided links to resources I've found to be very helpful. The most helpful of all the articles is Philip Bewig's article "How do you know your spreadsheet is right?" If you do nothing else, check that one article out. Some of the sites and articles focus on error rates and types of error; don't discount these—if you know how material errors are most likely to occur, you're more likely to catch them or prevent them.



From reading these papers, there seem to be three main ideas that greatly reduce error rate initially and improve error detection:

- Think before you create. Plan your model structure in advance, and consider extreme values that should break your model (you can use those for testing later). Work out the logic in advance, not on the fly. This will result in better structured spreadsheets and reduce the likelihood of logic errors.
- Expect errors as you work. In lab research, when people were made aware of how common spreadsheet errors were, they were much more likely to catch their errors, especially material ones. People who expect errors examine spreadsheets more carefully, perform more stress tests, and make error-checking part of their routine. Keeping your "spreadsheet ego" in check is a must.
- Work in groups. Research has found that there is a great improvement in error detection when spreadsheets are reviewed in groups. We can be blind to our own errors but very able to see the mistakes of others. As well, different people may be apt to find different types of errors, so that in combination they improve the overall error-correction rate. Panko's research has found a statistically significant improvement in error detection when people work in groups of four (a two-thirds improvement in the error-detection rate); working in pairs did not improve detection to a significant extent.

The sources listed have even more practical and technical ideas (data validation, cell protection, named ranges, R1C1 notation, and more), but the central concept is to be mindful and to be humble.

Spreadsheets have become part of the quantitative sea we swim in—let's make sure they're our Queen Mary, and not our Titanic.

Helpful tips:

"How do you know your spreadsheet is right?" *http://www.eusprig.org/hdykysir.pdf*

"52 ways to prevent spreadsheet problems" *http://www.mailbarrow.com/services_excel_prevent.php*

"Block that Spreadsheet Error!" *https://www.aicpa.org/PUBS/jofa/aug2002/callahan.htm*

Other Sources:

European Spreadsheet Risks Interest Group: *http://www.eusprig.org/*

Ray Panko's Spreadsheet Research: *http://panko.shidler.hawaii.edu/SSR/index.htm*

Other spreadsheet error news stories: *http://www.eusprig.org/stories.htm*

Ray Panko, "What We Know About Spreadsheet Errors", January 2005.

http://panko.shidler.hawaii.edu/SSR/Mypapers/whatknow.htm

Tuck School at Dartmouth: Spreadsheet Engineering Research Project

http://mba.tuck.dartmouth.edu/spreadsheet/product_pubs.html

Systems Modelling Ltd., Spreadsheet Research Resources

http://www.sysmod.com/sslinks.htm#Research

Winner of the CompAct Article of the Year Prize 06-07

Joe Alaimo (left), winner of the CompAct 2006-2007 "Article of the Year Prize," is presented an iPod Nano from Section Chair Kevin Pledge for his two-part series on Illustration Software Testing.