

# CompAct

ISSUE 30 | JANUARY 2009



## Cool Tech

by Matthew Wilson

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Welcome to the third edition of Cool Tech. This is where I point out cool things on the Web. In this edition I'll also be talking about free forum software, forum strategies, search engines, Google Adwords/Adsense, free meetings on the Web, Open Courseware, The Learning Annex, Virtual Learning Environments (VLEs) and a derivatives spreadsheet that I wrote.

From getting my Amazon.Com clones wiped out, handling Russian forum spammers and getting run-over by bad-boy search bots, I've found that it's not always easy playing around on the Web. However, I have picked up a thing or two along the way. Hopefully I'll be able to save you a little time, or at least give you some new ideas.

### A LITTLE HISTORY

Back in 2003 I read an interesting article about a guy who created a Web site that provided book pricing information from several different Web sites. Apparently, he had a program that would gather data from multiple Web sites at the same time. The whole idea of scraping Web site data from multiple Web sites at the same time fascinated me. So I decided that I was going to create a similar Web site. My only problem was that I was starting from ground zero.

To make a long story short, I eventually accomplished my goal. The only problem was that it took me a few years to do it, and by then these types of Web sites were a dime a dozen. In the process I learned Perl, Regular Expressions (RegEx), PHP, MySQL and a whole lot more.

By the way, if you haven't looked at RegEx, you're missing out. One can implement amazing search and/or replace scripts. Using RegEx made it

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# CompAct

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## Editor's Notes

by Howard Callif

The SOA meeting in Orlando provided a great forum to meet and discuss ideas. There are a lot of areas we could cover in our newsletter to help people make the most of technology. For a brief intro to the council members, please be sure to look at the "Letter from the Chair."

The newsletter has a new look, and has been reformatted to enhance on-line access, as well as be consistent with the other section newsletters. The SOA works hard to publish all of the section publications, and usually does all of the graphic and design layout for each issue. This behind the scenes work is very much appreciated, so a quick "Thank you" to Sam Phillips and Julissa Sweeney.

A special thank you Carol Marler and Stephanie Young—both of Employers Reinsurance Corp. They submitted book reviews on subjects they thought would interest section members. Please consider whether a book you are reading would fit in this category, and take a few minutes to write your thoughts on the subject. We are also going to mention any web-x presentations of interest, as long as they are not commercials, and have no cost. Please keep an eye out for material that could benefit other readers.

We are lucky to have several columnists volunteer to provide regular content to our newsletter: Steve Craighead (R Corner); Matthew Wilson (Cool Tech), and in upcoming issues Mary Pat Campell (still trying to find a catchy title). I am considering writing an article on VB, but need some guidance from readers on what topics would be most relevant. There are several different topics that could be covered in this column, but it is very difficult to know if any readers would be interested. Please let me know if any of the following would be useful to you:

- 1) Visual Basic 6.0
- 2) VB Macros in Excel
- 3) Visual Basic NET (2003, 2005, or 2008)
- 4) Converting from Visual Basic 6.0 to Visual Basic NET
- 5) Programming concepts/standards
- 6) Database/SQL processing
- 7) Introductory materials (for actuarial students or new users to easily pick up the language)
- 8) Tools/Utilities for common functions
- 9) Source code control/versioning

Finally, a sad note: a typo crept into our last issue in the table of contents. Although Mary Pat Campell found it amusing for the irony, I do apologize for the error, and take full responsibility for the misspelling. We work very hard to ensure that every issue is grammatically and typographically correct, but mistakes do occur.

Please contact me if you have any ideas, suggestions, or comments (even if it is to just point out a typo). ■



Howard Callif is a senior system architect at iPipeline in the Illustrations unit. He can be reached at [howard@callif.org](mailto:howard@callif.org).

# Letter from the Chair

by Timothy Rozar

It is a true pleasure to write this note introducing myself as the new Chair of the Technology Section Council. I'm excited about the year ahead and about the terrific group of council members that I will be working with this year. Last week at the annual meeting in Orlando we had a great time getting to know each other over wine and cheese, dining at the House of Blues, and brainstorming our many aspirations for the coming year. I'd like to introduce you to our 2009 council and some of the projects they will be working on this year:

**Tim Deitz** is a new council member this year, and he comes to us from Old Mutual in Baltimore. Tim will serve as the council Vice Chairman this year, and he will also be our People Coordinator. In that role, Tim will be coordinating volunteers and working to develop job descriptions for the key roles that we rely on each year to reach our goals. You are really going to appreciate Tim's work when you join the council and get to serve in one of these roles!

**Joe Liuzzo** is in his third and final year with the council and comes to us from TIAA-CREF in Charlotte, N.C. Joe is our Secretary Treasurer, and he also heads up our Table Manager project. Joe has worked tirelessly on Table Manager over the years, and there are not very many of us who don't owe Joe our thanks for making this tool available. Joe is currently working through validation and editing of the many tables in the manager, and is always happy to have a little help in his efforts, so don't hesitate to give him a call if you have some spare time on your hands!

**David Minches** is another third year member of the council, and David joins us from the Philadelphia office of Ernst and Young. David has served in various roles during his tenure which makes him well qualified for his new role this year as Communications Coordinator. The Communications Coordinator is responsible for integrating and supporting all aspects of our interaction with the section membership. The main points of contact that David will be focusing on are the newsletter and the various SOA sponsored meetings that we provide content for. David will also be involved in developing a membership survey this year to get your view of how the section can meet your needs, so please look for that survey and give us your feedback.

**Carl Desrochers** is in his second year on the council, and hails from Berkshire Life in Pittsfield, Mass. Carl just completed his role as 2008 SOA Annual Meeting Coordinator. Carl put together six sessions for the meeting, and various section and council social events. I was able to attend three of the sessions Carl put together, and they were excellent. Carl will be working with this year's Spring Meeting Coordinator, sharing his expertise, and then he will be exploring opportunities for our section to get more involved in the various smaller meetings sponsored or co-sponsored by the SOA. Look for Carl's handiwork at such venues as ValAct, ReFocus, or the LTCI this year, as we try to expand our footprint.

**Frank Reynolds** is another of our first-year council members and Frank comes to us from the University of Waterloo. Frank has past experience with our council which is a good thing, as he is jumping right in as our Spring Meeting Coordinator. With Carl's help, Frank will be taking on development of sessions and activities for both the Life and the



CONTINUED ON PAGE 4



Health meetings in Denver and Toronto. In his spare time (ha), Frank will be serving as the council's Education Liaison which will be a key role as the SOA continues to wrestle with the development of technology curriculum for the SOA education process. It will be great to have Frank's educational background onboard for this important task.



**Holly Loberg** is in her second year on council and comes from Allianz in Minneapolis. Holly will be our Web Site Coordinator this year which will put her in the middle of the SOA efforts to update and improve the section communications portion of the Web site. I'm sure we are all going to enjoy the fruits of Holly's labors as we enjoy the improvements underway. I have not broken the news to her yet, but I am also hoping to get Holly involved in our fledgling local actuarial club initiative. If I can talk her into it, you might be able to enjoy a free drink on us at your next club meeting. We piloted this idea in Philadelphia last year, and it was very well received. The local clubs are a great venue for our section to get out and show the profession what we are working on.



**Carl Nauman** is in his third year on council and he comes to us from GGY AXIS. Carl will continue his key role in the Scenario Manager project as it comes into maturity. This project standardizes the format of economic scenarios in order to enhance our ability to use, share and test them. This will obviously be an important leading edge development as stochastic analysis grows in importance for the profession. Carl will also be our Webinar Coordinator this year which is an area where we are trying to be innovative. We have noticed that there are numerous high quality webinars being produced by various technology vendors and think-tanks, and we would like to help our membership take advantage of some of these learning opportunities by highlighting opportunities we think you will value. Look for these recommendations in future newsletters and blast e-mails, and be sure to let Carl know if you have participated in a technology webcast that you found useful.



And, that brings me full circle to next year's Annual Meeting Coordinator. **Jeff Pomeranz** is our third new council member and he hails from Qualitative Risk Management in Chicago. Jeff has agreed to take on the daunting task of planning next year's annual meeting. He is following in some big footsteps, but he is ready for the task. To get a running start, Jeff will be assisting Frank as he plans the spring meetings. Then, one year from tonight, Mr. Deitz will be thanking Jeff for an awesome annual meeting and looking forward to another year's council activities—and that is the way the world goes round.

Before I sign off, there are a few important and honorable mentions. First, thanks go out to our past Chairman and retiring counsel member **Kevin Pledge**. Kevin, like so many of our past Chairs, has made a major impact in our section as well as the profession. This is evidenced in his new popularity as various members of the SOA as well as our council compete for his services in the coming year. I like to think Kevin will be helping us define and develop some of his own initiatives for the technology section, but, whatever he does, we wish him the best. **Howard Callif** is entering his second year as editor of the newsletter. Under his guidance, the newsletter has achieved new heights in quality and innovation. The role as editor is typically a two year commitment, so, in addition to putting out the newsletter, Howard will be recruiting and training his replacement. When Howard comes your way ... duck! Finally, I'd like to welcome back a past Chair. **Phil Gold** (2006 Chair) will be rejoining our council as this year's Board Partner. I'm looking forward to working with Phil to make our section the best that it can be. So, thanks to all in advance, and let's enjoy the year ahead! ■

# Business School

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dealing with change and conflict management, you will learn key tactics and strategies for managing conflict by utilizing **Harvard Negotiation Program** tenets. This extended seminar format will provide an interactive and **higher-level** educational experience in successfully managing conflict in your organization.



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possible to scrape book data from other Web sites. For example, RegEx gives you the ability to pull items that change, like book prices, based on surrounding items that don't change.

I recommend going through this tutorial if you want to learn more about RegEx: [http://www.1913intel.com/demo/RegEx\\_Tutorial.zip](http://www.1913intel.com/demo/RegEx_Tutorial.zip)

Going through the examples in this tutorial really helped me to get a handle on RegEx. This tutorial is copyrighted, but free redistribution is allowed. The original link for this tutorial is <http://perldoc.perl.org/perlretut.html>.

I've installed both forums in the past and found them to be pretty good.

You can download my RegEx examples for Excel here: [http://www.1913intel.com/demo/RegEx\\_Examples.zip](http://www.1913intel.com/demo/RegEx_Examples.zip)

Getting back to my story. I had this cool Web site up and running, but I wasn't getting much traffic. The site was based on Amazon.Com data, but it also grabbed data from other Web sites on the fly. The advantage of my Web site was that search results returned 200 books at a time instead of Amazon.Com's 10, and you could get pricing data from other Web sites. Then I got the bright idea to use the browse nodes at Browsenodes.Com to create over a million of pages of data. These pages were all generated on the fly. This strategy actually worked for about a year. I was actually starting to earn a little bit of money each month.

I got an even brighter idea to grab my own browse nodes from Amazon.Com in order to effectively clone it. I created Amazon.Com clones for America, Britain, Canada, France and Germany. Then a weird thing started happening. For some unknown reason I was selling a lot more toys than books or anything else for that matter. I was not able to figure out why before Google decided to change the rules. Google decided that affiliate Web sites that replicate other sites should not be in their database. That means Google didn't like

my Amazon.Com clones, so it wiped me out of their database.

I took the hint and moved on to other things.

Want to add Amazon.Com search to your Web site? Check out these scripts: <http://www.chipdir.nl/amazon/>

You want the amazonv4.php script: <http://www.chipdir.nl/amazon/amazonv4.php>

You will need to play around with the HTML code to get the look and feel you want. You can also set this up for browse nodes.

Now it's time to discuss some current topics.

## FORUMS

If you've been snooping around on the Web then most likely you ran into a forum or two along the way. They are really a great way for a group of people with similar interests to communicate. They are also one of the most difficult things to start. You have to overcome the chicken and egg problem. They will come if you have content, but you can't get content until they come. Even if you get enough visitors, that doesn't mean you'll have a lot of posters. Most people don't post but rather just read posts.

Let's look at a couple of open-source forums: phpBB and SMF.

I've installed both forums in the past and found them to be pretty good. So it's just a matter of personal taste as to which one to choose. PhpBB is probably the most popular open-source forum software.

Installation of both these packages is pretty quick. Both use PHP and MySQL. Just make sure you have a database created before you start the installation.

You can find out more about phpBB at <http://en.wikipedia.org/wiki/PhpBB> and SMF at [http://en.wikipedia.org/wiki/Simple\\_Machines\\_Forum](http://en.wikipedia.org/wiki/Simple_Machines_Forum).

You can download phpBB at <http://www.phpbb.com/downloads/> and SMF at <http://www.simplemachines.org/download/>

If you install phpBB then you're going to need this program too:

[http://www.1913intel.com/demo/starfoxtj\\_toolkit.zip](http://www.1913intel.com/demo/starfoxtj_toolkit.zip)

The Starfoxtj toolkit gives you the ability to make mass changes to the phpBB database. Why do you need to make mass changes? Because this will help you get rid of spam posters. I noticed that a lot of people were registering on my forum but not posting. Then I noticed that the e-mail addresses didn't look right, and they were mostly Russian. They looked computer generated. Then I started getting spam posts from these people. The Starfoxtj toolkit gave me the ability to wipe out these spammers easily.

Before I installed the phpBB forum I had installed the punBB forum. The spammers really loved the punBB forum. So I ported this forum over to the phpBB package. The spamming stopped for a while before it started again.

If you build it they will NOT come unless you have a strategy. You are going to need two or three guys (or gals) to help you with daily posting. You should probably expect to spend a couple of hours a day on this project for months until you reach critical mass. Critical mass means to have enough contributing visitors to keep it going without your daily input. I suggest you hire a forum boosting service, and think about hiring a virtual assistant in India to make daily posts. Try Elance.Com to hire a virtual assistant.

A forum boosting service makes posts to your forum for a fee. Generally, you should expect to use them to respond to given posts. They don't charge much, but you get what you pay for.

Using a virtual assistant in India is a good way to make quality posts. Just explain what you're looking for and monitor their activity. Then your forum boosting service can respond to these posts.



The whole idea is to make your forum look like it is busy with a lot of people posting. You will need to do this until you get enough regular visitors.

Another very good forum software package is vBulletin. This package costs \$180, but it's one of the best forum packages out there. It also uses PHP and MySQL.

<http://www.vbulletin.com/>

Expect to advertise on Google Adwords to boost the number of visitors.

<https://adwords.google.com/select/Login>

## SEARCH ENGINES

If you're new to the Web then you might be wondering about submitting your Web site to various search engines. Here's a tip: only hand submit your Web site to three search engines. All of the other search engines tend to be a waste of time.

The top three search engines: Google, Yahoo! And MSN.

1. Google - <http://www.google.com/addurl/>
2. Yahoo - <http://siteexplorer.search.yahoo.com/submit>
3. MSN - <http://search.msn.com/docs/submit.aspx>

Probably something on the order of 95 percent of your traffic will come from those three search engines.

There is no need to pay a service to submit your Web site to thousands of search engines. This is just a waste of money.

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Once you start advertising, and get other Web sites to link to you, then some of the other search engines will find you. How can you get another Web site to link to you? For starters, try asking them. If your site is relevant then they just might do it. Also, if people find your site interesting, then they'll link to it without you asking.

A few years ago I had my first experience with the bad-boy search bot from Ask.Com. After it found my Web site it was so aggressively sucking up Web pages that my Web host at the time kicked me off of their server. They shut down my Web site, zipped it up and e-mailed it to me. One day everything was fine, and the next I was out of business. Thanks Ask.Com!

My current host, Dreamhost.Com, actually tries to work with me over issues like bad-boy bots and scripts that run amok.



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## GOOGLE ADWORDS/ADSENSE

Use Google Adwords to bring visitors to your Web site. Make up a small ad that when clicked will bring people to your site. Your ad can appear two ways: when people search and on Web site ads as a content ad.

You can set up several ads and several different keywords in order to see what works.

Here's a strategy that worked for me at 1913 Intel. I only bid .01 per click. So my ad would not show up during a search, but it did show up on Web site ads as a content ad. Using this strategy I got 400 people a day to visit my Web site. The key for me was finding the right keywords. I guessed at a lot of keywords, but it wasn't until I used "Foreign Policy" that my ads really took off.

Here's another tip: sometimes it took a week to see the results when I changed keywords. Initially, my clicks would go down, later they would go up.

It's not that I had some brilliant strategy to get clicks. I just stumbled into this strategy. I was getting poor results initially as I guessed at keywords that never seemed to bring traffic. Keyword changes only brought less traffic. Then I got really fed up with my poor

results so I just ignored Adwords for a month. When I finally checked back with Adwords I was absolutely stunned to find out that I was getting 400 clicks a day. What happened?

Since my strategy used content ads, I had no way of knowing which keywords were bringing in the traffic. By using a process of trial and error I was able to isolate "Foreign Policy" as keywords that brought in all of the traffic. I had guessed at this right before I gave up.

Have you ever heard of advertising arbitrage? That's where you hope to make a spread between Adwords and Adsense. You can find out more here: <http://www.salarymap.com/google-encouages-arbitrage.cfm>

I was paying \$.01 per click on Adwords, and I was displaying Adsense ads on my Web site. I was hoping to make a spread. Ultimately, I broke about even, which means I was getting 400 visitors a day for free. Currently, I do not advertise with Adwords because I get enough search engine traffic for free.

Here's the Adwords tutorial: <http://www.google.com/adwords/learningcenter/>

Here's the link to Adwords and Adsense: <http://www.google.com/intl/en/ads/>

Google Adsense gives you the ability to display ads on your Web site. Unfortunately, most Web sites won't make a lot of money from Adsense. The goal should be to use several methods of advertising to improve your ability to make money.

John Chow's Web site will show you how he makes money online: <http://www.johnchow.com/>

Make sure you go to John Chow's site, NOT John Cow's site. John Chow has a report on how he went from \$0 per month to \$30,000 per month. John makes money telling people how he makes money. That's a nice job if you can get one.

In the Adwords section, Google gives you the ability to get analytics code. You can imbed this code in your



Web site footers and get statistics about your visitors. I recommend that you do this. It seems to generate much better statistics than those from my host.

## FREE MEETINGS ON THE WEB

If you're part of a small business then you might like this free software package: Dimdim. Dimdim allows you to conduct free meetings on the Web. You can share your desktop, show slides, collaborate, chat, talk and broadcast via Web cam. No attendee downloads are required. You can host meetings with up to 20 people for free. You can upgrade to the Pro version for \$99 per year for bigger meetings and for customization. Visit: <http://www.dimdim.com/>

## OPEN COURSEWARE

MIT really kicked off the open courseware revolution back in 2001. That's when it announced the idea of Open Courseware. Later it started making available the content from some 2,000 courses. MIT made available just about everything: book lists with links to Amazon.Com, video lectures, course outlines and more. Now people all over the world are using these online courses.

Check out what Wired Magazine had to say about this program: <http://www.wired.com/wired/archive/11.09/mit.html>

Here's the link that will take you to the course material: <http://ocw.mit.edu/OcwWeb/web/home/home/index.htm>

You can sign-up for their free newsletter to get monthly updates: <http://ocw.mit.edu/OcwWeb/jsp/subscribe.jsp>

Do you need help finding an online course? This Web site will help you to snoop around more efficiently: <http://oedb.org/library/features/236-open-courseware-collections>

## THE LEARNING ANNEX

The Learning Annex produces seminars, lectures, classes and workshops throughout the United States and Canada. The Learning Annex provides a wide variety of online (for fee) topics from "50 Sure-Fire Ways to Break the Ice & Improve Your Conversations" to "How to

If you're part of a small business then you might like this free software package: Dimdim.

Invest in Tax Delinquent Properties For Pennies on the Dollar." Visit: <http://www.learningannex.com/>

## VIRTUAL LEARNING ENVIRONMENTS (VLES)

A VLE is a software package that will allow you to set up courses online for teaching various subjects. Read more about VLEs here: [http://en.wikipedia.org/wiki/Virtual\\_learning\\_environment](http://en.wikipedia.org/wiki/Virtual_learning_environment)

Moodle.Org is one popular open source package for learning and teaching online. My Web host (Dreamhost.Com) installs this package for free. You can learn more about this package and download it for free here: <http://moodle.org/>

If this package sounds very interesting to you then I suggest you check out some of the Web sites that use Moodle. You can get a list of these websites here: <http://moodle.org/sites/>

Snoop around and see what other people are doing.

Web Options 2.6 (Derivatives Calculator)

Each quarter I will try to release one or two programs that I've written. In the "A Little History" section I gave you a link to an Excel spreadsheet that uses RegEx. Here's the link again in case you missed it: [http://www.1913intel.com/demo/RegEx\\_Examples.zip](http://www.1913intel.com/demo/RegEx_Examples.zip).

In the VBA section of the spreadsheet, it shows you how to set up and use RegEx within Excel.

Another program I've written is WO\_2\_6.xls. It is an Excel program I wrote several years ago to value various kinds of derivatives. Here's a list of its features:

1. European Options
2. European Options - Binary Tree
3. European Options - Monte Carlo Simulation

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4. European Options - Finite Differences
5. American Options
6. American Options - One known dollar dividend
7. American Options - Binary Tree
8. American Options - Finite Differences
9. Asian Options
10. Asian Options - Monte Carlo Simulation
11. Barrier Options
12. Barrier Options - Monte Carlo Simulation
13. Binary Options
14. Lookback Options - Floating Strike
15. Lookback Options - Fixed Strike
16. Chooser
17. Probability of Default (Credit Risk)
18. Swaption
19. Calculation of Spot Rates
20. Warrants

If you're interested in derivatives then you might enjoy playing around with the spreadsheet. All macros are open.

You can download this program here: [http://www.1913intel.com/demo/WO\\_2\\_6.zip](http://www.1913intel.com/demo/WO_2_6.zip)

If you have any cool ideas or links for Cool Tech then shoot me an e-mail at [matt\\_wilson@farmersinsurance.com](mailto:matt_wilson@farmersinsurance.com). ■

## Pay Your Dues and Section Memberships Online\*

Using your credit card and our easy-to-use online payment system, you can pay your dues, renew section memberships or sign up for new section memberships. For your convenience, you can also sign up for IAA special interest sections at the same time you renew your SOA membership.

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# R Corner*i*

by Steve Craighead

## DATA COMMA DELIMITED FORMAT (CSV)

In this article, I'll describe how to get data into and out of R. The first approach will be the simplest in that we will move data in and out by the use of text files. (Specifically the comma delimited CSV format). In R, one can read a CSV file in by the use of the read.csv method.

If you use the help command in a R command window

```
help(read.csv)
```

Figure 1 displays what you get from the help browser.



Steve Craighead, ASA, MAAA, is an actuarial consultant at TowersPerrin in Atlanta, Ga. He can be reached at [steven.craighead@towersperrin.com](mailto:steven.craighead@towersperrin.com).

```
Usage

read.table(file, header = FALSE, sep = ",", quote = "\"'\"",
  dec = ".", row.names, col.names,
  as.is = !stringsAsFactors,
  na.strings = "NA", colClasses = NA, nrows = -1,
  skip = 0, check.names = TRUE, fill = !blank.lines.skip,
  strip.white = FALSE, blank.lines.skip = TRUE,
  comment.char = "#",
  allowEscapes = FALSE, flush = FALSE,
  stringsAsFactors = default.stringsAsFactors(),
  encoding = "unknown")

read.csv(file, header = TRUE, sep = ",", quote="\"'\"", dec=".",
  fill = TRUE, comment.char="", ...)

read.csv2(file, header = TRUE, sep = ";", quote="\"'\"", dec=";",
  fill = TRUE, comment.char="", ...)

read.delim(file, header = TRUE, sep = "\t", quote="\"'\"", dec=".",
  fill = TRUE, comment.char="", ...)

read.delim2(file, header = TRUE, sep = "\t", quote="\"'\"", dec=";",
  fill = TRUE, comment.char="", ...)
```

Figure 1. Help(read.csv)results

Say you have some data in the file "george.csv," that looks like the following:

	VarOne,	VarTwo,	VarThree
1.	9000,	6.8000,	4.7000
2.	0090,	7.0080,	6.0000
3.	0900,	8.0080,	7.0070
4.	0009,	9.0008,	8.0000
5.	0090,	3.0800,	9.0007
6.	0900,	2.8000,	4.7000

Also, if this data is in the same subdirectory that you started R with, you can get this into a dataframe, let's call MyData, by using this command:

```
MyData <- read.csv("george.csv")
```

Here we have assumed that the .CSV file has header names on the first row.

If you type MyData, R will display the following:

```
> MyData
  VarOne  VarTwo  VarThree
1  1.9000  6.8000  4.7000
2  2.0090  7.0080  6.0000
3  3.0900  8.0080  7.0070
4  4.0009  9.0008  8.0000
5  5.0090  3.0800  9.0007
6  6.0900  2.8000  4.7000
```

Note how R has added a row number to each entry. Suppose, however, that george.csv is in a different sub-directory than the one that you are in. Say, that george.

csv is in C:\R\RCorner\. To access this data you will use a strange non-Windows method to enter the path information:

```
MyData <- read.csv("C:\\R\\RCorner\\george.csv")
```

Note how, R requires the use of “\\” instead of “\” when entering filepaths.

If you want to examine the data in a full screen editor, type the following command:

```
fix(MyData)
```

Figure 2 shows the content of the editor.

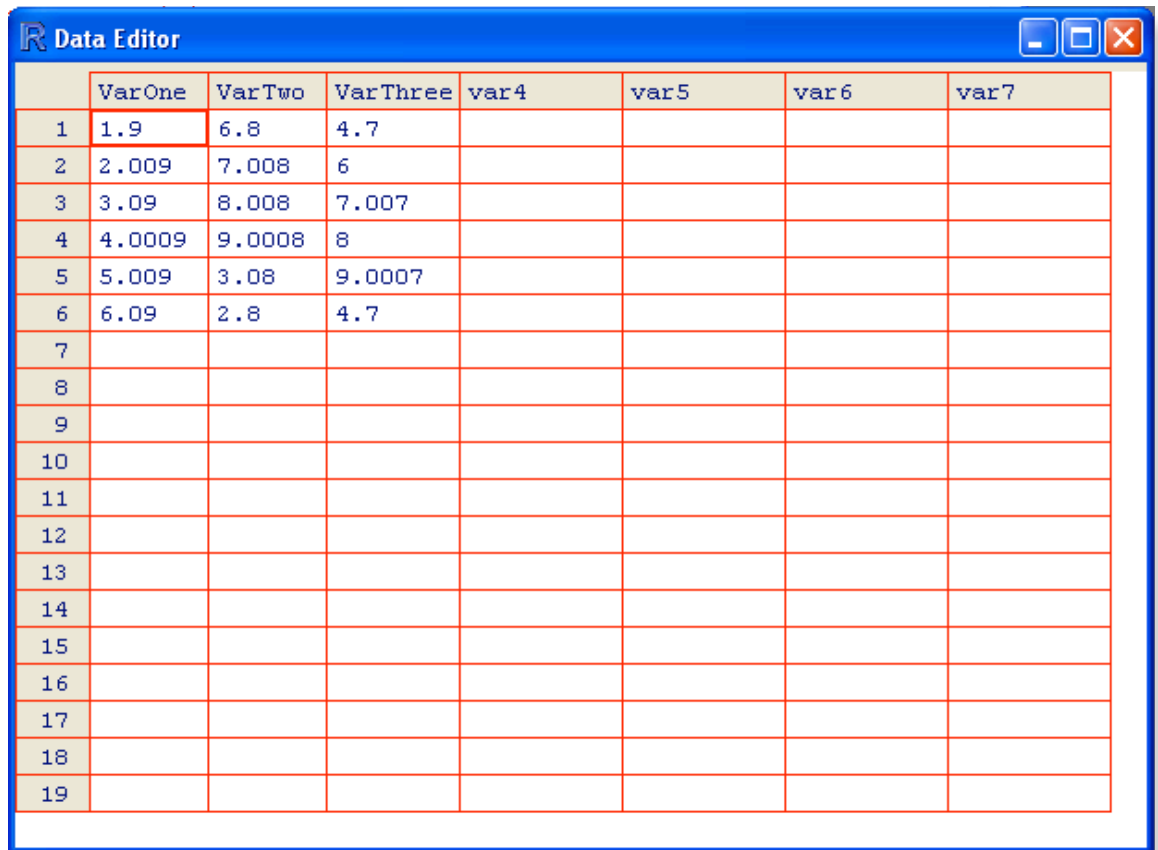



Figure 2. Screen display of the fix (MyData) command

Note that you can revise both the column names as well as the content by typing over them. Close the editor by pressing the  button.

To write out a dataframe into a CSV format, you will need to use the write command. Type the command:

```
?write.csv
```

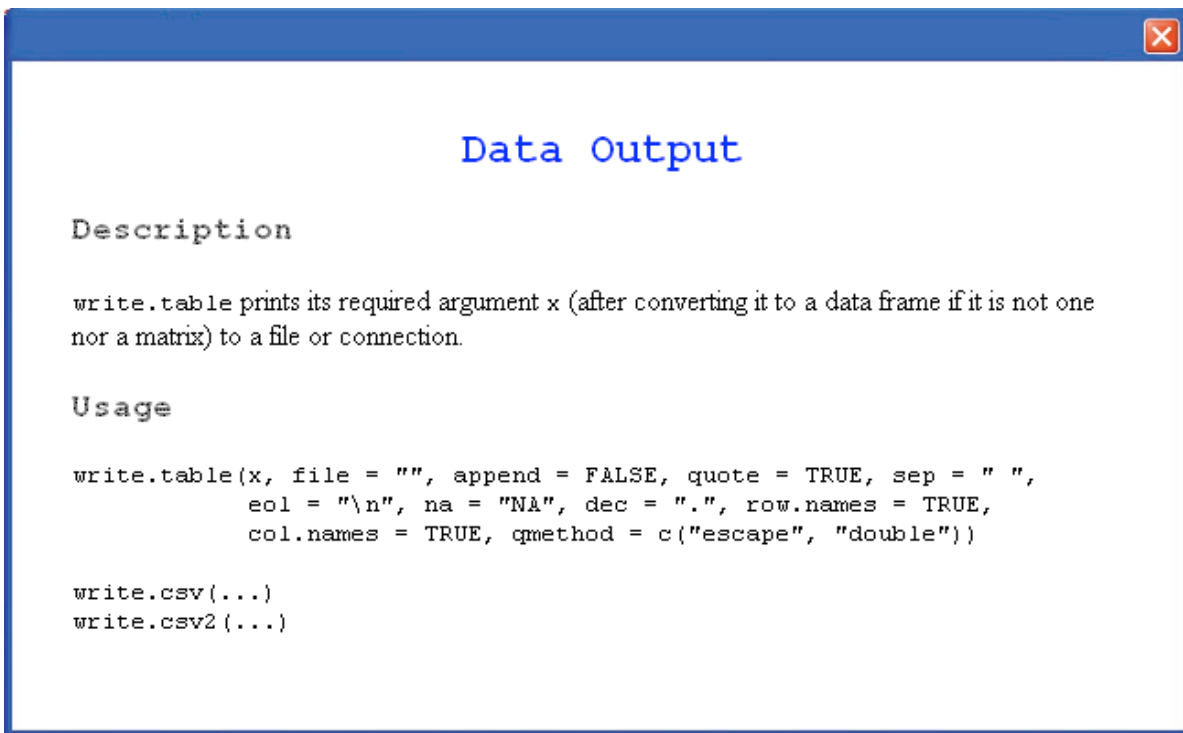


Figure 3. ?write.csv results

Figure 3 displays the result of this command. If you use the command

```
write.csv(MyData,"c:\\R\\Rcorner\\test.csv")
```

you will get a CSV file, but the first column will be one containing the row numbers. To make sure the output conforms to the same structure as what came in, when using `read.csv`, you should use the command:

```
write.csv(MyData,"c:\\R\\Rcorner\\test.csv", row.names=FALSE)
```

Now let's discuss how to use the RODBC package to get database and workbook data into R.

### RODBC<sup>ii</sup>

To get data from an Access database, you will need to use the RODBC package. The first time you use this package you will need to download it from some R package repository on the Web. The first step will be to select the Package option off of the R menu. When the dropdown list appears, choose the "Set Cran Mirror ..." option. See Figure 4 for a display of various mirrors.

CONTINUED ON PAGE 14



Figure 4. CRAN Mirror list

Choose the country or state nearest to your location and press the OK button. Next you will need to choose the “Install Packages ...” option from the dropdown list. See Figure 5, for a display of what this looks like. Look down the alphabetical list until you locate the RODBC package. Highlight this and press the OK button. If you get some message like: “Warning: unable to access index for repository ...,” you will need to choose a different CRAN repository and choose RODBC from the Install Packages again. Once you find an active repository and RODBC downloads, R will then proceed to install the package. You know that you are successful if you see the following message displayed:

package ‘RODBC’ successfully unpacked and MD5 sums checked

Next you will need to load the package. Again choose the Package dropdown list and choose “Load Package” option. From this list, choose RODBC.

To get further insight in the overall flexibility of RODBC, you can display the help browser on the package by typing either

?RODBC

or

help(RODBC)



Figure 5. Install Packages List

To get data into R from an access database, we will use two commands. The first sets up a “channel” to link R through an ODBC link to a specified MSAccess database to R and the other command sqlFetch will fetch the data from a specific table in the database.

I have created a simple MS Access database called “db1.mdb” and it contains one table called “Example.” The contents of this table are displayed in Figure 6.

Example : Table				
	ID1	Val1	Val2	Val3
▶	1	1	9	14
	2	8	8	7
	3	323	32	94
	4	94	22	11
	5	2	2	3
	6	3232	32	22
*	(AutoNumber)	0	0	0

Figure 6. Example data table in db1.mdb database

First you need to create the R object “channel1” by using the command:

```
channel1 <- odbcConnectAccess("e:\\db1.mdb")
```

Note how I designate the drive and path structure with the “\\” instead of the “.” Also, if you are accessing a 2007 Access database you need to change the command “odbcConnectAccess” to “odbcConnectAccess2007” above.

Once the channel is setup you can store the entire block of data from the Example table into an R dataframe by the following command:

```
MyData <- sqlFetch(channel1,"Example")
```

Display MyData in R by typing “MyData” in the R command window and press enter. R will display:

```
MyData
  ID1 Val1 Val2 Val3
1   1    1    9   14
2   2    8    8    7
3   3   323   32   94
4   4   94   22   11
5   5    2    2    3
6   6  3232   32   22
```

Finally, so there are no problems with re-accessing your database later, you may want to drop the linkage

to the table and close the channel by the using the following two commands:

```
sqlDrop(channel1, "Example")
close(channel1)
```

If you have an Excel workbook that you want to extract a specific worksheet from and store into R using RODBC, you will need to use something like the following set of commands:

```
chan<-odbcConnectExcel("e:\\book1.xls", readOnly = TRUE )
MyData <- sqlFetch(chan, "Sheet1")
close(chan)
```

If you want to be more choosy on what you want to extract from an Excel workbook, I have copied the following remark from the RODBC help browser:

A ‘table’ in an Excel ‘database’ (spreadsheet) can be either a ‘named range’ (<http://support.microsoft.com/default.aspx?scid=KB;EN-US;Q195951&>) or a worksheet: the latter have (the???)table (name the name???) of the worksheet with \$ appended (and such names may contain spaces and other characters not allowed in SQL table names). RODBC will generally allow worksheets to be referred to with or without the trailing \$, but this does need to be taken into account in SQL queries (where non-standard table names are escaped by enclosing them in square brackets).

This is just the tip of the iceberg regarding the flexibility of RODBC. Examine the RODBC help browser for further insight on how to conduct specific queries against various tables or to link to other database structures such as MySQL. However, realize that you will need a separate channel for each separate data source you want to access. ■

#### FOOTNOTES

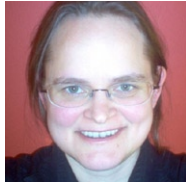
<sup>1</sup> R Development Core Team (2008). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL <http://www.R-project.org>. Originally Michael Lapsley and from Oct 2002 B. D. Ripley (2008).

<sup>2</sup> RODBC: ODBC Database Access. R package version 1.2-3.

# The End Users Justify the Means: II

## The Wrath of Numerate Decision-Makers

by Mary Pat Campbell



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It started out innocently enough. In May 2008, CFO.com featured a Q&A session with two professors talking about spreadsheet pitfalls that their business students often fall into, with tips and warnings for spreadsheet creators.

Then the floodgates opened and the responses to the article came fast and furious—peevish seems to be the most appropriate description of the responses. Some choice words from respondents:

- “Nearly every new college grad I hire has no idea how to actually create a spreadsheet that is ready to publish!”
- “One of the most annoying issues is the numbers not being in a common format, which makes the reading of numbers on the screen or on a printout very difficult.”
- “How many people actually test their spreadsheets? With the formulas hidden, it’s so easy to introduce a mistake and not even know it.”
- “I wanted to emphasize the horror of receiving a 20-tab or greater spreadsheet that does not delineate which tabs I, as the reader, should focus on.”

So far, CFO.com has run two follow-up articles on their original article on spreadsheet worst practices. (See references at the end of this article for links to these articles.) I would recommend reading the follow-up articles, at least, as none are long, and one can get the sense of frustration from this group of spreadsheet users.

In the preceding article of my current series, I looked at designing spreadsheets for use by the general public. While certain aspects of that user group require a lot of work and thought to provide the public with a useful tool, the user group of numerate decision-makers is likely to be the most exacting audience you will ever have to deal with. From the comments seen in CFO.com, the expectations aren’t necessarily high, but there are lots of details and features that the numerati will want.

Many actuaries are back office types, and their customers are usually the type of people who read CFO.com (a Web magazine geared toward financial execu-

tives). Excellence in spreadsheet design, alas, will not necessarily help in career advancement, and it is rarely taught, but adding to the frustration of the decision-makers will not have a positive impact on your position, that’s for sure.

Of course, one could fill books with spreadsheet best (and worst) practices, even for just the audience I have in mind: numerate decision-makers. As with my previous article, I will look at broad principles as well as some specific recommendations. There will be some overlap with my previous articles, but some principles cannot be overemphasized. You can also just skip over my content to the end—none of my ideas here are new, and you can go directly to the sources of these ideas. They will give far more details as to tricks and tips to accomplish certain actions in Excel; however, you need to think through the “why” before the “what” or “how.”

- Manage expectations, and know (and fulfill) standard expectations.

This is important in dealing with anybody in business, whether you’re dealing with them through spreadsheets or not. You want to make sure it’s clear to your end users as to what your spreadsheet does and, just as importantly, what it does NOT do.

This problem is solely one of communication, and you need to put information in appropriate places so that the user will actually pay attention to the information as needed. You also want to make sure the information is where it’s needed, and not tucked away in some auxiliary document that is easy to separate from the original spreadsheet.

For example, many times we can go overboard on the list of caveats, exceptions, and all those other minutiae that detail-oriented people love so well. But people will be overwhelmed when faced with a wall of text, and may not read your huge, long list at all. Figure out what is most important, and put it permanently in the spreadsheet display itself, or as a splash page (a window that pops up automatically when you first open the spreadsheet), or some other prominent reminder.



My own preference is to pick out one bottom-line important message; e.g., “This tool is intended for exploratory purposes, so FOR THE LOVE OF ALL THINGS RIGHT AND GOOD, do not use for customer illustrations.” (Excise the words in all-caps for a more professionally-worded statement.)

As for all the other piddly details, yes, put them somewhere, but hide them away. Maybe put in a button to take people to all the disclaimers, and for any kind of official printout, put them at the bottom in teensy print. If you have picked the unchanging aspects of your model appropriately, which are the sorts of things that would show up in the fine print, the user assumptions and this list should mesh. By all means, talk with the target end user before you start designing your spreadsheets, so that you know what they will expect your tool to do.

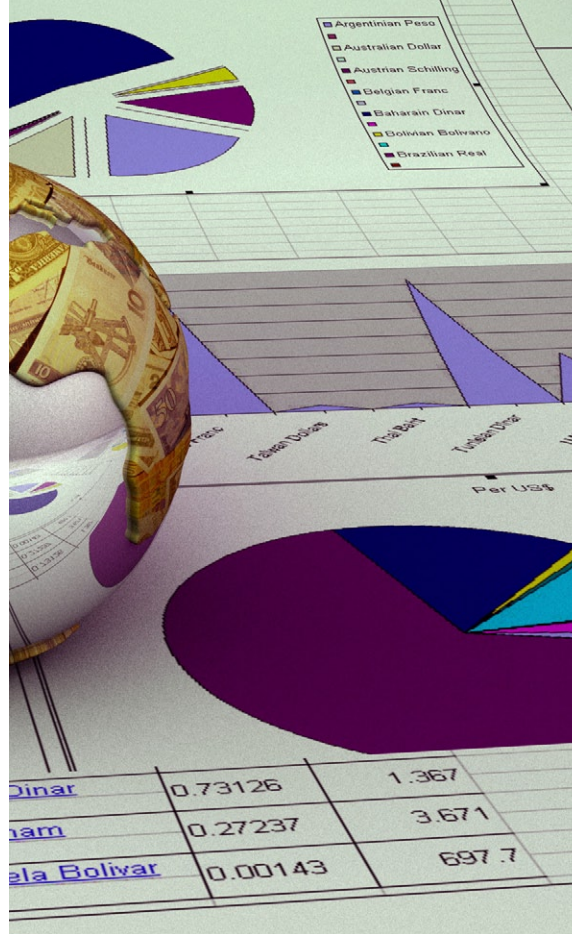
In managing expectations with regards to what the spreadsheets do, you want to make sure frustrations are low during actual operations. If you have any step in your spreadsheet operation that will appear less than instantaneous, have the spreadsheet announce it before starting the step, and if it’s going to take a minute or longer, make sure you have some sort of progress bar to let people know how much has gotten done (and if you can forecast how much longer it will take, that’s also useful.)

If you would like to know how to create progress indicators, I recommend any of John Walkenbach’s books on VBA programming for Excel (see references).

- Direct the flow and focus through the spreadsheets.

In the responses to CFO.com, many people mentioned the amount of confusion when they didn’t know where they were supposed to start in looking through the sheets in the workbook, couldn’t distinguish results from input, and in general had a tough time knowing if they were using the spreadsheet correctly.

When designing spreadsheets for numerate decision-makers, you’re more likely to have lots of input fields,



multiple pages, complex output, and in general, something that one cannot reduce to an iPod-like interface, or at least not a single screen with simple inputs.

I would map out the input flow before implementing in spreadsheet format. Below we see the principles I like to use:

- **Spreadsheet always opens to introductory or first input page.**

In the VBA code for the spreadsheets, you will see ThisWorkbook as one of the VBA objects, and you can put code in there (I did an example where upon opening a new version of the workbook was saved). So you can put in code such as this:

```
Private Sub Workbook_Open()

    Sheets("Start Page").Activate
    MsgBox("This is the first input page. Contact Mary Pat" & _
        " Campbell if you have any problems.")

End Sub
```

I use the Workbook\_Open() subroutine as the place to put all my workbook initializations, including setting the first page for the user to look at, any warn-

CONTINUED ON PAGE 18

ing messages or messages as to version number or date of the last update.

- **More important assumptions are input before less important assumptions.**

This is going to work with a later principle, in that you're going to allow an out to users from any input page, if this makes sense. You have the user's attention the most at the beginning of the process, and they're more likely to flag or lose focus as they have to input more and more data.

## To allow for easily-adapted spreadsheets, make sure nothing is hard-coded. ...

- **At most two input columns per page, and at most 15 rows of input.**

The main reason is that you don't want users to miss input fields. Once you expand beyond two columns of input (and you can set up input areas pretty clearly for two columns), you are starting to get into the dangerous area of input being overlooked or being off the screen view due to the user's preferences of font size or window size. I'm assuming you're using at least four columns for two input columns, with labels for the input to the left of where they're typed in (or chosen.)

Frankly, one column is safer still, but most of the time you don't have to worry about users cutting off a second column for input. When it comes to rows, you really have to test it for the set ups most likely in use. The basic concept here is to make sure that nothing important is overlooked by the user.

- **Clear Next and Previous buttons, when input and results are a multi-page process.**

Usually, even with sophisticated end users, I would turn off sheet tabs and have them navigate through the input screens using Next and Previous buttons (as well as clearly identifying how many pages they had to go through before results). In addition to controlling the flow through the spreadsheets, I would also do an input check every time the Next button

was punched, including looking for contradictions with input from previous pages.

- **Allow several exit points to results page.**

This works with prioritizing input as well, as if the input of less importance has a reasonable default set, or if it's likely the user will input that set once and for all and keep using that input set for multiple scenarios, just altering a few important items.

As with the Next button I mentioned above, I would always check that all input was OK, and ready to calculate final results, when a "Go directly to Results, do not pass go, do not collect \$200" button was pressed. When there was a problem, if possible, I would send them directly to the input fields that needed to be fixed or filled.

- **Results pages, within reason, should not require scrolling through screens—they should be viewable in one screen, with bottom line results (totals, ROI, etc.) as close to the top left as possible.**

As with input page design, you want to make sure the most important information is in the part of the screen that is most likely to draw the focus of users. In the English-reading world, top left is the default start point on a page of text; obviously, in other reading conventions, such as with Japanese or Hebrew, the default focus may be different.

- **Bulletproof your models, your code and your spreadsheets.**

Just as with the general public, you want to make sure that your spreadsheets do not crash in the middle of normal operation, and in the case of abnormal operation, meaningful error messages are given and recovery of data is possible.

Many times one cannot use traditional data validation for complex spreadsheets, but must check consistency between various input fields. As mentioned above, it's a good idea to check input reasonability throughout the input process, usually at key points, such as navigating to a new page. Give as much information as possible as to what about the input is

making the model choke, so the users can fix it for themselves.

Obviously, there will be errors the user will not be able to fix, and even though you're the one likely to fix it, it may help if you give some information as to where the error occurred (you never know, the person may have a staff member who can go into the code and fix the error—especially if you programmed the spreadsheet well). Any catchall error message should give direct contact information for the person who would fix any problems.

As mentioned in my previous articles for CompAct, one of the most crucial steps for bulletproofing your spreadsheets is to get other people to test them. It may help if you get someone who specializes in breaking spreadsheets, but these alpha- and beta-testers are likely to find issues that you are blind to.

- **Provide flexibility, customization and easy comparison.**

Numerate decision-makers like playing around with options, I've found; unlike with the general public, where I want a lot of the model nailed down, generally I've allowed every assumption to be played with when I have more sophisticated end users. Some assumptions are not easily changed, though, so sometimes I would customize the spreadsheet for use with a certain group. Where this is often true is having different input and output interfaces, where trying to satisfy all end user groups simultaneously can make for an unwieldy spreadsheet. To allow for easily-adapted spreadsheets, make sure nothing is hard-coded in terms of location—any cells being used in formulas should be referred to as named ranges.

One of the complaints amongst the CFO.com readers was not being able to compare two different input sets and their results, or being able to save their input without saving the entire worksheet. Allowing the saving of input and results is especially important for any spreadsheets that take a long time to calculate (say Monte Carlo modeling is involved).

In a recent working paper (“How can decision making be improved?”) published by Harvard Business School, it was noted that decisions can be improved when options can be compared head-to-head as opposed to in isolation. If your model calculates quickly, it may be a good idea to have mini-results areas on some input pages, so that one can flip through options to look at the impact of various choices. If the model is very complex, no matter how fast the spreadsheet calculates, it is a good idea to let the input be saved in its own file that can be loaded up, and especially to allow the results of two or more input sets to be compared against each other in the same display. This can be difficult to implement, but for crucial decisions, this will be well worth the effort.

- **Provide presentation-ready pages.**

What looks good on the screen may not look good on the printed page—or in Powerpoint or Word. I wouldn't prepare for all possible media displays (look good on a Blackberry? iPhone? Widescreen HDTV? At 4' by 8'?), but I would at the very least craft printable pages, as many people have trouble reading complex information off a computer screen (or, like me, want to make notes on the printout). It won't hurt too much to make them come back to you for special purposes, like preparing results for Powerpoint, but there's no excuse for not anticipating printing needs.

Standardize your formats. Make the styles (font, color, borders, other embellishments) reasonable, few and simple. Consider making printable pages separate from your regular output views, and if you do so, make a prominent “Print Results” button on your results pages, so that users do not unthinkingly hit “Ctrl-P” (though you can override that, too.)

If your results pages will work well as-is for printing, make sure you set the Print Area and default printing options for each page. If you're using sheet tabs to help identify pages, make sure that you have a header or footer identifying the page and workbook (one peeve from a CFO.com reader). When it comes to printed results, more information is usu-

CONTINUED ON PAGE 20

ally better than less, as people can absorb the information on the page at their leisure, and the printed page, far separated from the original program, loses all its context without more explicit labeling.

In designing printable results pages, consider how well the pages will look in black and white as well as color. Even if you know that users will print out pages in color, they may photocopy the pages into black and white. Anything intended for printing should be distinguishable in black and white. That means, for plots, you should vary the line pattern and line weight to help distinguish when you have multiple data series in a graph. Also, do not use highlighting or light-colored fonts for emphasis, but use borders, and italicized or bold fonts, to make the text stand out.

- **Design informative graphics, and eschew plots that mislead.**

There have definitely been books upon books written on this topic. My first encounter with such ideas was *How to Lie with Statistics*, a decades-old book with very dated statistics but very relevant information on misleading graphs (amongst other things), especially in this era of USA Today infographics ... almost all of which break the rules from this book.

Not everything requires graphics, though you may be asked to design dials, pie charts, and the like. When there are only a few numbers to compare, it is probably best to keep the numbers in table format. Pie charts are invariably misleading because they are difficult for people to really internalize, and most importantly, it's almost impossible to compare two pie charts. As several scenarios will likely be tested in using the tool, make sure if graphs are to be compared all graphs will be on the same axes scale; I've seen people misinterpret results because the visual differences were very obvious ... but the

In designing printable results pages, consider how well the pages will look in black and white as well as color.

plots were on entirely different scales. Some 3-D plots are also a bad idea because they are hard to interpret visually.

While graphics mislead, sometimes bare numbers can mislead more. One place where I think graphics are required is when one is showing correlations—you should have scatterplots here, and if the correlation does not satisfy the “interocular trauma test” (i.e., it hits you between the eyes), the correlation is probably bogus, just a statistical artifact.

Anyone who does heavy-duty quantitative analysis should check out Edward Tufte's books for guidance on how to best display the information. Tufte gives examples of best-in-show as well as horrendous graphics. The *Visual Display of Quantitative Information* is a good starting point for exploring Tufte's work.

In addition to plain graphs, one information-display technique that is in vogue amongst the numerati are dashboards. They are intended to provide easy comparisons at a glance, or keep people updated as to the state of the business. Check out the links in the references for good examples of dashboard design. When designing dashboards, you're trying to display a large amount of information in a few graphics, and trying to make it as simple as possible so that multiple lines may be compared against each other. Dashboards can be created with or without VBA, requiring connection to databases or not. As with other informational devices, you need to make sure the information can be digested by the user, and is not too dense to be useful.

- **Own your spreadsheets, and control your versions.**

As with bulletproofing, this is a recommendation I'm making for spreadsheets, no matter the end user. The reason here is a little more political, though. In addition to reducing the frustration of users by letting them know who should be contacted, if you've done your job well, surely you want the decision-makers to know who you are.

As mentioned at the beginning of the article, excellence in spreadsheet work is rarely noted by the end user. Most people only notice technology when it doesn't do what they want it to, And the perfect technology is that which is invisible, so if you've done your job well you probably won't hear anything from anybody. That said, spreadsheet users are voracious in their appetites, always wanting more features or new tools, and they certainly would want to contact the person who did the work the last time. You don't need to put an animated graphic of fireworks around your name; just make sure that if the user wants the information, it's easy to find, such as putting the contact information on an introductory page or having an "E-mail comments" button on a page.

Version control is also crucial. If your tool is going to be used by a variety of end users, you're going to have a large range of versions out there in the user cloud. Make sure version number is prominent in any About page, and as the version number is likely to mean something to you the designer, and not the user, also put a date for the version in the identifier, so it's readily apparent when someone has an out-of-date version.

I usually keep a version history in the spreadsheet itself, on a page by itself, giving the version numbers, dates, any important changes/differences between the versions, and a list of people who have worked on each version. I hide this sheet, but any user can unhide it and look at it for themselves, so they can request a previous version if that suits their need better, and it also gives them a development history.

I plan on closing out this series of articles by writing on design with auditors, testers and maintainers in mind. As with the CFO.com authors, I would appreciate hearing your own experiences, tips, pitfalls, etc., whether for the end users I have already covered, the ones I'm going to cover, or ones I didn't even consider. Too often, we back office types toil in anonymity, and the information-sharing can really improve our game.

Please contact me at [marypat.campbell@gmail.com](mailto:marypat.campbell@gmail.com). I look forward to reading your comments! ■

## REFERENCES:

CFO.com articles

"Spreadsheet Worst Practices"

<http://www.cfo.com/article.cfm/11288290>

"Sloppy Spreadsheets: Readers Speak Out"

<http://www.cfo.com/article.cfm/11525407>

"Sloppier Spreadsheets: How Bad Can They Get?"

<http://www.cfo.com/article.cfm/11950766>

## Edward Tufte

Home page: <http://www.edwardtufte.com/tufte/>

Writings: <http://www.edwardtufte.com/tufte/newet>

Q&A: [http://www.edwardtufte.com/bboard/q-and-](http://www.edwardtufte.com/bboard/q-and-a?topic_id=1)

[a?topic\\_id=1](http://www.edwardtufte.com/bboard/q-and-a?topic_id=1)

## Dashboards

Excel User dashboard info

<http://www.exceluser.com/dash/index.htm>

Jorge Camoes

<http://charts.jorgecamoes.com/how-to-create-an-excel-dashboard/>

## Other links

"How can decision making be improved?"

<http://www.hbs.edu/research/pdf/08-102.pdf>

John Walkenbach's website

<http://spreadsheetpage.com/>

Excel Hacks

<http://oreilly.com/catalog/9780596006259/>

# Book Review

## The Analysis of Insurance Earnings: An Enterprise Approach by John McGarry and Kevin Pledge

Reviewed by Carol Marler

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*Carol A. Marler, FSA, MAAA, is an associate actuary with Employers Reassurance Corporation in Indianapolis. She can be reached at carol.marler@ge.com.*

**T**his book is all about granularity. The authors envision a data warehouse with information at the policy level or lower, and demonstrate how this data can be used to analyze the sources of earnings. They consider not only traditional life and universal life products, but also disability income, payout annuities, health insurance and segregated fund plans.

The key to their analysis is the data warehouse, which links each policy, not only to valuation assumptions and results, but also to general ledger accounting amounts and to projections (model output that feeds the financial plan). By conducting the analysis on a monthly basis, they are able to disregard secondary effects, such as the effect of lapsation on claims and other similar interactions.

Extensive formulas are provided throughout the book, along with numerical examples. A few typos were found, but fortunately they were in the narrative portions, not in the formulas themselves. Other analysts

might have selected slightly different ways of combining data, but their approach seems reasonable.

Some special handling is needed to get the most out of the process. Investment income and administrative expenses must be driven to the policy level through some form of allocation. The treatment of new business is separated from existing in force, because the key driver of variance for this business is whether the volume of production matches plan. Once new business is put on the books, it can be analyzed with some of the same formulas as beginning in force. In the book, reinsurance is also treated separately, although the analysis of direct business and reinsurance can be subsequently combined if management prefers looking at net results.

This book provides a useful reference for actuaries who use or are considering a data warehouse for their financial reporting and analysis. ■

# Book Review

## Customer-Centered Products, by Ivy F. Hooks and Kristin A. Farry

Reviewed By Stephanie Young

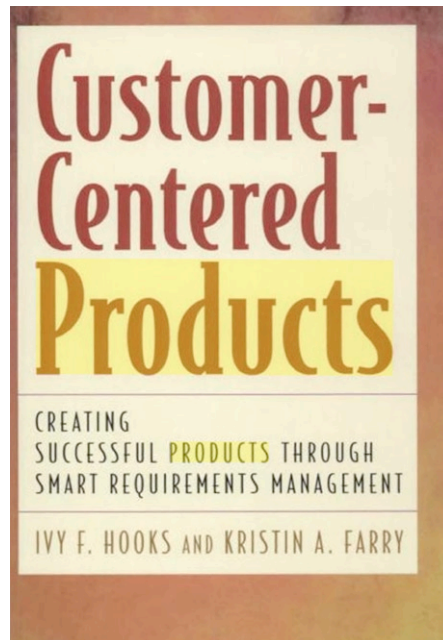
Every user has been frustrated when they've specified a product or change to a product and had something else delivered, or nothing at all delivered, or a product that cost so much that it wasn't worth the work put into it, or a product that was so late that there was no longer any point to the work. Users suffer through requirements meetings they don't understand, work through processes that don't have a clear outcome, and review pounds of paperwork without seeing what the purpose is.

But there IS a reason, and Ivy Hooks and Kristin Farry explain it to you, as well as spelling out what good requirements processes contribute to your project, what you can expect your role to be, and what you should expect from your product developers.

This book is written as a manager's and user's view into the requirements process. Each chapter explores a phase or product of the requirements process, providing an overview of why the process is required, what it adds to the project, and what the risks are if the process isn't included. Each chapter concludes with a section that summarizes why you should care, and what you can expect your contribution to be.

Each process is explored in appropriate detail—enough to give you insight into the process, but not enough to bore you with unnecessary technical detail. By the end of the book, you'll be prepared to discuss what your development team should be doing to prepare for your product, and to contribute your requirements at the appropriate level of detail. You'll understand why scope control is so critical. Most importantly, you'll understand that requirements defects—requirements that are missed or not recorded correctly—become exponentially more expensive to correct the further the development process has progressed. In addition, you will learn how to spot missing or ambiguous requirements that result in developers making decisions for you.

I strongly recommend this book for users involved in any kind of product development, and it is particularly valuable to the software development process. It is by far the best explanation of requirements processes and products that I've seen, and it's written at an appropriate level for business users and managers. ■



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# Society of Actuaries Life 2009 SPRING MEETING

May 18-19, 2009  
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