



**Actuaries  
Institute**

# Spreadsheets – blessing or curse?

by Phil Stott

# Overview

1. A little background and history
2. 'Pros' and 'cons'
3. Survey of current practice
4. Top 10 cockups
5. Tips for dealing with cons
6. Suggested 'standards'

# Background and history

- Origin: computerisation of paper accounting worksheets
  - Question: who put the ‘spread’ in ‘spreadsheet’?
- The concept of an electronic spreadsheet was first outlined in a 1961 paper
  - 1962-3: Implemented on IBM 1130 /7040 at Marquette University, Wisconsin using Fortran
  - 1968: Implemented on a timesharing IBM 360/67 at Washington Stater University and used to teach finance
  - Key calculation algorithm patented in 1970

# Background and history (cont.)

- Some historic milestones along the way:
  - 1979: VisiCalc on Apple II
  - 1981: Invention of the IBM PC
  - 1982-3: Lotus 1-2-3 (runs on IBM PCs)
  - Early 1990s: Microsoft Excel (runs under Windows 3.x)
  - 2005: emergence of on-line spreadsheets

# ‘Pros’ and ‘cons’ – the ‘pros’:

- Spreadsheets are very easy to use for “end-user development” (EUD):
  - Use of spatial relationships
  - Allow partial developments
  - Use of colours, typefaces, fonts etc (“secondary notation”)

# 'Pros' and 'cons' – the 'pros' (cont.)

- Why actuaries use spreadsheets:
  - Control is located closest to the experts
  - Flexibility
  - Highly visible interface
  - Ease of producing reports and graphs
  - IT training not required
  - Cost
  - Facilitates communication
  - Supports rapid “what if” thinking

# 'Pros' and 'cons' – the 'cons'

- Cons:
  - EUDs are difficult to police
  - Reliability
  - Limited use
  - Hard to debug
  - Alteration of dimensions is major surgery
  - Collaborative authorship can be difficult
  - Capacity limits (65,536 x 256 in some packages)
  - Audit / revision control
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# 'Pros' and 'cons' – the 'cons' (cont.)

The dimensionality problem for actuarial projections:

1. Purpose of the run (Statutory, EV, Capital etc)
2. Projected cashflows (premiums, sums insured, policies etc)
3. Projection periods (months, years, etc)
4. Valuation month
5. Interim / final runs
6. Product lines
7. Grouped data levels
8. Sensitivities, shocks, etc

# 'Pros' and 'cons' – the 'cons' (cont.)

- One classification of risks:
  - Mistakes in logic
  - Incorrect ranges in formulae
  - Incorrect cell references
  - Confused range names
  - Incorrectly copied formulae
  - Incorrect use of formats and column widths
  - Accidentally overwritten formulae
  - Misuse of built-in functions

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- Specific error risks for actuarial spreadsheets:
  - Incorrect modelling risks
  - Inconsistent modelling risks
  - Inadequate modelling risks

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- Only **37.7%** had ever received “formal classroom instruction”

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- **78.3%** devoted < 10% of time to testing
- **88.1%** devoted no time to documentation

# Survey of current practice (cont.)

Frequency of testing:

- “never” ???
- “sometimes” ???
- “usually” ???
- “always” ???

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Most common tool for testing spreadsheets:

- “use common sense” 67.4%

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Amount of training received p.a.

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Who is responsible in your organisation for managing spreadsheet risks?

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Who is responsible in your organisation for managing spreadsheet risks?

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- #7 ... MI5 makes 1061 bugging errors
- #6 ... Genetic research data lost

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- #4 ... The case of the \$200m parentheses
- #3 ... 'Houston, we have a \$644m (spreadsheet) problem'
- #2 ... The \$2.6bn minus sign

## Top 10 cockups (cont.)

- #1 ... 'Bank error NOT in your favour ...'

# Dealing with the 'cons'

- 4 strategies for dealing with the negatives of uncontrolled spreadsheet development:
  1. Version control tools
  2. Audit tools
  3. Automation tools
  4. Spreadsheet development standards

# Dealing with the 'cons' (cont.)

- Special considerations for actuarial processes:
  - Balance of flexibility and control
  - Robustness
  - Reasonableness checking
  - Removal of key person risk
  - Automation
  - Reliability of results
  - Auditability, transparency and documentation
  - Repeatability
  - Reduction in operational risk and capital charges

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- General principles:
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  3. Must be situational
  4. **Must be enforced**

# Suggested standards (cont.)

- Suggested areas where standards are particularly required:
  1. Version information
  2. Colour coding
  3. Restrictions on linking
  4. Protection of sheets / cells

# Suggested standards (cont.)

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# Suggested standards (cont.)

- Specific issue for decision – the use of links:
  - Allow unrestricted links
  - Allow no links at all (‘Copy values’)
  - **Only allow specific links:**
    - When? (Link into anything, or only link into ‘official’ sources?)
    - Where? (Anywhere you like, or only in specifically earmarked ‘in-link’ sheets?)
    - Why? (Simplicity / laziness, or to retain an audit trail?)

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- If you apply appropriate standards for control and balance ... clearly a blessing
- If you don't ... ?

# One solution: reliable spreadsheet training

