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Productivity Consulting

How To Manage Spreadsheet Risk

Ensuring the numbers you depend on are numbers you can trust

White Paper

Published: October 2009

Executive Summary

Spreadsheet risk is the collective risk of adverse impacts resulting from the use of spreadsheets by an organization.

The greatest strength of spreadsheets; their power and flexibility, when combined with a lack of training and a lack of processes and controls is at the root of spreadsheet risk. This risk manifests itself through financial, operational and reputational costs to an organization.

Research papers and surveys have found spreadsheet error rates ranging between 64% to 100%. Many of these errors are considered "very significant". Where organizations depend on spreadsheets to support critical processes, make important decisions or provide financial controls, a system to manage spreadsheet risk is needed to minimize the potential impacts.

An organization will benefit from managing spreadsheet risk by reducing is exposure to financial, operational and reputational costs. Although no research is available on the average or total cost of spreadsheet errors, many articles have appeared in the business press detailing the impacts. Examples include the demise of 234-year old Barclay's Bank due to US$1.3B in trading losses, which went undetected, in part, because of poor spreadsheet controls. Or a spreadsheet calculation error that led to an overstatement of a public company's profit prospects. The revised guidance precipitated a 25% drop in the company's share price, the firing of the CEO and the resignation of the CFO. Most managers have personal experiences with spreadsheet errors that cost of time, money and/or credibility.

The approach to Spreadsheet Risk Management presented in this paper is straightforward. An organization needs to inventory all spreadsheets in use, assess the risks and focus on removing the errors from and increasing the robustness of high-risk spreadsheets. This effort then needs to be supported by appropriate policies, procedures and training.

Tools and reference materials are available to aid in Spreadsheet Risk Management effort. Software is available to search for, analyze and audit spreadsheets. This software can save time in the inventory and auditing steps but does not fully replace expert testing and analysis.

Basic spreadsheet development standards are provided in this whitepaper and more extensive resources are readily available on the internet. Standards should be followed in order to minimize the chance of errors and maximize the robustness and ease of use of critical spreadsheets.

A policy to define periodic auditing, identification of new critical spreadsheets and version control requirements is necessary to institutionalize the risk management effort. The policy, coupled with supporting processes and appropriate training will ensure that an organization is minimizing its exposure to spreadsheet risk.

How To Manage Spreadsheet Risk

Spreadsheet risk is the collective risk of adverse impacts resulting from the use of spreadsheets by an organization.

Research studies have found spreadsheet error rates ranging between 64% and 100% of spreadsheets audited in the field[i]. Between 5% and 40% had "significant errors" - with potential financial impacts ranging from $100,000 to $100 million[ii].

The errors are understandable – end-users are offered little training[iii], few have guidelines or standards to follow[iv] and they do limited testing of their own work[v]. Few companies have process or procedures to identify error-prone spreadsheets, assure the accuracy of them or manage the risks they present.[vi]

If these spreadsheets were used only to split the lunch tab or to track the office sports pool, they wouldn't pose much of a risk to an organization. The reality is, at many organizations, key decisions are based, in part, on spreadsheets, financial control processes depend on spreadsheets and operational activities are supported by spreadsheets. These spreadsheets, unaudited, unmanaged and of questionable quality, represent a clear and present danger to the organization.

In addition to the financial costs of spreadsheet errors there are non-financial impacts – if the error affects customers or the public, an organization's reputation is at risk (see sidebar – Top 5 Spreadsheet Errors That Made the News). The cost of correcting the errors can also be significant – reversing decisions, restating reports and correcting downstream processes represents a loss of time, energy and organizational focus.

Millions of dollars, critical business decisions, operational impacts, reputational risk: these factors alone justify an effort to properly manage the risks posed by spreadsheet use. But there are additional benefits to managing spreadsheet risk – time savings and management confidence. Robust, audited and properly controlled spreadsheets are reliable. From reliability comes confidence. Analysts are confident that they don't need to check, double check and recheck their spreadsheets – a considerable time savings for most analysts. And management has increased confidence in the controls they have in place, the decisions they are making and the results they are reporting.

5 Common Sense Steps

The approach we recommend to managing spreadsheet risk follows 5 simple, common sense steps:

1. Inventory
2. Assess
3. Audit
4. Improve
5. Manage

Managing spreadsheet risk is a process of understanding what spreadsheets are in use, assessing and prioritizing the potential risks, auditing and removing the risk and then effectively managing those spreadsheets through their lifecycles.

Few organizations can readily list all the spreadsheets they depend on in their business activities, so that is the starting point.

1. Inventory

The inventory is a list of all spreadsheets in use in the business from the simplest to the most complex. Typically an organization will choose to prioritize their efforts on critical-path business processes, processes highly dependent on spreadsheets, areas of particular concern - identified by recurring issues or audit points or spreadsheets critical to financial controls (additional documentation is necessary if one of the goals of the risk management effort is to satisfy Sarbanes-Oxley section 404 requirements).

Software is available to aid in the inventory process. Enterprise-level spreadsheet auditing tools will crawl through an organization's network, looking for and cataloguing spreadsheet files.

2. Assess

A survey, one-on-one interviews or hands-on analysis provides the data necessary to assess spreadsheet risk in an organization. Each spreadsheet needs to be assessed on key risk areas: complexity, human input and impact of errors.

5 Spreadsheet Errors That Made The News

1. *25% share price drop, CFO fired, CEO resigns. Due to a calculation error in a spreadsheet, Redenvelope Inc. misstated its costs of goods sold and was forced to revise its 4th quarter outlook. The revision causes shareholders to sell.*

2. *$188,387 typo. The Columbia Housing Authority has to pay to cover expenses incurred when a data entry error resulted in overpayments to landlords.*

3. *Multi-million dollar lawsuit. Natural gas price spikes due to incorrect inventory data, US$200M-$1B lawsuit. The company had used the same computer file name for each week's storage balance spreadsheet, making it easy for the wrong one to be sent.*

4. *Investor relations nightmare. Share distribution announcement incorrect by US$2.6 billion. Cause: Accountant omitted a minus sign when entering a net capital loss of US$1.3B into a spreadsheet, thereby incorrectly treating it as a gain.*

5. *Bank bankrupted. Nick Leeson, enabled in part by weak spreadsheet controls, amassed US $1.3B in trading losses and bankrupted 235 year-old Barclay's Bank.*

Items 1-4 were sourced from the European Spreadsheet Risk Interest Group's archive.

www.eusprig.org/stories

Key risk areas:

Complexity: This criteria is a rating of the complexity of the Excel functionality used in the spreadsheet.

- Small spreadsheets that are limited to basic arithmetic calculations and formatting are of low complexity.
- Spreadsheets that have hundreds of cells, make use of complex built-in functions, particularly conditional and lookup functions, a few external links, and have a flat data structure are of medium complexity.
- Spreadsheets that have thousands of cells, make use of recorded or hand-coded VBA, extensive external links, relational data structure are of high complexity.

Human Involvement: This criteria rates the degree to which a correct output depends on the user.

- If there are a few, simple steps a user must perform to successfully use the sheet and no manual data entry and one person uses the spreadsheet, human involvement is low.
- If multiple steps of moderate difficulty must be performed, perhaps in a strict sequence, manual data entry is required and/or more than one person uses the same spreadsheet, human involvement is medium.
- If there are multiple difficult steps, a strict sequence requirement, in-cell formula editing is necessary, extensive manual data entry, many people using the same spreadsheet human involvement is high.

Impact of Errors: This criteria rates the business impact if any aspect of the spreadsheet is materially incorrect.

- In addition to the financial impacts, the organization will also assess the operational impacts (time and effort required to correct the mistake) and may include environmental, legal, safety and reputational impacts.
- It is important to normalize the risks over a standard period of time – an error in a spreadsheet used daily will have 7 times the financial impact as a similar error in a spreadsheet used weekly.

The outcome of the inventory and ranking activities is a list of spreadsheets, ranked according to their relative risk to the organization. The organization must now decide what degree of risk is acceptable. Spreadsheets above this level of risk require further review and analysis.

The first review of the high-risk spreadsheets is to determine if a spreadsheet is the appropriate tool for the job. Due the limitations of spreadsheet applications, there are cases where a spreadsheet solution, though possible, is simply not appropriate. Alternatives include an Excel front-end - database back-end architecture, exporting calculation tasks to an external application, customizations to existing enterprise applications, custom application development or process specific, off-the-shelf software.

The majority of the high-risk spreadsheets will remain spreadsheets and those ranked with the highest risk need to be accurate, robust, reliable and easy to use.

3. Audit

The primary purpose of an audit is to ensure the spreadsheet is error-free and to identify the spreadsheet's effective operating ranges.

To ensure a spreadsheet is error-free, it needs to be vigorously tested. The testing should include manual calculations, alternative calculation approaches, parallel testing and input sets with known results. In addition to testing for expected outcomes, the testing process needs to identify what inputs and conditions (rows/columns of input data, input value minimums/maximums, date ranges, etc.) cause the spreadsheet to fail, thus identifying the sheet's effective operating ranges.

Tools are available to aid in the audit process – spreadsheet auditing software individually analyses each spreadsheet, identifying inconsistent formulas, programming weaknesses and other potential risks. These applications don't replace expert analysis, but can significantly reduce the time spent on the auditing step.

Spreadsheet Best Practices

Some organizations have written formal spreadsheet standards, but most are focused on branding (logos, company name, fonts, etc.). Many individuals have documented and shared their "best practice spreadsheet standards" on the internet but there are few comprehensive standards available.

One of the leading standards bodies is the Spreadsheet Standards Review Board (ssrb.org), an organization created to develop and promote general acceptance of "best practice spreadsheet modeling standards".

The SSRB standards are comprehensive, peer reviewed and freely available.

4. Improve

The purpose of the improvement step is to eliminate the chance of introducing new errors and to make the spreadsheet easily used, supported and enhanced.

To minimize the risk of errors, each sheet needs to meet a minimum standard for spreadsheet development that has at least the following the elements:

1. Separate input data, calculations, parameters and output data/displays
2. No hard-coded values within formulae
3. Data and parameter validation
4. Unambiguous formats and measures
5. Minimal human involvement
6. Cell and sheet level protection

To improve the robustness and ease of use, support and enhancement, the spreadsheets should at least adhere to the following best practices:

1. Calculations broken down into simple, one-step formulas
2. Linear layout – one row or column per calculation step
3. Limited use of VBA
4. Redundant checks of data, parameters, business logic and arithmetic
5. Graphic representation of input, calculation and output data
6. Documentation, including instructions on use and how the spreadsheet works

The end result is a set of accurate, audited, secure, robust and well documented spreadsheets – baseline versions of the critical spreadsheets in an organization.

5. Manage

Last but certainly not least, the process of spreadsheet risk management needs to be institutionalized. A policy and process to safeguard the baseline versions, manage updates and enhancements, identify and manage new spreadsheets and perform periodic audits is needed to ensure the quality of critical spreadsheets. Training and awareness programs need to be in place to ensure staff is technically skilled and aware of and following the policies and procedures.

The policy needs to define:

- A criteria for determining what spreadsheets fall under the purview of the policy, and the organization's high-level approach to determining spreadsheet risk
- A process for auditing updates and enhancements to spreadsheets
- A process for periodic reviews of the spreadsheets in use in the organization, and who owns this process
- A process to ensure the secure storage and archiving of critical spreadsheets (consistent with statutory, legal and regulatory requirements)

Technology is available to help manage version control, access and archiving. Simple requirements can be managed through shared drives and user security, more complex requirements are often satisfied by content management applications. And some organizations have adopted tools used to manage software development source code to meet their requirements.

Suitable training on best-practice spreadsheet development, and awareness of the policies and procedures governing critical spreadsheets in and organization is critical to the success of this step. Without training and awareness, standards will not be adhered to, new spreadsheets or enhancements will be missed and errors will creep back in.

Conclusion

Spreadsheet Risk is a clear and present danger to any organization that depends on user-developed spreadsheets.

Errors abound in unaudited spreadsheets and sub-standard design approaches make them susceptible to the introduction of new errors.

When spreadsheets are used to make business decisions, provide financial controls or support key processes, spreadsheet errors can result in significant financial, reputational and operational impacts to an organization.

By undertaking an effort to inventory, audit and improve critical spreadsheets and implement processes to manage them, an organization can manage spreadsheet risks and minimize the potential for financial, operational and reputational impacts.

[i] Panko, Ray. "Error Research, Field Audits". Ray Panko's Spreadsheet Research Website. University of Hawaii. http://panko.shidler.hawaii.edu/SSR/index.htm

[ii] Panko, Ray.

[iii] Lawson, B.R. et al. A Comparison of Spreadsheet Users with Different Levels of Experience, Tuck School of Business, Dartmouth College. Table 10

[iv] Ibid. Figure 5.

[v] Ibid. Table 10.

[vi] Baker, Foster-Johnson, Lawson and Powell. Spreadsheet Risk, Awareness and Control, Tuck School of Business, Dartmouth College. Page 13, Figure 4 and Figure 5. http://mba.tuck.dartmouth.edu/spreadsheet/product_pubs_files/SSrisk.doc

About Jerts Consulting Inc.

Jerts Consulting can help you understand the risks associated with the spreadsheets in your organization, implement an effective spreadsheet risk management process and design and execute awareness and training programs.

We can help you:

- Create an inventory of spreadsheets in use in your organization
- Develop spreadsheet risk-assessment criteria specific to your organization
- Audit the spreadsheets in your organization and assess the risks
- Review spreadsheets to identify errors, risks and weaknesses
- Improve spreadsheets to reduce the risk of errors and improve robustness
- Develop best-practice spreadsheet standards for your organization
- Develop and implement a spreadsheet risk management policy
- Create and execute awareness programs
- Develop and facilitate training courses on spreadsheet risks, best-practice standards and other spreadsheet skills

In addition to its Spreadsheet Risk Management practise, Jerts Consulting also provides process outsourcing services, custom modelling and financial analysis services and custom training programs.

For more information and copies of this and other whitepapers please visit our website at www.jerts.com.

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ISBN-13: 978-0-9812802-0-2