



**Five Steps to Enterprise Spreadsheet
Management and Control**
A Best-Practices Framework for Critical Risk Reduction

A Compasssoft White Paper

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Executive Summary

In recent years, spreadsheets have become one of the cornerstones of financial analysis and financial record-keeping for enterprises worldwide. These essential applications are used for the majority of companies' critical operational decisions, and almost every line item for external reporting traces its origins to a single cell on some spreadsheet. Enterprises now have spreadsheets residing in thousands, even *hundreds* of thousands, of locations — network servers, desktop and notebook computers — both within and outside the enterprise's control.

And far too many of these spreadsheets are riddled with errors — errors that can introduce unacceptable levels of financial, operational, security and regulatory compliance risk.

Many key enterprise stakeholders are already well aware of the risks presented by out-of-control spreadsheets. Senior executives, external auditors, finance departments, risk managers and even boards of directors are seeking effective ways to manage and control spreadsheets and other critical end-user applications residing on, or connected to, enterprise networks. The need to eliminate errors in the spreadsheets used for external reporting and strategic operational decisions has taken on new urgency, as a result of heightened regulatory and corporate compliance and security requirements. But many other enterprises are still trying to ignore the problem — until a highly publicized data breach or a failed audit brings them back to reality.

There's no question that managing and controlling spreadsheets and their risks is a difficult, even overwhelming, task. But new advances in automation technologies — together with established and newly identified best practices — can offer enterprises comprehensive management and control, while simultaneously reducing their costs. The key to effective spreadsheet management: using automation to apply the appropriate, and appropriately prioritized, policies and controls to every spreadsheet in use across the enterprise.

Compasssoft, the recognized industry leader in this field, has worked with more than 180 companies, as well as with all of the "big four" accounting firms, in developing enterprise spreadsheet management strategies and technologies. This white paper draws on Compasssoft's extensive and wide-ranging experience — and new automation technologies introduced in the summer of 2007 — to present a best-practices framework for comprehensive, sustainable and cost-effective management of enterprise spreadsheets and the mission-critical risks they carry with them.

The Problem

A spreadsheet is a moving target. Enterprises use these familiar, endlessly useful applications everywhere — from finance departments' capitalization tables to operations managers' capacity plans, from inventory management to sales projections. Enterprise spreadsheets are often linked to one another, or directly to database feeds. Most spreadsheets are highly distributed, residing on local file shares, desktop and notebook computers. To complicate matters even further, they are also in an almost constant state of flux, with the data they hold, and sometimes even their locations, changing regularly. This shifting spreadsheet landscape means that enterprises all too often do not truly understand where their most critical business information is to be found.

Enterprises also cannot be certain that that information is accurate. Independent academic research shows that any spreadsheet with more than 200 rows has almost a 100% probability of containing errors. That means that up to 90% of any enterprise's spreadsheets are likely to contain errors.

It's tempting for finance professionals to think they're immune to these problems, because they "know spreadsheets" — but it's almost certainly a mistake. A review of the spreadsheet models used by twenty-one major banks and other financial service providers found that 92% of spreadsheet-based models dealing with tax issues had significant errors and 75% had significant accounting errors. And 91% of audited financial spreadsheets were found to have at least a 5% error in their bottom-line value.

Here's some survey data that should keep any finance professional with risk-or-compliance-related responsibilities from getting a good night's sleep: Only 11% of 245 chief financial officers (CFOs) surveyed by *CFO* magazine believed spreadsheet-based control reporting was accurate enough to make senior executives confident about certifying their companies' financial statement data for Sarbanes-Oxley Act compliance.

For all these reasons, auditors — both external and internal — are sharpening their focus on end-user applications, and especially spreadsheets, as a major source of risk enterprisewide. They are not concerning themselves only with financial spreadsheets. Analytical and operational spreadsheets, too, are increasingly seen as potential sources of financial impact and risk that require their own controls. In the past, auditors often simply issued audit warnings when spreadsheet controls were substandard, but enterprises that fail to adequately control their spreadsheets are now finding themselves subject to damaging audit deficiency statements.

The bottom line: Many enterprise stakeholders understand clearly that their spreadsheets and other end-user applications must be brought under control. But what does it really mean to control them, or even identify them? Which spreadsheets should be given priority? And who is responsible for this critical task? These are questions that Compasssoft clients often ask, as they look for specific, actionable guidance on how to implement a comprehensive spreadsheet control strategy.

Real-World Consequences of Spreadsheet Errors

- *Leading national mortgage lender writes down \$2.4 billion worth of mortgages because of change-control deficiencies found in a key spreadsheet.*
 - *Stock drops 13%, bank loses \$6.5 billion in market value*
- *European bank reveals \$691 million trading fraud using manipulated trade results via an alternate data feed hidden in a spreadsheet.*
 - *Bank loses 30% in market capitalization overnight*
- *International power generator and wholesale marketer underbids electricity supply contract by \$24 million due to cut-and-paste error.*
- *Major mutual fund overstates projected earnings by \$2.6 billion because of missing "minus" sign, misses promised dividend.*
- *Online retailer reports material understatement for cost of goods sold caused by spreadsheet calculation error.*
 - *Share price drops 25%, CEO loses position*

The Solution — Introducing the Spreadsheet Control Cycle

Comprehensive, effective spreadsheet control is an ongoing process, not simply a one-time project. Spreadsheets are always being changed, and new spreadsheets are always being created. Some of these are new spreadsheets are well-designed and subject to quality control from the planning stages, but most are effectively “unknown” to the enterprise as whole, and so outside the enterprise’s control. A periodic review of these spreadsheets can’t hope to capture emerging sources of risk adequately. That’s where Compasssoft’s five-step framework — based on a continuous cycle that reflects this constant state of change — comes in:



Step 1. Set Control Policy

- **Problem:** Enterprises use spreadsheets in complex and widely varying ways across many different organizations. Every spreadsheet — from financial, analytical and operational spreadsheets to “ad hoc” applications based on spreadsheets — represents a different level of risk, based on its content, its complexity, how it’s used and who has access to it. That means a “one size fits all” approach can’t possibly manage them all.
- **Solution:** To put controls in place that are appropriate for specific spreadsheets and spreadsheet uses, based on business priorities and/or specific spreadsheet data.
- **How Compasssoft helps:** Compasssoft can apply control rules based on its automated risk assessment framework, and/or monitor specific spreadsheet data for compliance with established limits. Compasssoft collects more than seventy analytical properties for each spreadsheet, including structure, content and relationships, and can pattern-match

to detect sensitive or high-risk data (for example, credit card numbers and social security numbers). This enables enterprises to develop and use complex, business-specific policies that combine properties, relationships and content-based conditions.

- **Key best practices:**

- Use a policy-based approach to prioritize spreadsheets based on identified risk factors — for example, the likelihood of error, the complexity of the spreadsheet (including the presence of external links, macros or hidden information) — and the business impact of the spreadsheet based on both its use and its content (for example, sensitive enterprise or personal information).
- Extend the general guidelines for spreadsheet complexity and use impact available from audit firms such as PricewaterhouseCoopers (PwC) (see sidebar) to create measurable criteria and definable controls actions. Compasssoft’s policies can be tailored to fit an organization’s specific needs, but — based on our work with our clients and the big four auditing firms — we have developed the following broadly applicable classifications:

		Spreadsheet Category				
		1 Critical Risk	2 High Risk	3 Moderate Risk	4 Some Risk	5 Low Risk
Characteristics	Description	Used as part of critical business process (e.g., financial reporting) or as template for repetitive use	Used for making business decisions or as an iteration of a template	Used for general financial analysis or finance-focused information	Used for general planning and calculations	Used only for logging of information
	Risk Error Probability	High formula complexity Size > 5 MB Sheets > 15 External links to databases Very hidden information Manual calculation Macros present Detected errors	Medium formula complexity Size > 1 MB Sheets > 10 External links to other spreadsheets Hidden information Arrays	Internal links Sheets > 5 Charts Validations Named ranges	Sheets > 3 Occupied cells > 500 Formulas > 100	Other low error probability
	Risk Impact	Identified as critical Used as template Password-protected High-frequency use Flagged as material Financial sums > \$1M Highly sensitive corporate or personal data	Identified as high-impact Iteration of a template Financial sums > \$100K Internally restricted information	Identified as moderate-impact Financial sums > \$10k Externally restricted information	Identified as having some impact Any dollar amount	Other low-impact
Actions	Testing	Forensic analysis required for every published version Detailed analysis documentation	Moderately detailed analysis required for every published version.	Basic analysis of every published version Detailed analysis periodically based on use	Periodic basic analysis Random spot-checking with detailed analysis	Subject to continuous property-level monitoring for changes
	Physical Control	Central repository with access and version control	Central repository with access and version control	Central repository with access and version control	Left <i>in situ</i> , content collected Periodic basic analysis Random spot-checking with detailed analysis "snapshots" upon change	Left <i>in situ</i>
	Use Control	Role-based functional use control within processes	Role-based functional use control within processes	Some functional use control may be required	No use control required	No use control required
	Documentation	Electronic signatures Audit trail for all changes Documentation of analysis	Audit trail for all changes Documentation of analysis	Content-level comparison report for previous published version	Property-level change report for each version	Basic history recording when changes made

PWC Definitions of Complexity

In its landmark paper “The Use of Spreadsheets: Considerations for Section 404 of the Sarbanes-Oxley Act”, PricewaterhouseCoopers outlined a three-tier approach to rating the complexity of spreadsheets to assess their risk. Compasssoft’s recommendations are based on taking this approach to a more granular level of detail and providing specific control steps.

- **Low:** Spreadsheets which serve as an electronic logging and information tracking system.
- **Moderate:** Spreadsheets which perform simple calculations such as using formulas to total certain fields or calculate new values by multiplying two cells. These spreadsheets can be used as methods to translate or reformat information, often for analytical review and analysis, for recording journal entries or for making a financial statement disclosure.
- **High:** Spreadsheets which support complex calculations, valuations and modeling tools. These spreadsheets are typically characterized by the use of macros and multiple supporting spreadsheets where cells, values and individual spreadsheets are linked. These spreadsheets might be considered “applications” (i.e., software programs) in their own right. They often are used to determine transaction amounts or as the basis for journal entries into the general ledger or financial statement disclosures.

Step 2. Continuous Inventory and Risk Measurement

- **Problem:** Spreadsheets containing critical information extend far beyond the handful that the finance team likely knows about. The enterprise may have thousands, even millions, of financially relevant spreadsheets, and they spreadsheets very rapidly. Many end users also create “ad hoc” spreadsheets to solve specific problems, and these spreadsheets tend to be widely distributed, poorly documented, and frequently high-risk.
- **Solution:** Maintain an up-to-date central inventory of all the spreadsheets in use across the enterprise — identifying new and changed spreadsheets as the changes take place — as a basis for understanding the spreadsheets that exist and the information they contain, and for controlling the risks they present.
- **How Compasssoft helps:** Compasssoft’s solution is the only one on the market with a spreadsheet discovery mechanism that is both automated and continuous. It uses an agentless approach that avoids the need for the enterprise’s IT organization to maintain an application on the desktop, but can continuously detect new or updated spreadsheets at the desktop level. Compasssoft collects copies of the spreadsheets and adds them to the inventory database, and identifies more than 70 spreadsheet properties –as well as content and external-relationship characteristics — to evaluate against established policies.
- **Key best practices:**
 - o Recognize that inventory creation is one of the most important elements of spreadsheet control. PwC, for example, recommends that “All departments utilizing spreadsheets should be evaluated, including, but not limited to, financial reporting, plant/cost accounting, tax, actuarial and operations.”

- Make discovery a continuous process that both finds new spreadsheets that have been created and finds new *versions* of spreadsheets that have been created. A periodic inventory “refresh” — for example, on a monthly or quarterly basis — is inadequate, because new high-risk spreadsheets or critical changes to existing spreadsheets may cause problems very quickly.
- Maintain spreadsheet information in a “living” inventory that represents both the current state of the enterprise’s spreadsheets and a history of the changes that have been made to them. The frequency of change itself can point to high-impact spreadsheets, and a view of how spreadsheets are changing provides critical traceability information. The level of detail of this change history depends on the risk and use of the spreadsheets. However, the inventory should at minimum contain summary-level information about spreadsheet location, structure, content, and external data feeds, as well as information about the spreadsheet that enterprise management needs, including relevant business processes, description of use and other high-level documentation.

Step 3. Risk Prioritization and Policy Enforcement

- **Problem:** The proliferation of spreadsheets throughout the enterprise makes it impossible to manually determine the relative risk levels and work required of specific spreadsheets. Detailed control policies are useful from a business perspective, but effective policy enforcement requires a detailed understanding of specific spreadsheets, which is impossible to achieve manually for more than a very small number of spreadsheets.
- **Solution:** Use an advanced rules-based automation framework to compare spreadsheet properties and content against established control policies, categorize and prioritize spreadsheets by risk level based on these policies, then create processes to document and manage spreadsheets accordingly.
- **How Compasssoft helps:** Compasssoft brings together a comprehensive, self-updating inventory with an advanced policy framework to create an automated, continuous policy enforcement mechanism. This approach provides a powerful, scalable powerful means of finding the individual spreadsheets that represent the highest risk to your business and determining whether these spreadsheets in ways that contravene enterprise policies.
- **Key Best Practices:**
 - Use risk assessment and prioritization to make sound decisions, based on established policies, about how to manage every spreadsheet in use.
 - Maintain an up-to-date inventory, with enough information to make assessment decisions, as a critical element in effective prioritization. Use a continuous discovery process, based on a wide range of analytical properties, to create the most extensive decision-making framework possible. Base the assessment on established policies and use an automated approach, so that prioritization can be performed in bulk and reevaluated continuously as information changes.
 - Recognize that risk assessment should be context-specific. General risk rules related to complexity are useful, but the specific uses of spreadsheets must be considered as part of the assessment process. This information is often highly

subjective, so end-user input or other spreadsheet documentation practices should be leveraged by automated analysis. Compasssoft can, for example, measure information from Microsoft Excel custom properties, or from a form embedded in a spreadsheet that outlines business process use and key performance metrics, against policy criteria.

- Identity spreadsheet applications that may be redundant or otherwise unnecessary for possible elimination, to further reduce risk.

Step 4. Analysis, Remediation and Documentation

- **Problem:** Spreadsheets allow end users to develop free-form applications, so they're extremely prone to error and fraud. And finding and diagnosing problems and assessing the risk of fraud is highly challenging. Excel, by far the most widely used spreadsheet, does not provide an adequate set of error-and-fraud-detection capabilities and has no documentation capabilities in this area.
- **Solution:** Forensically analyze high-risk spreadsheets in order to understand and document in detail their structure, data flow, hidden information and other factors and identify errors and potential sources of fraud.
- **How Compasssoft helps:** Compasssoft provides an unmatched level of comprehensive, powerful spreadsheet analysis capabilities, as is evidenced by its spreadsheet analysis being used by growing numbers of auditors at all of the "big four" firms.
- **Key Best Practices**
 - Use analysis to ensure that spreadsheet applications are achieving their primary goal – maintaining accuracy and integrity. Since spreadsheets are so error-prone, this activity should be directly proportional to the level of risk associated with the spreadsheet. In the case of mission-critical spreadsheets, using a more formal quality control process habitually with every published version is recommended.
 - Establish remediation workflows based on the types of problems identified. For example, suspected fraud may trigger security measures, while a simple human error may be corrected by the end user and the assessment process then automatically rerun.
 - Separate the analysis process from remediation activity in order to provide a clean set of documentation about the analysis of any given version of a spreadsheet and simplify the audit process.
 - Maintain the integrity of the documentation by keeping it outside of the body of the spreadsheet itself, and keep it out of the view of the end user, if appropriate.
 - Avoid the use of Excel plug-ins for spreadsheet analysis, because this creates the risk the spreadsheet being changed or even corrupted during the analysis phase and can produce unpredictable results when combined with other Excel add-ins. Compasssoft's application-based analysis manager interface does not invoke Excel, instead maintaining a separate viewing interface that strips out formatting and brings hidden information to the surface, while keeping a separate record of documentation in an access-managed location.

Step 5. Management (Securing and Monitoring)

- **Problem:** Spreadsheets are usually widely distributed across the enterprise, and this creates many challenges, from the perspectives of both security and management in general. It is extremely difficult to ensure that the right people — and only the right people — can easily find and use the spreadsheets they need. And it is even more difficult to track and document the use of those spreadsheets.
- **Solution:** Implement a framework that considers both the physical aspects of the spreadsheets (access and version control) and content-level management (continuous control monitoring, functional-level control, change management and documentation).
- **How Compasssoft helps:** Compasssoft can monitor a spreadsheet in place, or work with document management systems (for example, via integration with Microsoft SharePoint Server 2007) to provide a secure central repository. Compasssoft offers an additional level of control for mission-critical spreadsheets, providing a secure, tamper-proof audit trail showing all changes, and controlling the areas of functionality that are available to end users. Compasssoft also provides a complete set of reports, and allows enterprises to generate their own custom reports using Crystal Reports technology.
- **Key Best Practices**
 - o Move sensitive spreadsheets to a location with an appropriate level of access control, and make them available only to appropriate parties on an as-needed basis. Monitor less critical spreadsheets “in place” for changes in-situ, and require end users to log in, and check files in or out, based on their access rights.
 - o For repetitive processes (for example, the monthly “close”), publish a “gold standard” template to be used subject to controls. Use version control so that subsequent versions can be compared to the template to determine adherence to policy.
 - o Treat data sources (for example, links from external spreadsheets and databases) with the same level of care as a key spreadsheet.
 - o Instrument critical spreadsheets with cell-level change monitoring by maintaining an audit trail with an appropriate level of detail (who changed what, when and for what reason).
 - o Require electronic signatures from individuals (or roles) needed to sign off on specific data.
 - o Restrict the use of critical spreadsheets by limiting the functionality that a given individual or role is permitted to access for a given spreadsheet. For example, end users shouldn’t be allowed to insert or delete rows in an iteration of a spreadsheet template.
 - o Monitor key performance metrics in financial spreadsheets against range limits, and set up alerts for metrics that fall outside acceptable limits.
 - o Generate regular reports on control parameters and spreadsheet details, to create a robust set of documentation for auditors.
 - o Recognize that spreadsheet control and management is, and must be, a sustainable process. When new or changed information is introduced, reevaluate both the enterprise’s policies and how the information fits with those policies, and do so on a continuous basis.

The Bottom Line

With more than 180 enterprise clients, Compasssoft is the market leader in enterprise spreadsheet management and control. Other vendors attempt to address this problem by limiting or confining their customers to a partial, “departmental” solution that controls only a handful of financial spreadsheets, while Compasssoft has helped large enterprises implement a sustainable, comprehensive spreadsheet management and control strategy that reaches across the entire enterprise.

Enterprises that implement Compasssoft’s five-step framework benefit from reduced risk of errors, protection of sensitive information from leakage or loss and improved compliance with regulatory requirements. And the Compasssoft approach, which combines best practices and automation, sustains these benefits at lower cost to the enterprise. Compasssoft’s framework also offers other benefits to key enterprise stakeholders:

- **Executives** have improved visibility and confidence that their financial reporting information is both accurately reported to shareholders and controlled in accordance with regulations.
- **Line-of-business managers** have the assurance that information in spreadsheets is accurate for decision-making purposes and being managed according to enterprise policies.
- **End users** are able to locate the information they need when, they need it, and perform their duties in a secure and stable environment.
- **Internal auditors** have dramatically improved efficiency in locating and validating information, more extensive ability to institute and test controls and increased ease of documentation for regulatory compliance.
- **External auditors** have ready access to test controls and automatically compiled audit documentation, which significantly reduces their workload, while increasing their confidence about their clients’ spreadsheet management policies and systems.
- **IT organization** can identify “downstream” impact on end-user applications when IT-managed central systems are changed.

Gartner, the world’s leading technology research and analysis firm, offers the following summary: “The spreadsheet remains one of the least-understood and least-controlled elements of corporate risk. ... Compasssoft is the first provider that can address both key elements of spreadsheet management — quality control and governance — with offerings that address the quality of spreadsheets and their control after deployment. If enterprises do not simultaneously address both of these issues, spreadsheets will always be a source of losses.”

To learn more about how Compasssoft can help you manage and control your enterprise spreadsheets, visit <http://www.compasssoft.com>.