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The Institute of
Internal Auditors
Australia

Whitepaper

Controlling Spreadsheet Risks

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Level 5, 580 George Street, Sydney NSW 2000 | PO Box A2311, Sydney South NSW 1235

T +61 2 9267 9155 **F** +61 2 9264 9240 **E** enquiry@iia.org.au **www.iia.org.au**

Controlling Spreadsheet Risks

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Background

Purpose

An increasing number of entities are realising they need to better manage the integrity of their business-critical spreadsheets. Internal auditors have a crucial role to play in both raising awareness of potential vulnerabilities and solutions, and providing independent assurance.

Note 1: Modelling is a generic term used to describe any form of analysis for decision-making purposes. Most of the models are Excel Spreadsheet-based. There are also non-Excel spreadsheet tools available, such as Microsoft Access. Whilst this White Paper uses the term 'spreadsheets', the concepts equally apply to other forms of 'modelling'.

Background

When internal auditors and Audit Committees consider the highest risks facing their entities, spreadsheet risks rarely rate a mention.

Yet, entity-wide surveys have revealed widespread usage of spreadsheets for assembling and manipulating decision-making information. To provide some perspective:

- > A 2020 technology blog highlighted that countless studies of human errors in spreadsheets established unequivocally that over 90% of spreadsheet models used in making business decisions contain errors.
- > In one Australian entity, 75% of spreadsheets (of a large number) were assessed as 'business critical' and a significant proportion of the remainder were identified as 'significant for business management'.
- > In an Australian 'flash poll', 70% of participants confirmed that their entities rely heavily on spreadsheets for critical portions of the business; with 43% having little or no specific processes to confirm that the spreadsheets are functioning in accordance with management's intentions.

Note 2: The above statistics are illustrative; not published surveys.

The key drivers for using spreadsheets for business-critical functions include:

- > Difficulties in getting system changes made, so workarounds are developed;
- > It becomes the 'go to' tool when the system doesn't have the functionality;
- > Generally, a very user-friendly tool that is part of a standard Microsoft suite, so everyone has access (most people have developed a spreadsheet whether personal or at work);
- > Many believe they have the capability and understanding of spreadsheet development;
- > It is easier to turn to Excel or Access if senior managers want scenario analysis;
- > It is easy to use for scenario analysis, planning and reporting; and
- > Simulations or comparative studies are easily developed.

There are many 'real life' spreadsheet horror stories that have facilitated fraudulent accounting practices or led to reputational damage to entities when significant errors arise. There is a myriad common spreadsheet problems (discussed later).

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To mitigate the key risks, entity-wide strategies can be adopted such as:

1. Better modelling standards.
2. Accountability of decision-making capabilities and operational improvements.
3. Effective auditing and assurance arrangements.

Discussion

Issue

Notwithstanding the ease of spreadsheet use and the timeliness of modelling results, management needs to achieve a balance between convenience and risk. Common spreadsheet problems include:

- › Poor or non-existent development and maintenance methodology;
- › Absence of back-up;
- › No or minimal 'system documentation';
- › Poor data entry controls and access management;
- › Acceptance of results without understanding the underlying business rules and calculations;
- › Inexperienced and/or overly confident developers;
- › Lack of understanding regarding the handling and storing of what can be potentially sensitive data;
- › Business drivers/requirements are ever-changing, so sometimes spreadsheets are no longer fit for purpose but are still used as there is no alternative;
- › Minor tweaking of formulas is undertaken without knowing the flow-on effects and associated risks; and
- › Not understanding business implications and impact when there is a single person who has sole knowledge of how and why the spreadsheet has been developed.

Note 3: A table of Abbreviations and Glossary is included within Section 4.

Spreadsheet errors can have a profound effect on an entity's reputation and the community's confidence in its operations.

Just imagine explaining to the CEO or Board that your entity has lost more than \$6 billion because of basic Excel flaws and incorrect testing. A banking and financial services holding company in London experienced such a disaster by using 'copy-and-paste' for a new Value at Risk model, however the process became strained due to increasing pressure from the trader to meet deadlines. Or perhaps, a power generation company in Canada that suffered losses of \$24 million as the result of a simple clerical error which meant they bought US contracts at higher prices than they should have. Again, the culprit was 'cut-and-paste' and lack of proper review, which should have picked up on the error before the spreadsheet was finalised. Both incidents actually occurred.

The following 'real life' examples in Exhibit 1 illustrate the values, causes, and consequence of a representative sample of other reported spreadsheet errors.

Exhibit 1 – Examples of Reported Spreadsheet Errors

Type of Entity	Country	Value	When	Cause	Consequence*
Bank	Australia	\$A10 million	2005	Lack of user training	Profit overstated
County	USA	\$US15 million	2009	Bad link	Income expectation overstated
Local council	UK	£21 million	2010	Bad formula	Under-estimation of assets by 3.5%
County	USA	4,870 voters overstated	2011	Conversion errors	False election result
London Olympics	UK	10,000 tickets oversold	2012	Manual data entry	Synchronised swimming sessions oversold
State entity	Australia	2,693 photo cards	2017	Not stated	Serious data privacy breach: security, firearms, and driver licences

* All resulted in a loss of confidence by shareholders, customers, voters, and general community.

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History

Entity-wide framework

Internal auditors have a key role to play in ensuring that their entity has in place a suitable framework to guide spreadsheet development, usage and review to ensure it remains current and fit for purpose.

The framework needs to be structured in a way that anticipates and detects the potential for errors. The application of error reduction principles helps to:

- › Establish quality against which spreadsheets can be assessed; and
- › Provide a standard process for spreadsheet development, maintenance and change management.

It is essential to ensure that a consistent approach is used throughout the development of a spreadsheet, in order to produce a transparent and flexible tool, which is:

- › Easy to understand and use;
- › Focuses on the key outputs; and
- › Reliable in assisting with decision-making.

An example of the typical features is included on the next page in Exhibit 2.

Exhibit 2 – Framework to Guide Spreadsheet Use

Assurance	
Policy and Guides	People
	Process
	Technology

- › *Assurance* - An audit and assurance role is required to regularly validate risk and impacts.
- › *Policy and guides* - Are required providing direction in designing, implementing and executing spreadsheets, in particular, the development and delivery of templates, standards and enterprise-wide approach.
- › *People* - Specialist teams skill set, competency and technical perspectives are required by businesses using business critical spreadsheets.
- › *Process* - Local processes should govern how to use business critical spreadsheets, including usage, storage and security. Business rules and calculations should be documented.

- › *Technology* - Three technology capability areas play a key role: 1 - The capture and storage of data and information that is 'fit for purpose'; 2 - Information delivery and presentation products; 3 - Reporting and analytics applications, systems and infrastructure.

A well-founded auditing approach

A periodic review of business-critical spreadsheets ought to be considered in the audit plan, either as part of a 'rolling program' of audits across the entity, or as part of scheduled audits in the higher-risk areas of the entity (see Exhibit 3).

It is especially important for auditors to assess the controls of spreadsheets that they are given as part of testing in any audit that they undertake. It's something that some inexperienced auditors take for granted – they are given a spreadsheet with data as part of assurance work, and take it on face value that the data is correct without conducting some foundation assessment.

Exhibit 3 – Three Common Types of Spreadsheets Audits

Internal auditors initially need to understand the risks involved, using the sort of factors illustrated in Exhibit 4.



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Review of Entity-wide Framework	<ul style="list-style-type: none"> › Provision made in Internal Audit Plan to review spreadsheet control framework. › Review framework guiding spreadsheet development, usage and review (Exhibit 2). › Determine whether the framework is appropriate, current and fit for purpose. › Audit report issued with an opinion on the adequacy of the framework.
Rolling Entity-wide Program of Audits	<ul style="list-style-type: none"> › Provision is made in the Internal Audit Plan to review spreadsheets. › Business critical spreadsheets are identified across entity through a standard survey. › Sample of higher-risk spreadsheets (see Exhibit 4) are assessed. › Separate 'themes-based' audit report is issued.
Part of Scheduled Higher-risk Audits	<ul style="list-style-type: none"> › Business critical spreadsheets identified as part of audit of discrete business units. › Higher-risk spreadsheets (see Exhibit 4) are assessed as part of the audit field-work. › Audit results form part of the audit report for the business unit or activity.

Internal auditors initially need to understand the risks involved, using the sort of factors illustrated in Exhibit 4.

Exhibit 4 – Spreadsheet risk factors

1	2	3
Contribution to business outcomes	Managing the information tool	Understanding the impacts and consequences
To understand the risk, we needed to know how the spreadsheet contributed to achieving business outcomes.	To understand the likelihood of errors, we need to know practical information about the spreadsheet.	To understand the impact we need to make a determination about the overall risk for error.
What is the business objective? Why are we choosing to use a spreadsheet? Do we need it?	How big is the spreadsheet? Who has access? Where is it stored? How complex is it? Does it use macros and VBA? What security and access management exists?	Who uses the information? Is it internal or external? What other verification of the data occurs?

Complexity and Criticality Assessment

Internal auditors can determine the complexity and criticality of spreadsheet usage using a structured assessment process. This can be through a whole-of-entity survey approach or through assessment during scheduled internal audit engagements. The assessment will typically consider the following factors:

1. Determine whether spreadsheets are used as part of core business activities.
2. Determine the purpose and use of the spreadsheets. For instance:
 - › Financial - the model is used to determine financial statement transaction amounts or balances that are populated into the general ledger and/or financial statements.
 - › Operational - the model is used to facilitate tracking and monitoring of workflow to support operational processes, such as a listing of open claims, unpaid invoices.
 - › Analytical/Management Information - the model is used to support analytical review and management decision-making.
3. Determine the level of complexity of the spreadsheet. For instance:
 - › High - Support complex calculations, valuations

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and modelling tools. The model is typically characterised by the use of macros and multiple supporting spreadsheets where cells, values and individual spreadsheets are linked.

- › Medium - Perform simple calculations such as using formulas to total certain fields or calculate new values by multiplying two cells.
 - › Low - Serve as an electronic logging and information tracking system.
4. Determine how critical the spreadsheet is to the business. For instance:
- › High - Severe impact on business activities.
 - › Medium - Significant impact on business activities.
 - › Low - Moderate impact on business activities.
5. Establish the impact of incorrect outcomes resulting from the spreadsheets. For instance:
- › High - Major disruption to business activities.
 - › Medium - Significant disruption.
 - › Low - Disruptive but could work around it.

Assessing business-critical spreadsheets

Once the more complex and critical spreadsheets have been determined, the internal auditors can complete an assessment of individual spreadsheets using a suitable risk / control matrix and standard audit steps. Examples of typical controls and associated audit steps are detailed in Exhibit 5.

Exhibit 5 – Control assessment of Individual High-risk Spreadsheets

Control	Audit step
Access to the spreadsheet or the other user-developed model is restricted and monitored.	Are logical security tools and techniques implemented and configured to enable restriction of access to the spreadsheets?
Reconciliation is performed on a regular basis.	Does relevant management, other than the initiators, check inputs, calculations and results back to source data? Does relevant management, other than the initiators, check the accuracy and completeness of assumptions used? Are there any manual controls to check accuracy and completeness of the outcome from the spreadsheets?
Changes made to data inputs and calculations are valid, complete and accurate.	How are changes logged or recorded for tracking purposes? Are changes monitored and reviewed? Have standard change management procedures been followed? Do requests for changes need to be formally reviewed and approved by management on a regular basis?
Adequate documentation held of user and developer guidelines.	Has adequate documentation been developed and implemented?
Regular backup is maintained.	Is the spreadsheet backed-up regularly?
Security controls are built into the spreadsheet.	Is the model password protected? Is the password changed on a regular basis? Are the cells of the spreadsheet protected? Are any cells referred to blank cells? Are any cells referred to hidden columns, rows and sheets? Are any cells referred to unused calculations?

Common errors

Internal auditors need to understand the range of common errors in spreadsheets. Examples are included in Exhibit 6.

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Exhibit 6 – Examples of Common Spreadsheet Errors Identified by Auditors

Type of Control Check	Common Errors
<p><i>Structural checks</i> A manual check to carry out particular command sequences as part of the quality control check.</p>	<p>The general linear principle has not been followed correctly. A routine formula is removed without checking any existence of other formulas linked to it. The formula has been corrected or updated, however it has not been copied across the row. The use of multiple sheets increases the risk of error in itself, so there is a need to check that the reference itself is correct on its sheet. The link may or may not be updated automatically. The error recognition checks being rarely performed or not in detail. Majority of circularities are accidental and iteration will calculate any type of circular code.</p>
<p><i>Arithmetical checks</i> Designed to check that values add-up correctly.</p>	<p>A calculation has been updated to reflect a new element on the calculation sheet, but the relevant result sheet has not been updated to show the new element. A calculation has been updated to reflect a new element on the calculation sheet, but is not copied across the row. The result sheet has been updated, but with no changes made to the calculation sheet.</p>
<p><i>Financial checks</i> Designed to test the underlying financial and accounting policies used in a model.</p>	<p>Lack of technical, financial and accounting knowledge.</p>

Modelling platforms

Internal auditors need to understand the different risk considerations depending on the specific modelling platforms used (Excel or Microsoft Access). These are described below.

- Multiple simultaneous users

An Excel Spreadsheet is intended to be used as a single file for a single user. When one user opens the Excel Spreadsheet file on the network, other users cannot make

any changes on the file. On the other hand, a Microsoft Access database is designed to be used by multiple users simultaneously, up to a maximum of 255 users at any one time.

- Flat files or relational files database

Flat files are data structures that contain records without a relational database structure. By nature, an Excel spreadsheet has a flat file data structure. Building a model using a flat file data structure is simpler and requires little technical skill. A relational database structure enables staff to define more than one data structure. The advantage of relational database structures is the ability to sort and structure the data based on defined criteria, and generate robust reports.

- Prepared reports

An Excel spreadsheet has a standard limited reporting capability. In comparison, Microsoft Access provides a more robust reporting capability, which is easy to prepare.

- Learning curves

An Excel spreadsheet is a user-friendly tool. There are no specific skills required to understand the Excel spreadsheet data structure, which means it has a low learning curve for users. By contrast, some users may experience a steep learning curve in developing a model using Microsoft Access.

Five Action Steps

1. Raise awareness of spreadsheet risks amongst the Audit Committee, the Chief Executive, and the C-suite.
2. Promote the development and implementation of an entity-wide policy and associated guidelines on spreadsheet usage to provide direction on the design, implementation and execution of spreadsheets.
3. Work with management to establish suitable people, process and technology safeguards including periodic reminder communiques (see Exhibit 2).
4. Establish suitable auditing and assurance arrangements - at both a framework level and for high-risk spreadsheets - to regularly validate risks and impacts and reflect these arrangements in the entity's assurance map.
5. Incorporate periodic reviews of spreadsheet risks into the internal audit plan, noting:
 - › Consideration needs to be given to procuring suitable analytical software (such as Spreadsheet

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Professional).

- › A spreadsheet may not be seen as business critical now, but may become business critical in the future. Periodic assessment is required, and organisations need to incorporate this into their risk assessments/ risk management processes.
- › An initial Complexity and Criticality Assessment is to be completed.
- › For a sample of spreadsheets, an Assessment of Individual Business-critical Spreadsheets will typically be undertaken.
- › Internal audit staff will need to be trained to undertake these technical reviews.
- › Outcomes of spreadsheet reviews will need to be reported to the Audit Committee and to management, perhaps using a themes-based reporting approach where multiple spreadsheets have been reviewed.

Conclusion

Summary and Options

As internal auditors and Audit Committees consider the highest risks facing their entities, spreadsheet risks rarely rate a mention. Yet, simple and avoidable spreadsheet errors can have a profound effect on an entity's reputation and the community's confidence in its operations when spreadsheets are relied upon for business-critical functions. This is illustrated through the broad range of examples contained in Exhibit 1.

Conclusion

Internal auditors have the opportunity to raise the awareness of spreadsheet risks associated with business-critical operations.

They can champion appropriate policies and guidelines; help management to establish suitable people, process and technology safeguards; and determine the most suitable auditing and assurance arrangements.

The incorporation of periodic reviews of spreadsheet risks into the internal audit plan will help to deliver well-founded independent opinions on the adequacy of the safeguards in managing these risks.

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Access control	Limit access to the models and assign appropriate access rights.
Back-up	Implement a process to back up the models on a regular basis to ensure that information can be recovered during system failure.
Change control	Maintain a controlled process for requesting and making changes for the models. It also includes testing the models and obtaining a formal sign off from independent users to confirm that changes have been implemented as required.
Documentation control	Ensure an appropriate level of documentation is maintained and kept up-to-date.
Input control	Ensure that reconciliations are performed to determine whether data inputs are complete and accurate.
Modelling	A generic term used to describe any form of analysis for decision-making purposes. Most of the models are Excel Spreadsheet based. There are also non-Excel Spreadsheet tools available, like Microsoft Access Database.
Security control	Implement a process to ensure that data recorded in the models are current and secured.

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Sensitivity Analysis	A model which explores the effects of changing the input assumptions. It is commonly referred to as a “What If” analysis. Sensitivity Analysis is a useful method to predict the outcome if a situation becomes different to the key input assumptions.
Segregation of roles	Define and implement roles, authorities and responsibilities around the models.
Spreadsheet Professional tool	Spreadsheet Professional consists of a collection of tools to enable you to build, test, document, and use your spreadsheet models more quickly and effectively, while reducing the number of errors created. <i>Note: This tool is used solely as an example; IIA-Australia is not promoting any particular software solution.</i>
Version control	Ensure that only current and approved versions are being used by users.

Purpose of White Papers

A White Paper is a report authored and peer reviewed by experienced practitioners to provide guidance on a particular subject related to governance, risk management or control. It seeks to inform readers about an issue and present ideas and options on how it might be managed. It does not necessarily represent the position or philosophy of the Institute of Internal Auditors–Global and the Institute of Internal Auditors–Australia.

Author’s Biography

Written by: Bruce Turner AM
CRMA, CGAP, CISA, CFE, PFIIA, FFin, FFA, FIPA, FAIM, FAICD, JP

Bruce has been a member of the IIA since 1984 and was an IIA-Australia Board Director from 2012 to 2018. He spent nearly 30 years within the financial services sector, which included extensive internal auditing responsibilities in Australia, United States and United Kingdom spanning commercial banking, merchant banking and central banking. He ultimately held CAE roles at the State Rail Authority of NSW, Integral Energy Australia, and the Australian Taxation Office. He is currently a company director and audit committee chairman and independent member.

Edited by: Andrew Cox
MBA, MEC, GradDipSc, GradCertPA, DipBusAdmin, DipPubAdmin, AssDipAcctg, CertSQM, PFIIA, CIA, CISA, CFE, CGAP, CSQA, AIPA, AFA, MACS Snr, MRMIA

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