

# Deficiencies, Risk, and Sampling

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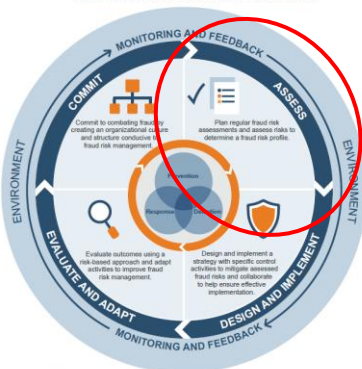
Figure 1: Interdependent and Mutually Reinforcing Categories of Fraud Control Activities



Source: GAO | GAO-15-892P

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Figure 2: The Fraud Risk Management Framework



Source: GAO | GAO-15-892P

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## Plan & Assess for Risks

Plan regular fraud risk assessments and assess risks to determine a fraud risk profile.

- Tailor the fraud risk assessment to the program, and involve relevant stakeholders.
- Assess the likelihood and impact of fraud risks and determine risk tolerance.
- Examine the suitability of existing controls, prioritize residual risks, and document a fraud risk profile.



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## Management Fraud & Audit Risk

“Profit is the result of risks wisely selected”  
 Frederick Barnard Hawley

“Risk comes from not knowing what you’re doing”  
 Warren Buffett

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## SAS 109 (AU 314):

- Describes the procedures to be used to gather information and gain an *understanding of the entity and its environment & fraud risks*, which include:
  - Inquiries
  - Analytical procedures
  - Observation and Inspection
- Requires “Brainstorming” Session

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- How proactive must management be to prevent fraud in the first place?
- “The primary responsibility for the prevention and detection of fraud and error rests with those charged with governance and the management of the entity.” (SAS 109, ¶ 68)

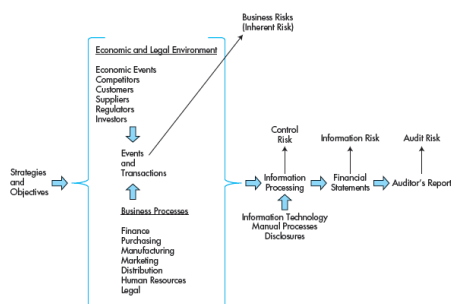
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## Management's Risks

- Business Risk—failure to meet objectives
  - Objectives—overall plans
  - Strategies—methods to meet objectives
- Information Risk—financial statements will be misstated.

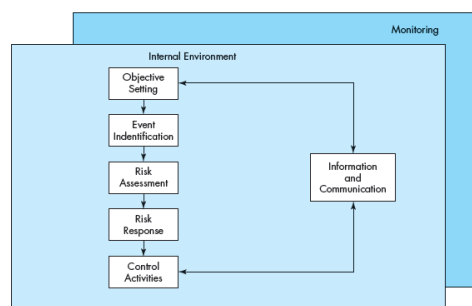
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## Sources of Risk



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## Enterprise Risk Management



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## Auditor's Risk Responsibilities

- Audit Risk—auditor will give unqualified opinion on misstated financial statements
- Management Fraud Risk—management intentionally misstates financial statements
  - Fraudulent financial reporting
- Errors are unintentional misstatements or omissions of amounts or disclosures in financial statements.
- Auditors' primary responsibility is to design procedures to provide *reasonable assurance that frauds that materially misstate the financial statements are detected.*

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- Whether the risk is a risk of fraud.
- Whether the risk is related to recent significant economic, accounting, or other developments and, therefore, requires specific attention.
- The complexity of transactions.
- Whether the risk involves significant transactions with related parties.
- The degree of subjectivity in the measurement of financial information related to the risks, especially those involving a wide range of measurement uncertainty
- Whether the risk involves significant nonroutine transactions which are outside the normal course of business for the entity, or otherwise appear to be unusual.  
(SAS 109, ¶1111)

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Risks of material misstatement may be greater for risks relating to significant judgmental matters requiring the development of accounting estimates arising from matters such as the following:

- Accounting principles for accounting estimates or revenue recognition may be subject to differing interpretation.
- Required judgment may be subjective or complex, or may require assumptions about the effects of future events, for example, judgment about fair value. (SAS 109, ¶ 114)

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## General Categories of Errors & Frauds

- Invalid transactions are recorded.
- Valid transactions are omitted from the accounts.
- Unauthorized transactions are executed and recorded.
- Transaction amounts are inaccurate.
- Transactions are classified in the wrong accounts.
- Transaction accounting and posting is incorrect.
- Transactions are recorded in the wrong period.

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Management has a unique ability to perpetrate fraud because of position...

- Management override
- Can direct employees (or solicit their help)
- Can manipulate accounting records
- Can take steps to conceal
- Withholds evidence
- Misrepresents evidence
- Falsifies documentation
- May involve collusion among management, employees, or third parties

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## Professional Skepticism...

- Conduct engagement with a mindset that recognizes the possibility that a material misstatement due to fraud could be present, regardless of any past experience with the entity and regardless of the auditor's belief about management's honesty and integrity
- PS requires ongoing questioning
- Auditor should not be satisfied with less-than-persuasive evidence because of a belief that management is honest

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## Fraud Risk Factors: Management's Characteristics and Influence

- Management has a motivation to engage in fraudulent reporting.
- Management decisions are dominated by an individual or a small group.
- Management fails to display an appropriate attitude about internal control.
- Managers' attitudes are very aggressive toward financial reporting.

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## Fraud Risk Factors: Management's Characteristics and Influence (cont.)

- Nonfinancial management participates excessively in the selection of accounting principles or determination of estimates.
- The agency has a high turnover of senior management.
- The agency has a known history of violations.
- Managers and employees tend to be evasive when responding to auditors' inquiries.
- Managers engage in frequent disputes with auditors

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## Fraud Risk Factors: Industry conditions

- Not normally a big deal in government...but...
  - Going concern
  - GASB
  - Federal Government
    - GAO,OMB
    - Big government
    - National debt and overreliance on federal funding
  - FASB

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## Fraud Risk Factors: Operating Characteristics

- A weak internal control environment prevails.
- Insufficient cash flows to ensure that it is a going concern.
- The agency has many difficult accounting measurement and presentation issues.
- The agency has significant transactions or balances that are difficult to audit.
- The agency has significant and unusual related-party transactions.
- Agency accounting personnel are lax or inexperienced in their duties.

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## The AUDIT RISK MODEL (ARM)

- **Audit risk (AR)** is the risk (likelihood) that the auditor may unknowingly **fail to modify the opinion** on financial statements that are **materially misstated** (e.g., an unmodified opinion on misstated financial statements.)
- The AUDIT RISK MODEL decomposes overall audit risk into three components: inherent risk (IR), control risk (CR), and detection risk (DR):  

$$AR = IR \times CR \times DR$$

$$(IR \times CR = \text{Risk of Material Misstatement (RMM)})$$

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## Inherent Risk

- Factors affecting account inherent risk include:
  - Dollar size of the account
  - Liquidity
  - Volume of transactions
  - Complexity of the transactions
    - New accounting pronouncements
  - Subjective estimates

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## Control Risk

- **Control Risk (CR)** is the likelihood that a material misstatement would **not be caught by the client's internal controls**.
- Factors affecting control risk include:
  - The environment in which the company operates (its "control environment").
  - The existence (or lack thereof) and effectiveness of control activities.
  - Monitoring activities (audit committee, internal audit function, etc.).

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## Detection Risk

- **Detection risk (DR)** is the risk that a material misstatement would **not be caught by audit procedures**.
- Factors affecting detection risk include:
  - Nature, timing, and extent of audit procedures
  - Sampling risk
    - Risk of choosing an unrepresentative sample.
  - Nonsampling risk
    - Risk that the auditor may reach inappropriate conclusions based upon available evidence

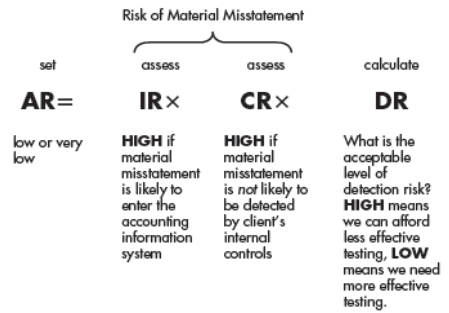
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## Detection Risk and the Nature, Timing, and Extent of Audit Procedures

	Lower Detection Risk	Higher Detection Risk
Nature	More effective tests (external evidence)	Less effective tests (internal evidence)
Timing	Testing performed at year-end.	Testing can be performed at Interim.
Extent	More tests.	Fewer tests.

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## Audit Risk Process



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## Information Sources

- General Industry Sources
- Agency Sources
  - Minutes
- Client acceptance, Planning, Past audits, and Other Engagements

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## Factors Affecting Overall Inherent Risk

- Agency and its environment
- Nature of Agency
  - Complexity
  - Related parties
- Accounting Principles and Disclosures
- Objectives and Strategies
- Measurement and Analysis of Financial & Agency Performance

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## Preliminary Analytic Procedures



- Attention directing
  - Identify potential problem areas
- An organized approach
  - A standard starting place to start examining the financial statements
- Describe the financial activities
  - Identify unusual changes in relationships in the data
- Ask relevant questions
  - What could be wrong?
  - What legitimate reasons are there for these results?
- Cash flow analysis

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## Analytic Procedure Steps

1. Develop an expectation.
2. Define a significant difference.
3. Calculate predictions and compare them with the recorded amount.
4. Investigate significant differences.
5. Document each of the above steps.

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## Analytic Procedures: Stages of Use

- **Preliminary planning-- required**
- Substantive testing -- optional
- **Final review -- required**

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## Audit Team Discussion (Brainstorming) (SAS 99 – AU 316 – Consideration of Fraud)

- Known external and internal factors regarding incentives/pressures, opportunities, culture/attitudes
- Set aside any prior beliefs
- How would the auditor respond to susceptibility of fraud
- Continually be alert
- Thoroughly probe issues
- Consult with other team members or experts if appropriate
- More than one location may involve more than one brainstorming session

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## Audit team discussions (brainstorming)

- Required procedure
- Objectives
  - Gain understanding of
    - Previous experiences with client
    - How a fraud might be perpetrated and concealed in the entity
    - Procedures that might detect fraud
  - Set proper tone for engagement
- Discussions should be ongoing throughout the engagement

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## Inquiries

- Management
- Audit committee
- Internal auditors
- Others
- Risk of Fraud

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## The most powerful audit technique – asking questions...

- Asking questions is the most effective audit technique of all
- About 50% of all frauds are discovered through tips and complaints
- The best clues usually don't come from the books but from the people who work with them

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## Diligent Inquiry...

- The ability to ask very penetrating, although non-accusatory, questions about the subject
- The benefits of "Diligent Inquiry" should be obvious – then why are auditors reluctant to ask questions about fraud?

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### 3 reasons we don't ask questions

- We think it will offend people to ask them about sensitive issues (like fraud)
- We believe it could lead to legal trouble
- We don't think people will answer such questions truthfully

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### The Art of Interrogation:

- Understanding the psychology of the thief is the key to effective interrogation
- Equally critical are the interrogator's listening skills (good interrogators take notice of more than the interviewee's verbal responses)

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### Interrogation 101

- Interrogation skills are not acquired quickly or easily
- A good interviewer can structure questions so the suspect isn't fully aware of potentially incriminating information being volunteered
- One of the best ways to detect fraud and to identify internal control problems is to simply ask about it

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### Interrogation 101

- Meet with each staff member individually
- Begin by establishing rapport with the employee
- Then, move into the fraud assessment questions

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### Calibration...

- This initial phase of questioning has two purposes:
  1. Get the employee comfortable with the interview environment
  2. Allow the interviewer to observe the employee's verbal and non verbal reactions to questions that aren't crime related
- This process is called "Calibration" because the interviewer can compare responses here to those in the fraud assessment questioning

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### Fraud Assessment Questioning (FAQ)

- *I've been engaged to look into the prevention and detection of fraud. The agency director wants me to ask about potential misdeeds by management and employees. Do you understand?*

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## FAQ...

- *When we talk about fraud in government, we're not talking about an agency pen or making a few personal copies on the copy machine. Rather, we're referring to a whole range of activities where people steal from the agency, lie to management, or take unfair advantage of the agency. Do you think fraud is a problem for government in general?*

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## FAQ...

- *Do you think this agency has a problem with fraud?*
- *If employees or managers are stealing from this agency, why do you think they would do it?*

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## FAQ...

- *Frequent, small thefts by employees can add up to a lot of money. If you knew another employee was stealing from the agency, what would you do?*
- *Do you know of anyone who might be stealing or taking unfair advantage of the agency?*
- *Suppose someone who worked at the agency decided to steal or commit fraud. How could he or she do it and get away with it?*

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## FAQ...

- *In your opinion, who is beyond suspicion when it comes to committing fraud at this agency?*
- *Did you ever think about stealing from the agency even though you didn't go through with it?*
- *Is there any other information you wish to furnish regarding possible fraud in this agency?*

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## Assess Fraud Risks

- Type of risk
- Significance of risk
- Likelihood of risk
- Pervasiveness of risk
- Assess controls and programs

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## Required Risk Assessments

- Presume that improper revenue recognition is a fraud risk.
- Identify risks of management override of controls.
  - Examine journal entries and other adjustments.
  - Review accounting estimates for biases.
  - Evaluate business rationale for significant unusual transactions.
- Identify *Significant Risks*

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## Respond to Assessed Risks

- Respond to Significant Risks
  - Assignment of personnel
  - Choice of accounting principles
  - Predictability of auditing procedures
  - Retrospective review of prior year accounting estimates
- Accumulated Results of Procedures
- Extended procedures

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## Evaluate Audit Evidence

- Discrepancies in the accounting records.
- Conflicting or missing evidential matter.
- Problematic or unusual relationships between the auditor and management.
- Results from substantive of final review stage analytical procedures.
- Vague, implausible or inconsistent responses to inquiries.

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## Communicate Fraud Matters

- Evidence that fraud may exist must be communicated to appropriate level of management.
- Significant deficiencies must be communicated to those charged with governance.
- Any fraud committed by management (*no matter how small*) is material.

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## Document Fraud Matters

- Discussion of engagement personnel.
- Procedures to identify and assess risk.
- Specific risks identified and auditor response.
- If revenue recognition not a risk—explain why.
- Results of procedures regarding management override.
- Other conditions causing auditors to believe additional procedures are required.
- Communication to management, audit committee, etc.

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## Noncompliance With Laws & Regulations

- **Direct-effect noncompliance** produce **direct** and **material** effects on the financial statements . The law or regulation can be identified with a specific account or disclosure (e.g., state contract laws).
  - Auditor's responsibility--design procedures to provide reasonable assurance
- **Indirect-effect noncompliance** are **not related to specific accounts or disclosures on the** financial statements (e.g., violations related to OSHA, EPA, EEO, etc.).
  - Auditor's responsibility—Follow up on suspected violations material to the financial statements

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## Red Flags of Potential Noncompliance

- Unauthorized transactions.
- Government investigations.
- Regulatory reports of violations.
- Payments to consultants, affiliates, or employees for unspecified services.
- Unusually large cash payments.
- Unexplained payments to government officials.

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## Audit Strategy Memorandum

- Identify significant accounts and disclosures
- Establish overall audit strategy for each relevant assertion
- Take into account
  - Reporting objectives and communications required
  - Auditor's risk assessment.
  - Other requirements of laws or regulations.
- Nature, timing, and extent of necessary *resources*
- Planned tests of controls, substantive procedures, and other planned audit procedures
- Memo is basis for preparing detailed audit programs
- Written audit plan (program) documenting audit strategy is required

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## Obtain Information Needed to Identify Risks of Material Misstatement due to Fraud

- Make inquiries of management and others within the entity to obtain their views about the risks of fraud and how they are addressed
- Consider any unusual or unexpected relationships that have been identified in performing analytical procedures in planning the audit
- Consider whether one or more fraud risk factors exist
- Consider other information that may be helpful in the identification of risks of material misstatement due to fraud

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## Identify risks that may result in a material misstatement due to fraud

- *Type* of risk that may exist (fraudulent financial reporting or misappropriation of assets)
- *Significance* of the risk (magnitude)
- *Likelihood* of the risk
- *Pervasiveness* of the risk (whole or particular assertion, account, or class of transactions)
- A presumption that improper revenue recognition is a fraud risk
- A consideration of the risk of management override of controls

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## Assess the identified risks after taking into account mitigating programs and controls

- Evaluate whether entity program and controls that address identified risks have been suitably designed and placed in operation
- Specific controls designed to mitigate specific risks of fraud
- Broader programs designed to prevent, deter, and detect fraud

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## Responding to the results of the assessment

- Overall response to the risk of material misstatement
  - Assignment of commensurate personnel and appropriate supervision
  - Choice and application of accounting principles
  - Predictability of auditing procedures – be unpredictable
- Response involving nature, timing, and extent of procedures to be performed
  - Revenue recognition
  - Inventory quantities
  - Management estimates

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## Responding to the results of the assessment

- Response to risk arising from management override ability
  - Examine journal entries and other adjustments for evidence of possible material misstatement due to fraud
  - Review accounting estimates for biases that could result in material misstatement due to fraud
  - Evaluate the business rationale for significant unusual transactions

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## Evaluating audit evidence

- Assessing risks of material misstatement due to fraud throughout the audit
  - Discrepancies in the accounting records
  - Conflicting or missing evidential matter
  - Problematic or unusual relationships between the auditor and management
- Evaluate whether analytical procedures performed as substantive tests or in the overall review stage of the audit indicate a previously unrecognized risk of material misstatement due to fraud
  - Trends
  - Unusual or unexpected analytical relationships
- Evaluate the risks of material misstatement due to fraud at or near the completion of fieldwork
- Responding to misstatements that may be the result of fraud

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## Communicating about possible fraud

- Inform the appropriate level of management, the audit committee, and others
- Consider whether fraud risks represent reportable conditions
- May wish to communicate other risks of fraud identified
- Disclosure outside the entity may be required to:
  - Comply with legal and regulatory requirements
  - A successor auditor
  - In response to a subpoena
  - A funding agency or other government agency

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## Documenting the auditor's consideration of fraud

- Audit planning and discussions among engagement personnel
- Procedures performed to obtain information necessary to identify and assess risks of fraud
- Specific risks that were identified and the auditor's responses
- Reasons the auditor did not identify improper revenue recognition as a risk of material misstatement
- The results of the procedures performed to further address the risk of management override of controls
- Other conditions and analytical relationships that caused additional auditing procedures or other responses
- Nature of communications to management, the audit committee, and others

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## Effects on practice:

- Requires auditors to search for fictitious entries
- Expanded inquiries of management
- Determine how audit committee exercises its oversight responsibilities and whether it has knowledge of fraud
- Expanded guidance on revenue recognition as a likely risk
- Evaluating the entity's response to identified fraud risks
- Professional skepticism
- Responses to address risk of management override of controls
- Documentation
- Greater emphasis on technology

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## SAS 109 (AU 314) – Appendices... (Excellent Resources)

- Appendix A – Understanding the Entity and Its Environment
- Appendix B – Internal Control Components
- Appendix C – Conditions and Events That May Indicate Risks of Material Misstatement

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## SAS 115 (AU 325)

**Communicating Internal Control Related Matters Identified in an Audit** defines deficiency in internal control, significant deficiency, and material weakness and provides guidance for auditors on evaluating the severity of the deficiencies in internal control.

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## Deficiency in Internal Control

Determination as to whether a deficiency is significant or material is based upon whether a reasonable person would derive the same conclusion as the auditor or whether prudent officials having knowledge of the same facts and circumstances would agree with the auditor's classification of the deficiency.

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## Deficiency in Internal Control

A **deficiency in internal control** exists when the *design* or *operation* of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent or detect and correct misstatements on a timely basis.

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## Deficiency in Internal Control

**Significant deficiency** is defined as a deficiency or combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

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## Deficiency in Internal Control

A **material weakness** is a deficiency, or combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis.

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## Deficiency in Internal Control

One situation when a deficiency in internal control should be regarded as at least a significant deficiency and a strong indicator of a material weakness – *ineffective oversight of the entity's financial reporting and internal control by senior management and those charged with governance*.

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## Indicators – Material Weakness

- *Identification of fraud, whether or not material, on the part of senior management.*
- Restatement of previously issued financial statements to reflect the correction of a material misstatement due to error or fraud
- Identification by the auditor of a material misstatement of the financial statements under audit in circumstances that indicate the misstatement would not have been detected by the entity's internal control.
- *Ineffective oversight of the entity's financial reporting and internal control by those charged with governance.*

(emphasis added)

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## Deficiencies in Design Controls

- Inadequate design of controls over the preparation of the financial statements being audited.
- Inadequate design of controls over a significant account or process.
- Inadequate documentation of the components of internal control.
- Insufficient control consciousness within the organization; for example, the tone at the top and the control environment.

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## Deficiencies in Design Controls

- Absent or inadequate segregation of duties within a significant account or process
- Absent or inadequate controls over the safeguarding of assets
- Inadequate design of IT general and application controls that prevent the information system from providing complete and accurate information consistent with financial reporting objectives and current needs.

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## Deficiencies in Design Controls

- Employees or management who lack the qualifications and training to fulfill their assigned functions.
- Inadequate design of monitoring controls used to assess the design and operating effectiveness of the entity's internal control over time.
- The absence of an internal process to report deficiencies in internal control to management on a timely basis.

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## Failures in the Operation of IC

- Failure in the operation of effectively designed controls over a significant account or process (example: the failure of a control such as dual authorization for significant disbursements within the purchasing process).
- Failure of the information and communication component of internal control to provide complete and accurate output because of deficiencies in timeliness, completeness, or accuracy (example: the failure to obtain timely and accurate consolidating information from remote locations that is needed to prepare the financial statements).

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## Failures in the Operation of IC

- Failure of controls designed to safeguard assets from loss, damage, or misappropriation.
- Failure to perform reconciliations of significant accounts (example: accounts receivable subsidiary ledgers are not reconciled to the general ledger account in a timely or accurate manner).
- Undue bias or lack of objectivity by those responsible for accounting decisions (example: consistent understatement of expenses or overstatement of allowances at the direction of management).

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## Failures in the Operation of IC

- Misrepresentation by entity personnel to the auditor (this is an indicator of fraud).
- Management override of controls
- Failure of an application control caused by a deficiency in the design or operation of an IT general control.
- An observed deviation rate that exceeds the number of deviations expected by the auditor in a test of the operating effectiveness of a control.

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“Is it possible to tell that a number is wrong just by looking at it? In some cases, you bet.”

Benford's Law 2012, Nigrini,

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“Using Benford’s law -- a mathematical phenomenon that provides a unique method of data analysis -- CPAs can spot irregularities indicating possible error, fraud, manipulative bias or processing inefficiency.”

Benford's Law 2012, Nigrini,

80

### Benford’s Law...

...is used to determine the normal level of number duplication in data sets, which in turn makes it possible to identify abnormal digit and number occurrence

Benford's Law 2012, Nigrini,

81

The probability that the first digit in a number is either a 1, 2, or 3 is 60.2%

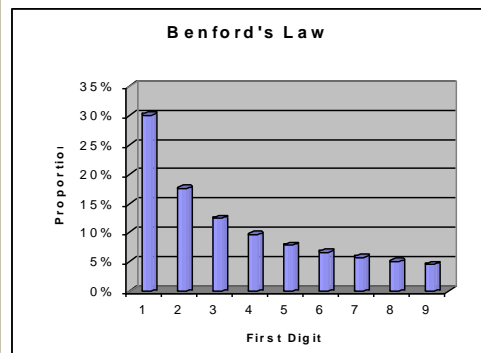
Benford's Law 2012, Nigrini,

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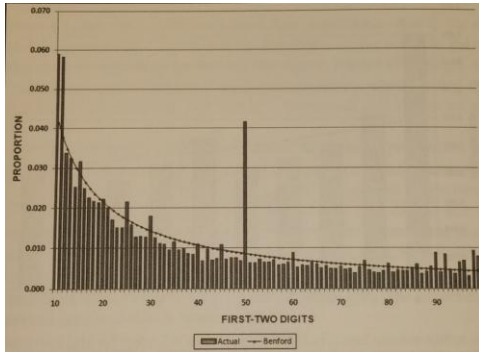
Benford's Law -- Expected Digital Frequencies				
Position of digit in number				
Digit	First	Second	Third	Fourth
0	--	.11968	.10178	.10018
1	.30103	.11389	.10138	.10014
2	.17609	.10882	.10097	.10010
3	.12494	.10433	.10057	.10006
4	.09691	.10031	.10018	.10002
5	.07918	.09668	.09979	.09998
6	.06695	.09337	.09940	.09994
7	.05799	.09035	.09902	.09990
8	.05115	.08757	.09864	.09986
9	.04576	.08500	.09827	.09982

Benford's Law 2012, Nigrini,

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**Data sets most likely to follow Benford's Law will have these characteristics:**

**#'s describe the sizes of similar phenomena (market values of corps., A/P and A/R, etc.)**

**#'s don't contain built-in maximum or minimum value (such as hourly wage rates)**

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**Not all data sets will follow Benford's Law**

Assigned numbers such as Social Security numbers, zip codes, or bank account numbers will not conform.

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Can apply to many sets of financial data:

Income tax data  
Stock exchange data,  
Disbursements,  
Revenue figures,  
Demographics,  
Scientific data

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**On the job applications:**

Accounts payable data  
Biases in data (travel vouchers)  
Ducking authorization levels  
Relative size factor (RSF)  
"same, same, different"  
"same, same, same"

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**Benford's Law is scale invariant...**

therefore, we can use this tool on financial data throughout the world, even though it is expressed in different currencies

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## Data Mining Software:

ACL @ [www.acl.com](http://www.acl.com)  
 IDEA @ [www.audimotion.com](http://www.audimotion.com)

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Check Fraud in Arizona	
The table lists the checks that a manager in the office of Arizona State Treasurer wrote to divert funds for his own use. The vendors to whom the checks were issued were fictitious.	
Date of Check	Amount
10/9/92	\$1,927.48
	27,902.31
10/14/92	86,241.90
	72,117.48
	81,321.79
	97,473.96
10/19/92	93,249.11
	89,658.17
	87,776.89
	92,105.83
	79,949.16
	87,602.93
	96,879.27
	91,806.47
	84,991.67
	90,831.83
	93,766.67
	88,338.72
	94,639.49
	83,709.28
	96,412.21
	88,432.86
	71,552.16
<b>Total</b>	<b>\$1,878,687.58</b>

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## Overview of Sampling

There are three kinds of lies: lies, damned lies, and statistics.

*Mark Twain (pseudonym of Samuel L. Clemens)*

There are five kinds of lies: lies, damned lies, statistics, politicians quoting statistics, and novelists quoting politicians on statistics.

*Stephen K. Tagg, marketing faculty member, University of Strathclyde*

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## Sampling

- **Sampling** is the process of making a statement about a population of interest by examining only a subset (or **sample**) of that population
- When used?
  - The need for exact information is less important
  - The number of items comprising the population is large

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## Sampling Risk

- Likelihood that the decision based on the sample differs from the decision that would have been made if the entire population were examined
- Caused by selecting a **nonrepresentative sample**
- Can be controlled by
  - Determining an appropriate sample size
  - Ensuring that all items have an equal likelihood of selection
  - Evaluating sample results to control risk

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## Nonsampling risk

- Likelihood that an incorrect conclusion is drawn for reasons unrelated to the sample
- Most common cause is mistakes in evaluating sample items

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## Approaches to Sampling

- **Statistical sampling** applies laws of probability in selecting sample items and evaluating sample results
  - Allows audit team to control exposure to sampling risk
- **Nonstatistical sampling** does not allow audit team to control exposure to sampling risk
- Both statistical sampling and nonstatistical sampling are appropriate under GAAS

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## Steps in Sampling: Planning

1. **Determine the objective of sampling**
  - Drawing conclusion about some population of interest (e.g., does brand of golf ball provide increased distance?)
2. **Define the characteristic of interest**
  - Question of interest to person conducting sampling plan (e.g., golf ball distance)
3. **Define the population**
  - Item(s) about which question is asked (e.g. all amateur golfers?)
  - Need to ensure population is carefully and completely defined

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## Steps in Sampling: Performing

4. **Determine sample size**
  - Under statistical sampling, sample size considers desired exposure to sampling risk
5. **Select sample items**
  - Ensure that all items are available for selection
6. **Measure sample items**
  - Perform procedure and make appropriate evaluation/measurement
  - Determine sample estimate
  - Nonsampling risk can occur if incorrect procedures are performed or mistakes in evaluation or measurement are made

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## Selecting Sample Items

- **Methods**
  - **Unrestricted random selection:** Select items based on random numbers matched to items in population
  - **Systematic random selection:** Bypass a fixed number of items in population, selecting every  $n^{\text{th}}$  item
  - **Block selection:** Select contiguous units
  - **Haphazard selection:** Select items in a nonsystematic manner
- Can only use unrestricted random selection or systematic random selection with statistical sampling

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## Steps in Sampling: Evaluating

7. **Evaluate sample results**
  - In statistical sampling, evaluating sample results controls exposure to sampling risk
  - Parameters
    - Sample estimate
    - Precision
    - Reliability

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## Precision and Reliability

- **Precision (allowance for sampling risk):** Distance from the estimated population value in which the true (but unknown) population value may lie with a given probability.
- **Reliability (confidence):** Likelihood of achieving a given level of precision
- **Steps:**
  - Based on sampling procedure, form sample estimate
  - Based on precision and reliability, form **precision interval**

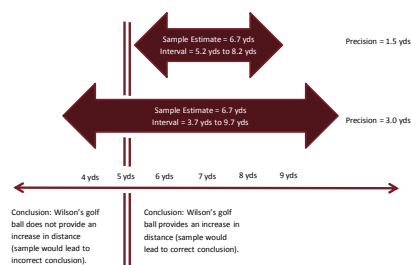
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## Example

- If
  - Sample estimate = 6.7 yards
  - Precision = 1.5 yards
  - Reliability = 90%
- There is a 90% likelihood (reliability) that the true population value is between 5.2 yards ( $6.7 - 1.5$ ) and 8.2 yards ( $6.7 + 1.5$ )

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## Precision Intervals



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## Documentation

- Involves all seven steps of sampling process
- Important judgments include:
  - Factors affecting **sample size** and rationale for those factors
  - Method of **selecting sample** and summary of items selected
  - Method of **measuring sample items** and summary of measurements
  - **Evaluation of sample results** and overall conclusion

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## Attributes Sampling

- Used to estimate the extent to which a characteristic exists within a population
- Used in the auditor's study of internal control
- Process
  - Estimate the rate at which the client's internal control policies or procedures are not functioning effectively (**deviation conditions**)
  - Compare upper limit rate of deviation to an allowable level (**tolerable rate of deviation**)

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## Factors Affecting Sample Size

- Sampling risk (Risk of overreliance)
  - Establish based on desired level of control risk
  - Lower control risk = lower risk of overreliance
- Tolerable rate of deviation
  - Establish based on desired level of control risk
  - Lower control risk = lower tolerable rate of deviation
- Expected population deviation rate
  - Estimate based on past audits or pilot sample
- Population size
  - Not applicable unless relatively small

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## Risk of Assessing Control Risk too Low (Risk of Overreliance)

- Occurs when
  - Sample indicates controls are functioning effectively
  - Controls are not functioning effectively
- Result?
  - Auditors conclude that controls are functioning effectively
  - Effectiveness loss (do not reduce audit risk to sufficient level)

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## Risk of Assessing Control Risk too High (Risk of Underreliance)

- Occurs when
  - Sample indicates controls are not functioning effectively
  - Controls are functioning effectively
- Result?
  - Auditors conclude that controls are not functioning effectively
  - Auditors assess control risk at higher than necessary levels
  - Efficiency loss (perform more effective substantive procedures than necessary)

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## How to Determine Sample Size

- Process
  - Select AICPA Sample Size table corresponding to desired **risk of overreliance**
  - Identify row related to the appropriate **expected population deviation rate**
  - Identify column related to the appropriate **tolerable rate of deviation**
  - Determine sample size at junction of row and column

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## Sample Size Example

- Parameters
  - Risk of overreliance = 5%
  - Tolerable rate of deviation = 4%
  - Expected population deviation rate = 1%

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Step 1: Select table for risk of overreliance = 5%

Step 3: Select column for TRD = 4%

Expected Population Deviation Rate	Tolerable Rate of Deviation			
	2%	3%	4%	5%
0.00%	149 (0)	99 (0)	74 (0)	59 (0)
0.25%	236 (1)	157 (1)	117 (1)	93 (1)
0.50%	313 (2)	157 (1)	117 (1)	93 (1)
0.75%	386 (3)	208 (2)	117 (1)	93 (1)
1.00%	590 (6)	257 (3)	156 (2)	93 (1)

Step 2: Select row for EPDR = 1%

Step 4: Read sample size at junction of row and column

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## Selecting Sample Items

- Methods
  - **Unrestricted random selection:** Select items based on random numbers matched to items in population
  - **Systematic random selection:** Bypass a fixed number of items in population, selecting every  $n^{\text{th}}$  item
  - **Block selection:** Select contiguous units
  - **Haphazard selection:** Select items in a nonsystematic manner
- Can only use unrestricted random selection or systematic random selection with statistical sampling

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## Measuring Sample Items

- Perform appropriate tests of controls
  - Look for presence or absence of control applied by entity
  - If item cannot be located, consider as a deviation
- Determine **sample rate of deviation**

$$\text{Sample Rate of Deviation} = \frac{\text{Number of Deviations}}{\text{Sample Size}}$$

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## Upper Limit Rate of Deviation

- $(1 - \text{risk of overreliance})$  probability that the true rate of deviation is less than or equal to the ULRD
- $(\text{Risk of overreliance})$  probability that the true rate of deviation exceeds the ULRD
- Consists of
  - Sample rate of deviation
  - Allowance for sampling risk

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## How to Determine ULRD

- Sample Evaluation Tables in Appendix F.C
- Process
  - Select AICPA Sample Evaluation table corresponding to desired **risk of overreliance**
  - Identify row related to the appropriate **sample size**
  - Identify column related to the appropriate **number of deviations**
  - Determine ULRD at junction of row and column

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## ULRD Example

- Parameters
  - Risk of overreliance = 5%
  - Sample size = 30
  - Number of deviations = 3
- **Sample rate of deviation** =  $3 \div 30 = 10\%$

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Step 1: Select table for risk of overreliance = 5%

Step 3: Select column for 3 deviations

Step 2: Select row for sample size = 30

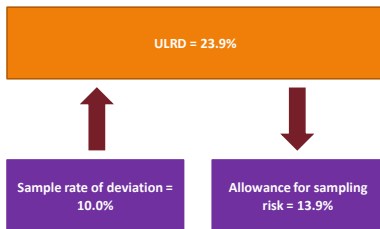
Step 4: Read ULRD at junction of row and column

Sample Size	Actual Number of Deviations			
	0	1	2	3
20	14.0	21.7	28.3	34.4
25	11.3	17.7	23.2	28.2
30	9.6	14.9	19.6	23.9
35	8.3	12.9	17.0	20.7

## Summary: ULRD

Adjusts sample deviation rate for desired risk of overreliance

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Determined based on sample size and deviations

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Difference between ULRD and sample rate of deviation

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## Attributes Sampling: Making the Decision



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## Outcomes

- **If ULRD ≤ Tolerable Rate of Deviation**
  - Rely on controls as planned
  - Maintain planned level of control risk and detection risk
- **If ULRD > Tolerable Rate of Deviation**
  - Reduce reliance on controls, increase control risk, and reduce detection risk (perform more effective substantive procedures)
  - Expand sample to examine additional items and potentially reduce ULRD

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## Summary: Sampling Risks Under Attributes Sampling

### Decision Based on Population

	Rely on internal control as planned (ARD ≤ TRD)	Reduce reliance on internal control (ARD > TRD)
Rely on internal control as planned (ULRD ≤ TRD)	Correct decision	Risk of overreliance (risk of assessing control risk too low)
Reduce reliance on internal control (ULRD > TRD)	Risk of underreliance (risk of assessing control risk too high)	Correct decision

Decision Based on Sample

ARD = Actual rate of deviation  
 TRD = Tolerable rate of deviation  
 ULRD = Upper limit rate of deviation

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## Summary of Sampling Risks

- **Effectiveness losses**
  - Risk of overreliance (assessing control risk too low)
  - Risk of incorrect acceptance
- **Efficiency losses**
  - Risk of underreliance (assessing control risk too high)
  - Risk of incorrect rejection

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## Sequential Sampling

- Also known as “stop-or-go” sampling
- Process
  - Select initial sample
  - Options
    - Conclude control is operating effectively
    - Conclude control is not operating effectively
    - Sample is inconclusive; examine additional items
- Advantage is that sample may be more efficient than a fixed sampling plan

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## Discovery Sampling

- Used when deviations occur at a very low rate, but are critical in nature
  - Extremely important controls
  - Possible existence of fraud
- If one deviation is identified, audit team concludes control is not operating effectively

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## Nonstatistical Sampling

- Permissible under GAAS
- Does not allow auditors to control exposure to sampling risk
- Major differences in:
  - Determining sample size
  - Selecting sample items
  - Evaluating sample results

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## Qualitative Considerations

- In addition to number of deviations (quantitative) consider qualitative nature of deviations
- Examples
  - Pervasive vs. isolated deviations?
  - Unintentional vs. intentional deviations?
  - Misunderstanding vs. carelessness?

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## Variables Sampling

- Used to estimate the amount (or value) of some characteristic of a population
- Used in the auditor's substantive procedures
- Process
  - Estimate the amount of misstatement (**upper limit on misstatement**)
  - Compare upper limit rate on misstatement to an allowable level (**tolerable misstatement**)

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## Variables Sampling: Making the Decision



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## Risk of Incorrect Acceptance

- Occurs when
  - Sample indicates account is not misstated
  - Account is misstated
- Result?
  - Auditors conclude that account is not misstated
  - Effectiveness loss (issue incorrect opinion on misstated F/S)

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## Risk of Incorrect Rejection

- Occurs when
  - Sample indicates account is misstated
  - Account is not misstated
- Result?
  - Auditors conclude that account is misstated
  - Auditors perform additional procedures
  - Efficiency loss (perform more effective substantive procedures than necessary)

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## Summary: Sampling Risks Under Variables Sampling

Decision Based on Population

	Account is not misstated (AM $\leq$ TM)	Account is misstated (AM $>$ TM)
Account is not misstated (ULM $\leq$ TM)	Correct decision	Risk of incorrect acceptance
Account is misstated (ULM $>$ TM)	Risk of incorrect rejection	Correct decision

AM = Actual misstatement  
 TM = Tolerable misstatement  
 ULM = Upper limit on misstatement

Decision Based on Sample

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## Effect of Factors on Sample Size

Factor	Effect	Explanation
Population size	Direct	As population is larger, need to sample more items
Expected rate of deviation (Expected misstatement)	Direct	As auditors expect higher level of deviations or misstatements in population, need to sample more items
Tolerable rate of deviation (Tolerable misstatement)	Inverse	As auditors require lower level of deviations or misstatements, need to sample more items
Sampling risk	Inverse	As auditors wish to reduce chance of incorrect decisions, need to sample more items
Population variability	Direct	As population is more variable, need to sample more items to obtain representative sample

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## Qualitative Considerations

- In addition to number of deviations (quantitative) consider qualitative nature of deviations
- Examples
  - Pervasive vs. isolated deviations?
  - Unintentional vs. intentional deviations?
  - Misunderstanding vs. carelessness?

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## Monetary Unit Sampling (MUS)

- Defines the **sampling unit** as an individual dollar (or other monetary unit) in an account balance
- Auditor will select individual dollars (or monetary units) for examination
- Auditor will verify the entire “**logical unit**” containing the selected dollar (or monetary unit)
  - Accounts receivable: Customer account
  - Inventory: Inventory item

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## Advantages of MUS

- Results in more efficient (smaller) sample sizes
- Selects transactions or components reflecting larger dollar amounts
- Effective in identifying overstatement errors
  - Asset and revenue accounts
- Generally simpler to use than classical variables sampling

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## Disadvantages of MUS

- Provides a conservative (higher) estimate of misstatement
- Not effective for understatement or omission errors
  - Liabilities and expenses
- Expanding sample is difficult if initial conclusion is to reject the account balance
- Requires special consideration for accounts with zero or negative balances

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## Classical Variables Sampling Approaches

- **Mean-per-unit:**
  - Assumes each item in population (component of account) has similar balance
  - Estimates recorded balance by multiplying number of components by average audited value
- **Difference estimation:**
  - Assumes each item in population (component of account) has similar difference between recorded and audited value
  - Estimates the amount of misstatement by multiplying number of components by average misstatement
  - Estimates recorded balance using estimated misstatement
- **Ratio estimation:**
  - Assumes a constant percentage misstatement in population
  - Estimates recorded balance by multiplying recorded balance by ratio of audited value to recorded balance

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## Sampling Methods

MUS	Classical Variables Sampling
Overstatement errors are greatest concern	Both overstatement and understatement errors are of concern
Standard deviation difficult to estimate	Standard deviation can be estimated
Smaller number of misstatements anticipated	Larger number of misstatements anticipated
Population has high degree of variability and large dollar components exist	Population is homogenous (in terms of dollar balances) and large dollar components do not exist

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## Questions?

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