



cutting through complexity

A MATURITY MODEL

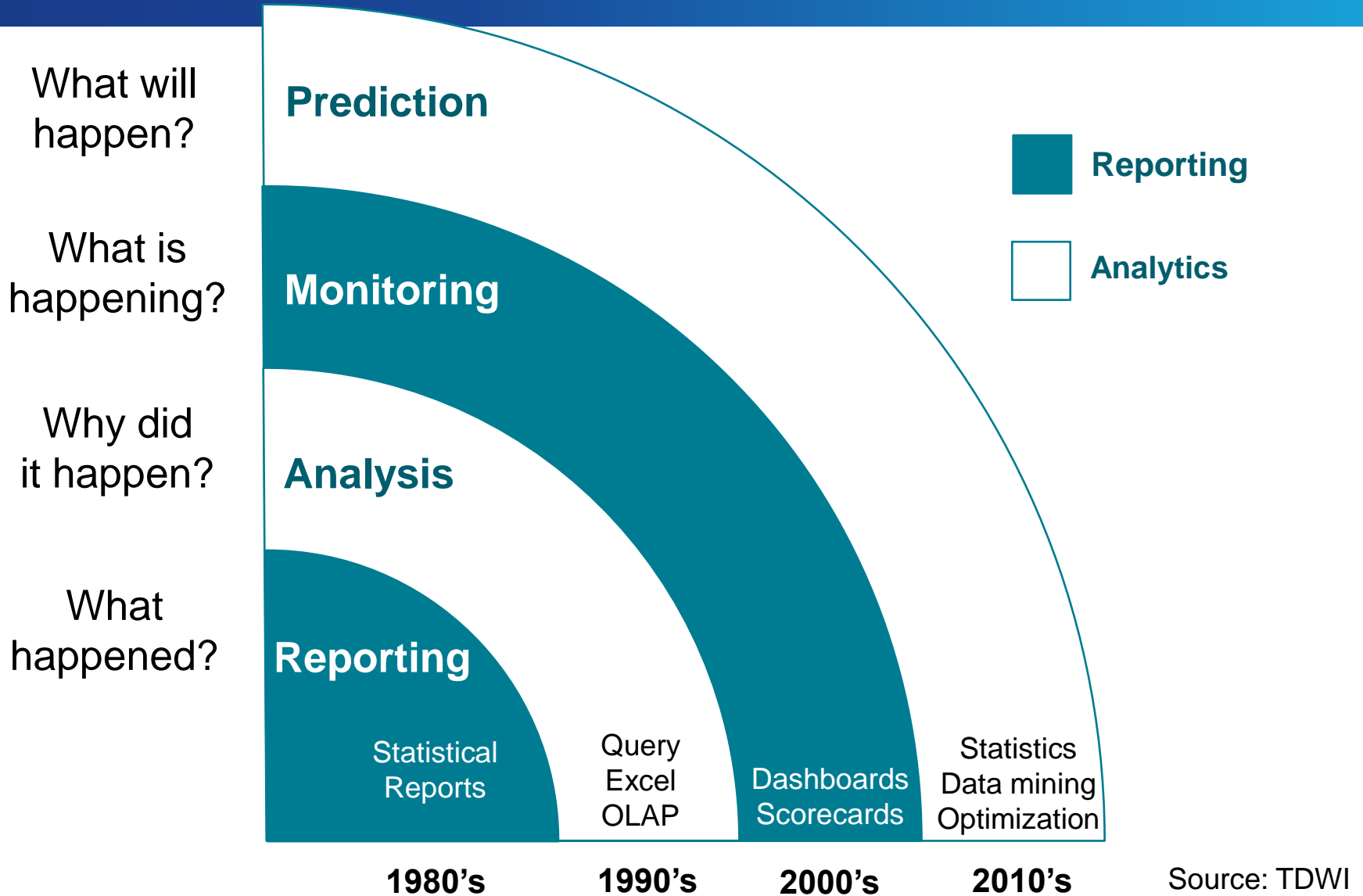
Data Analytics-Enabled Auditing through Continuous Assurance of Enterprise Risk Management

January 16, 2013

Agenda

- Evolving world of Big Data and Analytics
- Why have Audit Data Analytics and Continuous Auditing in Internal Audit not been radiated or sustained?
 - What have been the challenges?
- A Hypothesis: Modifying the Audit Methodology will Manage Change and help transform the audit function
- Audit Methodology Reference Model
- Q&A

Analytics Waves Follow Reporting Waves

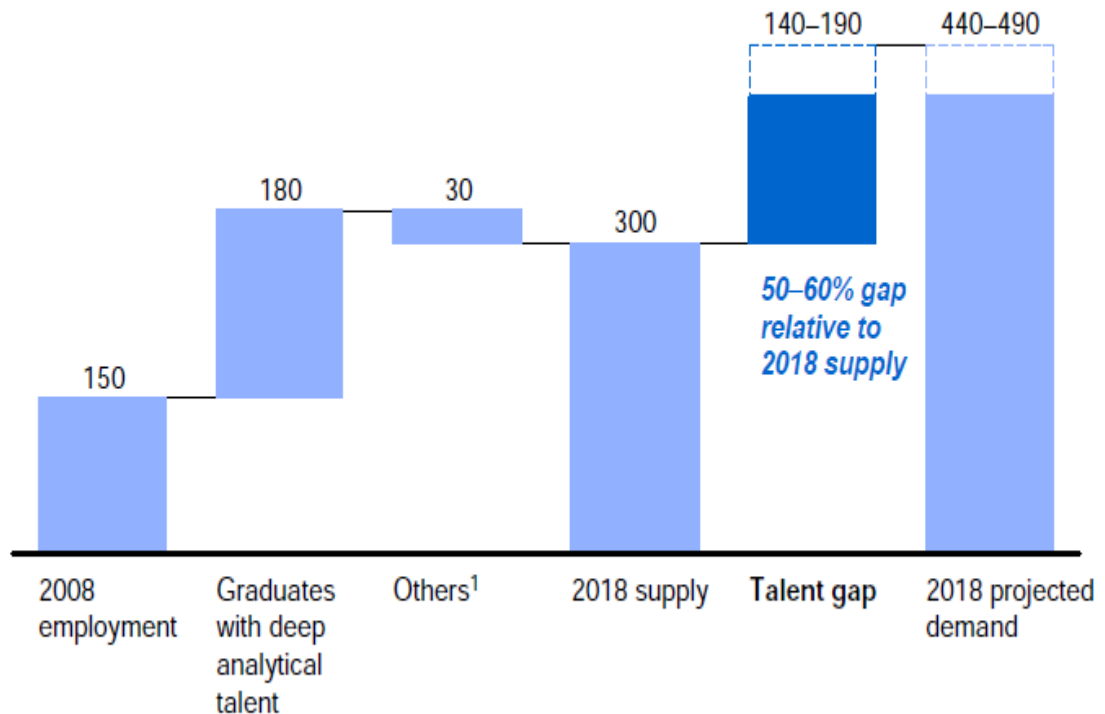


A Major Talent Gap is Expected

1. Data have swept into every industry and business function and are now an important factor of production
2. Data generates value by creating transparency, enabling experimentation, segmenting populations to customize actions, automatically replacing human decisions, and innovating business models, products, and services
3. The use of Big Data is becoming a key way for leading companies to out-perform their peers
4. The use of Big Data will lead to new waves of productivity and improve efficiency and effectiveness, enabling organizations to do more with less
5. Certain sectors are poised for greater gains than others through the use of Big Data – these include Healthcare, Public Sector, US Retail, and Manufacturing
6. **There will be a shortage of talent necessary for organizations to take advantage of Big Data**
7. Several issues will need to be addressed to capture the full potential of Big Data, such as data policies, industry structure, and organizational change

Demand for deep analytical talent in the United States could be 50 to 60 percent greater than its projected supply by 2018

Supply and demand of deep analytical talent by 2018
 Thousand people



¹ Other supply drivers include attrition (-), immigration (+), and reemploying previously unemployed deep analytical talent (+).

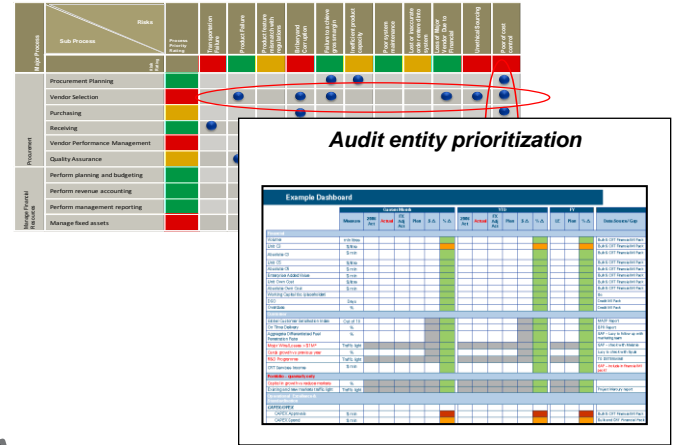
SOURCE: US Bureau of Labor Statistics; US Census; Dun & Bradstreet; company interviews; McKinsey Global Institute analysis

Continuous Risk Assessment to Verification of Risk Management

1. Continuous Risk Assessment



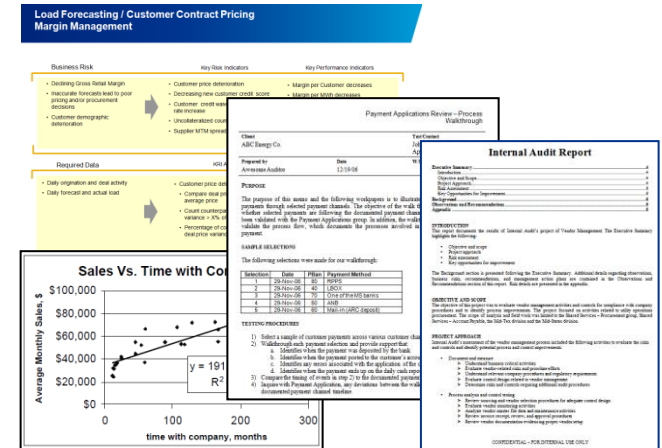
2. Dynamic Audit Planning



4. Verification of Risk Management

Organization	Processes					
	1	2	3	4	5	6
Accounting	Review accounts receivable	Review internal management reports and statements	Review P&L, Budget, Variance	Review and implement internal reporting standards	Review financial statements	Review financial statements
Operational Audit	Review audit strategy, risk assessment	Review audit execution, quality	Review audit results, quality	Review audit results, quality	Review audit results, quality	Review audit results, quality
Operational Affairs and Administration	Review organizational structure	Review organizational structure	Review organizational structure	Review organizational structure	Review organizational structure	Review organizational structure
Operational Security	Review and control assets	Review physical, technical, and data security	Review physical, technical, and data security	Review physical, technical, and data security	Review physical, technical, and data security	Review physical, technical, and data security
Operational Strategy	Review Operational Strategy	Review Operational Strategy	Review Operational Strategy	Review Operational Strategy	Review Operational Strategy	Review Operational Strategy
Operational Performance	Review operational performance	Review operational performance	Review operational performance	Review operational performance	Review operational performance	Review operational performance
Operational Planning & Analysis	Review operational planning	Review operational planning	Review operational planning	Review operational planning	Review operational planning	Review operational planning
Operational Risk	Review operational risk	Review operational risk	Review operational risk	Review operational risk	Review operational risk	Review operational risk
Operational Technology	Review operational technology	Review operational technology	Review operational technology	Review operational technology	Review operational technology	Review operational technology
Operational Compliance	Review operational compliance	Review operational compliance	Review operational compliance	Review operational compliance	Review operational compliance	Review operational compliance
Operational Reporting & Review	Review operational reporting	Review operational reporting	Review operational reporting	Review operational reporting	Review operational reporting	Review operational reporting
Operational Support	Review operational support	Review operational support	Review operational support	Review operational support	Review operational support	Review operational support

3. Audit Execution



Value of Data Analytics-Enabled Internal Auditing

1. Identify the “right” audits to perform (coverage focus)

- *If only 30 audits can be performed a year, how do we know which 30 audits to perform (i.e., which are the “riskiest” audit areas)?*

2. Increase the number of audits performed per year (coverage breadth)

- *How do we increase the number of audits performed per year from 30 to 40 without adding hours or FTE?*

3. Decrease the time required to cycle through the audit universe (coverage efficiency)

- *Currently it takes three years to audit every auditable entity, how do we decrease that cycle time to every two years?*

4. Increase the frequency of audits of key risk areas (coverage frequency)

- *Currently we can only audit key risk areas every other year, how can we audit them every year?*

5. Increase the scope of specific audits (coverage depth)

- *Currently we can only focus audits on two or three key areas of risk and test a sample of transactions, how can we audit five to 10 areas of risk (e.g., including fraud, inefficiencies, and regulatory non-compliance) and cover 100% of the transactions?*

Data Analytics/Continuous Auditing Implementation (and Sustainability) Challenges

General

- Determining and establishing consensus on objectives and success criteria.
- Measuring and demonstrating success.
- **Limited resources (technology and human know how).**

Data Availability and Quality

- **Lack of access to data.**
- Disparate information systems with different data formats.
- Incomplete data sets, inconsistent data quality.
- Data privacy/security issues to navigate.


























Data Analytics


- **Inability to effectively leverage data analytics to achieve audit objectives.**
- Definition of “exception;” addressing “false positives” and “false negatives.
- Workflow around exception resolution; managing volumes of exceptions.


Change Management


- ***Managing impact of CA/DA processes on auditors and other business processes.***

Audit Methodology-based Maturity Model

Maturity Levels	Level I	Level II	Level III	Level IV	Level V
IA Methodology	Traditional Auditing	Ad Hoc Integrated Analysis	Continuous Risk Assessment & Continuous Auditing	Integrated Continuous Auditing & Continuous Monitoring	Continuous Assurance of Enterprise Risk Management
Strategic Analysis					
Enterprise Risk Assessment					
Internal Audit Plan Development					
Execution and Reporting					
Continuous Improvement					

 Data Analytics are generally not used

 Data Analytics are partially used but are sub-optimized

 Data Analytics are effectively and consistently used (optimized)

Audit Methodology: Strategic Analysis and Enterprise Risk Assessment Phases

<i>Internal Audit Data Analytics and Continuous Auditing Maturity Model</i>	Traditional Auditing	Ad Hoc Integrated Analytics	Continuous Risk Assessment & Continuous Auditing	Integrated Continuous Auditing & Continuous Monitoring	Continuous Verification of Enterprise Risk Management
	<i>Perform relatively few analytics on an ad hoc basis</i>	<i>Integrated into work plan to achieve audit objective</i>	<i>Repeatable and sustainable</i>	<i>Continuously auditing the continuous monitoring function</i>	<i>End objective of all audit work</i>
1. Strategic Analysis 1.1 Understand the business 1.2 Stakeholder Needs Analysis 1.3 Perform an Enterprise Risk Assessment	<ul style="list-style-type: none"> • Use of management reports • Limited use of descriptive data analytics • Understand the business and verify results of management consultations (Annually) 	<ul style="list-style-type: none"> • Extensive use of management reports • Underlying data for expanded use of descriptive data analytics (i.e., benchmarking) • Understand the business and verify results of management consultations (Annually) 	<ul style="list-style-type: none"> • Predefined analytics (i.e., internal and external benchmarking) to identify and prioritize risks based on changes in the business • Review protocols established • Automated ETL, analytics and reporting • Intervals of ERA 	<ul style="list-style-type: none"> • Leverage Management systems to enable continuous assessment and prioritization of business risks • Management provides continuous insight to business risks (both internal and external) • System generated analytics and dashboards monitored by the business • Specified strategic risk criteria, risk capacity and impact and likelihood analysis. 	<ul style="list-style-type: none"> • Leverage management's Continuous Monitoring processes by aggregating the output to extract enterprise insights about the risk management processes • Linking the company's strategic objectives with risk management practices • Strategic objectives and risks are updated and monitored on a continuous basis • System generated analytics & dashboards monitored by the enterprise. • IA Plan is dynamic and able to react to changes in the business

Audit Methodology: Audit Plan Development Phase

<i>Internal Audit Data Analytics and Continuous Auditing Maturity Model</i>	Traditional Auditing <i>Perform relatively few analytics on an ad hoc basis</i>	Ad Hoc Integrated Analytics <i>Integrated into work plan to achieve audit objective</i>	Continuous Risk Assessment & Continuous Auditing <i>Repeatable and sustainable</i>	Integrated Continuous Auditing & Continuous Monitoring <i>Continuously auditing the continuous monitoring function</i>	Continuous Verification of Enterprise Risk Management <i>End objective of all audit work</i>
2. Internal Audit Plan Development 2.1 Identify and Prioritize Areas of Focus 2.2 Determine Assurance Appetite and Coverage 2.3 Develop IA Plan	<ul style="list-style-type: none"> • Data Analytics are not utilized to develop the audit plan • Discuss concerns with management and review prior year audit plan • Assurance map and traditional audit plan 	<ul style="list-style-type: none"> • High level quantitative measures (financial statement trends, industry benchmarking) – (Annually) • Review prior audit observations, internal and External • Audits with simple analytics incorporated 	<ul style="list-style-type: none"> • Monitor quantitative and qualitative measures to ensure they are aligned with priority business risks (Quarterly/ Monthly). • Refined assurance of risk appetite and coverage using technology at determined time intervals • Near real-time consideration of impact related to regulatory and environmental events • Data analytics enabled audit plan 	<ul style="list-style-type: none"> • Leverage business intelligence and continuous monitoring to evaluate business results and risks. • Leverage the business monitoring to identify audit trigger events and re-prioritize risks on a continuous (monthly) basis. • Refined assurance of risk appetite and coverage using technology at determined time intervals • System generated data analytics are from with the business unit • Analytic enabled plan is dynamic and updated on a continuous basis. 	<ul style="list-style-type: none"> • Enterprise and process risks are monitored using business intelligence and continuous monitoring techniques. • Data analytics, risks and performance indicators are continuously reconciled to the Entity's Strategic business objectives (monthly). • Refined assurance of risk appetite and coverage using technology (monthly) • Prioritize Strategic goals used to drive audit plan which is dynamic and updated on a continuous basis.

Audit Methodology: Execution and Reporting Phases

<i>Internal Audit Data Analytics and Continuous Auditing Maturity Model</i>	Traditional Auditing	Ad Hoc Integrated Analytics	Continuous Risk Assessment & Continuous Auditing	Integrated Continuous Auditing & Continuous Monitoring	Continuous Verification of Enterprise Risk Management
	<i>Perform relatively few analytics on an ad hoc basis</i>	<i>Integrated into work plan to achieve audit objective</i>	<i>Repeatable and sustainable</i>	<i>Continuously auditing the continuous monitoring function</i>	<i>End objective of all audit work</i>
3. Execution and Reporting 3.1 Project Architecture 3.2 Process Analysis 3.3 Measure and Analyze 3.4 Reporting	<ul style="list-style-type: none"> • Data Analytics are not utilized to drive the execution of the audit plan in traditional auditing • Interview process owners to gain an understanding of the process, identifying risks and controls • Control testing and investigation of exceptions and observations. 	<ul style="list-style-type: none"> • Ad hoc data analytics to identify outlying transactions or to assist in scoping the audit. • Review of financial statements, management reporting, performance and risk indicators. • Consideration for sampling, data analysis, and six sigma techniques to reach the audit objective. • Audit program is flexible and balances increase scope coverage and efficiencies. 	<ul style="list-style-type: none"> • Data is readily available • Key business processes have automated analytics ready for the auditor during planning to scope and focus audit efforts. • Dependencies on IT are minimal given the availability of data and pre-packaged analytics. • Data analytic enabled audit programs 	<ul style="list-style-type: none"> • Leverages the business monitoring and independently performs analysis to identify trends and prioritize areas to focus audit efforts. • IA is connected to the same data and reporting as management and assesses the quality of the data and the analytics monitored by the business. • Audit programs are aligned and dynamically created from KPIs, KRIs, and audit trigger results. • Automated Auditing techniques achieve several audit objectives based on "exception" auditing. 	<ul style="list-style-type: none"> • Business monitoring and audit's procedures rely on the same technology. • Procedures verifying the underlying data analysis and reporting at the business level are aligned with the strategic objectives. • Audit scope is fluid, focusing on root cause analysis and management's effectiveness at monitoring and responding to risks. • Audit programs focus on risk management practices backed by analytical depth towards risk management practices. • Automated auditing is focused on management's responses to business anomalies and trigger events.

Data Analytics-Enabled Audit Program Guides (APGs)

ERM/ERA – Risk Libraries

Risk Definitions – Delivery Channels

Business Risk **Definition** **ERM Steering Committee**

Delivery Channels The risk that a customer demanded route of communication or access to products / services may not be

XYZ Business Risk Portfolio

- Loss of revenue customers
- Legacy channels
- Lack of a plan to

External Risks

- Central Availability
- Economy
- Industry
- Customer Needs
- Legal
- Regulatory
- Swamp/Fraud
- Technological Innovation

Internal Risks

Strategic	Operational	Financial
<ul style="list-style-type: none"> Business Model Business Portfolio Business Collaborations Business Changes Operational Efficiency Operational Resilience Operational Innovation Operational Excellence Operational Risk Operational Security Operational Compliance Operational Sustainability Operational Resilience Operational Innovation Operational Excellence 	<ul style="list-style-type: none"> Customer Satisfaction Process Efficiency Product Quality Supply Chain Management Human Capital Technology Information Security Operational Resilience Operational Innovation Operational Excellence 	<ul style="list-style-type: none"> Financial Reporting Capital Structure Financial Performance Financial Risk Financial Innovation Financial Excellence

Advisory Base Processes - Toolkit

Accounts Payable
Controls: Risk & Control Matrix (1 of 10)

Process	Risk	Control Objective	Risk	Control Activity	Test Steps
7.0 Accounts Payable					
7.1 Receive Invoices	7.1.1	Obtain and document an understanding of the accounts payable process and related internal controls.	Policies and Procedures are not understood and are therefore not followed.	Policies & Procedures related to accounts payable must be in place and must be periodically updated.	<ol style="list-style-type: none"> Obtain the following: <ul style="list-style-type: none"> Existing process documentation (i.e., from Sarbanes-Oxley projects) Organizational chart for accounts payable, including vendor master-file setup and maintenance, invoice entry, and payments. Signature authorization list – checks and invoice approval (note check signers should not be involved in normal accounts payable (AP) activity). Most recent AP aging, and detailed AP trial balance. AP check registers for the audit period (electronic if possible). An electronic download of the vendor master file. Interview individuals within the Accounts Payable department to determine the process for vendor payments. Perform a process walk-through to confirm the understanding of the process and modify process documentation as needed. Based on the interviews and walkthrough, prepare observations and recommendations for management regarding the process and procedures.

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Standard APGs

Accounts Payable (Purchase to Pay Cycle)

Procedures	Auditor Initials	Date	WP Ref
Internal Audit Objective 1: Obtain and document an understanding of the accounts payable process and related internal controls.			
<ol style="list-style-type: none"> Obtain the following: <ul style="list-style-type: none"> Existing process documentation (i.e., from Sarbanes-Oxley projects) Organizational chart for accounts payable; Policies and procedures for accounts payable, including vendor master-file setup and maintenance, invoice entry, and payments; Signature authorization list – checks and invoice approval (note check signers should not be involved in normal accounts payable (AP) activity); Most recent AP aging, and detailed AP trial balance; AP check registers for the audit period (electronic if possible); An electronic download of the vendor master file. Interview individuals within the Accounts Payable department to determine the process for vendor payments. <p>If necessary, prepare flow charts or narratives on the accounts payable process.</p> <p>Consider the following key questions during interviews:</p>			

Vendors and Third Party Content

Data Analysis examples, KPMG libraries, repositories, etc.

Data Analysis Enhanced APGs



General Accounting

Accounts Payable

- Correlate vouchers or invoices posted versus purchase order amounts
- Extract total posted invoices for the year for accurate vendor rebates
- Isolate vendor unit
- Summarize large i
- Identify distribut
- Reconcile check r
- Review recurring i
- Extract invoices p
- Generate cash req
- Create activity su

Control Activity Description	Assertion	Control Type	Control Component	Vendor	Analysis Description	Analysis Guidance
1.000001 All vendor invoices are properly recorded and approved.	OC	Manual	General Ledger	1	1.000001 All vendor invoices are properly recorded and approved.	1.000001 All vendor invoices are properly recorded and approved.
1.000002 All vendor invoices are properly recorded and approved.	OC	Manual	General Ledger	2	1.000002 All vendor invoices are properly recorded and approved.	1.000002 All vendor invoices are properly recorded and approved.

APG Work plan Program Guide

Location Ref.	Title	Business Objective	Risk	Control Objective	Audit Objective	Data Analysis Procedures	Measure and Analyze Procedures
A. General Process Understanding							
A1	AP Process Documentation and Internal Control Review		Policies and Procedures are not understood and are therefore not followed.	Policies & Procedures related to accounts payable must be in place and must be periodically updated.	Obtain existing policy and procedure documentation to understand the Accounts Payable process.	1. Obtain the following: <ul style="list-style-type: none"> Existing process documentation (i.e., from Sarbanes-Oxley projects); Organizational chart for accounts payable; Policies and procedures for accounts payable, including vendor master-file setup and maintenance, invoice entry, and payments; Signature authorization list – checks and invoice approval (note check signers should not be involved in normal accounts payable (AP) activity); Most recent AP aging, and detailed AP trial balance; AP check registers for the audit period (electronic if possible); An electronic download of the vendor master file. 	1. Obtain the following: <ul style="list-style-type: none"> Existing process documentation (i.e., from Sarbanes-Oxley projects); Organizational chart for accounts payable; Policies and procedures for accounts payable, including vendor master-file setup and maintenance, invoice entry, and payments; Signature authorization list – checks and invoice approval (note check signers should not be involved in normal accounts payable (AP) activity); Most recent AP aging, and detailed AP trial balance; AP check registers for the audit period (electronic if possible); An electronic download of the vendor master file.
B. Macro Analysis and Business Profiling							
B1	Supplier Management	Optimize Supplier Portfolio	High	None	Understand the supplier portfolio	1. # of active suppliers on vendor master list 2. % of active suppliers accounting for 80% of purchases or volume spends 3. # of suppliers with	Review, and drill into analytic results as appropriate
C. Preventative / Configurable Controls Testing							
C1	Vendors properly authorized	Only authorized vendors are paid	Selected vendors do not meet company's requirements (quality, prices, availability).	Only appropriate vendors are included in approved vendor list	Ensure vendors are properly authorized	System is configured to: 1. provide AP clients approved vendors only. 2. require "mandatory" fields before vendor is active	See Testing at D1
D. Transactional Testing							
D1	Improper vendor setup	Only authorized vendors are paid	Selected vendors do not meet company's requirements (quality, prices, availability).	Only appropriate vendors are included in approved vendor list	Ensure vendors are properly setup	1. Identify missing mandatory fields 2. Identify duplicate vendors 3. Identify vendors creation data to first paid date X. Prioritize vendors in issue/	Select a sample of vendors from the prioritized list of vendors and confirm system setup and authorization traces to master authorization per system approvals as appropriate.

Examples: Order to Cash

Business Risks

- A. Customer information is not accurate resulting in incorrect shipments**
- B. Customers credit is not monitored increasing credit risk**
- C. Payments are processed incorrectly leading to inaccurate customer balances**

Traditional Procedures

- A. Confirm that recent additions and edits to the customer master file agree to supporting documentation**
- B. Confirm the credit manager sign offs on the weekly credit report**
- C. Unapplied cash ledger reconciles to the GL**

Data Analytics Procedures

- A1. Identify duplicate customer records**
- A2. Identify missing or incorrect key values**
- A3. Count undeliverable and/or re-shipments**

- B1. Identify customers over their credit limit with new orders**
- B2. Identify invoices greater than 360 day that are not written off**

- C1. Identify and count the number of cash repostings (i.e., cash between customers)**
- C2. Trend the age between date of cash receipt date of customer posting**

Examples: Procure to Pay

Business Risks

- A. Discounts may be missed causing a decrease in cash flow.
- B. Goods received may be incorrectly recorded and result in incorrect inventory quantities.
- C. Payment terms may not be consistent with company terms and policies.

Traditional Procedures

- A. Sample invoices from suppliers offering discounts and confirm discounts were taken.
- B. Confirm that receiving records agree to purchasing and packing list documents
- C. Sample payments and confirm payments processed according to supplier contract terms

Data Analytics Procedures

- A1. Summarize vendors and discounts taken
- A2. Identify invoices entered more than 30 days after invoice date
- B1. Identify receipts without a PO and profile the results by vendor or personnel
- B2. Identify PO's created on the same day as receipt
- C1. Summarize vendor master on Payment Terms
- C2. Calculate payments processing timing and compare to vendor master payment terms

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