AUDIT HORIZONS

Continuous Audit

Why Audit Needs to Change Now!!

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The Institute of Internal Auditors in Lebanon

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- What is Continuous Auditing (CA)?
- Examples of CA
- Auditing BC/DLT
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Why Auditing Needs To Change Now!

15th Century: Luca Pacioli "The Father of Auditing - Advocated for Population Auditing!

Why does auditing needs t ange?

CFO

NEC Details Major Fraud

"Fake orders resulted in $4 million in kickbacks. Meanwhile, internal investigations continue."

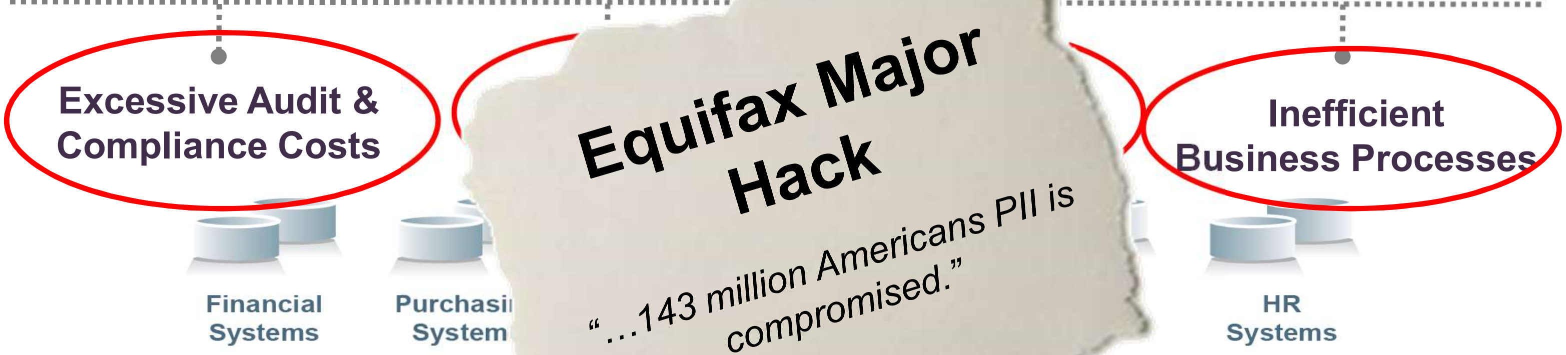
The New York Times

G.M. Says It Has Found Serious Flaws in Accounting

"…performance was threatened by "ineffective" controls over financial reporting…"

y…

- e monitored **manually.**
- ntrols go **untested.**
- Control breakdowns are identified long **after they occur.**
- CFOs sign off on financials with **i information.**


Excessive Audit & Compliance Costs
Inefficient Business Processes
Financial Systems
Purchasi System
HR Systems

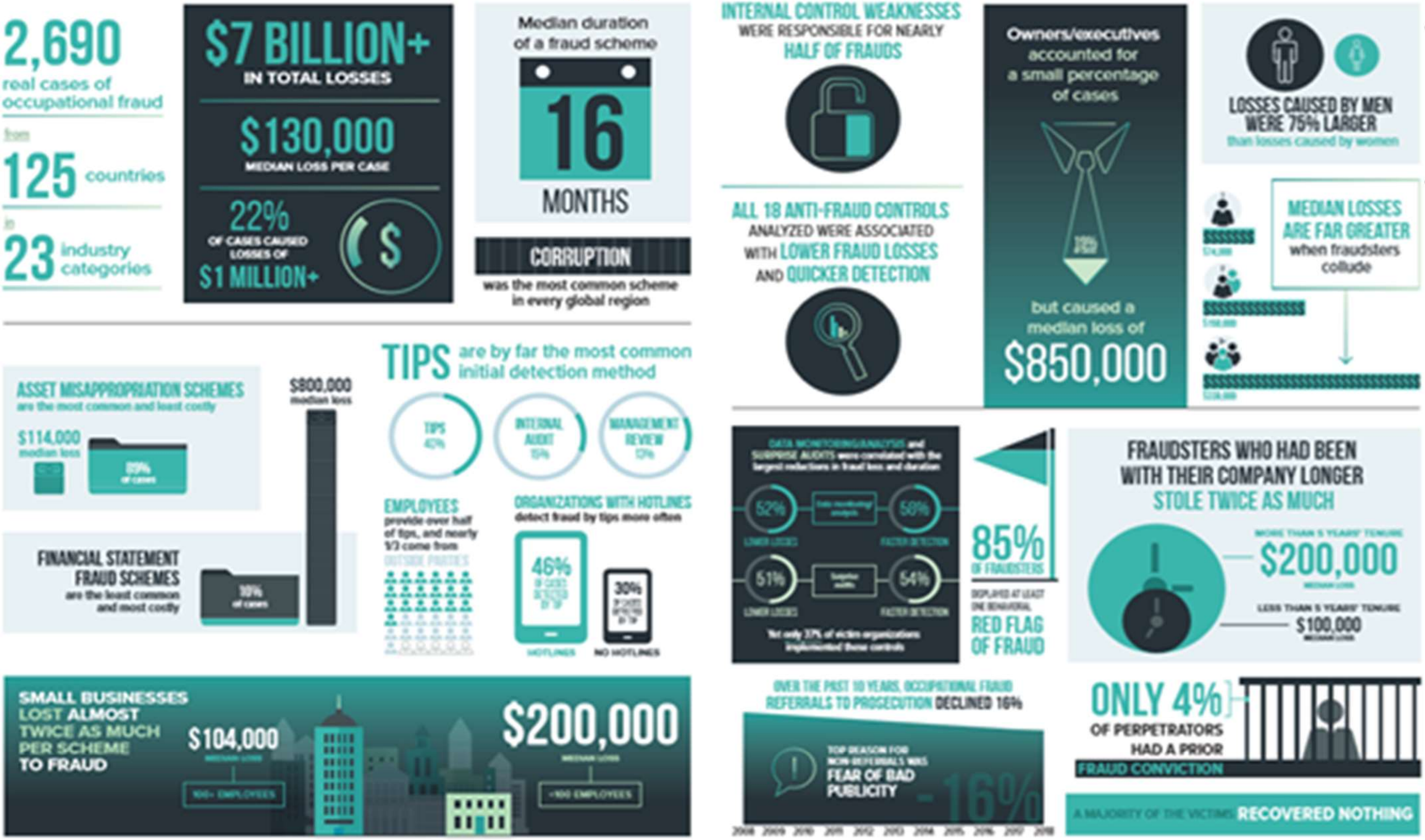
Equifax Major Hack

"…143 million Americans PII is compromised."

Why Accounting/Auditing needs to change now – “Crisis of Practice”!

- Latency
- Demands of the Millennial Workforce “According to a study by CompTIA, three-quarters of millennials say technology usage by a company affects their employment decisions.”
- Non-Statistical Sampling vs. Population Auditing
- Periodic vs. Continuous Audit Methods
- PCAOB’s Audits of Firms
- Four Eyes & Collusive Fraud

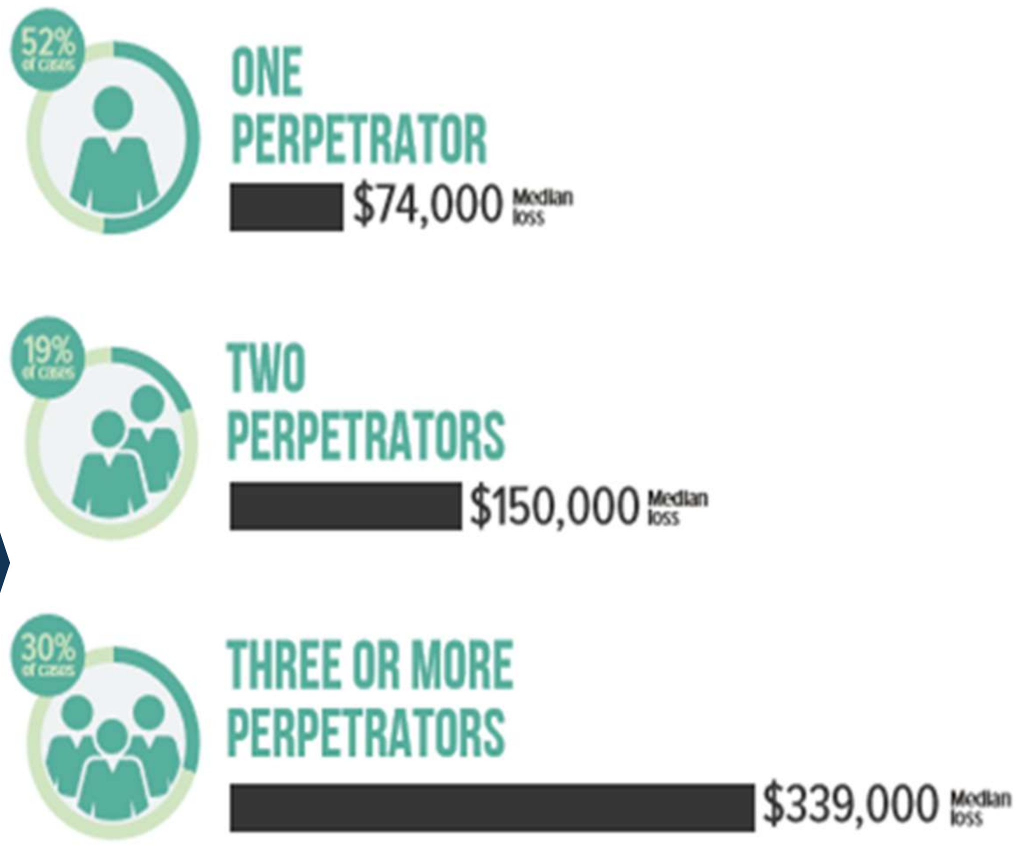
ACFE 2018 Fraud Report to the Nations



The CFEs who participated in our survey estimated that the typical organization loses 5% of revenues in a given year as a result of fraud.

ACFE 2018 Fraud Report to the Nations

FIG. 35 How does the number of perpetrators in a scheme relate to occupational fraud?



Note: 49% of all fraud is collusive (2018 ACFE Fraud Report to the Nations) and almost all Financial Fraud is collusive (per prior reports)!!

Why does auditing need to change?

When the U.S. Department of Justice prosecuted a Morgan Stanley managing director last year for circumventing internal controls to violate the Foreign Corrupt Practices Act, it tipped its hat to the bank for Morgan Stanley's efforts to prevent such actions. It was practically an endorsement for the up-and-coming practice of continuous monitoring, says Patrick Taylor, CEO of Oversight Systems.

The Justice Department imposed the maximum penalty on Garth Peterson, who admitted to paying off Chinese officials as part of a real-estate scam, but brought no action against the firm, citing its extensive policies, internal control, and training meant to prevent FCPA violations. The Justice Department even noted: "Morgan Stanley's compliance personnel regularly monitored transactions, randomly audited particular employees, transactions and business units, and tested to identify illicit payments."

That got the attention of compliance and corporate governance professionals, says Taylor. Companies tune in to new laws and regulations, but they pay even closer attention when an enforcement agency describes specific factors in a decision not to pursue charges against a company. "In the last three to four quarters, we're seeing some recognition of the power that continuous monitoring can add to the compliance domain," says Taylor. **"The DoJ specifically recognized Morgan Stanley for its ongoing transaction monitoring." (Patrick Taylor – CEO Oversight Systems)**

Taylor

What is Continuous Auditing?

Are you seeing the risks in your organization??

Continuous vs. Traditional Auditing

Continuous Auditing (continuous assurance)	**Traditional Auditing**
Observing events close to or when they happen	Observing events as part of a periodic (annual) review process.
Automatic alarming when exceptions occur	Manual reporting of findings when observed in periodic reviews
Population data review	Sampling data review
Integrating data across multiple and distinct processes	Capturing data from each process separately
Performing repeated automated tests with low variable costs	Performing mostly manual tests or interviews with high variable costs.

Continuous Audit (CA) vs. Continuous Monitoring (CM)

- Internal Auditors
- External Auditors

CONTINUOUS AUDITING	CONTINUOUS MONITORING
Independent assurance **function by an internal or external auditor**	Management / assurance **function at the pleasure of management** for compliance, process control, etc...
Uses a variety of automation tools and formalized business rules to audit.	Uses a variety of automation tools and formalized business rules to monitor

- Business Process Owners
- Etc.

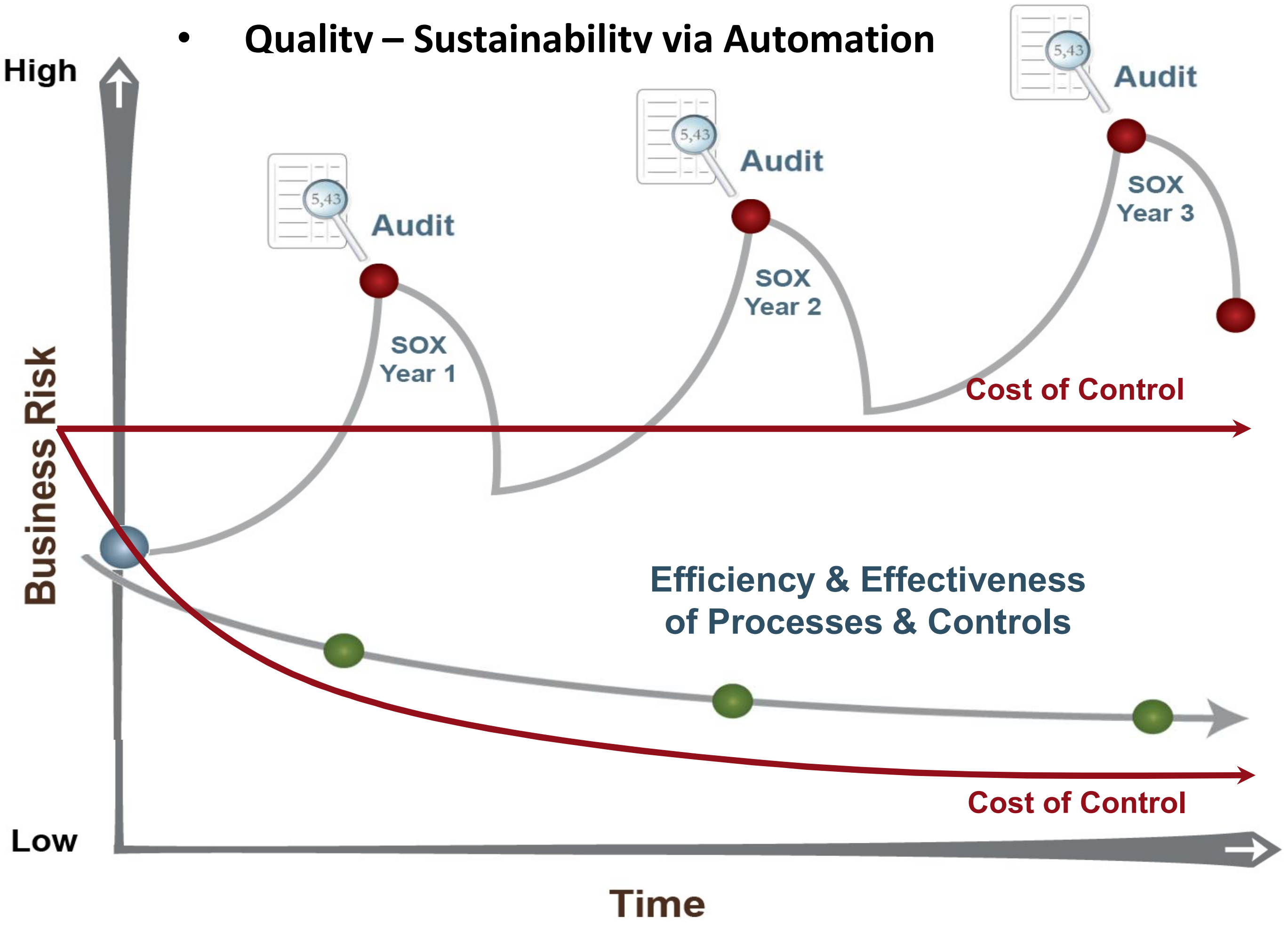
The Respective Functions are different, but the tools should be the same.

Why automate audit: why does it matter?

1. Improved audit quality, impact and assurance level by:
   - ⇨ **company-wide coverage**
   - ⇨ access to hard/proven facts from first hand sources (databases)
   - ⇨ continuous observation/evaluation
2. Improved audit productivity and reduced audit cost by:
   - ⇨ **better audit scoping and increased effectiveness (due to improved audit risk analysis)**
   - ⇨ automation of audit actions or even audit phases (opportunity to skip up to 70% of audit process in some high impact areas*)
   - ⇨ **reduced travelling effort (due to remote access to information)**
   - ⇨ Easy user interface requiring no special expert knowledge to be used by all auditors
   - ⇨ increased reliance of external auditor on results of ICS and internal auditor
   - ⇨ **Reduced client effort for preparation and support of audit engagements**
   - ⇨ allocation of monitoring/auditing effort as close as possible to the root cause
3. **Prevent fraud/bribery by leveraging technology to create a "perception of monitoring"** (big brother is watching you effect)
4. Attract and retain top talents by provision of an innovative, high productive working environment

What does automation provide?

- **Qualitv – Sustainabilitv via Automation**



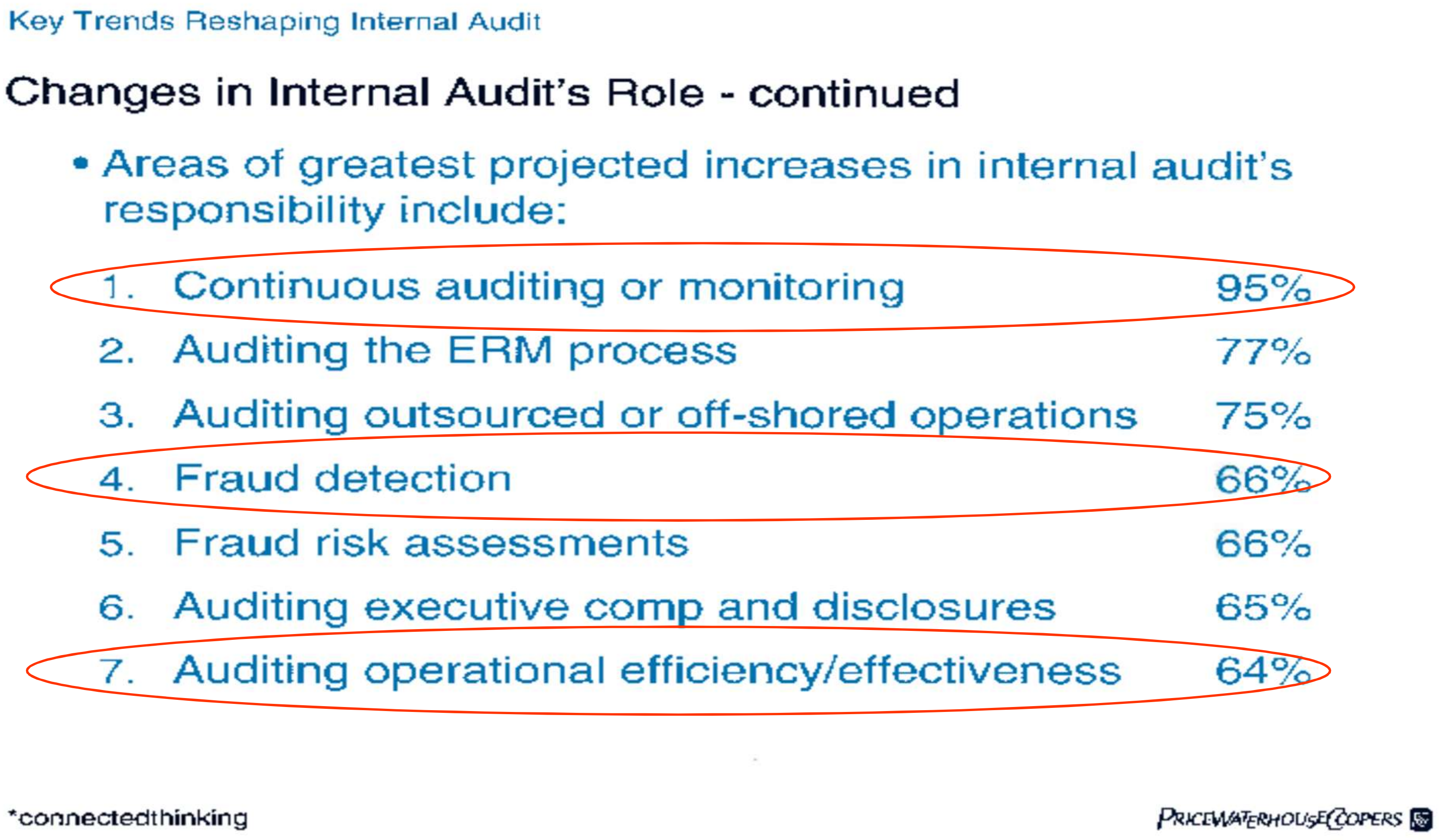
Current Solutions

- Point in Time
- Reactive, Manual
- Sampling
- Disconnected
- IT only

Sustainable Solutions

- Continuous
- Proactive & Automated
- Comprehensive
- Integrated
- Business, IT Finance

How will audit change in the future?



Key Trends Reshaping Internal Audit

Changes in Internal Audit's Role - continued

- Areas of greatest projected increases in internal audit's responsibility include:

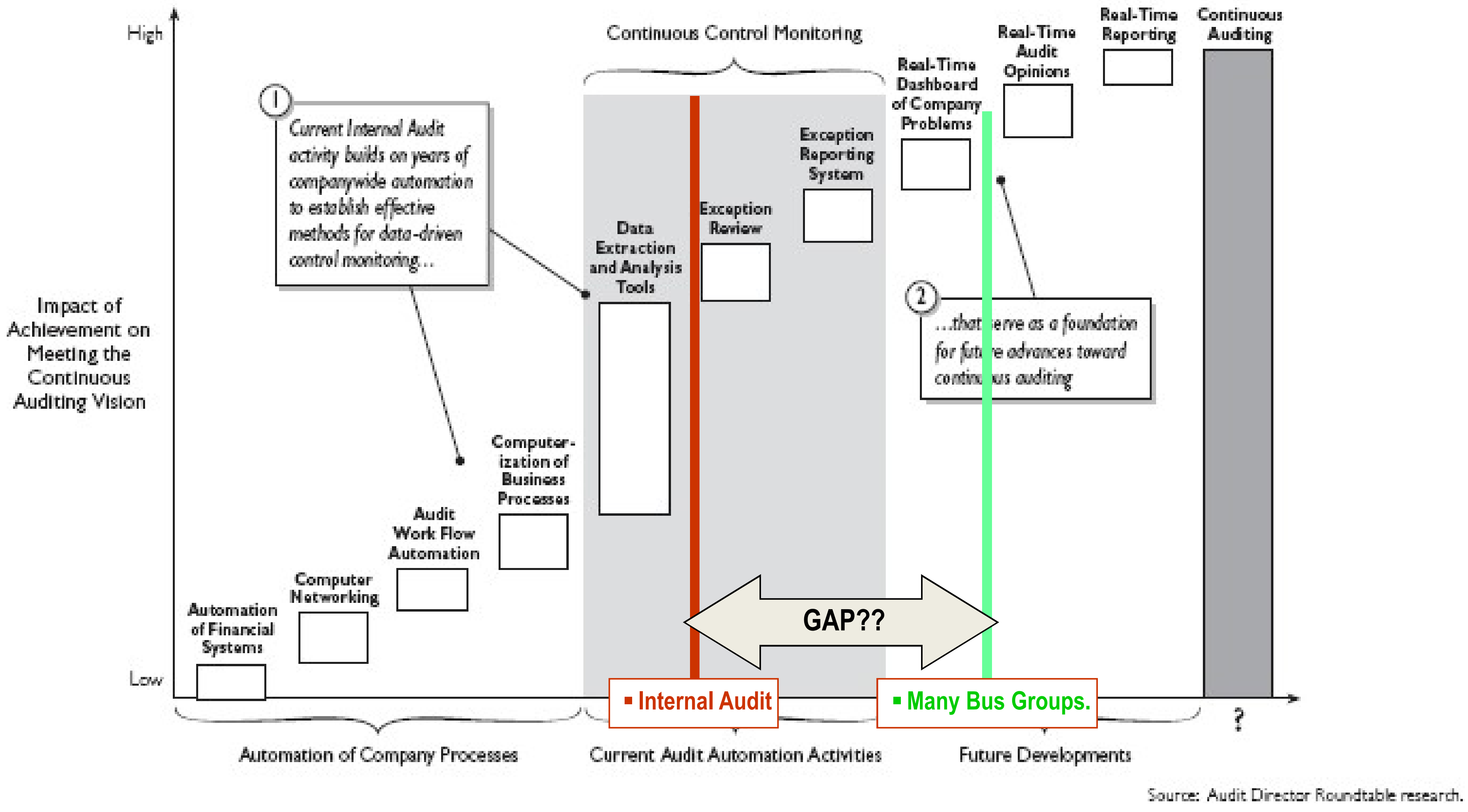
1.	Continuous auditing or monitoring	95%
2.	Auditing the ERM process	77%
3.	Auditing outsourced or off-shored operations	75%
4.	Fraud detection	66%
5.	Fraud risk assessments	66%
6.	Auditing executive comp and disclosures	65%
7.	Auditing operational efficiency/effectiveness	64%

*connectedthinking

PRICEWATERHOUSECOOPERS

Current State of Continuous Auditing / Monitoring at many large firms

The Ramp-Up Toward the Continuous Auditing Vision



High

Low

Impact of Achievement on Meeting the Continuous Auditing Vision

Automation of Financial Systems

Computer Networking

Audit Work Flow Automation

Computerization of Business Processes

Continuous Control Monitoring

Data Extraction and Analysis Tools

Exception Review

Exception Reporting System

Real-Time Dashboard of Company Problems

Real-Time Audit Opinions

Real-Time Reporting

Continuous Auditing

1. *Current Internal Audit activity builds on years of companywide automation to establish effective methods for data-driven control monitoring…*

2. *…that serve as a foundation for future advances toward continuous auditing*

GAP??

▪ Internal Audit

▪ Many Bus Groups.

Automation of Company Processes

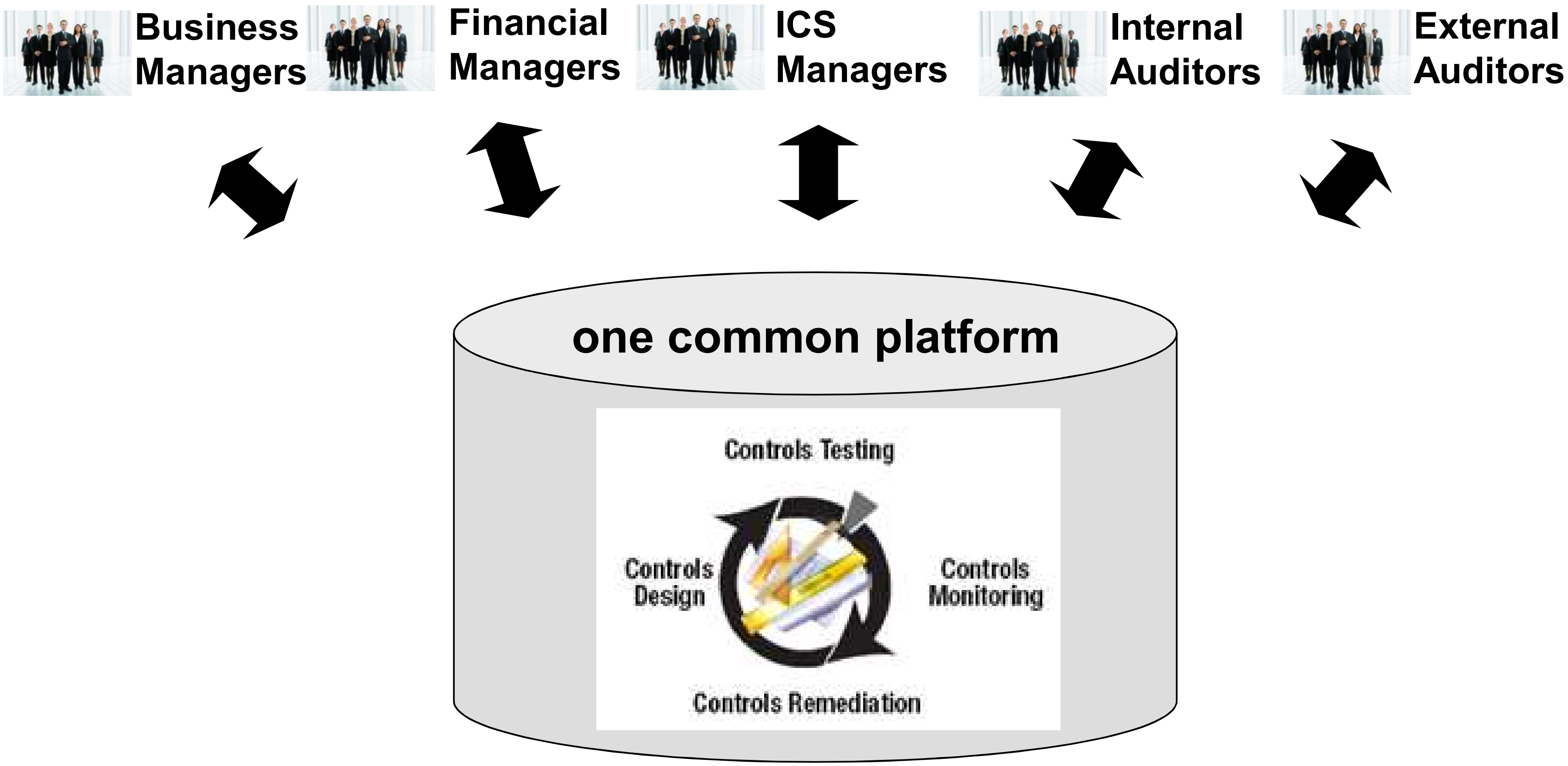
Current Audit Automation Activities

Future Developments

?

Source: Audit Director Roundtable research.

CA/CM = same platform/tools with different views, used by all control assurance stakeholders!



Business Managers

Financial Managers

ICS Managers

Internal Auditors

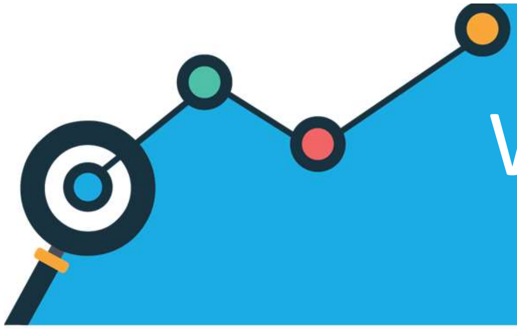
External Auditors

one common platform

Easy user interface, requiring
no special expert knowledge!

Analytics are telling a story with your data

CA Examples / Impact!



What does an automated audit / monitoring tool look like?

Sample Analytics Library for Purchase to Pay process – Over 100 key controls

A Preventative Controls Security Weaver

1 23 SAP-SoD Rules

1. Basis Development vs. Transport Administration
2. Basis Development vs. Configuration
3. Basis Table Maintenance vs. Client Administration
4. Basis Table Maintenance vs. System Administration
5. Basis Utilities vs. Transport Administration
6. Basis Utilities vs. Configuration
7. Create Transport vs. Perform Transport
8. Maintain Authorization Profile vs. Activate Authorization Profile
9. Maintain Authorization Profile vs. Maintain User Master
10. Maintain Authorizations vs. Activate Authorizations
11. Maintain Authorizations vs. Maintain User Master
12. Maintain Authorizations vs. Maintain Authorization Profile
13. Maintain User Master vs. Maintain Roles
14. Security Administration vs. Transport Administration
15. Security Administration vs. Client Administration
16. Archiving vs. Transport Administration
17. Archiving vs. Client Administration
18. Archiving vs. Configuration
19. Archiving vs. System Administration
20. Basis Development vs. Client Administration
21. Basis Development vs. System Administration
22. Basis Utilities vs. Client Administration
23. Basis Utilities vs. System Administration

2 20 P2P-SoD Rules

1. Create & maintain PO vs. process GR
2. Create/maintain vendor record vs. create/maintain PO
3. Create/maintain PO vs. approve PO
4. Approve PO vs. process GR
5. Approve PO vs. create/maintain vendor record
6. Create/maintain vendor record vs. create/maintain PA
7. Create /maintain vendor record vs. process invoice
8. Process outgoing payment vs. process invoices
9. Process outgoing payment vs. create/maintain vendor record
10. Process vendor invoice vs. create/maintain PO
11. Process outgoing payment vs. create/maintain PO
12. Perform service acceptance vs. process outgoing payment
13. Process outgoing payment vs. approve PO
14. Approve PO vs. process vendor invoice
15. Process outgoing payment vs. create/maintain PA
16. Process vendor invoice vs. create/maintain PA
17. Process outgoing payment vs. service master maintenance
18. Process vendor invoice vs. perform service acceptance
19. Process outgoing payment vs. maintain bank account
20. Process incoming payment vs. maintain bank account

3 33 PAC Controls

3a Basis PAC Controls

1. Enable logging of users with extensive authorizations
2. Enable logging of changes to critical tables
3. Prevent loss of posting data due to database reorganization
8. Check usage of Esprit interface for consolidation
9. Enable Esprit data provisioning only for closed posting periods
10. Prevent multiple logins of the same user
11. Enable authority checks for transaction codes
12. Prevent usage of standard user passwords
13. Require use of strong password and login parameters
14. Require authorization checks for remote access
15. Require standard transport path for changes in productive environment
16. Prevent global disablement of authorization checks
17. Prevent automatic deletion of aborted postings

3b P2P PAC Controls

4. Enable error message when target quantity of a contract exceeded
5. Enable customizing parameters for two way match
6. Enable customizing parameters for three way match
7. Prevent duplicate invoice posting
18. Prevent payments to alternate payee
19. Require approval of changes to sensitive master data fields
20. Prevent automatic creation of PO during GR
21. Enable blocking of suppliers in PO creation
22. Prevent removal of payment block flag during payment processing
23. Prevent use of one-time vendor accounts
24. Prevent posting of unvalued GR
25. Block invoices when quantity deviates (beyond tolerance) from GR
26. Prevent reversal of GR after IR
27. Enable duplicate vendor check
28. Prevent change of payment terms for a PO
29. Prevent change of account assignment after GR and IR
30. Enable automatic closing of purchase orders when GR matches order amount
31. Prevent bypass of GR/IR accounts during PO creation
32. Prevent changes to tolerance limits during PO creation
33. Define mandatory fields during Vendor Master maintenance

4 4 PUC Controls

1. User is missing email address
2. User hasn't logged on in last 120 days
3. Email address assigned more than once
4. Multiple combination of GID and Email

GR:	Goods Receipt
IR:	Invoice Receipt
PO:	Purchase Order
PA:	Purchasing Agreement

B Detective Controls ACL-CCM

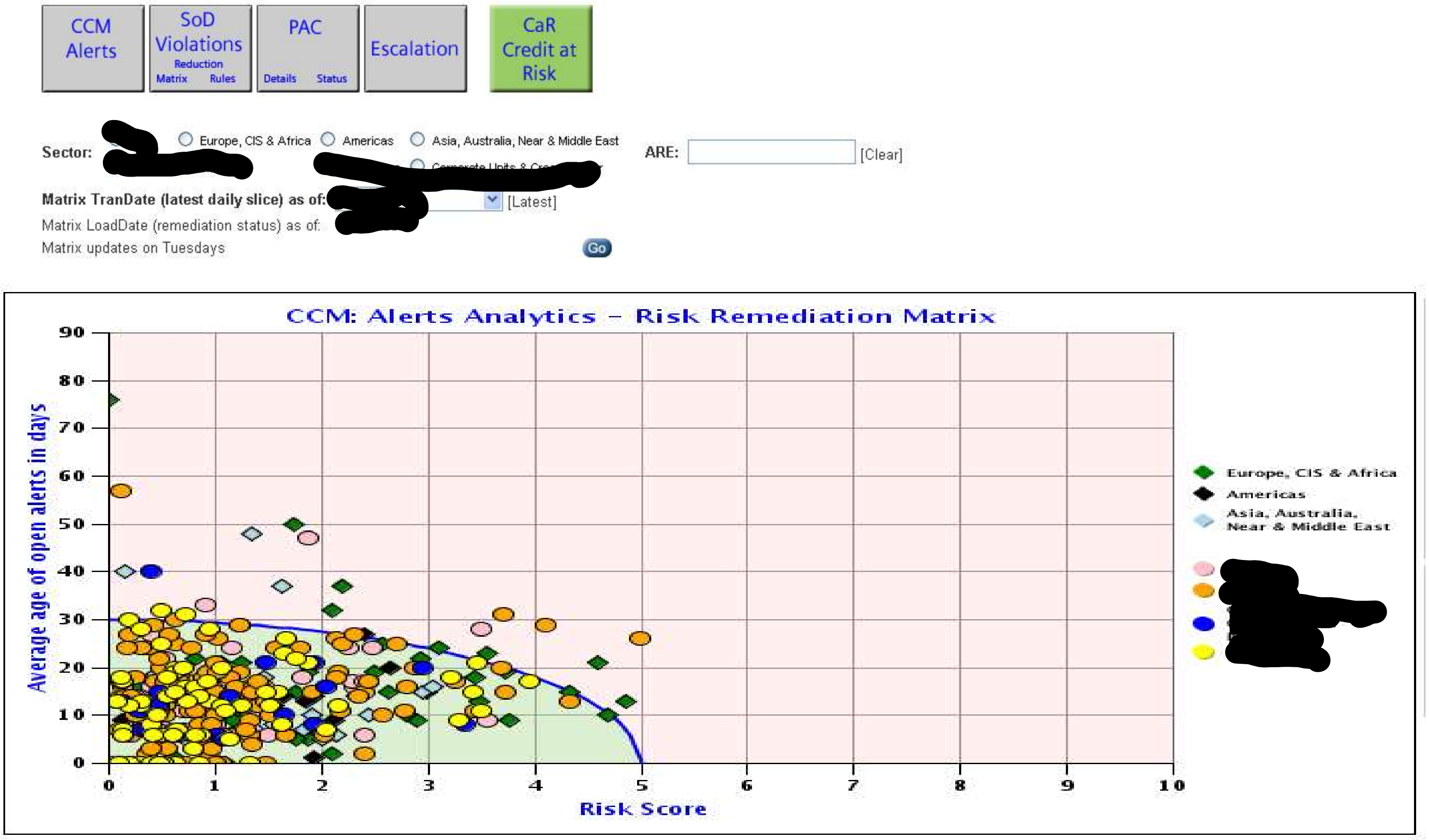
1 12 Key Controls

1. Check for suspicious vendors / blocked vendors
2. Manipulation of / inconsistencies in Master Data (e.g. Conto pro Diverse)
3. PO approver vs. GR creator
4. PO creator vs. Invoice approver
5. PO creator vs. Payment approver
6. Check data validation of critical fields
7. Identify split transactions
8. Identify incorrect sequence of process steps
9. Three-way match (PO vs. GR vs. IR)
10. Identifying duplicate payments
11. Check for users having inappropriate access
12. Reconciliation of payments made with purchasing transactions

2 10 PayBAC Controls*

1. Payments to banks located in non-cooperating countries
2. Payments to countries with low CPI (Corruption Perception Index)
3. First time transactions
4. Transactions with differing bank country vs. payee country
5. Transactions with differing transaction currency vs. payee currency or bank country
6. Transactions with round amounts (more than half of the digits of the amount are zero at the end)
7. Reconciliation of business partner by IfA-number / GID (unique identifier)
8. Screening of business partner against warning lists (OFAC, EU-List, etc..)
9. Check existence of corresponding open items
10. Payments to banks located in tax havens

Dashboard – Tool used by CF O's & Business Monitors ~100 controls Across IT, P2P, Banking, etc.



Sector: [redacted] ○ Europe, CIS & Africa ○ Americas ○ Asia, Australia, Near & Middle East [redacted]

ARE: [Clear]

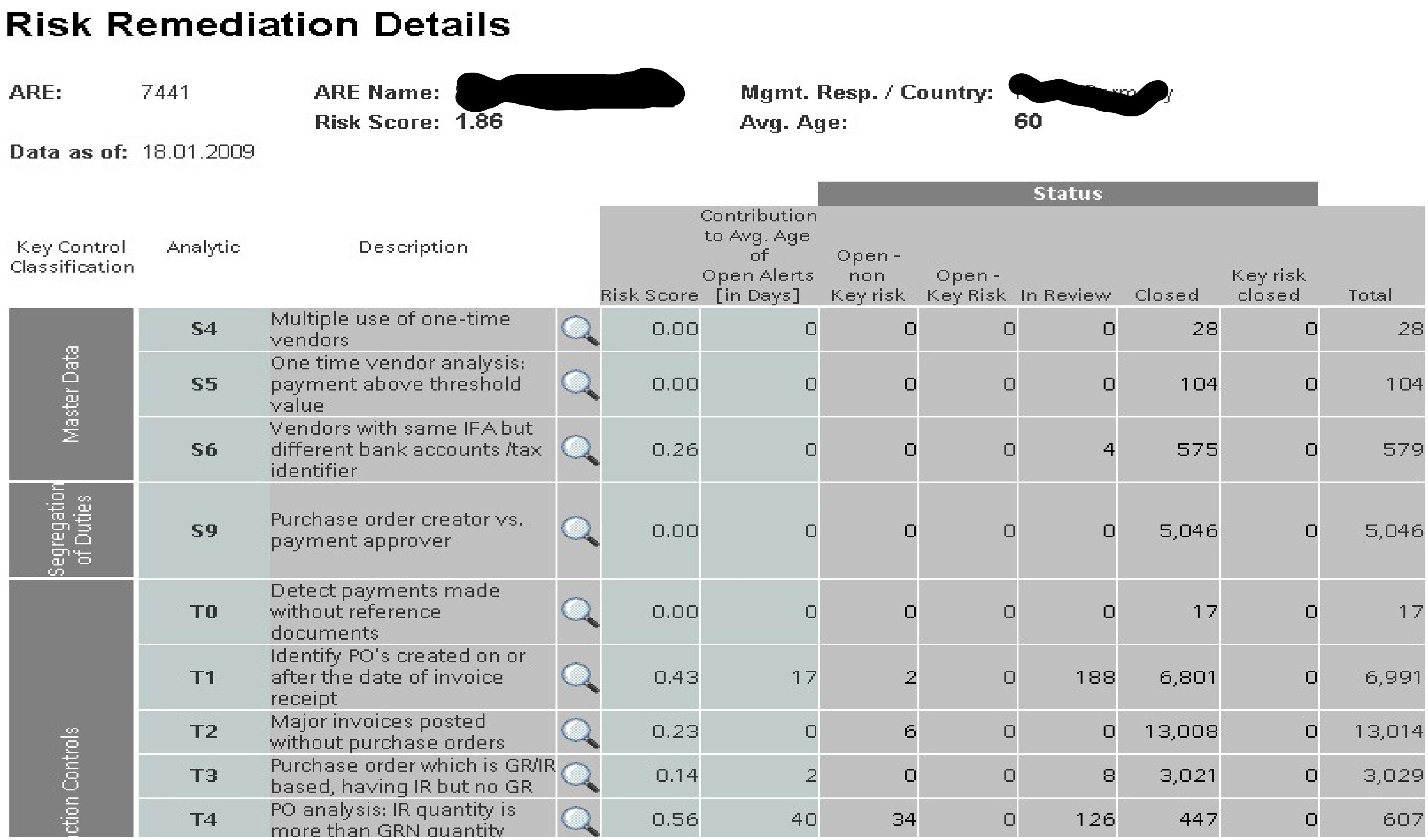
Matrix TranDate (latest daily slice) as of: [redacted] [Latest]

Matrix LoadDate (remediation status) as of: [redacted]

Matrix updates on Tuesdays

Go
CCM: Alerts Analytics – Risk Remediation Matrix
Average age of open alerts in days
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
Risk Score
◆ Europe, CIS & Africa
◆ Americas
◆ Asia, Australia, Near & Middle East
[redacted]

Dashboard – Tool used by CF O's & Business Monitors ~100 controls Across IT, P2P, Banking, etc.



Risk Remediation Details

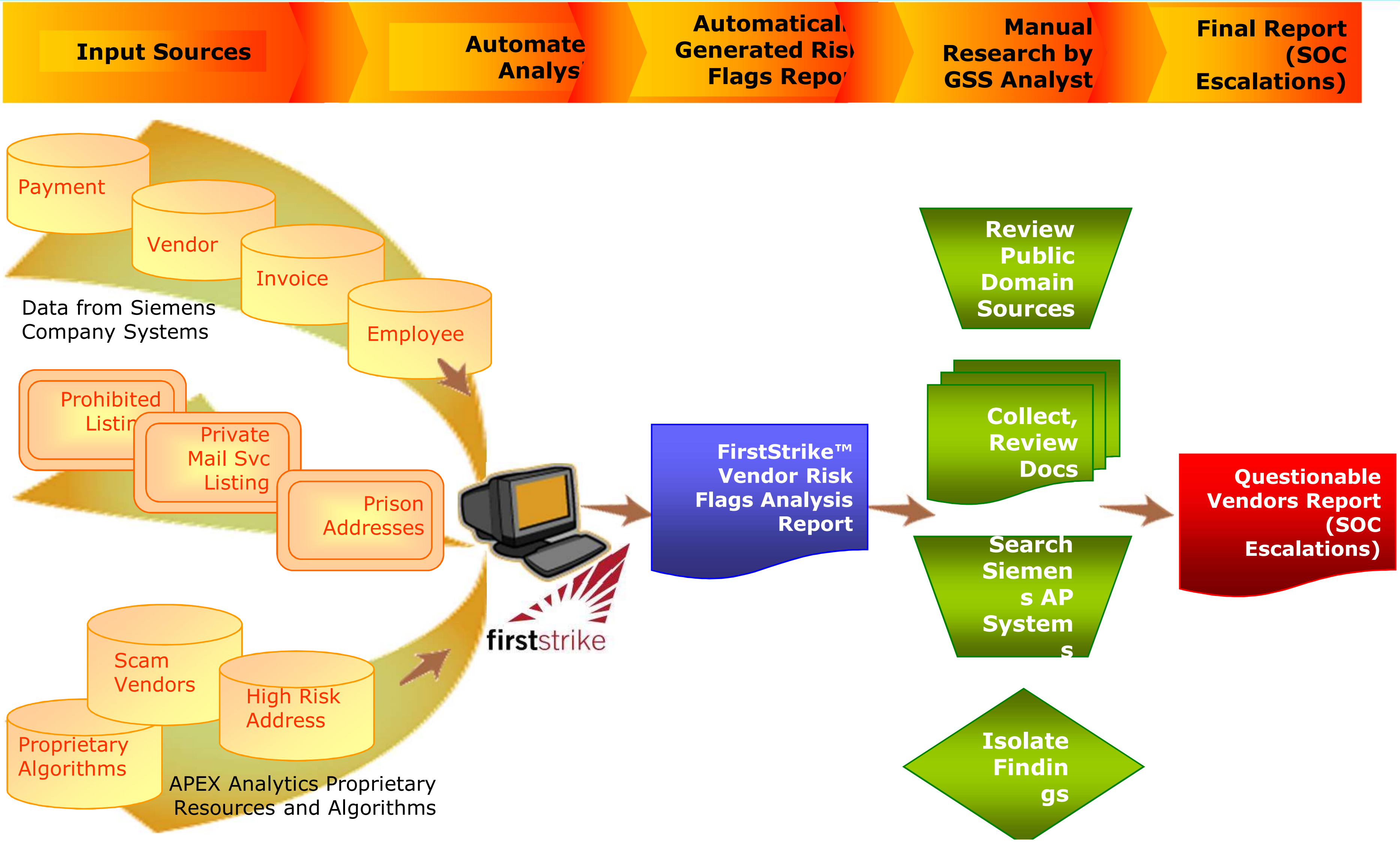
ARE: 7441 ARE Name: [redacted] Mgmt. Resp. / Country: [redacted]

Risk Score: 1.86 Avg. Age: 60

Data as of: 18.01.2009

						Status					
Key Control Classification	Analytic	Description		Risk Score	Contribution to Avg. Age of Open Alerts [in Days]	Open - non Key risk	Open - Key Risk	In Review	Closed	Key risk closed	Total
Master Data	S4	Multiple use of one-time vendors	🔍	0.00	0	0	0	0	28	0	28
	S5	One time vendor analysis: payment above threshold value	🔍	0.00	0	0	0	0	104	0	104
	S6	Vendors with same IFA but different bank accounts /tax identifier	🔍	0.26	0	0	0	4	575	0	579
Segregation of Duties	S9	Purchase order creator vs. payment approver	🔍	0.00	0	0	0	0	5,046	0	5,046
ction Controls	T0	Detect payments made without reference documents	🔍	0.00	0	0	0	0	17	0	17
	T1	Identify PO's created on or after the date of invoice receipt	🔍	0.43	17	2	0	188	6,801	0	6,991
	T2	Major invoices posted without purchase orders	🔍	0.23	0	6	0	0	13,008	0	13,014
	T3	Purchase order which is GR/IR based, having IR but no GR	🔍	0.14	2	0	0	8	3,021	0	3,029
	T4	PO analysis: IR quantity is more than GRN quantity	🔍	0.56	40	34	0	126	447	0	607

Vendor Risk Analysis Process



Input Sources

Automate Analys

Automatical Generated Ris Flags Repor

Manual Research by GSS Analyst

Final Report (SOC Escalations)

Payment

Vendor

Invoice

Employee

Data from Siemens Company Systems

Prohibited Listin

Private Mail Svc Listing

Prison Addresses

Scam Vendors

High Risk Address

Proprietary Algorithms

APEX Analytics Proprietary Resources and Algorithms

firststrike

FirstStrike™ Vendor Risk Flags Analysis Report

Review Public Domain Sources

Collect, Review Docs

Search Siemen s AP System s

Isolate Findin gs

Questionable Vendors Report (SOC Escalations)

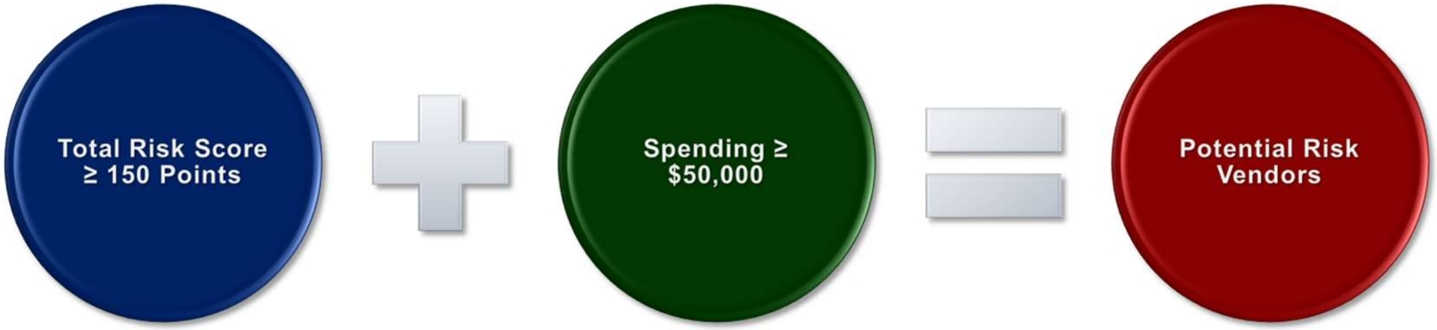
Vendor Risk Analysis Process

Vendor Characteristics									Invoice Characteristics								Manual	
Inits Vend Name	High Risk Recpt	Res	Multi Vend Cross	Cell Phone	Bus Risk	High Risk Geo	Proh Vend	Empl Vend Match	Cons Inv Nums	Benf Law	Even Amts	First Pmt Small	Chk Ret'd Empl	No PO	High Risk Acct	Year To Year	Manual Review	Invoice Net Amount
20		50	25	50	100		100	150	75	50	25	10	40	5	20	30	75	

POBX	(PO Box)	15
PMB	(Private Mail Box)	50
PRSN	(Prison)	100

HRPC	(High Risk Postal Code)	5
CPI*	(Corruption Perceptions Index)	10-100

Spending Stratification	
10,000	10
100,000	20
500,000	30
1,000,000	50



*CPI Score: Adapted from the Corruption Perceptions Index. Copyright 2008 Transparency International: the global coalition against corruption. Used with permission. For more information, visit http://www.transparency.org/.

Vendor Risk Analysis Process

	Vendor Characteristics										Invoice Characteristics								Manual				
Vendor	Inits Vend Name	High Risk Recpt	Res Addr Word	Multi Vend Cross	Cell Phone	Bus Risk	High Risk Geo	Proh Vend	Empl Vend Match		Cons Inv Nums	Benf Law	Even Amts	First Pmt Small	Chk Ret'd Empl	No PO	High Risk Acct	Year To Year	Manual Review	Score	Invoice Count	Invoice Net Amount	Base Curr
176806-A001-OSI [redacted]											X 60%	X 31%	X 81%							160	41	26,398.75	USD

Notes:
- State Inc: Company Name found at the KY Department of State.
- Company Website: Found with favorable customer reviews.
- Check list of Research: Invoices found, No W9/W8, No EFT.
- SSL recommends for SOC to research further due to Even Dollar Amount invoices (Questionable that invoices consistently have even dollar amounts) and adjustments made to invoice to create Even Dollar Amount invoices (Questionable that supplier only does business with Siemens).

[redacted]
(Google Earth)

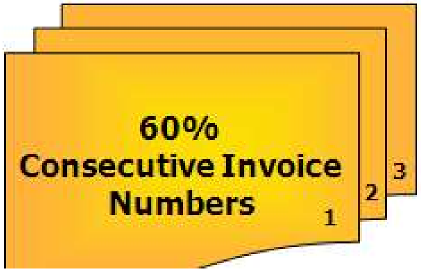
[redacted]

[redacted]

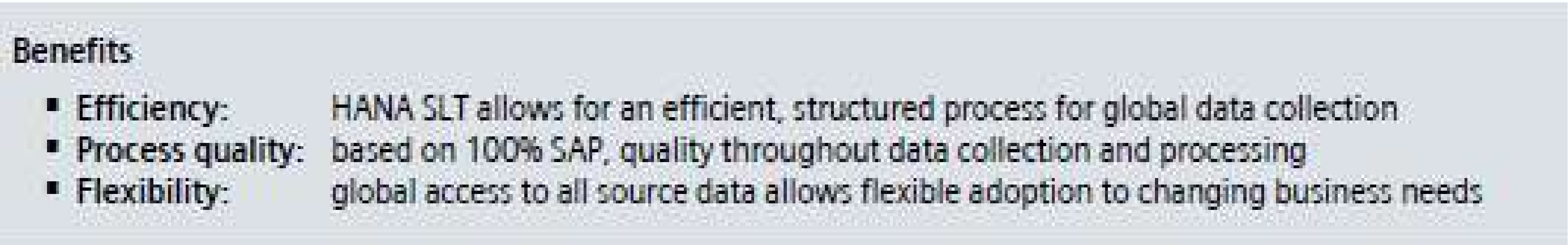
Categories: Shoes

A [redacted] more info »

81%
Even $ Amounts

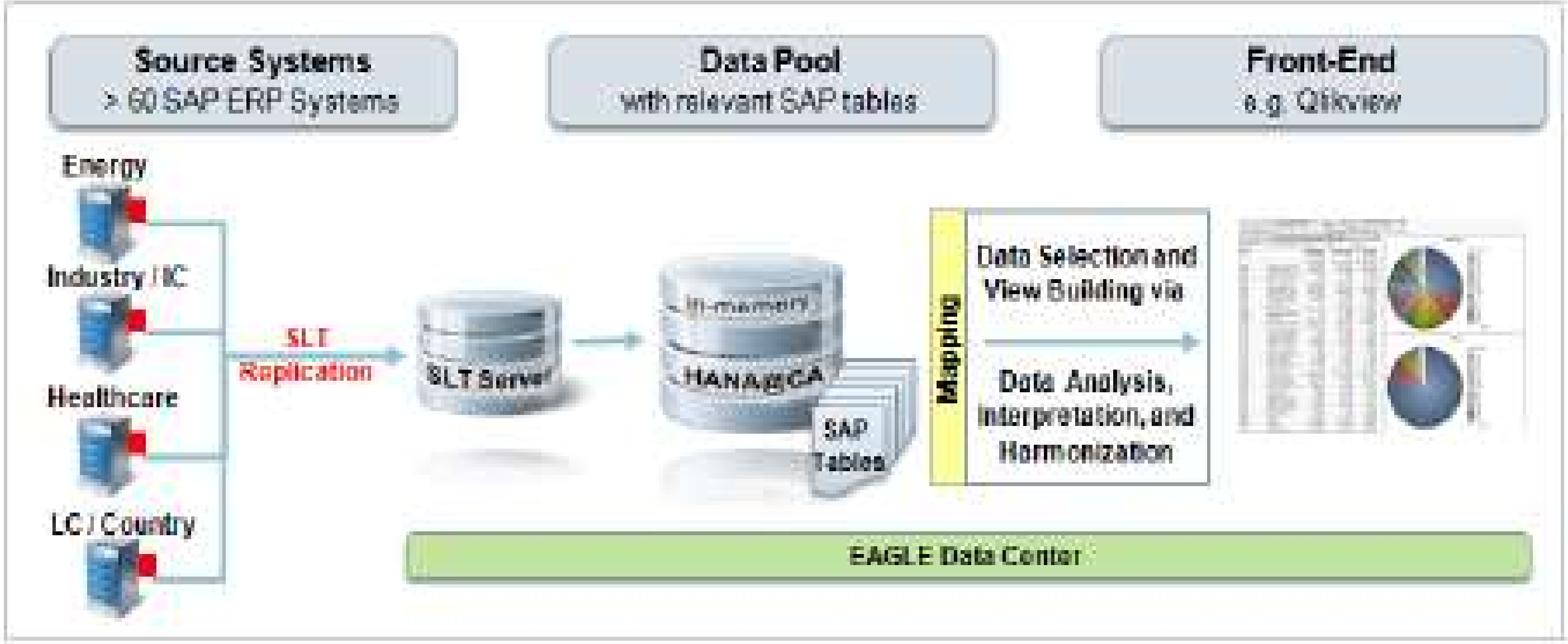

60%
Consecutive Invoice Numbers

Audit Automation with SAP Hana

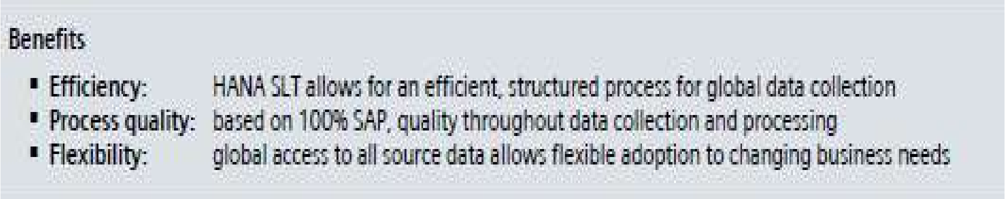


Benefits

- Efficiency: HANA SLT allows for an efficient, structured process for global data collection
- Process quality: based on 100% SAP, quality throughout data collection and processing
- Flexibility: global access to all source data allows flexible adoption to changing business needs



Audit Automation with SAP Hana – AI/BI to Continuous Auditing



Benefits

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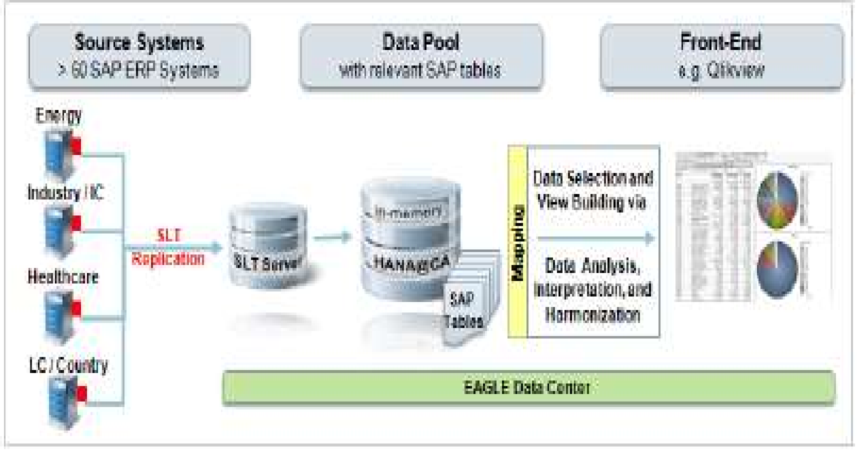
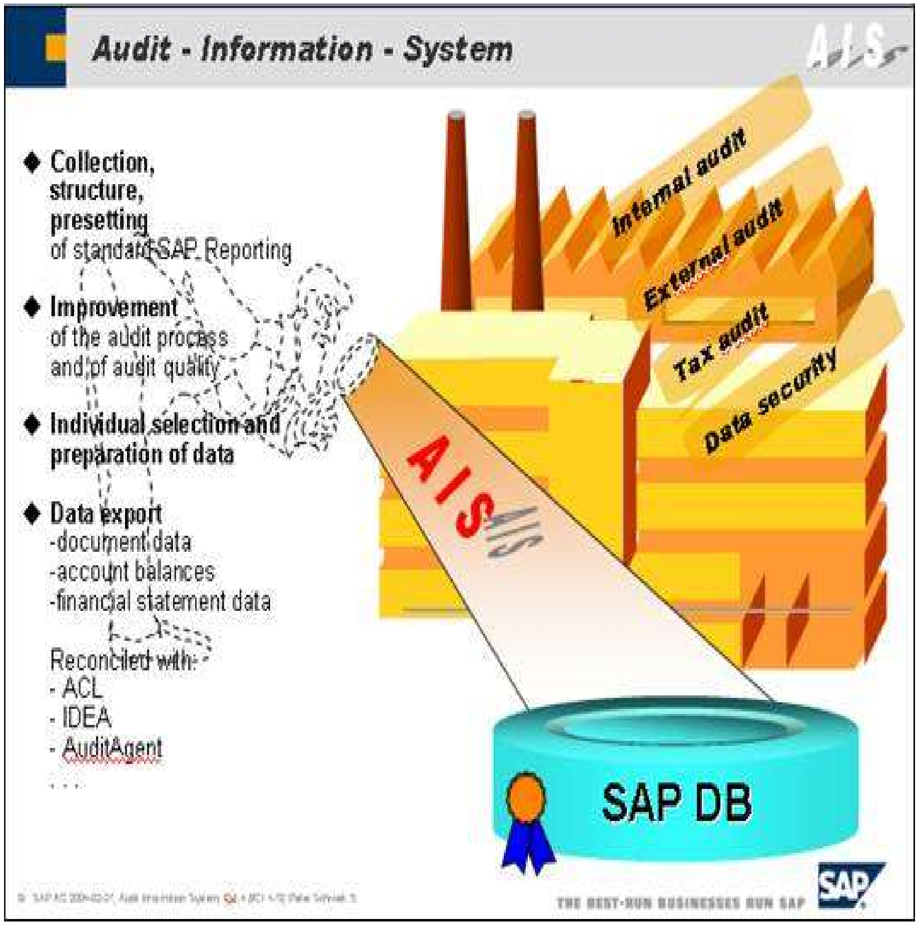


Need to add "Closed Loop – Escalated Alerting"

WHY????

- Adds an active process control.
- Gives information ownership / Resp. to the user (and monitor if appropriate) – and assures they follow-up / remediate.
- Assures process conformance
- Changes behavior and ensures sustainability.
- Eliminates testing / sampling as the control becomes the test!!
- Fully reliable by external auditors, eliminating their need to sample, test – reducing the overall audit / assurance process.

SAP’s Audit Information System (AIS) available on all SAP Systems!!

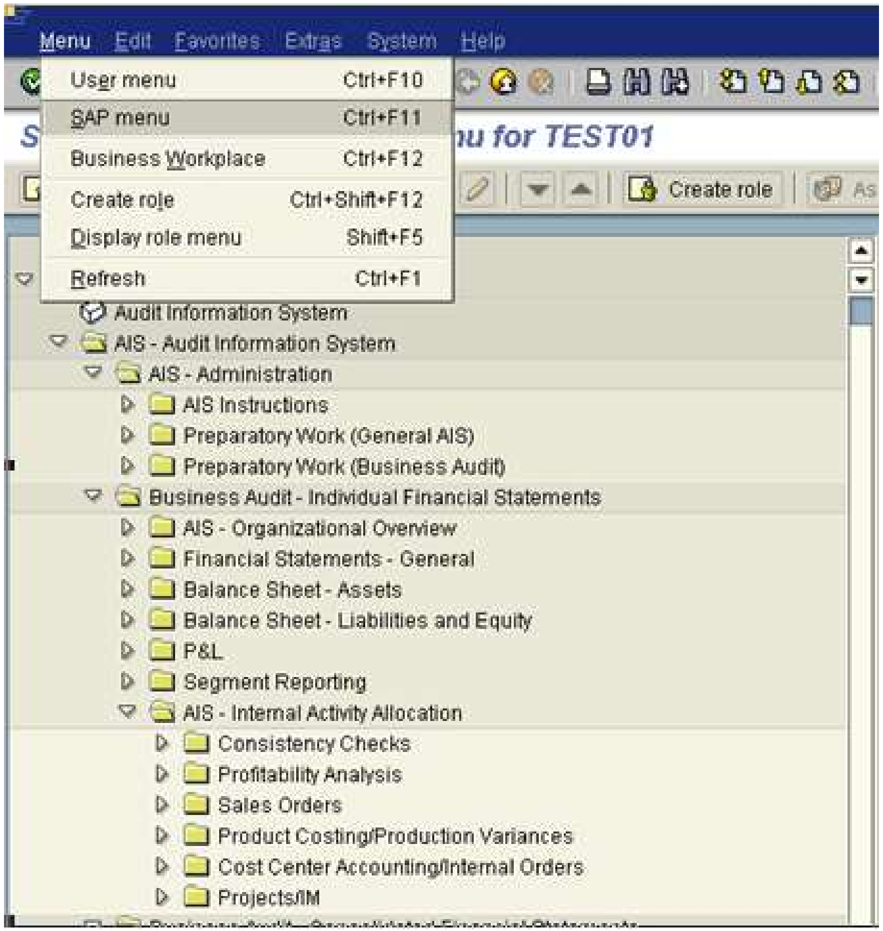


Audit - Information - System

- **Collection, structure, presetting** of standard SAP Reporting
- **Improvement** of the audit process and of audit quality
- **Individual selection and preparation of data**
- **Data export**
  - -document data
  - -account balances
  - -financial statement data

Reconciled with:
- ACL
- IDEA
- AuditAgent

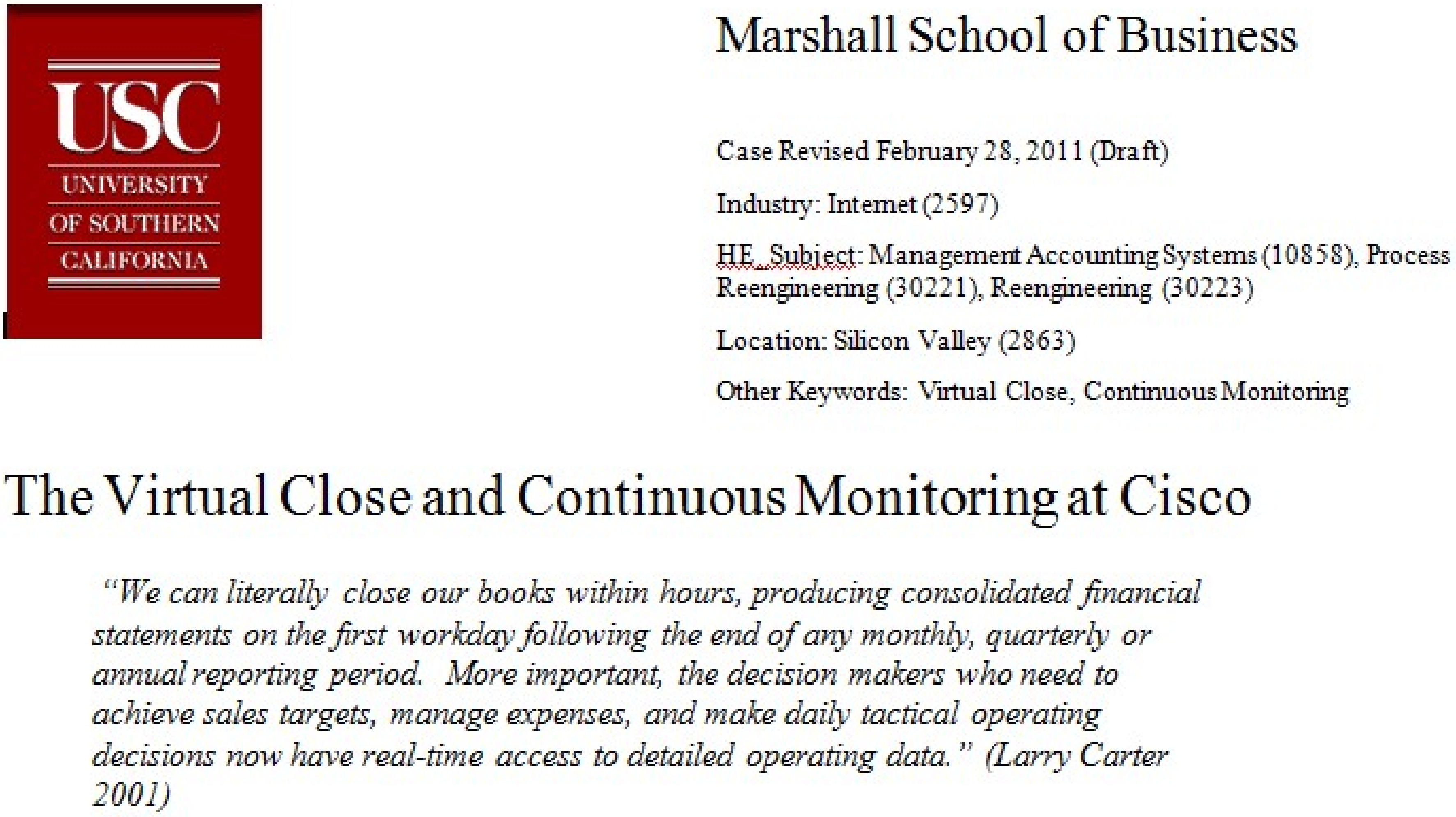
. . .



User menu	Ctrl+F10
SAP menu	Ctrl+F11
Business Workplace	Ctrl+F12
Create role	Ctrl+Shift+F12
Display role menu	Shift+F5
Refresh	Ctrl+F1

- Audit Information System
  - AIS - Audit Information System
    - AIS - Administration
      - AIS Instructions
      - Preparatory Work (General AIS)
      - Preparatory Work (Business Audit)
    - Business Audit - Individual Financial Statements
      - AIS - Organizational Overview
      - Financial Statements - General
      - Balance Sheet - Assets
      - Balance Sheet - Liabilities and Equity
      - P&L
      - Segment Reporting
      - AIS - Internal Activity Allocation
        - Consistency Checks
        - Profitability Analysis
        - Sales Orders
        - Product Costing/Production Variances
        - Cost Center Accounting/Internal Orders
        - Projects/IM

Continuous Auditing Enables a "Virtual Close"



USC UNIVERSITY OF SOUTHERN CALIFORNIA

Marshall School of Business

Case Revised February 28, 2011 (Draft)

Industry: Internet (2597)

HE Subject: Management Accounting Systems (10858), Process Reengineering (30221), Reengineering (30223)

Location: Silicon Valley (2863)

Other Keywords: Virtual Close, Continuous Monitoring

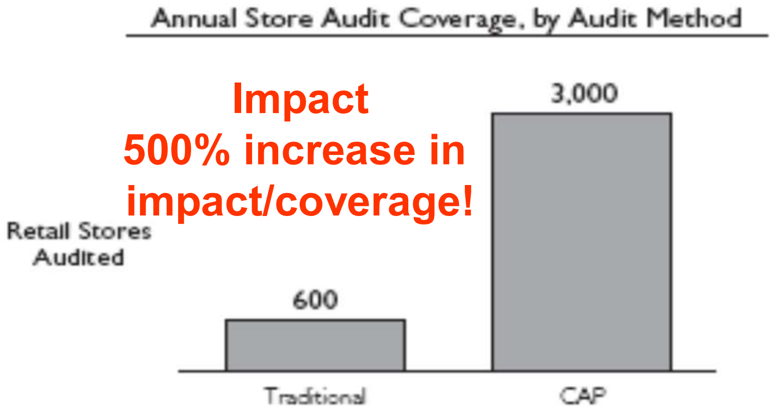
The Virtual Close and Continuous Monitoring at Cisco

> *"We can literally close our books within hours, producing consolidated financial statements on the first workday following the end of any monthly, quarterly or annual reporting period. More important, the decision makers who need to achieve sales targets, manage expenses, and make daily tactical operating decisions now have real-time access to detailed operating data." (Larry Carter 2001)*

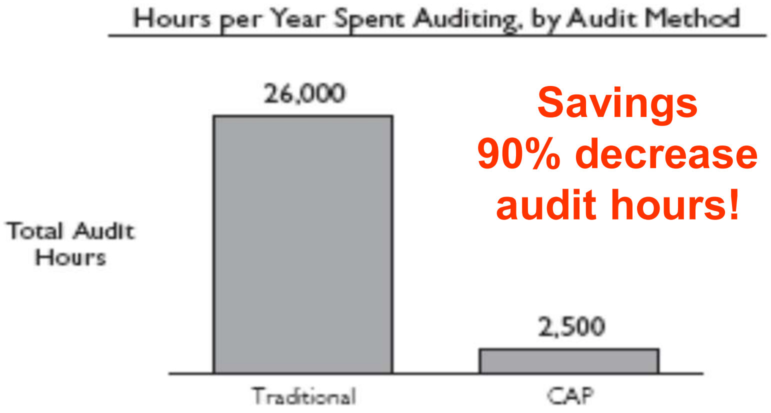
Cost / Impact Benchmark Example: Wells Fargo (Rev = 32B, 230 Auditors)

Wells Fargo's initiative to focus on high-risk activities improves branch coverage and streamlines reporting…

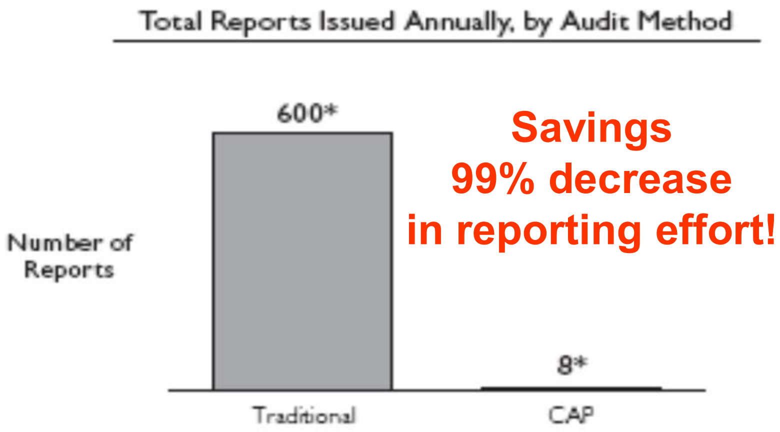
…while reducing the cost of retail stores' audits


Annual Store Audit Coverage, by Audit Method

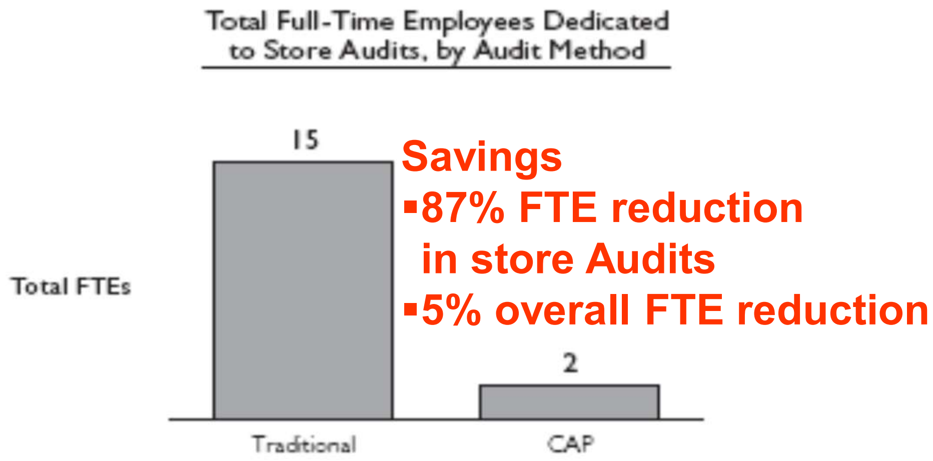
Impact
500% increase in impact/coverage!


Hours per Year Spent Auditing, by Audit Method

Savings
90% decrease audit hours!


Total Reports Issued Annually, by Audit Method

Savings
99% decrease in reporting effort!


Total Full-Time Employees Dedicated to Store Audits, by Audit Method

Savings
- **87% FTE reduction in store Audits**
- **5% overall FTE reduction**

* Does not include quarterly summary reports.

Source: Wells Fargo & Company; Audit Director Roundtable research.

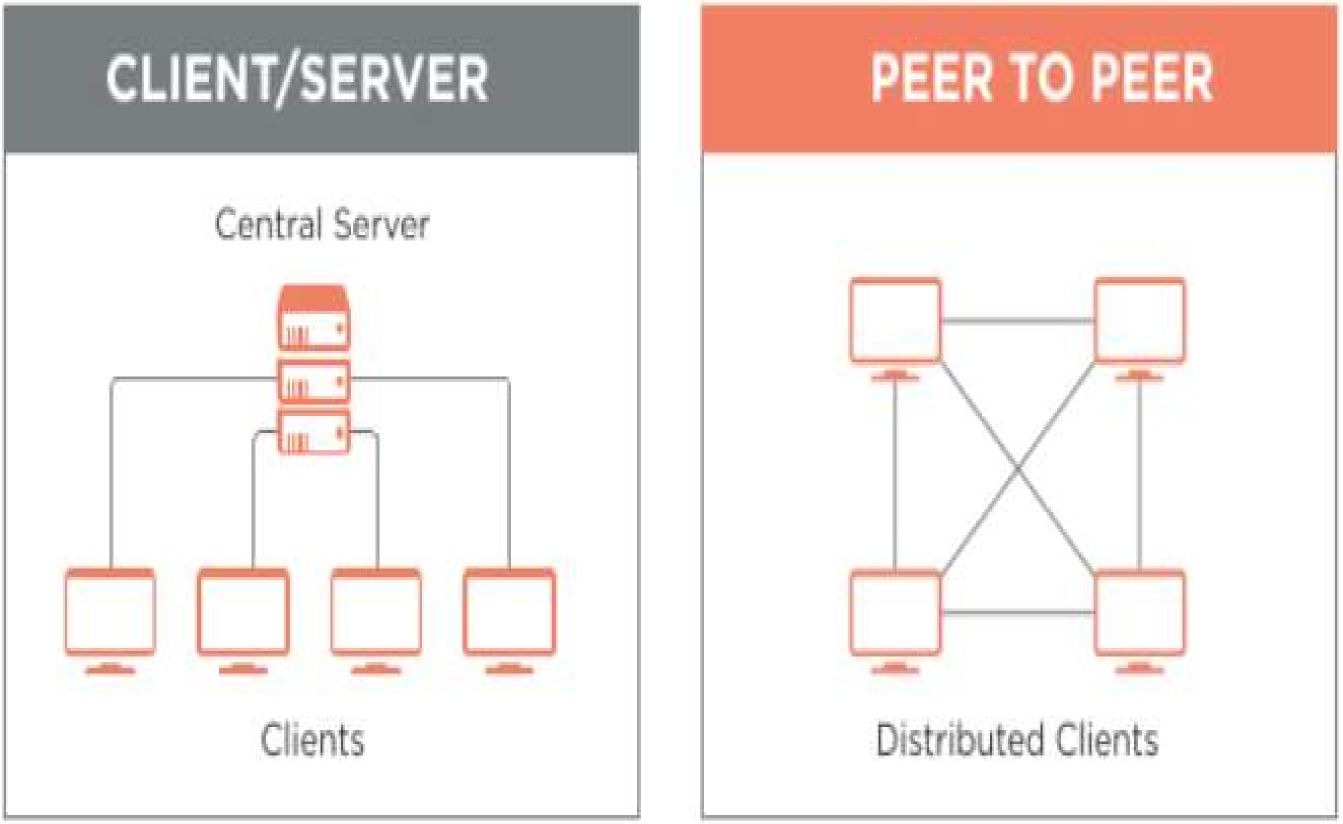
Sample of value proposition for or a CA/CM tool for a large Firm

Benefits (In thousand €)

Detail items	EVA year 0	EVA year 1	EVA year 2	EVA year 3	Total
Reduced compliance costs Internal Audit	1,761	10,000	10,000	10.000	31,761
Reduced compliance cost Business	199	1,130	1,130	1,130	3,589
Reduction in external auditing fees (4% by Yr. 2)	228	1,700	2,300	2,300	6,528
Total benefits	2.188	12,830	13.430	13.430	41.878
Development Cost	6,959	1,350	1,350	1,350	11,009
Internal Audit Resources	1,082	0	0	0	1,2
Total costs	8,041	1,350	1,350	1,350	12,091
Net value per year	**-5, 853**	**11,480**	**12.080**	**12.080**	**29.787**
Fraud and Error Prevention (Assume just ½ of 1% of Rev)	*38,500*	*154,000*	*288,750*	*385,000*	*866,250*

Auditing BC/DLT Systems

Blockchain/DLT = Cheaper, Better, Faster & Way More Secure



Disrupting the Audit: The Emergence of Blockchain & Its Impact on Auditing Practices

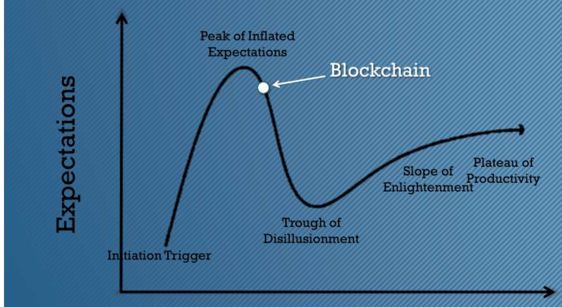
By Meghan Brennan
Co-Authored by Dr. J. Donald Warren, Jr. and Dr. Gerard Brennan

ABSTRACT

This project seeks to determine how public accounting firms will need to adjust their audit engagements as more companies integrate blockchain technology in their business practices. The research addresses current sampling methods used during audits and how these will change, the risks of smart contracts, and controls companies will need in order to secure their private blockchains.

BACKGROUND

Blockchain technology was first introduced in 2008 when Satoshi Nakamoto released his whitepaper about Bitcoin. Blockchain is a distributed ledger that underlies Bitcoin transactions. In around 2014, people started to realize blockchain technology could be utilized outside of Bitcoin, and the idea of private blockchains emerged. Today, companies such as Walmart, Nestlé, UPS and British Airways have begun adopting blockchain technology to streamline their processes and make them more efficient and transparent.



Gartner Hype Cycle

HOW BLOCKCHAIN TRANSACTIONS WORK

Each user on the blockchain has both a private and public key, the private key being used to sign and verify transactions and remaining confidential to the user. The public keys are used to address transactions and are visible by any user. Each transaction is put on a block, and the block is given a hash determined by all past transactions. Each block also contains the hash of the block before it which forms a link. Because of this, if one block is tampered with, every block after it on the chain will be invalidated. Each user has access to the same copy of the blockchain, making transactions more transparent and verifiable. Blockchains operate in a trustless environment – there is no need for third party verification.

> *" The technology likely to have the greatest impact on the next few years has arrived "*
>
> – Don Tapscott, Co-Founder & Executive Chariman of The Blockchain Research Institute

DANGERS OF SMART CONTRACTS

A smart contract's terms are coded and stored on a blockchain, and this code self-executes when the contract is addressed by a transaction. Since smart contracts are held on blockchain's distributed platform, every user can see and validate the contract's executions. Smart contracts are also immutable – once the code is executed it cannot be changed. The risk of smart contacts lies in the code behind it. Since execution is automatic, if a hacker finds and exploits a vulnerability in the code, the contract will continue to execute improperly until someone detects the error.

AUDITING BLOCKCHAINS

As companies begin to adopt blockchain technology as a platform for their supply chain management, financial transactions, and other use cases, auditors need to adapt their practices to successfully audit their clients who utilize blockchain. Audit teams will need to be staffed with more data scientists or accountants with the technical skills to understand the coding behind smart contracts. They will need to perform code and security audits to ensure the contract is coded properly and is executed for its intended purposes.

Audit firms will be able to focus on all of the data instead of testing selected account balances. Companies using blockchain will help auditors approach a continuous audit, something that has been time-consuming and expensive in the past, since the auditors will be able to see and test the transactions in real time.

Auditing Blockchain – Traditional Audit Methods will not work!

Pros:

- Much higher level of control precision & formalization
- Security / Sustainability via distributed ledgers → no single point of failure
- Fully automated / integrated ecosystem secured by cryptography
- Consensus prevents collusion→ instead of “4 eyes” - 8, 100, 1000 eyes!

Cons:

- Blockchain new / suspect first implementation less than a decade ago
- Objectives, risks, and controls are different for single database processes
- Limited technical expertise / experience in audit and IT around blockchains

Auditing Blockchain – Impact of DLT on Mgmt. Assertions (WSBA)

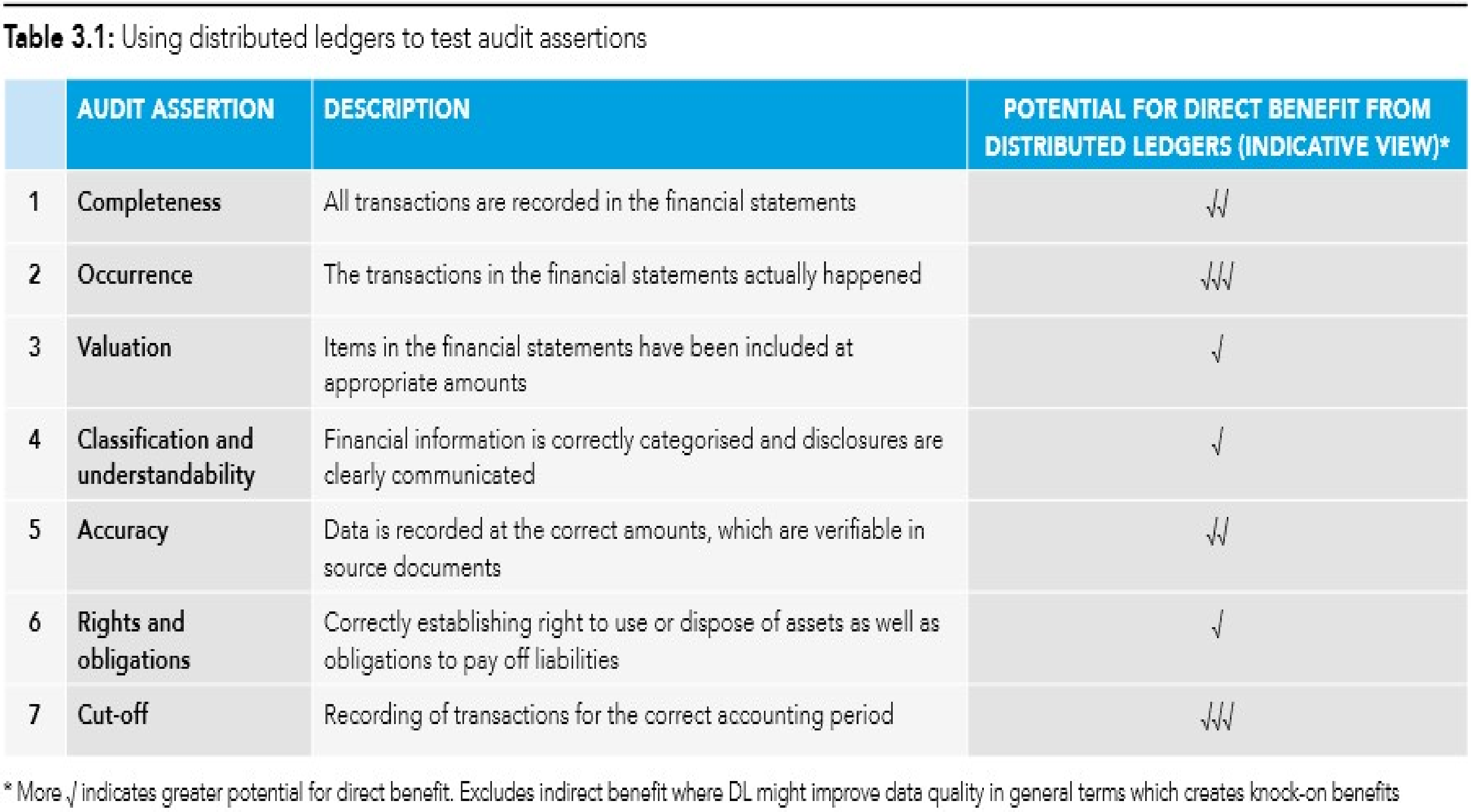


Table 3.1: Using distributed ledgers to test audit assertions

	AUDIT ASSERTION	DESCRIPTION	POTENTIAL FOR DIRECT BENEFIT FROM DISTRIBUTED LEDGERS (INDICATIVE VIEW)*
1	Completeness	All transactions are recorded in the financial statements	√√
2	Occurrence	The transactions in the financial statements actually happened	√√√
3	Valuation	Items in the financial statements have been included at appropriate amounts	√
4	Classification and understandability	Financial information is correctly categorised and disclosures are clearly communicated	√
5	Accuracy	Data is recorded at the correct amounts, which are verifiable in source documents	√√
6	Rights and obligations	Correctly establishing right to use or dispose of assets as well as obligations to pay off liabilities	√
7	Cut-off	Recording of transactions for the correct accounting period	√√√

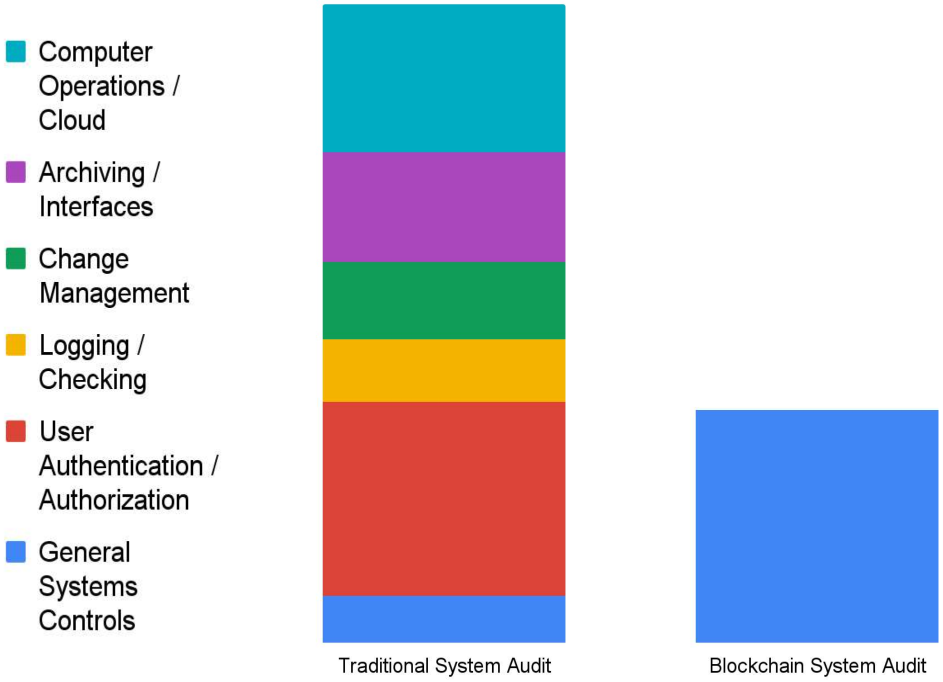
* More √ indicates greater potential for direct benefit. Excludes indirect benefit where DL might improve data quality in general terms which creates knock-on benefits

Auditing Blockchain – System Audit on Blockchains

_Audit Insights

With Blockchain, auditing is just plain different

Reduces Risk and Activities



- Blockchain protocol code is open source and secured by the consensus mechanism - mostly self-audited. Blockchain transaction controls include ubiquitous cross protocol controls which help address risks with smart contracts
- No passwords, permission is by the consensus or all participants, no SOD, super users, etc...
- The blockchain is an immutable log /archive
- All transactions and change management is controlled by the consensus mechanism
- The blockchain is an immutable archive
- Blockchain has no need for a data center

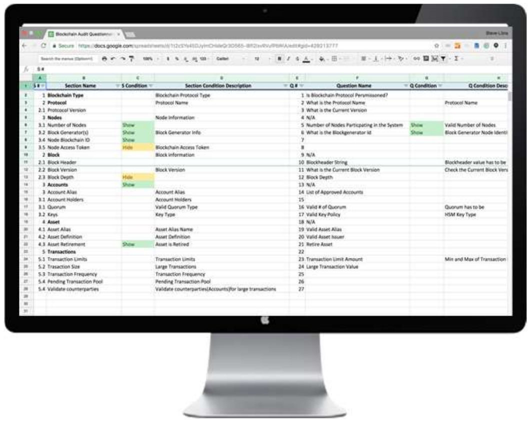
Auditing Blockchain – Impact of DLT on Mgmt. Assertions (WSBA)

Protocol Accreditation	CM Monitoring	Transaction Assurance
Verify for participating nodes & regulators the sound design of the protocol against industry standards & best practice respected frameworks / standards (NIST, Cobit, ISO 27001, IIA, etc.) ensuring key controls are not missing.	Verify the sound design of consensus mechanism is consistent with requirements of respective protocols and the baseline design is approved by the participating nodes.	Assure the security, availability, immutability, processing integrity, confidentiality, validity, scalability, etc. of all transactions on the blockchain/DLT network.
Verify via automated analytics that ubiquities, “best practice” protocol rules / controls are in place for any public or private blockchain.	Validate node rights / participation, quorum, voting participation, etc. to ensure the protocol required and user defined baseline consensus mechanism is operating effectively.	The Libra Audit Engine will provide assurance on ubiquitous controls related to any smart contract and will allow user configuration of additional controls as defined by the needs of the specific use case.

Libra Audit Solution for Blockchains

Libra Interface

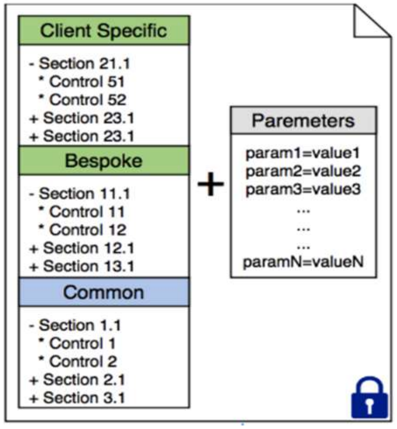
- Questionnaire
- User Configuration



S #	Section Name	S Condition	Section Condition Description	Q #	Question Name	Q Condition	Q Condition Desc
1	**Blockchain Type**		Blockchain Protocol Type	1	Is Blockchain Protocol Permissioned?		
2	**Protocol**		Protocol Name	2	What is the Protocol Name		Protocol Name
2.1	Protocol Version			3	What is the Current Version		
3	**Nodes**		Node Information	4	N/A		
3.1	Number of Nodes	Show		5	Number of Nodes Particpating in the System	Show	Valid Number of Nodes
3.2	Block Generator(s)	Show	Block Generator Info	6	What is the Blockgenerator Id	Show	Block Generator Node Identi
3.4	Node Blockchain ID	Show		7			
3.5	Node Access Token	Hide	Blockchain Access Token	8			
2	**Block**		Block Information	9	N/A		
2.1	Block Header			10	Blockheader String		Blockheader value has to be
2.2	Block Version		Block Version	11	What is the Current Block Version		Check the Current Block Vers
2.3	Block Depth	Hide		12	Block Depth		
3	**Accounts**	Show		13	N/A		
3	Account Alias		Account Alias	14	List of Approved Accounts		
3.1	Account Holders		Account Holders	15			
3.1	Quorum		Valid Quorum Type	16	Valid # of Quorum		Quorum has to be
3.2	Keys		Key Type	17	Valid Key Policy		HSM Key Type
4	**Asset**			18	N/A		
4.1	Asset Alias		Asset Alias Name	19	Valid Asset Alias		
4.2	Asset Definition		Asset Definition	20	Valid Asset Issuer		
4.3	Asset Retirement	Show	Asset is Retired	21	Retire Asset		
5	**Transactions**			22			
5.1	Transaction Limits		Transaction Limits	23	Transaction Limit Amount		Min and Max of Transaction
5.2	Trasaction Size		Large Transactions	24	Large Transaction Value		
5.3	Transaction Frequency		Transaction Frequency	25			
5.4	Pending Transaction Pool		Pending Transaction Pool	26			
5.4	Validate counterparties		Validate counterparties(Accounts)for large transactions	27			

Libra Library

- Base set of blockchain controls
- Ability to add custom rules



Client Specific

- Section 21.1
 * Control 51
 * Control 52
+ Section 23.1
+ Section 23.1

Bespoke

- Section 11.1
 * Control 11
 * Control 12
+ Section 12.1
+ Section 13.1

Common

- Section 1.1
 * Control 1
 * Control 2
+ Section 2.1
+ Section 3.1

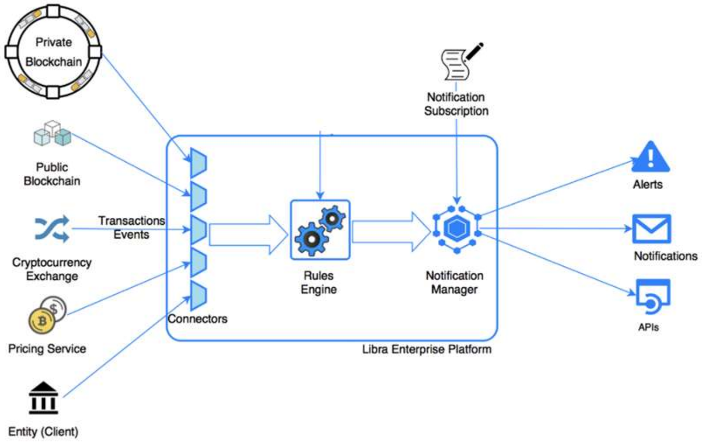
+

Parementers

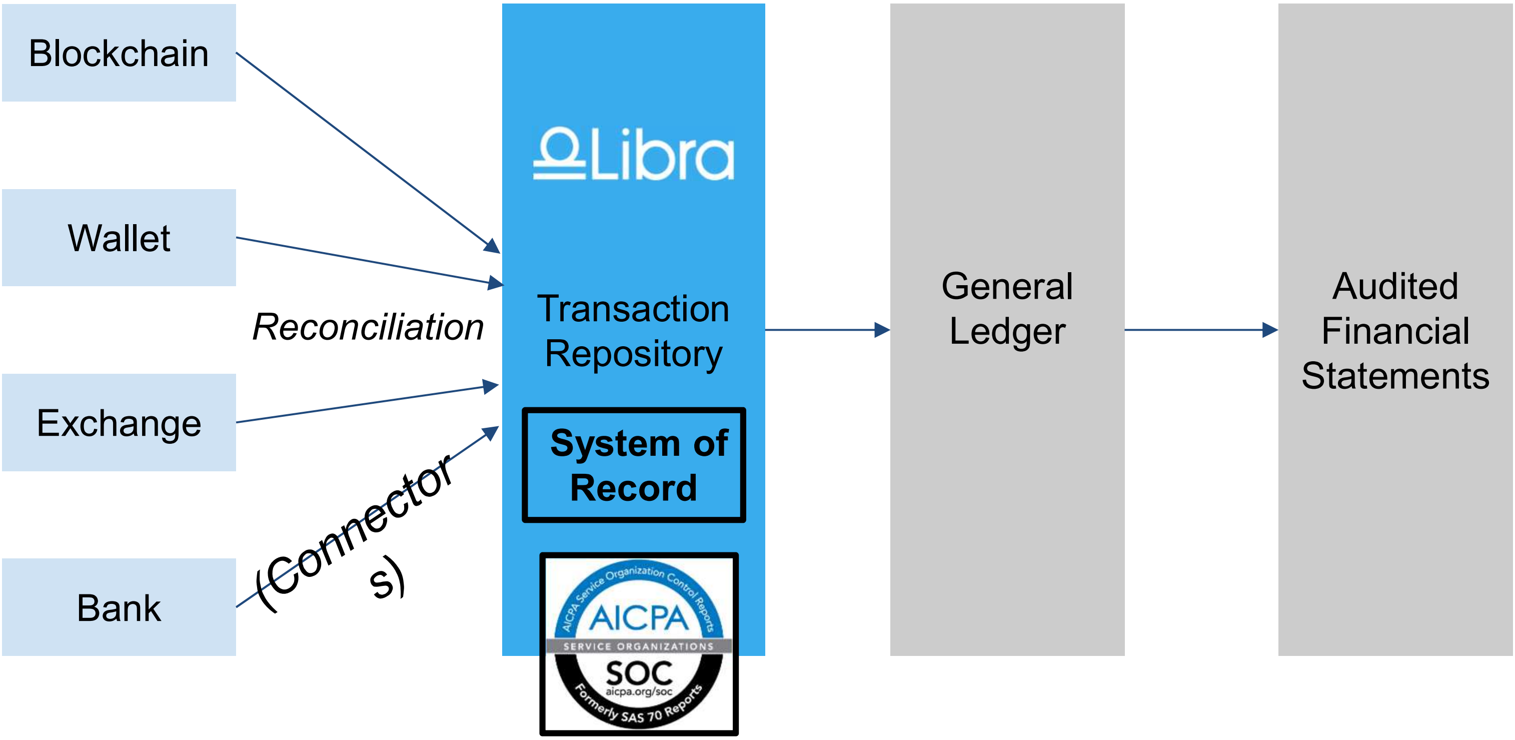
param1=value1
param2=value2
param3=value3
...
...
...
paramN=valueN

Libra Engine

- Controls/Rules Engine
- Alerts & Notifications

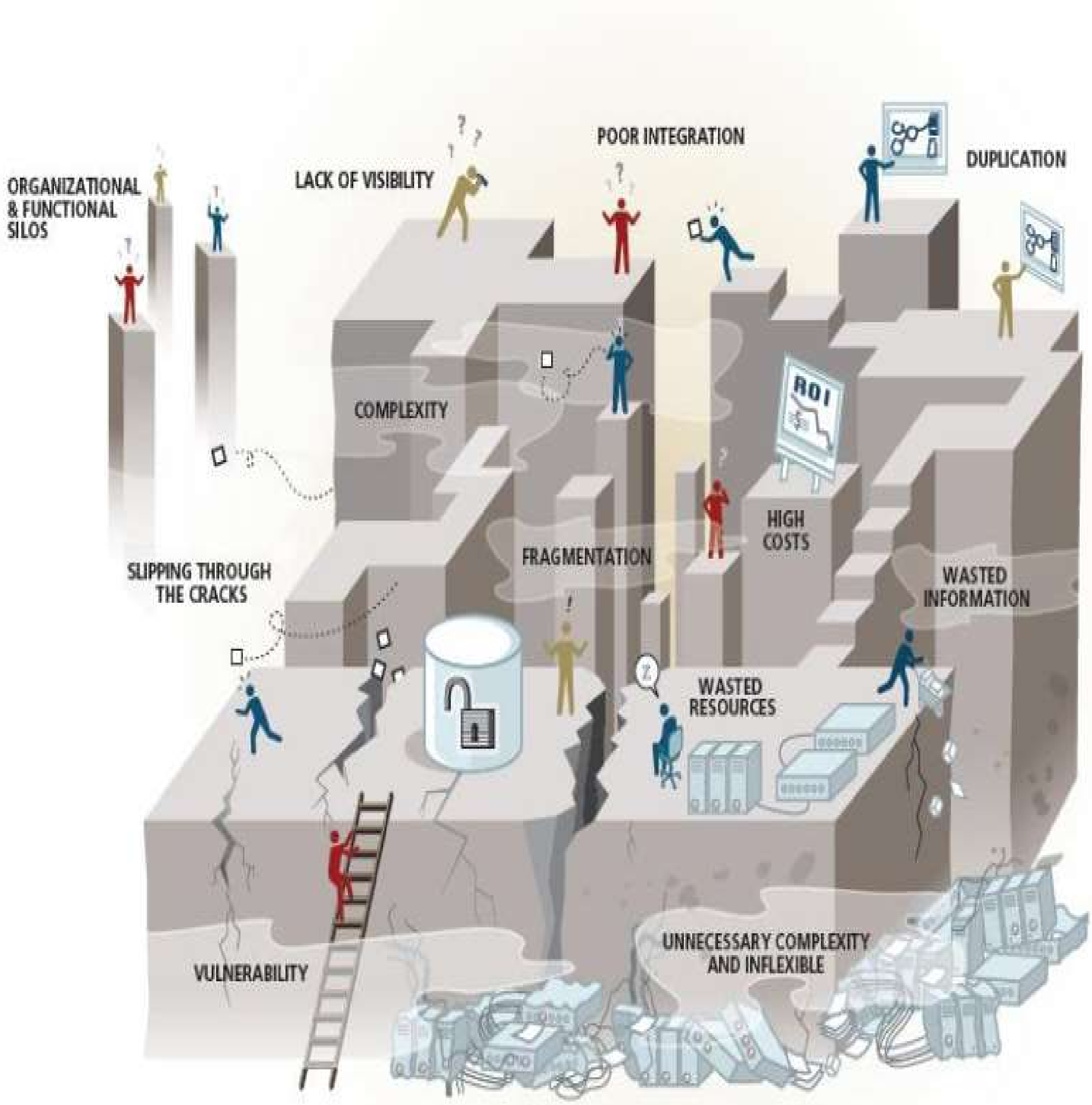


Libra Audit Solution for Blockchains. "System of Record"



Barriers to Adoption of CA

Current State of Information in Many Companies



- Managed in silos
- Mostly reactionary
- More projects than programs
- Handled separately from mainstream processes and decision-making
- People used as middleware
- Limited and fragmented use of technology

Barriers to Adoption of CA

- It is too intrusive
- **Fear of PCAOB Challenge (For non compliance to their own audit standards)**
- **Too expensive and complex to implement. (i.e. billing based on “bodies & hours”)**
- Auditing software will slow down operational system performance.
- Comprehensive analysis, testing and comparison of transactions is not practical in real-time.
- Risk not being independent.
- Confidentiality and privacy considerations
- **Adequate restriction of auditor access (display only)**
- Modification of auditor software routines or tools to perform unauthorized activity
- Potential impact on systems integrity and availability
- Privacy regulations, e.g.: HIPAA – Healthcare industry, Graham-Leach-Bliley Act – Financial services industry ,etc...

D. Searcy et al. , based on feedback from partners at the big 4 accounting firms, condensed all barriers to continuous auditing into three categories, which they identified as people impediments, process impediments

Barriers to Adoption of CA

- “The phonograph is of no commercial use” (Thomas Edison, 1880).

- “Everything that can be invented has been invented” (Charles Duel, Director US Patent Office, 1899).

- Who the hell wants to hear actors talking?” (Harvey Warner, 1927).

- “I think there is a world market for about five computers” (Thomas J Watson, Chairman, IBM, 1943).

- “There is no reason for any individual to have a computer in their home” (Ken Olhson, President of Digital Equipment Corp., 1977).

- “640k ought to be enough for anyone” (Bill Gates, 1981).

Q&A

Discussion / Questions & Answers