

Data Analytics, Audit Tools & Techniques

July 13, 2019

Setting the stage – data analysis defined

Setting the Stage - Data Analysis Defined

Data Analysis

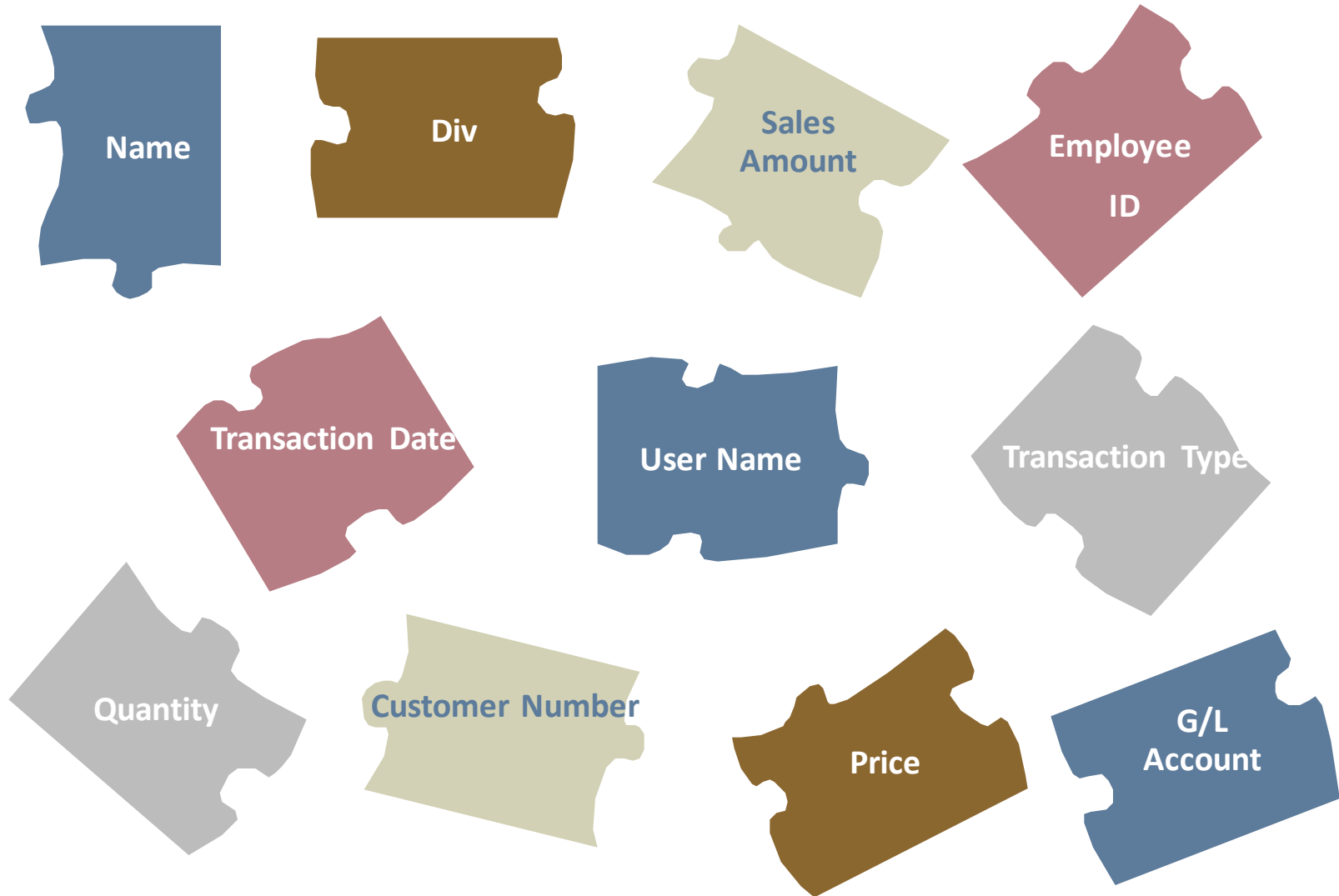
CAATS

Data Mining

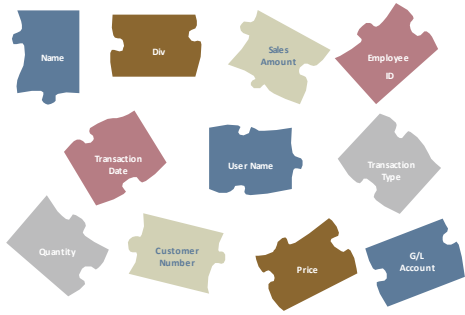
Data Analysis is

the *extraction* of data from a client's information system in order to perform data selection, classification, ordering, filtering, translation, and other functions to provide the client with *information* about their *business processes*

What is Data?



Data Becomes Reports



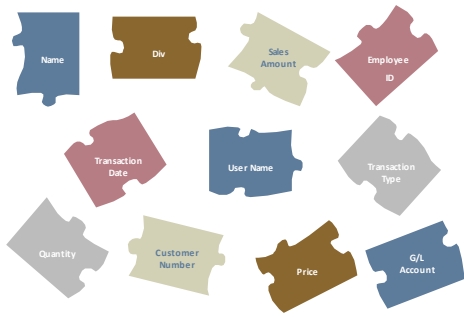
Data File



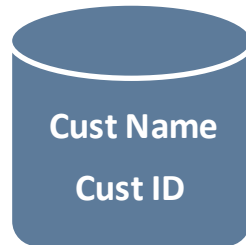
Client
Application
Program

Inventory Report					
Warehouse	Part	Description	Quantity	Unit Cost	Extended Cost
1	5340	XJ4701	540	1.65	891.00
1	5560	LN502	1005	.79	793.95
4	4061	SR437	6057	.85	5148.45
4	9011	CF605	275	2.25	618.75
10	5560	LN502	850	.74	629.00
10	4831	JR864	579	1.15	665.85

With Data Analysis...YOU Design Reports



Data File



Summarized by Part Number				
---	---	---	---	---
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Extensions & Footings Verified				
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Excess Inventory				
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Unusual Items				
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What is data analytics?

For Internal Audit this means audit scopes and annual audit plan better focused on risks

The process of inspecting, cleansing, transforming, and modeling data sets with the objective of highlighting meaningful information, drawing conclusions, and supporting decision making.

Converting Information to Insight

Protiviti Mission Statement



Our Mission is to help companies harness their data to make **intelligent business decisions** that drive **performance** and **growth** while managing risks. We deliver **customized solutions** in the areas of data strategy, advanced modeling and analytics. We help our clients **face the future with confidence** by sharing leading practices, building meaningful relationships, and delivering excellence.

Data analysis & tools – part of our day to day life

Data analysis & tools part of our day to day life



Smart watch - No. of steps in a day, weekly/ monthly trend; calorie intake/ burn



Mobile phone

- Data usage pattern - how much data you use and what is right plan for you
- Storage (Documents, Images, Audio, Video, Application), Memory, Junk Files, Junk cleansing



Public domain search history - Analysis of your search habits/ patterns



Cricket or any other sport: Strike rate, batting average, economy, Best batsman & bowler (based on points)

Data analysis & tools part of our day to day life



CIBIL Score is a three-digit numeric summary of your credit history. The score is derived using the credit history found in the CIBIL Report (also known as CIR i.e Credit Information Report). A CIR is an individual's credit payment history across loan types and credit institutions over a period of time



Credit card reward points

- 5 points on every Rs 150 spend, each point is Re 1
- 10X reward points on specific merchant transactions



Credit card usage/ spend pattern

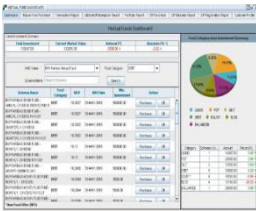
- Where are you spending more
- How much you exceeded your budget

Data analysis & tools part of our day to day life



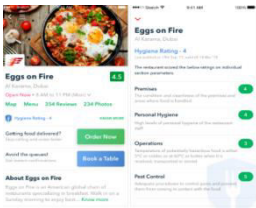
Your car digital dash board

- Mileage
- How many kms vehicle can go with existing fuel & mileage



Mutual fund investment portfolio (SIPs)

- CAGR
- Absolute return



Ratings

- Zomato for restaurants
- Bookmyshow & others for movies
- Tripadvisor for hotels
- Ola/ Uber rating

Protiviti survey results on data analytics

Protiviti survey results on data

analytics

The digital data universe is growing 40% year on year into the next decade and will have as many digital bits as there are stars in the universe. It is expanding to include not only the increasing number of people and enterprises doing everything online, but also all the smart devices connected to the Internet, unleashing a new wave of opportunities for businesses. This data explosion has created opportunities for enterprises to use data in new ways – to learn about customers, hasten business cycles, transform themselves or simply stay relevant.

In recent research conducted across 400 companies worldwide, only 4% of the organizations are efficient in deriving value from their data. Not coincidentally, these organizations are within the top 25% in their respective industries. They consistently demonstrate a quick response to market changes, are more robust than peers in facing recession and excel in financial performance.

Investment in analytics has increased to 3% of revenue on an average across all industries. Companies are realizing that the competitive advantage of such investment is decreasing with time, and gradually becoming industry best practice. Therefore, the size and urgency with which these investments are made have also increased.

Protiviti survey results on data analytics

Top risks

Use of data analytics and “big data” to achieve market intelligence and increase productivity and efficiency – Inability to utilize data analytics and “big data” to achieve market intelligence and increase productivity and efficiency may significantly affect our management of core operations and strategic plans.

Existing operations may not be able to meet performance expectations related to quality, time to market, cost and innovation as well as our competitors, especially new competitors that are “born digital” and with a low cost base for operations, or established competitors with superior operations.

“In a digital world, the future auditor recognizes the opportunity to embrace analytics if he/she has yet to embark on that journey. The ‘analog’ approach to auditing has little use in an increasingly digital world.”

– “The Future Auditor’s Advancement of the Audit Committee Relationship,” *The Bulletin* (Vol. 6, Issue 7), Protiviti, www.protiviti.com/bulletin.

Internal audit standard requirements on data analytics/ tools

Internal audit standard requirements on Data Analytics/ Tools

Performance Standard 2310: Internal auditors must identify sufficient, reliable, relevant and useful information to achieve the engagement's objectives.

Performance Standard 2210: Objectives must be established for each engagement.

Performance Standard 2320: Internal auditors must base conclusions and engagement results on appropriate analyses and evaluations.

ISACA Data Analytics – A practical approach: Data Analytics involves processes and activities designed to obtain and evaluate data to extract useful information.

Internal audit standard requirements

on Data Analytics/ Tools

SIA 6 – ANALYTICAL PROCEDURES: The internal auditor should apply analytical procedures as the risk assessment procedures at the planning and overall review stages of the internal audit.

“**Analytical procedures**” means the analysis of **significant ratios and trends**, including the resulting investigation of fluctuations and relationships in both **financial and non-financial data** which are inconsistent with other relevant information or which deviate significantly from predicted amounts.

Factors to be considered in determining the extent to which the analytical procedures should be used:

- The significance of the area being examined.
- The adequacy of the system of internal control.
- The availability and reliability of financial and nonfinancial information.
- The precision with which the results of analytical procedures can be predicted.
- The availability and comparability of information regarding the industry in which the organization operates.
- The extent to which other auditing procedures provide support for audit results.

Investigating Unusual Items or Trends:

When analytical procedures **identify significant fluctuations** or inconsistencies, the internal auditor should investigate and **obtain adequate explanations and appropriate corroborative evidence**. The examination and evaluation should include inquiries of management and the application of other auditing procedures until the internal auditor is satisfied that the results or relationships are sufficiently explained. **Unexplained results** or relationships may be **indicative of a potential error, irregularity, or illegal act**. Results or relationships that are not sufficiently explained should be communicated to the appropriate levels of management. The **internal auditor may recommend appropriate courses of action**, depending on the circumstances.

The analytics advantage

Why use data analytics?



1 Transform a flood of data into meaningful information

2 Facilitate risk identification, measurement and profiling – answer important business questions

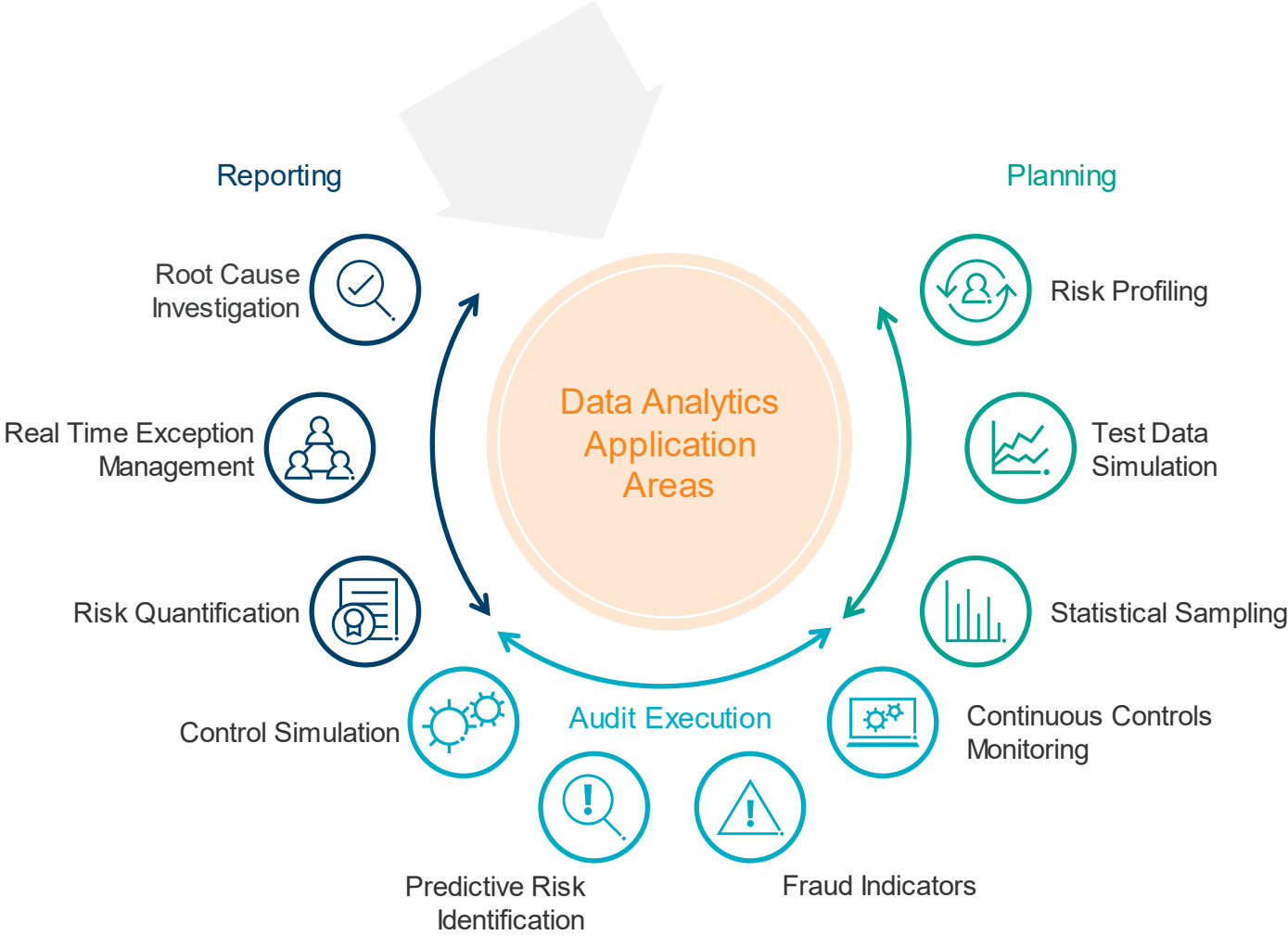
3 Increase testing quality and insight:

- Test 100% of populations instead of sampling
- Provide true error rates rather than error estimates
- Highlight trends and factors that may not be noticed through conventional audit techniques
- Identify interesting subsets of the population for testing and new unseen relationships

4 Increase productivity and efficiency

5 Deliver value-added suggestions and/or provide ongoing analytics tools to management

The analytics advantage



Integrating analytics into the audit

The entire audit process from scoping to reporting is affected by integrating analytics

process

Traditional Audit Steps

Confirm objectives and approach



Identify potential analytics

Confirm detailed scope



Identify potential issues

Kick-off audit



Sample testing



Targeted testing

Reporting



Visualize results

Integrated Analytic Audit Steps

SIA -5 Sampling

Introduction:

When using either **statistical or non-statistical sampling methods**, the internal auditor should **design and select an audit sample**, perform audit procedures thereon and **evaluate sample results** so as to **provide sufficient and appropriate audit evidence** to meet the objectives of the internal audit engagement unless otherwise specified by the client.

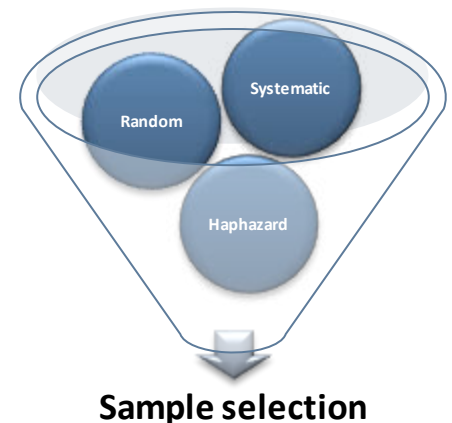
Important points to be noted:

- When designing an audit sample, internal auditor should consider specific audit objectives, the **population** from which internal auditor wishes to **sample and the sample size**.
- When determining the sample size, internal auditor should **consider sampling risk, tolerable error** and the **expected error**.
- **Sample items should be selected** in such a way that the sample can be expected to be **representative of the population**. This requires that all items or sampling units in the population have an opportunity of being selected.

Finally, the internal auditor should **evaluate the sample results** to determine whether the assessment of the relevant characteristics of the population is **confirmed or whether it needs to be revised**.

While there are a number of **selection methods**, three methods commonly used are:

- **Random selection and use of CAATs**
- **Systematic selection**
- **Haphazard selection**



Identify the starting point

- • • Indicators of Analytics Needs

Repetitive Audit Procedures

Audits repeat across business units, locations, geographies or time (e.g., annual SOX testing, location-based audits, etc.)

Information Exists in Unstructured Data

Information is captured in unstructured data format that is difficult to mine/report on

System Processing/Data Integrity Issues

System processing or data/report integrity issues are suspected or have existed in the past

Common Process Areas

Audit of a process where analytics are frequently applied

Manual Audit Procedures

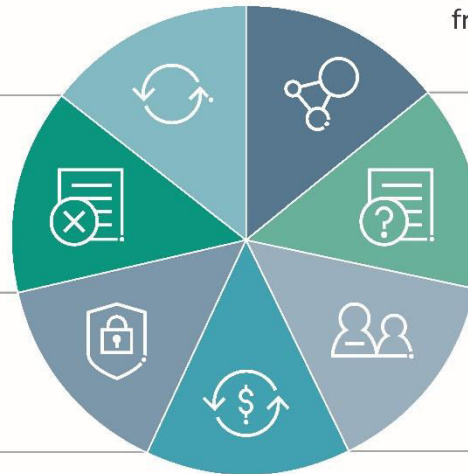
Traditional audit procedures in the area are extremely manual, time-consuming and/or tedious to perform

Inadequate Management Reporting

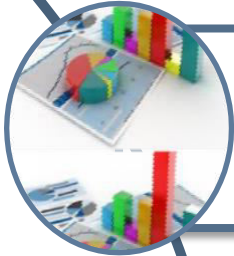
Business or management reporting in the area audited would not sufficiently identify risks or process breakdowns

High Transaction Volumes

The area audited includes high transaction volumes that are retained over meaningful periods of time



Identify the starting point



Board and AC asking us to back-up our gut feel with hard data and facts



C Suite want a quantitative understanding of risks and their relative importance in real numbers



Management has greater responsibility to foresee future risks long before they manifest themselves



Data Analytics is becoming a mainstream competency for all Internal Audit Professionals

Analytics types

Audit Analytics

Risk Assessment: Analytics as a precursor to Audit to identify risk profile and prioritize Audit activities

Sampling analytics: Sample large and complex population through modeling and sampling algorithms

Strategy development: Maturity and readiness assessment, Feasibility study, Gap analysis

Continuous audit: Solution design:
Tools selection, solution blueprint, Analytics Scope definition

Continuous Audit: Implementation
Automate data analytics for specific processes through a library of business rules, covering 100% of population.

Data visualization & reporting

Executive dashboards: Build interactive Reporting and Data Visualization solutions on top of the existing enterprise data store for decision-makers

Mobile dashboards: Live and On-the-Go Dashboards on your Mobile Devices refreshed in near real-time

Operational dashboards: Address reporting / coverage gaps in existing BI solutions through custom Dashboard

Dynamic reporting solutions: 'What-If' and 'Predictive Analysis through interactive Dashboard applications

Analytics types

Business Analytics

Inventory Optimization: Just in time inventory to optimize your supply chain costs

Customer Analytics: Increase loyalty and share of wallet. Offer personalized and differentiated customer experience

Revenue leakage analytics: Identify missing revenue in complex value chains

Spend analytics: Provide visibility into Procurement and Supplier performance and anomalies

Route optimization: Logistics Optimization and increase in operational efficiency

Cost & margin analysis: What-If analysis of cost and revenue variables to determine optimal margins

Data Management

Master Data Assessment
Assessing Master Data and Gaps as compared to standards

Data Governance Framework and Processes:
Define governance processes and the guidelines to drive data governance

Data Cleansing:
Identify, assess, measure and remediate data quality of key data elements

Data analytics – used cases

Manufacturing unit - Service certification and contract review

1	Service certification summary for the audit period for the plant
1.1	- Service code & description wise certification - In count and value
1.2	- Vendor wise services certified - In count and value
1.3	- Service code wise, vendor wise services certified - In count and value
1.4	- Manpower based services certified - In count and value
1.5	- Non-Manpower (Output/ Activity) based services certified - In count and value
1.6	- Department wise services certified - In count and value
1.7	- Department wise, vendor wise services certified - In count and value
1.8	- User wise (A1, A2, A3) JMS certified - In count and value
1.9	- User wise (A1, A2, A3), vendor wise JMS certified - In count and value
1.1	- User wise (A1, A2, A3), Service wise, vendor wise JMS certified - In count and value
2	Contract summary - ARC entered during audit period
2.1	- Service code wise no. and value of ARC
2.2	- Service code wise no. and value of ARC finalized at plant level
2.3	- Service code wise no. and value of ARC finalized at HO level
2.4	- Service code wise no. and value of OTC
2.5	- Service code wise no. and value of work orders raised at plant level
2.6	- Vendor wise ARC finalized at plant level - No. and value
2.7	- Vendor wise ARC finalized at HO level - No. and value
2.8	- Vendor wise OTC finalized at plant level - No. and value
2.9	- Vendor wise listing of ARCs and OTCs finalized at plant level with ARC & OTC dates
2.10	- Vendor wise listing of ARCs finalized at HO level with ARC dates
2.11	- Service code wise no. of vendors and value of contracts - Find out single source
2.12	- Service code wise rate comparison across sites and identify service wise major variances

Potential Internal Audit Analytics

Order-to-Cash	Payroll	Purchase-to-Pay
Valid Sales Orders	Accurate & Authorized Payments	Duplicate Payments
Accurate Product Pricing	Timely and Accurate Hires & Terms	Unapproved Purchases
Authorized Shipments	Reasonable Overtime & Commissions	Payments for Items not Received
Proper Invoicing	Proper Timekeeping and Attendance	Payments Exceeding Approval Levels
Valid Cash Receipts	Non-existent employees	Missed Discounts or Credits
Timely Collections & Write-Offs	Unusual trends between periods	Improper Payments and Questionable Disbursements
Sales Contract Compliance	Payroll fraud schemes	Schemes (e.g., Phantom Vendors, Kick-backs, Dormant Accounts)
Manual Adjustments	Inventory Management	Travel & Entertainment
Cancelled Orders	Customer Returns	Purchasing Cards
Changes to Customer Orders	Slow Moving and Aged Inventory	Changes to Vendor Payment Details
On-Time-Delivery	Days Inventory On Hand	Employee Vendors
Credit Memo Reasons and Frequency	Inventory Adjustments	Payment & Purchase Order Overrides
Accounts Receivable Balances	Cycle Count Adjustments	Payment methods and times
New customer trends	Shipping Methods and Utilization	General Data Quality
Changes to customer information (e.g., payment terms and credit limits)	Standard Cost Variances & Changes	Reasonable / Within Expected Range
General Ledger	Bill of Material Variances & Changes	Validity
Journal Activities	Margin by Item	Complete
Manual Adjustments	Date and Time of Receipts	

Our government is using Data

Applications

“Project Insight, the big-data analytics project of the I-T department, among other things, aims at matching spending patterns of individuals with their declared income, to detect any tax evasion. Mandatory filing will aid in this exercise,” explains a government official.

- ▶ Mandatory filing of tax returns even if income is below exemption limit if amount spent on foreign travel exceeds ₹2 lakh or annual electricity bill exceeds ₹1 lakh

The analytics key

I know the objective,



I know the business question,

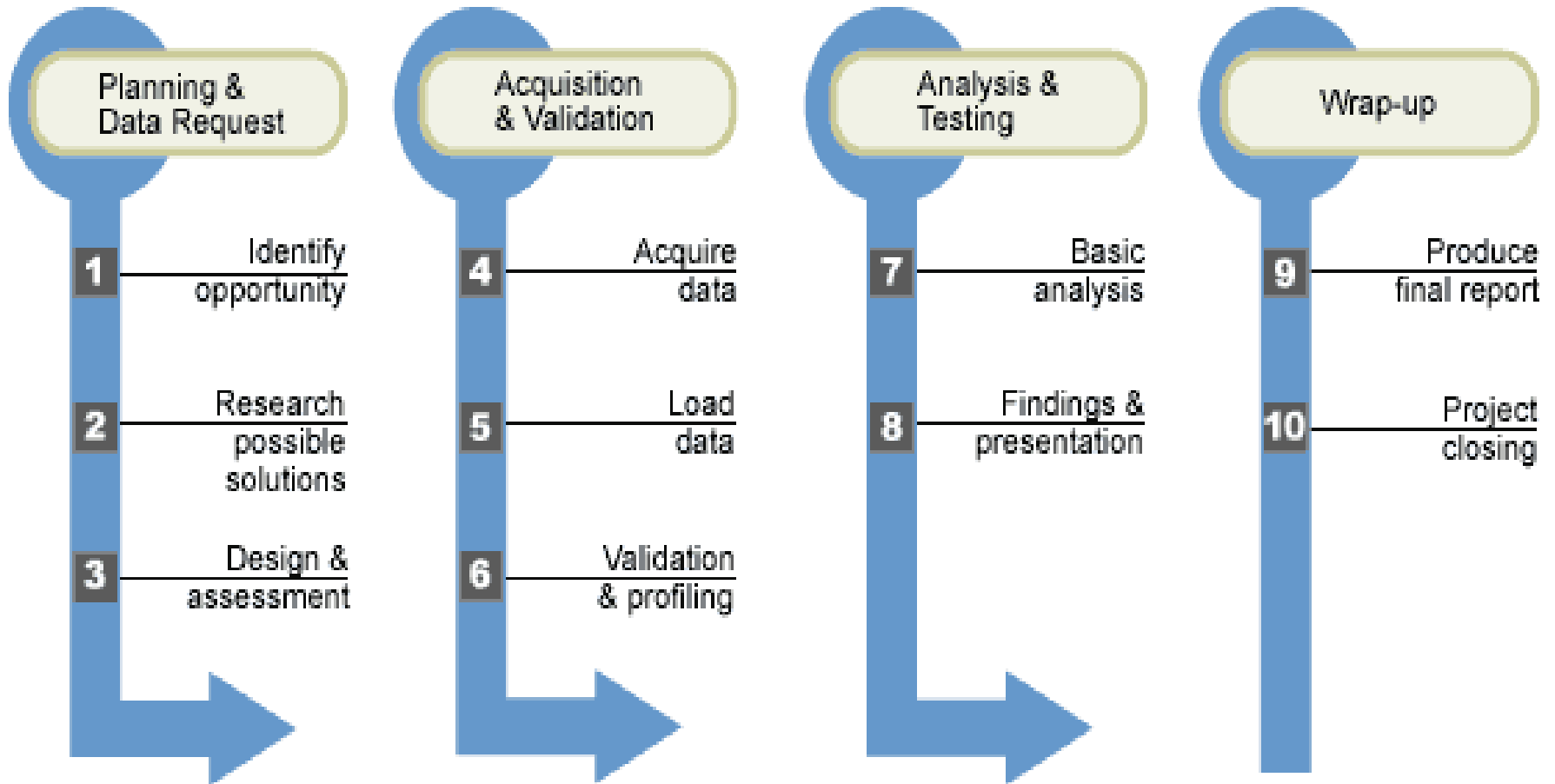


I have clarity on output format.



Data analytics – suggested approach

Data analytics – Suggested approach



Data analytics – Challenges

Data analytics – Key challenges

Absence of leadership support

Lack of Management Buy-In and Leadership to drive Analytics within IA

Lack of clarity on objective

Lack of a well-defined analytics objective and dealing with False Positives

Insufficient planning

Understanding how data is created, processed, and consumed; and how it drives business activities and decision-making. Carefully identifying which analytics are likely to yield the most valuable results

Focusing too much on the tool versus the outcome

- 80% of time spent on understanding the data, the business process it supports, and the activities and decision-making that it drives, along with the business value the analysis is designed to deliver.
- 20% of time spent on the technical aspects of the analysis, including the tool.

Data analytics – Key challenges

Poor data quality

A common challenge is access to QUALITY data.

The big bang approach

The 'Big Bang' Approach – trying to do everything is a recipe for failure

Getting the right partner

Getting the right Partner – 'If you have to wrestle with an elephant, get help'

Creating a silo rather than awareness

- Develop an understanding of the data to create a business-centric view of analytics as opposed to a technology-only view.
- Technical competence is necessary (absolutely) but avoid creating a silo.
- Collaboration with IT, Operations and Senior Leadership

Data analytics – Key challenges

Narrow thinking

- Avoid thinking only about the “old benefits” e.g., testing a full population.
- Leading internal audit functions use analytics throughout the audit life cycle: Dynamic risk assessments, Monitor trends, fraud, and risk and performance indicators, Deviations from acceptable performance levels, Model business outcome

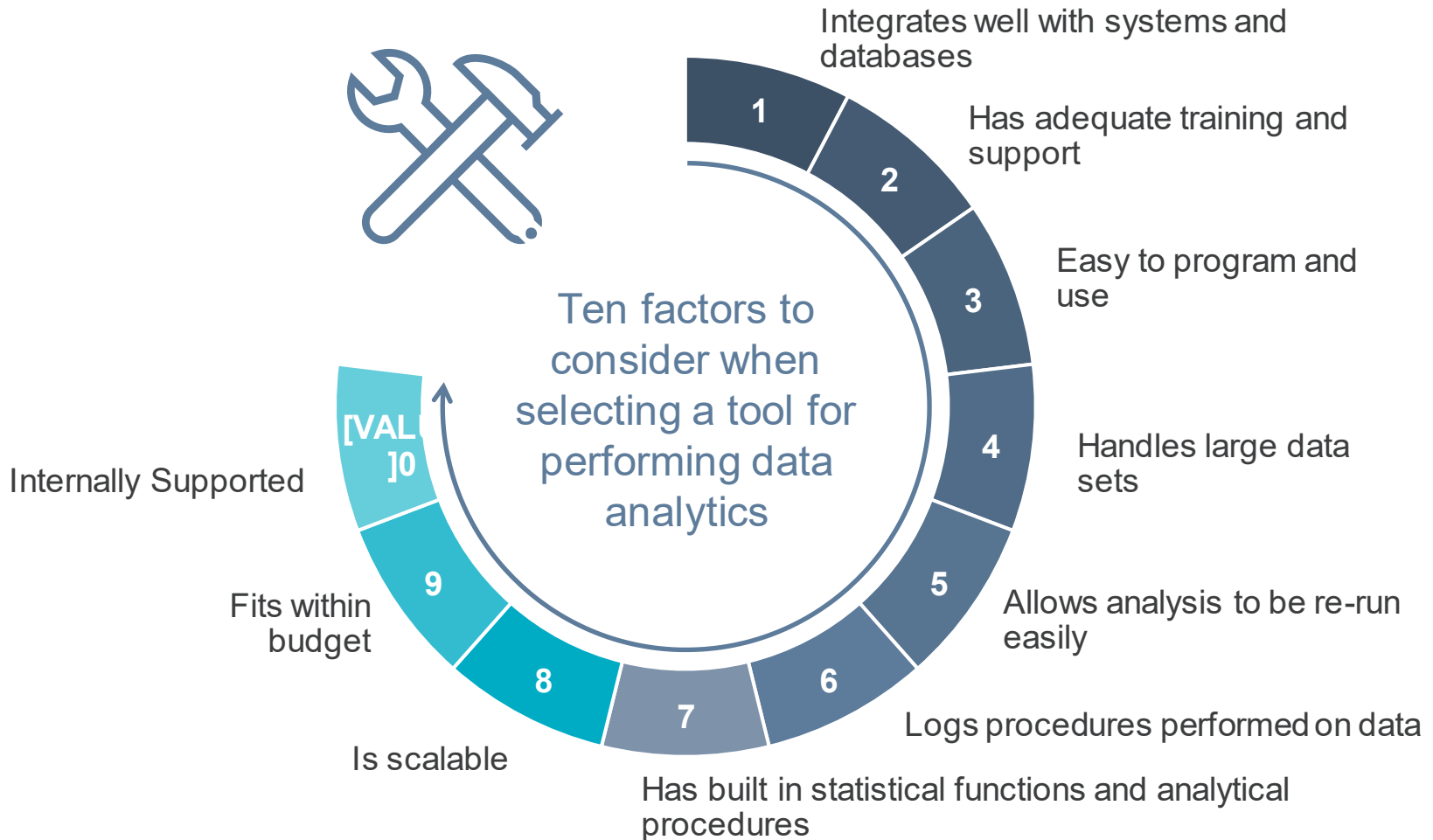
Uninspired reporting

- There is no excuse for using old-style tables and charts.
- Make use of widely available visualization tools – dynamic presentation of results and real time, drill-down capability.
- Visually compelling, high-impact reports help internal audit and internal audit clients quickly draw insights from data.

Selecting a right tool

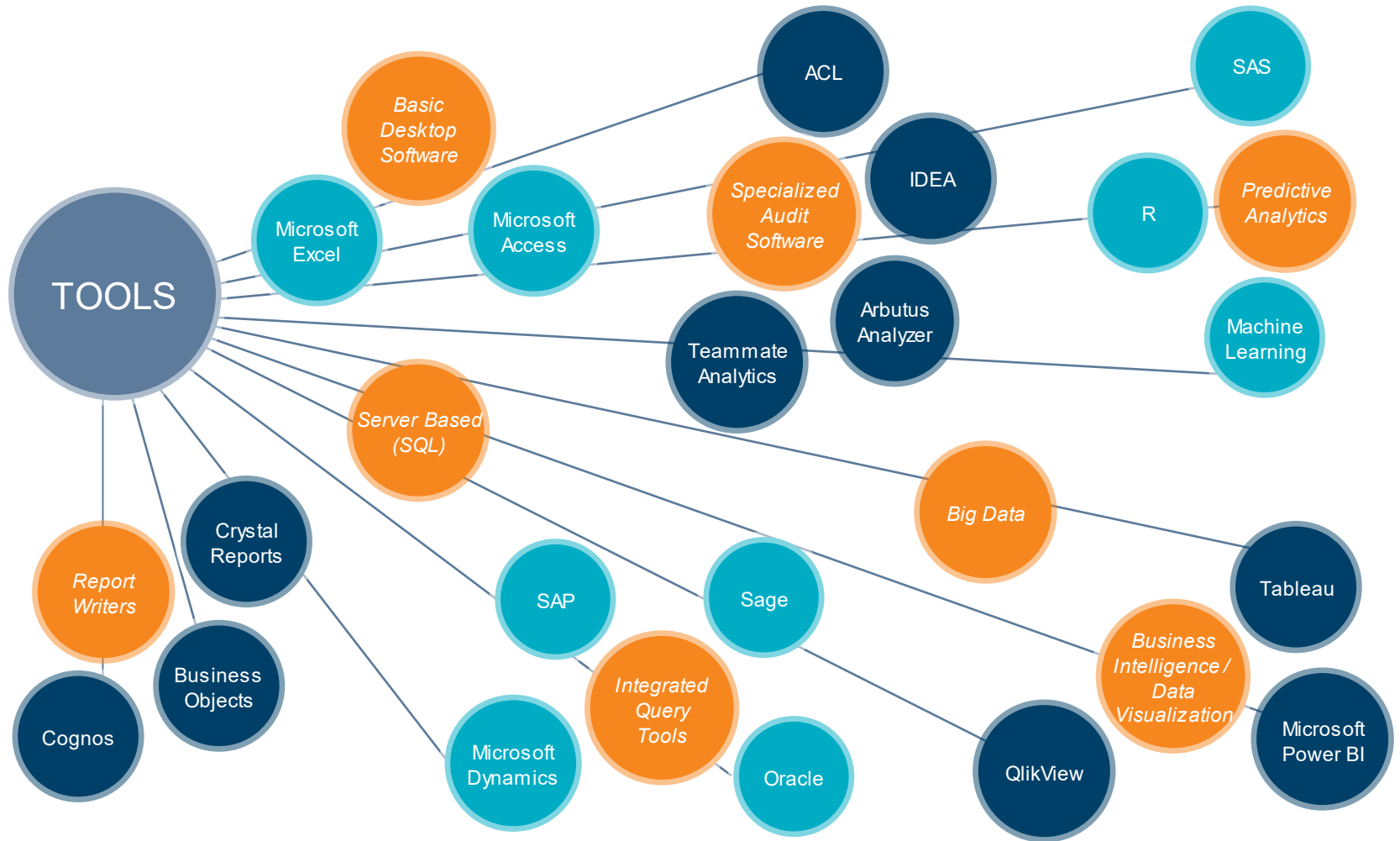
Selecting a right tool

Focus on selecting a tool that will work best in the target environment



Tools

An available tool supported by the data owners will be more likely to result in success



Technology evolution in internal audit



Utility Programs / Productivity Software:

E.g. Spreadsheet, Word Processing, Text Editing, Data Browsing



Risk and Audit Management Software:

E.g. TeamMate, Protiviti Governance Portal



Data Management Tools:

E.g. Pentaho, ETL Platforms



Analytics Tools:

E.g. ACL, IDEA, TeamMate Analytics, ISS CG Solutions, ESG Analytics, Main Data Group



Advanced Analytics and Statistical Tools:

E.g. R, SPSS, Statistical Sampling & Data Modeling Tools



Reporting and Dashboard Applications:

E.g. Tableau, Qlikview, Crystal Reports

Audit Management Software

Audit management software (AMS) features

Performing end to end audit from planning, execution, closure, reporting and QRM through AMS

- ✓ Risk Assessment,
- ✓ Audit planning and scheduling, Creation of audit program, Resource planning
- ✓ Field work & execution,
- ✓ Data repository, reporting, management action plan with dates, documentation,
- ✓ Quality & risk management,
- ✓ Follow-up audit.
- ✓ Project timeline and status monitoring
- ✓ Automatic notifications
- ✓ Dashboards
- ✓ Workflow based

Audit committee dashboard

Executive Control Panel

Summary	Real Estate	Aviation	Industry and Power	Ports and Free Zones	Banking and Finance	Commercial	Government
Count of Entities	3	2	1	3	1	1	1
Overall Entity Score (%)	74%	49%	87%	44%	40%	43%	73%
Macro Score (%)	33%	56%	75%	30%	10%	55%	84%
Residual Risk (%)	33%	55%	73%	36%	64%	78%	51%
Open Findings							



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Audit committee dashboard

Quarterly Follow up Update (Details)



Bahrain



Iraq



Jordan



Kuwait



Lebanon



Saudi Arabia



Sudan



South Sudan



Group

Snapshot of IA Testing		High	Medium	Low	Ageing of High Risk Issues					
Issues due for Implementation in Q4		118	391	262	Ageing of Issues	1 Jan 2017	Q1 2016	Q2 2016	Q3 2016	Q4 2016
Implemented/Partially Implemented as per Management Feedback		51	158	98	Carried Forward	92	70	63	59	56
Implemented/Partially Implemented, Pending IA Testing		18	54	36	Issues due in Q1 2016		26	18	13	11
Tested By Internal Audit		33	104	62	Issues due in Q2 2016			9	6	6
Internal Audit Testing Update	Implemented /removed	12	55	43	Issues due in Q3 2016				10	9
	Partially Implemented	12	42	13	Issues due in Q4 2016					29
	Not Implemented	9	5	4	Grand Total	92	96	90	88	111
Total Open Issues due but not Implemented/ Tested as of 31 Dec 2016		106	336	219	Ageing of Medium Risk Issues					
					Ageing of Issues	1 Jan 2017	Q1 2016	Q2 2016	Q3 2016	Q4 2016
					Carried Forward	329	305	248	231	212
					Issues due in Q1 2016		61	60	50	40
					Issues due in Q2 2016			37	31	28
					Issues due in Q3 2016				43	37
					Issues due in Q4 2016					34
					Grand Total	329	366	345	355	351

Revised Risk Grading(30Sep16):
Issues Due for implementation in Q4-values: **4** **Low**

Legal compliance tool

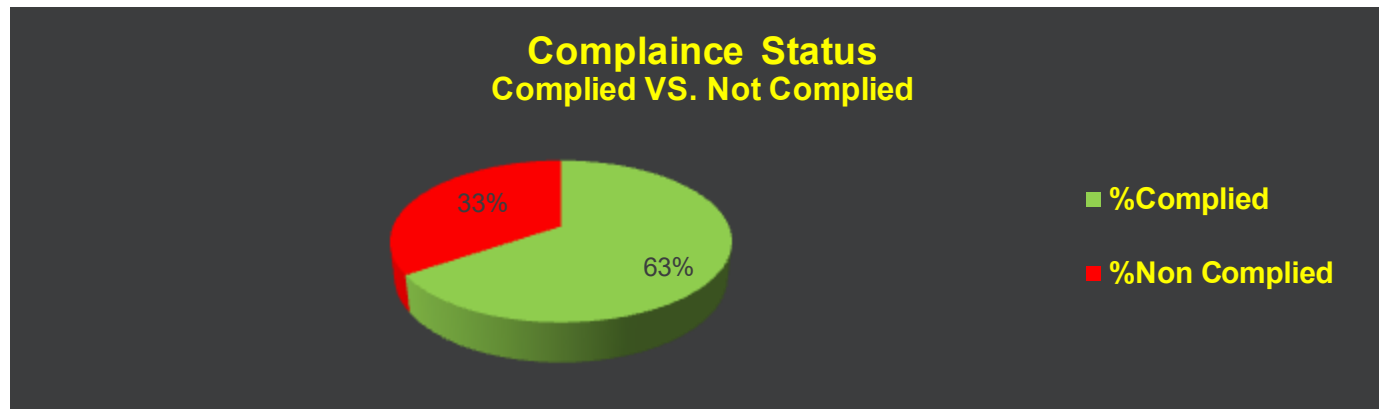
Compliance Tool

Compliance tools help organizations to discover and mitigate risks of non-compliance through technology-based solutions. It covers end-to-end compliance processes consisting of Regulatory, Contractual & Internal Compliant.

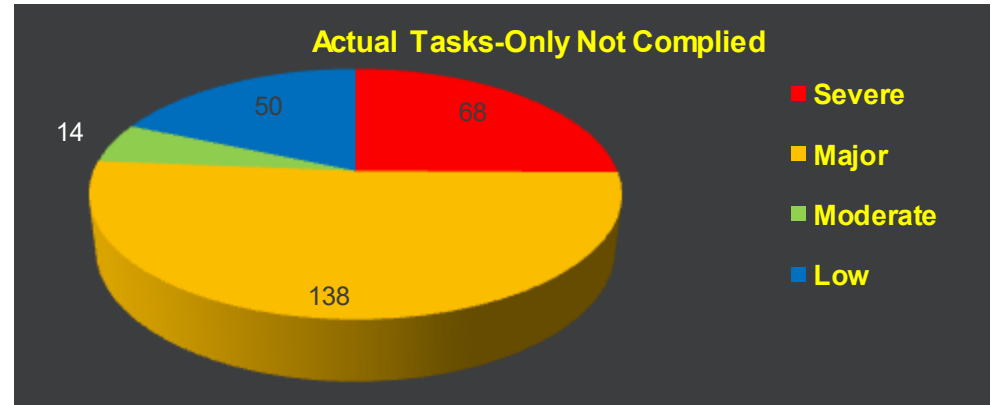
- ✓ Cover one-time, periodic/ongoing and event-based compliances, exhaustive coverage
- ✓ Workflow-based, compliance confirmations from users, customize as per user requirements
- ✓ Roles & responsibilities clearly defined, email reminders/notifications before due date
- ✓ Complete legal compliance documentation
- ✓ Monthly sign-off
- ✓ Multi-location
- ✓ Periodic updates
- ✓ Scalable and handle complex, large-size organization structure
- ✓ Supports audit

Compliance tool dashboard

Complied Vs. Not Complied				
Total Applicable Compliances	No of Complied Items	No of Non-Complied Items	%Complied	%Non Complied
813	514	270	63	33

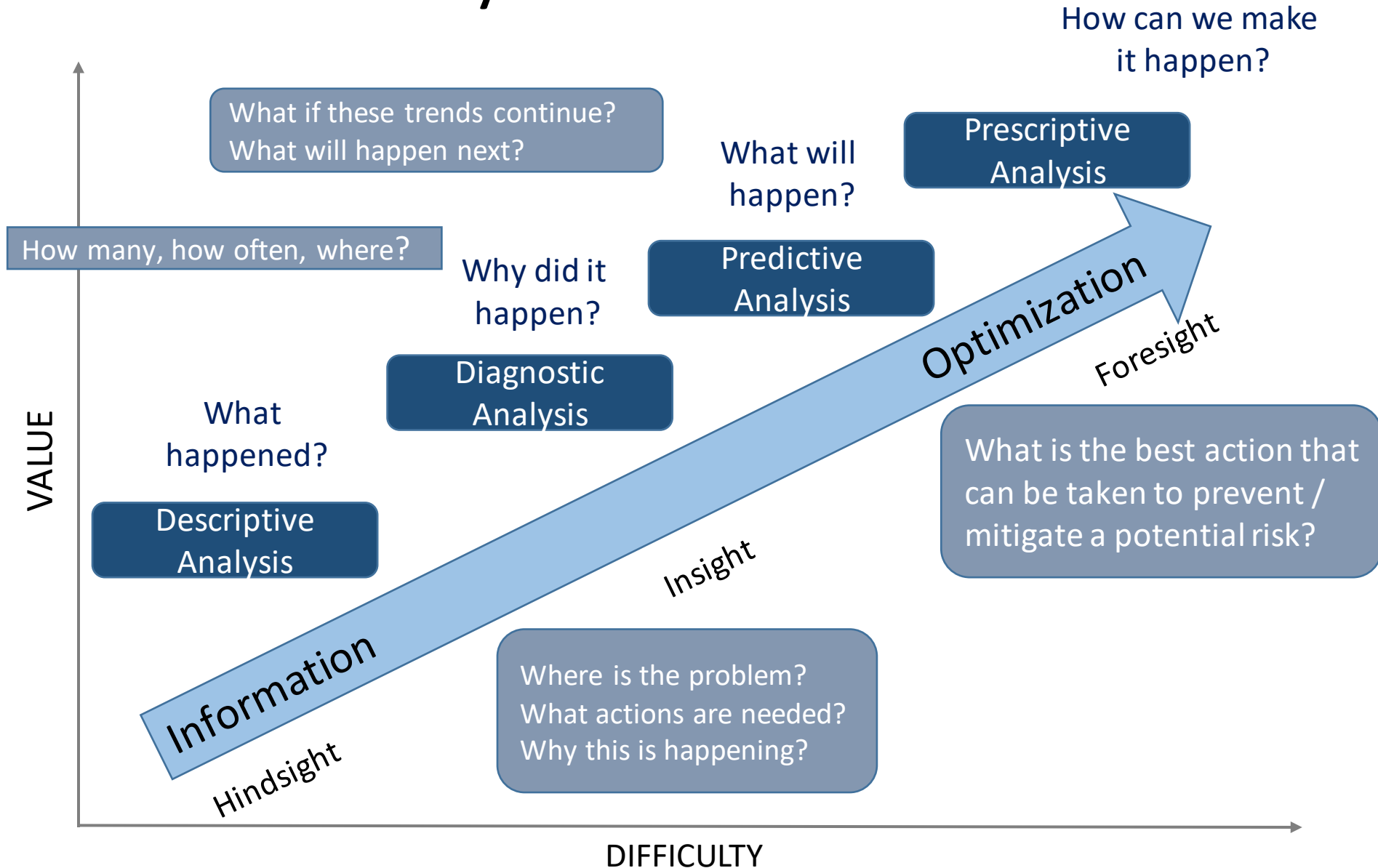


Not Complied			
Severe	Major	Moderate	Low
68	138	14	50

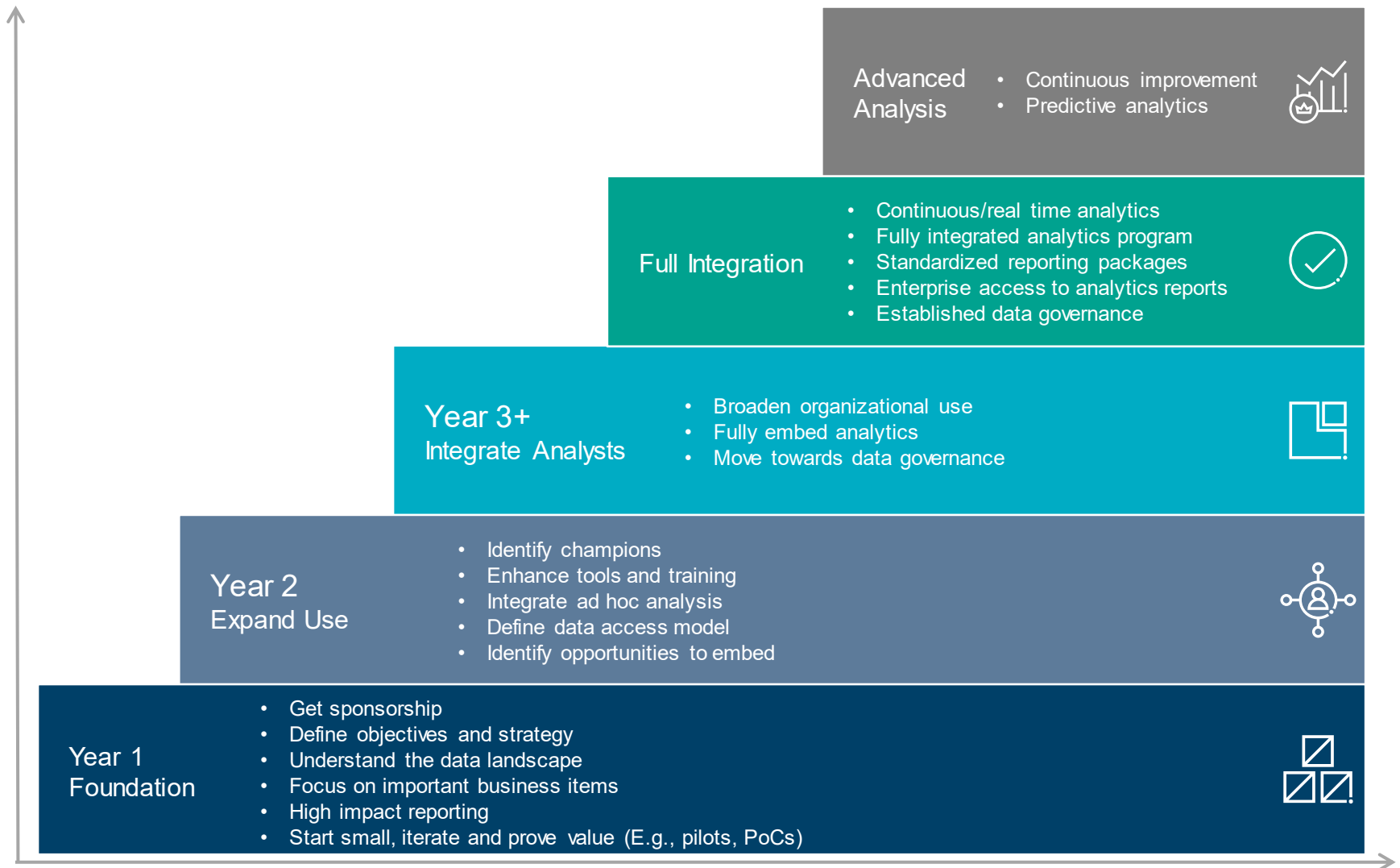


Data analytics journey

The analytics value escalator



Sustainable analytics – It's a journey



**If you change nothing,
nothing will change**

Questions / Open Discussion



*Thank You - learning
together is always a pleasure....*

Manindra Prakash
Director