DAY 3

Breakout Session 3: Data Analytics: The Power of Data

The focus will be on understanding the potential for data analytics to drive effective and efficient tax administration, including improving tax compliance and revenue collection, reducing tax fraud and errors, and enhancing taxpayer services. It will look at data analytics tools, techniques, and best practices.

Conceptual Presentation

• Mr. Anthony Mwandha, Risk Management Expert and Tax Administrations Advisor, Uganda

Case Studies Presentations

• Mr. Daniel G.P.M. Appiah, Tax Auditor, Ghana Revenue Authority

• Ms. Paulina Correa A., Chief – IT Planning, Internal Revenue Service (SRI), Ecuador

• Mr. Samuel Micah Gaalya, Technical Specialist – Digitalisation of Tax Administrations, Tax for SDGs, United Nations Development Pro gramme (UNDP)

Open discussion and Q&A

Moderator

• Ms. Tochukwu Sandra Onyemata, Communications and Liaison Manager, WATAF

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Presentation

Appiah, D. G. P. M. (2023). *Data Analytics: The Power of Data: Practical applications and experiences of the Ghana Revenue Authority (GRA) in using data analytics for tax administration*. Ghana Revenue Authority.

Correa, P. (2023*). Information Management*. Internal Revenue Service Ecuador.

Gaalya, S. M. (2023). *Data Analytics: the Power of Data: Technical Expert Digitalisation of Tax Administrations*. UNDP.

Mwandha, A. (2023). *The Power of Data Analytics in Revenue Administration*.

2nd nto

Technical Conference

hosted by ATAF

Data Analytics: The Power of Data.

Practical applications and experiences of the Ghana Revenue Authority (GRA) in using data analytics for tax administration

2nd nto Technical Conference hosted by ATAF

Background

- Ghana Revenue Authority(GRA), Ghana's tax administration momentum for data analytics drive started gaining ground during late 2009 after the integration of the Internal Revenue Service, the Customs, Excise and Preventive Service and the Value Added Tax Service.
- GRA set up the Data Mining & Analytics Unit during Mid 2020. The Unit is made up of experts in the field.

Practical Applications & Experiences

S/N	Project Name	Applications	Experiences
1	Enterprise Data Warehouse & BI Solution	A data repository for GRA	DW served as a one-stop source of data.
2	Audit Management Solution	An audit module	AMS used by auditors in their audit process. Worked both on-site and off-site
3	Taxpayers’ Portal	Online taxpayers' portal	An online portal that enables taxpayers to file returns, pay outstanding liabilities, apply for Tax clearance certificates, access their statement
4	Revenue reporting dashboard	Reporting dashboard	A dashboard to report on revenue collection and related activities to top management
5	Third-Party Exchange	Exchange of third-party data	Data Exchange with other state institutions to enrich GRA’s KYC of taxpayer information
6	Handwritten Commodities Dashboard	Reporting dashboard	An explorative dashboard for taxpayer activities.

Practical Applications & Experiences

S/N	Project Name	Applications	Experiences
7	Data Governance Framework	Data Governance	Draft completed and shared with top management awaiting full implementation.
8	Electronic VAT	VAT Automation	System has started, where GRA receives live output VAT (Sales) data of taxpayers via API.
9	High Net Worth Dashboard	Reporting Dashboard	Evolved a BI dashboard to identify HNW persons using various sources of data as lead for the HNW Auditors.
10	Computer Assisted Audit Tools(CAATs)	CAATs	GRA deployed CAATs to assist auditors in analysing large data that could not be manipulated in MS Excel.
11	CRS Data Movement (AEOI)	CRS	Deployed analytics on CRS information with the EOI team
12	Data Submission Portal	Tax Administrator-Taxpayers data exchange	A cloud-based platform that enables taxpayers to securely submit their data & files to GRA Tax Auditors for tax purposes. This is an extension of the Audit Management Software.(Audit Model in GITMIS)

Practical Applications & Experiences

S/N	Project Name	Applications	Experiences
13	GRA Risk Engine	Risk Engine	Deployed a risk engine for tax auditors
14	Integrated Compliance Improvement Group	Compliance Report	A compliance dashboards to report on the compliance performance of GRA on all relevant areas' alignment with TADAT
15	National ID number as TIN	GIN-TIN	To expand the tax net, the ID number of the national ID cards (Ghana Card) are now the Tax Identification Numbers(TIN)
16	E-Commerce	Digital Services Registration for Non-Residents E-Commerce filing	This tool enables non-residents digital services to register and file returns. For example; Meta(Facebook), Alphabet (Google) and others have successfully registered and have started filing returns

Revenue Impact

- Ghana Revenue Authority(GRA) witness increase in taxpayer compliance and growth in revenue in both the Domestic Tax and Custom Divisions respectively.

Amount in Millions of GHS

Year	Actual	Target	Dev	YoY Growth
2019	43,907.12	42,076.16	4.4%	
2020	45,402.61	42,769.50	6.2%	3.4%
2021	57,433.38	57,055.57	0.7%	26.5%
2022	75,706.34	71,948.76	5.2%	31.8%
2023 - Target				49.5%

Source: GRA's Annual Report

- There was a sharp increase in revenue collection from 3.4% in 2019 to 26.5% in 2020.
- Subsequently increased by 31.8% in 2022.
- In 2023, we are envisaging a growth in revenue collection by close to 50% increase in revenue over 75.7billion cedis of revenue collection in 2022

Conclusion

- Tax administrators could recruit expert in the field of data science, artificial intelligence and blockchain to guide in the implementation of the digitalisation of tax in the respective jurisdictions.
- Tax administrators could discover their challenges before adopting the type of technology to apply to address those identified challenges.
- The journey to digitalisation for tax administrator begins NOW!!!

THANK YOU

MERCI

¡GRACIAS!

2nd NTO Technical Conference

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Intra-European Organisation of Tax Administrations

INFORMATION MANAGEMENT

Content

1

Evolution of Organizational Structure

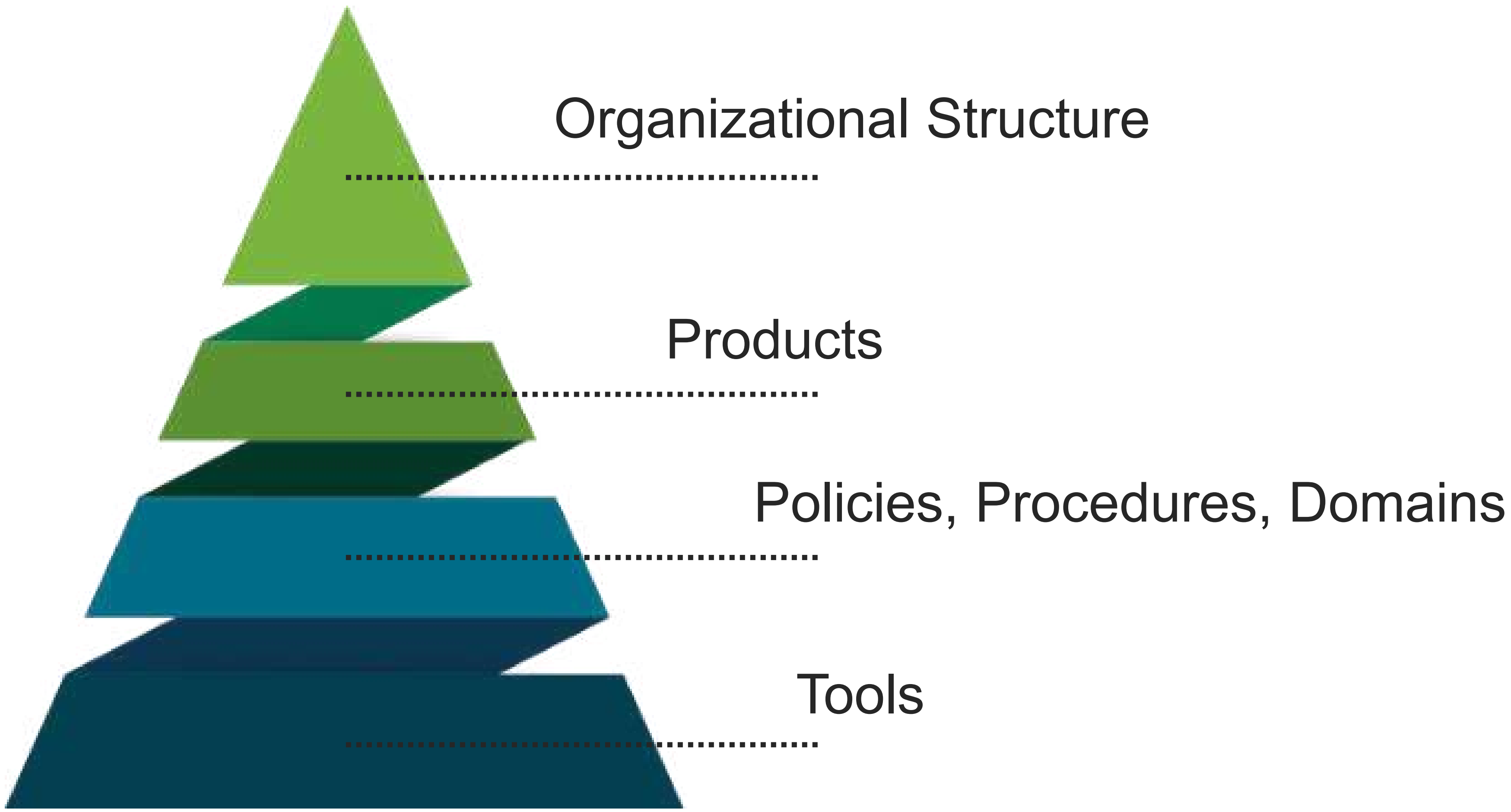
2

Information products and Tools

3

Information Management

INFORMATION MANAGEMENT



Organizational Structure Evolution

2008

- Business Intelligence (Development Department - IT)
- Information Systems

2014

- Datawarehouse (Development Department - IT)
- Information Intelligence

2019

Information Intelligence (Compliance Unit)

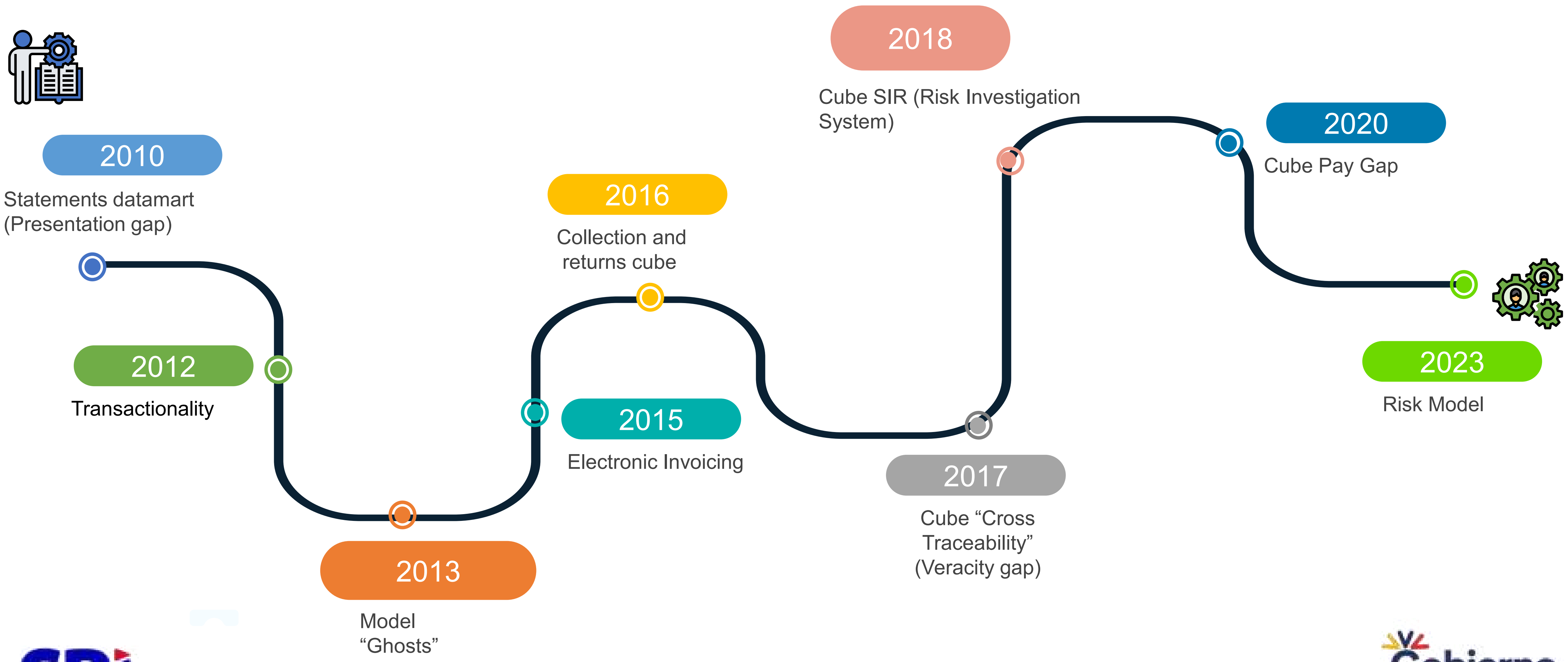
2023

- IT Planning
- Data Engineering
- Information Management

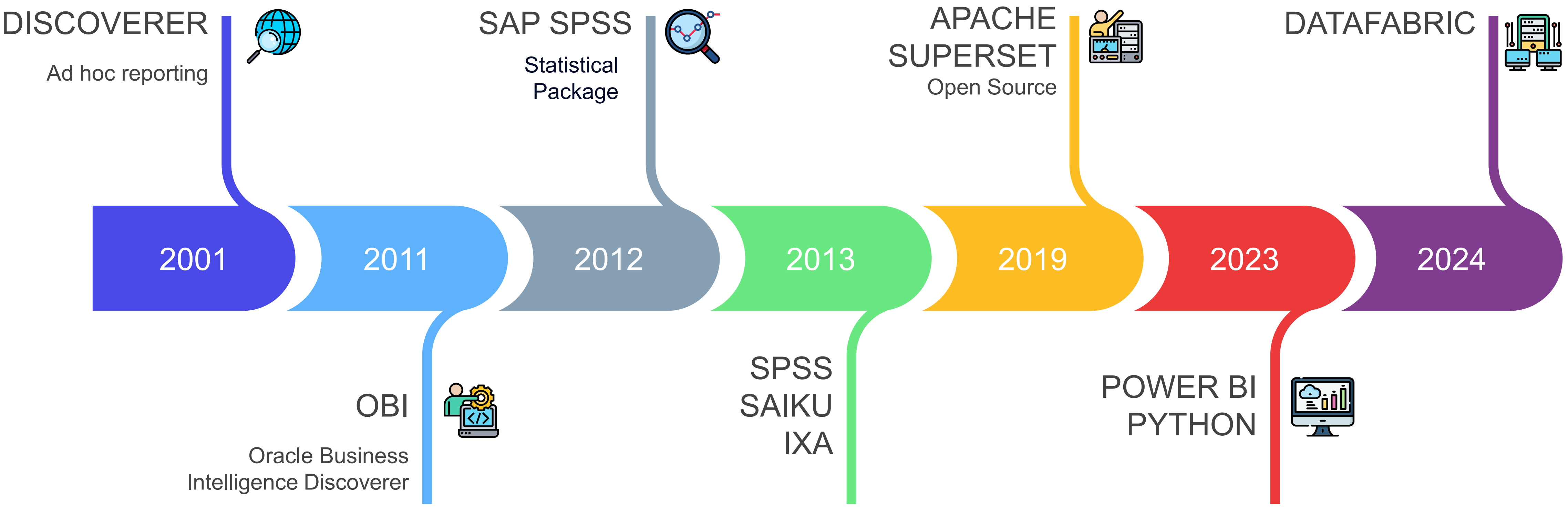
SRI

Gobierno del Ecuador

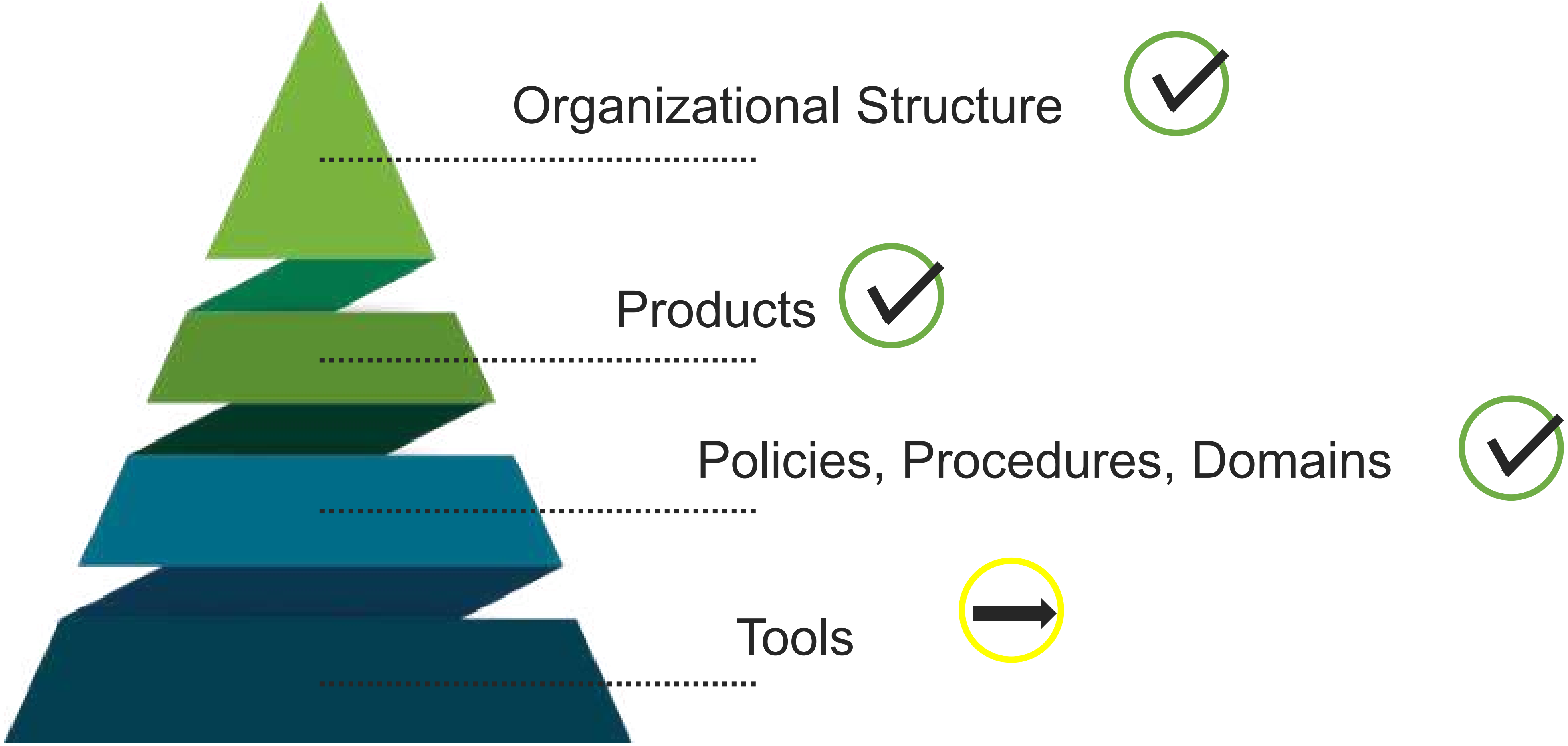
Products


2010
Statements datamart
(Presentation gap)
2012
Transactionality
2013
Model
“Ghosts”
2015
Electronic Invoicing
2016
Collection and
returns cube
2017
Cube “Cross
Traceability”
(Veracity gap)
2018
Cube SIR (Risk Investigation
System)
2020
Cube Pay Gap
2023
Risk Model

Tools


DISCOVERER
Ad hoc reporting
2001
OBI
Oracle Business
Intelligence Discoverer
2011
SAP SPSS
Statistical
Package
2012
SPSS
SAIKU
IXA
2013
APACHE
SUPERSET
Open Source
2019
POWER BI
PYTHON
2023
DATAFABRIC
2024

INFORMATION MANAGEMENT



Thanks

SRI

Gobierno del Ecuador

Data Analytics: The Power of Data

Technical Expert Digitalization of Tax Administrations
UNDP Tax for SDG Project

September 2023

Background

Tax for SDGs Initiative

1. Almost halfway implementation of SDG's achievement below benchmark
2. Financing Needs – 3.9 trillion USD
3. Debt, Interest Rates, Inflation
4. Urgent need to unlock DRM as a reliable source of financing
5. UN SGs report on reformation of International Financial Architecture

Case for DTA: Data Analytics

Tax for SDGs Initiative

Data analytics highlighted as a critical need in engagements with govt's i.e., CEP's, Workshops, Dialogues & Trainings

Challenges related to implementing data analytic solutions in Tax4SDG pilot countries

1. Shared understanding in the areas of data management & governance
2. Outdated business processes and technologies
3. Limited data capabilities; absence of data
4. Capacity building and skills transfer
5. Inadequate legislation & policy to enable use of modern data analytics tools to detect fraud, compliance & evidence-based decision-making
6. Lack of financing & increasing costs

UNDP Digital Transformation Support Areas

Tax for SDGs Initiative

1. Roadmaps/strategies, using help of FTA DTMM
2. Review & re-engineer NTA's business process & institutions capability
3. Capacity building to incorporate technological advances
4. Support access to concessional financing
5. Augment critical thinking in this area and support innovation

Activities being undertaken

Tax for SDGs Initiative

UNDP provides guidance, resources, and technical support to address digital transformation challenges.

- UNDP/OECD - TIWB
  - By June 2022, 110 programs in 56 Jurisdictions
  - US$1.7 Bn collected & US$ 3.7Bn additional assessment
  - Digital Forensic Labs in Honduras and Armenia to support Criminal Investigations
- Other Pilot Countries – Tanzania, Nigeria,Congo Brazzaville, Eswatini, Namibia, Sri Lanka & Lebanon.

- Review of Digitalisation Strategy - Tanzania, Nigeria
- Review and Developing data governance strategy for Tanzania, Maldives
- Developing Business Continuity Plan and Risk Management Policy in Maldives
- Workshop to review ICT Policy in Tanzania

Lessons learnt in Tax4SDG Focus Countries

Tax for SDGs Initiative

1. Increasing understanding of data governance and management
2. Effective communications and collaboration with stakeholders within govt internal & external with non government third parties data
3. Successful review of data standards, collections, sharing, governance, analytics, innovation and security frameworks
4. Continued research; emerging solutions with in tax administration e.g., distributed computing, data governance & innovations

Looking forward

Tax for SDGs Initiative

1. Foster Innovation – find some global solutions
2. Build synergy – support bilateral efforts and other multilateral initiatives, FTA, TIWB
3. As a multilateral organization work with partners in development, diffusion and incorporation of standards – making the process inclusive, and evidence based.
4. Access to concessional finance – critical to the achievement of SDGs

Tax for SDGs Initiative

UNDP

For more information contact taxforsdgs@undp.org

The Power of Data Analytics in Revenue Administration

Antony Mwandha

AFRICAN TAX ADMINISTRATION FORUM
FORUM SUR L'ADMINISTRATION FISCALE AFRICAINE

nto
United for better tax administration

WHAT I WILL BE COVERING.........

- Introduction:
- What is Data Analytics?:
- The Data Analytics Process:
- Benefits of Using Data Analytics
- Challenges to Revenue Authorities
- Risk Management and Security:
- Using External Data:
- Future Outlook:

Objectives

Understanding the potential for data analytics to drive effective and efficient tax administration

Outcomes

Appreciate data analytics for improved revenue collection

Future

A sneak peek into the future of data analytics for revenue administrations

What is Data Analytics?

What is

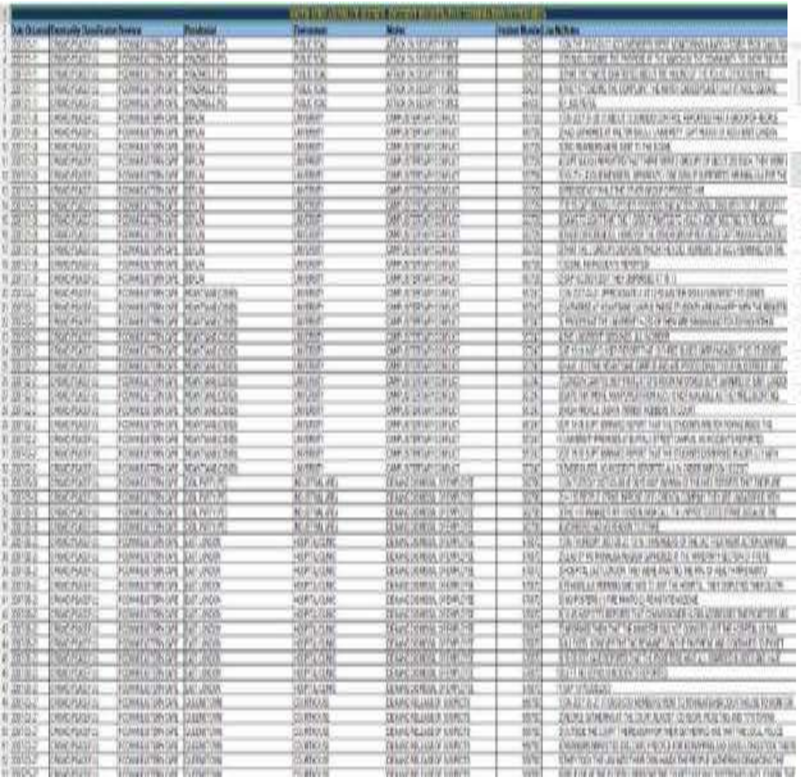
Aus Datenschutzgründen wurde das automatische Herunterladen dieses Bilds von PowerPoint gesperrt.

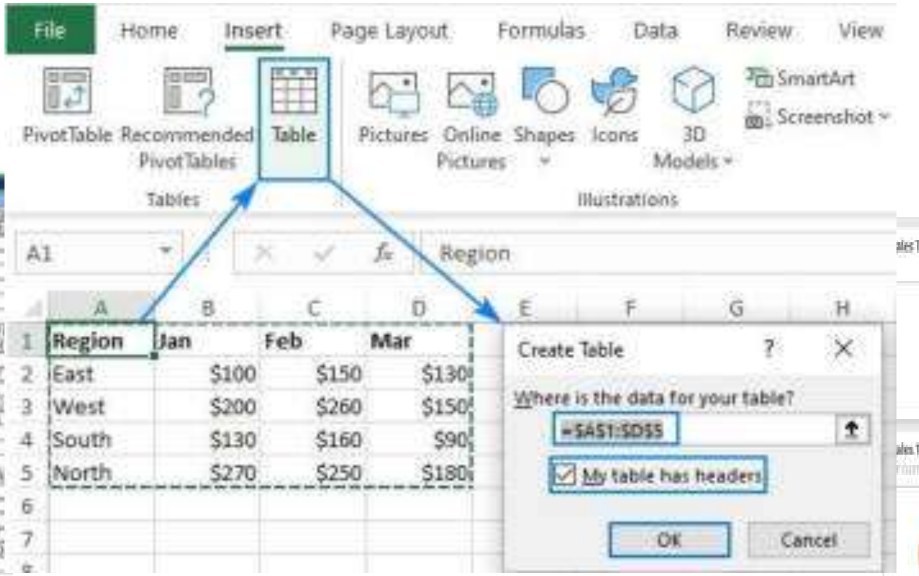
The process through which we deduce/infer insights from the tax data in order to get a better understanding of taxpayer behaviour and other characteristics in order to facilitate decision-making

The Science of analysing raw data to make conclusions about that information

What is Data Analytics ?

DATA





INSIGHTS

INFORMATION

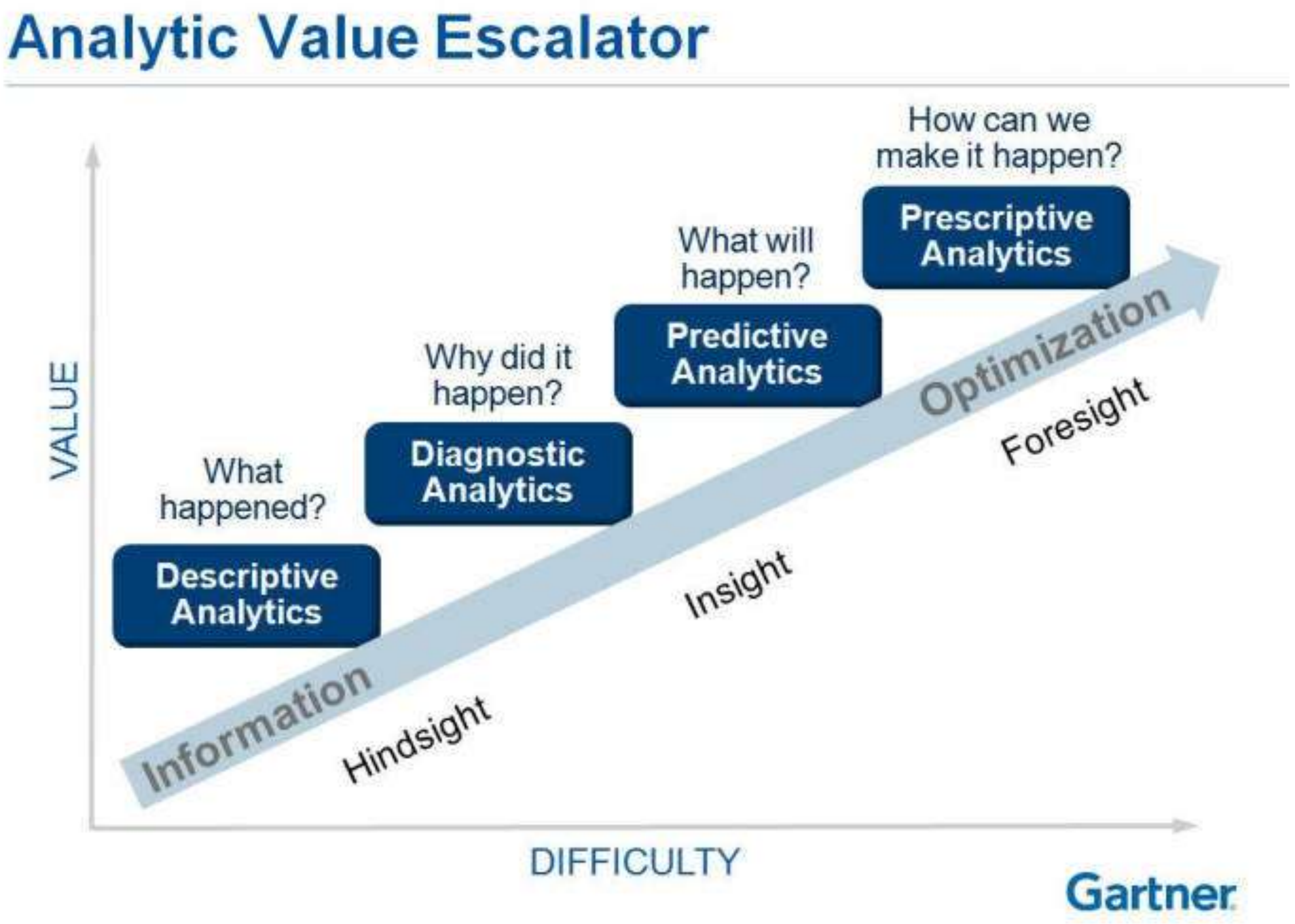
"From Data to Insights"

The types of Data Analytics

Insight	Hindsight	Foresight
Reporting	**Analysis**	**Analysis**
How are we doing? Are we compliant?	Why are we performing this way? Which instruments brought success?	How will we perform in the future? Shall we get a competitive advantage?

VALUE

The types of Data Analytics



The Data Analytics Process

The Data Analytics Process

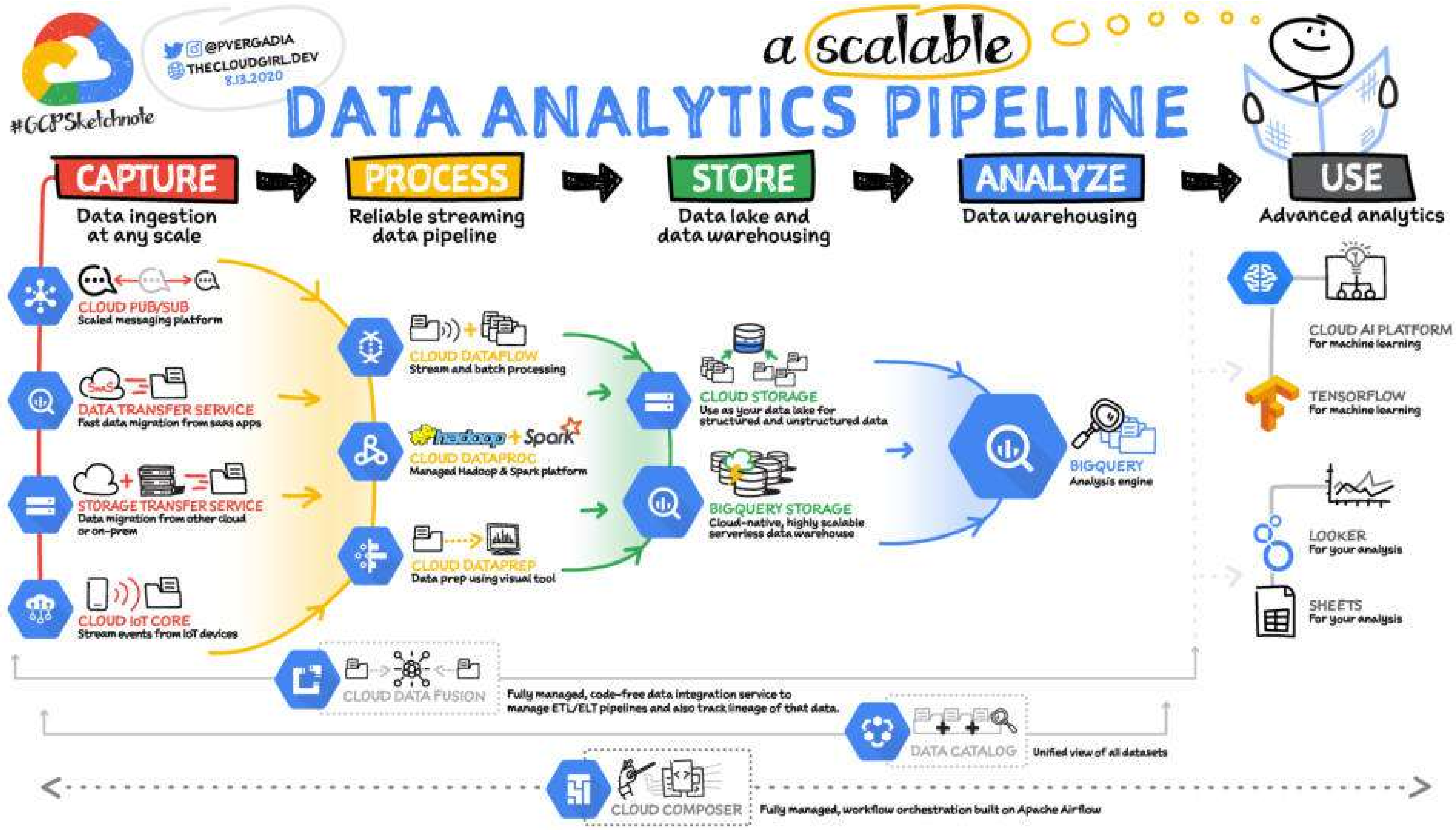
Data collection:
Sources, such as tax filings, financial records, and external databases.

Data cleaning and preparation:
Techniques to ensure data quality and consistency.

Data analysis:
Various analytical tools and methods for extracting meaningful insights.

Interpretation and decision-making:
Transforming data insights into actionable strategies.

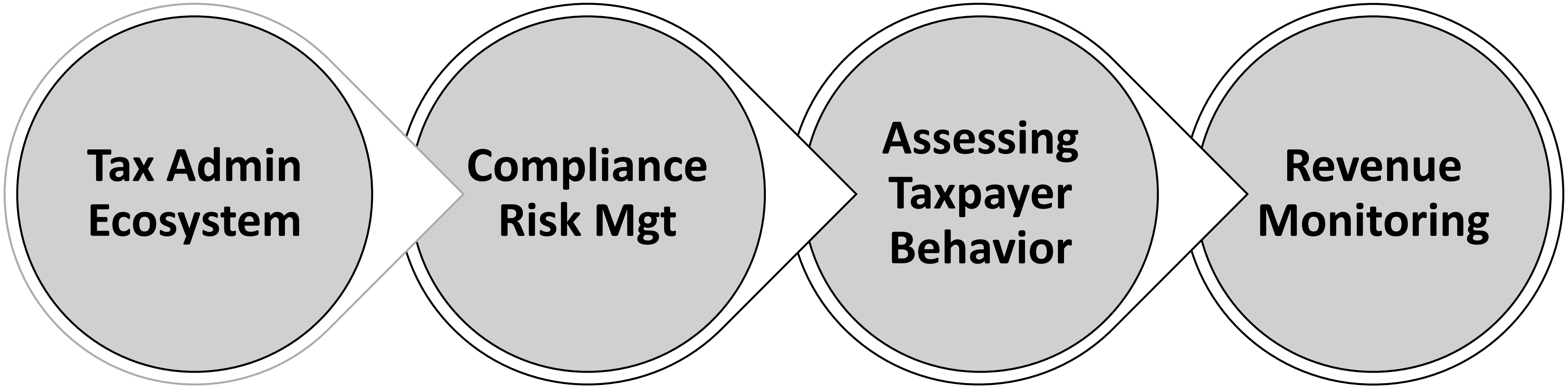
"From Data to Insights"



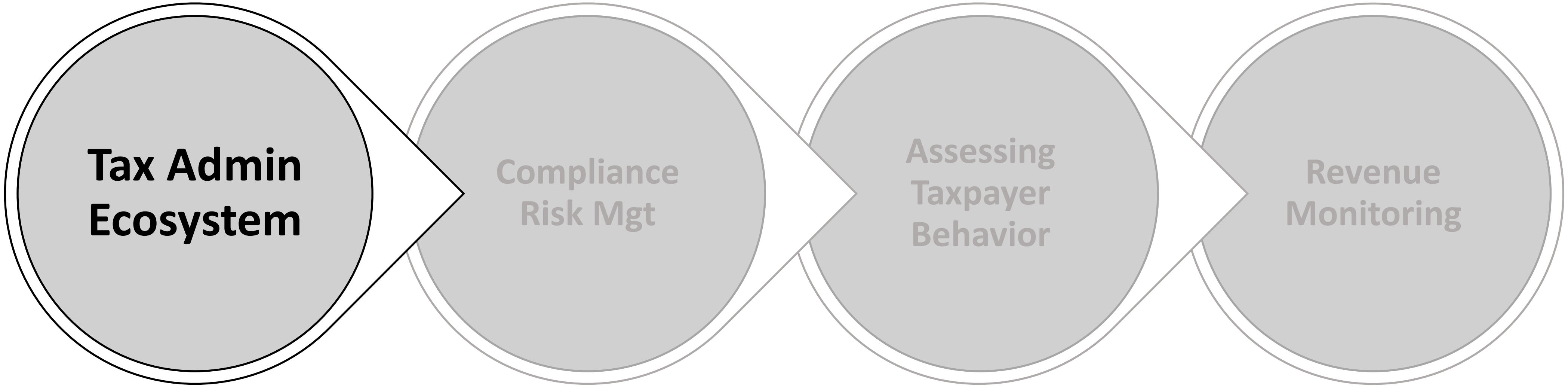
#GCPSketchnote
@PVERGADIA
THECLOUDGIRL.DEV
8.13.2020
a scalable
DATA ANALYTICS PIPELINE
CAPTURE
Data ingestion at any scale
PROCESS
Reliable streaming data pipeline
STORE
Data lake and data warehousing
ANALYZE
Data warehousing
USE
Advanced analytics
CLOUD PUB/SUB
Scaled messaging platform
DATA TRANSFER SERVICE
Fast data migration from saas apps
SaaS
STORAGE TRANSFER SERVICE
Data migration from other cloud or on-prem
CLOUD IoT CORE
Stream events from IoT devices
CLOUD DATAFLOW
Stream and batch processing
hadoop + Spark
CLOUD DATAPROC
Managed Hadoop & Spark platform
CLOUD DATAPREP
Data prep using visual tool
CLOUD STORAGE
Use as your data lake for structured and unstructured data
BIGQUERY STORAGE
Cloud-native, highly scalable serverless data warehouse
BIGQUERY
Analysis engine
CLOUD AI PLATFORM
For machine learning
TENSORFLOW
For machine learning
LOOKER
For your analysis
SHEETS
For your analysis
CLOUD DATA FUSION
Fully managed, code-free data integration service to manage ETL/ELT pipelines and also track lineage of that data.
DATA CATALOG
Unified view of all datasets
CLOUD COMPOSER
Fully managed, workflow orchestration built on Apache Airflow

Benefits of Using Data Analytics:

Benefits of Data Analytics to Revenue Administrations



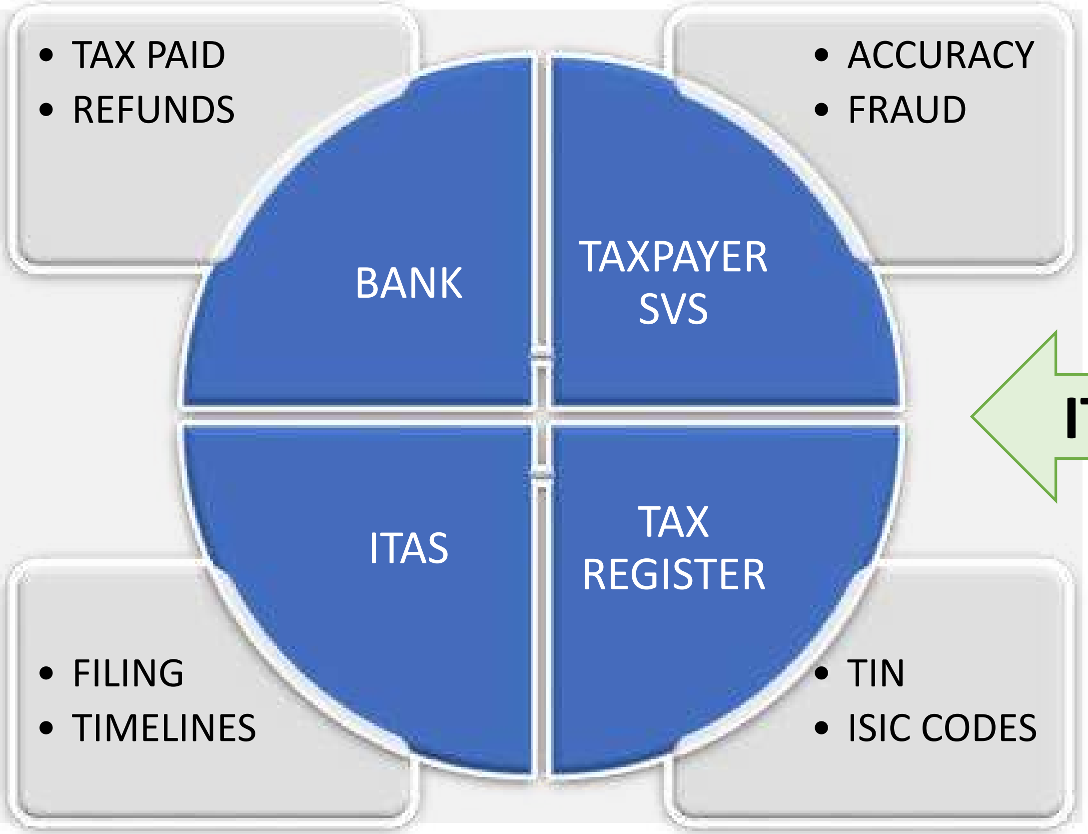
Benefits of Data Analytics to Revenue Administrations



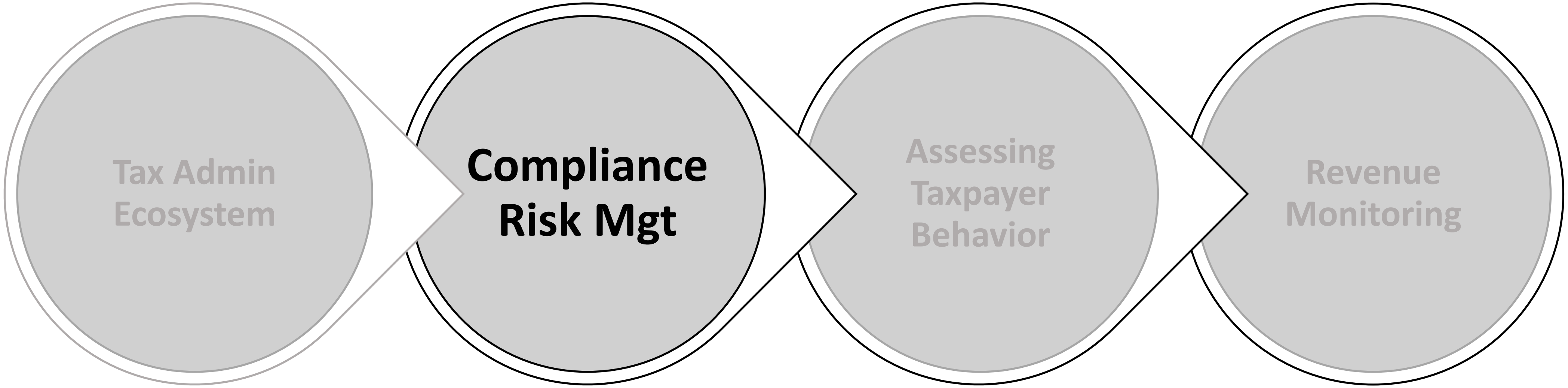
THE TAX ADMINISTRATION ECOSYSTEM

TAXPAYER COMPLIANCE RISK MANAGEMENT

NATIONAL / REGIONAL LANDSCAPE



Benefits to Revenue Administrations



Compliance Risk Management

CRM Objectives

Identify Compliance Risks
- Policy
- Compliance

Improve Resource Allocation
- Human Capital
- Others

Enhancing Reporting
- Monitoring
- Evaluation

CRM Pillars

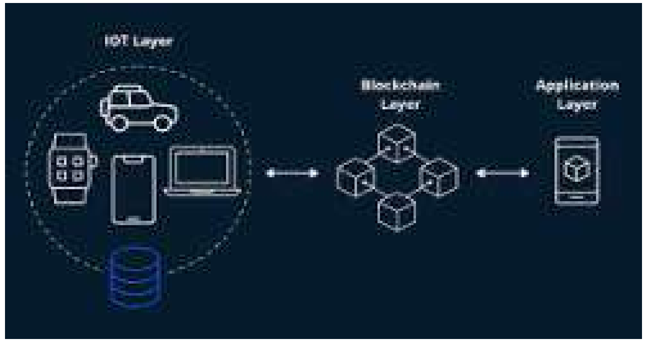
Risk Assessment

- Risk Identification
- Risk Analysis
- Risk Evaluation

Compliance Risk Management

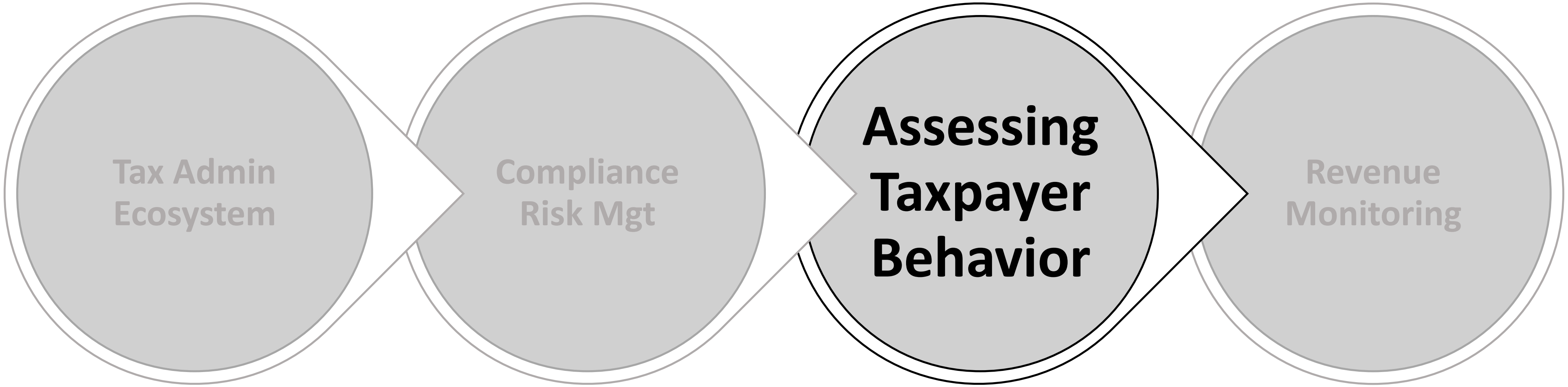
Manual

Digital



Registration → Declaration/ Filing → Accuracy of declarations → Payment of tax

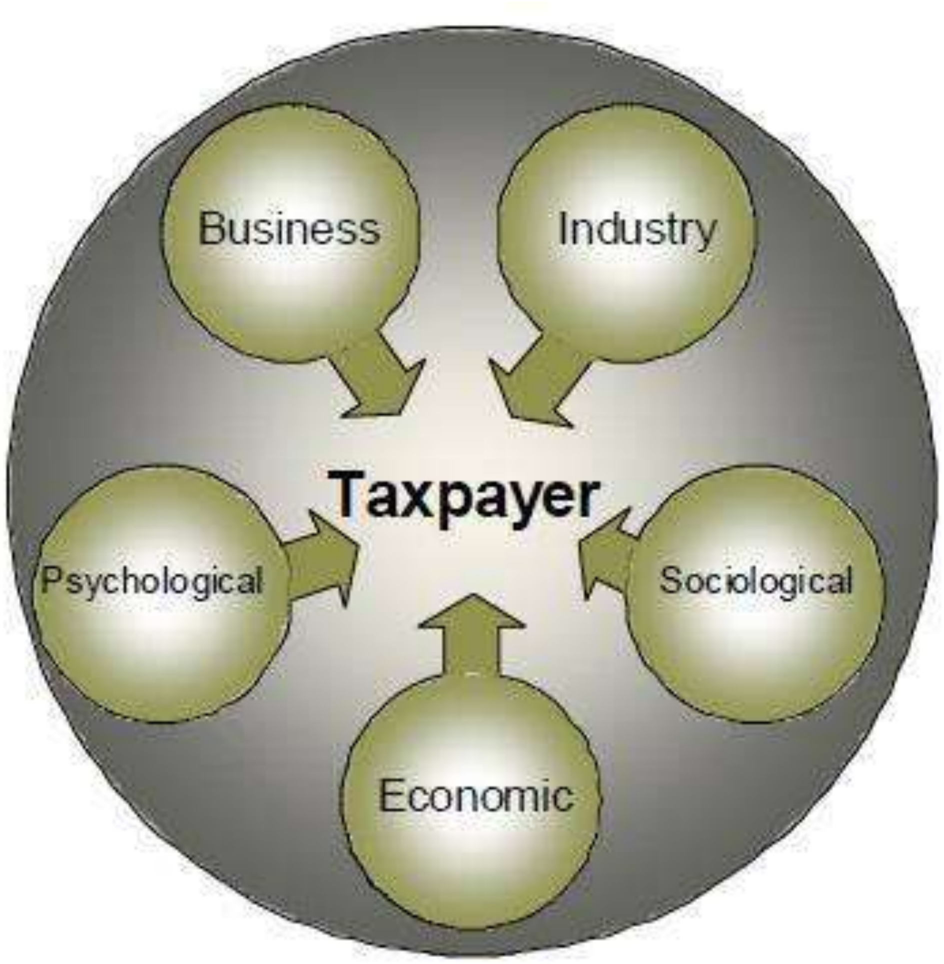
Benefits of using Data Analytics



Assessing Taxpayer behavior
Causes of taxpayer non-compliance

Compliance Triangle - ATO

BISEP Model

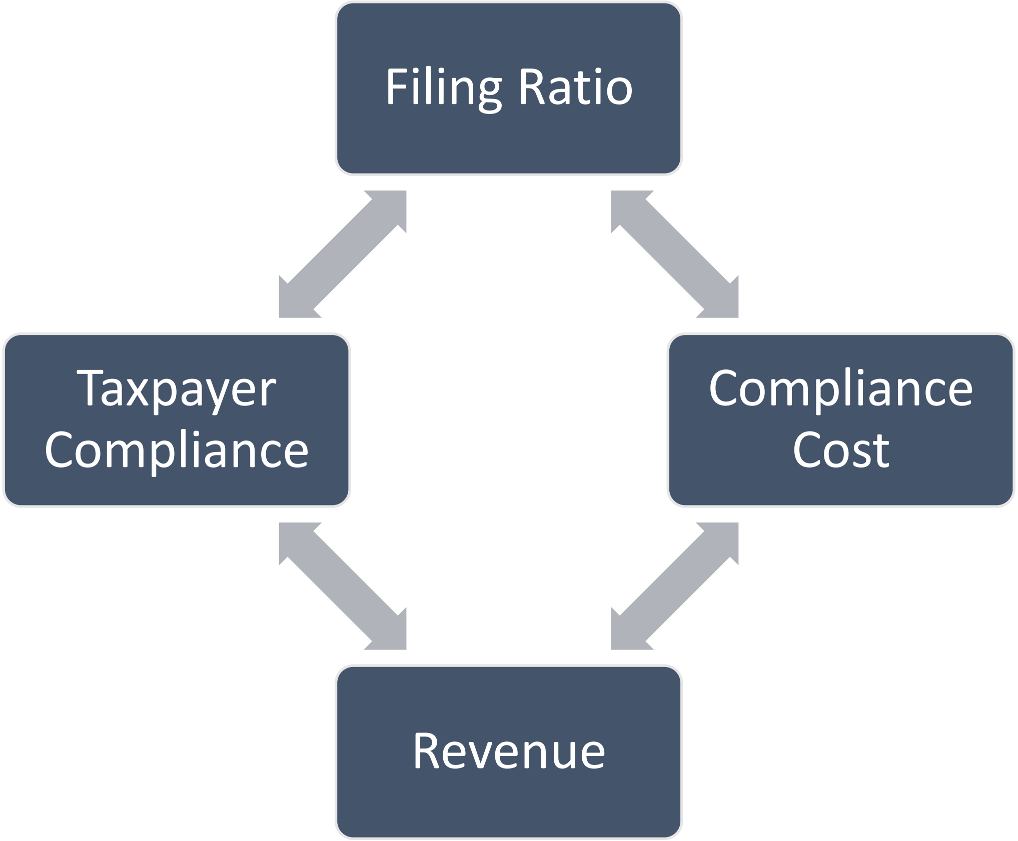


Response to Taxpayer behavior

Taxpayer Obligations

- Registration
- Declaration/ Filing
- Accuracy of declarations
- Payment of tax

Compliance Matrix



Benefits of using Data Analytics

VISUALISATION OF TAXPAYER COMPLIANCE

Identification of high-risk areas:

1. CIP
2. Register expansion

Targeted enforcement:

1. Risk management
2. optimal deployment

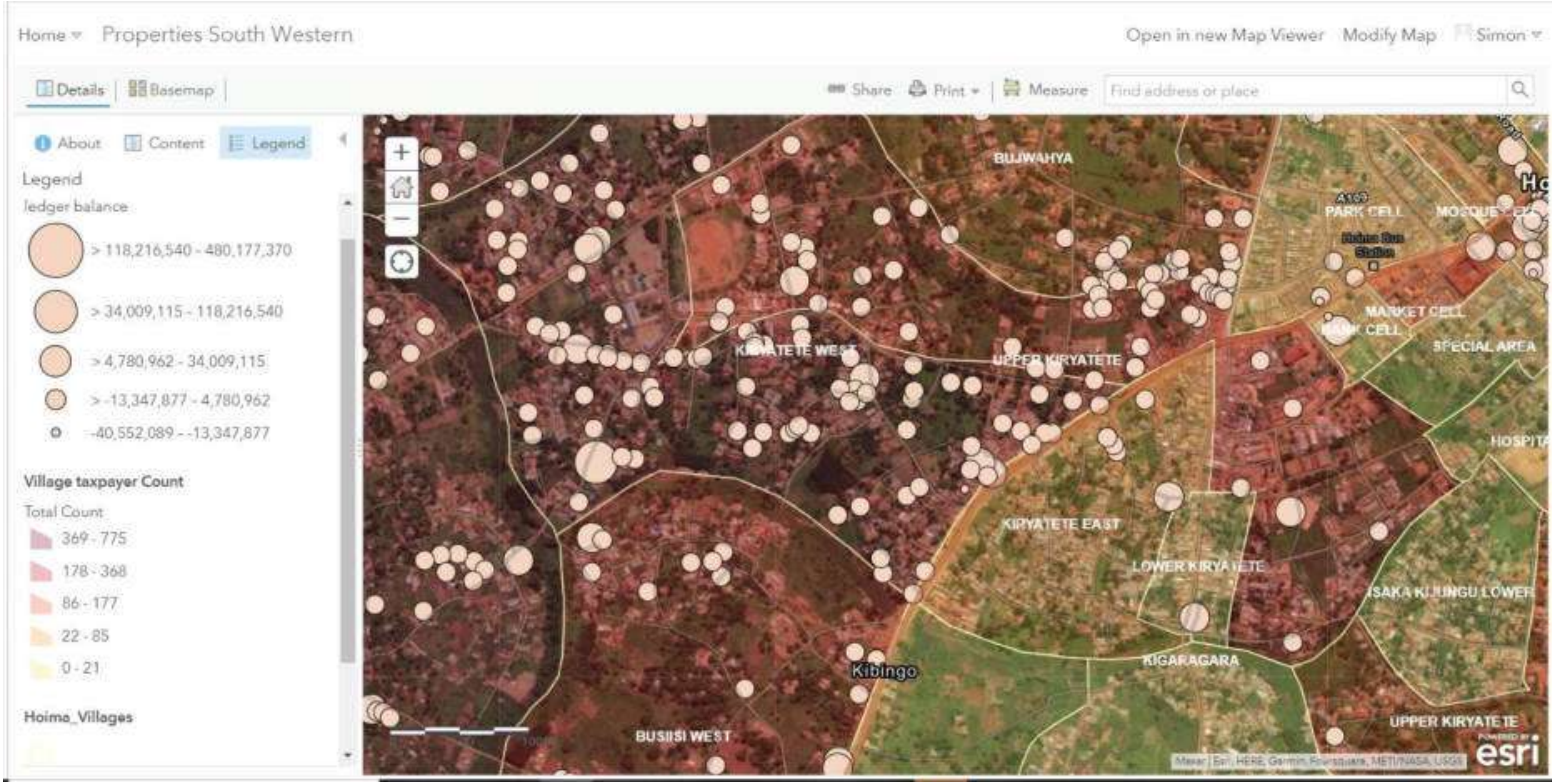
Improved tax collection:

1. New Taxpayers
2. Widening taxbase

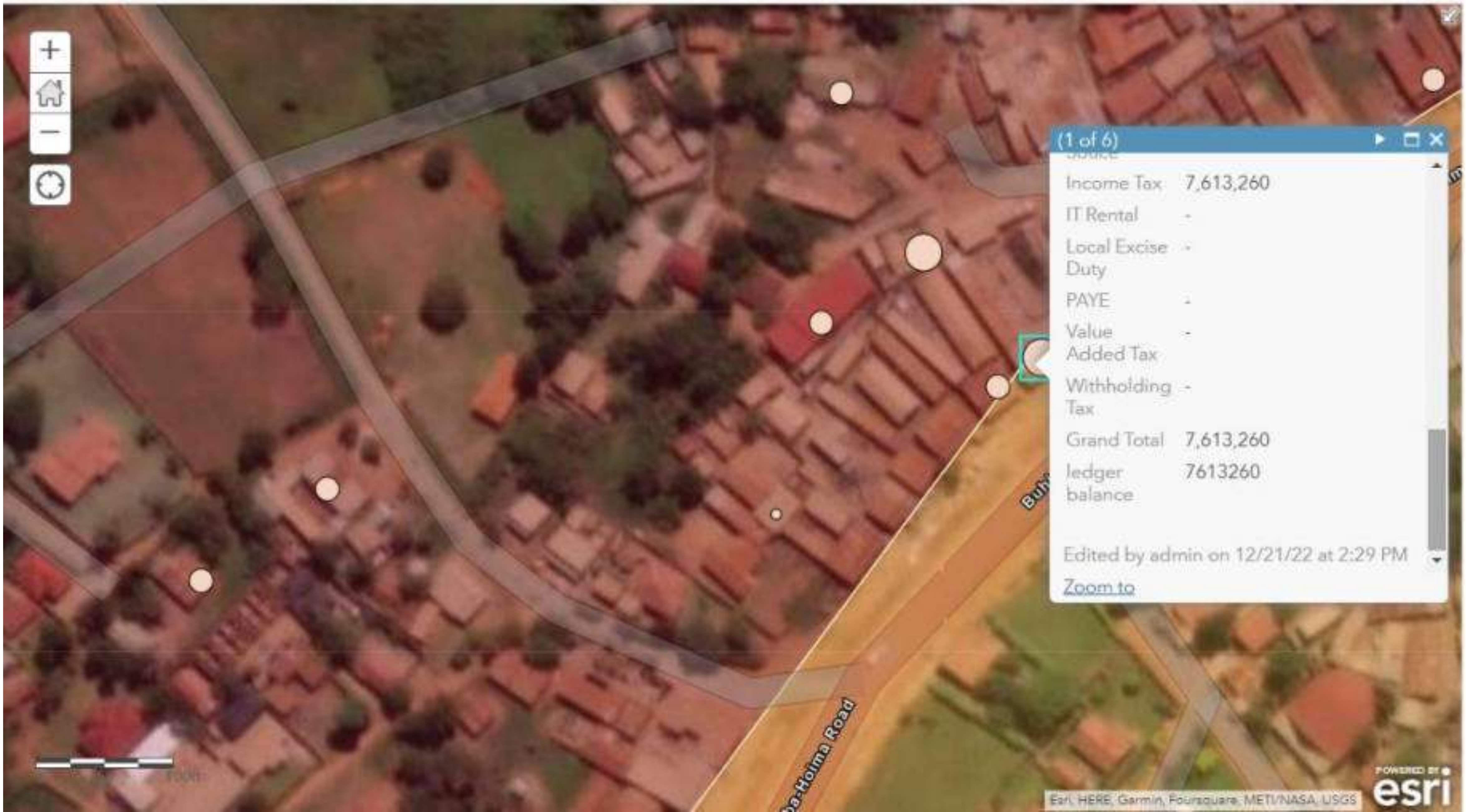
Improved taxpayer services

1. Geo tags

Taxpayer distribution by GEO Tags

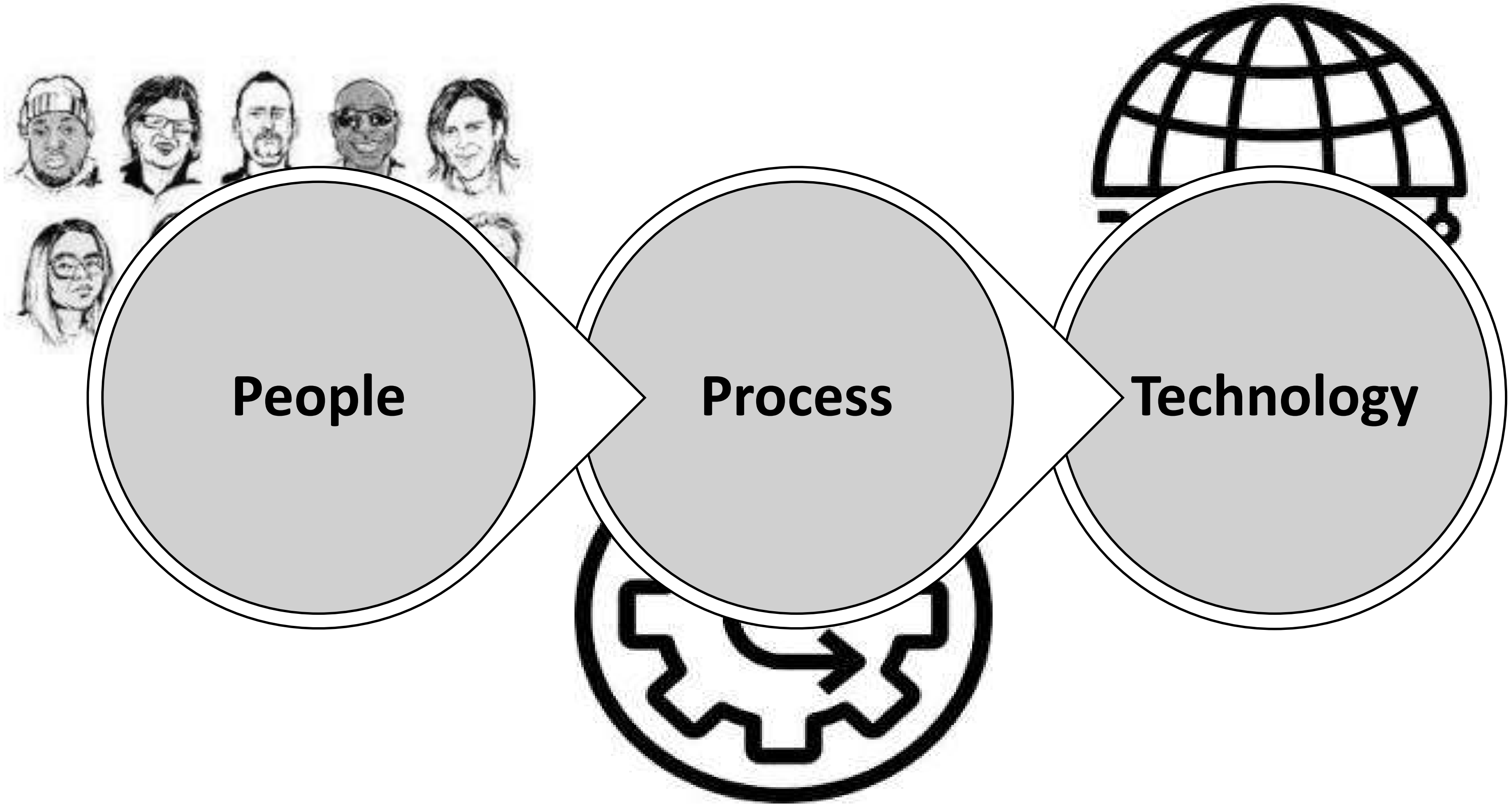


Taxpayer distribution by Key parameters



Challenges to Revenue Administrations

Challenges to Revenue Administrations



Challenges to Revenue Administrations – People factors

Skill Gap:

- Shortage of skilled data analysts proficient in advanced analytics techniques.

Data Literacy:

- Lack of understanding among non-technical staff about data analysis and its potential.

Change Management:

- Resistance to adopting data-driven decision-making culture among employees.

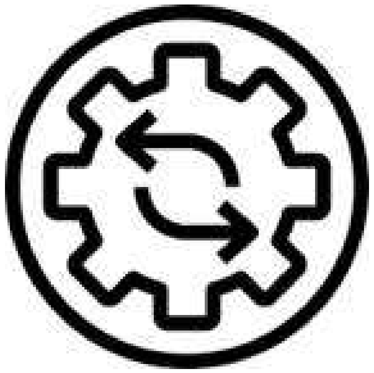
Recruitment and Retention: .

- Difficulty in attracting and retaining top data analytics talent.

Interdisciplinary Collaboration:

- Challenges in fostering collaboration between data analysts, tax experts, and IT professionals.

Challenges to Revenue Administrations – Process factors



Data Governance:

- Establishing robust data governance frameworks for data quality, privacy, and security.

Data Integration:

- Integrating data from various sources and legacy systems into a unified analytics environment.

Data Cleaning and Preparation:

- Time-consuming process of cleaning and structuring raw data for analysis.

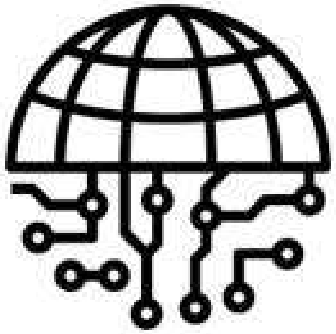
Interdepartmental Coordination:

- Coordinating data sharing and collaboration across different departments and agencies.

Decision-Making Bottlenecks:

- Delays in translating analysis results into actionable decisions due to bureaucratic processes.

Challenges to Revenue Administrations – Technological factors



Legacy Systems

Incompatibility of outdated technology with modern data analytics tools and techniques.

Scalability

Ensuring that analytics infrastructure can handle large and growing datasets effectively.

Data Security

Implementing robust security measures to protect sensitive taxpayer data from breaches.

Data Quality

Ensuring data accuracy, consistency, and reliability for meaningful analysis.

Integration Challenges

Integrating new analytics tools and platforms with existing IT infrastructure.

DATA ISSUES

Data Governance:

Data Access and Sharing:

Data Analytics Skills:

Data Silos:

Data Migration and Integration

Data Quality Issues:

Data Integration:

Data Security and Privacy:

Legacy Systems:

Data Volume and Velocity:

DATA ISSUES - Challenges

Data quality issues:

Missing data, inconsistencies, and data integration challenges.

Lack of technical skills:

Inadequate skills to acquire, match, analyse and utilise data.

Data privacy concerns:

Disjointed regulator requirements impede exchange information; privacy regulations and data protection laws.

DATA ISSUES - Proposed Solutions:

Data quality measures:

Data validation, cleaning procedures, and data governance frameworks.

Building data analytics capabilities:

Training programs and collaborations with data experts.

Ethical guidelines:

Implementing strict privacy policies and ensuring transparency.

OTHER ISSUES

- Tax Evasion and Fraud:
- Informal Economy:
- Complexity of Tax Laws:
- Tax Avoidance:
- Lack of Resources:
- Taxpayer Education:
- Changing Business Models:
- Cash Economy:
- Taxpayer Trust:
- Taxpayer Compliance Burden:
- Political and Legal Factors:
- Global Tax Transparency Initiatives:
- Cross-Border Taxation:
- Tax Compliance Cost:

The Power of Data Analytics in Revenue Administration

Applications of Data Analytics

Applications of Data Analytics

KEY APPLICATIONS

- Tax Compliance and Auditing
- Fraud Detection and Prevention
- Revenue Collection and Forecasting
- Risk Profiling
- Taxpayer Segmentation

IMPORTANT OUTPUTS

- Tax Gap Analysis
- Real-Time Compliance Monitoring
- Policy Evaluation
- Customer Service Enhancement
- External Data Utilization

Complex functionality

- Completeness: Gap and duplicate detection
- Data Matching
- Linking varied databases
- Fraud Detection

Indicators of tax fraud

Income Manipulation:

- Underreporting of Income

Expense Manipulation:

- Unusual Deductions

Data Tampering:

- Frequent Filing Amendments

Transaction Anomalies:

- Unusual Transaction Volumes STR, LCTR

Consistency Violations:

- Excessive Tax Credits
- Patterns of Underpayment

Charitable Contributions:

- Inflated Deductions for Charitable Contributions

Withholding Discrepancies:

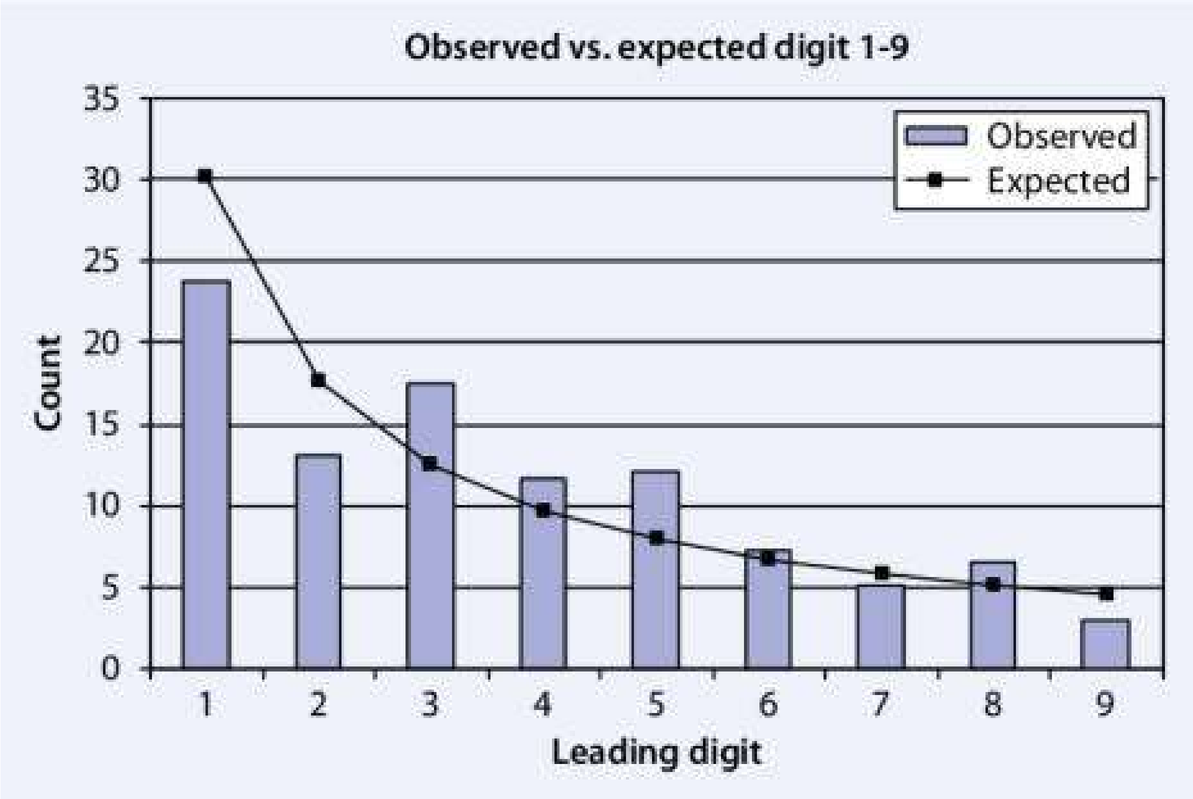
- Mismatched Withholding

FRAUD DETECTION - BENFORDS LAW

A statistical principle stating that the leading digits of numbers follow a non-uniform distribution.

The digit 1 appears most (about 30.1%), while 9 appears the least (about 4.6%).

It is used in fraud detection and data validation, as deviations from the expected distribution may indicate errors or anomalies in the data.



Risk Management and Security

Risk Management and Security

"Securing Taxpayer Data: Risks and Precautions"

THE IMPORTANCE OF DATA SECURITY

- Data breaches can lead to identity theft and financial fraud.
- Risks associated with unauthorized access to sensitive taxpayer information.

INFORMATION SECURITY MEASURES

- Encryption techniques, secure data storage, and access controls
- Regular audits and compliance checks to monitor security protocols.

Considerations in data security

Confidentiality:

Protects sensitive taxpayer information from unauthorized access.

Trust and Compliance:

Fosters taxpayer trust and encourages compliance with tax regulations.

Fraud Prevention:

Deters fraudulent activities and manipulations of data.

Data Integrity:

Maintains the accuracy and reliability of data for informed decision-making.

Legal and Regulatory Compliance:

Ensures adherence to data protection laws and regulations.

Reputation Management:

Preserves the reputation of revenue authorities and instills public confidence.

Operational Continuity:

Minimizes disruptions and ensures smooth tax administration processes.

Cross-Agency Collaboration:

Facilitates secure data sharing between government agencies.

Global Standards:

Safeguards cross-border data exchange and collaboration.

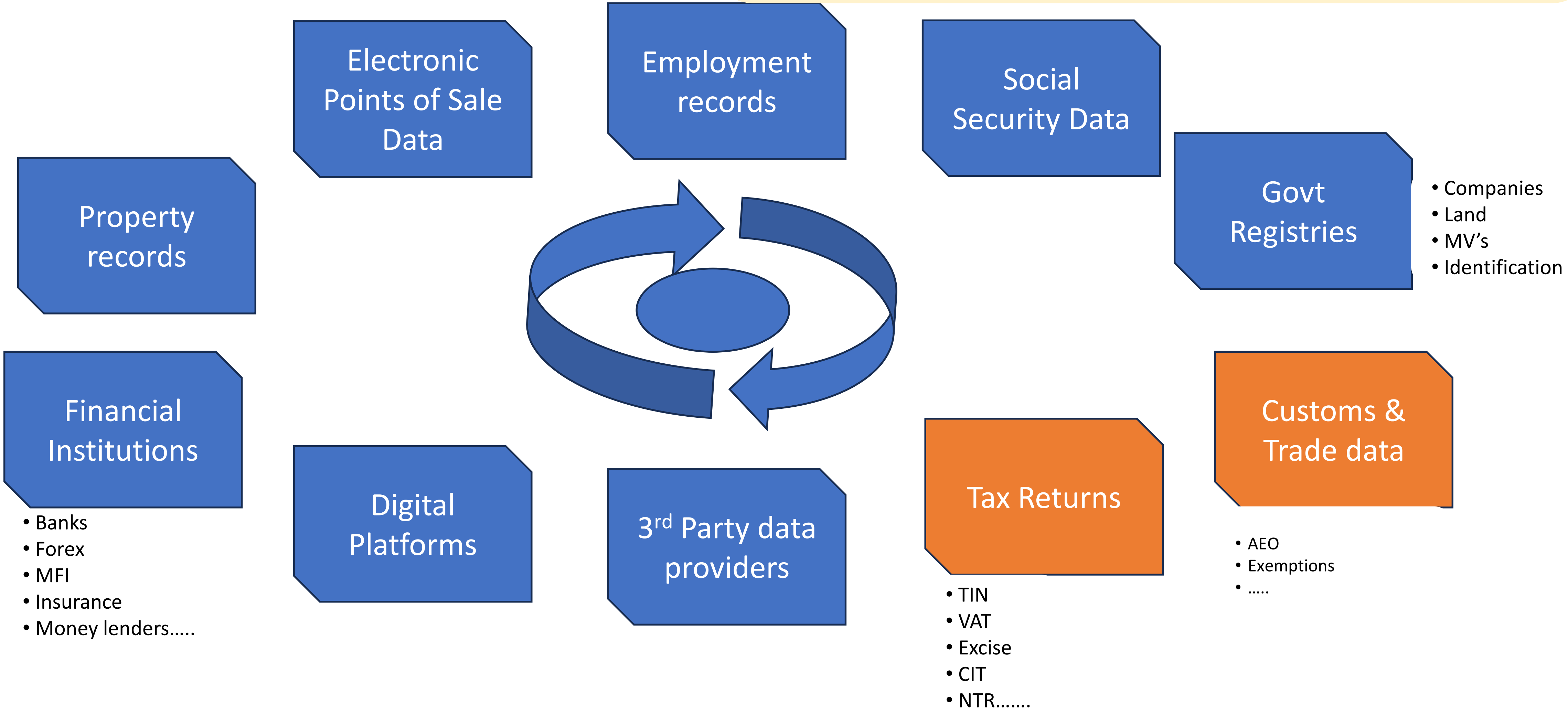
Digital Transformation:

Integral for secure and successful adoption of technological advancements.

Using External Data

CONTRIBUTING DATASETS

Effective utilization of these data sources allows revenue administrations to enhance their operational efficiency, detect non-compliance, and improve overall revenue collection efforts.



Data Analysis Tools

DATA ANALYSIS TOOLS - OPERATIONS

6 most Common tools

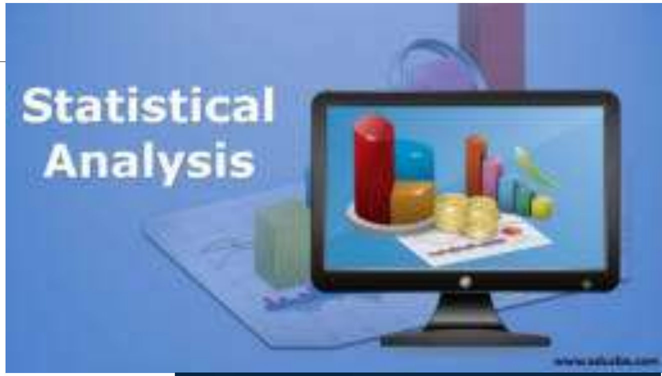
Power BI

tableau

CaseWare IDEA

python

Common functionality



"Through data analysis, we unveil hidden insights that empower informed decisions

turning raw information into actionable wisdom.“

Antony Mwandha

THANK YOU!