

DATA ANALYTICS IN AUDIT

“Audit Analytics como Agente de Mudança”

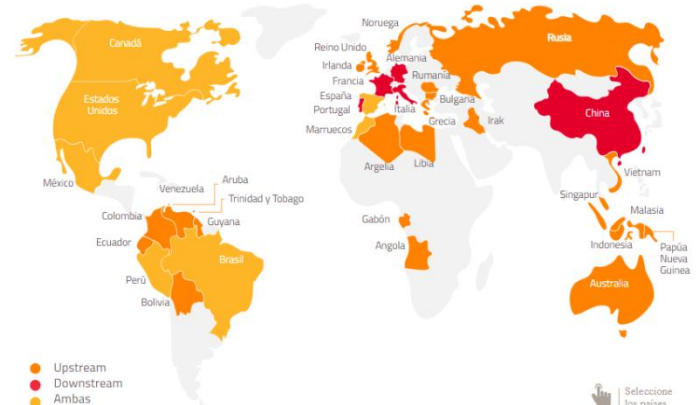




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AGENDA

1. **WHAT IS AUDIT DATA ANALYTICS?**

2. **WHY IS IT NECESSARY IN AUDIT DEPARTMENTS?**

3. **AUDIT ANALYTICS TOOLS AND TECHNIQUES**

4. **HOW TO TRANSFORM AN AUDIT AREA**

5. **CONCLUSION**

1



WHAT IS AUDIT DATA ANALYTICS?

“The science and art of discovering and **analyzing patterns, identifying anomalies** and **extracting other useful information** in data underlying or related to the subject matter of an audit through **analysis, modeling and visualization** for the purpose of **planning or performing** the audit.”

AICPA - Association of International Certified Professional Accountants

WHY IS NECESSARY? VALUE AND BENEFITS
















2



Has anything changed?

← → ↺ 🏠 <https://www.google.es/search?q=lisbon+cathedral&tbs=isch&tbs=simg:CAQSIQJEJr-UI9xUGI0YaiQELEKjU2AQaAggVDAsQslynCBpiCmAiXIo8B2GFZ8...> ☆

🌐 Aplicaciones 📁 Repsolnet Favorites 🌐 Home - Workday 📖 Diccionario 📧 Correo - jtoledo@re... 📄 Repsol Parking - Ges... 🔍 Refining 2050 🌐 Symbaloo 📁 Viajes » 📁 Otros marcas

 5500 x 3768 Four Seasons Hotel Ritz Lisbon - U... atlantida.travel	 5500 x 3768 VISITE DE LISBONNE costakreuzfahrten.ch	 2048 x 1403 Lisbon Weather www.topsimages.com topsimages.com	 2048 x 1403 ПОРТУГАЛИЯ, Auto Week - уникал... onestarlife.com	 1920 x 1315 EDIÇÃO FRANCESA DA REVISTA F... mamassessoria.com.br
 1920 x 1315 参团游北京出发西班牙+葡萄牙13天跟... traveldetail.fliggy.com	 1800 x 1233 Lisbon by Beetle private half-day tou... musement.com	 1800 x 1233 Touren und Ausflüge in Lissabon buc... topguide24.com	 1666 x 1143 Tourisme: les Français privilégient l'... lefigaro.fr	 1665 x 1141 Lisboa, la magia de los fados tempsdocl.com
				

DIGITALIZATION IS CHANGING THE WORLD



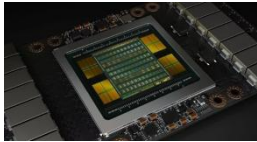
Source: social media. Oct 2018

CHANGES RELEVANT TO DO ANALYTICS

**AUTOMATED BUSINESS
PROCESSES**

MORE USE OF I.T.
SYSTEMS

NEW D.A.TOOLS



**MORE POWERFUL
COMPUTERS**

DIGITALIZATION

ROBOTICS – RPA

IOT / IIOT

VALUE AND BENEFITS

INCREASE EFFICIENCY

Increase coverage of Audit universe

Increase quality of Audit findings

Repeatable processes

INCREASE EFFECTIVENESS

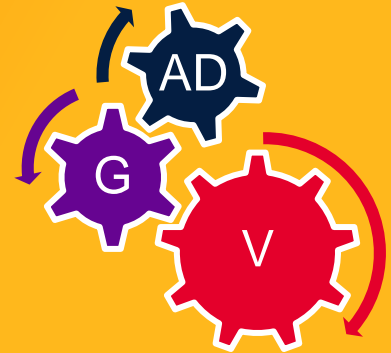
Focus on areas of particular strategic need

More dynamic reports



AUDIT ANALYTICS TOOLS AND TECHNIQUES

3



AUDIT ANALYTICS TOOLS AND TECHNIQUES

TOOLS

THERE ARE A VARIETY OF TOOLS TO
FACILITATE DATA ANALYSIS

VISUALIZATION, DATA ANALYSIS & PROCESSING,
ADVANCED ANALYTICS TOOLS...

TECHNIQUES

FROM VERY SIMPLE TO VERY ADVANCED

FIND A RECORD, COMBINE DATA OF DIFFERENT
SOURCES, USE FUNCTIONS, BENFORD, CLUSTERING
TECHNIQUES, ARTIFICIAL NEURAL NETWORKS

EXAMPLE OF TECHNIQUES

FILTER & VIEW

Find a register, detect missing records, summarize,...

COMBINE DATA

Combine data from different tables or sources.

CONTINUOUS MONITORING

Apply rules to automated periodic evaluations of risks and controls, using a larger proportion of transactions

ADVANCED FUNCTIONS

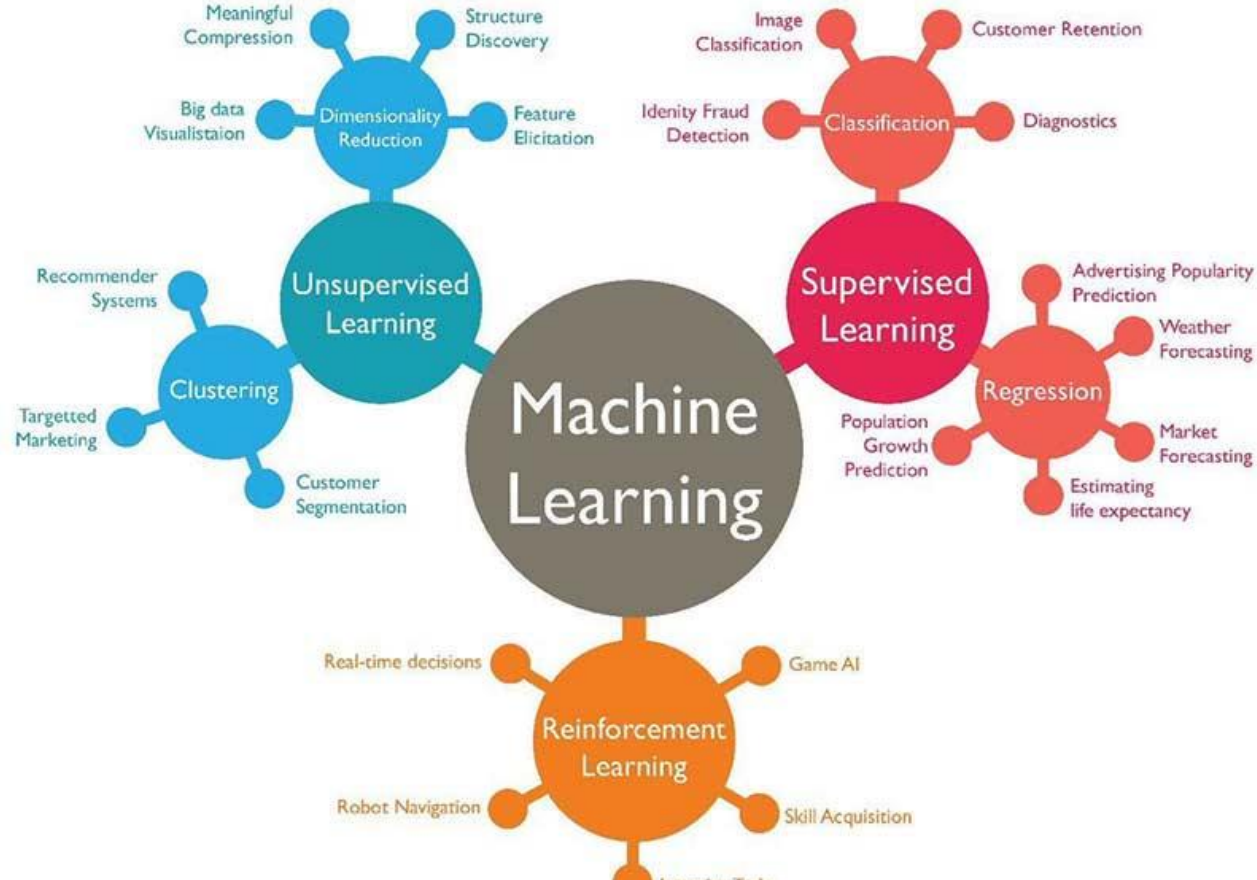
Correlation analysis, Fuzzy Joins, Benford Law,

ADVANCED ALGORITHMS

Machine Learning Algorithms, Clustering, SVM, Artificial Neural Networks (ANN).

AUDIT ANALYTICS TOOLS AND TECHNIQUES

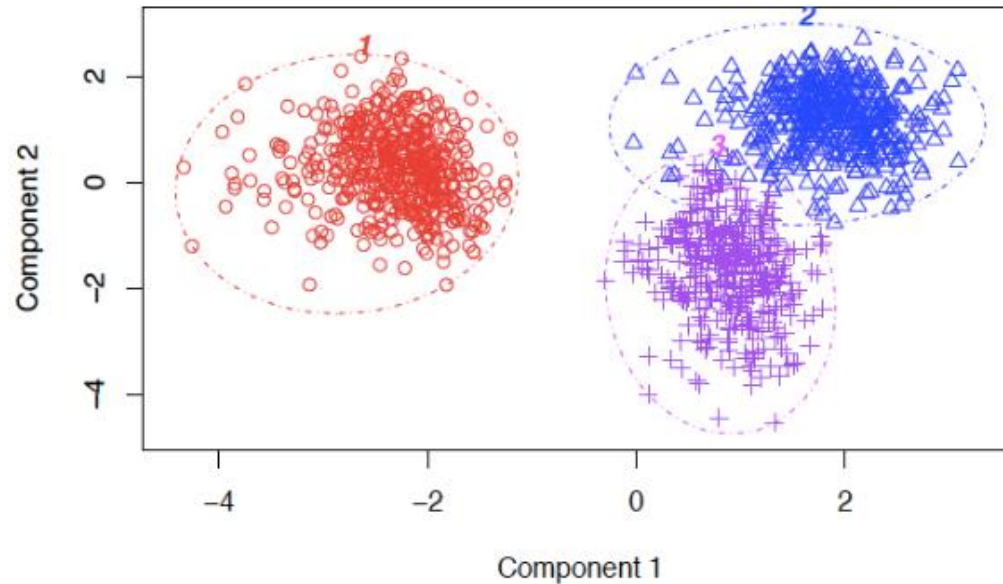
SUPERVISED AND UNSUPERVISED MACHINE LEARNING



AUDIT ANALYTICS TOOLS AND TECHNIQUES

CLUSTERING

Principal Components plot of K-means clusters



TOOLS

VISUALIZATION



DATA PROCESSING AND ANALYSIS



ADVANCED ANALYSIS



EXTRACTION TOOLS



SQL

DATA PREPARATION AND CLEANING



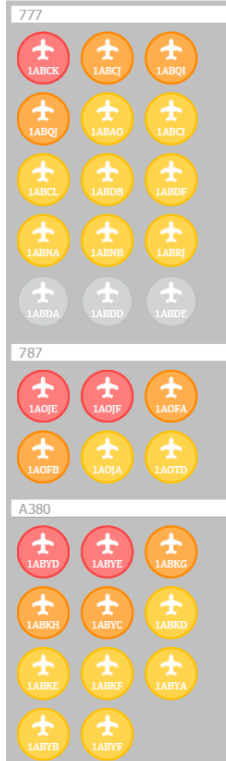
CONTINUOUS MONITORING

SACI



*Examples for illustrative purposes.

AUDIT ANALYTICS TOOLS AND TECHNIQUES VISUALIZATION



Predicted fleet health - overview



Issue details

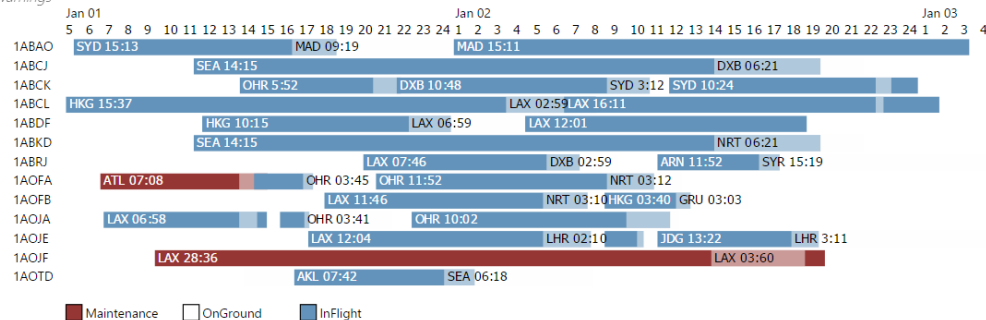
Tail Number	Type	MessageSummary	Part reference
1AOTD	Recommendation	Fuel consumption increase predicted, engine wash ...	3620
1AOJF	Anomaly	Significant engine second stage pressure anomaly.	3840
1AOJE	ML model forecast	Bleed air anomaly prediction.	7390
1AOJA	Maintenance message	Maintenance Message combination suggests signif...	2784
1AOFB	Recommendation	Fuel consumption increase predicted, engine wash ...	3620
1AOFA	Anomaly	Significant engine second stage pressure anomaly.	3840
1ABYF	Maintenance message	Maintenance Message combination suggests signif...	2784
1ABYE	Recommendation	Fuel consumption increase predicted, engine wash ...	3620
1ABYD	Anomaly	Significant engine second stage pressure anomaly.	3840
1ABYC	Maintenance message	Maintenance Message combination suggests signif...	2784
1ABYB	Recommendation	Fuel consumption increase predicted, engine wash ...	3620
1ABYA	Anomaly	Significant engine second stage pressure anomaly.	3840

Current location or next destination



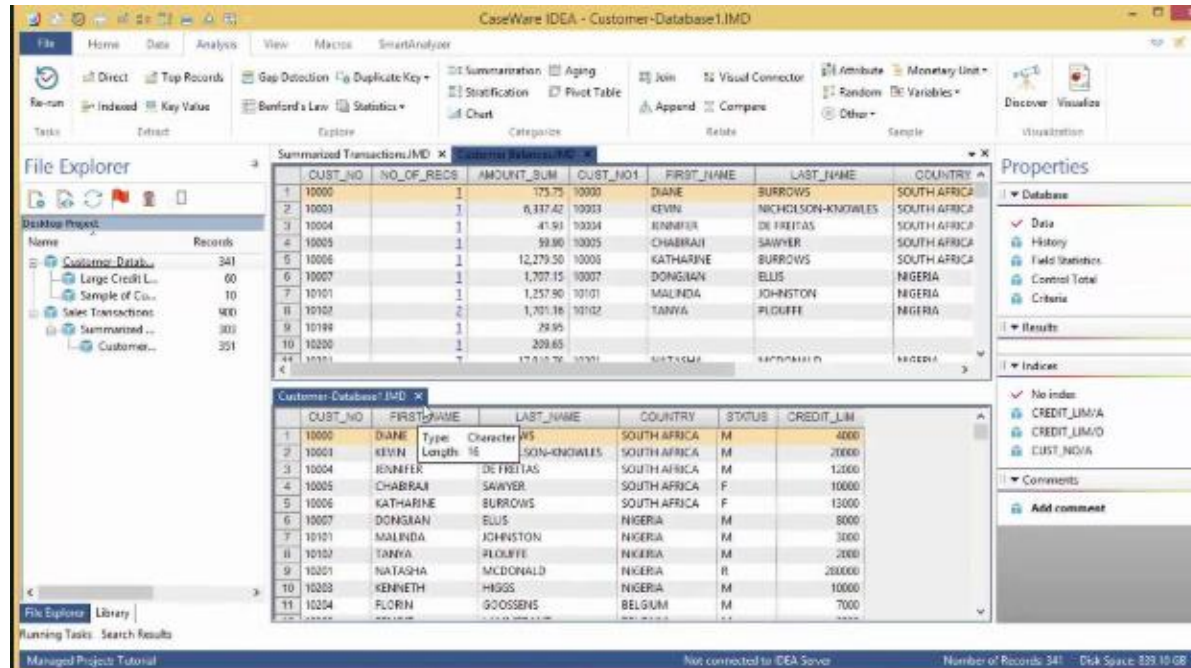
Click on any aircraft to see its location and warnings

Flight schedule



AUDIT ANALYTICS TOOLS AND TECHNIQUES

DATA PROCESSING AND ANALYSIS (CAATS)



The screenshot displays the CaseWare IDEA software interface. The top menu bar includes File, Home, Data, Analysis, View, Macros, and SmartAnalyzer. The Analysis tab is active, showing various tools like Direct, Top Records, Gap Detection, Duplicate Key, Summarization, Aging, Join, Visual Connector, Attribute, Monetary Unit, Random, Variables, Discover, and Visualize. The File Explorer on the left shows a project structure with a 'Customer-Database' folder containing 341 records. The main workspace displays two tables. The top table, 'Summarized Transactions', has columns: CUST_NO, NO_OF_RECS, AMOUNT_SUM, CUST_NO1, FIRST_NAME, LAST_NAME, and COUNTRY. The bottom table, 'Customer-Database', has columns: CUST_NO, FIRST NAME, LAST NAME, COUNTRY, STATUS, and CREDIT LIM. The Properties panel on the right shows the 'Database' section with 'Data' selected, and the 'Results' section with 'No Index' selected. The bottom status bar indicates 'Not connected to IDEA Server', 'Number of Records: 341', and 'Disk Space: 833.10 GB'.

CUST_NO	NO_OF_RECS	AMOUNT_SUM	CUST_NO1	FIRST_NAME	LAST_NAME	COUNTRY
1	10000	1	175.75	DIANE	BURROWS	SOUTH AFRICA
2	10003	1	6,337.42	KEVIN	NICHOLSON-KNOWLES	SOUTH AFRICA
3	10004	1	41.91	JENNIFER	DE FREITAS	SOUTH AFRICA
4	10005	1	59.90	CHABIRAJI	SAWYER	SOUTH AFRICA
5	10006	1	12,279.50	KATHARINE	BURROWS	SOUTH AFRICA
6	10007	1	1,707.15	DONGSIAN	ELIUS	NIGERIA
7	10101	1	1,257.90	MALINDA	JOHNSTON	NIGERIA
8	10102	1	1,701.16	TANYA	PLOUFFE	NIGERIA
9	10199	1	29.95			
10	10200	1	299.65			
11	10201	1	17,015.70	DIANE	BURROWS	NIGERIA

CUST_NO	FIRST NAME	LAST NAME	COUNTRY	STATUS	CREDIT LIM
1	DIANE	BURROWS	SOUTH AFRICA	M	4000
2	KEVIN	NICHOLSON-KNOWLES	SOUTH AFRICA	M	20000
3	JENNIFER	DE FREITAS	SOUTH AFRICA	M	12000
4	CHABIRAJI	SAWYER	SOUTH AFRICA	F	10000
5	KATHARINE	BURROWS	SOUTH AFRICA	F	13000
6	DONGSIAN	ELIUS	NIGERIA	M	8000
7	MALINDA	JOHNSTON	NIGERIA	M	3000
8	TANYA	PLOUFFE	NIGERIA	M	2000
9	NATASHA	MCDONALD	NIGERIA	F	20000
10	KENNETH	HIGGS	NIGERIA	M	10000
11	FLORIN	GOOSSENS	BELGIUM	M	7000

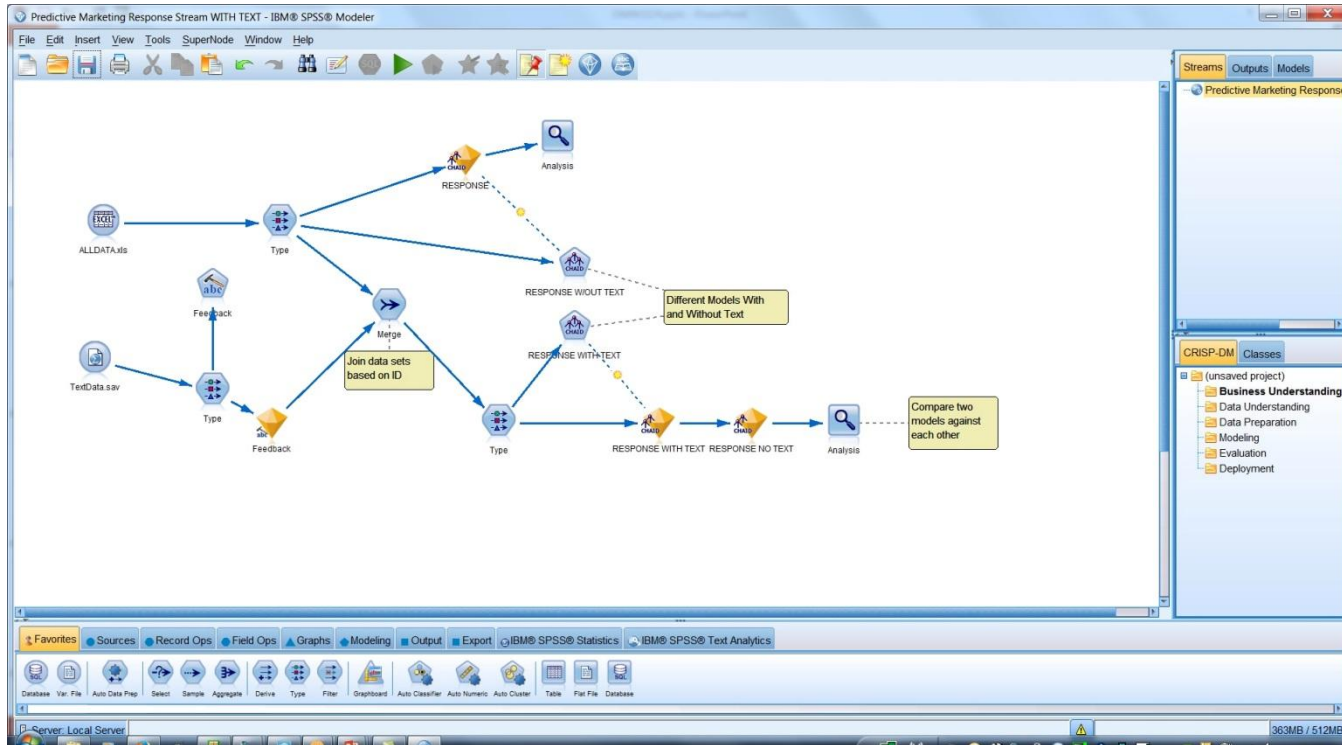
Easy

MERGE
TABLES
AND
SEARCH
RECORDS

AUDIT
TRAIL

AUDIT ANALYTICS TOOLS AND TECHNIQUES

ADVANCED TOOLS



HOW TO TRANSFORM AN AUDIT AREA

4



REPSOL EXPERIENCE IN AUDIT DATA ANALYTICS

1

CONTINUOUS MONITORING

2

AUDIT PROJECTS ADVANCED ANALYTICS EXAMPLES

3

TRANSFORMATION PLAN

CONTINUOUS AUDIT MONITORING PROCESS

Identification Issues

Communication and follow up



Results Panel

Calculus DACG
Opción de autorizaciones y delegaciones
Control, Compensación y Riesgos
Reporting Agrupado
Opción de recomendaciones >

Comunicación
Calidad y Emisión
Seguimiento
Cierre
Informes
Administración SACI

☐ **Cal. Recursos:**
☐ **Proyectos:**
☐ **Cal. Control:**


[Linking Menu](#)
[Referencia](#)

Periodo	01/15	02/15	03/15	04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	Ycto
TOTAL DE PARTIDAS	Mens.	6,322.00	6,446.00	6,660.00	7,001.00	7,190.00	7,209.00	7,230.00	7,053.00	7,454.00			
IMPORTE EN EUROS	Mens.	5,960.00	6,026.00	6,464.00	6,800.00	6,714.00	6,729.00	6,729.00	6,489.00	6,780.00			
TOTAL DE PARTIDAS	Mens.	5,644.00	5,644.00	5,644.00	5,644.00	5,644.00	5,212.00	5,212.00	5,440.00	5,502.00			
IMPORTE EN EUROS	Mens.	562.00	1,400.00	1,134.00	1,076.00	1,002.00	1,000.00	1,000.00	1,300.00	1,206.00			
TOTAL DE PARTIDAS	Mens.	5,082.00	5,044.00	5,110.00	5,034.00	5,090.00	5,025.00	5,130.00	5,242.00	5,296.00			
IMPORTE EN EUROS	Mens.	479.00	1,272.00	1,046.00	944.00	7,911.00	7,983.00	7,791.00	7,737.00	8,062.00			
TOTAL DE PARTIDAS	Mens.	1,508.00	1,644.00	1,811.00	2,103.00	2,491.00	2,304.00	2,630.00	2,604.00	2,610.00			
IMPORTE EN EUROS	Mens.	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63.00			
TOTAL DE PARTIDAS	Mens.	338.00	338.00	338.00	338.00	338.00	338.00	338.00	338.00	338.00			
IMPORTE EN EUROS	Mens.	103.00	103.00	103.00	103.00	174.00	209.00	209.00	209.00	209.00			

Buenos días Pablo y Armando.

Los procesos de Auditoría Continua, consisten en la monitorización puntual de indicadores automáticos de control en los sistemas informáticos con el fin de detectar o prevenir las irregularidades de los distintos componentes del Grupo Repsol. Dichos controles tienen como principal objetivo controlar el entorno de control.

En el proceso de monitorización controlado del ciclo de vida de los sistemas IT en la sociedad Repsolur, ejecutado para el ejercicio 2013, se ha puesto de manifiesto que el siguiente hecho releva en el período de análisis:

Cód. Indic.	Descripción	Sociedad / Período	Unidad	Valor	Dato Adjunto
ATFC01	Activos PMS sin imputaciones en un periodo determinado y sin haberse comunicada a auditorías (1)	REPSOLUR RPT 2013	Número de imputaciones por mes (2) Imputaciones recibidas por correo electrónico (3)	13,966 3,947	 ATFC Respuesta al FC

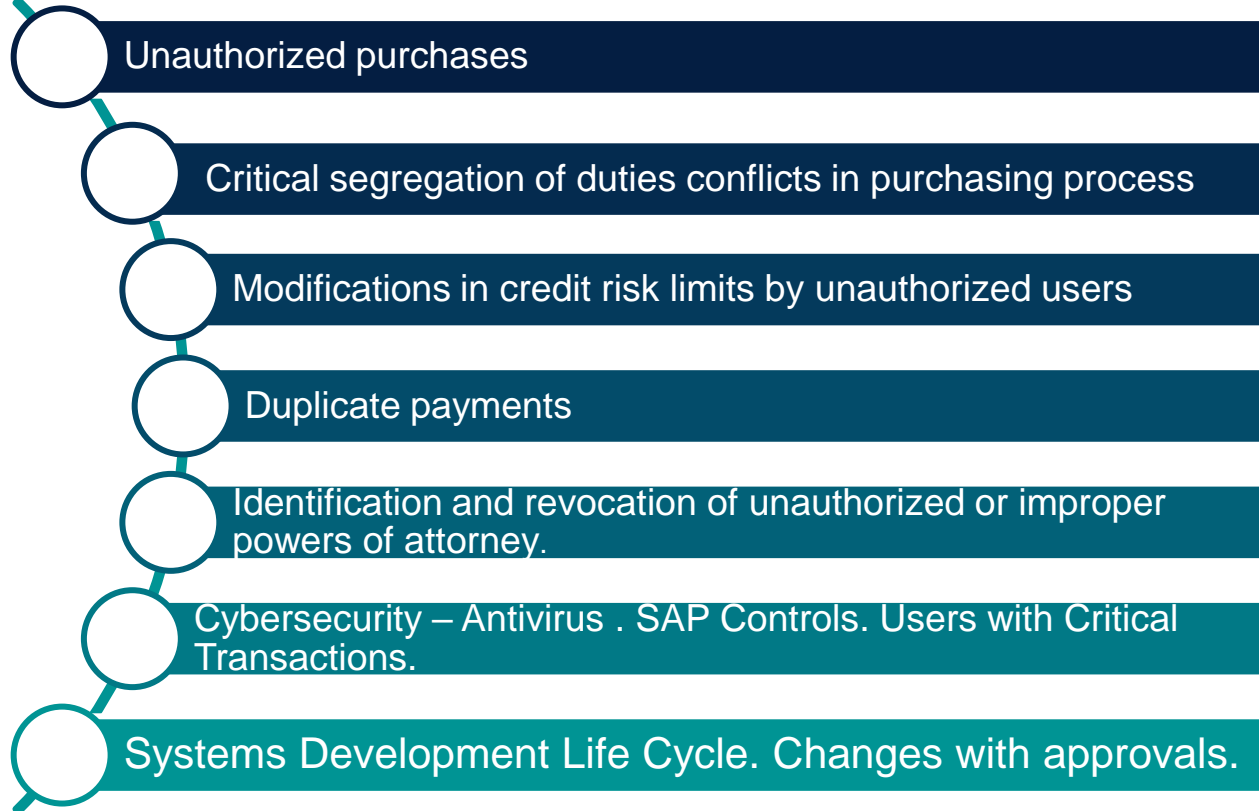
MONITORIZACIÓN AUDITORÍA CONTINUA

D. Auditoría Interna – Noviembre 2015



EXAMPLES CONTINUOUS AUDIT

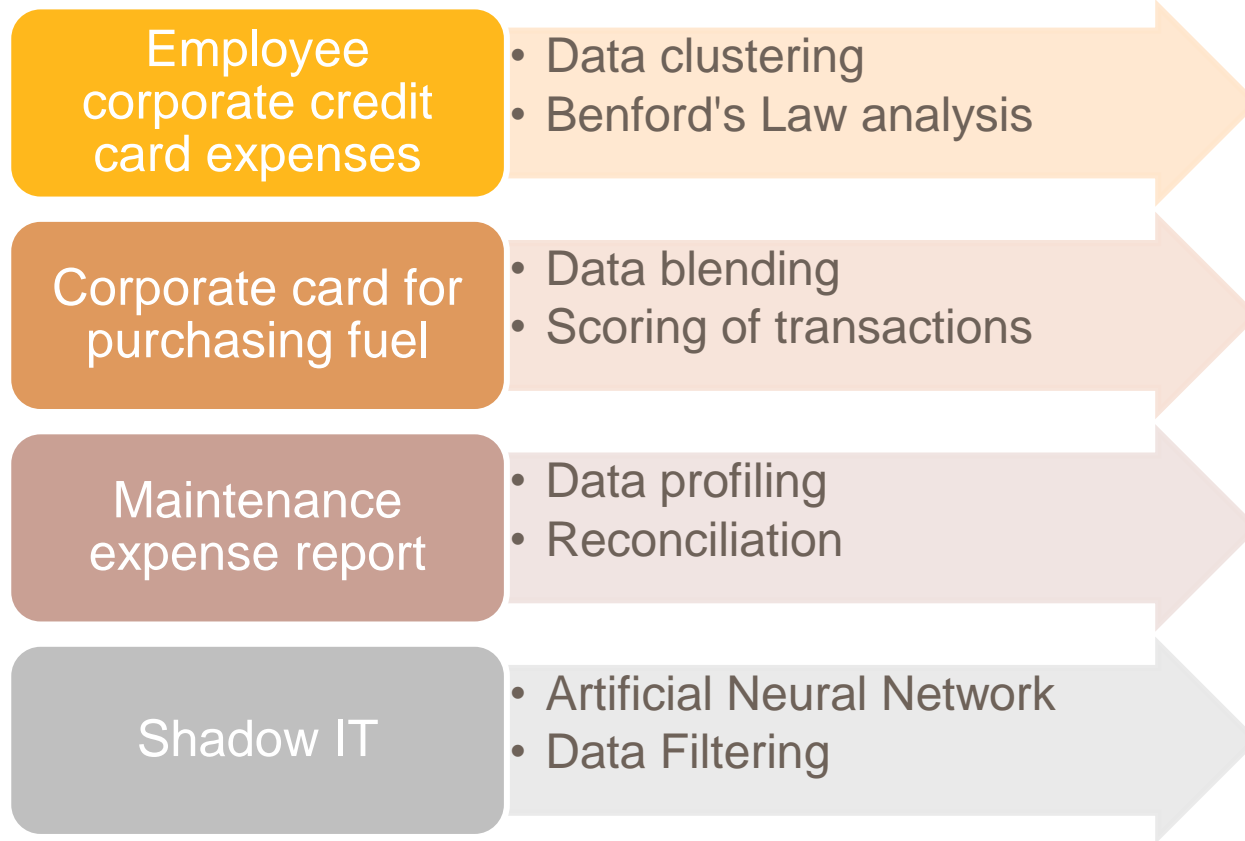
EXAMPLE OF TYPES OF ISSUES THAT WE CAN DETECT



2

EXAMPLES

SOME EXAMPLE OF PROJECTS & TECHNIQUES



REPSOL EXPERIENCE IN AUDIT DATA ANALYTICS

3

TRANSFORMATION PLAN

DATA ANALYTICS AUDIT TRANSFORMATION

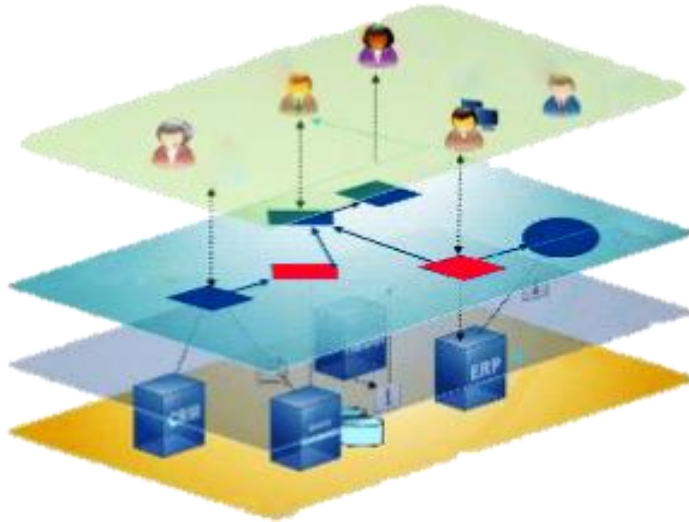
Lines of work

PEOPLE

PROCESS

TOOLS

**DATA
SOURCES**



PEOPLE

(knowledge/skills)

AUDIT PROCESSES

(Plan, Fieldwork, Reporting)

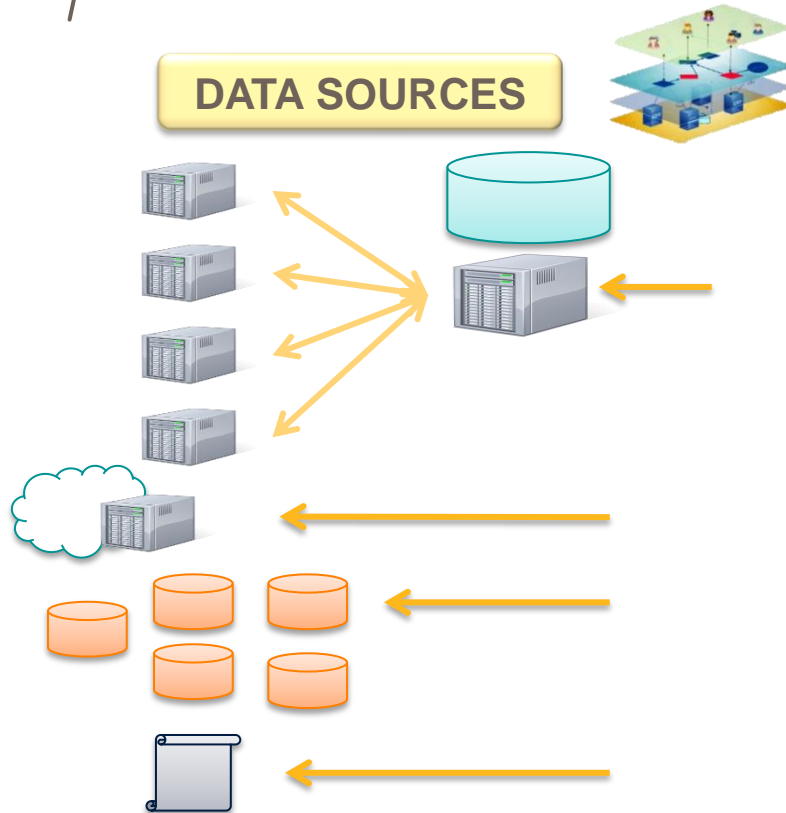
TOOLS

(data extraction, visualization, transformation, mass analysis, advanced techniques)

DATA SOURCES

(identify current and future data sources, e.g. SAP, data lake, cloud,...)

DATA ANALYTICS AUDIT TRANSFORMATION



- ✓ Identify Databases. Don't forget Cloud Computing.
- ✓ Align the plan with the IT plan
- ✓ Connect with Data Lake and DW
- ✓ Define tools to facilitate the download the data
- ✓ Establish rules for approvals and privacy

DATA ANALYTICS AUDIT TRANSFORMATION

TOOLS



1

Define tools for
each DA
requirement

2

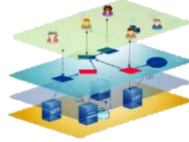
Align tools with
IT &
Digitalization
Strategy

3

Reevaluate
periodically the
tools needed.

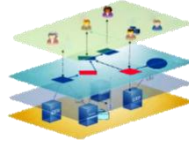
DATA ANALYTICS AUDIT TRANSFORMATION

AUDIT PROCESSES



DATA ANALYTICS AUDIT TRANSFORMATION

PEOPLE (1)



Define INTERNAL vs EXTERNAL resources strategy



Define COMPETENCES needed



Do an ASSESSMENT of the competences



Identify different PROFILES



Establish a TRAINING PROGRAM

DATA ANALYTICS AUDIT TRANSFORMATION

PEOPLE (2)



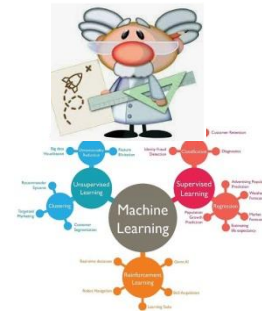
Auditors &
Managers



Data Analyst



Data
Scientist



IBM SPSS
MODELER



SQL



CONCLUSION

5



CONCLUSIONS

SPONSOR



**CONNECT
WITH I.T
AND
BUSINESS**



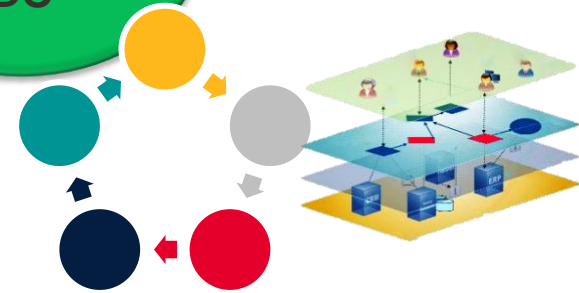
**D.A.
FOR ALL
AUDITORS**



**CHANGE
OF
MINDSET**



**MEASURE
PLAN
DO**



Q&A

“VISUALIZE WHERE YOU WANT TO BE ...AND DO IT”

THANK YOU