Pisa, 24 July 2018

Data analytics for auditing: methods and techniques

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EUROPEAN
COURT
OF AUDITORS

In 2015 the ECA

Scenario 2

In **2015**, …

… the generation and availability of large amounts of data is transforming the world's economies ("big data"). At the same time, access to sophisticated data analysis methods is becoming cheaper.

Therefore, in **2040** …

… the ECA is using a high degree of automation in its audit procedures. Algorithms spot irregularities in digitalised reports and documentation. Artificial intelligence detects performance patterns in large data sets. Auditors will focus more on asking the right audit questions than on verification and analysis.

Agenda

- Digital transformation, digital audit
- Why now? The context
- Techniques
- Contribution to audit transformation
- A framework to develop data services
- Roadmap – Towards digital audit
- Benefits for the organisation
- ECAlab and the importance of sharing knowledge

Techniques and methods

Risk analysis

Exploratory data analysis

Data visualistion

Artificial intelligence

Sentiment analysis

Cluster Analysis

Sampling

Forecasting Time Series

Image Recognition

Big data analitics

Geographical information systems

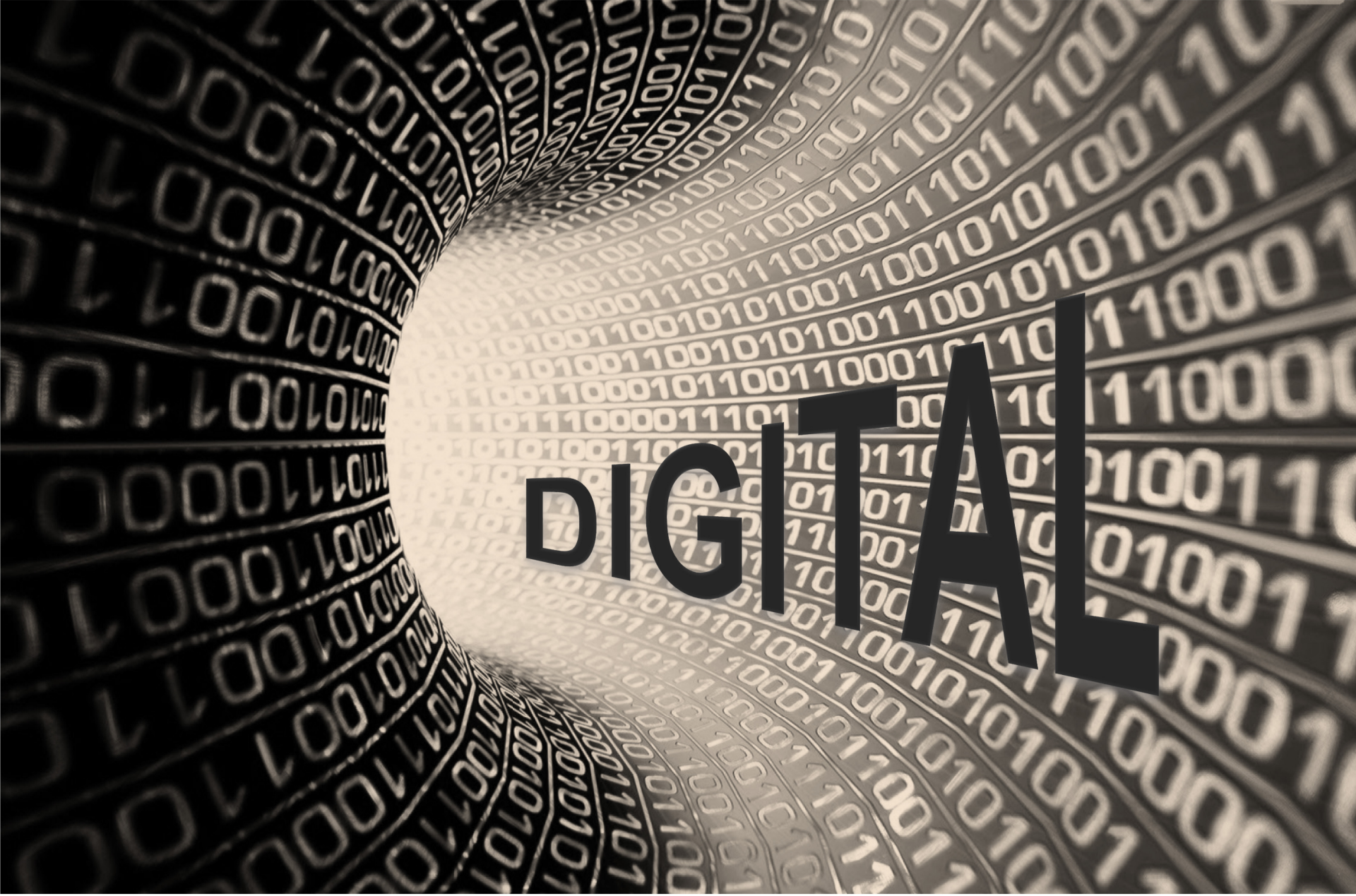
Big data analytics

Machine learning

Network analysis

Natural language processing

Machine Translation

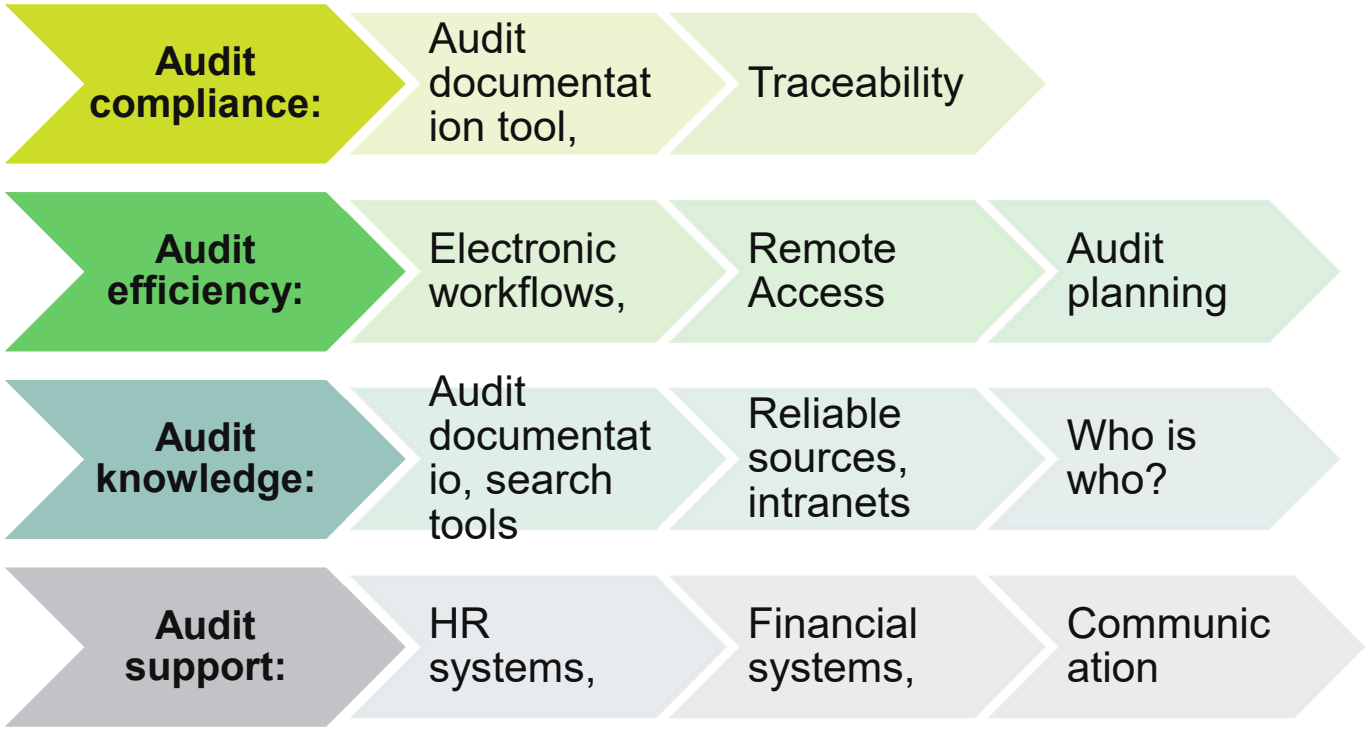

DIGITAL

Digital transformation, digital audit

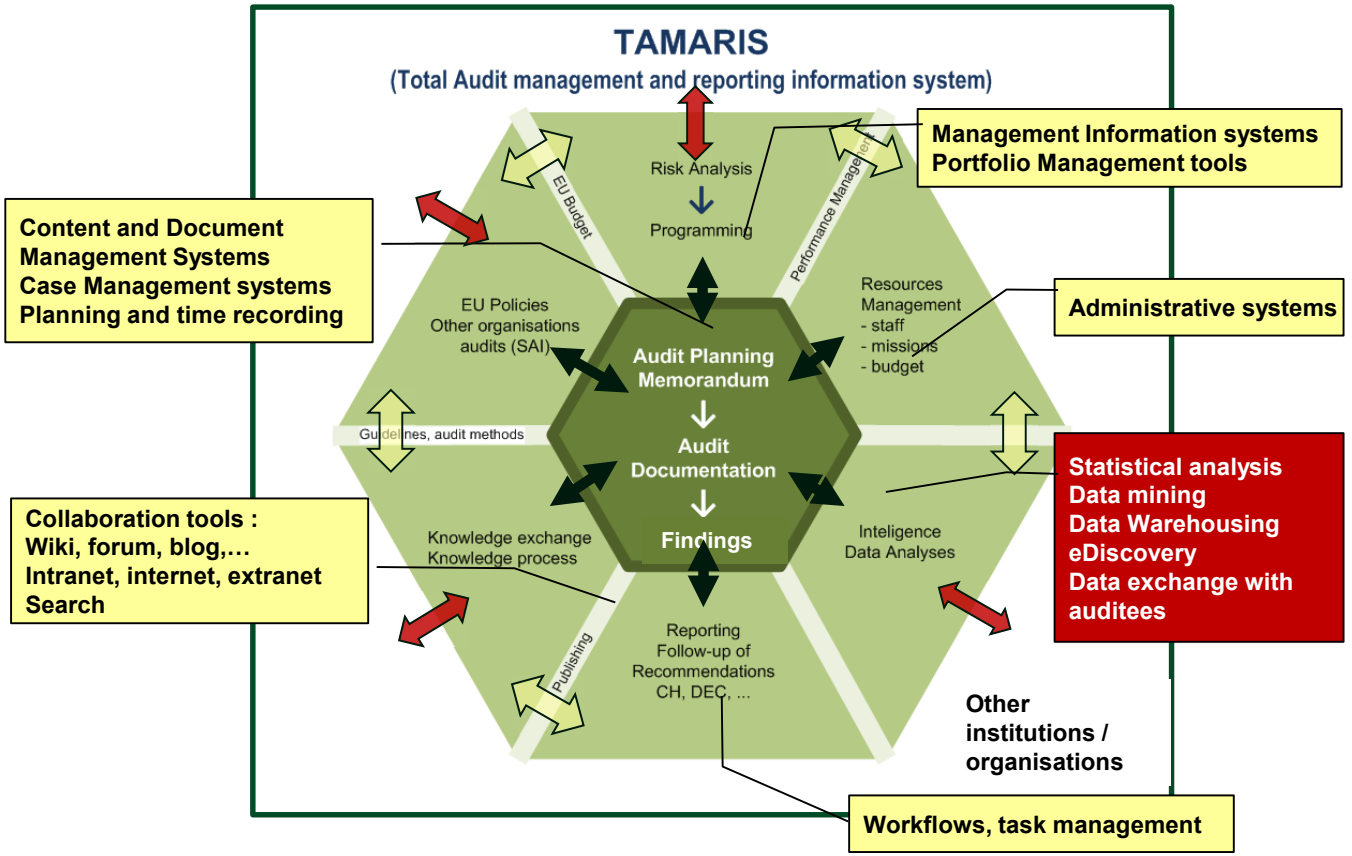
«The profession needs to achieve a "quantum leap" to redesign audit processes using today's technology, rather than using information technology to computerise legacy audit plans and procedures.»

AICPA. Reimagining Auditing in a Wired World

Technology for audit: traditional role



IT supporting existing processes



Technology for audit: traditional role

IT audit

COBIT

- Control Objectives for Information and related Technology
- Since 1996. ISACA.
- Version 5.

Next step

Audit transformation

Driven by digitalisation and data analysis

Why now?

«Measure what is measurable and make measurable what is not so.»

Attributed to Galileo Galilei

Audit transformation

Why?

- Evidence is digital
- Presence is digital
- Auditees are more and more digital

Technology maturity

- Data exchange methods
- Data analytics
- Big data
- Natural language processing

The evidence is DIGITAL

- Digital financial processes
- Digital administrative processes
- Electronic signature
- E-Government
- e-tendering, e-invoicing
- GPS
- Electronic charts
- **Digital twins/proxies**

The presence is DIGITAL

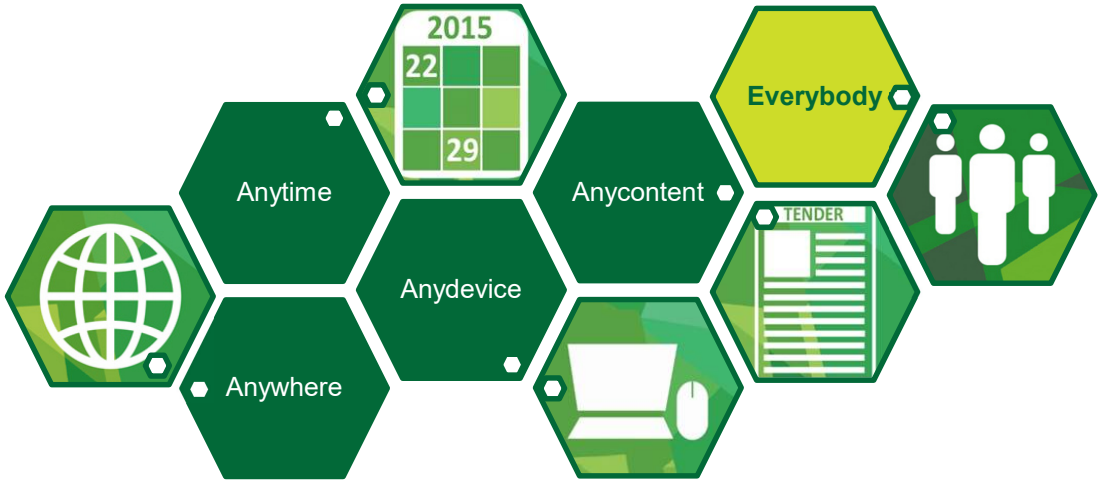
Work from **Anywhere**

At **Anytime**

Using **Anydevice**

To access **Anycontent**

Everybody: Collaboration



The control is digital

- Controls performed by the auditee documented electronically
- Controls perfromed by the controller of the auditee (internal audit) also electronically documented
- The full control system is described on databases and electronic document

Digitalisation allows control by design

eGovernment

Tallinn declaration on eGovernment

- Digital-by-default, inclusiveness and accessibility
- Once only
- Trustworthiness and Security
- Openness and transparency
- Interoperability by default
- Horizontal enabling policy steps

New digital services: new data and new risks

Risks: coordination, interoperability, common architecture

The key element

Data

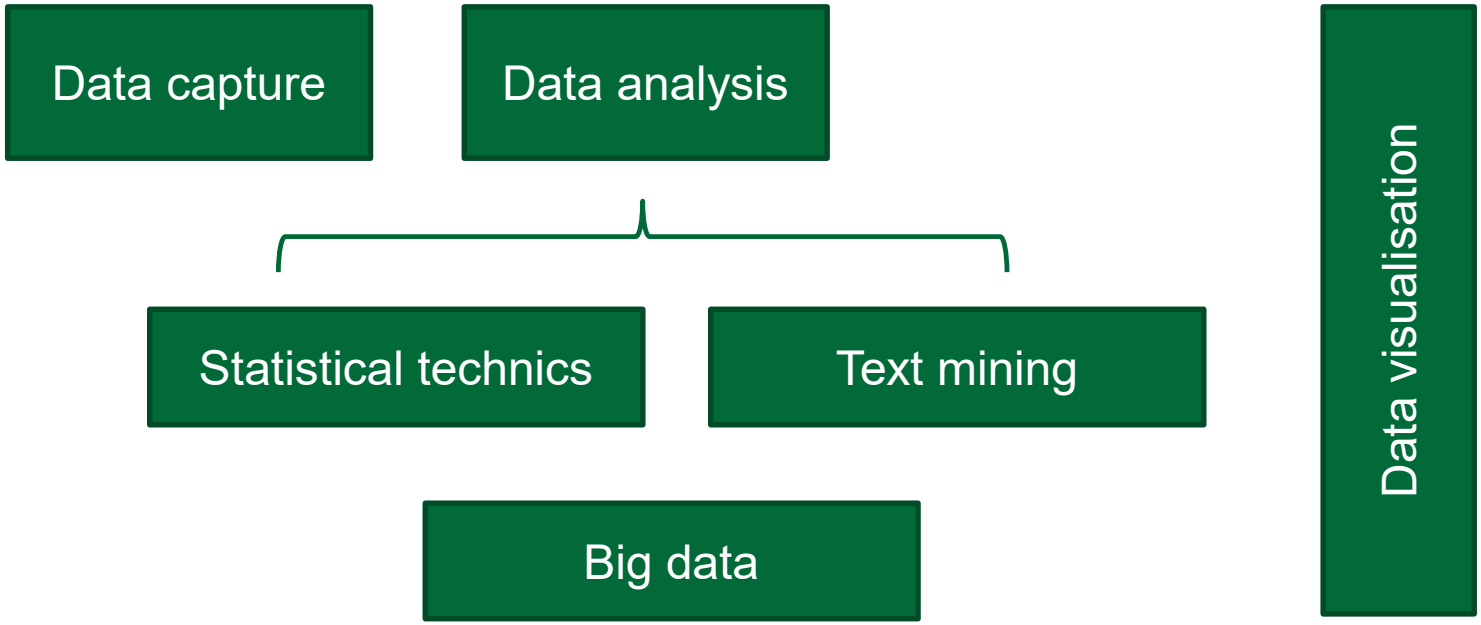
Audit institutions don’t produce the data needed to perform audit.

Techniques

«The profession needs to achieve a "quantum leap" to redesign audit processes using today's technology, rather than using information technology to computerise legacy audit plans and procedures.»

AICPA. Reimagining Auditing in a Wired World

Techniques

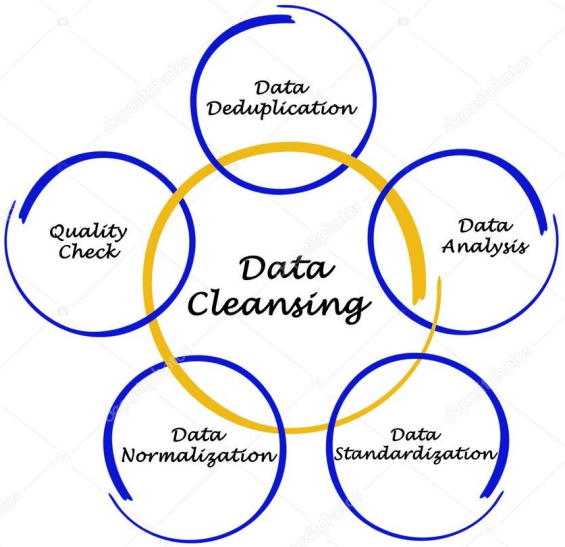

Data capture
Data analysis
Statistical technics
Text mining
Big data
Data visualisation

Data capture

- Regular data transfer
- Access to the auditee systems
- Data exchange via extranet sites (portal)

Dat**a preparation**

- Data extraction, transformation and load
  - Data cleansing



Data analysis

Statistical techniques

Unknown model

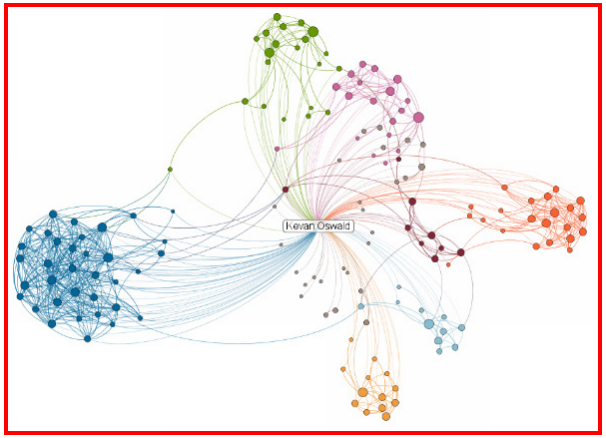
Exploratory what the data tell us?

- Visual. Allow for patterns and trends. Use of GIS (Geographical Information Systems)
- Data mining:
  - Explore the full dataset
  - Data will tell what is next
  - Analysis of outliers
  - Expert systems
  - Requires IT, statistics and business experts and skills

Known model

Analytical. Reply to specific questions: Is there relation between A and B?

Regression models, time series analysis, factor analysis, discriminant analysis, causality analysis,etc.



Big data

The Internet of Things and big data

Everyday objects have sensors , become smart and "talk " to each other. Everything can be registered, measured and captured in digital format.

What is digitally captured ? what becomes data ?

What is big data?

- Massive amounts of data
- Combination of data from different sources
- Very complex data
- Generated by automatic processes (machine, generally)
- Requiring special treatment

Benefits

No need to “clean up" the data to determine the model. Instead of trying to understand the causes of complex phenomena correlations are used to analyse effects

Text mining

The goal is to turn text into data for analysis via application of **natural language processing** and analytical methods.

Text analytics linguistic, statistical and machine learning techniques that model and structure the information content on textual sources

- Semantic relations
- Sentiment analysis
- Pattern recognition
- Named entity recognition
- Speach tagging
- Machine translation
- …

Natural language processing

What Artificial Intelligence can do today in the field of document understanding

- Summarise
- Group by criteria

- Search by meaning
- Correlate different sources

What technology can do, ECB - 1

EUROPEAN CENTRAL BANK
EUROSYSTEM

DGC Senior Management Presentation
Frankfurt Am Main, 13 February 2018

DISC in Motion…
DG-IS DISC Team

Unstructured Data Processing on DISC - Document summarization example

1. Input to the Natural Language Processing Algorithm (~500 words)

Big data encompasses a wide range of highly complex information sources, characterized by granul (observed at the individual or product level), high frequency (such as intra-daily time series), lac structure (data retrieved from text or internet sources), or combinations of the above.

The increased availability of big data creates a novel opportunity for central banks to improve on fulfilment of their mandate. In order to fully leverage the potential of ever-growing volumes of informa the European Central Bank (ECB) is compelled to develop the capacity to collect and store this data well as analyse it by means of modern machine learning techniques. This encompasses a rang algorithms trained for data-driven predictive modelling.

Accurately assessing the present and forecasting the future are core activities of the ECB, continuously perfected by means of advanced analytical methods. The adoption of big data and machine learning techniques would represent an expansion of the existing statistical toolbox, further promoting informed decision-making. A range of novel economic studies illustrate how analytical tools designed for big data enable the construction of more precise statistical indicators, the detection of anomalies in economic patterns and the estimation of more accurate predictive models. Aware of these benefits, ECB business area experts have already experimented with machine learning techniques in their work, thus placing the bank at the forefront of cutting-edge economic analysis.

Alongside the conduct of monetary policy, the increasingly important role of the ECB as a financial market supervisor has entailed the production and analysis of more granular data. Given its pan-European access to a large and growing number of confidential datasets, the ECB enjoys a unique position to become a leader in the use of big data for monetary policy and financial supervision.

Big datasets used by the ECB require ample storage space and working memory, often exceeding the capacity of a single computer. Moreover, the confidential nature of the information managed and produced by the ECB prompted the need for a secure, in-house solution for data management. In order to enable ECB experts to harness the potential of available big data, DGIS has been working on improving the available IT infrastructure. To this end, DGIS put in place the Data Intelligence Service Centre (DISC) platform, a secure distributed computing environment for the storage of all datasets used within the bank, which enables general data processing capabilities and facilitates information sharing across business areas.

Over time, the techniques used by ECB experts have become progressively more demanding from a computational point of view. As these methods require the use of more processing power, analytical work conducted on a single laptop can become very cumbersome, slow or even unfeasible.

The necessary processing power for state-of-the-art analytics can be guaranteed by a system of computers that work together in a cluster. To this end, we will further leverage the Hadoop cluster computing system underlying the DISC platform. The parallelization of machine learning computations in the cluster would expand the possibilities for analytical work along two important dimensions: the use of large datasets and the deployment of algorithms with high computational demands, moving the ECB into the realm of big data.

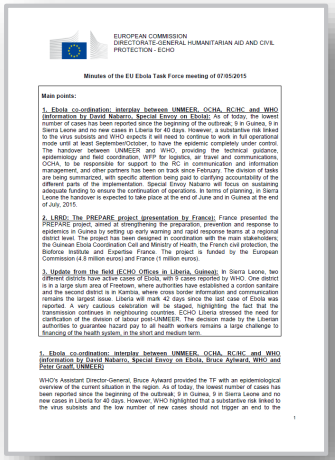
What technology can do, ECB - 2

3. Summary of the Summary Generated by the Natural Language Processing Algorithm (~50 words)

In order to fully leverage the potential of ever-growing volumes of information, the European Central Bank (ECB) is compelled to develop the capacity to collect and store this data, as well as analyse it by means of modern machine learning techniques.

Natural Language Processing

Document summarisation



EUROPEAN COMMISSION
DIRECTORATE-GENERAL HUMANITARIAN AID AND CIVIL PROTECTION - ECHO

Minutes of the EU Ebola Task Force meeting of 07/05/2015

Main points:

1. Ebola co-ordination: interplay between UNMEER, OCHA, RC/HC and WHO (information by David Nabarro, Special Envoy on Ebola): As of today, the lowest number of cases has been reported since the beginning of the outbreak; 9 in Guinea, 9 in Sierra Leone and no new cases in Liberia for 42 days. However, a substantive risk linked to the virus subsists and WHO expects it will need to continue to work in full operational mode until at least September/October, to have the epidemic completely under control. The handover between UNMEER and WHO, providing the technical guidance, epidemiology and field coordination, WFP for logistics, air travel and communications, OCHA, to be responsible for support to the RC in communication and information management, and other partners has been on track since February. The division of tasks are being summarized, with specific attention being paid to clarifying accountability of the different parts of the implementation. Special Envoy Nabarro will focus on sustaining adequate funding to ensure the continuation of operations. In terms of planning, in Sierra Leone the handover is expected to take place at the end of June and in Guinea at the end of July, 2015.

2. LRRD: The PREPARE project (presentation by France): France presented the PREPARE project, aimed at strengthening the preparation, prevention and response to epidemics in Guinea by setting up early warning and rapid response teams at a regional district level. The project has been designed in coordination with the main stakeholders, the Guinean Ebola Coordination Cell and Ministry of Health, the French civil protection, the Bioforce Institute and Expertise France. The project is funded by the European Commission (4.8 million euros) and France (1 million euros).

3. Update from the field (ECHO Offices in Liberia, Guinea): In Sierra Leone, two different districts have active cases of Ebola, with 9 cases reported by WHO. One district is in a large slum area of Freetown, where authorities have established a cordon sanitaire and the second district is in Kambia, where cross border information and communication remains the largest issue. Liberia will mark 42 days since the last case of Ebola was reported. A very cautious celebration will be staged, highlighting the fact that the transmission continues in neighbouring countries. ECHO Liberia stressed the need for clarification of the division of labour post-UNMEER. The decision made by the Liberian authorities to guarantee hazard pay to all health workers remains a large challenge to financing of the health system, in the short and medium term.

1. Ebola co-ordination: interplay between UNMEER, OCHA, RC/HC and WHO (information by David Nabarro, Special Envoy on Ebola, Bruce Aylward, WHO and Peter Graaff, UNMEER)

WHO's Assistant Director-General, Bruce Aylward provided the TF with an epidemiological overview of the current situation in the region. As of today, the lowest number of cases has been reported since the beginning of the outbreak; 9 in Guinea, 9 in Sierra Leone and no new cases in Liberia for 40 days. However, WHO highlighted that a substantive risk linked to the virus subsists and the low number of new cases should not trigger an end to the

Case: Chamber III – Union Civil Protection Mechanism (14PAN253)

Goal: help auditors to quickly read through many documents and select the meaningful ones

ECALabers Emanuele Fossati

Summary, 2% ratio

"The situation needs to be monitored closely in Guinea before we can announce a definitive slowdown of the epidemic: no new cases of primary contamination; all current and expected new cases are family or health

Most positive paragraph

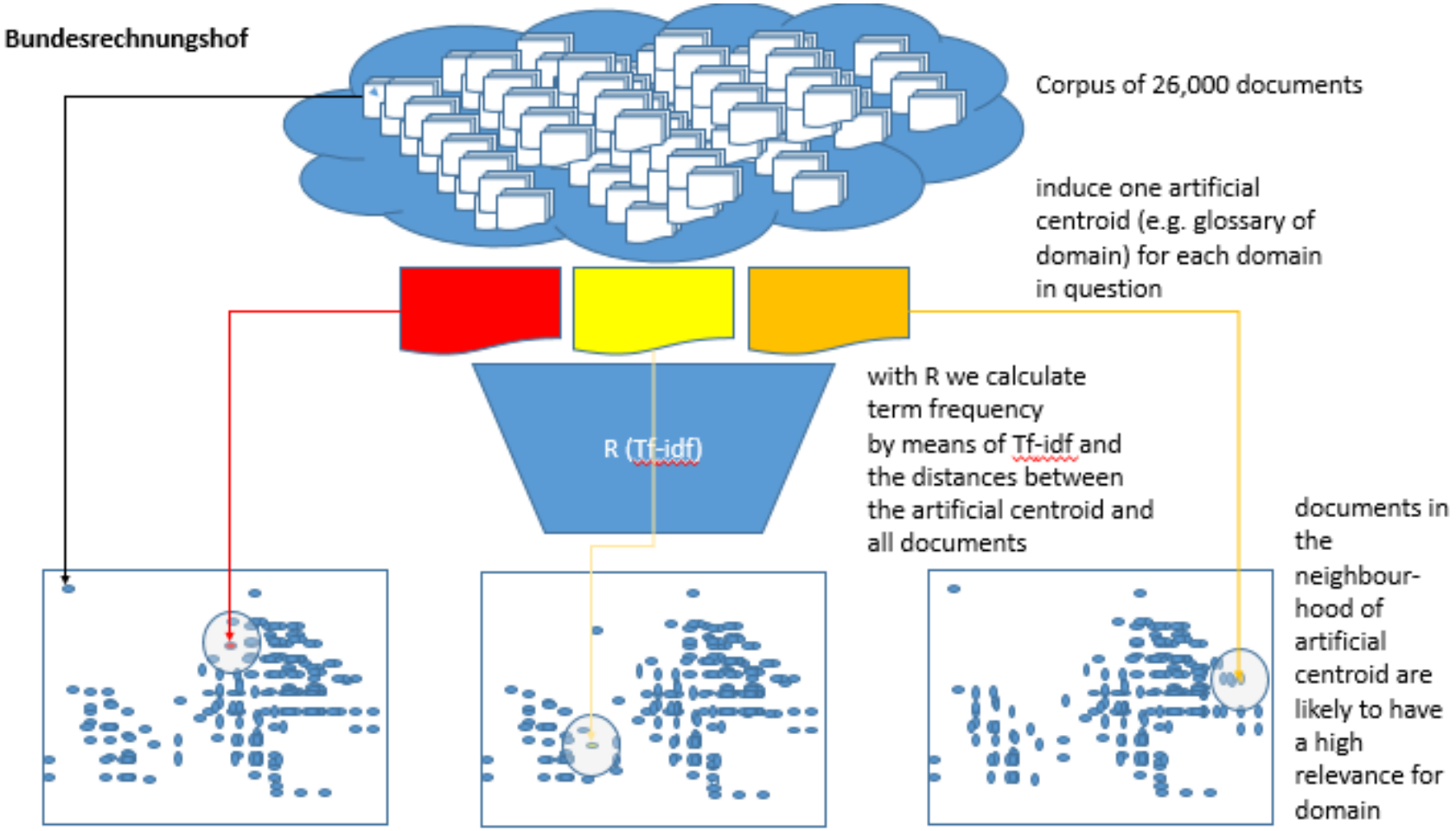
"The response from national authorities, international organisations and partners show a clear improvement in the response"

Most negative paragraph

"The EU DEL Sierra Leone mentioned that there are no cases confirmed (to the contrary of previous messages from WHO). One suspected case was contaminated in Guinea and died around 12 March in SL. Contacts were isolated but they have tested negative."

German SAI. Text mining methodology

Text mining for selection of relevant documents/files in the domain of an audit



Semantic search/navigation

Search by meaning

The searched keyword “Train” is nowhere here, only similar concepts

Report: SR/08/2016

Rail freight transport i the EU: still not on the right track

- Recommendation

Reply (European Commission):

lures (b) The Commission should, within its
erning
corridors to facilit e rail freight operations a oss
as considering how a cons path
best be ensured across the whole rail network.

The Commission accepts the recommendation. Stakeholders have taken the lead in harmonising in certain areas (e.g. the common Framework for capacity allocation). An evaluation of the RFC regulation will be conducted in 2016 taking into account what has already been done or is in the process of being done, and assessing whether there are areas where harmonisation is needed through an intervention from the Commission.

tities:

['The Commission (ORG)']

['Commission (ORG)', 'Framework (ORG)', 'RFC (ORG)']

Report: SR/08/2016

Rail freight transport in the EU: still not on the right track

Paragraph: 98 - Conclusion

Reply (EC/MS):

In add on to improving the regu tory and strategic framework, enhan ing rail freight transport c petitiveness requires a rail network adapted to s ght needs, which entails making the best possible use of the available funding.

Under the 2014-2020 MFF, the newly creat almost entirely on projects with clear Euro cross-border rail projects and the ERTMS border sections and interoperability will ne freight services, since rail freight is particu and long distances. The Commission consi will continue to be made, to target rail inve TEN-T Programme.

Important Entities are recognised!

Recognised Entities:

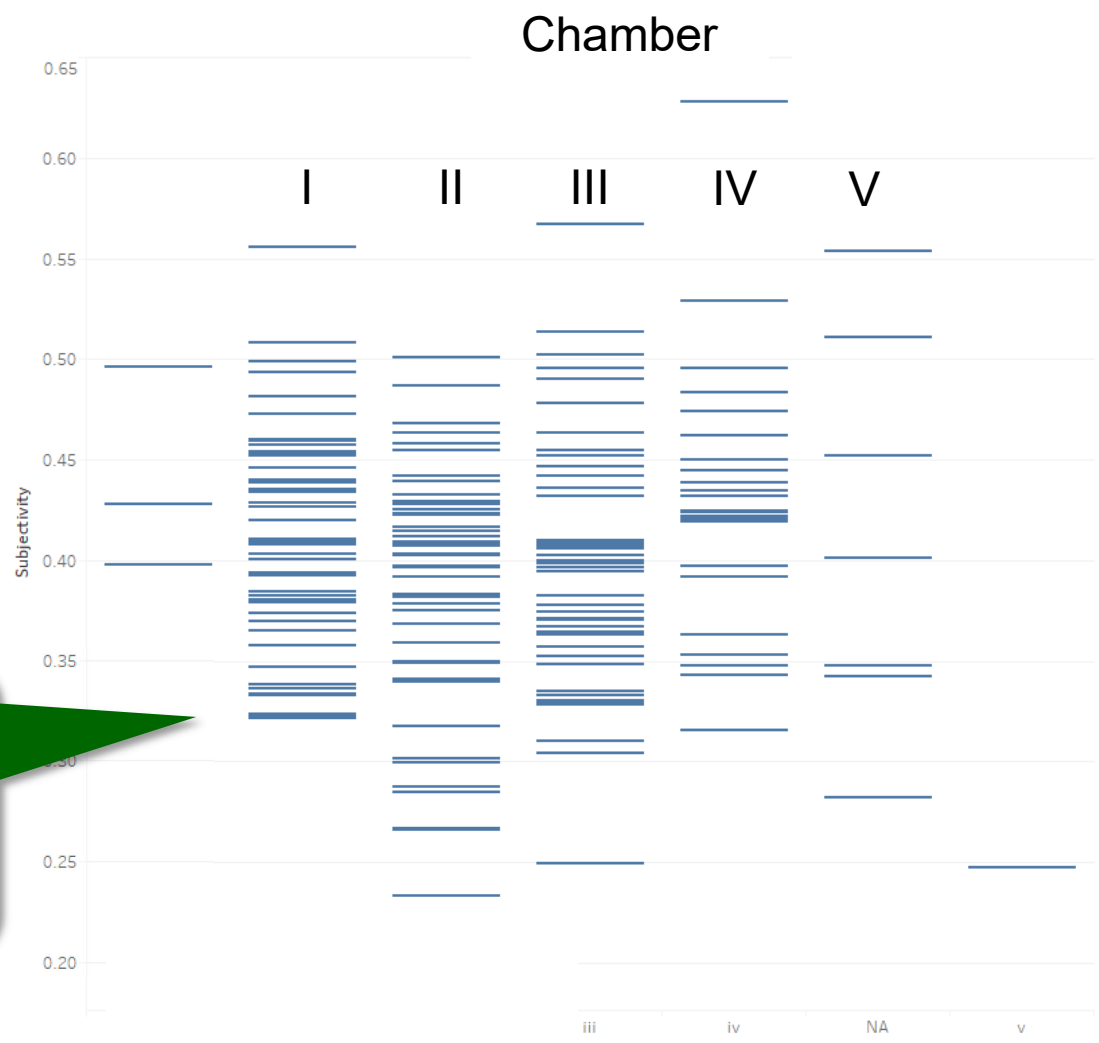
[]

['MFF (ORG)', 'CEF (ORG)', 'ERTMS (PERSON)']

Sentiment analysis

Subjectivity scores of Special Report

How frequently "subjective" words are used in a document



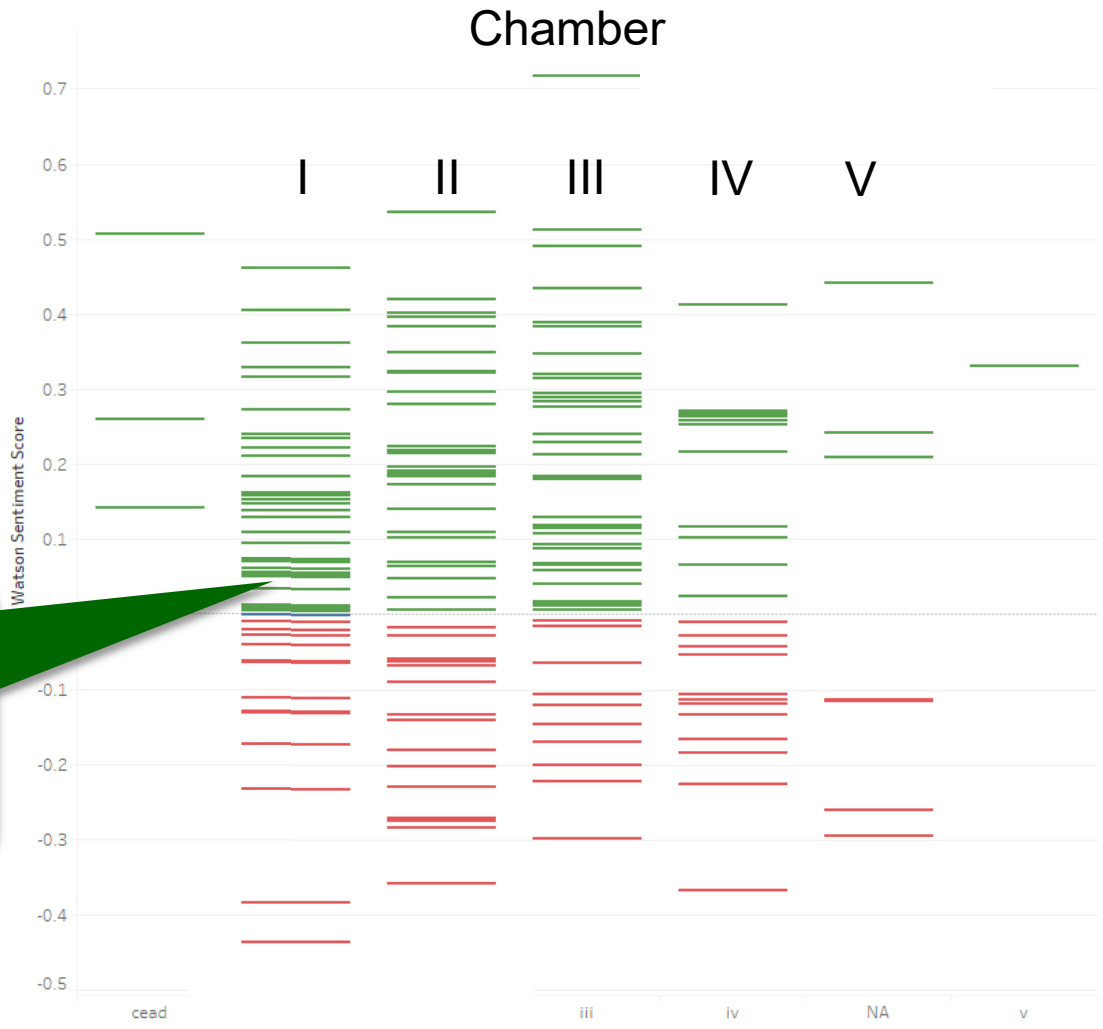
Overall balanced distribution.
CH II is slightly less
CH IV is slightly more subjective in wording.

Sentiment analysis

Sentiment scores of Special Reports

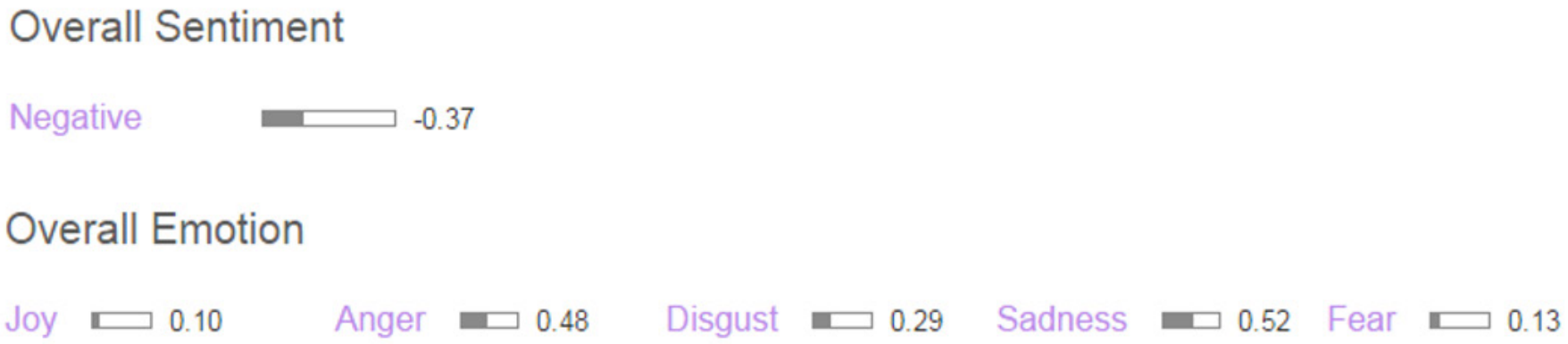
How "positive" or "negative" is the wording used in a document

Overall balanced distribution.
CH I is slightly less positive CH III is slightly more positive
In wording.



Sentiment Analysis – executive summary of SR

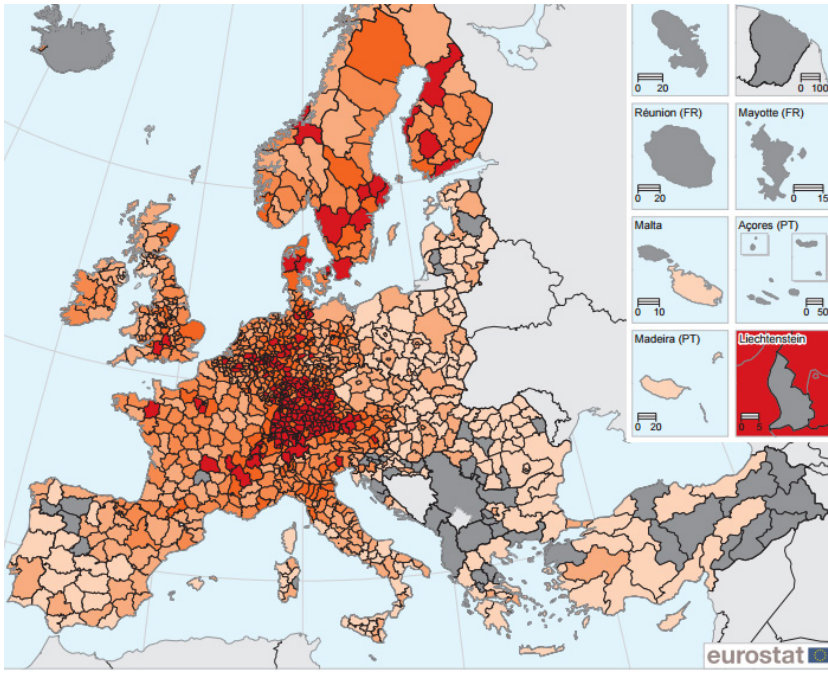
Food waste



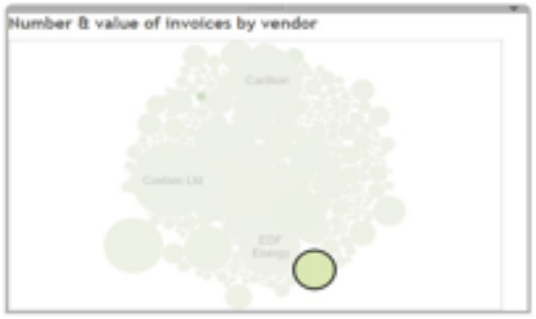
Water waste

Data visualisation

- Tabular
- Graphical
- Word clouds
- Infographics
- Dashboarding



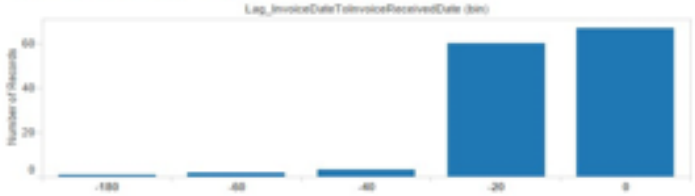
Purchase to pay (P2P) analytic – invoices analysis



Top 20 highest value invoices

Invoice Id	Vendor Name	Invoice Desc...	
6836394	Morgan Sindall Plc	Null	8,244,213
5971136	Morgan Sindall Plc	Null	7,428,084
5995083	Morgan Sindall Plc	Null	7,381,823
6305732	Morgan Sindall Plc	Null	7,008,666
6093486	Morgan Sindall Plc	Null	6,103,917
6115284	Morgan Sindall Plc	Null	5,438,145
6198649	Morgan Sindall Plc	Null	5,327,254
6230206	Morgan Sindall Plc	Null	5,193,587
6278317	Morgan Sindall Plc	Null	4,961,938
6157745	Morgan Sindall Plc	Null	4,901,715
6079738	Morgan Sindall Plc	Null	4,848,976
6228533	Morgan Sindall Plc	Null	4,599,929
6007921	Morgan Sindall Plc	Null	4,445,588
6836384	Morgan Sindall Plc	Null	3,913,464
6118155	Morgan Sindall Plc	Null	3,890,259
6231116	Morgan Sindall Plc	Null	3,213,853
6308447	Morgan Sindall Plc	Null	3,076,859
5976136	Morgan Sindall Plc	Null	2,268,929
6089693	Morgan Sindall Plc	Null	1,154,636
6017832	Morgan Sindall Plc	Null	1,047,397

Lag time (days) between invoice date and received date



Distribution of invoices by value

Invoice value by sorce & currency code

Invoice Source	Invoice Curren... GBP
CERTIFICATES	111,324,575
ERS	585,514
IT_PMFI	0

Number invoices by day of week paid

Weekday of Payment Accou...	
Null	2
Monday	36
Tuesday	12
Wednesday	28
Thursday	31
Friday	22

Building a series of dashboards that allow audit teams to consider their knowledge of the business and identify areas of interest is a key aim of our P2P work.

NAO experience of applying data analytics to performance and financial audit:
24th UN/INTOSAI Symposium 2017

National Audit Office

Blockchain. Contol by design.

Changes in audit

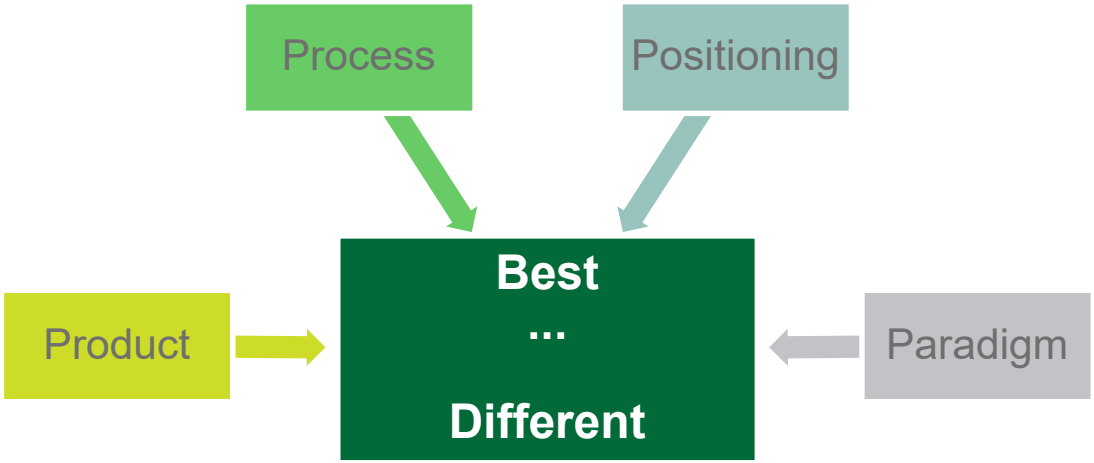
«The best way to predict the future is to invent it»

Alan Kay

The use in audit

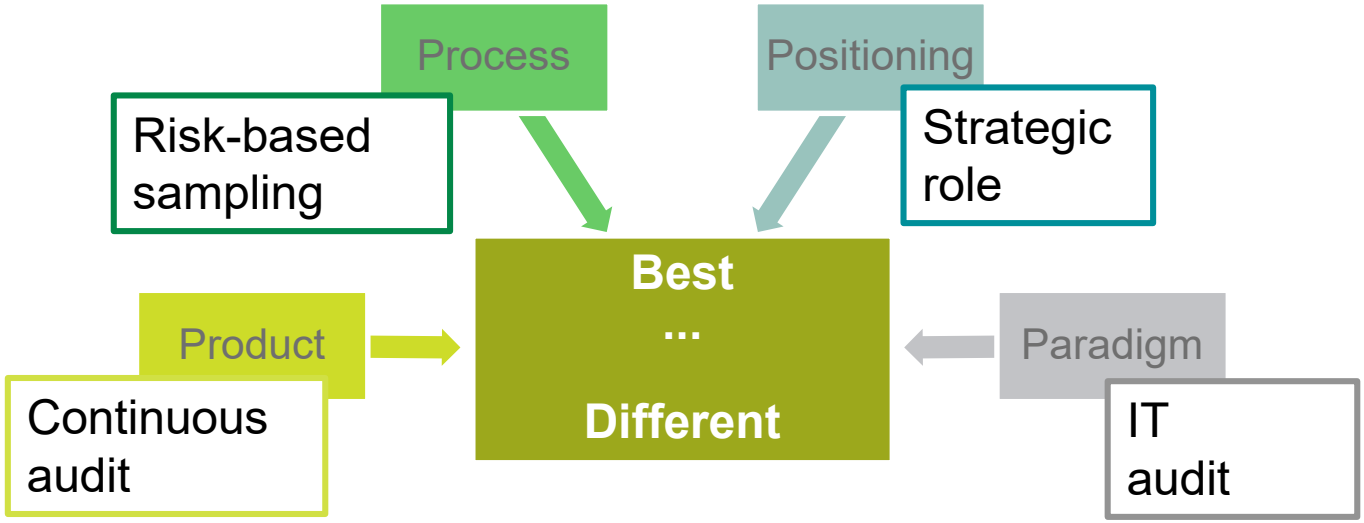
- Participation to
  - Programming
  - Planning process
  - Automation of repetitive tasks
  - Evidence gathering
  - Reporting
  - Knowledge management

Innovation: the “4 Ps” model



Tidd J., Bessant J. (2016). ”Managing innovation: Integrating Technological, Market and Organizational Change, 5th edition”. *Wiley.* Chichester, West Sussex.

Innovation: the “4 Ps” model



Product: Continuous audit

Continuous control of the transactions

This requires

- Frequent data transfer or remote access to control systems
- Algorithms containing the rules to identify irregularities
- Business rules to set alerts
- Enough computing capacity
- To be efficient it has to be done remotely

Benefits

The work is not concentrated in a period of the year: it is distributed.

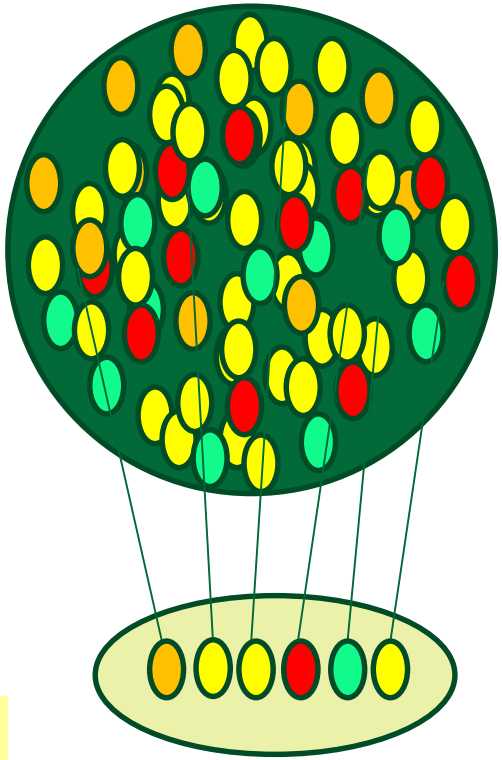
The continuous and interactive feedback to the auditee on irregularities. This allows the auditee to take action.

More effective audit.

Process: Risk analysis

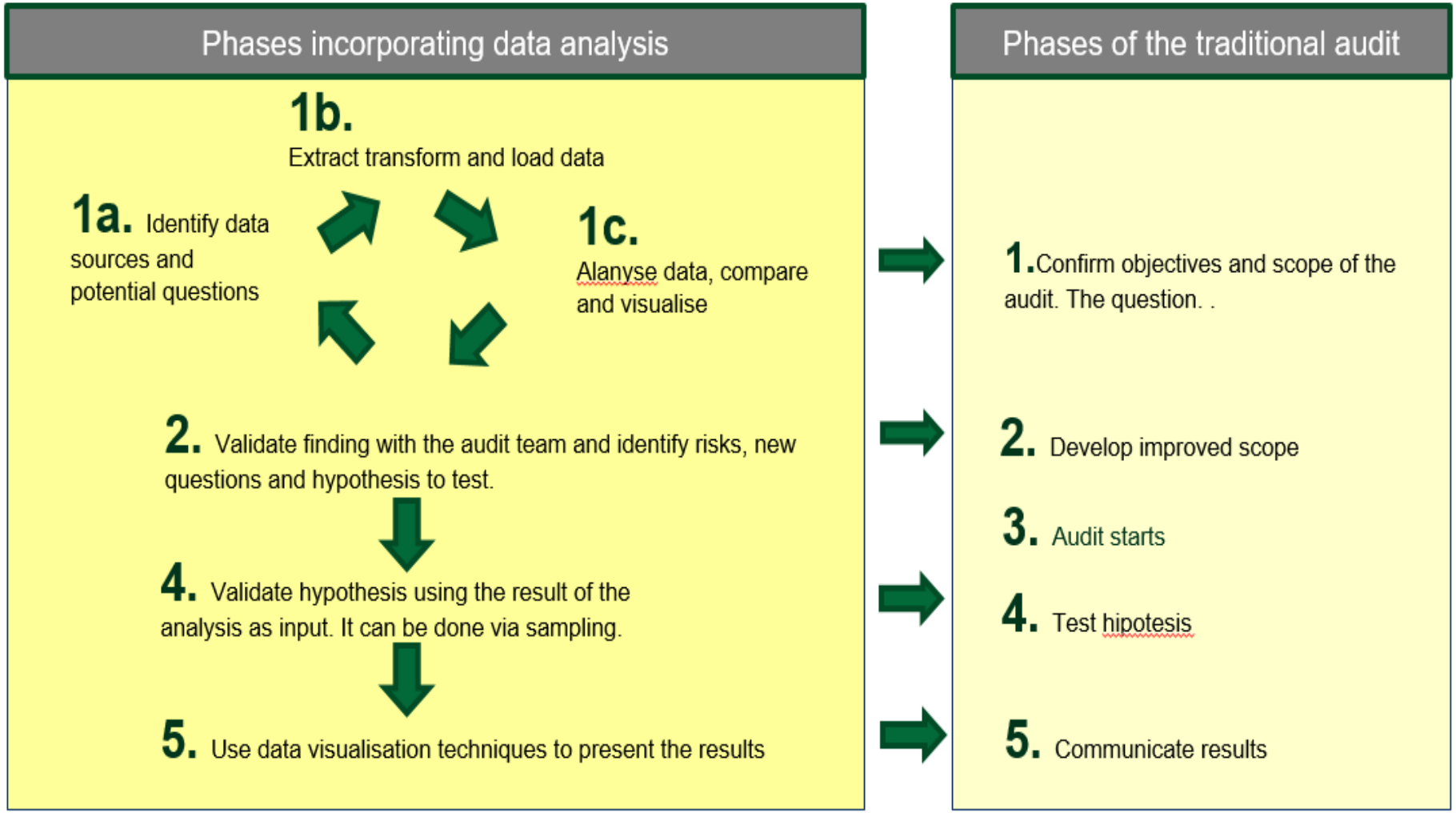
New planning and programming

- Analyse the complete data set before starting to audit.
- Utility: audit planning, risk analysis.
- Identifies patterns, correlations and changes
- Use in the audit field, only in high-risk cases
- Focus on outliers



From sampling to 100% of the population

Process innovation



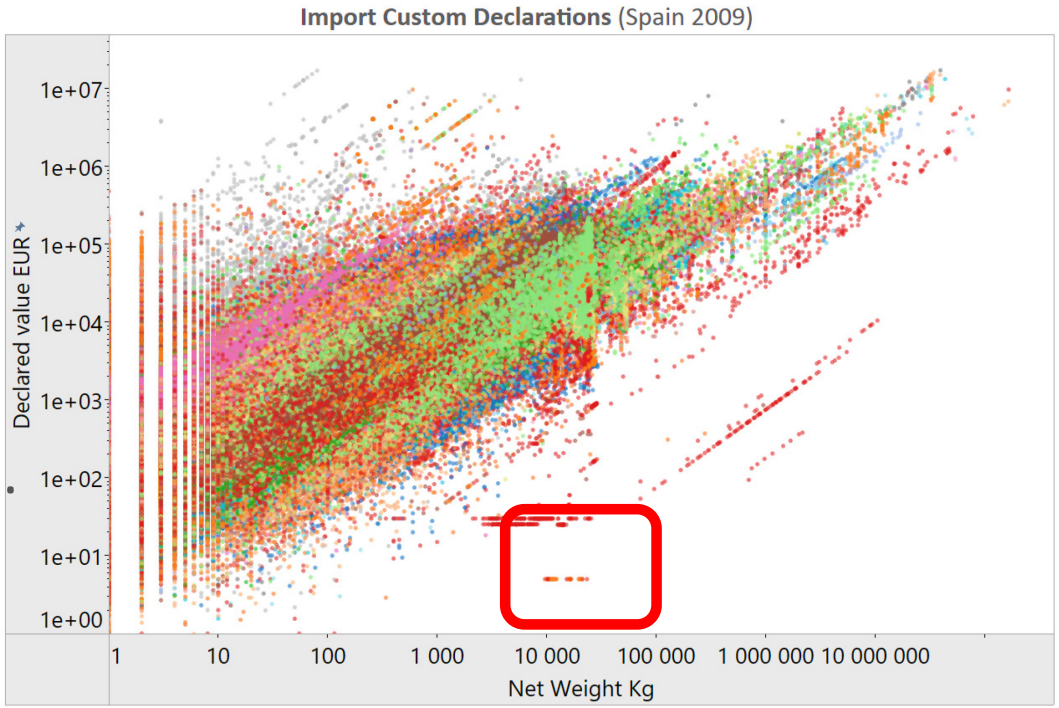
Risk based sampling EU Customs audits – CH4

Goal: assess control systems

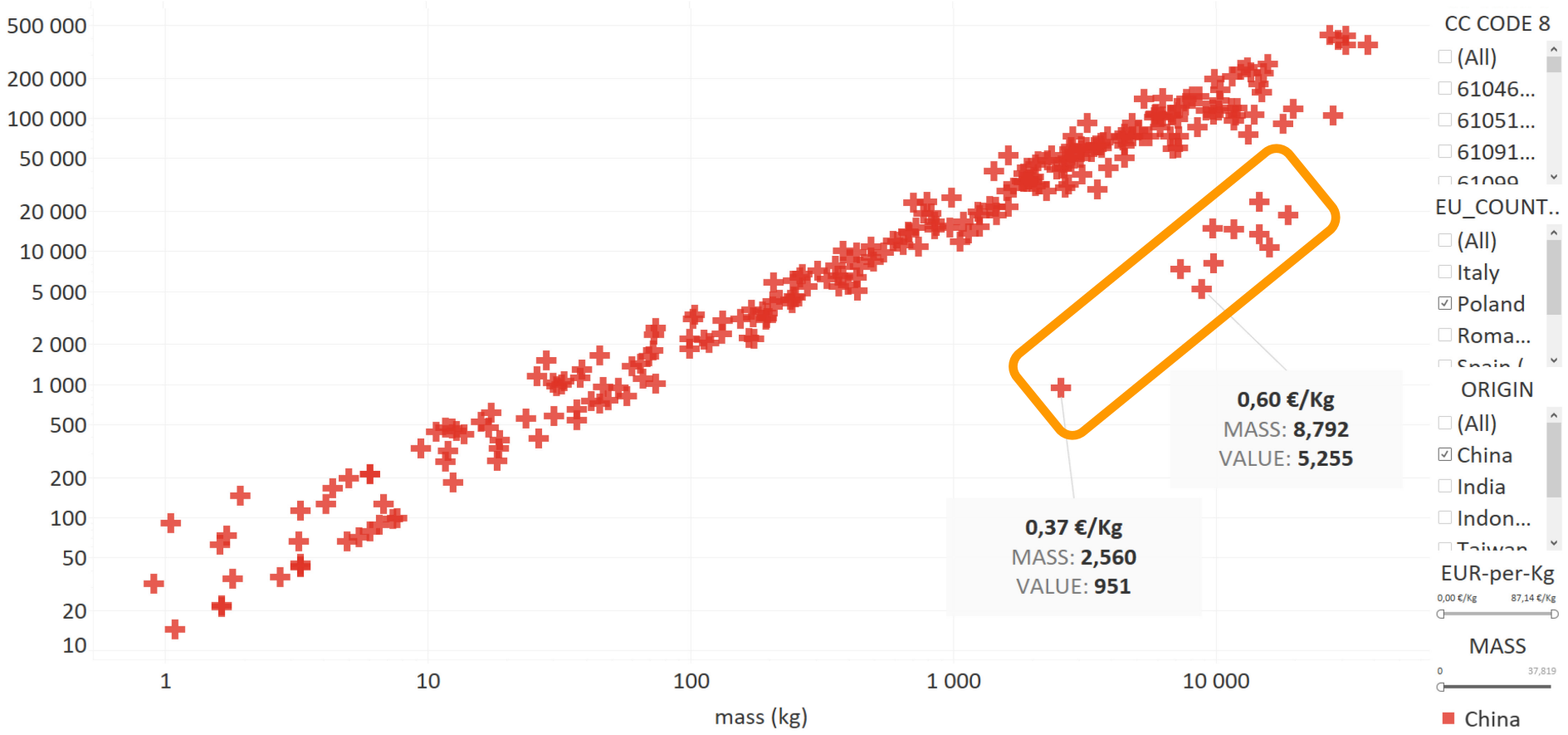
- "Are the **import procedures** robust?"
- "Are we tackling **VAT fraud**?"

Sampling

- Random samples 😐
- 2014: data visualised …



2. Sampling - Poland, Cotton trousers (10)



Positioning: auditor as a collaborator

From financial audit to a more strategic role

If audit is carried out continuous: collaborator.

Enables the team a greater focus on strategic risk

Dublin Airport Authority

"*Prior to apply data analytics, 90% of the function's time was spent on financial audits. Since the incorporating data analytics the focus has shifted, with 50% of audits now concerning non-financial risks. … The overall direction of internal audit is to opérate on a more strategic level by looking at strategic risks*. "

Example described in Data Analytics It is time to take the first step Chartered IIA (2017)

KPMG France: Automate the junior auditor role using IBM Watson.

Paradigm: IT, object to audit

When the result of the audit is based on data and its quality,

The information system must be audited first.

IT will move from being an instrument to help the auditor, to be the object to be audited.

Information systems

Governance, code quality

Business rules and controls, …

Security

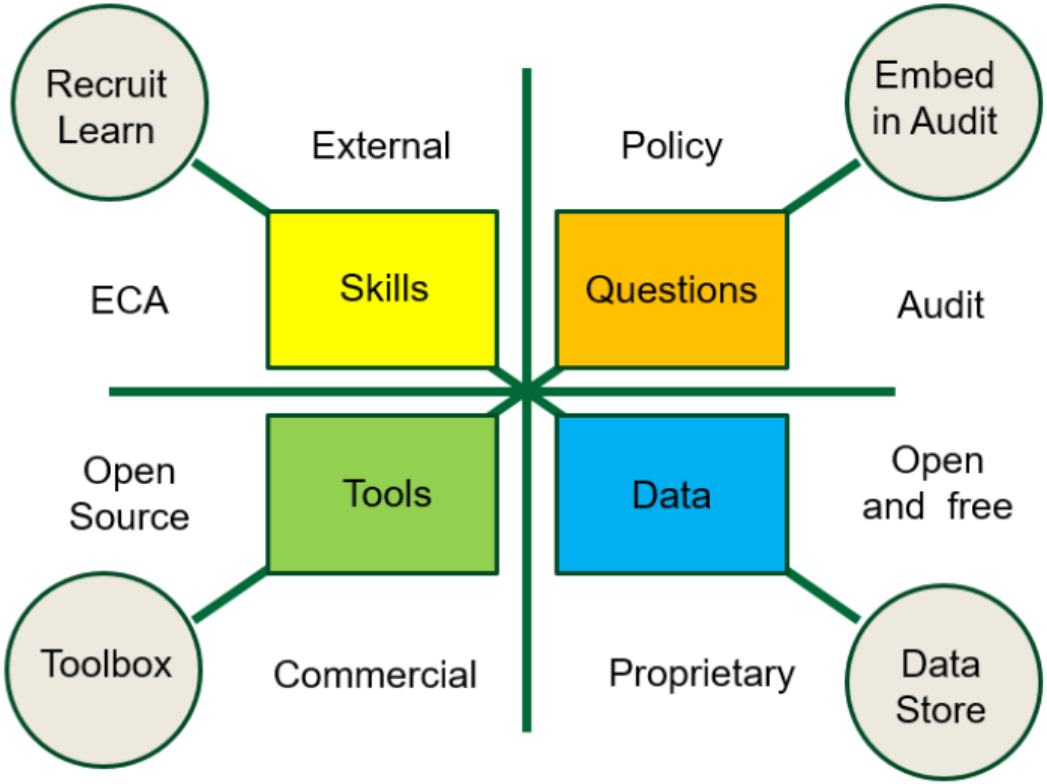
- Access, penetration, prevention, confidentiality, backup and resilience, …

Efficiency

. . .

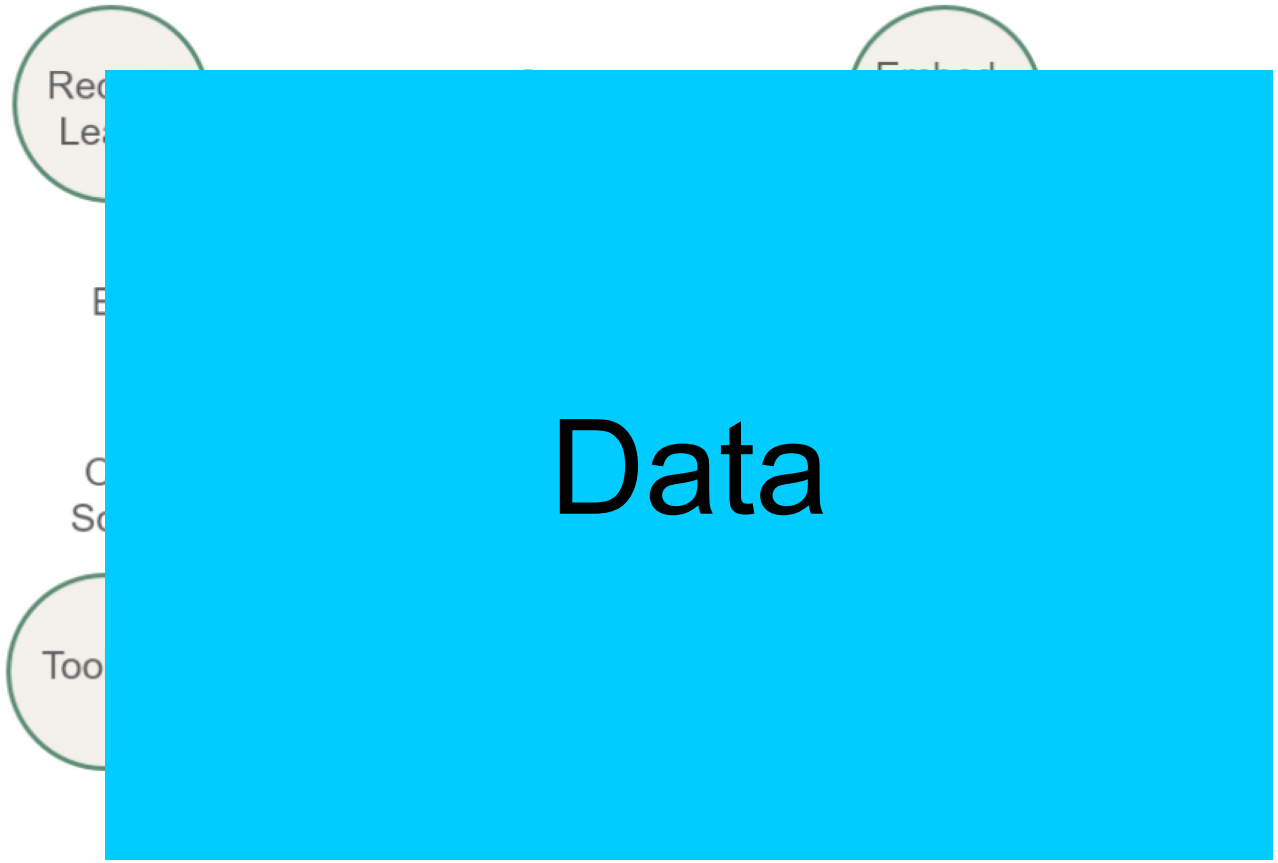
A framework to develop data services

A framework to develop data services



Why a framework for audit?

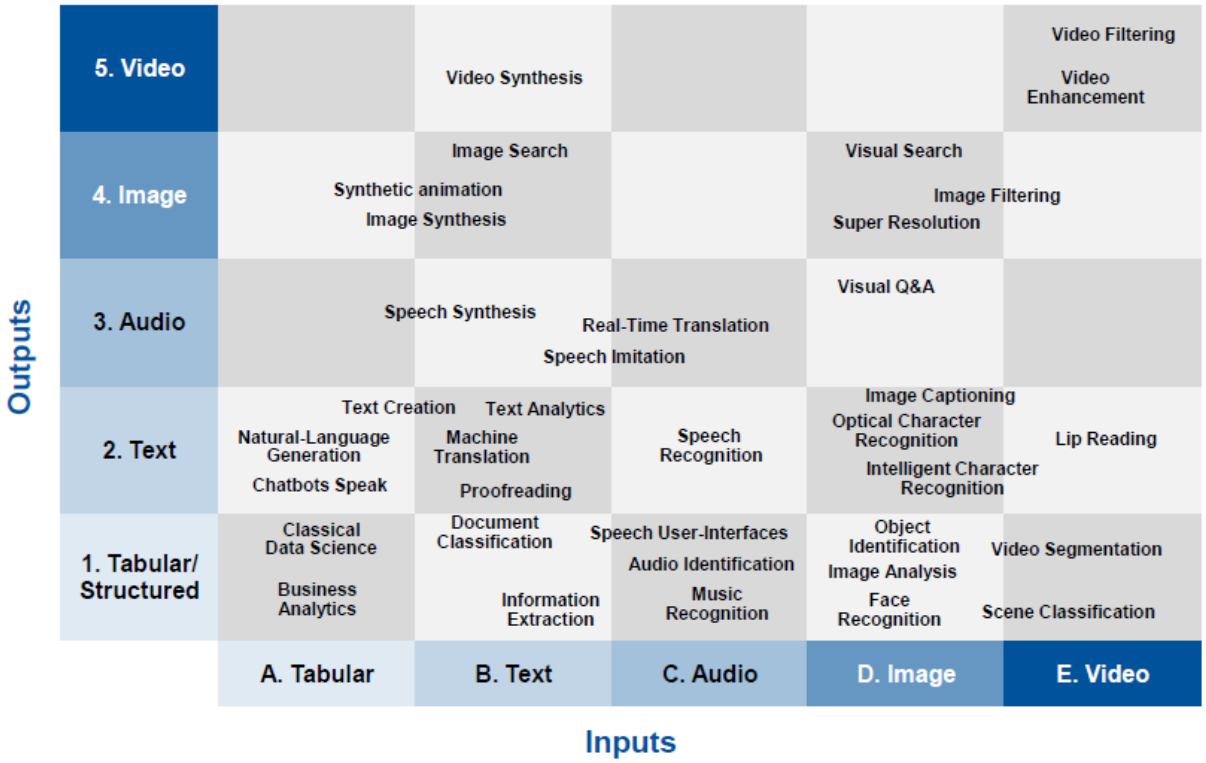
- Audit organisation aren’t data producers
- The planned time for audit is limited
- Components should be reusable and reused
- Each audit is like a new project


Data

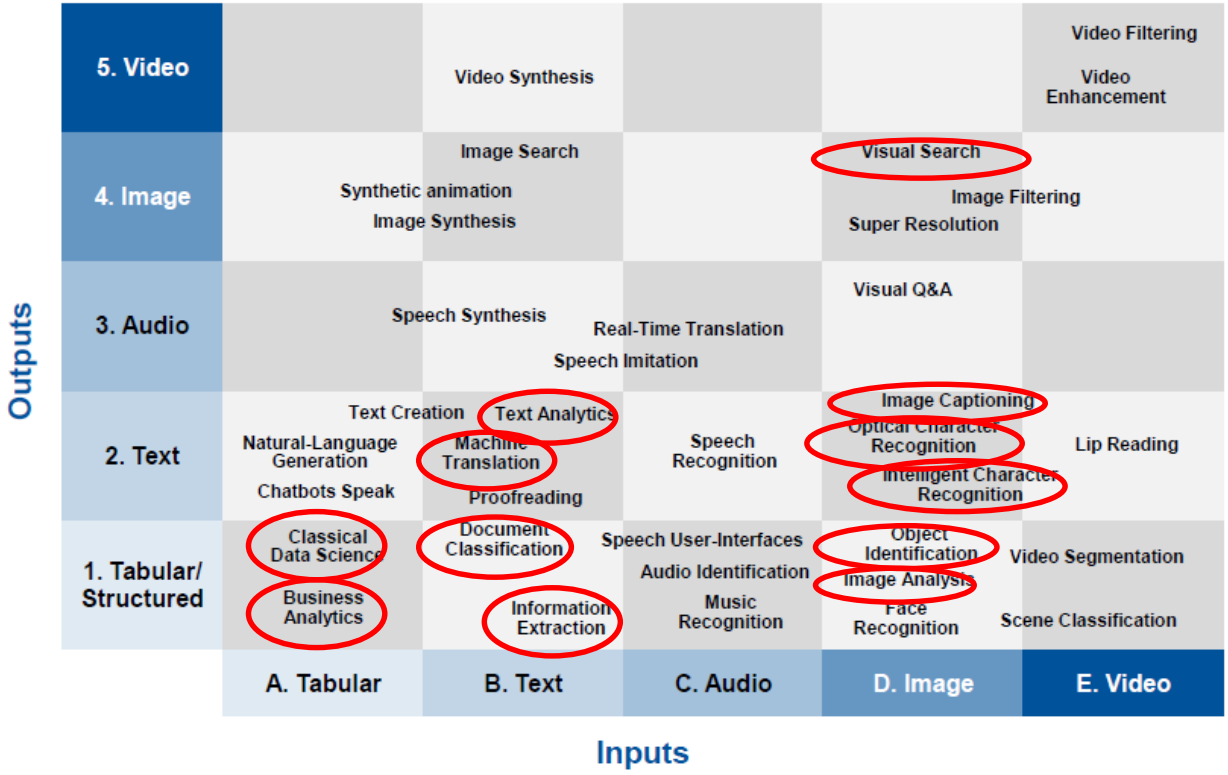
Data

- **Identify reliable data sources**
- **Create a data sources catalogue**
  - Quality
  - Access mechanism
- **Structured and unstructured data**
  - 90% of the data available on the internet are unstructured!
- **Proprietary data / Data brokers**
- **Public data / Open data**
- **Data must be combined to generate knowledge**
- **Big data : volume, variety, veracity, velocity, value,… ?**
- **Social networks data**
- **Create a data store**

Data formats, tools and transformations



Technologies to transform the data

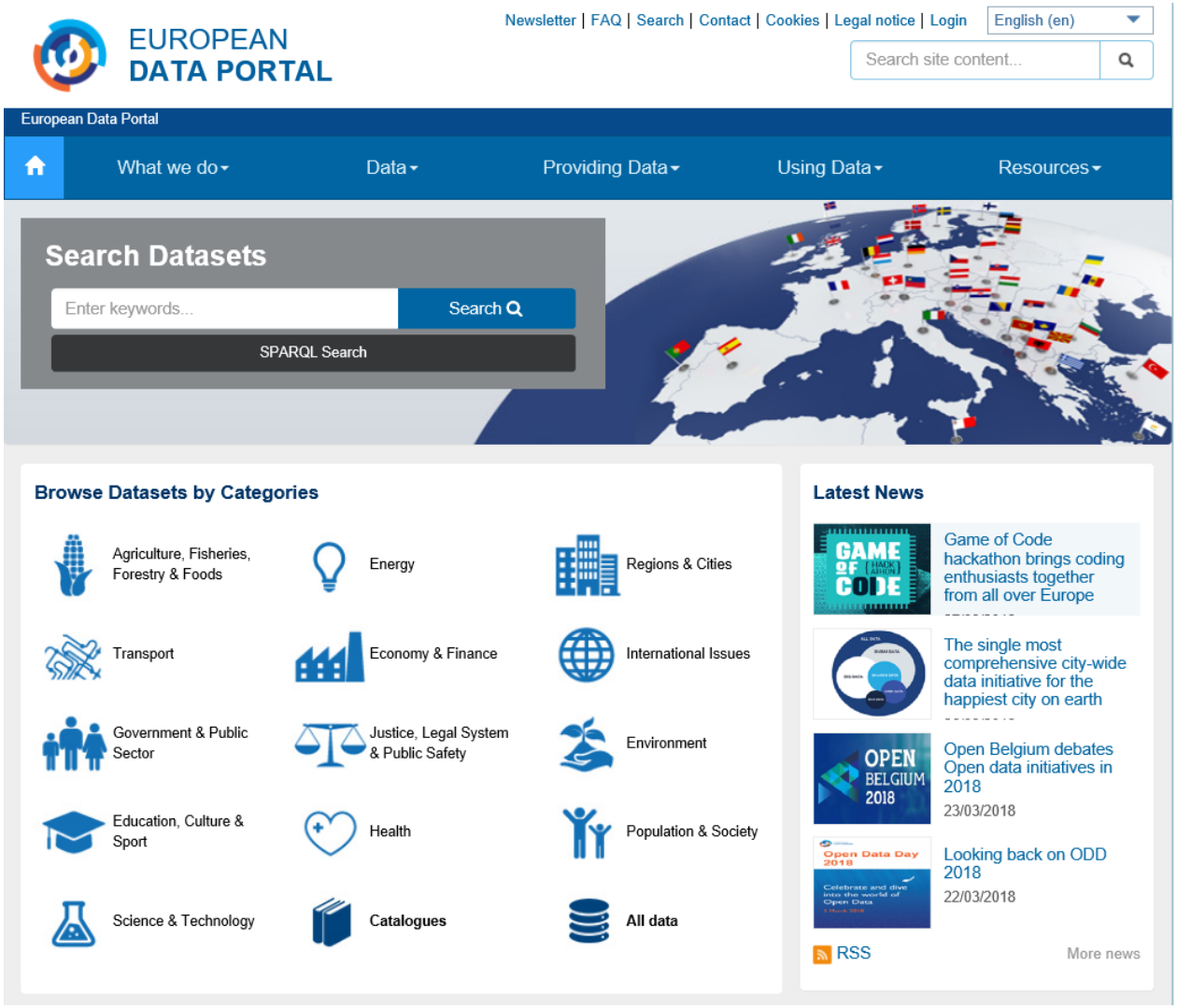


Open data

- **Public Sector Information** (PSI) is information collected, produced or paid for by the public bodies
- **Open government data** is PSI made freely available for re-use for any purpose.
- EDP harvests the metadata of open government data available on **public data portals** across European countries.

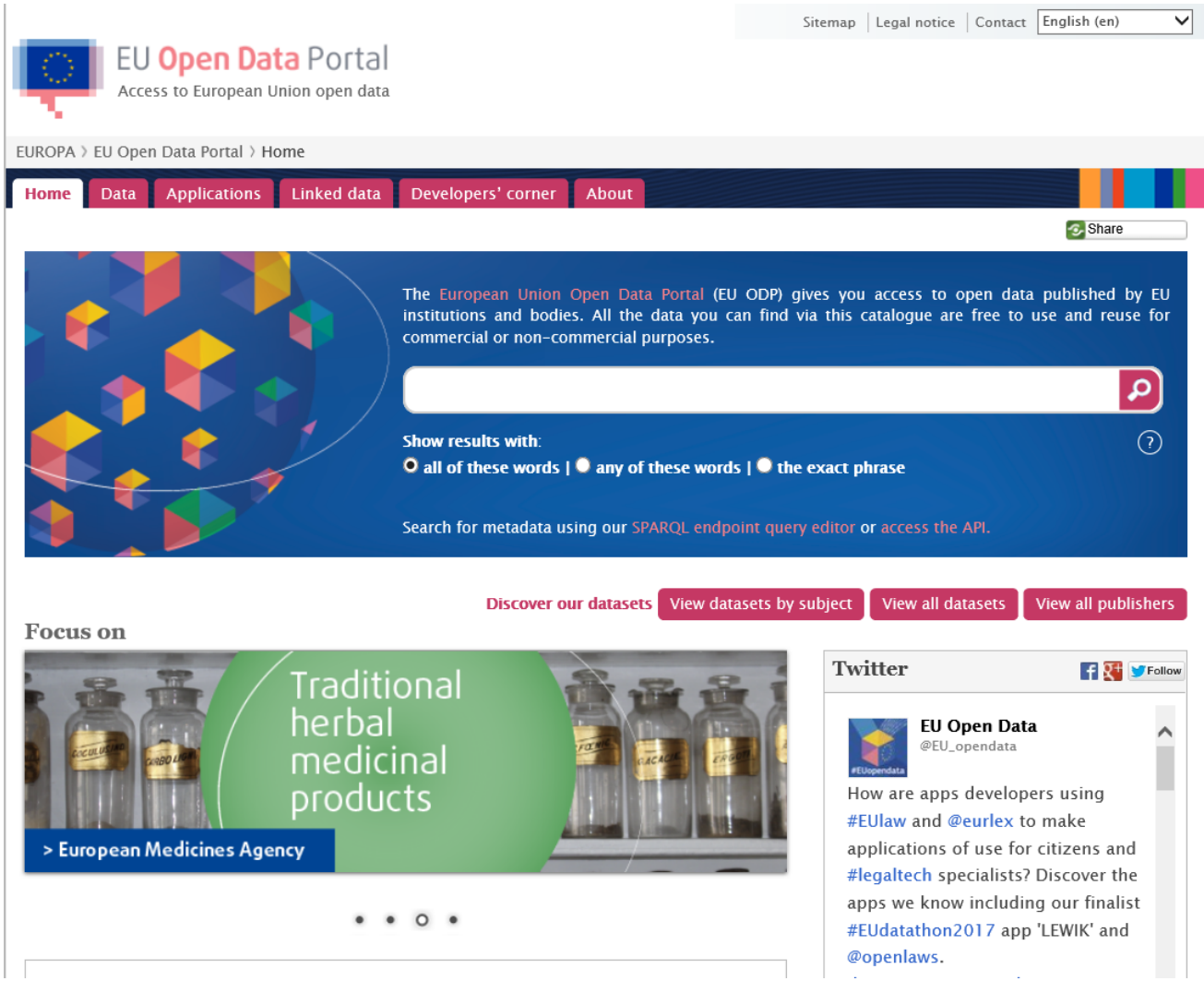
25 April 2018: EC Communication '**Towards a common European data space**' *(data package III)*:

- Review of PSI directive
- recommendations on scientific data
- guidance to private sector



Open data

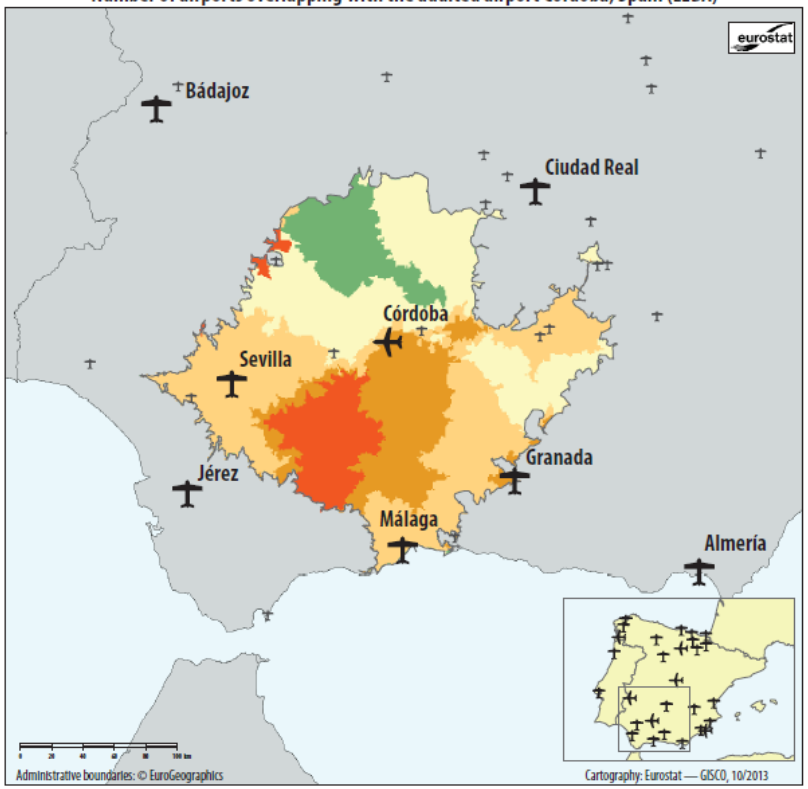
- EU ODP gives access to open data published by EU institutions and bodies.
- All this data is free to use for commercial or non-commercial
- Incudes also information on how to use open data
- For example a list of close more than 70 data visualisation tools (of which 15 have been developed by EU institutions!) as well as a knowledge centre with tutorials on how to use some of these tools.

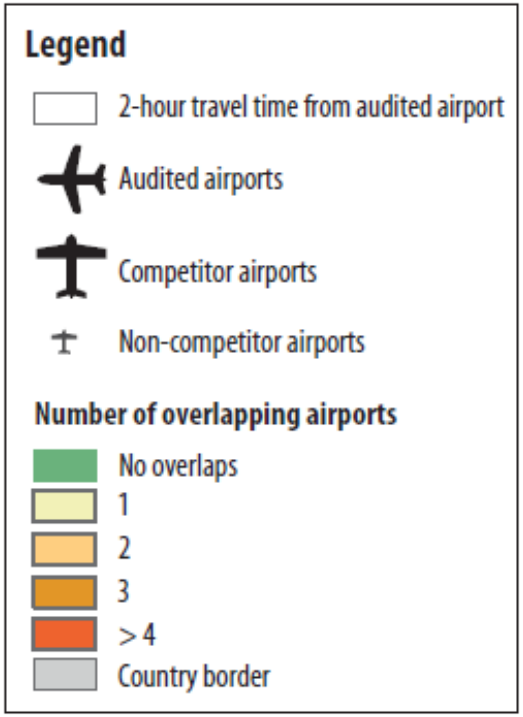


Member States

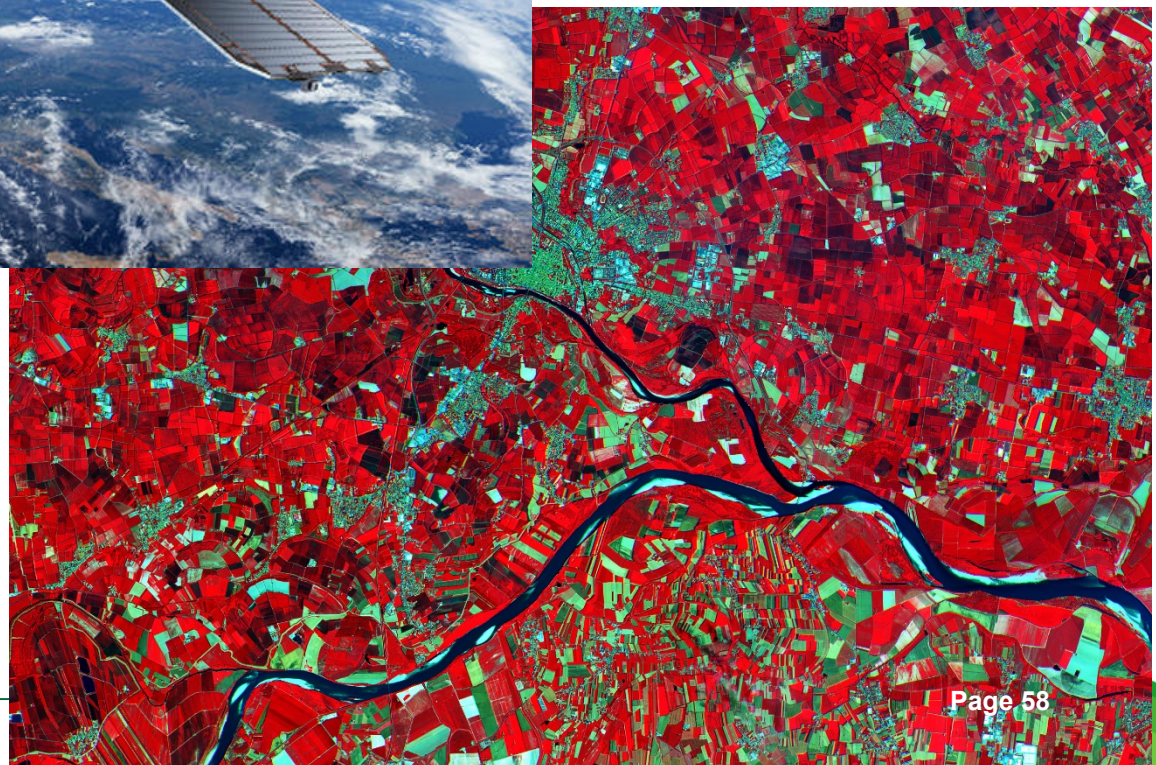
ECA Special Report No 21/2014: EU-funded airport infrastructures

Number of airports overlapping with the audited airport Córdoba, Spain (LEBA)





Sentinel data

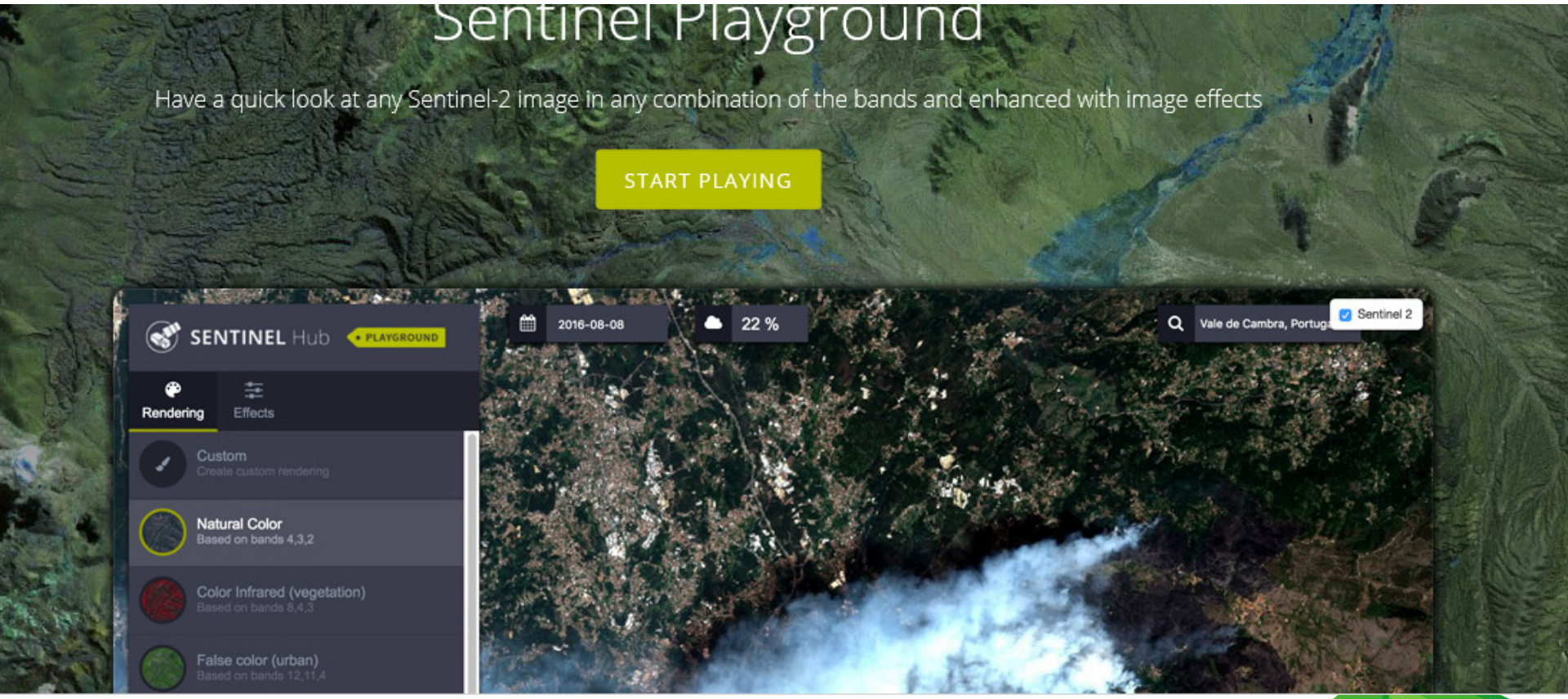


Sentinel data

Examples for applications include:

- Monitoring land cover change for **environmental monitoring**
- Agricultural applications, such as crop monitoring and management to help **food security**
- Detailed vegetation and **forest monitoring** and parameter generation (e.g. leaf area index, chlorophyll concentration, carbon mass estimations)
- Observation of **coastal zones** (marine environmental monitoring, coastal zone mapping)
- **Inland water** monitoring
- Glacier monitoring, ice extent mapping, snow cover monitoring
- Flood mapping & management (risk analysis, loss assessment, disaster management during floods)

Sentinel


Sentinel Playground
Have a quick look at any Sentinel-2 image in any combination of the bands and enhanced with image effects
START PLAYING
SENTINEL Hub
PLAYGROUND
Rendering
Effects
Custom
Create custom rendering
Natural Color
Based on bands 4,3,2
Color Infrared (vegetation)
Based on bands 8,4,3
False color (urban)
Based on bands 12,11,4
2016-08-08
22 %
Sentinel 2

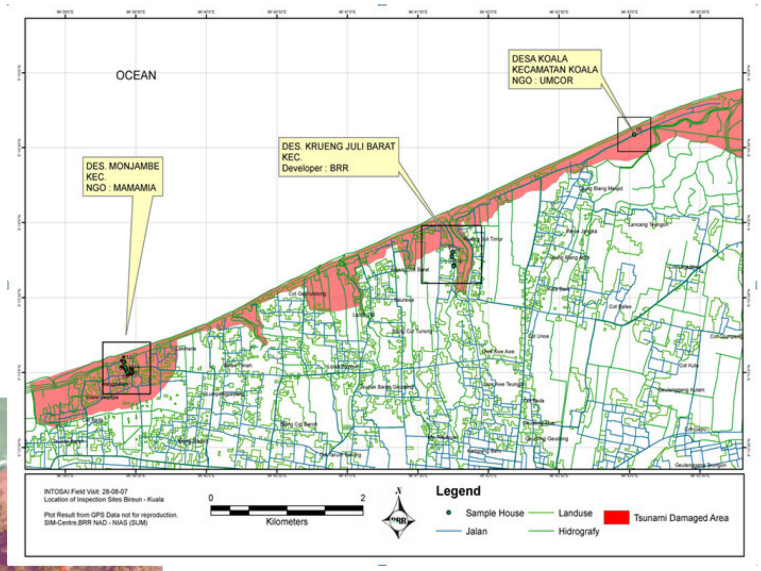
Tools

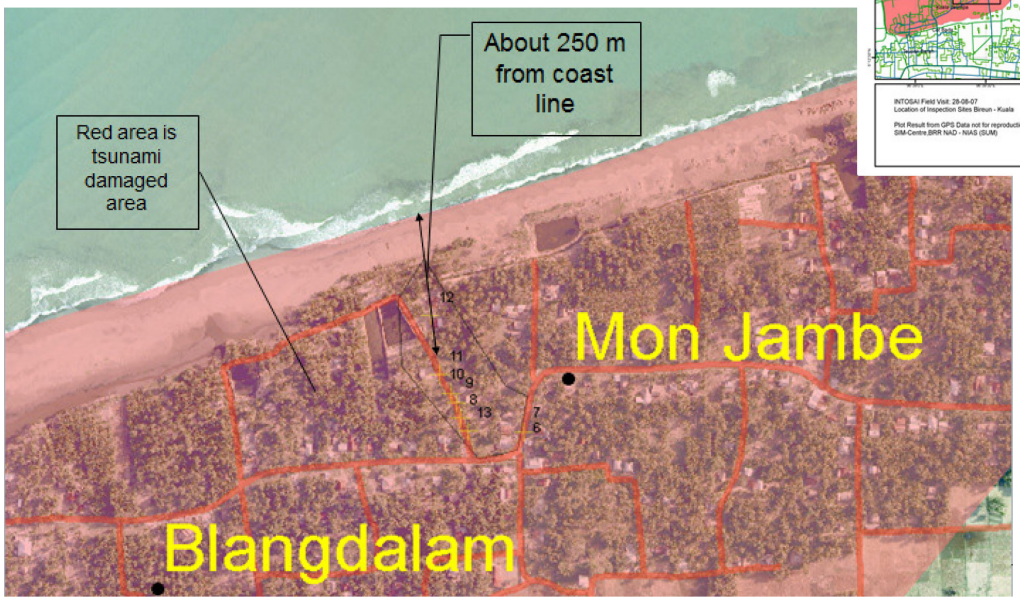
Tools - classification

Office Automation	Specialised	Audit specific	Corporate	Open source	Artificial intelligence
(Excel)	(SPSS, SAS, Tableau, GIS)	(ACL, IDEA)	(SAP, Oracle)	(R, Phyton)	(Watson, Cortana)
In most of the organization these are the only used tools	Allow for an vast range of tasks from statistical analysis to data visualization.	Allow for advanced statistical analysis and require specialization via training	Used in audit, they require programming sckills	They allow for statistical analysis and text mining	They process natural language and machine learning

Take into consideration the cloud

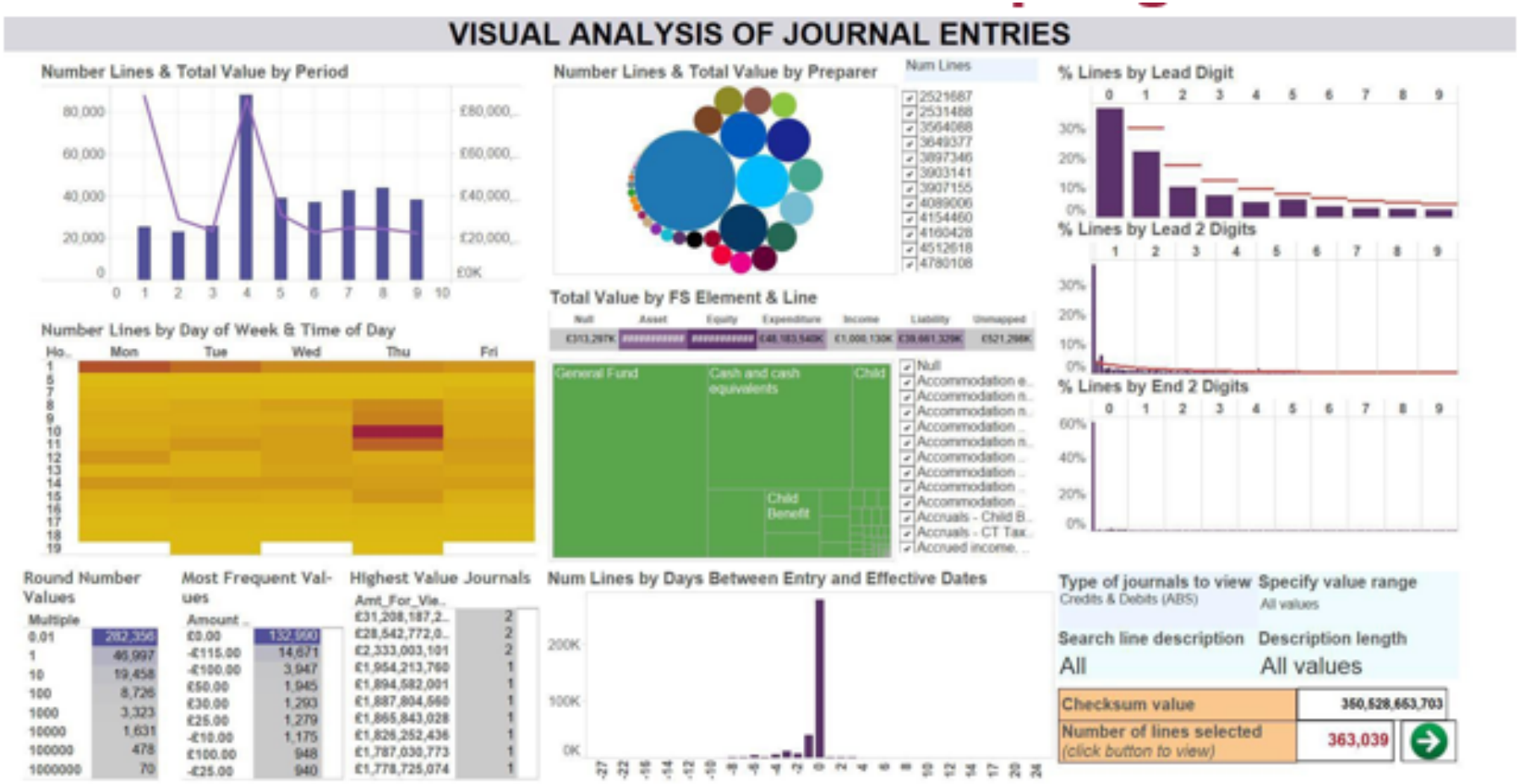
INTOSAI – Tsunami 2007





Geographical information systems and data visualisation

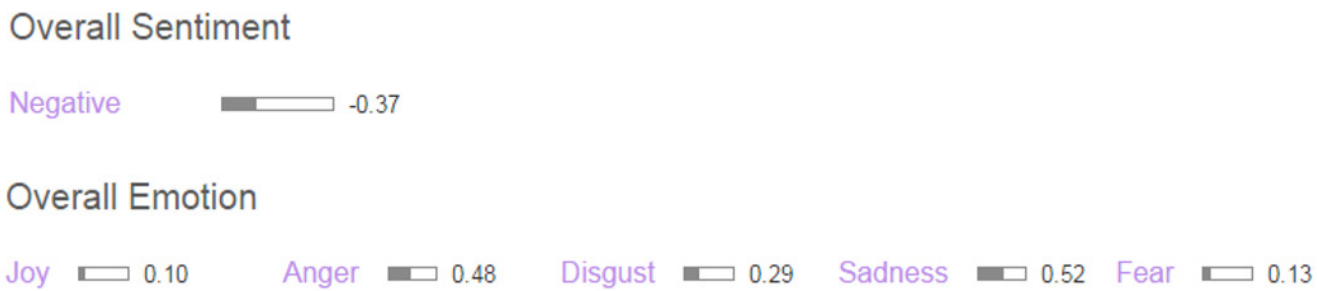
NAO example of Journal



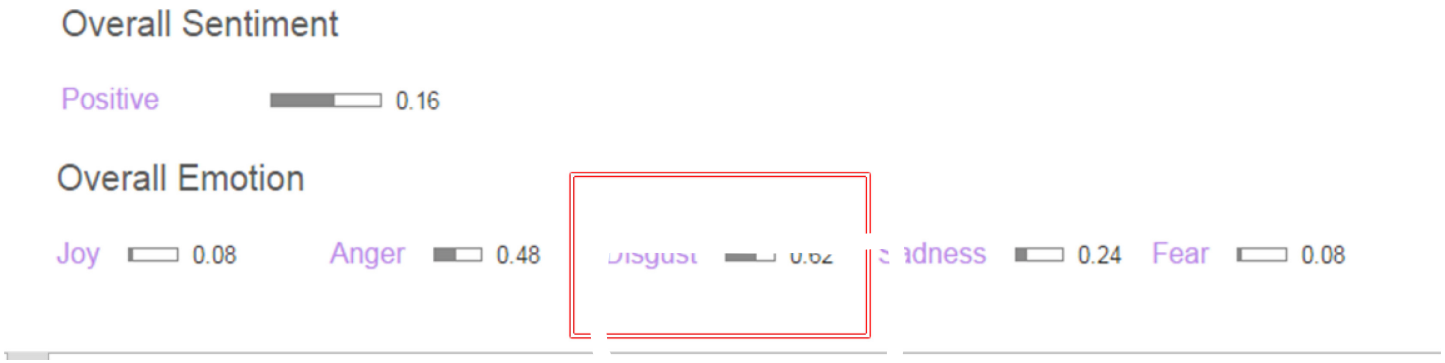
Manual Journals present a number of risks. In a large population, it can be hard to see patterns. This dashboard allows a user to quickly identify unusual patterns, and investigate the individual underlying transactions. It also assigns transactions a risk score, to aid in their assessment.

Sentiment Analysis – executive summary of SR

Food waste



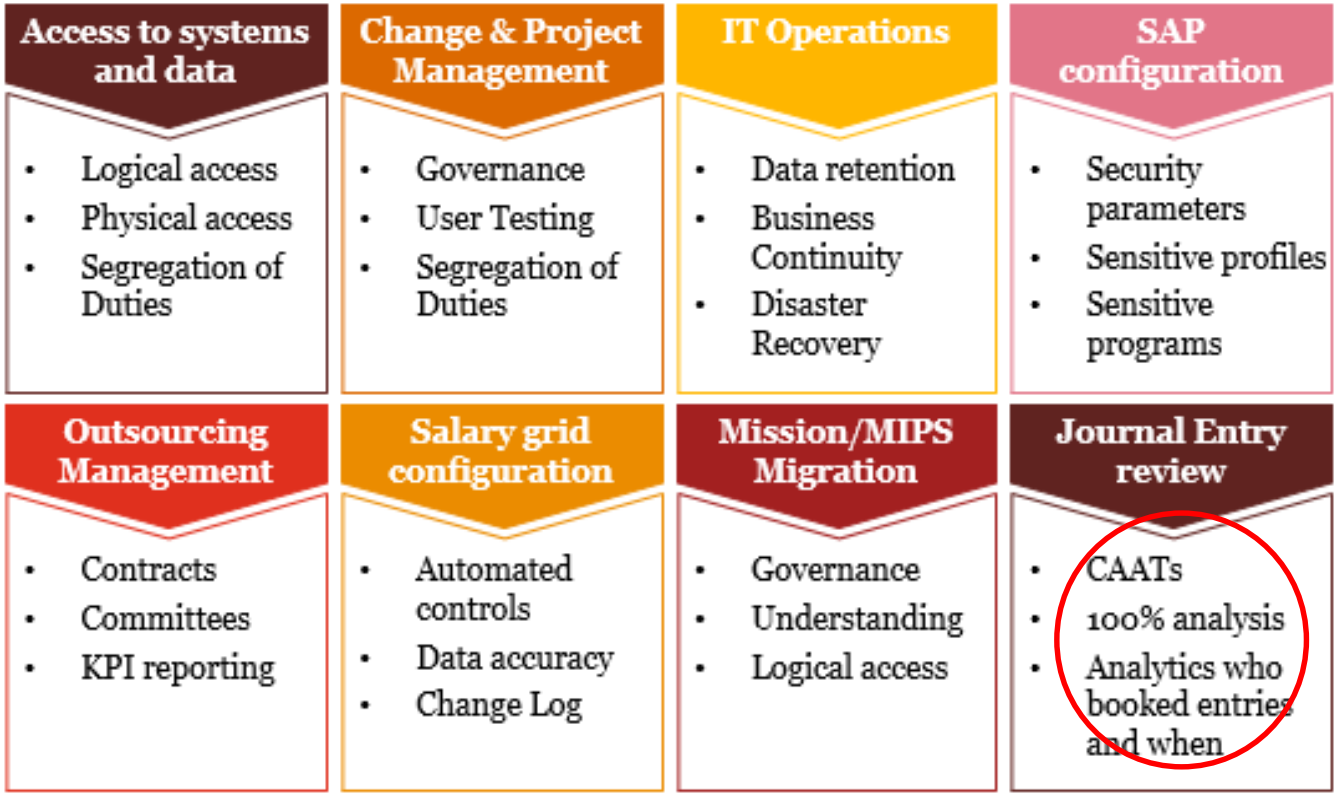
Water waste



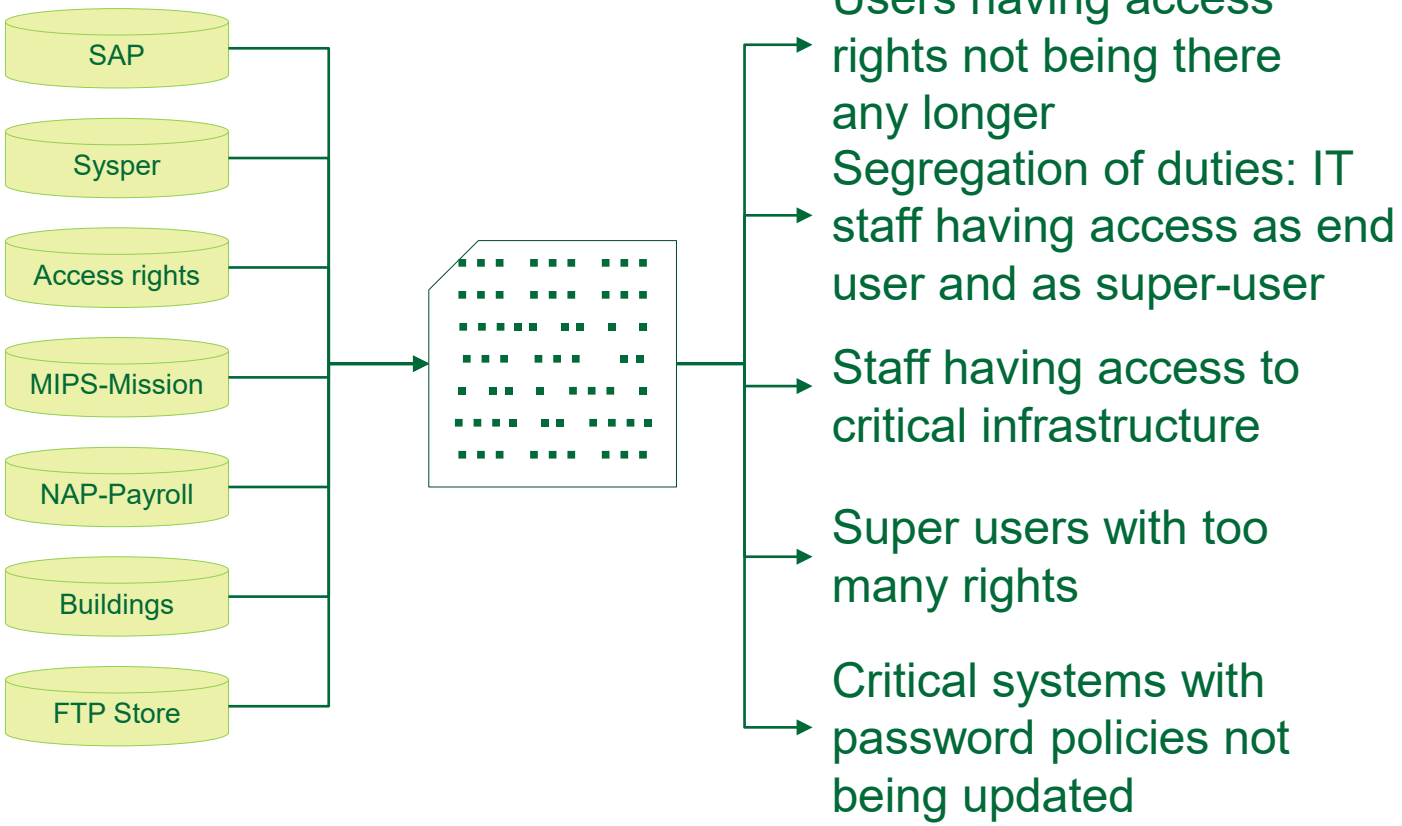
PWC auditing ECA IT

European Court of Auditors

IT procedures and related results for 2017



PWC auditing ECA



PWC Findings reporting

Short and to the point
100 % data analysed
Give value

Access to FTP Store (Medium risk)

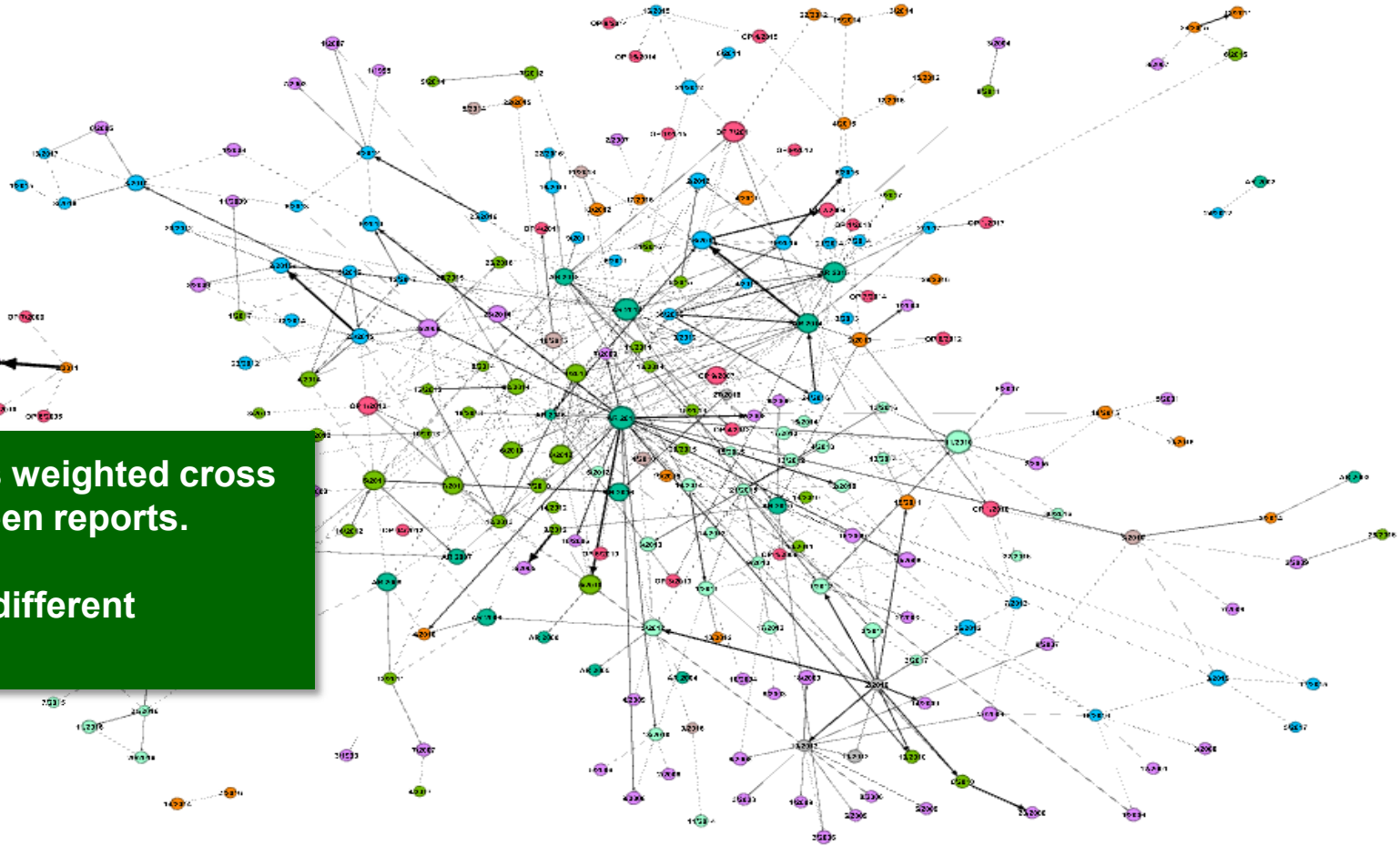
In order to be able to access FTP Store, users' IP addresses have to be whitelisted in the firewall (i.e. Access will not be blocked by the firewall). For 3 users from IT department and 1 user who left in 2015, the IP addresses were whitelisted while access to FTP Store is not required as per their job responsibilities. The whitelisted IP addresses have been already removed during the audit. We recommend to review whitelisted IP addresses on an annual basis.

Privileged access (Medium risk)

The Active Directory (AD) domain administrator accounts follow the default password policy (which enforces passwords to be changed once a year). However, the acceptable use policy of the Court requires that passwords of administrator accounts are changed at least every 90 days or completed by a second factor authentication. The AD parameter has been already adapted to follow ECA's acceptable use policy for administrator accounts.

Network analysis

Interconnection graph of SR, ARs and Ops



The graph shows weighted cross references between reports.

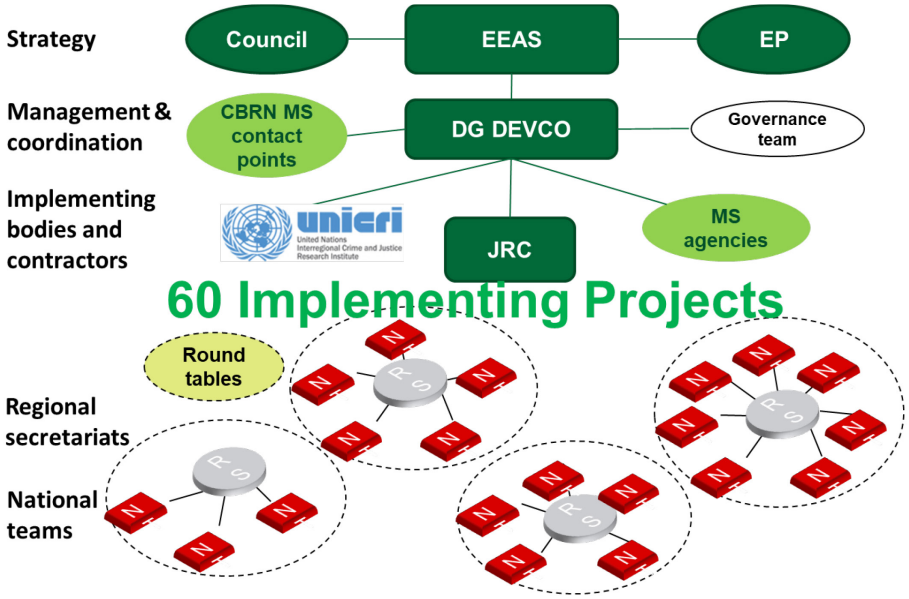
Colours identify different Chambers.

Exploring a network: EU Centres of Excellence (CBRN)

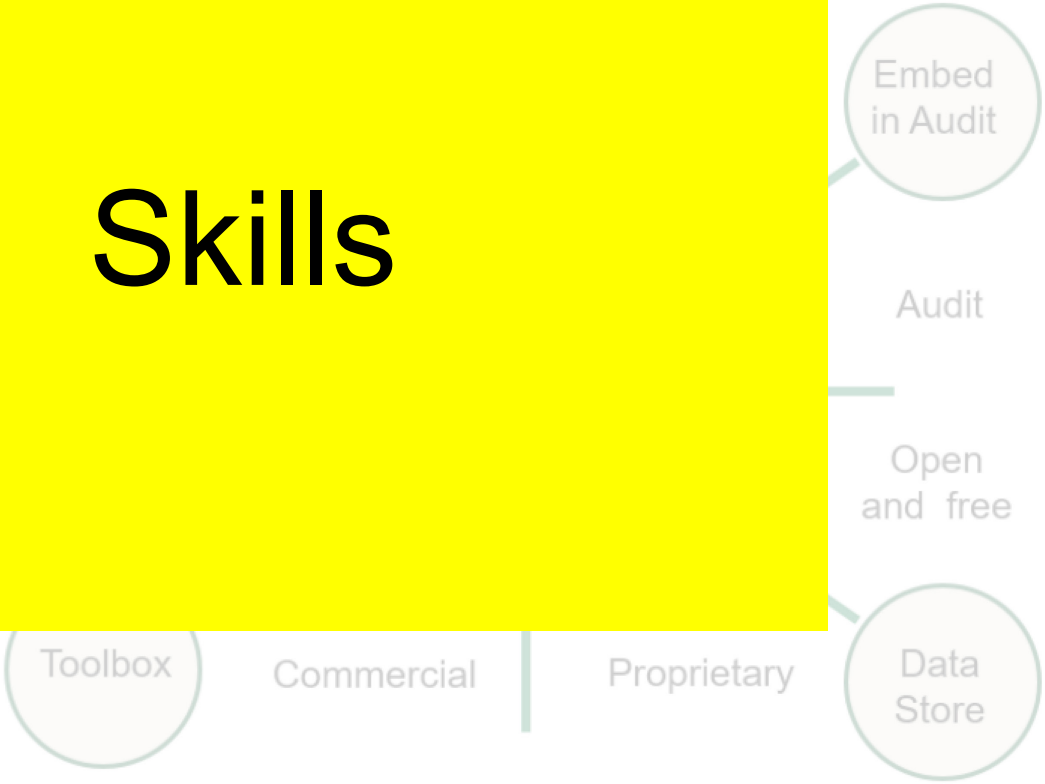
Case: Chamber III - Follow-up CBRN CoE (17CH3012)

Goals:

- model the EU Chemical, Biological, Radiological and Nuclear Centres of Excellence network
- measure effectiveness
- observe evolution over time



Skills


Embed in Audit
Audit
Open and free
Data Store
Proprietary
Commercial
Toolbox

Prepare the auditors of the XXI century

New areas of knowledge

- Information technology
- Data science and statistics
- Modelisation

The new auditor: must feel confortable on these domains and

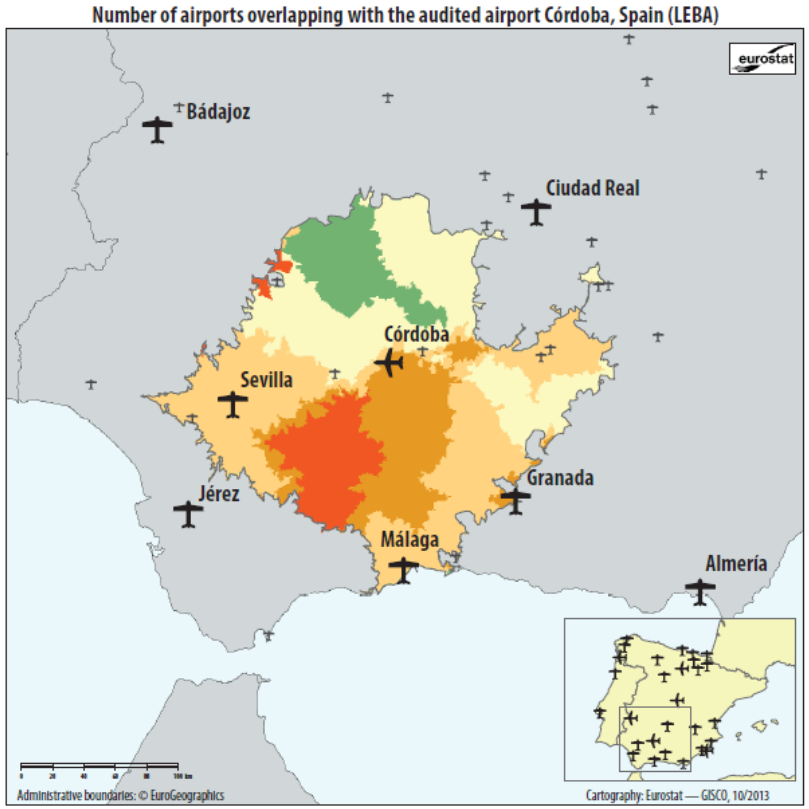
must be able to work on teams where different expertises are combined: **cross-functional team**.

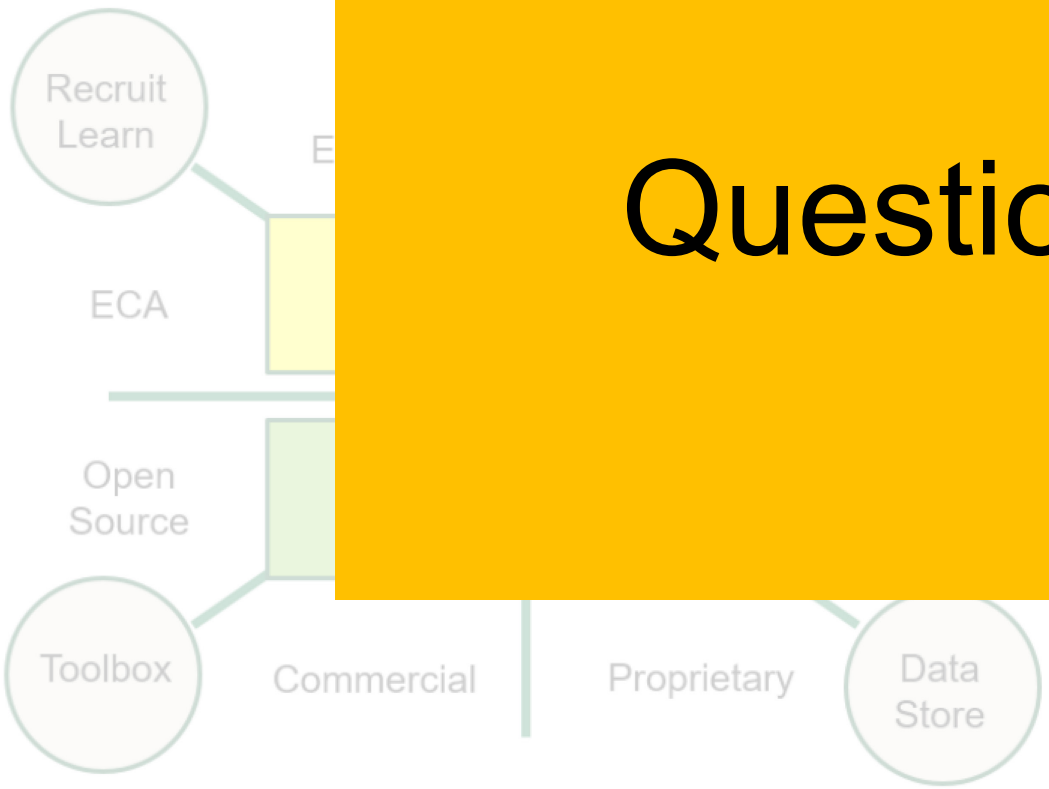
Skills required – cross-functional team

Auditor	• Understands audit objective • Identifies opportunities for data analysis • Generates the demand • Solves audit problems • Asks questions
Data scientist	• Expert in analytical tools • Data extractions and manipulations • Statistical analysis knowledgeable
Data management expert	• Analyses and programs algorithms • Administers the database • Expert in data extraction, cleansing and transformation
Domain expert	• Knows the domain

How to acquire the skills

- **Recruitment**
- **Training**
- **Collaboration agreements**
  - Other audit institutions
  - Academia




Recruit
Learn
ECA
Open
Source
Toolbox
Commercial
Proprietary
Data
Store

Questions

Questions

- From policy scan
- From the data analysis itself
- Not only give replies but also ask questions.

Roadmap – Towards digital audit

Short term:

RE-USE

analytics used to improve current processes

- Knowledge Node on Data science
- Identify case of application
- Training of auditors in analytics using existing tools

Mid term:

EXPERIMENT

identify digital impact on the audit process

- Create a Data Lab
- Recruit and train data scienctis
- Investigate improvements to Financial audit
- Investigate improvements to Performance audit

Long term:

INDUSTRIALISE

Propose new ways of working

- Redefinition of the processes
- Elaboration of new products
- Creation of an analytics tool set to be used autonomously by auditors
- Creation of cross-functional teams

Benefits of the digitalisation

How de we imagine the near future

Continuous and predictive audit : *("…audit today the problems of today…")*

- Auditors have remote access to the auditee systems or receive frequent updates of the data.
- Algorithms are developed containing the rules for identifying irregularities and alerts.
- Audit is not "ex post only" anymore. Auditors can continuously interact with the auditee indicating potential irregularities

Risk analysis on full population: *("…with more confidence")*

- Auditors carry out risk analysis on full populations, using data and information available from different sources.

How de we imagine the near future

Process all available information: *("…audit all problems of today")*

- Auditors are assisted by technology in processing all information they can access in any digital form.
- They can navigate through masses of text, images and figures and interact with the information
- They also get suggestions/alerts for abnormal or atypical behaviour worth examining.

Audit automation: "*…with fewer resources and fewer errors*"

- Manual, recurrent processes related to audit as well as processes linked to delivering standard services are automated.
- Machines learning from the past, are used to leverage past experience and reuse past work to a maximum to gain insights from all information available, i.e. not reinventing the wheel.

How de we imagine the near future

eGovernment: (…with more transparency")

- Self-controlled processes have been set up, building on the already implemented good principles of eGovernment, i.e. all is digital by default, all is done once only, information systems across the EU are interoperable, trustworthy, secure, open and transparent.
- Auditees and beneficiaries register in real time evidence of transactions in any digital form in secure, immutable and directly auditable ways.
- Auditors can access and audit this information at any time.

These are the actions mentioned in the Tallinn declaration on eGovernment adopted at the ministerial meeting during the Estonian Presidency of the Council of the EU on 6 October 2017

The importance of sharing knowledge ECALab and ECALabers

ECAlab

- In 2017, the ECA created the **ECALab** as a step towards establishing data services tailored for audit.
- **The ECALab is :**
  - **a network of people**, comprising colleagues having personal interest in big data, data analytics, text mining, visualisation, machine learning, etc.
    - they may have specific studies or be self-taught and they have different job profiles within ECA (IT, languages, audit, statistics, etc.)
  - **a space for technologies** equipped essentially at this stage with "upcycled" IT equipment such as servers and laptops where tools can be tested in real life conditions.
  - **a meeting place** to share knowledge and ideas on technologies for audit
  - **a place for auditors** where they can come and ask for advice and search for solutions to problems or questions they have
  - **a learning hub** with books and people who are available to explain

The ECALabers

ZSOLT VARGA

Translator
SG3

Translation
Data Science
IT, MBA

EMANUELE FOSSATI

IT project manager
SG2

Telecom Engineer

JESÚS NIETO MUÑOZ

IT auditor
DQC

Physics
Computer science

MIRKO IACONISI

Auditor
CH III

Computer engineering, Management of multidisciplinary projects

BOGOMIL KOVACHEV

Statistician
CH V

Mathematics
Computer science

MAGDALENA CORDERO VALDAVIDA

Director
SG2

Mathematics
Statistics

SPYRIDON PILOS

Principal Manager
SG2

Mathematics

IVO KOPPELMAA

IT auditor
DQC

Physics
MBA

Text mining

Natural Language Processing

Social media analysis

Network analysis

Visual Data analysis

FinTech

Blockchain

Big Data

Statistical Data analysis

Neural Netrworks

Sampling

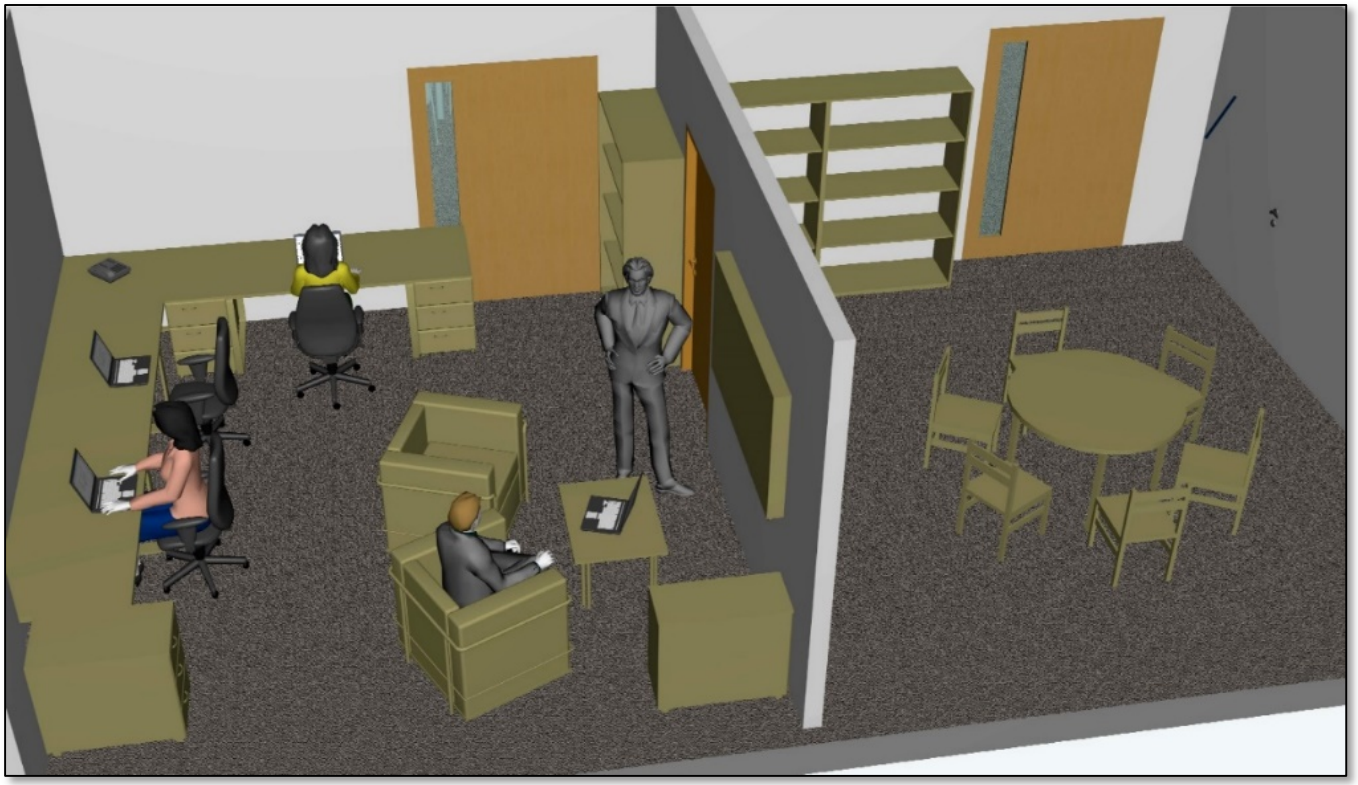
Statistics

Artificial Intelligence

Machine translation

The ECALabers

A physical space



A learning hub

SharePoint Newsfeed OneDrive Sites

BROWSE PAGE

ECALab News Back to ECALab Homepage

ECALab News

Categories

- Artificial Intelligence
- Blockchain
- Data Analysis
- Data Visualisation
- FinTech
- Open data
- Text Mining
- Varia
- ADD CATEGORY

Archives

- July
- June
- May

2018 22/06

Fintech Awards Luxembourg 2018

by Emanuele Fossati at 10:01 in FinTech

Last Wednesday, the 20 of July, the audit giant KPGM hosted the final round of a fintech

Contact us

ECA-Lab@eca.europa.eu

Visit the Lab: K3.273

Or start a discussion in our Forum

RSS FEED

ALERT ME

About this blog

Creating a network to share knowledge and expertise

ECA IT Master Plan 2018-2020

Goal1: Technology for audit

- Implementing the mechanisms to share knowledge with selected external stakeholders like experts from other EU institutions, SAIs, etc. active in data analysis work.

Goal 2: Connect

- Establish sharing platforms between ECA and SAIs in member states and the world, to share knowledge and insights on audit related issues.

Actions:
Create a “second intrernet” to publish the non official information
Organise a conference first quarter of 2019 in Luxembourg to launch the initiative.

Closing remarks

Magdalena Cordero

Prepare auditors for the XXI century

- **Strategic thinking is needed at the top level**
  - Big data and data analytics projects should be approached in an experimental way.
  - Develop a data science, analytics and business intelligence culture
- **Data is an asset**
  - Full life-cycle, new roles and responsibilities
- **Critical thinking and intellectual curiosity**
  - Promote innovation and experimentation in a "no-regret" and learn fashion
- **Boost collaboration and community of practice**
  - Learn from others
- **Close the skills gap**
  - invest in hiring the right people and build a pool of experts

The future…

- Impossible to predict impact of emerging technology.
- Transformation is going to be very rapid and disruptive.

We need to :

BE ADAPTABLE

- flexible approach when thinking about the future.
- diversify and improve our analytical tools to uncover audit opportunities.

BE PREPARED

- Build up in-house digital and analytic capability

HERE IS Edward Bear, coming downstairs now, bump, bump, bump, on the back of his head, behind Christopher Robin. It is, as far as he knows, the only way of coming downstairs, but sometimes he feels that there really is another way, if only he could stop bumping for a moment and think of it.

A.A.Milne. Winnie the Pooh