Responsible AI - Co-innovation with Government

e-Invoicing Anomaly Detection: learnings

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Today’s Debate

- Facial Recognition
- Fairness
- Corporate responsibility
- Deepfakes
- Human rights
- Meaningful human control
- Contact tracing
- Consent
- Unintended consequences
- Disproportionate impact
- Model Fragility
- Socio-technical issues
- Algorithmic auditing
- Platform accountability
- Regulation
Ethical problems to tackle from AI implementation
Responsible AI Governance & 18 Design Guidelines for human-AI interaction
Historical moment: It’s the first time we have developed a solution with a company from the private sector.

Raul Zambrano
Technical Assistance and Information Technology and Communication Director, Inter-American Center of Tax Administrations (CIAT) and contributor to IOTA, WB, ONU, IBFD, OECD.
Collaboration (Government + Private Sector)

Contribution by core team members

- Tax technical advice
- Business Data (1 Year)
- Tax Data Science advice (2 experts)
- Project coordination
- Facilitation of interaction with the 7 participating Tax Agencies
- Technical resources (10 experts)
  - Cloud Services
  - DevOps Practice

Core Team

- Costa Rica
  - Ministerio de Hacienda
- Spain
  - Agencia Tributaria
- Panama
  - Microsoft

Contributors

- México
  - SAT
- Brazil
  - Receita Federal
- Chile
  - SII Servicio de Impuestos Internos
- Argentina
  - AFIP
- Guatemala
  - SAT

Advice on risk patterns relevant for the Tax Compliance Business
Homologate data schema relevant to any e-Invoicing deployment in the World

HOW WE BUILT IT:

- Agile Development using DevOps and SCRUM
- Strong isolation security techniques to keep business data private and secure
- Innovation from Microsoft Engineering and Microsoft Research

LESSONS LEARNED:

- To build something applicable to any country we should build something no specific to anyone.
- End to end integration... point & go (easy to use, time-to-value)
- End to end telemetry... track the internals to facilitate adoption
- Integrate with your existing tools... plug it in
- Extend features and reports... make it your own
How AI contributes to Public Finance processes improvements

- **Time to value**: Accelerate the time we provide value to the tax compliance business.
- **Volume**: Do AI/ML with large volumes of FE data.
- **Scoring**: Improve the positive ratings for anomaly detection in e-Invoicing data.
- **Productivity**: Focus the analysis on an appropriate number of detected anomalies.
- **Analysis**: Provide resources to complement the auditing task.
- **Existing tools**: Facilitate integration with existing risk analysis or risk management tools.
- **Learning**: Improve the accuracy of the process through iterative learning.
How do you introduce iterative learning in your anomaly detection?

To continuously improve results/accuracy

**Typical sequential execution**

- Define Scope
- Prepare Data
- Ingest Data
- Run ML
- Produce Results
- Analyze results
- Investigate
- Validate accuracy

**Cyclical end-to-end process**

- Ingest Data
- Iterate
- Run ML
- Produce Results
- Analyze Results
- Investigate
- Tune Hypothesis
- Iterate

**e-IAD introduces the ability to iterate quickly, to improve accuracy by learning from initial results.**

How easy is to repeat the cycle?

*How fast to iterate?*

Constant iteration, tuning, and improvement.
Microsoft e-Invoicing Anomaly Detection

The e-Invoicing Anomaly Detection Solution Accelerator is a collaboration between Microsoft, the Inter-American Center of Tax Administration (CIAT), and innovative tax agencies around the world.

- Summarize anomaly rates and statistics
- Plot annual pattern of anomalies
- List taxpayers with highest anomaly rates
- Display anomaly statistics by sector

The Microsoft e-Invoicing Anomaly Detection Solution Accelerator is for informational and illustrative purposes only. The results may not be replicated in production environments.
Unlocking new type of insights:
Risk Pattern Coverage: Supply Chain Deviation

Example of a regular supply chain network:
- Issuer_id1 has multiple buyers
- Issuer_id2 has multiple suppliers

Hypothesis
Taxpayers are expected to have a regular supply chain network according to their company size, industrial activity, maturity, and financial resources. When a taxpayer has an irregular supply chain network, it could be an indication of risk, such as:
  - The deep of the supply chain is trending to zero.
  - The number of suppliers is small or trending to zero, but the sales transactions are significant in number or value.
  - The number of buyers is small or trending to zero, but the sales transactions are significant in number or value.
Empowering Responsible AI

Establish a responsible AI strategy

Design, build, and manage your AI solution

Aka.ms/AIBS >

Aka.ms/RAIresources >
Thank you!

Q&A