



PARANÁ STATE
STATE FINANCE SECRETARIAT



RECEITA ESTADUAL
REVENUE COORDINATION

Analytics in the Age of Electronic Invoicing and Digital Bookkeeping

Teradata Forum 2017

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Brazil's economy have gone digital. Practically all transactions (business to business and business to consumers) occur in digital format, to comply with the tax code. This means that electronic invoicing and digital bookkeeping became a common place, and the amount of data generated is staggering. How can a tax administration cope with this data growth in order to keep control of its tax base and at the same time change the way its tax auditors perform their work in this paperless reality?

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Chapter One

Paraná State



5th largest economy in Brazil

(São Paulo, Minas Gerais, Rio de Janeiro, Rio Grande do Sul)



300,000+ corporate tax payers (VAT)

Area (km²): 199,880 *(England: 130,279)*

Population: 10,444,526 *(5.5% of Brazil's pop.)*

399 municipalities

State Capital:
Curitiba



STATE TAX

REVENUE
(%)

Tax on the circulation of goods and interstate and inter-municipal transportation and communications services (ICMS) ➡ That's our "VAT"	88.9
Tax on property of automotive vehicles (IPVA)	6.1
Tax on property "causa mortis" transmission and donations (ITCMD)	0.7
General Fees	4.3

Chapter Two

Electronic Invoicing & Digital Bookkeeping

Agreement 115/03

Since 2003, Brazilian corporate taxpayers from telecommunications and electric distribution industries are required to record electronically every transaction and file all their invoices (TXT format) with the state tax administration.



This means [all electric and phone bills \(invoices\)](#), in text files with [digital signature](#).

Public Digital Bookkeeping System (SPED)

Since 2008, companies are required to provide information about their transactions using [digitally signed documents](#). There are, for VAT purposes, two main requirements for Brazilian corporate taxpayers:



They have to submit to the tax administration, for prior approval, [all their invoices](#). In this case, we have three types of electronic invoicing: the [NF-e](#), the [CT-e](#) and the [NFC-e](#).



They are also required to monthly report their [tax bookkeeping](#) in a digital file (TXT format), containing all their purchases and sales (invoices), along with several other information.



**Circulation
of goods**

Industry/Wholesale: **NF-e**

Retail: **NFC-e**

Energy Distribution: **Agreement 115/03**



Inter-municipal transportation services: **CT-e**



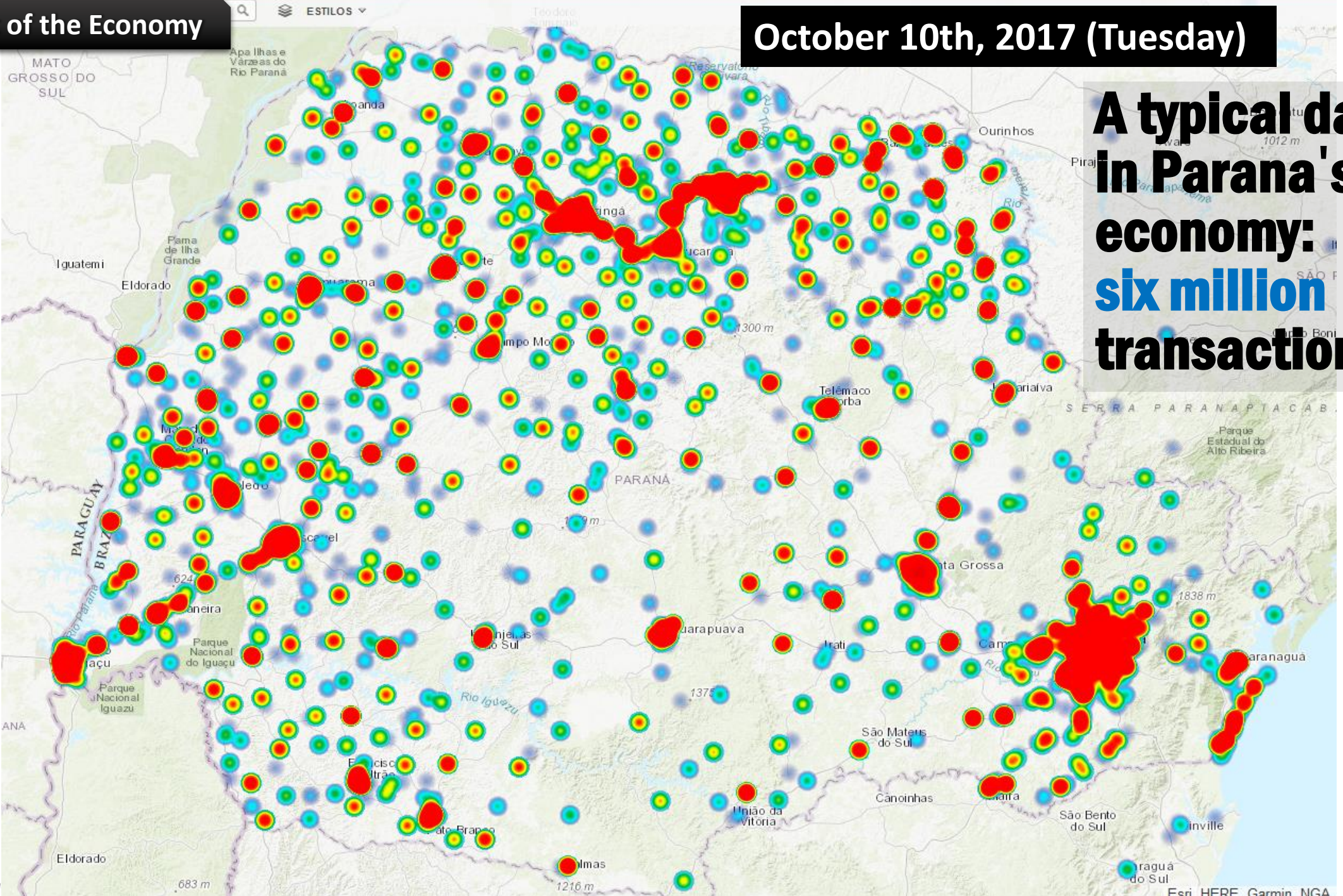
Telecommunication services: **Agreement 115/03**



**All aforementioned invoices, and many other
information, must also be filed within the Digital
Tax Bookkeeping:** **EFD**

October 10th, 2017 (Tuesday)

A typical day
in Parana's
economy:
six million
transactions

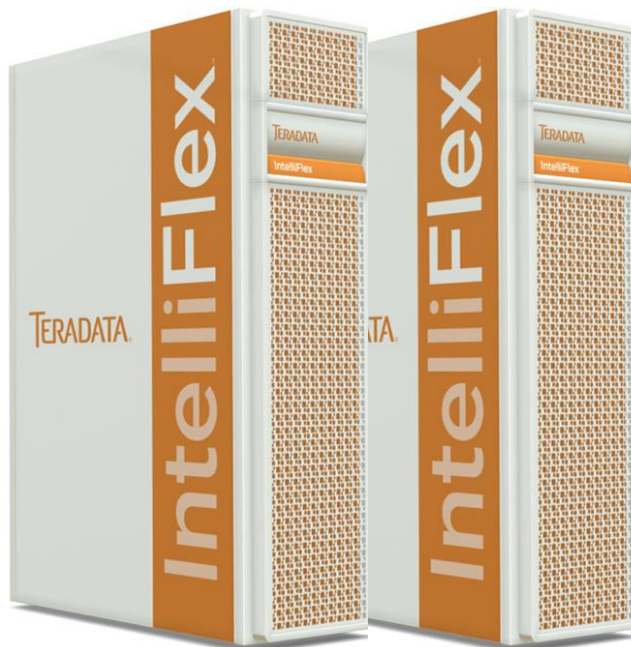
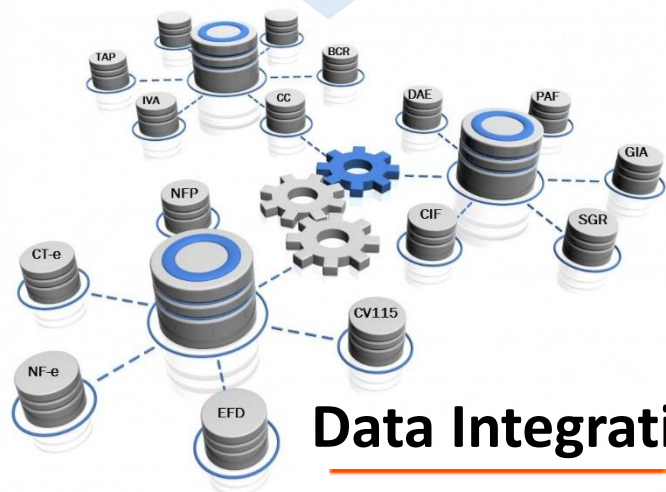
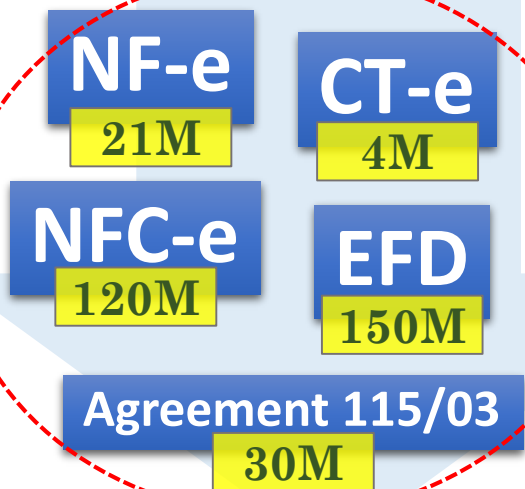


Chapter Three

Architecture, Usage & Processes

325 million
documents per month

175M invoices
150M tax bookkeeping

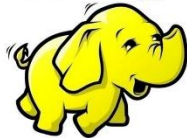


Data Warehouse

TERADATA

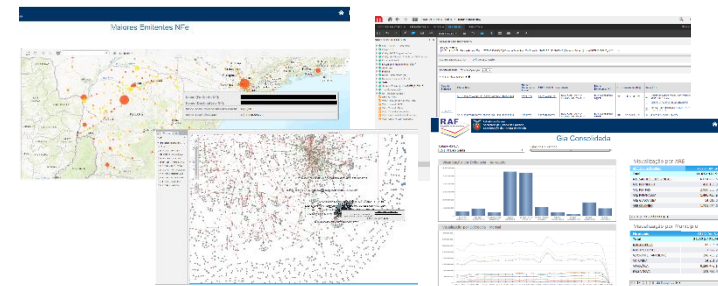


hadoop



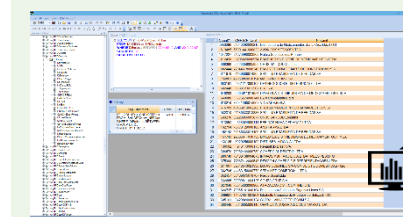
Hadoop
Integration
planned for
late 2018

Intelliflex
on-premises
& as a service



Business Intelligence
& Data Discovery

MicroStrategy

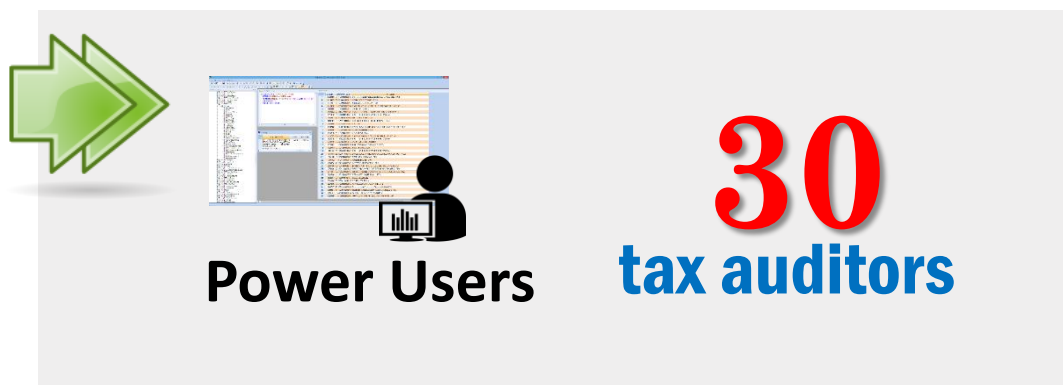


Power Users



Applications

We have (*only...*) a total of **640** tax auditors (considering all staffing levels)



**MONTHLY
AVERAGE**

50K
queries

4B
result set rows

Virtually all businesses processes related to tax enforcement depend strongly on analytics, such as:

**analysis on tax refund for
“tributary substitution”**
(special tax collection regime)

**persistent debtor
program**

**analysis on
administrative
processes**
(requests and appeals)

**special ad-hoc
project audits**

**voluntary disclosure
special program**

**screening processes
for tax fraud**

**tax audits and tax
enforcement planning**

**analysis on inconsistencies
by “Simples Nacional”**
(special regime for SMB)

**taxpayer
monitoring**

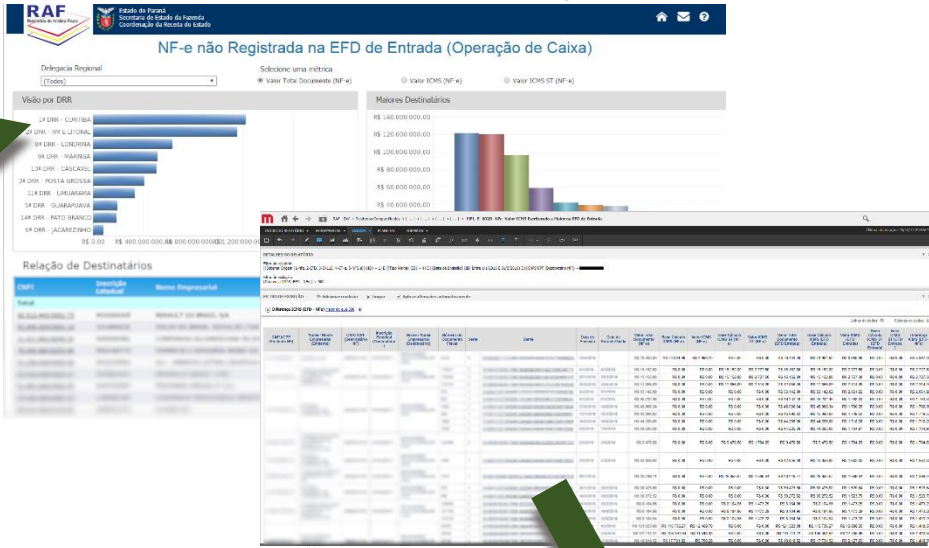
Chapter Four

Example of Analytics for Tax Audits... and a Bird's View of Our Self-Service BI

Automated screening processes for Tax Fraud are routinely performed in the Teradata DW.



Using MicroStrategy, the data is then made available in dashboards and reports.



Screening: predetermined set of rules to compare data from transactions (invoices and tax bookkeeping) between buyers and sellers.



Tens of billions of records are crunched in less than one hour.

** We do NOT use data mining techniques... yet*

Actions can then be taken to investigate the flagged taxpayers.



Type/Name of the screening



NF-e não Registrada na EFD de Entrada (Operação de Caixa)

Delegacia Regional

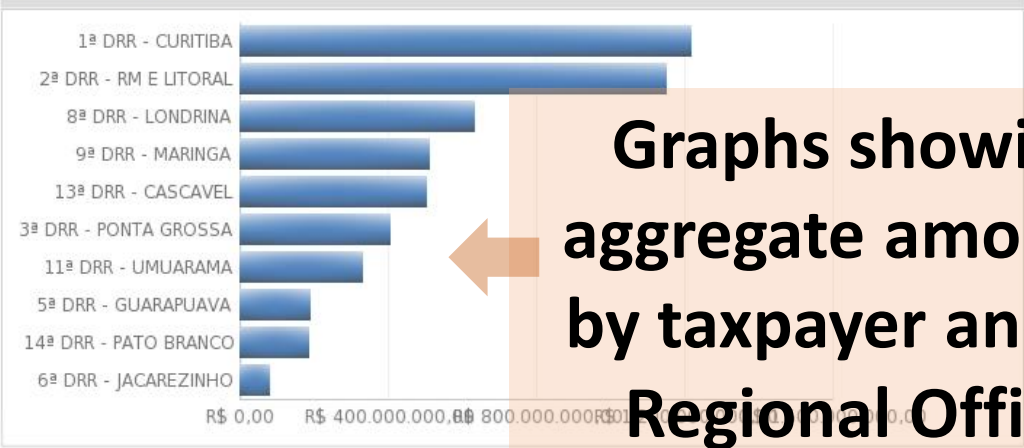
(Todos)

Selecione uma métrica

☒ Valor Total Documento (NF-e) ☐ Valor ICMS (NF-e) ☐ Valor ICMS ST (NF-e)

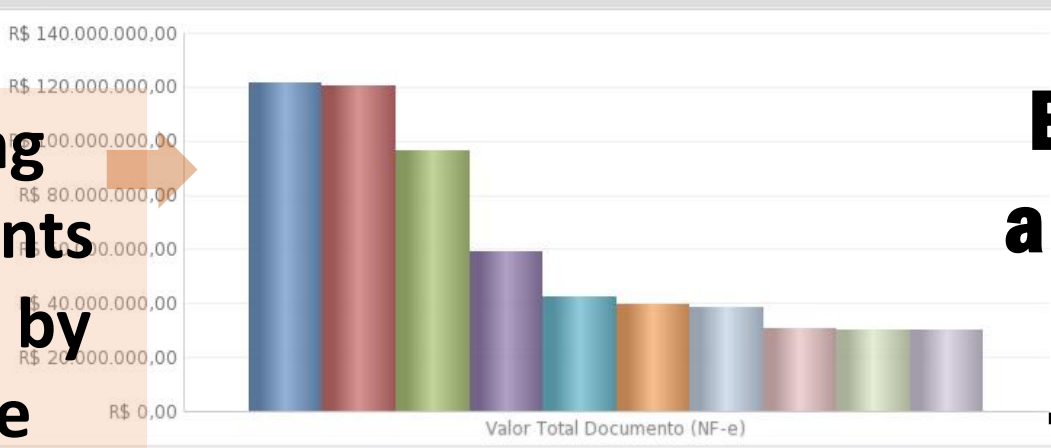
Filters and options

Visão por DRR



Graphs showing aggregate amounts by taxpayer and by Regional Office

Maiores Destinatários



Example of a dashboard showing taxpayers selected by one specific screening

Relação de Destinatários


CNPJ	Inscrição Estadual	Nome Empresarial	Data Obrigação	Valor Total Documento	Valor ICMS	Valor ICMS ST
Total						
01.234.567/0001-90	12345678	EMPRESA ABC LTDA	2023-01-01	R\$ 100.000,00	R\$ 20.000,00	R\$ 5.000,00
02.345.678/0001-90	23456789	EMPRESA DEF LTDA	2023-01-01	R\$ 80.000,00	R\$ 16.000,00	R\$ 4.000,00
03.456.789/0001-90	34567890	EMPRESA GHI LTDA	2023-01-01	R\$ 60.000,00	R\$ 12.000,00	R\$ 3.000,00
04.567.890/0001-90	45678901	EMPRESA JKL LTDA	2023-01-01	R\$ 40.000,00	R\$ 8.000,00	R\$ 2.000,00
05.678.901/0001-90	56789012	EMPRESA MNO LTDA	2023-01-01	R\$ 20.000,00	R\$ 4.000,00	R\$ 1.000,00
06.789.012/0001-90	67890123	EMPRESA PQR LTDA	2023-01-01	R\$ 10.000,00	R\$ 2.000,00	R\$ 0.500,00
07.890.123/0001-90	78901234	EMPRESA STU LTDA	2023-01-01	R\$ 5.000,00	R\$ 1.000,00	R\$ 0.250,00
08.901.234/0001-90	89012345	EMPRESA VWX LTDA	2023-01-01	R\$ 2.000,00	R\$ 0.400,00	R\$ 0.100,00
09.012.345/0001-90	90123456	EMPRESA YZA LTDA	2023-01-01	R\$ 1.000,00	R\$ 0.200,00	R\$ 0.050,00
10.123.456/0001-90	01234567	EMPRESA ABC LTDA	2023-01-01	R\$ 500,00	R\$ 0.100,00	R\$ 0.025,00

List of the taxpayers “victims” of the screening...

By clicking in the taxpayer register number, the user can view a detailed report with all “problematic” invoices from that taxpayer

Screening Processes for Tax Fraud – Report Example

Detailed report listing all invoices, from a specific taxpayer, that met the parameters of the screening



Detailed report listing all invoices, from a specific taxpayer, that met the parameters of the screening

BUT...

...what our tax
auditors **really,**
really like to do is...



Image: O-que-é-Self-Service-BI.jpg - <https://taticview.com/pt/o-que-e-afinal-esse-self-service-bi/>

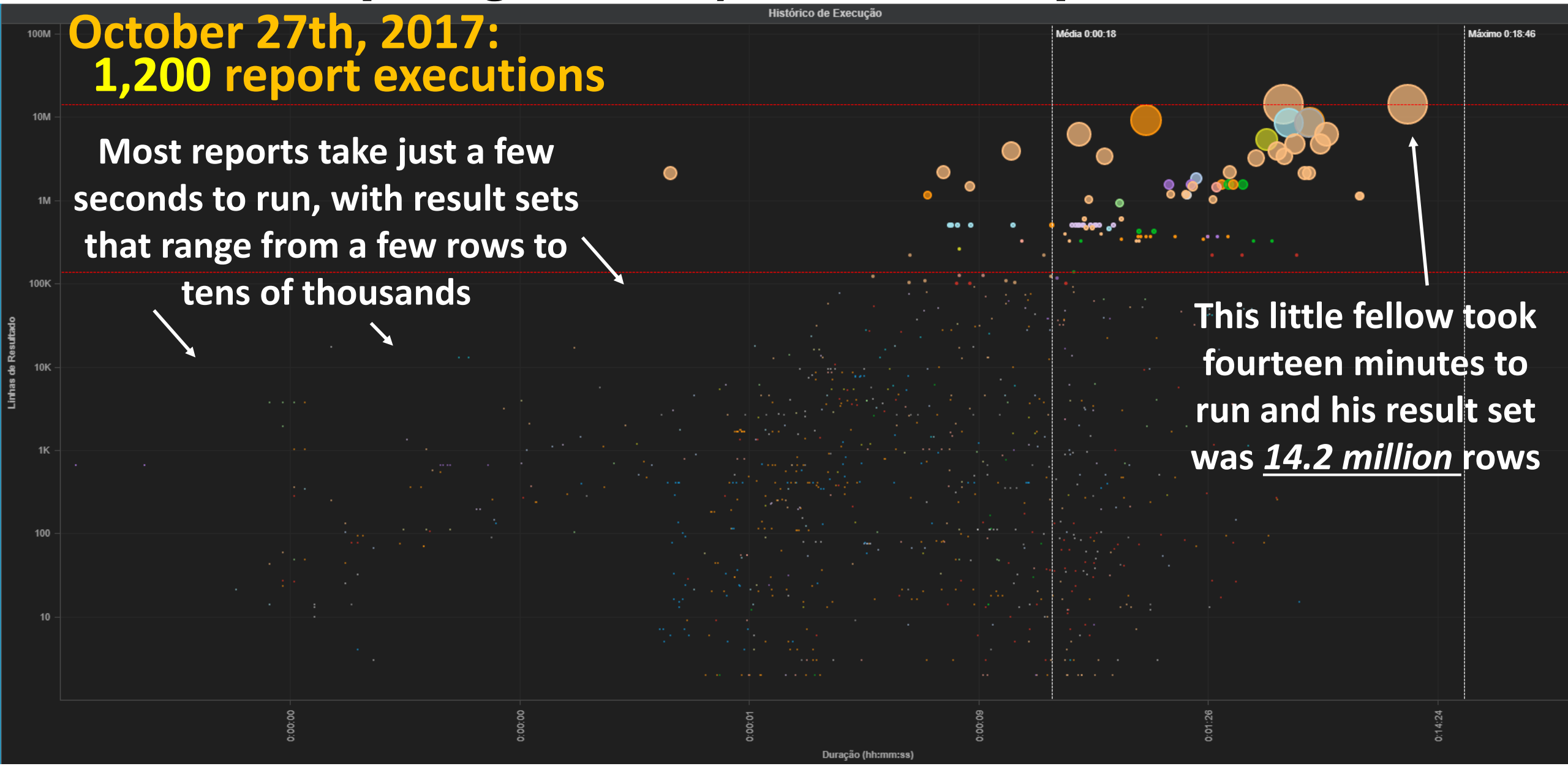
...to create their own reports!

These are the report executions from **tax auditors** with privilege to create/run their own reports

October 27th, 2017:
1,200 report executions

Most reports take just a few seconds to run, with result sets that range from a few rows to tens of thousands

This little fellow took fourteen minutes to run and his result set was 14.2 million rows



Chapter Five

Some Solutions & Benefits



Problem Corporate taxpayers, by intent or by honest mistake, don't comply with all or part of their tax obligations. But the tax administration doesn't have enough human resources to audit all taxpayers.



Solution

A special program for voluntary disclosure was implemented in December 2013. **Analytics performed in our Teradata DW, using data from electronic invoices and digital bookkeeping,** identifies some non-compliant taxpayers activities. Taxpayers are informed that possible tax evasion was detected and they can either file a Notice of Objection (if they disagree with the assessment) or pay the tax evaded.



Benefits

Since its deployment in December 2013, this special program generated more than **180 million reais (60 million USD)** in revenue. It is responsible for an **average increase of more than 4 million reais (1.3 million USD) per month** for this specific type of revenue (voluntary disclosure).

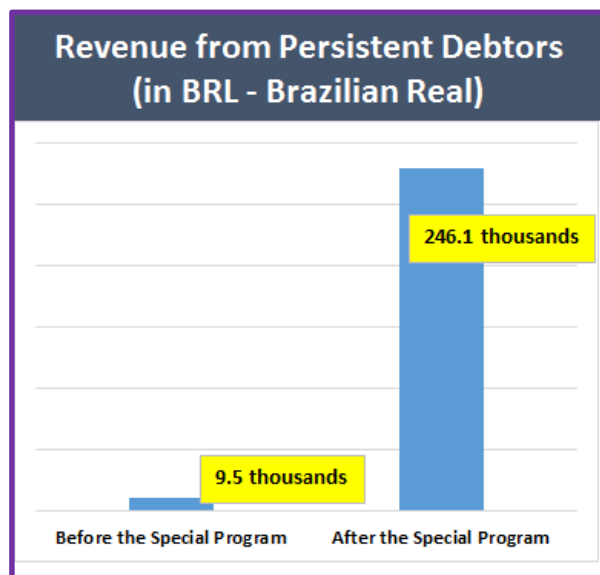


There are many corporate taxpayers with an established history of **default** (failure to pay the taxes owed) and it is very time consuming for the tax administration to track and collect taxes from these *persistent debtors*.



Solution

The persistent tax debtors are required to pay their taxes in a **daily basis, or after each transaction**. So they are constantly monitored and a **dashboard identifying all large persistent debtors** is used to quickly deploy **teams of tax auditors** to keep contact with the taxpayer and ensure that they pay their taxes.



Benefits

Since the deployment of this special program for Persistent Debtors, **the tax revenue from these specific taxpayers increased 24 times** - from a monthly average of 9.5 thousands reais to 246.1 thousands. The total of tax amount recovered from this program since its deployment in May 2015 is 5.6 millions reais (1.8 million USD).



Problem Corporate taxpayers are **increasingly failing to pay the ICMS-ST**, the “tax substitution VAT”, on their transactions (i.e., failure to declare taxable transactions)

Only **ONE small type** of tax audit on **a SINGLE taxpayer** generated enough income to pay **practically all investment** that we recently made in a new Teradata DW infrastructure



Benefits

This specific tax audit **resulted in 10.6 million reais (3.5 million USD) of tax paid by the offending taxpayer**. The same MicroStrategy report (that the tax auditor used for this tax audit) is used by him to audit other taxpayers, simplifying his work and making it far more efficient than before.



Solution

Using data available in the Teradata DW, the tax auditor **built a report in MicroStrategy** that compares the taxable value informed by the taxpayer in his “GIA-ST” (ICMS-ST Information File Monthly) with the tax value registered in his own invoices issued and also with the value of tax actually paid. **Very simple and efficient!**

Chapter Six

What Are They Saying?

And what our tax auditors are saying about our new analytical toys?

Efficiency & Completeness

“Now we can perform tax audits with much more in-depth analysis and in less total time”

Volume

“... is extremely important for tax enforcement, especially regarding corporate taxpayers with large volumes of data”

Easy of Use

“The simplicity is scary, it’s difficult to believe in how easy this is”

Accessibility

“We finally have quick access to data and information”

Availability

“The sky is the limit to how we can work with the available data”

Speed

“It allows quick analysis of inconsistencies in taxpayers data”





Analytics in the Age of Electronic Invoicing and Digital Bookkeeping

Thank You!