





Analytics in the Age of Electronic Invoicing and Digital Bookkeeping



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Glauco Oscar Ferraro Pires

Tax Auditor, Paraná State Finance Secretariat

glauco@sefa.pr.gov.br

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?



Chapter One - Paraná State

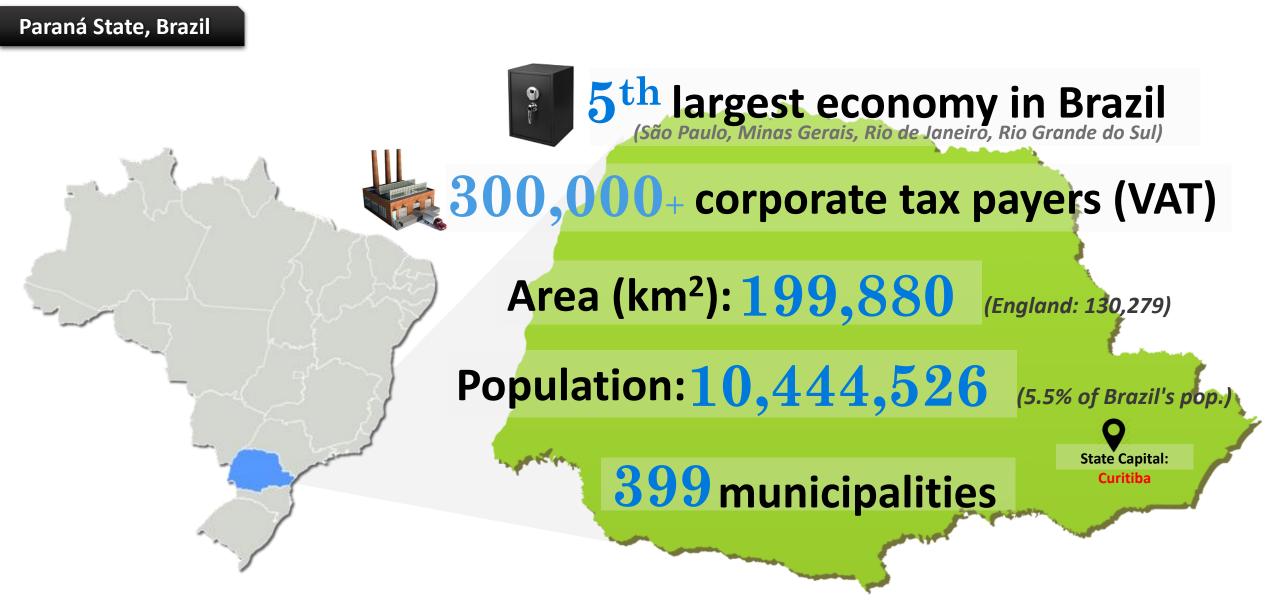
- Chapter Two Electronic Invoicing & Digital Bookkeeping
- Chapter Three Architecture, Usage & Processes
- Chapter Four Example of Analytics for Tax Audits... and a Bird's View of Our Self-Service BI
- Chapter Five Some Solutions & Benefits

Chapter Six - What Are They Saying?



Chapter One Paraná State









STATE TAX

REVENUE (%)

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

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 <u>all electric and phone bills (invoices)</u>, 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, <u>all their invoices</u>. In this case, we have three types of electronic invoicing: the <u>NF-e</u>, the <u>CT-e</u> and the <u>NFC-e</u>.



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







Inter-municipal transportation services: CT-e

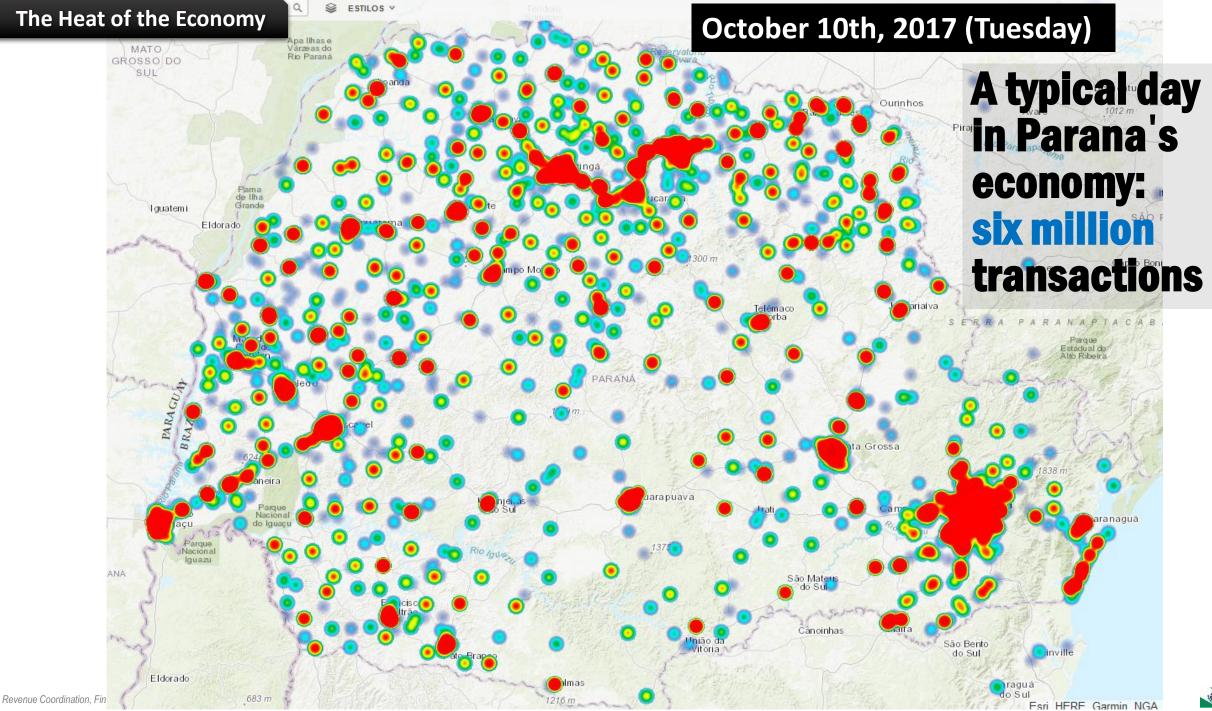


Telecommunication services: Agreement 115/03



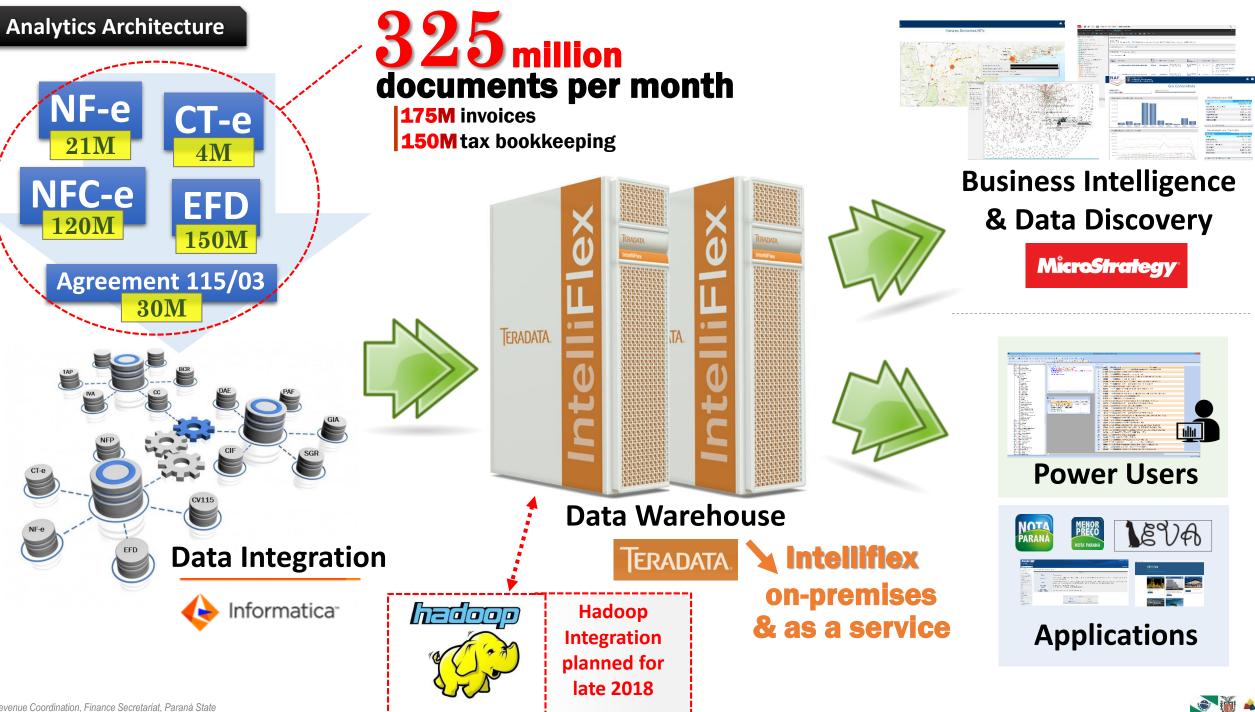
All aforementioned invoices, and many other information, must also be filed within the Digital Tax Bookkeeping:



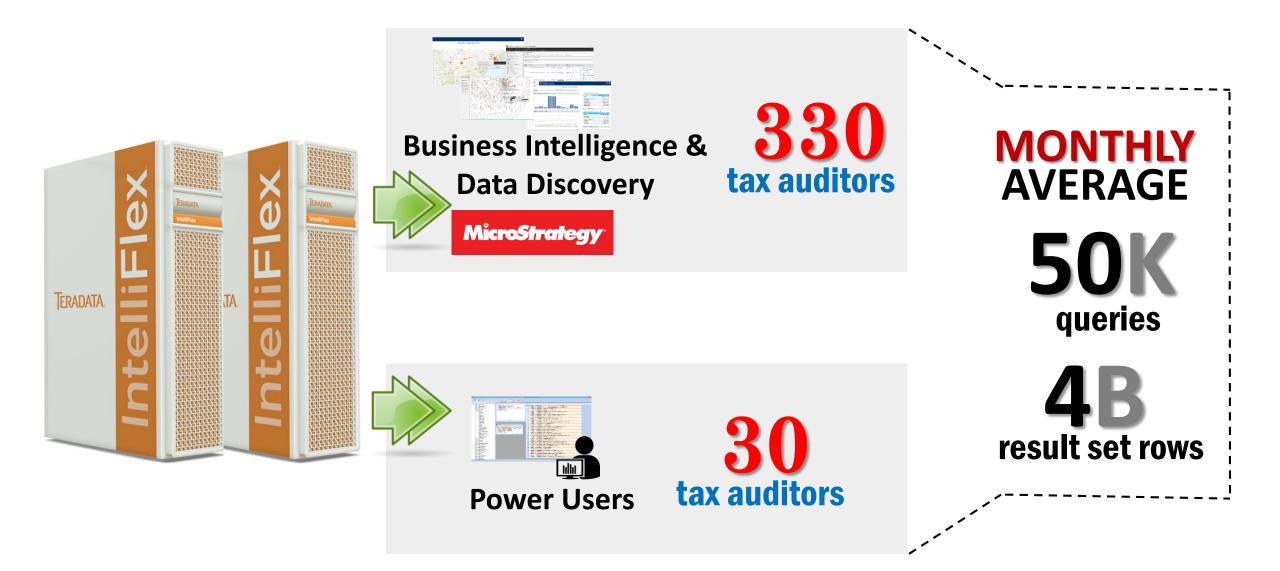


Chapter Three Architecture, Usage & Processes





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





What Do We Do With All This Data?

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 Bl



Automated screening processes

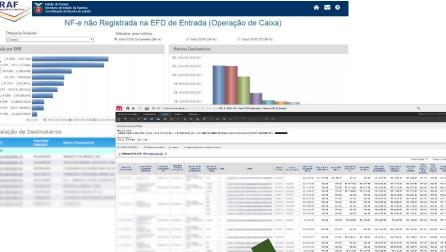
for Tax Fraud are routinely performed in the Teradata DW.



Tens of billions of records are crunched in less than one hour. * We do NOT use data

mining techniques... yet

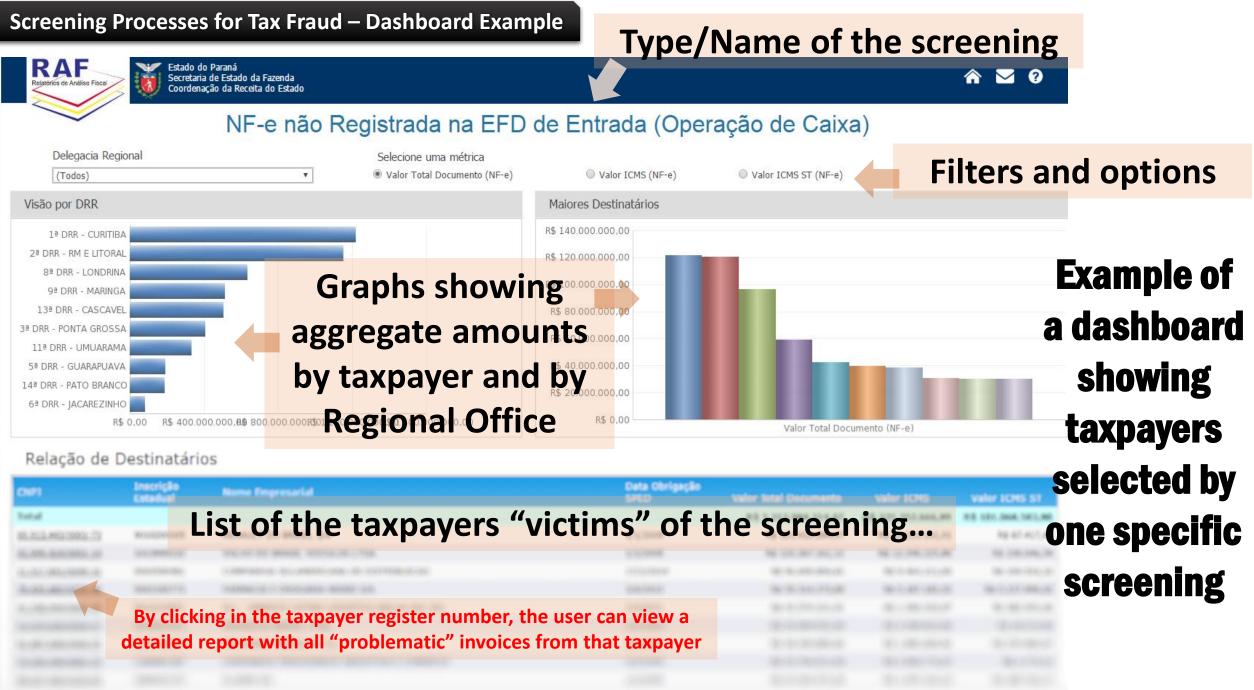
Using MicroStrategy, the data is then made available in dashboards and reports.



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



Actions can then be taken to investigate the flagged taxpayers.



Screening Processes for Tax Fraud – Report Example

Detailed report listing all invoices,

from a specific taxpayer, that met

the parameters of the screening

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Self-Service Analytics



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

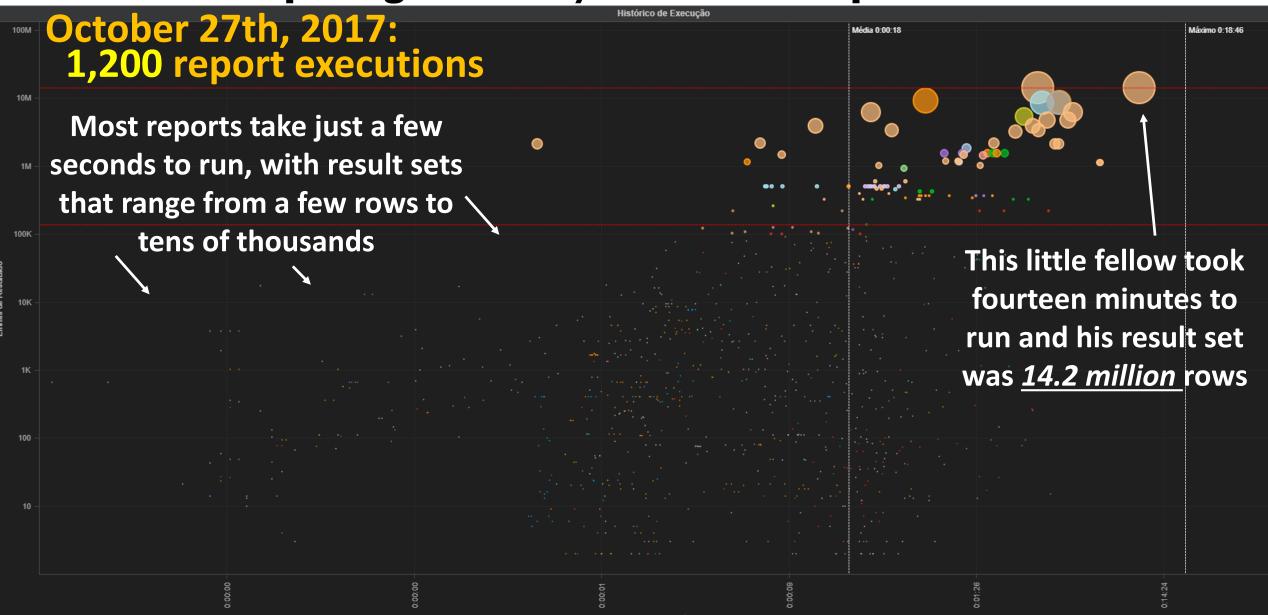


...to create their own reports!



Revenue Coordination, Finance Secretariat, Paraná State

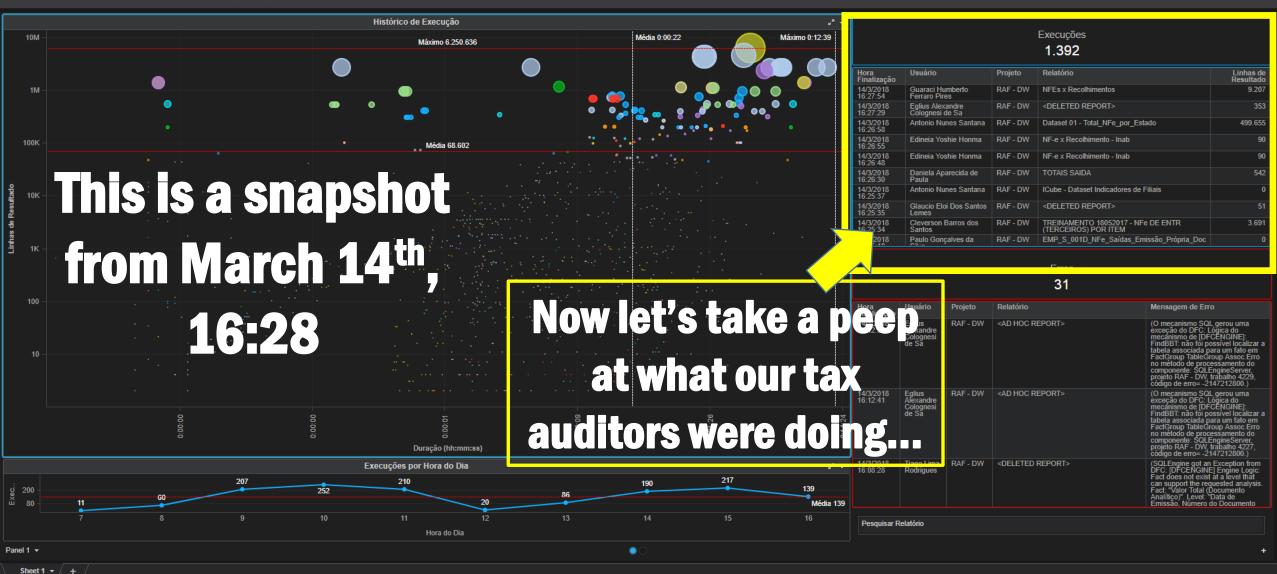
A Typical Reporting Day These are the report executions from tax auditors with privilege to create/run their own reports



A Typical Reporting Day

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			Execuções 1.392	
Hora Finalização	Usuário	Projeto	Relatório	Linhas de Resultado
14/3/2018 16:27:54	Guaraci Humberto Ferraro Pires	RAF - DW	NFEs x Recolhimentos	9.207
14/3/2018 16:27:29	Eglius Alexandre Colognesi de Sa	RAF - DW	<deleted report=""></deleted>	353
14/3/2018 16:26:58	Antonio Nunes Santana	RAF - DW	Dataset 01 - Total_NFe_por_Estado	499.655
14/3/2018 16:26:55	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:48	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:30	Daniela Aparecida de Paula	RAF - DW	TOTAIS SAIDA	542
14/3/2018 16:25:37	Antonio Nunes Santana	RAF - DW	ICube - Dataset Indicadores de Filiais	0
14/3/2018 16:25:35	Glaucio Eloi Dos Santos Lemes	RAF - DW	<deleted report=""></deleted>	51
14/3/2018 16:25:34	Cleverson Barros dos Santos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.691

Guaraci was viewing the invoices (and tax payed) from transactions of a specific taxpayer, since 2013.



			Execuções	
			1.392	
lora ïnalização	Usuário	Projeto	Relatório	Linhas de Resultado
4/3/2018 6·27·54	Guaraci Humberto Ferraro Pires	RAF - DW	NFEs x Recolhimentos	9.207
4/3/2018 6:27:29	Eglius Alexandre Colognesi de Sa	RAF - DW	<deleted report=""></deleted>	353
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4/3/2018 6:25:35	Glaucio Eloi Dos Santos Lemes	RAF - DW	<deleted report=""></deleted>	51
4/3/2018 6:25:34	Cleverson Barros dos Santos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.691

Eglius was viewing the contents informed, by different
taxpayers, in texts fields of 325 invoices. Afterwards, he deleted his report.



Execu	ições
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Hora Finalização	Usuário	Projeto	Relatório	Linhas de Resultado
14/3/2018 16:27:54	Guaraci Humberto Ferraro Pires	RAF - DW	NFEs x Recolhimentos	9.207
14/3/2018	Eglius Alexandre Colognosi do Sa	RAF - DW	<deleted report=""></deleted>	353
14/3/2018 16:26:58	Antonio Nunes Santana	RAF - DW	Dataset 01 - Total_NFe_por_Estado	499.655
14/3/2018 16:26:55	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:48	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:30	Daniela Aparecida de Paula	RAF - DW	TOTAIS SAIDA	542
14/3/2018 16:25:37	Antonio Nunes Santana	RAF - DW	ICube - Dataset Indicadores de Filiais	0
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14/3/2018 16:25:34	Cleverson Barros dos Santos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.691

Antonio was browsing an executive dashboard showing
total values of all transactions from all taxpayers, by all industries, in the past three years.



Exe	cuções
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Hora Finalização	Usuário	Projeto	Relatório	Linhas de Resultado
14/3/2018 16:27:54	Guaraci Humberto Ferraro Pires	RAF - DW	NFEs x Recolhimentos	9.207
14/3/2018 16:27:29	Eglius Alexandre Colognesi de Sa	RAF - DW	<deleted report=""></deleted>	353
14/3/2018 16:26:58	Antonio Nunes Santana	RAF - DW	Dataset 01 - Total_NFe_por_Estado	499.655
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14/3/2018 16:26:48	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:30	Daniela Aparecida de Paula	RAF - DW	TOTAIS SAIDA	542
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14/3/2018 16:25:35	Glaucio Eloi Dos Santos Lemes	RAF - DW	<deleted report=""></deleted>	51
14/3/2018 16:25:34	Cleverson Barros dos Santos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.69

 Edineia was, like Guaraci, viewing the invoices (and tax payed) from transactions of a specific taxpayer. She ran the same report twice.



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	ius Alexandre ognesi de Sa	RAF - DW	<deleted report=""></deleted>	35
14/3/2018 Anto 16:26:58 Anto	onio Nunes Santana	RAF - DW	Dataset 01 - Total_NFe_por_Estado	499.65
14/3/2018 Edir 16:26:55	neia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	9
14/3/2018 Edir 16:26:48	neia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	9
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14/3/2018 Clev 16:25:34 San	verson Barros dos itos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.69

 Daniela was listing the total values (transaction, taxable basis, tax value, freight) of all sales from a specific taxpayer in 2016.



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Hora Finalização	Usuário	Projeto	Relatório	Linhas de Resultado
14/3/2018 16:27:54	Guaraci Humberto Ferraro Pires	RAF - DW	NFEs x Recolhimentos	9.207
14/3/2018 16:27:29	Eglius Alexandre Colognesi de Sa	RAF - DW	<deleted report=""></deleted>	353
14/3/2018 16:26:58	Antonio Nunes Santana	RAF - DW	Dataset 01 - Total_NFe_por_Estado	499.655
14/3/2018 16:26:55	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:48	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:30	Daniela Aparecida de Paula	RAF - DW	TOTAIS SAIDA	542
14/3/2018 16:25:37	Antonio Nunes Santana	RAF - DW	ICube - Dataset Indicadores de Filiais	0
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14/3/2018 16:25:34	Cleverson Barros dos Santos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.691

This is a cube (report) part of the dashboard Antonio was browsing.



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14/3/2018 16:27:29	Eglius Alexandre Colognesi de Sa	RAF - DW	<deleted report=""></deleted>	353
14/3/2018 16:26:58	Antonio Nunes Santana	RAF - DW	Dataset 01 - Total_NFe_por_Estado	499.655
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14/3/2018 16:26:30	Daniela Aparecida de Paula	RAF - DW	TOTAIS SAIDA	542
14/3/2018 16:25:37	Antonio Nunes Santana	RAF - DW	ICube - Dataset Indicadores de Filiais	0
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14/3/2018 16:25:34	Cleverson Barros dos Santos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.691

Glaucio was listing all items sold with tax value greater
than zero by a specific taxpayer, since 2013. Afterwards, he deleted his report.



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14/3/2018 16:27:54	Guaraci Humberto Ferraro Pires	RAF - DW	NFEs x Recolhimentos	9.207
14/3/2018 16:27:29	Eglius Alexandre Colognesi de Sa	RAF - DW	<deleted report=""></deleted>	353
14/3/2018 16:26:58	Antonio Nunes Santana	RAF - DW	Dataset 01 - Total_NFe_por_Estado	499.655
14/3/2018 16:26:55	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
14/3/2018 16:26:48	Edineia Yoshie Honma	RAF - DW	NF-e x Recolhimento - Inab	90
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14/3/2018 16:25:35	Glaucio Eloi Dos Santos Lemes	RAF - DW	<deleted report=""></deleted>	51
14/3/2018 16:25:34	Cleverson Barros dos Santos	RAF - DW	TREINAMENTO 18052017 - NFe DE ENTR (TERCEIROS) POR ITEM	3.691

Cleverson was listing every item purchased by a specific taxpayer from 2015 to 2017.



An Example of a MicroStrategy Report Listing All Invoices and Payments and their Difference (Unpaid Tax)

Aplicar alterações automaticament

> Meus relatórios > NFEs x Recolhimentos

1 2 2

Y+ Adicionar condição

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O filtro está vazio.

This column shows the difference between the tax informed in the invoice and the value actually paid ({Sistema Origem (1-Nfe, 2-EFD, 3-CV115, 4-CT-e, 5-NFC-e) = 1:NF-e) E ({Situação do Documento Fiscal} = Autorizado) E ({Data de Emissão

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FERRAMENTAS -

DETALHES DO RELATÓRIO

Filtro do relatório:

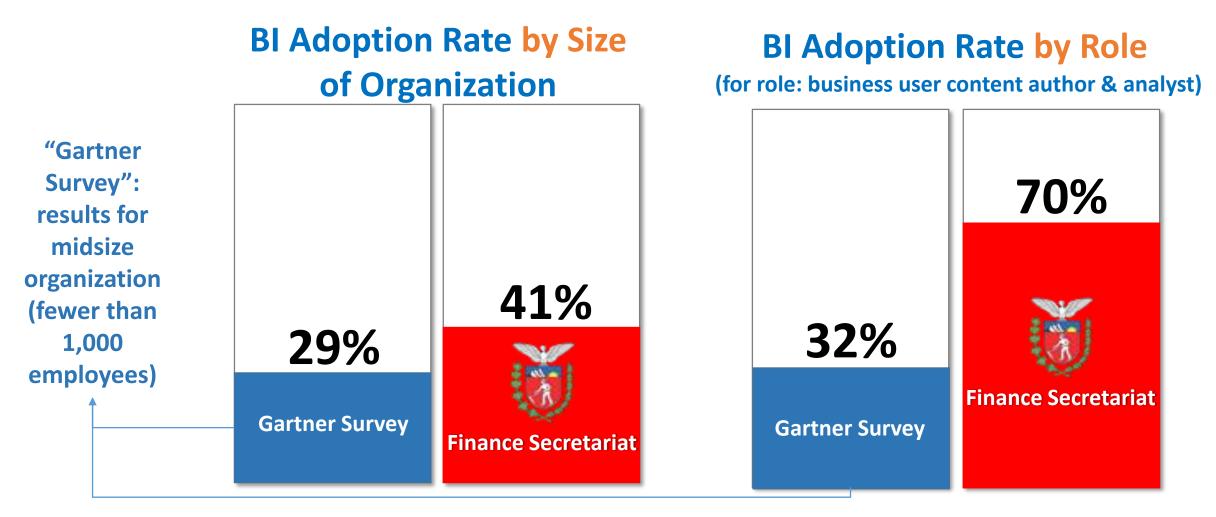
FILTRO DE EXIBIÇÃO

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	Data de Emissão	Chave de Acesso	Número do Document o Fiscal	CNPJ/CPF (Destinatário)	Nome (Destinatário NF)	UF (Dest inatá rio NF)	Data de Pagament o	CNPJ/CPF do Recolhimento	Indice Referencial	Base de Cálculo ICMS	Base de Cálculo ICMS ST	Valor Total do ICMS	Valor Total do ICMS ST	Valor da Receita	Difere
5/6/	6/2017	2017 Tangin wit, tangina ta canada ana canada ana ana ana ana ana ana ana ana an	9580	Description of the	DECOMP DECTROLADORIA DE BLETRICHECOLI (1014	PR	8/6/2017	240.4210000 (CI	3811, JANS 001011 (11, JA	R\$ 2.179,44	R\$ 3.994,22	R\$ 87,17	R\$ 631,77	RS 12,96	-6
27/1	7/1/2017	20x70x02x623002000x00x00x000000000002x00003x52x0	9062	20070200000022	DECOMP DETRIBUTIONS DE ELETRONICOS CTUR	PR	6/2/2017	(40°503880-00)	2017 Charles Cities	R\$ 1.621,88	R\$ 2.944,14	R\$ 64,87	R\$ 465,07	RS 12,96	4
15/1	5/1/2018	22-08-02 ⁺ 46,20820440-0482048-04840-02880-04865-625223	10388	240750300102	DECIMP DISTRIBUTIONAL DE ELETRONICOS UTUA	PR	25/1/2018	2-45-75 (1998) - (1)	2010/001121-00122	R\$ 1.263,12	R\$ 2.319,72	R\$ 50,53	R\$ 367,03	RS 12,97	4
31/8	1/8/2017	221-7482-46,78923649-6825348-6888648425-68895223427	9925	24675238865222	DECEMP DESTINATIONS OR ELECTRONICOL (10)	PR	8/9/2017	\$4075.0000122	2017/0811030210	R\$ 1.154,52	R\$ 2.092,84	RS 46,17	R\$ 330,54	R\$ 12,96	4
12/9	2/9/2017	To Jac., 47 architecture reserves a reserved	9970	14080 (2400) 10200	LERCH MERLA-CAN BRUIR, ERR. DE BRUIR, AGEN SIA	PR			4	R\$ 1.035,84	R\$ 1.808,08	RS 41,43	R\$ 284,03	RS 0,00	1
20/4	20/4/2017	The property of the last of the second statements of statements (1), (1)	9410	200702000000222	DECOMP DISTRIBUIDORIA DE ELETRONICOS (704	PR	28/4/2017	(40°50388+0))	201704203002400	R\$ 983,28	R\$ 1.791,73	R\$ 39,32	R\$ 283,18	RS 12,96	-
14/2	4/2/2017	121 YOR MORE AND ADDRESS AND ADDRE	9154	24675224061022	DECOMP DISTRIBUIDIORIA DE ELETRONICOS UTUA	PR	20/2/2017	2-45-75 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2017/02/2010/4057	R\$ 948,60	R\$ 1.747,46	R\$ 37,95	R\$ 276,61	RS 12,97	
9/2/	1/2/2018	22-8620°462002068-080538-08089-0520-08085-440*2	10528	2467520886522	DECEMP DISTRIBUTIONS OR ELETROPICOIS (1754)	PR	26/2/2018	240750000-022	2010032205007905	R\$ 739,62	R\$ 1.413,97	R\$ 29,59	R\$ 224,93	RS 14,81	1
10/*	0/1/2017	$\mathbb{E}[x_1,y_2,w]$, which are solved in the constraint of the state x_2,∞	9000	1001-0071000-011	FARMER E RUERY L'TOA	PR			- 48	R\$ 0,00	RS 0,00	RS 0,00	R\$ 0,00	RS 0,00	
24/1	24/1/2017	The part of the second community of the	9030	Carlos Thatter (1988)	LENCE HERLIN CAN Mile IRLEMA (HE MILE CALACENE SA	PR	24/1/2017	145,000,000 +00	2010 Colorado	R\$ 758,22	R\$ 1.267,95	RS 30,33	R\$ 199,40	R\$ 199,40	
		Total Activity of the second sec	9051	1408/104803019	CENT NERVER CONFISION SPECIES CON CE BRICOL COM	PR	24/1/2017	1402052308108	Jacob Contraction (CD	R\$ 2.176,74	R\$ 3.856,18	RS 87,07	R\$ 607,07	R\$ 607,07	
27/1	27/1/2017	231, Jacob W. San Sanda Anna an	9062	2467520880-022	DECEMP DISTINUADORAL OR ELEPHONECOS L'ÉLA	PR	27/1/2017	7402002000100	201701275000045	R\$ 1.621,88	R\$ 2.944,14	R\$ 64,87	R\$ 465,07	R\$ 465,07	
2/2/	1/2/2017	To AD, ACMENT ORDER ONLY AND ADD	9088	1408075400110280	LENCY MERLIN-CM Ministration CM Ministration CM	PR	2/2/2017	1462082088100	2117022589607	R\$ 1.064,86	R\$ 1.792,66	R\$ 42,59	R\$ 281,62	R\$ 281,62	
10/2	0/2/2017	The ACRO ACTIVITY OF THE OWNER OF THE OWNER	9142	14081040001148	ulmin- withum Conference Brackstone De Brackstone	PR	10/2/2017	7462708270881408	2011/02100001980	R\$ 984,54	R\$ 1.195,93	R\$ 39,39	R\$ 187,99	R\$ 187,99	
os		211/221422002000-005200-000000-00100020025	9150	14267246810588	LENCY WERLIN-COL MICCOLUMN DE MICCOLUMN DE	PR	10/2/2017	1402002008-008	2017021050017564	RS 1.118,64	R\$ 1.901,46	RS 44,74	R\$ 299,01	R\$ 299,01	



BI and Analytics Adoption in the Finance Secretariat

A Gartner Group survey made in June 2017 showed that "**business intelligence** remains elusive, with BI and analytics adoption at about 30% of all employees"*



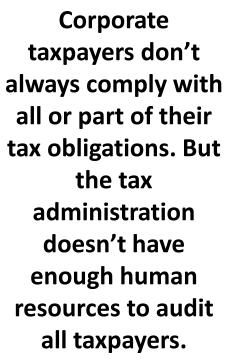
* Source: "Survey Analysis: Why BI and Analytics Adoption Remains Low and How to Expand Its Reach", Gartner Group, published: 30 June 2017



Chapter Five Some Solutions & Benefits









A special program for voluntary disclosure was implemented. Analytics performed in our Teradata **DW**, using data from electronic invoices and digital bookkeeping, identifies some non-compliant taxpayers activities. Taxpayers are then informed that a 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.

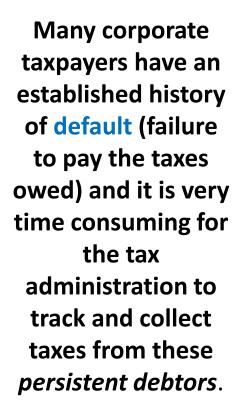
Benefits

This special program recovers a considerable amount of revenue, increasing year by year. Amount of tax revenue recovered so far: 120 million reais (37 million USD)

Revenue from Voluntary Disclosures, in BRL -Brazilian Real (millions) - 2012-2017



Problem





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

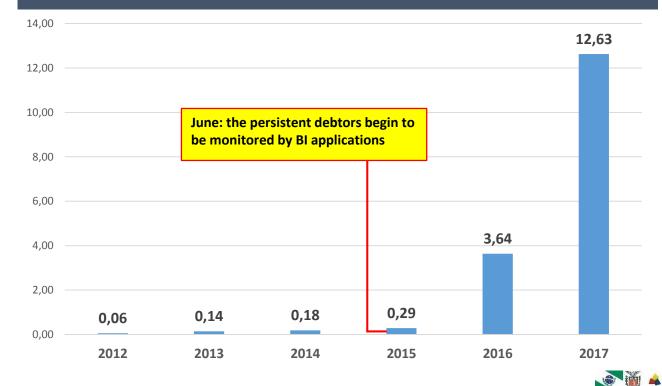
taxpayer and ensure that

they pay their taxes.



Tax revenues from persistent debtors increased substantially. Amount of tax revenue recovered so far: 20 million reais (6 million USD)

Revenue from Persistent Debtors, in BRL - Brazilian Real (millions) - 2012-2017



Revenue Coordination, Finance Secretariat, Paraná State





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

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 electronic invoices with the value of taxes actually paid for each transaction made. Very simple and efficient! Benefits

This specific tax audit resulted in 10.6 million reais of tax paid by the offending taxpayer.

The MicroStrategy report used for this audit is used by the tax auditor on other taxpayers, simplifying his work and making it far more efficient and rewarding than before.





Chapter Six

What Are They Saying?



Revenue Coordination, Finance Secretariat, Paraná State

The Users (Tax Auditors) Stories

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!



Revenue Coordination, Finance Secretariat, Paraná State