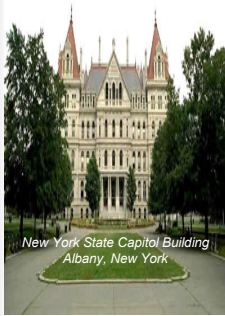




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Using Advanced Analytics for Refund Denial

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Background / Project Initiation



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The Audit Division for the department was given the task to come up with some revenue enhancement opportunities.

- **Nov 2002 - The Revenue Enhancement Identification Team was formed to provide division management with revenue raiser ideas.**
 - **Audit division Staff**
 - **IT Division Staff (a.k.a. Enterprise Services Division (ESD))**
- **Refund Claim Denial Identification**
 - **High revenue generation (savings)**
 - **\$\$\$ could be realized quickly**
 - **Similar programs were already being done by the Audit Division.**
- **July 2003 - Project Team is formed consisting of**
 - **Audit Division Staff**
 - **ESD Staff**
 - **IBM Consulting Services consultants.**



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Past enforcement efforts were not keeping up with the ever-changing compliance environment

- **“Early warning” compliance detection was rudimentary**
- **Existing strategy was limited to “deferred detection” and “pay and chase”**
- **Batch selection systems were inflexible and difficult to change**
- **Case workflow was disjointed and mostly manual**
- **Auditors did not have the complete picture of why a case was selected**
- **Limited capability to analyze the effectiveness of the audit programs**
- **Limited capability to detect or predict new fraud areas**



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The project objective was to build a system to enhance existing audit case selection methods for fraud detection of pre-processed Returns

The Questionable Refund Detection unit wanted...

- **A better way to identify questionable returns**
- **To question suspect returns before issuing refunds**
- **To improve the ability to collect on additional tax audit cases**
- **To issue refunds in a timely manner**
- **To make program management more flexible**
- **To leverage investments in data warehousing and business intelligence technologies**
- **To scientifically predict good audit candidates utilizing return filing patterns, case history, and other external indicators**
- **To improve their ability to detect new areas of fraud**



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New York's compliance solutions have been evolving over the past 6 years

In partnership with IBM New York has developed...

- **Tax Data Warehouse** – strategy and design
- **Traditional Audit Selection** – built compliance risk models for individual income and sales/use taxes
- **Case Management** – designed business processes and designed/built audit case management system
- **“Real-Time” Audit Selection**– using rules engine and predictive modeling, designed and developed ‘early warning’ system to detect compliance issues at time of filing



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Business Background



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There are 3 major programs for the questionable refund detection unit

Categories of Questionable Returns

- **Earned Income Tax Credit**
- **Itemized Deductions**
- **Wage / Withholding**
- **Dependent Child Care Credit**
- **Real Property Credit**
- **Suspect DB's (Prisoner, Identity Theft, Preparer, Bad Address)**



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Earned Income Tax Credit was known to be one of the areas of greatest compliance risk for New York

- New York offers a state credit that is 30% of the federal EITC
- State credit is claimed on 1.3M returns, for a total of \$700M in tax expenditure (2003)
- EITC fraud schemes were becoming more sophisticated and widespread (based on IRS and NY studies)



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The EIC audit issues mainly stem from the misrepresentation of income and/or dependents to maximize the credit.

- **Potential Fraud – Maximizing the EIC Claim**
 - Questionable Business Income – Schedule C
 - Questionable Wages And Withholdings
 - Identity Theft
 - Preparer Fraud
 - Multiple Claims
 - Questionable Business Losses
- **Domestic Issues**
 - Custody Disputes
 - Duplicate Claims
 - Math Errors
 - Social Security Number Verification



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As always the Itemized Deduction audit issues stem from the overstating of deductions to wipe out AGI and are hard to verify

- Taxpayers claiming high deductions in areas of
 - **job expenses**
 - **personal mortgage interest**
 - **contributions**
- Deductions wipe out AGI to allow total refund of withholding
- Hard to verify deductions at the time of filing
 - **No requirement to provide proof of deductions claimed on Schedule A**
 - **Schedule A data not available at review time for paper filers**
 - **Limited third party data**



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Most of the Itemized Deductions questioned were being performed via post audits.

- Limited verification of some deductions can be done using Federal IRMF and other data sources
 - **Deductions like job expenses and cash contributions need to be verified by correspondence with the taxpayer**
 - **Very labor intensive process**



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The withholding and Identity theft audits are a growing concern for the department.

- **Rapidly growing area of concern due to the multiple ways fraud can be accomplished**
 - **Stolen social security numbers**
 - **Wage and tax statement**
 - **Easy to obtain W-2 statements with a valid employer EIN**
 - **Print their own W-2 on a computer to be submitted with their return**
 - **Rapid Refunds**
- **Limited employer withholding information available at time of filing**



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Solution Background

Tax Audit and Compliance System (TACS)



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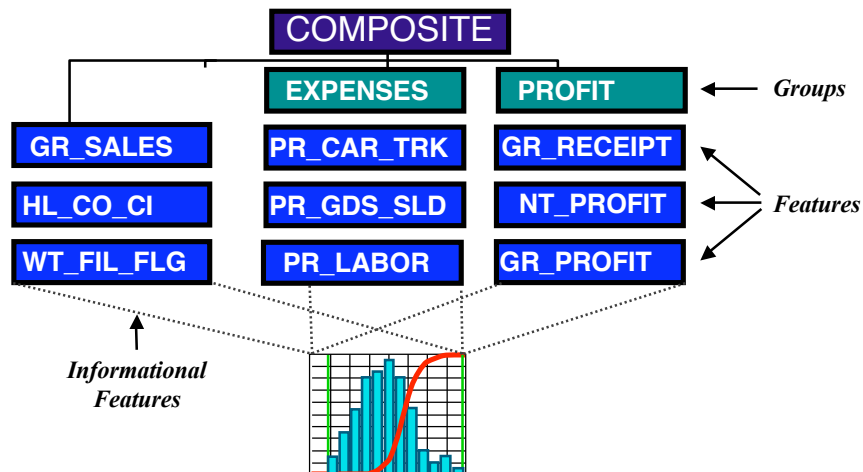
TACS is a solution that enables taxing authorities to detect and investigate the fraudulent and abusive practices of taxpayers.

- Sorts through information on tens of thousands of tax returns in minutes
- Ranks taxpayers in relation to their peers within specific industries, corporate demographics and geographic regions
- Results are displayed in a variety of graphical formats that readily identify taxpayers who fall outside norms
- Supports further investigation by enabling users to drill down into detailed information on taxpayer's returns and audit history as well as a variety of third party data sources
- Integrated data mining, interactive data visualization and ROLAP drilldown reporting enable the system to display results as reports, spreadsheets, bar graphs, two and three dimensional scatter plots and various other presentations



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The profile model defines the content and structure of the profile. Scores for features roll up to groups, and groups to the composite.

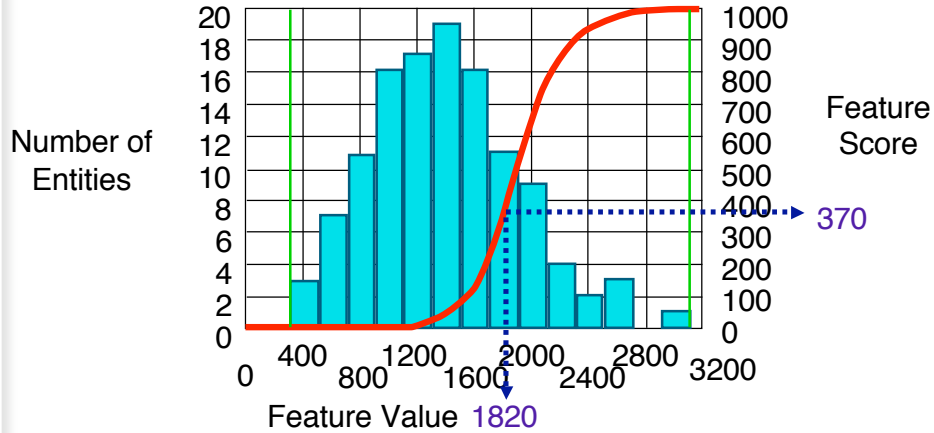




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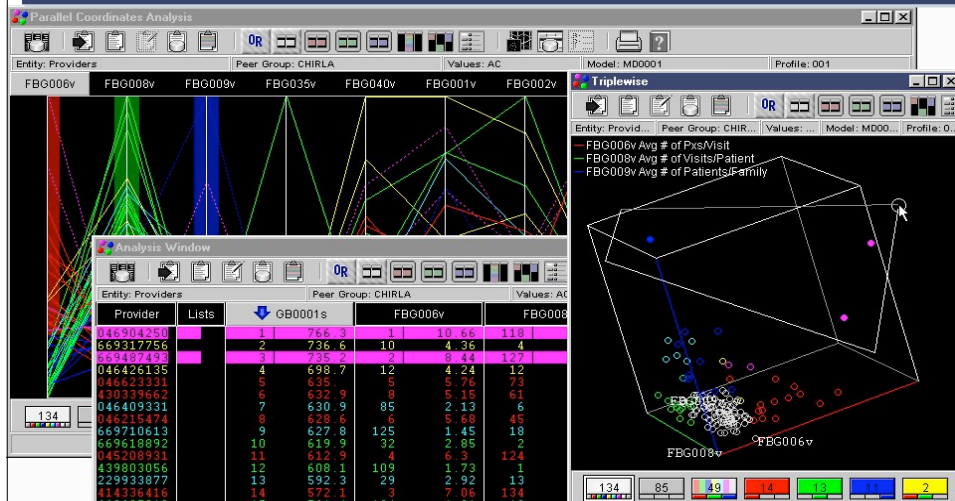
The metrics of the distribution of all entity values for a given feature are used to define the transformation of values into scores.

Sample Feature, "Average Dollars per"



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Interactive visual data mining is provided by the integration of data visualization into the profile model and into the report wizard.





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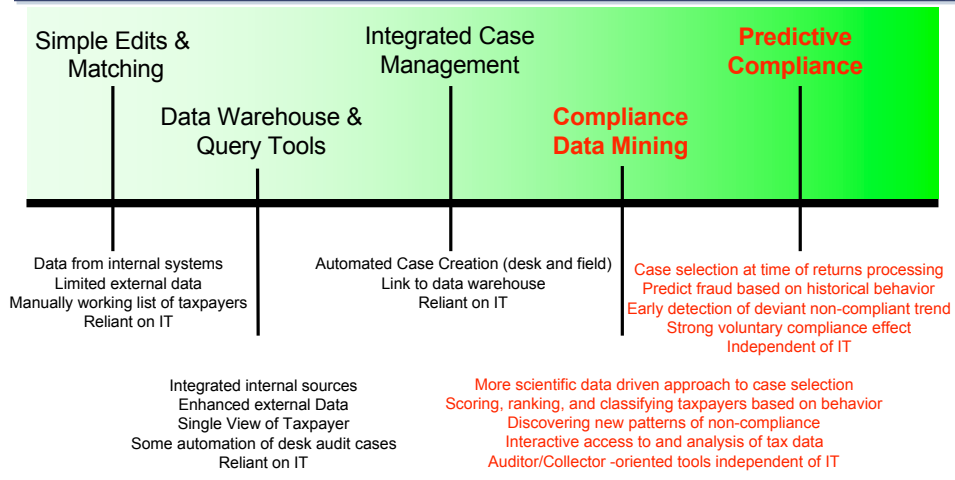
Case Identification and Selection System (CISS)

Taking Audit Case Selection to Pre-processed Returns



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After having experience with compliance data mining, NY realized it needed to take a more proactive approach to case selection





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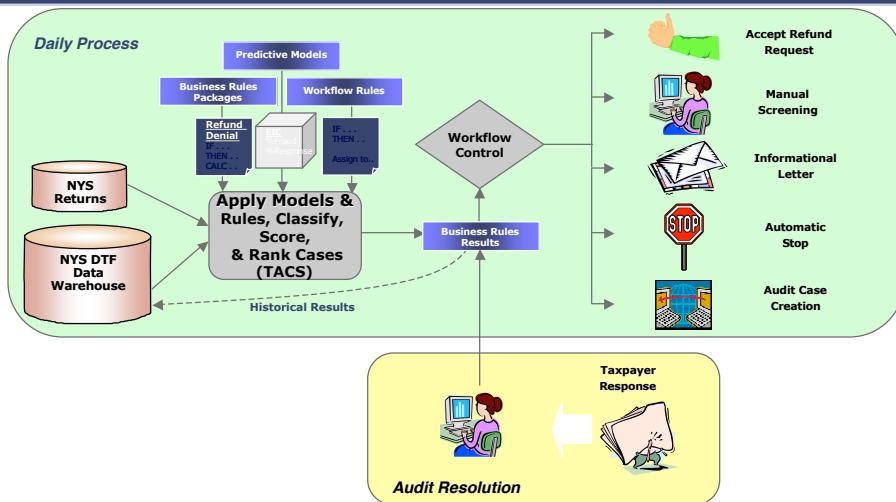
CISS is an end-to-end system enabled by the TACS application suite for audit case selection, resolution, and post processing year analysis

- Applies business rules and predictive models to categorize and score returns received nightly
- Identifies the “next best case” for pre-processing audit selection
- Provides a web based application for screening and resolving cases
- Triggers automated downstream processes
 - Accept Refund Request
 - Automatic Stop
 - Audit Case Creation
 - Informational Letter
 - Manual Screening



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Process flow for CISS





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Utilizing TACS's Rules engine cases are evaluated individually through the application of business rules and predictive models.

- **Business Rules**
 - **Business logic that evaluates data from each current tax return, previous returns, audit history and other sources to make A determination about the action to be taken by the department regarding each return**
- **Predictive Modeling**
 - **Utilize historical case results to predict such things as probability of fraud or taxpayer response**



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The Rules Engine scoring process prioritizes cases to ensure the auditors and screeners are continually working the "Next Best Cases."

Identify "next best case"

- **Based on all returns received not on a batch or daily basis**
- **Dynamic re-ranking of all potential cases nightly**
- **Browser based front end which provides a single point of entry for:**
 - **case identification**
 - **manual screening**
 - **business analysis**
 - **case selection and creation**
 - **reporting**



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Externalized rules allow the user to manage the inventory and keep the volume of cases at a level that can be worked by the audit staff.

Improved Program Management

- **Management of selection thresholds based on predicted resource availability**
- **Current year case analysis capabilities to identify new areas of fraud with immediate implementation.**
- **Externalized business rules provide greater flexibility in modifying existing edits and creating new ones**
- **Post-year analysis of system edits to:**
 - **improve business rules**
 - **identify new areas for case review**
 - **enhance the predictive models**



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Users now have the ability to implement business logic from existing compliance methods as well as “discover” new deviant patterns

Advanced analytics takes detection to the next level

- **Augments return data with comprehensive indicators and scores to be used in rules engine**
- **Utilizes predictive modeling to discover patterns in historical data for application to current returns**
- **Utilizes profile modeling to identify new patterns and relationships in current returns**



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CISS incorporates a web based information portal to support the return screening, audit resolution, and customer service processes.

Improved application for screening and auditing cases

- **Enhanced system screens**
 - Placing needed case information in one spot
 - Quick access to other system screens
 - Reduced clerical support time
 - Dependent Tree Application
- **Automation of screening and case closing functions**
- **Improved taxpayer correspondence**
 - Taxpayer inquiry letters now target the specific audit issues
 - Utilized by call center for refund status inquiries

Summary screen shows case scored 806 in the withholding category. Note key identifiers shows T/P not found on previous RP file and prime T/P filed another return this year.

DB01MEF/ALBWSUAT11/10.67.102.124 GUIDE - New York State Department of Taxation and Finance - Microsoft Internet Explorer

CISS Build: 2.1.9

GUIDE

FRN: 13777311 Tax Year: 2003 TP SSN: 110-44-1040 Spouse SSN: No Audit Action Select for Audit
Name(s): EXAMPLE-ANN Deny Refund Unable to Work

Summary Rule Results Results Return Filed: 07/07/2005 Earliest Exp: 01/01/2054 Status: Awaiting Screening

Current Org Unit: BAD

Org Unit Select
OICS
CM Image Viewer
CISS
Search
Worklist
Retrieve Case
Reply Received
Reset Menu
02/19/05 10:27:15

Form IT-201 Resident Income Tax Return

General

Federal AGI NY Col:	42120
NY AGI NY Col:	42120
Filing Status:	Head of House
Exemptions:	1
Deductions:	15905
Taxable Income:	25215

Refund / Tax Due

Refund Requested:	1149
Tax Due:	0
Payment with Return:	0

Taxes

NY State:	1210
New York City:	802
Yonkers:	0
Other Taxes:	0
Tax Claimed:	2012

Credits

EIC Requested:	0
DCC Requested:	0
Real Property Tax:	0
STAR Credit:	62
Other Credits:	0

Withholding

NY State:	1962
New York City:	1137
Yonkers:	0
Estimated:	0

Dependent SSN

EIC Dependent 1:	
EIC Dependent 2:	
DCC Dependent 1:	
DCC Dependent 2:	

Additional Information

Preparer SSN/PTN:	115366230
Preparer EIN:	0

Category Summary

Category	Tax Potential	Score
EIC DCC Category	0	0
Withholding Category	0	806
Itemized Deductions Category	0	0

Key Taxpayer Indicators

Prime not found on the Previous RP Database
Prime filed another return this year

Audit Maintained Databases

Bad	Neutral	Good
<input type="checkbox"/> Identity Theft	<input type="checkbox"/> Prev. Bad Addr. - Rev	<input type="checkbox"/> Previous valid EIC claim
<input type="checkbox"/> Quest. Dir. Dep. Acct. - Rev.	<input type="checkbox"/> Prev. Protester Database	<input type="checkbox"/> Prev Validated Withldg Claim
<input type="checkbox"/> Prev. Denied EIC Claim (EDPM)		
<input type="checkbox"/> Prev. Fraud - SSN		

Processing Exceptions

n/a	EIC Dep1 SSN invalid vs SSA tbl
n/a	EIC Dep1 SSN used on other DTF return
n/a	EIC Dep1 age not w/in EIC range per SSN
n/a	EIC Dep1 age not w/in EIC range per TP
n/a	Prime/Spouse SSN matches EIC Dep1 SSN
n/a	EIC Dep2 SSN invalid vs SSA tbl
n/a	EIC Dep2 SSN used on other DTF return
n/a	EIC Dep2 age not w/in EIC range per SSN
n/a	EIC Dep2 age not w/in EIC range per TP
n/a	Prime/Spouse SSN matches EIC Dep2 SSN
n/a	EIC Dep2 SSN invalid vs SSA tbl
n/a	Spouse SSN claim EIC invalid vs SSA tbl
n/a	Investment income yearly limit exceeded
n/a	DCC Dep1 SSN invalid vs SSA tbl
n/a	DCC Dep1 SSN used on other DTF return
n/a	DCC Dep1 age not w/in DCC range per SSN



Results



The audit division has realized increased revenue from the previous years projected to be a gain of over \$53 million over 2 years

<u>Processing Year</u>	<u>2003</u>	<u>2004</u>	<u>2005*</u>
Inquiry Letters Issued	55,776	74,000	78,000
Response Rate (%)	41%	41%	32%
Response Denial Rate (%)	80%	87%	TBD
Denied Refunds	\$39 M	\$80 M	\$92–100M

* 2005 Numbers are projected through the end of the year



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Even with the increased letters and revenue we are still only questioning less than 6% of the population.

<u>Processing Year</u>	<u>2004</u>	<u>2005*</u>
EIC Returns Filed	1,469,719	1,421,324
Inquiry Letters Issued	74,000	78,000
Pct Questioned	5%	5.5%
EIC Dollars Claimed		
(New York State)	\$759 Million	\$756 Million
(New York City)	NA	\$ 73 Million
Total EIC Dollars Claimed	\$759 Million	\$ 829 Million
Total Dollars Questioned	\$80 Million	\$96 Million
Pct of Total EIC Dollars Questioned	10%	11.5%

* 2005 Numbers are through 6/8/2005



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CISS provides the capability of adjusting thresholds such as the number of letters to send based on staffing limitations.

<u>Processing Year</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>
Inquiry Letters Expired	27,458	49,966	0***
Potential Denied Refunds (\$)	\$30.6 M*	\$70 M**	0***

•These cases were selected into the pool of potential letters to be sent, however were not sent due to the limitations of Audit to handle the additional potential responses

** On the assumption that the Category score were reduced to 500 and the probability of fraud were reduced to .74

*** We are getting better at knowing our population and threshold limits to better manage the potential expired pool to not hold up refunds that would eventually be issued.



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Additional letters could be sent however the program must manage to the predicted response rates due to resource constraints.

	<u>Current</u>	<u>Safe Potential</u>	<u>More Aggressive</u>
EIC Returns Filed	1,421,324	1,421,324	1,421,324
Inquiry Letters Issued	78,000	106,000	147,000
Pct Questioned	5.5%	7.5%	10.3%
EIC Dollars Claimed			
(New York State)	\$756 Mill	\$756 Mill	\$756 Mill
(New York City)	\$ 73 Mill	\$73 Mill	\$ 73 Mill
Total EIC Dollars Claimed	\$ 829 Mill	\$829 Mill	\$ 829 Mill
Total Dollars Questioned	\$96 Mill	\$134 Mill	\$163 Mill
Pct of Total EIC Dollars Ques	11.5%	16.1%	19.6%



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Next Steps.....



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Build on our success from the previous years.

Future Compliance Initiatives

- **Enhanced Refund Denial**
 - **Filing Status**
 - **Demographics Data**
 - **Preparer Analysis**
- **Expansion into other Audit Programs**
 - **Non-resident**
 - **Tax Shelters**



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Develop TACS for the Tax Compliance Division to aid in collection enforcement, risk analysis, and selection of next best collection case

- **Understand the make up and complexity of cases**
 - **Determine what cases have the highest and lowest probability of being collected.**
 - **Determine the most effective and efficient collection path to assign to a case to maximize the chances of collection**
- **Streamline current risk assessment processes and quickly forecast industry trends**
- **Enable managers to make smart and timely mission critical business decisions**



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Questions?