

# Audit Analytics as the Agent of Change

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# A Little About Me

- VP of Internal Audit. - Responsible for the U.S. Business Audit Team
- My team performs internal audits to help ensure regulatory compliance, operational effectiveness and financial reporting integrity for Nasdaq entities
- Responsibility for Internal Audit's Data Analytics and Continuous Monitoring
- Prior to Nasdaq, senior level positions with technology consulting organizations providing program leadership, system analysis and business process expertise
- CPA, CIA, Bachelor of Accounting, Masters of Information Systems Technology
- Adjunct Faculty- University of Maryland, Southern New Hampshire University
  
- Washington DC..Husband..father and avid sports fan....(Hockey, Golf Tennis)

# Agenda

- Who is Nasdaq
- Agent of Change
- Case Study: Index Licensing Billing
- How Audit Transformed the Business through Analytics
- How Your Internal Audit Team can be Change Agents

# Nasdaq...More than a Stock Exchange

## Corporate Overview

- Multiple exchanges and clearing houses, domestic and international
- Listing venue for publicly traded companies
- Multiple asset classes (equities, options, commodities)

## Corporate Solutions

- Investor Relations, Public Relations, Governance

## Market Technology

- Trading and Data Solutions to Exchanges, alternative-trading venues, banks and securities brokers

# Nasdaq...More than a Stock Exchange

## **Global Information Services (GIS)**

- Data Products
- Global Index Licensing

## **Internal Audit Team**

- 22 world wide
- New York, Maryland, Philadelphia, Stockholm, Vilnius

## **Analytic Tools include**

- IDEA Data Analysis Software
- Varonis
- RedSeal
- Bwise GRC

# Case Study: Global Information Services

## Data Products

- Sells and distributes historical and real-time quote and trade information to retail online brokers, proprietary trading shops, other venues, internet portals and data distributors
- Our data products enhance transparency of market activity within our exchanges and provide critical information to professional and nonprofessional investors globally

# Case Study: Global Information Services Index Licensing



- <https://www.youtube.com/watch?v=jDMfgxlg9wg>

# Case Study: Index Licensing

## Index Licensing and Services

- Index provider that develops and licenses Nasdaq branded indexes, associated derivatives and financial products
- As of December 31, 2017
  - 324 ETPs licensed to Nasdaq's indexes
  - \$167 billion of assets
  - Nasdaq-100 Index includes the Top 100 Non-Financial Securities listed on The Nasdaq Market



# Case Study: Index Licensing

## Nasdaq Global Index Family

- More than 40,000 indexes
- Global securities broken down by market segment, region, country, size and sector
- Nasdaq Global Index Family covers 45 countries and approximately 9,000 securities

## Dorsey Wright Associates

- Provides model-based strategies and analysis to support the financial advisor community

# Who are Change Agents?

## Change Agents

- People who look to change elements of their work place before problems occur
- Auditors tend not to embrace change

## The opposite:

- Things done the same way because that is they way we have always done it
- Change is not looked at as different but as dangerous

# Internal Auditors: Change Agents ?

- Internal Auditors believe their job is to audit an area, issue a report, follow up on issues in the future
- Do more than provide observations and recommendations, but to help facilitate positive changes to enhance the organization
- Recognize what works now will not always work tomorrow
- Understand implementing meaningful change can be difficult

# Project Scope – IA Focus

- Index Licensing invoice calculation and billing processes are accurately calculated, recognized and paid

At the time of the audit (2016)

- 261 Index Licensing customers
- Index Licensing Fees and Index Calculation Services revenue: \$90 Million

# Case Study: Index Licensing Billing Project Background

There are 5 different types of licenses

- Blanket License
- Blanket-per-Issuance License
- Index Services License
- License for Asset-Based Products
- Index Services License

# Case Study: Index Licensing Billing Project Background

## Billing calculations

- Entered into licensee's file maintained as Excel spreadsheets
- Submitted to the Billing Information Systems team (BIS)
- Reviewed and approved for processing

# Why Nasdaq uses Data Analytics

- Easy to view multiple data sets
- Able to uncover secrets hidden in data faster and reliably
- Able to provide a view of the data to the business
- Ideal for data discovery and visualization

# Internal Audit Analytics: Data Analysis Tool

## Evaluated Product Master Database

- Determine which did not have billings associated over a 2-year period
- Over 15% were identified

## Summary of the root causes

- Database reflected incorrect billing status or missing billing records
- Operations could not determine billing status, needed additional research
- Insufficient information from Sales
- Assets Under Management (AUM) never received
- Invoices missed



# Internal Audit's Use of Data Analytics

27 records invoiced had an agreement status of terminated

## Root Causes

- Master database reflected incorrect agreement status
  - Status should be active
- Operations cannot determine the status
  - Needs to research further

# Internal Audit's Use of Data Analytics

Analytics led to the following Observations

- Inconsistent customer, contract and product setup
  - impacted billing calculations, accruals, commissions, invoicing status and forecasts
- Ineffective monitoring, reporting, escalation of invoicing status and issues
- Excessively manual licensing fee calculation and billing process

# So What did the business do....

- **Controls Initiated**
  - Billing Pre-check, Post-check, Gaps
  - Audit Self-Service Function
  - Invoice Payments against Accounts Rec.
  - Metric Dashboards

# Audit Transforms Index Licensing Business Billing

- Data Quality – Product and Master Agreement Setup
- Data Quality – Invoice and Billing Gaps
- Database Reconciliation
  - Product Master → Billing → General Ledger

# Data Quality: Product Data Integrity

Issue	Analytics
Agreements without Products	List of Agreements with no products associated
Missing Contact Name or Phone Number or Email	List of Products Data with missing contact name or phone number or email
Products without Countries	List of Products with no country
Active Products with old Termination Date	List of Products with Product Status as Active and Termination Date is less than today

# Data Quality: Invoice Integrity

Issue	Analytics
No Invoices generated	Products with no billing data available
Fee Structure to Billing Month Discrepancies	List of Products with Product Fee Structure mismatch with Product Billing Month
Invoices are generated with no Amortization Dates	Billing Data has no Amortization Dates
Amortization Start Date greater than End Date	Billing Records has Amortization Start Date greater than Amortization End Date
Billings Gaps	Monthly, Semi-Annual, Quarterly, Annual

# Data Quality: Invoice Integrity

Issue	Analytics
Billing Month does not match Amortization Period for Semi-Annual Fees	Amortization Start Date → First day of Period Amortization End Date → Last date of Period Duration between Start & End Date → 182 & 184 days
Invalid Billing Date or Invalid Amortization Duration	List of records with Amortization End Date is greater than Invoice Date
Billing Month does not match Amortization Period for Monthly Fees	Amortization Start Date → First day of month Amortization End Date → Last day of month Duration between Start & End Date → 28-31 days

# Data Quality: Invoice Integrity

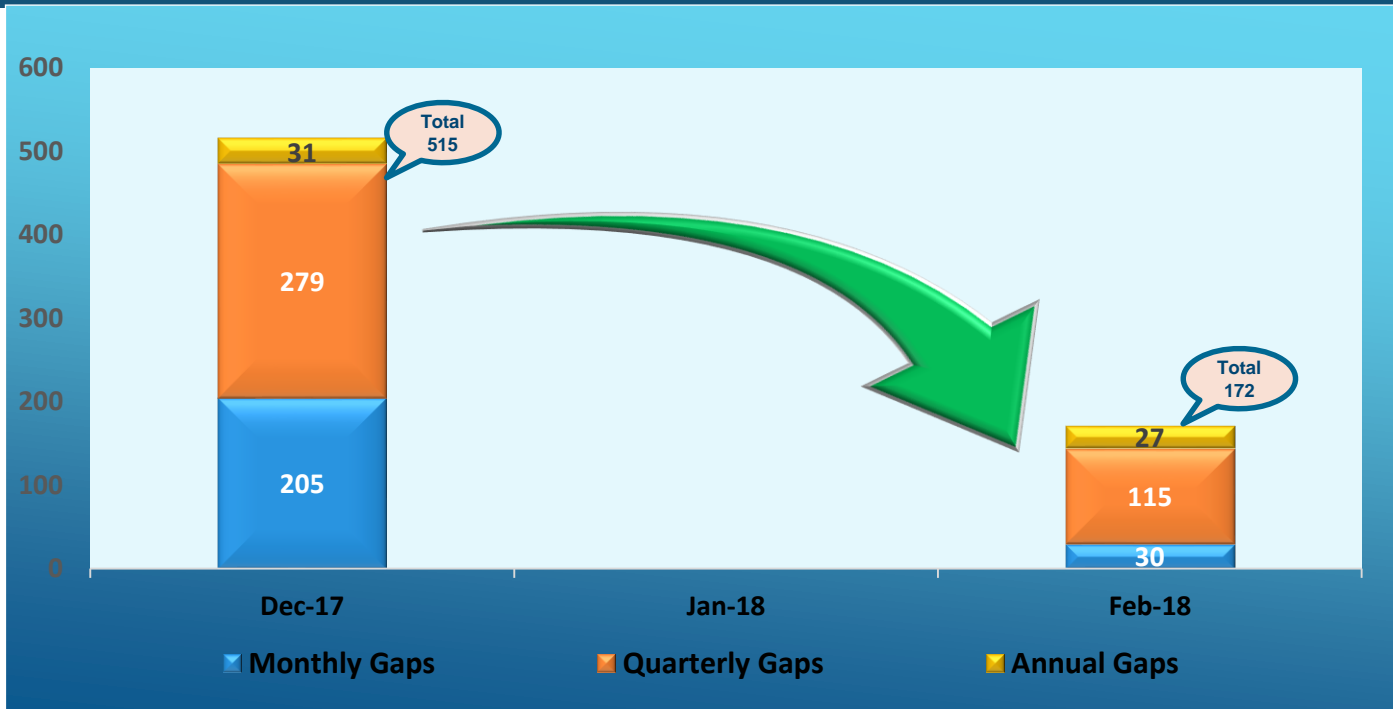
Issue	Analytics
Product Fee Structure (Product) vs. Period Covered (Billing)	List of Billing records with Product Fee Structure from product data mismatched to Period Covered in Billing Data. i.e., Product Fee Structure = "Quarterly" or "Annual Quarterly" should have Period Covered as "Q1", "Q2", "Q3", "Q4".
Billing Month doesn't match Amortization Period for Quarterly Fees	Amortization Start Date → First day of the Quarter Amortization End Date → Last date of the Quarter. Duration between Amortization Start Date & End date should be Between 90 to 92 days.
Billing Month doesn't match Amortization Period for Annual Fees	Amortization Start Date → First day of the Year Amortization End Date → Last date of the Year Duration between Amortization start date & End date should be 365/366 days



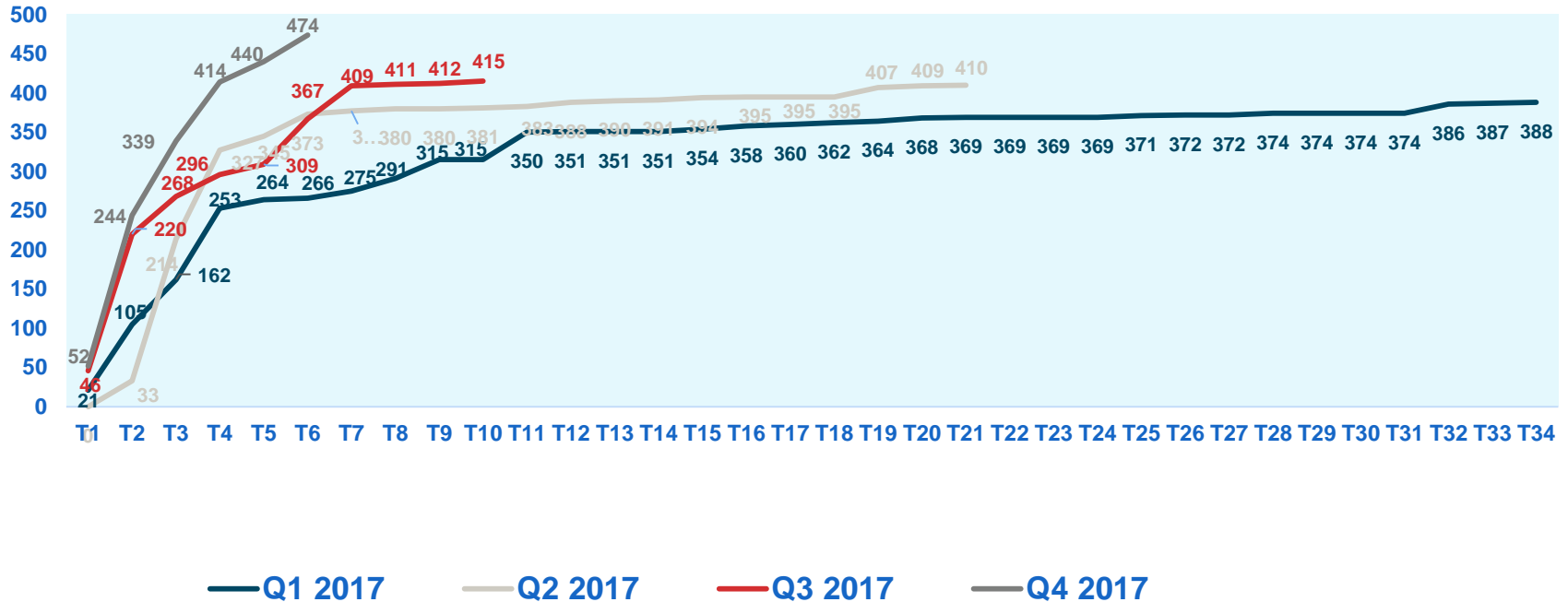
# Database Reconciliation

Issue	Analytics
Invoice Dates Mismatch	List of billing records with Invoice date/Target invoice date mismatched with BIS Invoice date
Merlin Missing Records	List of Billing records but missing from master database
BIS Missing Records	List of Invoice records that are in Merlin but missing from billing
PeopleSoft AR Missing Invoices that BIS has	BIS invoices are missing in PeopleSoft AR
BIS Missing Invoices that PeopleSoft AR has	BIS invoices are missing in PeopleSoft AR
BIS Missing Invoices that PeopleSoft AR has	PeopleSoft invoices are missing in BIS
Payment Received	Master Billing records are mapped to PeopleSoft AR through BIS to get Payment Date for received payment
Payment not Received	Master Billing records are mapped to BIS invoices, for which no payment recorded in PeopleSoft

# Billing Gap Improvement (Missing Invoices)



# Time to Complete Billing – Greatly Improved



# Market Data Audit Usage Reconciliations

- Market Data Policy requires customers submit monthly usage report for certain products
- Monthly Summary Usage Report helps Nasdaq understand and monitor how customers consume and distribute
- IDEA Software has helped with:
  - Reconciliation of usage reports over a 3-year period
  - Allowed for automated reconciliation of unstructured data to be transformed into meaningful information for Market Data Audits

# Audit Usage Reconciliation –Before Analytics

- User activity needs to be compared against what customers reported

Location	User ID	Name	Count	Product ID	Product	Activation	Deactivation
HK_PROD	johns	John S.	1	INDNA2	NASDAQ INDICES - INTERNET CLIENTS	1/22/2016	6/29/2016
HK_PROD	marys	Mary S.	1	INDNA2	NASDAQ INDICES - INTERNET CLIENTS	8/12/2013	8/27/2014
HK_PROD	seans	Sean S.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/25/2016	8/15/2016
HK_PROD	jessicas	Jessica K.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/25/2016	4/28/2016
HK_PROD	peters	Peter R.	1	NAF	NASDAQ US GIDS INDEX DELAYED	5/9/2016	--
HK_PROD	margots	Margot T.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/28/2016	
HK_PROD	pauls	Paul K.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/27/2016	
HK_PROD	jennifers	Jennifer T.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/25/2016	
HK_PROD	tammys	Tammy Y.	1	NAF	NASDAQ US GIDS INDEX DELAYED	5/27/2016	
HK_PROD	pablos	Pablo B.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/27/2016	
HK_PROD	davids	David R.	1	NAF	NASDAQ US GIDS INDEX DELAYED	5/25/2016	
HK_PROD	patrick	Patrick W.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/25/2016	
HK_PROD	camerons	Cameron D.	1	NAF	NASDAQ US GIDS INDEX DELAYED	4/25/2016	
HK_PROD	richards	Richard L.	1	NAF	NASDAQ US GIDS INDEX DELAYED	10/15/2015	

# Audit Usage Reconciliation - After

Using data analytics, the Audit team was able to establish rules and criteria for an automated reconciliation

- Reduces the Audit Review of the report from weeks to seconds
- Transforms the messiness of the data into a meaningful summary

LOCATION	Example Total Counts Customer Report	Example Total Counts Usage Report	PRODUCT	DATE
HK_PROD	8	10	NAF	200804
HK_PROD	7	8	NAF	200805
HK_PROD	5	6	NAF	200806
HK_PROD	9	10	NAF	200807
HK_PROD	5	10	NAF	200808
HK_PROD	4	9	NAF	200809

# Benefits Realized

- Add lost revenue
- Reduce lost revenue upfront
- Places responsibility on customers for audit
  - Lets them know company has controls to catch under reporting
- Automates auditors role that saves time

# How Your Internal Audit Team Can Be Change Agents





# How Your Internal Audit Team Can Be Change Agents



Think outside the box

# How Your Internal Audit Team Can Be Change Agents

Recognize data analytics are not a magic wand

“If you do not know where you are going, any road will get you there.”

Lewis Carroll  
(Alice In Wonderland)

# How Your Internal Audit Team Can Be Change Agents

## Build Relationships

- Take them behind the scenes of your audit
- Show them the tools of the trade
- Establish a partnership
- Understand audit analytic tools are not just for auditors
- Explain how audit analytics provides them insight into their own data

# Analytical Tools Can be “Productionalized”

- Audit analytics tools can be a great temporary solution in prototyping new systems (i.e. billing systems)
- Rapid implementation and cost effective
- Can lead to more full scale systems down the road
- Often companies will just stay with the audit analytic tool since it works

# How Internal Audit Team Can Be Change Agents

## Our value as Change Agents

Internal Audit starts the change process through an audit

The business will finish it when they can incorporate what Internal Audit started into its mainstream operations



# Thank You!

## Questions?

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