Deloitte.

New England Healthcare Internal Auditors (NEHIA) and Healthcare Financial Management Association (HFMA) – Healthcare Internal Audit Data Analytics

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1

Table of Contents

A. Digital Transformation in Healthcare

B. IA 4.0 & Digital Internal Audit

C. Industry Agnostic Solutions

D. Healthcare Specific Analytics

E. Q&A

1

Inflation and Affordability

Digital **Transformation**

Data as a **Strategic Asset**

Shrinking M**argins**

Humanity, ESG & DEI now at the center

New **Payment Models** and alternative sites of care

Health being **redefined** for all audiences

Factors that are likely to influence hospitals, health systems, and health plans in the years ahead

Disruption creates new opportunities. Within this rapidly shifting landscape, leading organizations are harnessing analytics to delight customers, reinvent their operations, and spark differentiated business

3

Internal Audit 4.0

Purpose driven, digitally powered

What's new?

Purpose	Purpose	Vision	Strategy

Remit — *High impact areas of focus*

Assure
- Core processes
- Greatest risks
- Decision governance
- Change risk
- Behaviors
- Second line functions
- Digital technologies

Advise
- Risk & assurance strategy
- External & leading practice

Anticipate
- Emerging & dynamic risk

Accelerate
- Organizational learning
- Management action

CORE OPERATING SYSTEM
- Position & organization
- Process & technology
- People & knowledge
- Performance & communication

Agile | Mindset | Digital

Starts with purpose
aligning Internal Audit's role and remit with the organization's purpose, a new orientation for many functions

Challenges Internal Audit functions to add Accelerate
(a fourth "A") to the remit to support organizational learning and management action in ways that match today's pace of change

Fully embraces the use of digital technologies across the lifecycle
To help drive insights, collaboration, quality and productivity

Promotes a continuous improvement mindset
that enables agility and digitalization through encouraging purposeful and structured focus on incremental improvement

Outlines the key principles and building blocks
that functions need to consider as they design, build, and evolve their operating models

2

4

Digital Internal Audit Megatrends

Dynamic Risk Assessment

Dynamic Annual Planning
Combines quantitative KRIs, qualitative interview insights and experienced auditor inputs

Intelligent Interview Analysis
Dynamically captures and analyzes interview notes using Machine Learning

Continuous Risk Assessment
Provides a "live" Risk Sensing aspect to the Annual Planning process

Modernized Professional Practices

Past Audit Insights
Delivers insights from past audit findings

Risk Focus Guidance
Delivers enhanced levels of advice around areas with greatest risk

High-Impact Reporting
Produces modern, high-impact reporting

Digital Skills Training
Serves as a catalyst for skills training across risk functions

Digitized Audit Execution

Agile IA
Provides a framework and process for moving into an outcome-driven, iterative, transparent Agile IA process

Assurance by Design
Goes beyond pre-implementation reviews to support the goals of real-time assurance and reporting

Self-Service Analytics
Offers auditors the ability to digitally request and receive audit support analytics

Platforming and Tech Enablement

Integrated Data Platform
Establishes a backbone of data, technology and tools that allows for rapid development, deployment and support of auditor focused capabilities

Controls Testing Automation
Automates the manual activities associated with controls testing

Continuous Monitoring
Provides continuous insights to the 2nd & 3rd Line of Defense

Workforce of the Future

Purple People
Increases the number of people with a mix of business (red) and technology (blue) skills

Digital and Human Workgroups
Normalizes the use of automated activities being in conjunction with human decision making

Flexible Staffing Models
Leverages a mix of third-party staffing "pods" and traditional teams

5

Digital Techniques

Digital is much broader than just a function's use of analytics to support audit delivery. Digital is how an internal audit function leverages and applies the capabilities which technology can unlock across the function's ways of working. Example and common capabilities for internal audit can include...

VISUALISATION	DATA ANALYTICS	AUTOMATION	ARTIFICIAL INTELLIGENCE
• Insight Generation	• Key Risk Indicator Analysis	• Data Gathering	• Predictive / emerging risk analysis
• High Impact Reporting	• Audit Planning	• Continuous KRI Monitoring	• Pre-population of audit work programmes
• Risk and Audit Universe	• Hypothesis/Outcome Testing	• Continuous Auditing	• In-audit suggestions on audit file completion
• Operational Performance Monitoring	• Process Mining	• Scheduled Analytics	• Natural language processing
• Follow-up Reporting	• Specific Risk Test Scripts	• Automatic Workpaper	• Sentiment analysis
...	• Controls Testing	• Workflow Management	...
	• Resource Modelling	• Automatic Report Preparation	
	• Outlier Detection	...	
	...		

6

3

Our Approach for Building Analytics Solutions

Using a collaborative approach, we develop data driven solutions that provides a deeper understanding of the data, helps to identify insights, gaps, outliers and trends and make more informed risk management decisions.

Our Approach

Develop Hypothesis	Build and Refine Solutions	Operationalize and Enhance
Develop data analytics hypothesis	**Build analytics solutions to test the hypothesis and visualize the results**	**Using insights generated to improve performance**
It all starts with a hypothesis.	Identify data requirements, including tables and fields from various data sources for the analysis	Operationalize the analytics package and help to understand the data and insights generated from the solution
Work together with client to identify risk-based hypotheses and known business issues that can benefit from the insights gained from leveraging data analytics solutions.	Develop analytics and machine learning models that will test the hypotheses and refine the models based on feedback from the IA team and client.	Work with client teams to update the analytics logic, enhance the machine learning model, and the reporting layer when business requirements change

Tech Architecture & Solutions
Are you optimised to deliver impact?

Risk Assessment		Planning		Fieldwork		Reporting		Monitor / Track	
Key Risk Indicator (KRI) Development	Dynamic Annual Planning	Risk Focus Guidance	Flexible Staffing Models	Self-Service Analytics	Controls Testing Automation	High-Impact Reporting	Agile IA	AI for Audit Reports	High Impact Reporting
Intelligent Interview Analysis	Continuous Risk Assessment	Assurance by Design	Purple People	Integrated Data Platform	Continuous Monitoring	Generative AI Reporting			
				Digital Investigation Analytics	Digital and Human Workgroups				

Evaluating digital maturity capabilities

The 9 domains from the IDO framework are measured against 4 criteria (initial, developing, mature, advanced) to assess the Global and US IA DA teams' current and future maturity level and identify where opportunities exist to propel to a desired future state.
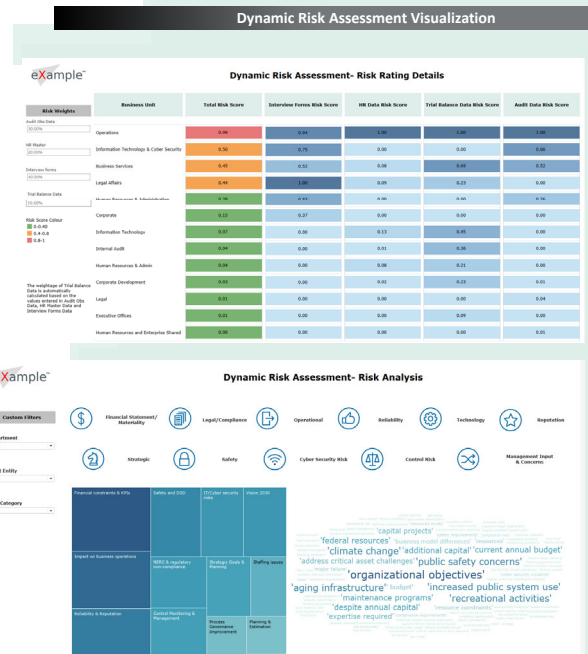
1 Initial

People – Analytics team is part-time. Small number of pilots. Most auditors have no experience with analytics; training is limited.

Process – Minimal cooperation across the enterprise. IA methodology does not mention analytics. Analytics resources engage during fieldwork.

Data and Technology - Testing and results are delivered in Excel spreadsheet format.

2 Developing

People - CAE sees Analytics as important; KPIs are employed. A training budget exists.

Process - IA has representation within organization. The IA methodology integrates analytics. Analytics standards for quality control and deliverables are sparse.

Data and Technology - Risk scoring models are paired with basic data visualization capabilities. The majority of work performed is script based.

3 Mature

People - Business and IT auditors have strong data skills and rely on a central analytics team for heavy lifting. Quantitative/data science skills are represented on the team with a strong commitment to training.

Process - Analytics support the full audit lifecycle. IT supports infrastructure and data. Strong workflow and PMO

Data and Technology - Advanced analytics techniques, including predictive models, network analysis, unsupervised techniques and advanced visualization. Access to common systems has been established.

4 Advanced

People - Risk assessment and audit execution are largely driven by analytics. Auditors have access to integrated tools and systems to support their mission. Training is tied to performance goals.

Process - The IA analytics team employs leading practices from various disciplines (such as software development). Workflows for audit work are fully integrated with analytics activities.

Data and Technology - Cognitive capabilities and RPA. Auditors rely heavily on results to drive planning and scoping activities.

| Assurance | Insight (+) | Efficiency (++) | Impact (+++) |

9

Dynamic Risk Assessment (DRA)

Background

- DRA refers to the use of automated techniques to provide for the continuous monitoring of business operations, functions and processes.

- It is equally referred to as Continuous Business Monitoring, Risk Sensing, or Continuous Risk Assessment.

- DRA provides new insights to risk professionals and new alternatives on how to respond.

- DRA transforms the annual planning or annual risk assessment by taking manual, fragmented, often unrepeatable, or largely gut instinct approaches and provides repeatable, standardized tools and methods to allow for continuous monitoring of risk and adjustment to audit plan.
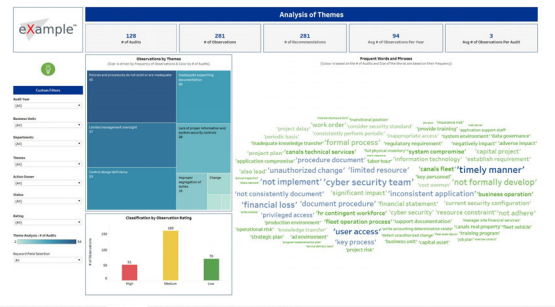

Dynamic Risk Assessment Visualization

5

10

Dynamic Risk Assessment (DRA) – Interview Template

11

Dynamic Risk Assessment (DRA)

12

Dynamic Risk Assessment (DRA)

eXample™

Dynamic Risk Assessment- Risk Rating Details

Risk Weights	Business Unit	Total Risk Score	Interview Forms Risk Score	HR Data Risk Score	Trial Balance Data Risk Score	Audit Data Risk Score
Audit Obs Data **30.00%**	Operations	0.98	0.94	1.00	1.00	1.00
HR Master **20.00%**	Information Technology & Cyber Security	0.50	0.75	0.00	0.00	0.66
Interview forms **40.00%**	Business Services	0.45	0.52	0.08	0.69	0.52
Trial Balance Data **10.00%**	Legal Affairs	0.44	1.00	0.09	0.23	0.00
	Human Resources & Administration	0.29	0.53	0.00	0.00	0.26
Risk Score Colour ■ 0-0.40 ■ 0.4-0.8 ■ 0.8-1	Corporate	0.15	0.37	0.00	0.00	0.00
	Information Technology	0.07	0.00	0.13	0.45	0.00
	Internal Audit	0.04	0.00	0.01	0.36	0.00
	Human Resources & Admin	0.04	0.00	0.08	0.21	0.00
The weightage of Trial Balance Data is automatically calculated based on the values entered in Audit Obs Data, HR Master Data and Interview Forms Data	Corporate Development	0.03	0.00	0.02	0.23	0.01
	Legal	0.01	0.00	0.00	0.00	0.04
	Executive Offices	0.01	0.00	0.00	0.09	0.00
	Human Resources and Enterprise Shared	0.00	0.00	0.00	0.00	0.01

13

Assurance Mapping

Assurance mapping is designed to provide a high-level overview of where the various risk universe components map to corresponding assurance activities undertaken to monitor and mitigate those risks, including recency and period coverage of the assurance activities. This activity also has capabilities to incorporate competitor risk inputs, providing a readymade benchmarking exercise

14

14

7

AI for Audit Reports

Background

- Deloitte designed an audit report analytics framework leveraging machine learning and natural language processing, that analyzed the audit reports and provided insights through a dashboard.

- The insights driven out of the framework provided useful information on the key themes and patterns and whether the audits provided sufficient coverage. The analysis identified weaknesses during audits and if these weaknesses were reduced to over time.

- The objective was to ensure that audit plans were designed to gain insights from the audit practice without having to go through hundreds of historic audit reports and to prioritize risks and audit areas of interest.

15
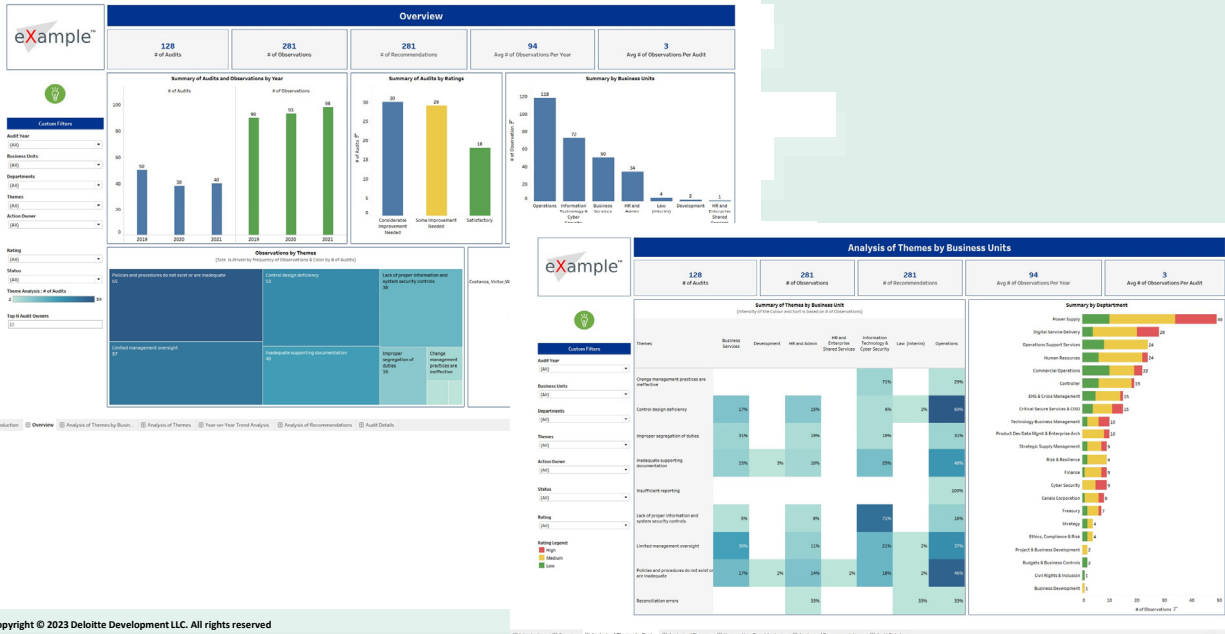
AI for Audit Reports

16

AI for Audit Reports

17

Healthcare Specific Analytics

Compliance

- Drug Diversion/ Control Substance Analysis
- Short Stays Analytics
- Claims Denial Analysis
- Compliance to Opioid Prescribing Practices
- Healthcare Pricing Transparency
- Customer Billing Compliance
- HRSA Payment Compliance Analysis
- HIPAA Data Privacy Analysis

Process Optimization

- Revenue cash claims for 837 and 835
- Float pool/Travel Nurse analysis
- Caregiver Offboarding Analytics
- Agency Audit Fees Analysis
- Remittance Denials Management
- Physician Analysis
- Physician / Nurse Overtime Analysis

AI in Healthcare

- 340B Insight Reporting

Ready to Deploy solution   Customizable solution   AI based solution

9
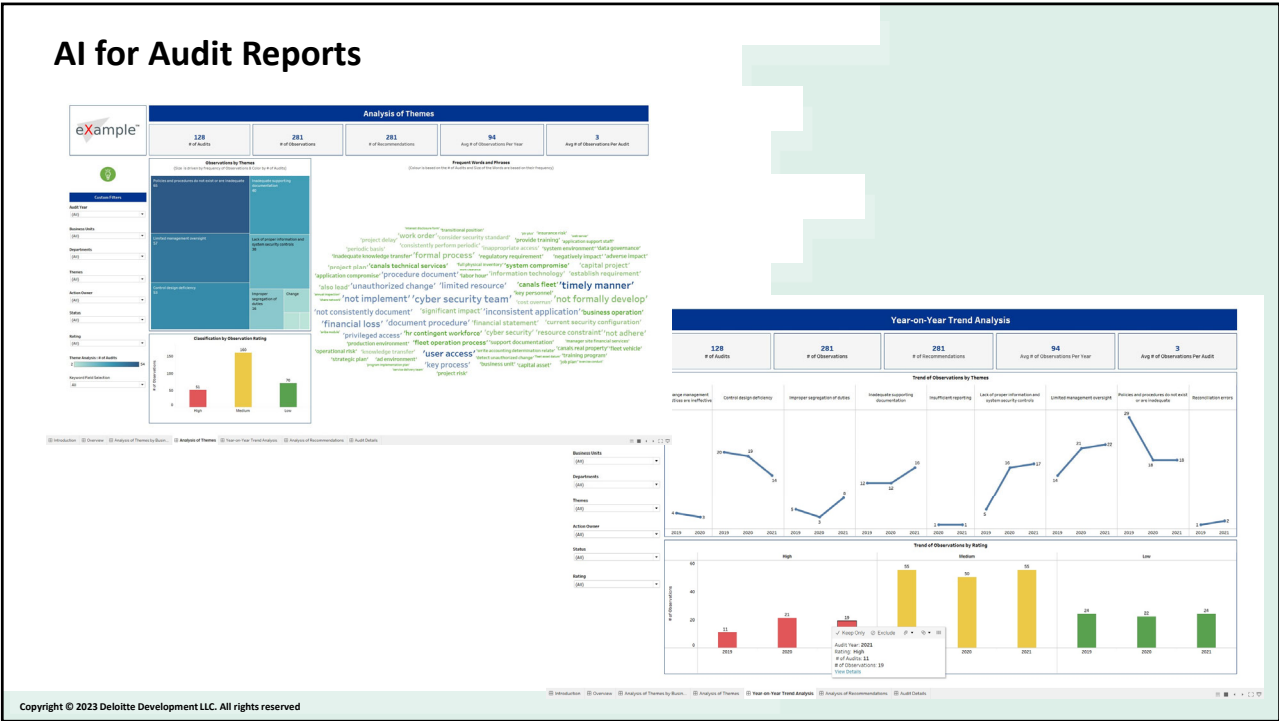
18

340B Audit Insight Reporting

Background

- HRSA's 340B Program audit reviews the manufacturer's compliance with 340B Program requirements with respect to eligibility status, including compliance with 340B Program requirements and the determination that the manufacturer provided 340B drugs at or below the 340B ceiling price to covered entities/hospitals.

- To meet the set-out objectives, the leadership needs to have a transparent and rigorous oversight of how the audits are going and overall pulse of the issues arising from them.

- Deloitte Designed and developed a solution that **analyzes hundreds of 340B audit reports leveraging machine learning and natural language processing and** uses advanced algorithms to extract key themes and patterns.

### 340B Insight Reporting Visualizations

The visualization provides an overview of the audits that were performed, the regions and hospitals getting audited, and the issues and recommendations extracted.
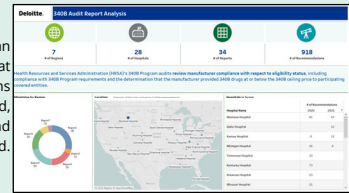
The thematic analysis of the data helps to identify the key issues and recurring observations from the audits. A crisp view to showcase the themes to leadership.

The key issues identified enables us to discover the trends and patterns hidden in the data

19
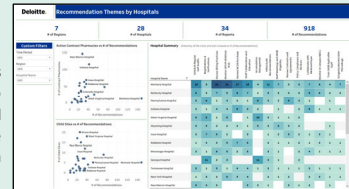

Compliance to Opioid Prescribing Practices

Background

- This analysis transforms Opioid risk management process by leveraging the prescription data from the EMR systems to assist in monitoring risks.

- Failure to properly monitor opioid prescribing practices can result in harm to the public and poses significant financial & compliance risk to the organization.

- The dashboard provides analytical insights around opioid prescriptions, enabling identification of high-risk entities in terms of providers & patients. An MME (Morphine Milligram Equivalent) was calculated for each opioid prescription & then used as a primary basis to analyze all the opioid prescriptions within the scope period.

### Opioid Prescribing Practices Visualizations

Provider Analysis identifies misuse of power to prescribe opioids, summarizes prescriptions by encounter type or provider specialty to identify outliers & looks for time trends through prescriptions
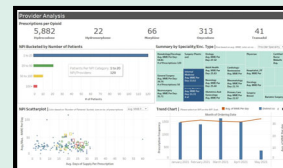
Patient analysis identifies set of patients at high risk based on age factor or who are getting opioid prescriptions written from multiple providers and/or for multiple medical descriptions

Provider patient analysis identifies cases of providers & patients colluding to misuse opioid prescriptions.

10

20
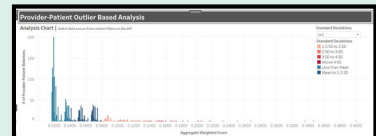
Control Substance Analysis / Drug Diversion

Background

- Pharmacy requested the drug diversion analysis for defined scope period. Deloitte assisted to perform a reconciliation of drugs purchased and subsequently dispensed for the Retail Pharmacy at Hospital.

- Objective is to review and quantify the suspected diversion between the purchased amounts and dispensed amounts identified in QS1.

- Assisted in finding missing quantities of various drugs accounting to (~60,000 units).

- Validated data on diversion which gained local law enforcement and DEA confidence with the Pharmacy operations.

Drug Diversion Output

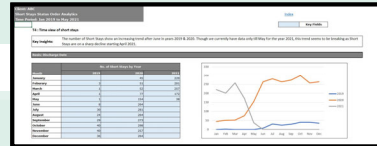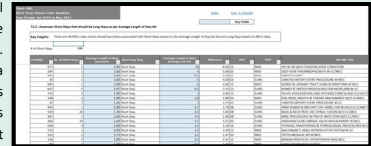| Drug Description	Calculated Discrepancy
Drug 1	490
Drug 2	430
Drug 3	350
Drug 4	280
Drug 5	256
Drug 6	246
Drug 7	233
Drug 8	233
Drug 9	161
Drug 10	148
Drug 11	120
Drug 12	110
Drug 13	104
Drug 14	102
Drug 15	100

Short Stays Analytics

Background

- Objective is to achieve optimal balance of patient placement and ensure accurate use of condition codes to optimize patient care quality, coding and billing excellence, and improved revenue while protecting from and preparing for regulatory audits and enforcement actions.

- Short stays related test analytics were ran on client's in-scope data. The solution can be easily deployed in any client environment and the data update process can be designed to be highly automated.

- Provide guidance on where to deploy limited resources for the greatest impact or risk mitigation through trend analysis and the ability to filter on clinical area, facilities and timeframe, thus promoting data-driven decision making.

Short Stays Analytics Outputs

Identification of OP claims with Surgical or Medical DRGs that would typically be expected to be inpatient procedures. Higher occurrence will point out to a potential financial opportunity as well as be indicative of issues with status assignment

Further visuals were developed to uncover increasing trend of Short Stays in particular months over multiple years

Profiling the outlier OP claims to identify trends by hospital, location, department, DRGs

11

Float Pool / Travel Nurse Analysis

Background

- A float pool nurse is available on an impromptu basis and may work in different departments over the course of the year depending on scheduling needs and are intended to support the health system during contingencies. Due to the nature of their work, float pool nurses receive a higher rate than full time regularly scheduled nurses.

- The client wanted to get insights into the data and identify trends that would allow them to strategically examine and deal with any odd events involving the scheduling of float pool nurses, the usage of overtime, etc.

- Deloitte designed and created a solution to assess **pool nurses' shifts leveraging overtime and frequency analysis**. The analysis gives a timeline of the nurses' time usage tendencies.

Float Pool / Travel Nurse Analysis Visualizations

The visualization provides an overview statistics for individual nurses . Additionally, it shows the disparity between the charged and real hours..

The frequency analysis of the data aids to identify the key issues. Spending 75% time for the entire year concentrating on only one department. Additionally shows instance of charging the float pool time to the home department

The key issues identified enables us to discover the trends and patterns hidden in the data

23

Revenue cycle cash claims analysis for 837 and 835

Background

- The goal of this analysis was to perform a reconciliation exercise on the claims data due to suspicion of unaccounted variances between the claim and payment amounts. Deloitte was asked to analyze the following reports:
    - 837 Reports - Sent by healthcare service provider to payer to provide claim billing information
    - 835 Reports- Electronic transaction sent by the payer to the bank that provides claim payment information

- Utilized scripts to extract and transform the hundreds of text files received containing the report information into a readable format that could be analyzed. Built an automated workflow to execute the import and export of the data to the reconciliation engine.

Cash Claims Reconciliation Visualizations

Observed records with unreconciled value of health claims to actual paid amount which could impact client revenues. Results were displayed in a quick summary to help visualize gaps

Further visuals were developed to understand root cause of variances and to identify specific trends, patterns and outliers from the non-reconciled claims

Visuals were also made dynamic to enable the client filter the information on multiple selections and view corresponding claim details through clicks

24

Any Questions?

25

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Neil is the Global Leader for IA Analytics and has over 26 years of experience and serves our largest national and multi-national clients through IA and data analytic services.

Neil leads our US Digital Center of Excellence (COE) for IA analytics and automation and leads large digital transformation initiatives for our clients. The Digital COE provides leading in class Digital Strategy, Data Science, Intelligent Automation, and Applications for the IA and Risk Management profession. Neil has completed a wide range of strategy and risk related projects for clients specifically assisting in the development and implementation of data analytics strategy.

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Tom has served clients across a variety of industries and has performed and led teams to perform advanced analytics over multiple business process areas (OTC, P2P, R2R, etc.), using a variety of tools and technologies such as SQL, Python, Alteryx, PowerBI, Tableau, and more. Additionally, he has helped clients automate controls testing on the 3rd LOD and develop Continuous Controls Monitoring for the 2nd and 1st LOD. Having an advanced understanding of risk and controls allows Tom to identify the best controls to target for automation, as well helping clients adapt their control designs and methodology to be more automation focused.

26

13

26

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27