The CFO's Cognitive Counterpart: Advanced Natural Language Generation

narrative science Deloitte.

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The CFO’s Cognitive Counterpart: Advanced NLG

Today’s Topics

- Trends in the Finance function to reduce the burden of data analysis and communication
- Increasing efficiency through innovative technologies, namely Advanced Natural Language Generation (NLG)
- How Deloitte is leveraging Advanced NLG internally and with clients
- Assessing your organizational readiness to adopt Advanced NLG

Housekeeping

- Send questions and comments through the Questions feature throughout the webinar
- Recording will be available after the webinar

Meet the Speakers

Ryan Kurt

narrative science

VP of Business Development

Ryan and his team work to establish strategic relationships and collaborations with global tech companies and professional services firms. In addition to working at Narrative Science, Ryan is an instructor at the Startup Institute of Chicago.

Abhay Panth

Deloitte.

Senior Manager

Abhay is a leader in Deloitte Consulting LLP's Strategy and Operations Finance Service Line serving leading companies in the Technology, Media and Telecommunications sector. He also leads Deloitte's Natural Language Generation offering for the firm as a part of the Finance in a Digital World™ portfolio.

Per Gartner, the top business processes that need technology investment for the finance function are aimed at facilitating analysis and making decisions.

Gartner Financial Executives International (FEI) CFO Technology Study

Cognitive Technologies

Robotics & Cognitive Automation

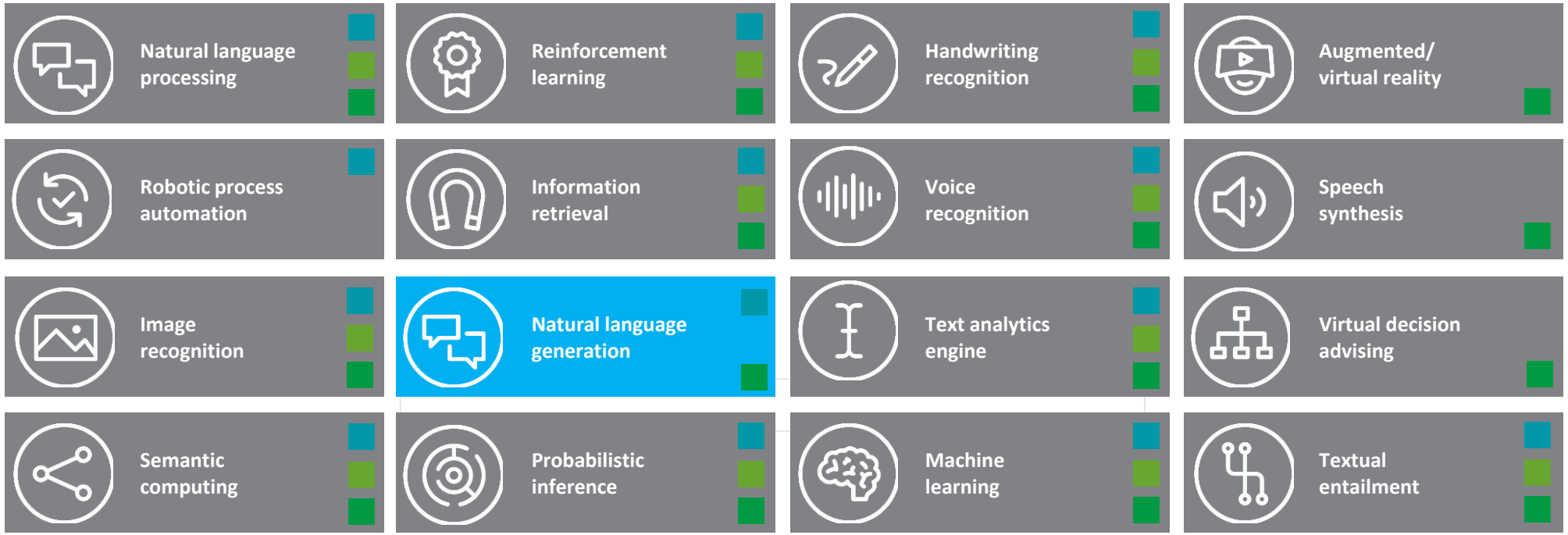
Enabling smart applications to replicate human actions and judgement with robotics and cognitive technologies

Cognitive Insights

Identifying growth, diversification and efficiency opportunities via large-scale organization intelligence platforms with pattern detection and the ability to analyze multiple data sources

Cognitive Engagement

Use of intelligent agents and avatars to deliver mass personalization at scale and smarter, more relevant insights to amplify end user experience



Natural Language Technologies in A.I.

Natural Language Understanding (NLU)

Assesses pragmatics (contextual info), semantics (meaning of words), and syntax (structural relationships among types of language elements), to understand what is talked about.

User: “Tell me the weather forecast in New York for today.”

Natural Language Processing (NLP)

Transforms language into a machine-readable format through extracting entities, tagging topics, and performing sentiment analysis.

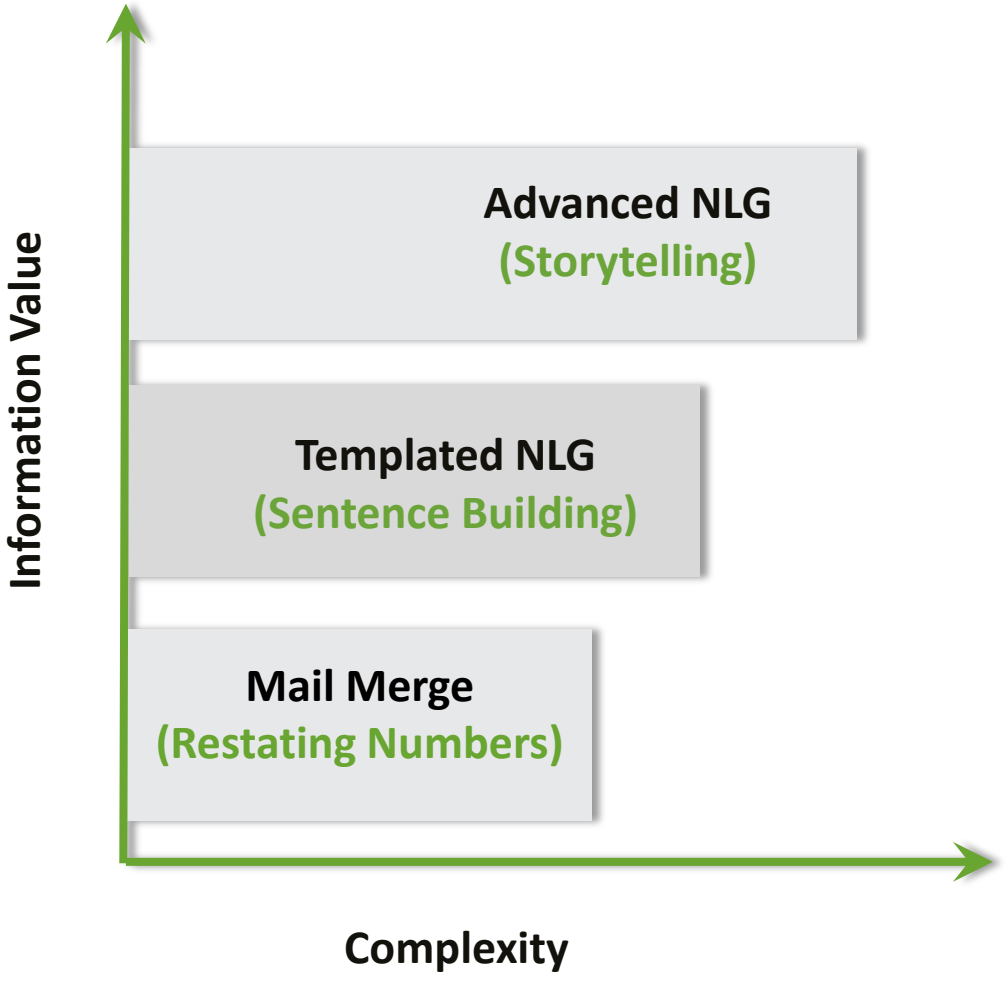
Weather is a topic that is tagged and associated with temperature and other metrics.

Natural Language Generation (NLG)

Analyzes data to identify what is important and interesting and communicates that analysis via language.

Assistant: “It’s hot -- 90 degrees and sunny. However, it’s likely to rain this afternoon. if you’re going out, bring an umbrella.”

Natural Language Generation: Not all the same

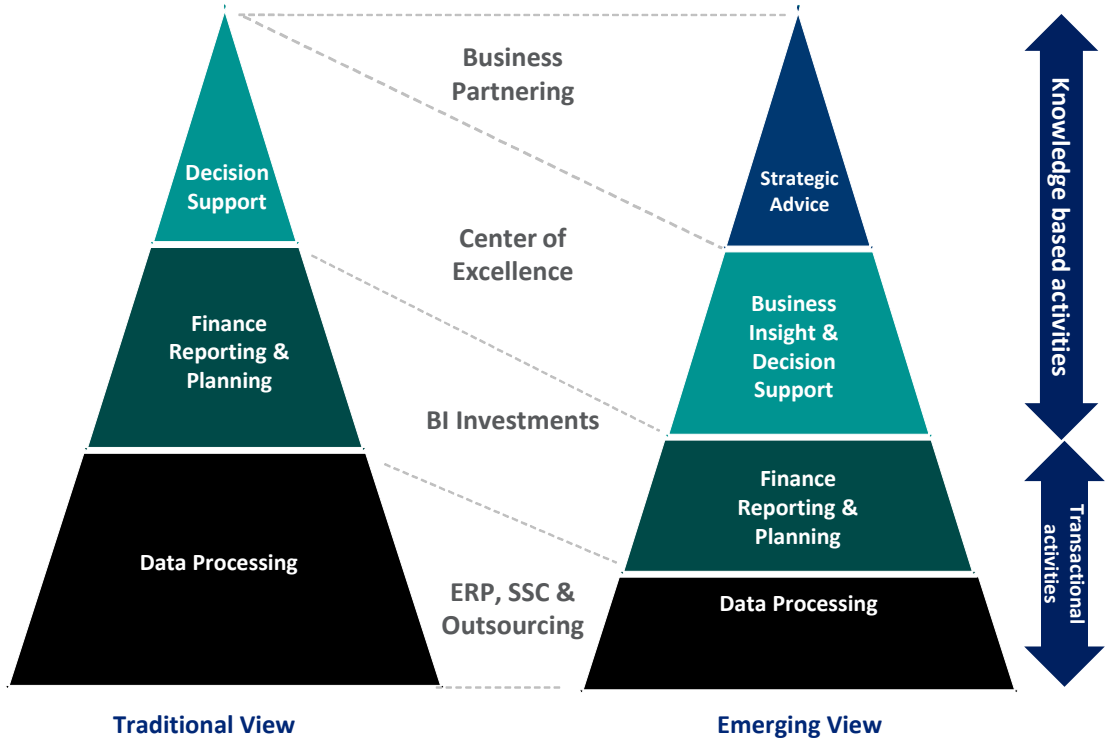


- Intelligent System
- Enterprise Grade

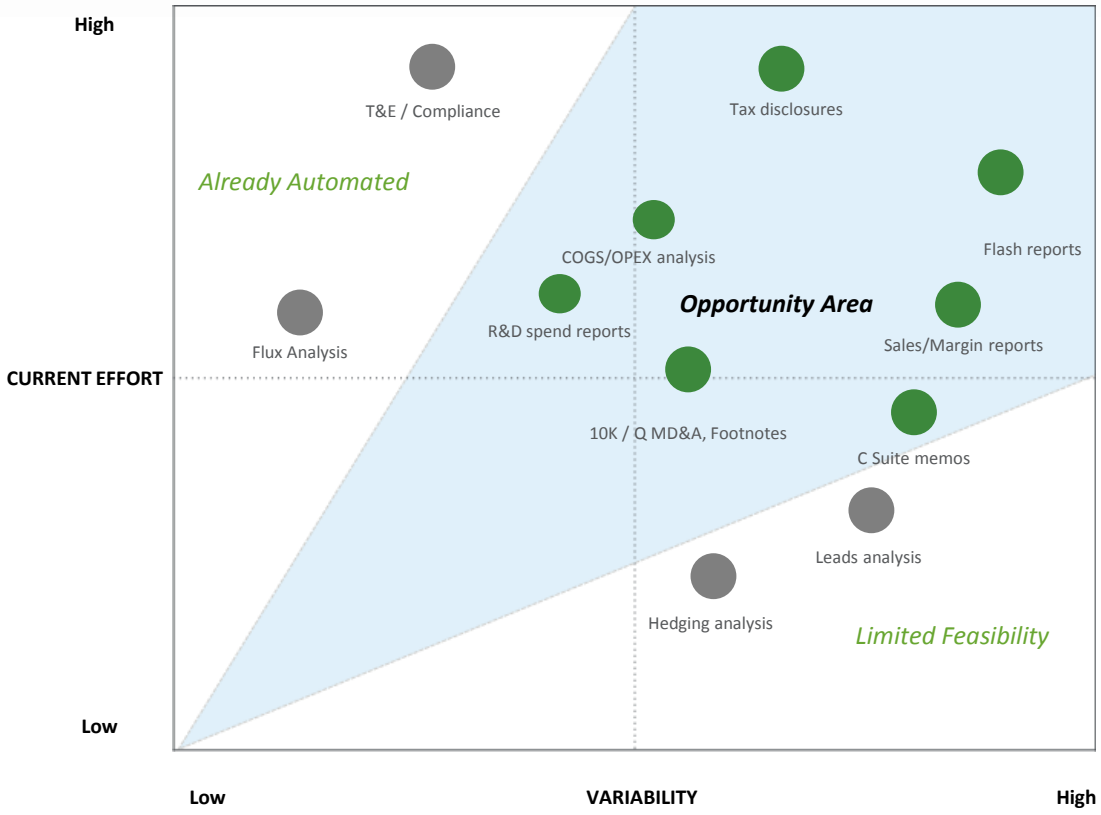
- Business Rules
- Baseline Calculations (i.e.: Sum)
- Templates

- Lite Rules (i.e.: Functions)

Applications within Finance



Note: Activities shown are meant to be indicative and are not exhaustive



Note: Activities shown are meant to be indicative and are not exhaustive

Natural Language Generation has the potential to:

- Reduce manual effort in time consuming, cyclical reports
- Perform data analyses including trends, changes, patterns, and outcomes
- Extract and incorporate insights from structured data

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Use Cases in Finance

Although historically NLG has not been used much throughout the Finance function, many companies are now considering NLG to automate their management reporting processes to drive efficiencies and reduce costs

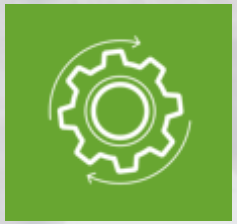
Type	FP&A	Internal Audit	Investor Relations	Treasury	Tax	Controllership	M&A	Business Partnering
Internal	▪ Flash reports ▪ Sales / margin reports (BU, product, customer, geography) ▪ Variance reporting ▪ Headcount changes ▪ KPIs ▪ Supplemental schedules	▪ Controls assessment ▪ Fraud risk assessment	▪ Changes in holdings / trading volumes	▪ Working capital requirements ▪ Cash balances / forecasting ▪ Debt obligation ▪ Hedging analysis	▪ Reserve analysis ▪ I/C Legal Agreements	▪ Monthly close reporting ▪ Cost center analysis ▪ Spend efficiency ▪ Expense monitoring ▪ Tracking # of manual journal entries	▪ Synergy tracking & reporting	▪ Clinical trial reporting ▪ Sales force analysis (profitability of products, etc.) ▪ R&D spend reports ▪ Staffing analysis ▪ Project spend reporting
External		▪ SOX compliance reporting	▪ Quarterly earnings ▪ 10K / 10Q ▪ 8K ▪ Non-financial metrics ▪ Proactive investor communication	▪ Performance of capital and risk for credit rating agencies	▪ Annual Tax Return ▪ Statutory reporting ▪ Customs reporting	▪ Real-time transaction validation ▪ Credit collection letters	▪ Synergy reporting	▪ Targeted customer communications

Opportunity areas to roll out NLG due to the frequency, high-degree of manual effort and standard nature of the reports

Case Study: Narrative Science

Automated Business Performance (or P&L) Report to show sales by state, region, and product line, each highly customized based on the respective audience.

Quill enabled the ability to report on various metrics and standardize reports across business units.



SAVE TIME

by utilizing Advanced NLG to power intelligent, data-driven communications at machine scale

SCALE THE EXPERTISE

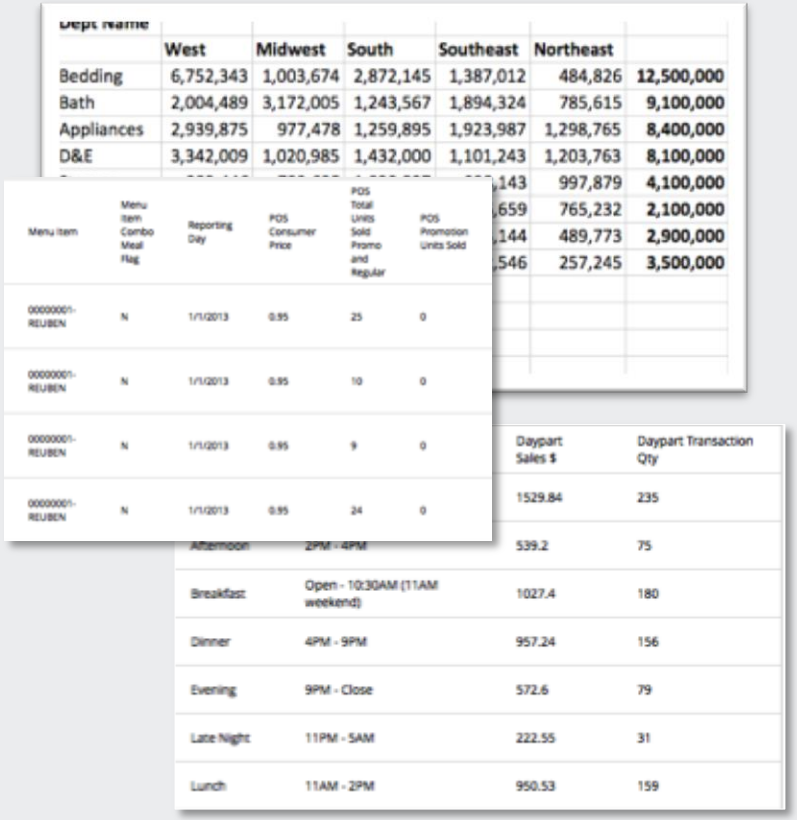
of top tier analysts by automating the identification and communication of key drivers of financial performance

DRIVE OPERATIONAL EFFICIENCY

by immediately generating comprehensive, consistent financial performance reports

Case Study: Narrative Science

Input



Dept Name	West	Midwest	South	Southeast	Northeast	
Bedding	6,752,343	1,003,674	2,872,145	1,387,012	484,826	12,500,000
Bath	2,004,489	3,172,005	1,243,567	1,894,324	785,615	9,100,000
Appliances	2,939,875	977,478	1,259,895	1,923,987	1,298,765	8,400,000
D&E	3,342,009	1,020,985	1,432,000	1,101,243	1,203,763	8,100,000
				,143	997,879	4,100,000
				,659	765,232	2,100,000
				,144	489,773	2,900,000
				,546	257,245	3,500,000

Menu Item	Menu Item Combo Meal Flag	Reporting Day	POS Consumer Price	POS Total Units Sold Promo and Regular	POS Promotion Units Sold
00000001-REUBEN	N	1/1/2013	0.95	25	0
00000001-REUBEN	N	1/1/2013	0.95	10	0
00000001-REUBEN	N	1/1/2013	0.95	9	0
00000001-REUBEN	N	1/1/2013	0.95	24	0

		Daypart Sales $	Daypart Transaction Qty
		1529.84	235
Afternoon	2PM - 4PM	539.2	75
Breakfast	Open - 10:30AM (11AM weekend)	1027.4	180
Dinner	4PM - 9PM	957.24	156
Evening	9PM - Close	572.6	79
Late Night	11PM - 5AM	222.55	31
Lunch	11AM - 2PM	950.53	159

Output

Data Points Include:

- Top & Bottom Performers
- Revenue & Profit by Product
- Regional / National Performance

Product Revenue Led by Bedding

Product-Line Report, January 2018

In-Store Sales Summary

February performance was strong with in-store sales of $50.7M across all eight product lines, 3.1% above plan. Positive results were driven by an exceptional month for Bedding, ahead of plan by 8.9% overall with sales of $12.5M, mostly driven by sales in the West region which were 12.1% above plan. However, some product lines performed far below plan. Sales of Storage were 13.7% below plan and sales of Furniture missed plan by 7.8%.

Top Performing Product Lines

Bedding was the highest performing product line. The 8.9% increase in Bedding was primarily driven by sales in the West region, with revenue above plan by 12.1% at $4.8M. Other high performing product lines were Bath, Appliances, and Dining & Entertainment:

- Bedding: $12.5M (+8.9%) led by the West region (+12.1% to plan)
- Bath: $9.1M (+5.1%) led by the Midwest region (+7.7% to plan)
- Appliances: $8.4M (+5.1%), led by the West region (+9.3%) and Southeast (+2%to plan)
- Dining & Entertainment: $8.1M (+2.3%), led by the West region (+4.3% to plan)

Bottom Performing Product Lines

Sales of Storage were down 13.7% to plan to $4.1M, driven primarily by poor sales in the South region (-15% to plan). Window Treatments generated the least sales in February, generating sales of $2.1M and missing plan by 12%.

- Storage: $4.1M (-13.7%), driven by South region (-15% to plan)
- Window Treatments: $2.1M (-12%) driven by Northeast region (-18% to plan)
- Furniture: $2.9M (-7.8%), driven by the West region region (-8% to plan)
- Lighting & Lamps: $3.5M (-6.6%), driven by the West region (-6% to plan)

Case Studies: Deloitte

Reporting Optimization

Auto-generate parts of the internal actuarial memo for audit engagement support, with the goal of reducing manual reporting, improving time-to-market, improving consistency of communication for extended adoption in client service

Deloitte.

MEMO

Date: February 12, 2018

To: The Audit File

From: John Smith — Deloitte Consulting LLP, Los Angeles — Firm Actuary'
Fiona Apple — Deloitte Consulting India Private Limited, Delhi

Subject: Summary of actuarial conclusions associated with self-insured major liability loss and loss adjustment expense reserves for 14 as of December 31, 2016

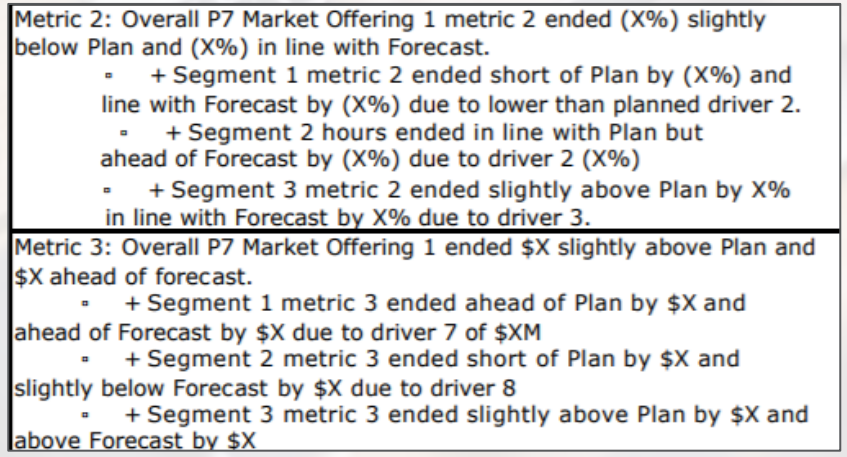
A. SCOPE

As the Firm Actuary and supporting Actuarial Team ("the Actuarial Team") participating on the audit engagement, we have performed certain procedures as documented in Form ACTSI1200A, *Actuarial Specialist Scoping Memo — Reserves for Self-Insured Risks* (the "Scoping Memo"), dated March 28, 2017, regarding self-insured major liability reserves ("Actuarial Liabilities") in connection with the nonintegrated audit of the financial statements of 14 (the "Entity") as of December 31, 2016 and for the year then ended. Reserve amounts that the Entity has recorded are "Recorded Actuarial Liabilities," and estimates of these reserves are "Estimated Actuarial Liabilities."

Estimates of the Recorded Actuarial Liabilities may be referred to as "Unpaid Claim Estimates" to be

Flash P&L Reports

Automated business-area performance reports that describe how different businesses and service lines are functioning based on revenue and costs and varied based on the reader's persona



Metric 2: Overall P7 Market Offering 1 metric 2 ended (X%) slightly below Plan and (X%) in line with Forecast.

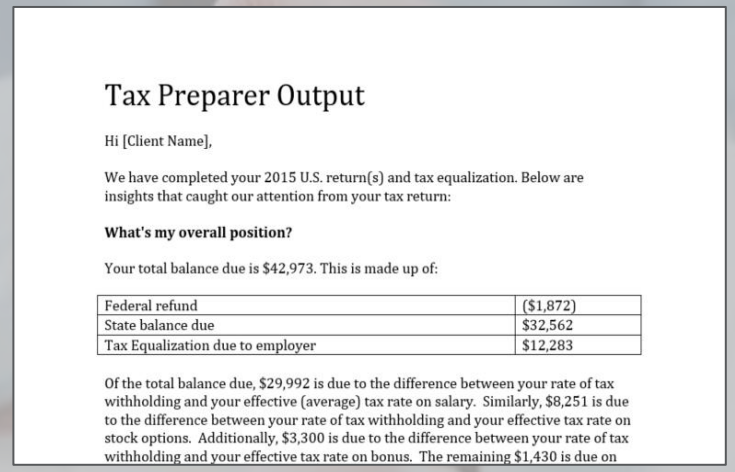
- + Segment 1 metric 2 ended short of Plan by (X%) and line with Forecast by (X%) due to lower than planned driver 2.
- + Segment 2 hours ended in line with Plan but ahead of Forecast by (X%) due to driver 2 (X%)
- + Segment 3 metric 2 ended slightly above Plan by X% in line with Forecast by X% due to driver 3.

Metric 3: Overall P7 Market Offering 1 ended $X slightly above Plan and $X ahead of forecast.

- + Segment 1 metric 3 ended ahead of Plan by $X and ahead of Forecast by $X due to driver 7 of $XM
- + Segment 2 metric 3 ended short of Plan by $X and slightly below Forecast by $X due to driver 8
- + Segment 3 metric 3 ended slightly above Plan by $X and above Forecast by $X

Syntax

Ingests a client tax return to produce a customized, actionable memo for each client, advising on leading practices for the upcoming tax year



Tax Preparer Output

Hi [Client Name],

We have completed your 2015 U.S. return(s) and tax equalization. Below are insights that caught our attention from your tax return:

What's my overall position?

Your total balance due is $42,973. This is made up of:

Federal refund	($1,872)
State balance due	$32,562
Tax Equalization due to employer	$12,283

Of the total balance due, $29,992 is due to the difference between your rate of tax withholding and your effective (average) tax rate on salary. Similarly, $8,251 is due to the difference between your rate of tax withholding and your effective tax rate on stock options. Additionally, $3,300 is due to the difference between your rate of tax withholding and your effective tax rate on bonus. The remaining $1,430 is due on

Assessing Readiness

TIME

Does my team spend a significant amount of time creating a standardized report?

DATA

Is this report backed by structured data within a database, spreadsheet, or machine-readable format?

VOLUME

Is the report generated at a high frequency and/or volume?

CONSISTENCY

Are similar reports being drafted by individuals with differing levels of expertise in a multitude of locations or geographies?

OPERATIONAL ENHANCEMENTS

How can the narratives be included within your existing workflow? How can we scale or develop new revenue streams?

Establishing a Practical Framework

1. Set **goals & metrics** for NLG and for the initial narrative report.

2. Ensure you have **domain expertise** by assigning a Subject Matter Expert to ensure the data and content are approved.

3. Ensure access to **clean, structured data**.

4. Develop a **distribution plan** for optimal adoption and engagement.

Questions?

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