DEVELOPMENT OF COMPETENCY MODELS FOR BUSINESS INTELLIGENCE, DATA

ENGINEERING, AND DATA SCIENCE ROLES AT A PROFESSIONAL SERVICES FIRM

By

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Capstone

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Table of Contents

Executive Summary

Resultant is a modern professional services consulting firm founded in 2008 with 500 employees nationwide focused on enabling data, technology, and digital transformation for clients.

The Resultant RMO team seeks to define, aggregate, and assess the knowledge, skills, attributes, and other characteristics (KSAOs) of its Professional Services employees to manage better and staff projects. Such KSAOs are often organized within a competency model.

This quality improvement project investigated the following questions:

1. What are the required competencies of business intelligence roles at the professional services firm?

2. What are the required competencies of data engineering roles at the professional services firm?

3. What are the required competencies of data science roles at the professional services firm?

From our data collection and analysis process, we identified 24 technical competencies and descriptors at two (2) levels of proficiency across three (3) parent categories for Business Intelligence roles, eleven (11) competencies, and their descriptors at two (2) levels of proficiency across three (3) parent categories for Data Engineering roles, twelve (12) competencies and their descriptors at two (2) levels of proficiency across four (4) parent categories for data science roles, and eight (8) general consulting or soft-skill competencies and their descriptors at two (2) levels of proficiency across five (5) parent categories. In all three job roles, we also identified key proficiency differentiators between entry-level (novice) and high-performers (expert).

Based on these findings, we recommend (1) the competency frameworks be reviewed on an annual basis and revised according to the established governance practices; (2) that the

frameworks include soft skill consulting competencies as client relations are a critical differentiator between junior and senior employees and project success; (3) and that the frameworks be used to align employee hiring, training, evaluation, promotion, and compensation as a way to achieve organization strategy better.

I.   Organization Context

Resultant is a modern professional services consulting firm focused on enabling data, technology, and digital transformation for clients. Resultant was founded in 2008 as KSM Consulting, a subsidiary of Indianapolis accounting firm Katz, Sapper & Miller. It became an operationally and financially independent organization because of investment from an outside venture capital firm taking a majority ownership stake in the company in March 2019.

Since its founding, Resultant has successfully partnered with clients in the public and private sectors to help them overcome their most complex technology challenges and achieve better outcomes.

Resultant is headquartered in Indianapolis and has nearly 500 employees nationwide. The firm serves clients nationally with offices in Indianapolis, Fort Wayne, and Odon, Ind.; Springfield, Ill.; Dallas, Texas; Columbus, Ohio; Lansing, Mich.; Denver, Colo.; and Atlanta, Ga. Many of these offices are products of mergers and/or acquisitions of other companies by Resultant. Resultant has three divisions of employees - professional services, which provides data, technology, and digital transformation consulting engagements and services to clients; managed services, which provides hosted data and technology services; and enabling services, which conducts the internal business functions of the company including finance, legal, human resources, and other similar processes.

The Resource Management Office (RMO) team are our primary clients (stakeholders) and have engaged with us to advise on these efforts, including the VP of Client Experience and Delivery Operations, who is the primary executive sponsor, a Resource Planning Manager who is our primary point of contact, and another Resource Planning Manager. We consider and interact with multiple other stakeholders to various degrees for this project, including Resultant

executives, Resultant Business Intelligence, Data Science and Data Engineering subject matter experts and employees, and Resultant internal services employees.

Additionally, outputs of our efforts may inform or impact other aspects of the talent lifecycle as they are currently conducted and evaluated at Resultant, including workforce planning, job architecture, talent acquisition, resource management, career pathing, leadership and succession planning, performance management, and rewards, among others.

II.   Problem of Practice

The Professional Services division of Resultant contracts project engagements with clients based on several factors that vary across the work, including project team structure and roles involved, length and scope of engagement, data and technology needs, and others. The Professional Services division tracks their employees' time utilization and availability to ensure that they are staffed on projects to deliver the work for engagements. The RMO team was established within the Professional Services division to manage the staffing of employees for projects. The RMO team seeks to define, aggregate, and assess the knowledge, skills, attributes, and other characteristics (KSAOs) of its Professional Services employees and has contracted the use of a cloud-based technology to conduct such activities, believing that this will improve the staffing process. Such KSAOs are often organized within a competency model to maintain consistency, an approach that can be applied across different HR systems (Campion et al., 2011). The RMO team planned to conduct these efforts with a small sample of the employees within the Professional Services division, starting with the Business Intelligence (BI), Data Science, and Data Engineering roles, before broadening the efforts to all roughly 200 Professional Services employees.

While there may not currently be a competency model(s) across the organization, some type of 'skills inventory' may have been developed and used within Resultant despite it no longer being used. Internal documents also show similar prior competency modeling efforts have been conducted to achieve outcomes comparable to the intent of efforts currently being acted upon. Additionally, interviews that we conducted with various Resultant stakeholders indicate that employee sentiment supports improvements to the project staffing experience and associated processes. Conceptually, creating an overarching competency framework and subsequent competency model(s) for the largest job families/roles within the organization would integrate those items throughout the various talent management processes, enabling Resultant to make better data-driven talent management decisions as the company grows.

While multiple efforts could be evaluated and deployed to improve project staffing efforts, competency models have been used to align the HR systems (e.g., Green, 1999; Lawler, 1994; Lepsinger & Lucia, 1999; Schippmann et al., 2000) so that, for example, the organization hires, trains, evaluates, compensates, and promotes employees based on the same attributes. This approach integrates, prevents inconsistency, and allows the HR systems to reinforce each other for maximum return on investment and impact.

III.   Review of Literature

The Resource Management Office at Resultant is charged with efficiently and effectively staffing project teams, given the current availability of staff, to achieve excellent outcomes for clients from each engagement. The solution that the RMO team has identified as best suited to achieving these twin goals is creating a competency model, which is then used to populate a cloud-based skill repository. This skill repository is then used by managers and their staff in the Business Intelligence, Data Engineering, and Data Science divisions to conduct

periodic self-assessments, thereby creating employee profiles relative to competencies essential to job performance. The RMO team uses the results of these assessments to guide their project staffing work.

A competency model is a collection of competencies – knowledge, skills, abilities, and other behaviors (KSAOs) – needed for effective job performance (Campion et al., 2011). It is an "attribute-based form of work analysis" (Stevens, 2012). The anatomy of a competency includes a name/label, a clear and succinct definition of the label that includes specific and observable behavior(s), and detailed descriptions for a sequence of proficiency progression (Stevens, 2012). A typology can be used to organize competencies such as technical competencies (hard skills) and managerial competencies (soft skills) (Stevens, 2012). There is often a relationship between the design of the competency model and the organizational context within which it is applied; the competency categories and descriptors are customized according to the organizational strategy and objectives (Campion et al., 2011). The Human Resource systems are then aligned with the competency model, influencing hiring decisions and employee training, evaluation, promotion, and compensation (Campion et al., 2011).

When designing a competency model, it is best to identify a relatively small number of detailed competencies, usually no more than a dozen (Campion et al., 2011; Stevens, 2012). The repository for these competencies can be more detailed at the Human Resource level than those shared with the end user who is doing the self-assessment.

It is essential that the identified competencies, a customized list, have a direct connection to the organization's overall strategic objectives, as they can influence hiring decisions and employee training as well as employee evaluation, promotion, and compensation (Campion et al., 2021).

It is also essential that each identified competency has descriptors of observable behavior that show progression in proficiency (Campion et al., 2011). This proficiency hierarchy provides visibility around what level of ability is required upon hire and what can be trained and serves as a roadmap for talent development (Stevens, 2012).

A distinction can be made between technical (hard) skills, including tools and processes, and working with and managing people (soft) skills (Ravindranath, 2016). Both sets of skills are necessary for project success. Different competency libraries can be developed for various job families within an organization.

Competency model development begins with executive leadership. To achieve a competitive advantage, they must identify organizational objectives and key results (OKRs) in current and future strategies (Campion et al., 2011).

With these objectives in mind, multiple methods for data collection are used, including document review and interviewing internal subject matter experts and focus groups to identify the most important competencies for each job family and to create clear definitions for each competency and proficiency level (Campion et al., 2011; Stevens, 2012). When done well, the competency model defines effective job performance and aligns employee behavior with organizational strategy (Stevens, 2012).

Effective deployment of the competency model rigor profile developed by Jeffrey Schippmann helps significantly in the accuracy of the final model. Ten variables require sound execution during the design process. The first four concern the appropriate and conscientious selection of multiple data collection methods, involve key internal subject matter experts and result in precise and unambiguous categories and descriptors of competencies (Schippmann et al., 2000). The second set of four ensures the link of competencies to long-term strategies, a

closely scrutinized review of the competency descriptors and proficiency rankings, and an assessment of reliability (Schippmann et al., 2000). The final two include rational criteria for changing and updating the model over time and the rich documentation of the research, methods, and results (Schippmann et al., 2000). Competency model developers often fail to employ proper rigor around these steps, resulting in a less reliable and accurate model.

The competency model specifies the collection of knowledge, skills, abilities, and other behaviors (KSAOs) necessary for effective job performance for today and the future. In this way, they also align employee behavior, a consequence of one's focus and attention, with organizational strategy. Competency models are relied on as a foundation for the organization's talent management systems (Campion et al., 2020). The skills repository is simply the tool that is populated with the competency descriptors and engaged by end users to conduct self-assessments, staff teams and projects, and develop, evaluate, promote, and compensate employees.

IV.   Conceptual Framework

The conceptual framework for our project was based on the framework for competencies identified by Campion et al. in the Best Practices of Competency Modeling (2011). Our project only focused on a segment of that framework as our process involved identifying competencies, behaviors, and behavioral indicators at only the job family level rather than across the entire organization. Additionally, while this framework conceptualizes the overall process of competency modeling, we felt it necessary to enhance this framework by incorporating testing and validation of the competency model(s), as conceptualized by Naquin & Holton (2006), and incorporating consideration of the variables that comprise the competency model design process and the subsequent rigor that comprises the data collection techniques of those variables, as

conceptualized in the Level of Rigor Scale by Schippmann et al. (2000). We felt it necessary to incorporate these enhancements into the conceptual framing to address concerns of due diligence in competency modeling data collection. Figure 1 below provides a visual depiction of our conceptual framing.
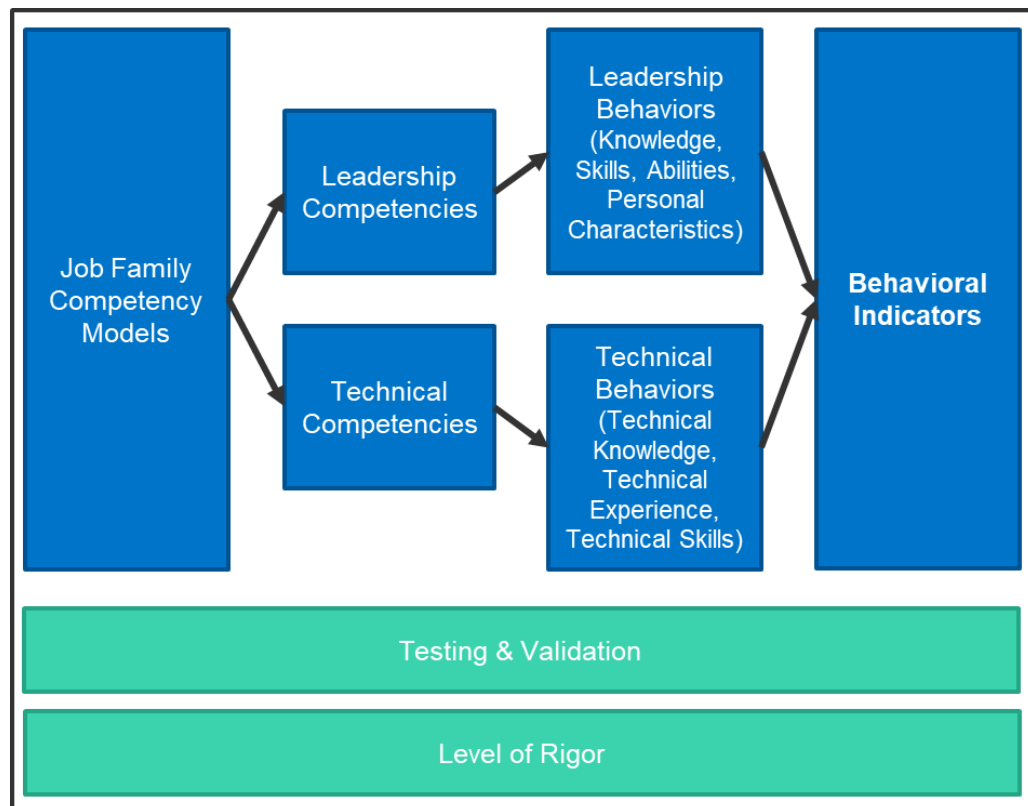
Figure 1

V. Research Questions

This quality improvement project investigated the following questions:

Research Question 1: What are the required competencies of business intelligence roles at the professional services firm?

Research Question 2: What are the required competencies of data science roles at the professional services firm?

Research Question 3: What are the required competencies of data engineering roles at the professional services firm?

VI.   Project Design

Data Collection

We used three different data sources to identify the competencies for each research question. These data sources were chosen to improve the rigor based on the method of investigation used, as noted in Schippmann et al. (2000). Data was collected sequentially using multiple methods, with document analysis at the outset followed by subject matter expert and high performers of target role interviews, then high performers of target roles focus groups on an iterative manner to identify the competencies as is shown in the literature (Campion et al., 2011; Lepsinger & Lucia, 1999; Schippmann et al., 2000). This strategic sequencing of data collection and intentional methodological, data source, and perspectival triangulation help to ensure study validity (Carl & Ravitch, 2021).

First, we worked with the professional services partner organization contact persons to obtain organization documentation that contained definitions of knowledge, skills, activities, objectives, etc., of business intelligence, data engineering, and data science roles. Such information is often found within an organization's human resources and other associated functions (Schippmann et al., 2000). Through this process, we developed an initial list of knowledge, skills, abilities, and other characteristics for each role. These lists were provided to subject matter experts for each respective role to review before their scheduled interview with us and served as the basis for the questions we asked during the interview.

Second, we conducted critical incident and behavioral event interviews with subject matter experts of Business Intelligence, Data Engineering, and Data Science roles as have been used in competency identification and the development of competency models (Boyatzis, 1982; Campion et al., 2011; Flanagan, 1954; McClelland, 1998; O'Brien et al., 2022). The semi-

structured 45-minute-long interviews were recorded and transcribed for thematic analysis, with one of us serving as the moderator, asking questions, and the other taking notes of the conversation. All members of the RMO team were also in attendance for these interviews. During these interviews, we asked questions to elicit feedback on the list overall and better define performance criteria for those different knowledge, skills, abilities, and other characteristics, which enabled adjustments to the overall list as well as the development of a proficiency or rating scale for the different knowledge, skills, abilities, and other characteristics. These revised lists, which included definitions of performance for each of the knowledge, skills, abilities, and other characteristics, were then provided to high-performing Business Intelligence, Data Science, and Data Engineering employees for review before their scheduled focus group. These lists also served as the basis for the questions we asked during the focus group.

Third, and like the subject matter expert interviews, we conducted critical incident and behavioral event interviews with focus groups of high performers of the Business Intelligence, Data Science, and Data Engineering roles, as these are regularly used in competency identification and the development of competency models (Boyatzis, 1982; Campion et al., 2011; Flanagan, 1954; McClelland, 1998). The semi-structured 45-minute-long interviews were recorded and transcribed for thematic analysis, with one of us serving as the moderator, asking questions, and the other taking notes of the conversation. All members of the RMO team were also in attendance for these focus groups. During these focus groups, we asked the following questions, as had been used in Naquin and Holton (2006):

1. Are these competency statements representative of the tasks that this role must perform?

2. Are there competency statements included on this list that should be eliminated?

3. Are there competency statements that should be added to this list?

These questions elicited feedback on the list overall and defined performance criteria for those different knowledge, skills, abilities, and other characteristics, which enabled adjustments to the overall list, including greater segmentation of the proficiency or rating scale levels for the different knowledge, skills, abilities, and other characteristics.

Limitations of Data Collection

A relatively small cohort of executive leadership, subject-matter experts, and high-performers were recruited for competency model development via interviews and focus groups for validation. This aligns with best practices for appropriate rigor in competency model profile development (Schippmann et al., 2000). However, capturing and analyzing organization-wide data from validation surveys would help to refine the model further and facilitate employee adoption. Also, assessing a year later whether the competency model was used as intended and, if so, whether it had the intended impact on employee performance and goal attainment as defined by the organization's strategy would also be valuable data collection.

Participant Recruitment

We used snowball sampling, starting with requests to the RMO team to recruit at least ten (10) subject matter experts and high performers in total across both the interviews and focus groups for each community of practice - Business Intelligence, Data Science, and Data Engineering. We were able to interview nine (9) total - two (2) subject matter experts were interviewed, and seven (7) high performers participated in the focus group - Business Intelligence employees. We were able to interview three (3) total - one (1) subject matter expert was interviewed, and three (3) high performers participated in the focus group - Data Science employees. We were able to interview four (4) total - one (1) subject matter expert was interviewed, and three (3) high performers participated in the focus group - Data Engineering

employees. Regarding validation participants, all subject matter experts and high performers participated in a survey assessment (i.e., competency model validation process). Afterward, all Business Intelligence, Data Engineering, and Data Science employees of the professional services partner organization and their managers were recruited to participate in the survey assessment via email solicitation in coordination with the RMO team. However, analysis of this data is beyond the scope of our project.

Data Analysis

Data was collected sequentially, as outlined above, with analysis conducted in an iterative manner to identify the competencies. The analysis of organization documents (Campion et al., 2011), behavioral event and critical incident interviews of subject matter experts and high performers (Boyatzis, 1982; Campion et al., 2011; Flanagan, 1954; McClelland, 1998; O'Brien et al, 2022), and behavioral event and critical incident focus groups of high performers (Boyatzis, 1982; Campion et al., 2011; Flanagan, 1954; McClelland, 1998) are all tools that have been used in similar prior competency model studies. Tables A through I in Appendix A show in detail the three rounds of iterative competency analysis and model development for each Business Intelligence, Data Engineering, and Data Science role.

Documents analyzed were provided electronically, and the interviews and focus groups were captured verbatim using Microsoft Teams recordings of each meeting with transcripts produced through the software. This helped to ensure descriptive validity. Precoding of each document review, interview, and focus group through an initial read included highlighting words and phrases and capturing questions and impressions (Carl & Ravitch, 2021). The track changes function in Microsoft Word was used, and a separate pre-code memo that captured initial insights was created. Subsequently, multiple readings of the document, interview, and focus

group data occurred using inductive coding, keeping as close to the original text as possible for

descriptive categories (Carl & Ravitch, 2021). The code sets made it possible to highlight

patterns, themes, and agreement between interview participants. Dialogic engagement, which is

collaborative analysis through discussion between both research partners, enabled us to have

confidence that we had accurately represented and analyzed the participant's contributions.

Limitations to the Analysis

We acknowledge that our positionality as two white cis-gendered males can introduce

unconscious bias in our analysis. We also recognize that our sample size for interviews does not

include all employees at the organization and, therefore, may not be fully representative.

VII.   Findings

Research Question #1: What competencies are required for business intelligence (BI) roles at a

professional services firm?

Finding #1: We identified 24 technical competencies and descriptors at two (2) levels of

proficiency across three (3) parent categories for Business Intelligence roles, as shown below in

Table 1.

Parent Category	Skill	Skill Definition	Entry Level	High Performer
Data Management	Data Querying	Ability to write and conduct data querying and data retrieval tasks	Able to write basic queries to retrieve data from databases using SQL or other query languages. They understand the fundamentals of querying databases and can perform simple data retrieval tasks.	Have advanced skills in writing complex queries and have a deep understanding of database systems, optimization techniques, and data manipulation. They can efficiently retrieve and filter large datasets, perform joins, and aggregate data for analysis purposes.

Data Management	Data Exploration	Ability to understand and use various data exploration and analysis techniques	Able to explore and navigate datasets using basic data exploration techniques. They are familiar with basic statistical concepts and can summarize and visualize data to gain initial insights.	Possess advanced skills in using exploratory data analysis techniques to uncover patterns, trends, and relationships in complex datasets. They can apply statistical methods, employ data visualization tools, and identify key insights and actionable recommendations.
Data Management	Extract Data	Ability to extract data from different data sources using various methods and tools	Able to extract data from various sources such as databases, APIs, or files. They are familiar with basic data extraction methods and tools.	Have expertise in designing and implementing efficient data extraction processes. They can handle large-scale data extraction, perform data validation, and ensure data quality during the extraction process. They are also familiar with data integration and ETL (Extract, Transform, Load) processes.
Data Management	Transform Data	Ability to clean, manipulate, and prepare data for different purposes	Able to perform basic data transformations such as cleaning and formatting data, handling missing values, and applying basic calculations.	Possess advanced skills in data cleansing, data normalization, data standardization, and data enrichment. They can develop complex data transformation pipelines and apply advanced data manipulation techniques to prepare data for analysis or reporting purposes.
Data Management	Load Data	Ability to load data into different data storage systems	Able to load data into databases or data storage systems following predefined procedures. They are familiar with basic data loading techniques and tools.	Have expertise in designing and optimizing data loading processes. They can handle large volumes of data, ensure data integrity during the loading process, and implement data validation and verification procedures.
Data Management	Programming Languages	Ability to use SQL in managing data	Experienced in SQL with an understanding of SQL syntax, queries, modifiers, and calculations.	Possess advanced skills in SQL.
Data Management	Data Management Tools	Ability to use different data management tools	Some familiarity with data management tools, including but not limited to: - Talend - Alteryx - Fivetran - Pentaho - Azure Data Factory - Google Cloud Dataflow - AWS Glue - Matillion - Hadoop - Integrate.io	Proficiency in 2-3 of the following data management tools: - Talend - Alteryx - Fivetran - Pentaho - Azure Data Factory - Google Cloud Dataflow - AWS Glue - Matillion - Hadoop - Integrate.io

Data Management	Platform Management	Ability to use different hosted data visualization platforms	Familiar with data visualization hosted platforms (Tableau Server, Power BI Service). They can navigate the platform comfortably and know how to publish visualizations to the platform.	Possesses advanced skills in data visualization hosted platform management. They can advise on, manage, and execute the initial design, set-up, and configuration of Tableau or Power BI Service for a variety of service models and client types. They are an expert in service offerings, pricing, and compatibilities. They work closely with infrastructure team to set up servers for these hosted platforms, when necessary.
Data Management	Database Solutions	Ability to use different database solutions	Some familiarity with database solutions, including but not limited to: - Azure - AWS - Snowflake - BigQuery - BigTable	Proficiency in 2-3 of the following database solutions, including but not limited to: - Azure - AWS - Snowflake - BigQuery - BigTable
Data Visualization	Connect to Data Sources	Ability to access and use data from different types of data sources	Able to establish connections to data sources using visualization tools or programming languages. They understand the basics of data connectivity and can retrieve data for visualization purposes.	Possess advanced skills in connecting to various data sources, including databases, APIs, and data lakes. They have expertise in data integration, data extraction, and building robust and scalable data pipelines for visualization.
Data Visualization	Data Modeling	Ability to understand and utilize different data modeling concepts and techniques	Has a basic understanding of data modeling concepts, such as entities, attributes, and relationships. They can create simple data models and diagrams to represent data structures.	Possesses advanced skills in designing and implementing complex data models that accurately represent business requirements. They understand data modeling techniques, normalization, and optimization strategies. They can create efficient and scalable data models for visualization purposes.
Data Visualization	Calculations	Ability to perform calculations and analyses to derive insights from data	Able to perform basic calculations and aggregations on data within visualization tools. They have a basic understanding of mathematical and statistical functions and can apply them to visualize data.	Has advanced skills in performing complex calculations, statistical analysis, and advanced data transformations within visualization tools. They can create calculated fields, build complex formulas, and apply advanced statistical models to derive meaningful insights from data.

Data Visualization	Visualization Development	Ability to understand principles of visualization and to create effective visualizations	Able to create basic visualizations, such as bar charts, line charts, and pie charts. They understand basic visualization principles and can represent data in a clear and understandable manner.	Have expertise in creating advanced and interactive visualizations using a wide range of visualization techniques and tools. They can design compelling dashboards, employ data storytelling techniques, and ensure effective data communication and engagement.
Data Visualization	Device Layouts	Ability to understand and create visualizations across various devices and platforms	Possesses a basic understanding of device layouts and responsiveness. They can create simple layouts that adapt to different screen sizes and resolutions.	Possess advanced skills in designing responsive and optimized visualizations for various devices and platforms. They understand user experience considerations, accessibility, and usability principles. They can create visually appealing and user-friendly visualizations across different devices and screen sizes.
Data Visualization	UI/UX Design and Wireframing	Ability to utilize UI/UX best practices and wireframing techniques to create visualizations	Possesses a basic understanding of visualization and UI/UX best practices with basic skills in creating wireframes or low-fidelity prototypes to visualize and communicate the layout and functionality of user interfaces. They can advise on chart types and dashboard layouts to effectively communicate data. They use wireframing tools to depict the structure and navigation of report visualizations.	Possesses advanced skills in designing highly effective visualizations, visual communications, and data stories, including creating detailed wireframes, interactive prototypes, and mockups. They have a deep understanding of user-centered design principles, accessibility, usability (testing), and user experience (UX) best practices. Expert in planning and conducting user research to optimize information architecture. Their wireframes effectively capture user requirements and serve as a blueprint for development teams. Knowledge of coding/visualization platform is required.
Data Visualization	Publishing	Ability to understand and publish visualizations within visualization tools or platforms	Able to publish visualizations within visualization tools or platforms. They understand the basic publishing workflows and can share visualizations with others.	Excel in publishing visualizations using advanced techniques, such as embedding visualizations in websites or applications, creating interactive presentations, and implementing scheduled data refreshes. They can effectively distribute and share visualizations with stakeholders and ensure data security and privacy.

Data Visualization	Data Visualization Tools	Ability to use various data visualization tools	Experienced with Tableau or PowerBI with exposure to the other and all the following tools: - Qlik - Looker	Expert in Tableau or PowerBI with proficiency in the other and all the following tools: - Qlik - Looker
Testing & Quality Assurance	Data Validation	Ability to understand and conduct data validation techniques	Have a basic understanding of data validation techniques and can perform basic data quality checks. They can compare data against predefined rules or specifications and identify inconsistencies or anomalies.	Possess advanced skills in designing and implementing comprehensive data validation processes. They can create complex validation rules, perform data profiling, and ensure data accuracy, completeness, and consistency across multiple data sources.
Testing & Quality Assurance	Regression Testing	Ability to conduct regression testing	Able to perform basic regression testing by retesting previously tested functionalities to ensure they still work correctly after changes or updates. They understand the basics of regression testing concepts and processes.	Possess advanced skills in designing and executing regression test suites that cover a wide range of functionalities and scenarios. They have expertise in test automation, test case management, and identifying regression risks. They can ensure high-quality data by minimizing regression issues.
Testing & Quality Assurance	Test Plans	Ability to understand and create test plans	Have a basic understanding of test planning processes and can assist in creating basic test plans. They understand the importance of test coverage, test objectives, and test schedules.	Excel in developing comprehensive test plans that encompass all aspects of the testing process. They can identify testing objectives, define test scope, create test strategies, and allocate resources effectively. They ensure that testing activities align with project goals and quality standards.
Testing & Quality Assurance	Performance Testing	Ability to assess data and conduct performance tests of that data	Have a basic understanding of performance testing concepts and can assist in executing basic performance tests to assess data visualization performance, scalability, and response times.	Possess advanced skills in diagnosing data visualization performance issues. They have expertise in performance monitoring tools, analyzing performance metrics, and identifying performance bottlenecks within data visualizations. They can optimize data visualization performance and ensure scalability and reliability.

Testing & Quality Assurance	Technical Documentation	Ability to create technical documentation with requisite detail for ease of interpretation by others	Able to assist in creating basic technical documentation, such as test cases, test scripts, and test result reports. They understand the importance of documenting testing activities and outcomes.	Excel in creating comprehensive technical documentation that covers all aspects of testing, including test plans, test cases, test scripts, and data issue reports. They ensure that documentation is clear, well-organized, and easily accessible to stakeholders.
Testing & Quality Assurance	Client Deliverables	Ability to create, contextualize, and communicate deliverables to clients	Have a basic understanding of client deliverables and can assist in preparing and delivering basic testing-related deliverables, such as test summaries or defect reports.	Possess advanced skills in creating and delivering high-quality data testing deliverables tailored to client requirements. They can generate detailed test reports, provide insightful recommendations, and effectively communicate testing results to clients and stakeholders.
Testing & Quality Assurance	Issue Identification and Troubleshooting	Ability to identify and troubleshoot data issues	Able to identify and report basic data issues during the testing process. They have a basic understanding of data issue tracking tools, troubleshooting techniques, and can assist in not only documenting and communicating issues but investigating and resolving basic issues or problems encountered during testing activities.	Excel in identifying and analyzing complex data issues, conducting root cause analysis, and providing detailed information to development teams. They can prioritize and escalate issues effectively and collaborate with cross-functional teams to resolve issues promptly. Possess advanced troubleshooting skills and can independently investigate and resolve complex data issues or problems. They have expertise in data troubleshooting techniques and log analysis (where applicable). They can identify and implement effective solutions to ensure smooth data testing and high-quality deliverables.

Table 1

Using the process outlined in Data Collection and Analysis, the initial Business

Intelligence technical competency list was developed from a competency model that had been

previously used at the professional services firm and included 48 technical competencies

grouped into four (4) different categories. The second iteration of the Business Intelligence

technical competency list was developed from an interview with BI subject matter experts (n=2) and included 25 competencies across the same four (4) different categories. The third iteration of the Business Intelligence technical competency list developed from a focus group with BI high performers removed one (1) competency to bring the total to 24 technical competencies across the same four (4) different categories with clarified levels of high and low proficiency. The first three iterations of the Business Intelligence technical competency list can be found in Appendix A.

To illustrate the competency framework development process, a few quotes from the BI interviews that resulted in this final table are representative. In helping to refine the set of Data Management Tools for the Business Intelligence role, BI Subject Matter Expert 1 shared, "One of the tools I would include under data management would be Alteryx," and for "testing and quality assurance […], we use a tool called Validator." BI Subject Matter Expert 2 stated, "I would think you could put [Matillion and Azure Data Factory] under the ETL tools," and "data modeling, I probably put in data management." The reflective and iterative nature of this process is captured well by BI Subject Matter Expert 2's comment, "It's a tool that you can use to build an application. [Power Apps] doesn't fit data visualization, and it really doesn't fit data management either. […] So maybe it has its own subcategory. I just wouldn't classify [Power Apps] in the same way as I would Tableau or Power BI." Each of these quotes represents a change that the subject matter expert wished to address and, in turn, was incorporated into the final competency model, as you can see in Table 1 above.

Finding #2: Key proficiency differentiators exist between an entry-level (novice) and high-performing (expert) business intelligence employee.

Summary findings from our subject matter expert and high-performer interviews for the business intelligence (BI) role surfaced key differentiators between an expert and a novice. Experts know required tools such as Tableau, Power BI, and SQL, as well as essential combinations of tools such as Tableau and Tableau Prep. They can also quickly learn new tools. BI Subject Matter Expert 1 stated, "It's kind of one of those things where if you know SQL, you can know Snowflake."

Experts have experience with complex projects, frequent practice of skills, and expertise in various industries. BI High Performer 1 made the point that the complexity and size of the project should be a factor in determining expertise since practice on a more straightforward project is not the same as practice on a project that is complex or deals with a challenging problem such as infant mortality rates increasing, the opioid overdose epidemic, or the COVID-19 pandemic. Expertise is "project dependent." BI High Performer 3 said that "cross-role competencies" are an important differentiator between a novice and an expert. For example, a "data modeling novice can be handed a model and work with it, but an expert is going to understand how to create a model and how the differences in data models can impact the kinds of analysis […] and they can work with other members of the ETL [extraction, transformation, loading] team to suggest models that would be better." BI Subject Matter Expert 2 confirmed this cross-role competency "yeah, you are going to be almost advising the data engineer at that point."

Experts are also able to work directly with the clients and deliver solutions by asking the Who, What, When, Where, and Why questions to gather requirements and scope the project. High Performer 1 shared that "a lot of people come into consulting from a development role that doesn't require [requirements gathering] … they are used to getting a ticket and working off that

ticket." These early career associates and analysts are not experts yet. BI High Performer 2 noted that an expert would try to understand what the client is currently doing and how their request aids that work or not (e.g., is the dashboard they are requesting the right solution?), whereas a novice would simply ask how they want the "dashboard" to look. BI Subject Matter Expert 1 shared that "we have plenty of people who can build [a dashboard but few…] who can ask a client what story they are trying to tell, and then how to position the dashboard to tell that story." BI high performer 2 also shared that "the easiest [human] resources to work with are the ones who don't need a PM or BA [project manager or business analyst] in between them and the client." BI Subject Matter Expert 1 summarized this differentiator by stating that an expert is "going to take ownership of that relationship with the client [and] they don't really need direction."

Research Question #2: What competencies are required for data engineer (DE) roles at a professional services firm?

Finding #3: We identified 11 competencies and their descriptors at two (2) levels of proficiency across three (3) parent categories.

Parent Category	Skill	Skill Definition	Entry Level	High Performer
Pre-Development	Time Estimation	Ability to provide accurate and detailed time estimates	Able to provide accurate and detailed time estimates	
Pre-Development	Database Models	Ability to design and build out database models	Able to design and build out database models	
Pre-Development	Architectural Design	Ability to design detailed data solutions	Able to design detailed data solutions	
ETL	Data Extraction, Transformation, and Loading (ETL)	Ability to design and build ETL/ELT pipelines	Able to design and build ETL/ELT pipelines	

ETL	Data Standardization and Cleansing	Ability to identify, design and apply standardization and cleansing routines, and unit testing to data pipelines	Able to apply standardization and cleansing routines, and unit testing to data pipelines	Able to identify, design and apply standardization and cleansing routines, and unit testing to data pipelines
Testing & Validation	Data Validation	Ability to identify data to be validated, how it should be validated, and perform validation	Able to validate data as instructed	Able to identify what data should be validated, how it should be validated and perform validation
Testing & Validation	Regression Testing	Ability to design and perform regression testing	Able to perform provided regression testing	Able to design and perform regression testing
Testing & Validation	Conducting Testing	Ability to conduct basic testing on code	Able to conduct basic testing involving their own code	Able to conduct basic testing, including code that is not their own
Testing & Validation	Technical Documentation	Ability to create technical documentation with requisite detail for ease of interpretation by others	Create documentation that needs to be reviewed by separate resource	Creates detailed technical documentation that is complete enough to not need reviewed by different resource
Testing & Validation	Issue Identification & Troubleshooting	Ability to work with client to identify and troubleshoot issues	Able to assist client with identifying issue	Able to work with client to go beyond identified issue to diagnose root cause of the problem and conduct in-depth troubleshooting, involving all aspects of the data solution.

Table 2

Using the process outlined in Data Collection and Analysis, the initial Data Engineering

technical competency list was developed from a competency model that had been previously

used at the professional services firm and included 57 technical competencies grouped into four

(4) different categories. The second iteration of the Data Engineering technical competency list

was developed from an interview with DE subject matter experts (n=2) and included 16 technical

competencies across the same four (4) different categories. The third iteration of the Data

Engineering technical competency list developed from a focus group with DE high performers

removed six (6) competencies to bring the total to 10 technical competencies across three (3)

different categories with clarified levels of high and low proficiency. The first three iterations of

the Data Engineering technical competency list can be found in Appendix A.

To illustrate the competency framework development process, a few quotes from the DE interviews that resulted in this final table are representative. Data Engineer Subject Matter Expert 1 makes suggestions to refine skillsets through combination, "Combine the extraction, transformation, and loading into one," and "I would say standardization and cleaning, probably combine those two as well because it's kind of the same thing as data manipulation, " and "data querying, aggregation, and calculations could probably be combined into one because they are all kind of the same thing." Data Engineer Subject Matter Expert 1 also suggested both category and skill changes, such as, "Instead of testing quality assurance, maybe testing validation might be a better way of doing that," and "If we had a practitioner level and an expert level and just got rid of novice level," and "I would say secure data connections and data operations, we drop those off [data management].

Each of these quotes represents a change that the subject matter expert wished to address and, in turn, was incorporated into the final competency model, as you can see in Table 2 above.

<u>Finding #4</u>: We also identified key proficiency differentiators between an entry-level (novice) and high-performing (expert) Data Engineer.

Summary findings from our subject matter expert and high-performer interviews for the data engineering (DE) roles also surfaced key differentiators between an expert and a novice. Since the Resource Management Office (RMO) uses proficiency in hard and soft skills as the starting place for project staffing, understanding the differences between an expert and a novice is essential. RMO High Performer 1 confirms this: "The difference between an expert and a novice is the first step to help me understand if someone who's entry-level will be able to fill the role or the expectation from a data engineering perspective." As DE High Performer 1 notes an expert, "works without direction."

Data Engineering experts can manage client relations, estimate the time it takes to model the data, conduct testing and quality assurance (TQA) on the work of others, and have far greater experience than junior employees. DE Subject Matter Expert 1 notes that "time estimation in database modeling [is …] definitely a differentiator." DE subject matter expert 1 also says that experts can "make sure the numbers line up […they] validate and test somebody's code versus their own." DE High Performer 1 confirms that "the engineer that wrote [the code] should not be performing an official TQA ever." DE High Performer 1 also shares that "experience to us is variety more than anything" and "really that comes down to [project] complexity as a differentiator." It is beneficial to have an expert-level data engineer capable of leading a project on a team, according to DE High Performer 1, "ideally from day one," since "sometimes we are three-quarters of the way through a project when [a data engineer] join." DE High Performer 1 also prefers having an engineer capable of leading when "There's multiple engineers involved."

It is essential to highlight that client relations comprise a set of skills that differentiates a senior from a junior employee as much as experience working on complex projects. DE High Performer 1 notes, "The difference between a senior and a not senior for us is the ability to really be able to lead and deal with the client directly." DE Subject Matter Expert 1 also believes it is important to "grow folks that are data engineers that want to do more into [data] architects." Once again, we see cross-role competency as a need and a factor in differentiating between expert and novice as DE Subject Matter Expert 1 says, "We've got people who are great engineers doing that role [data architect] on larger projects though maybe not having the title of data architect." As DE High Performer 1 shares, "Every excellent data architect I've met has a background in engineering." There is "a lot of cross-pollination between our team," DE High

Performer 1 says, "Because there's too many facets to everything we do. There are never two projects that are the same. They can look the same on paper, but they're not."

Research Question #3: What competencies are required for data scientist (DS) roles at a professional services firm?

Finding #5: We identified 12 competencies and their descriptors at two (2) levels of proficiency across four (4) parent categories.

Parent Category	Skill	Skill Definition	Entry Level	High Performer
Research	Background Research	Ability to identify, reference, and leverage background information on data science techniques and methodologies	Able to understand and collect previous work done around a topic from tutorials, blogs, and some academic journals if applicable.	Additional deep dives on previous techniques and results while also speaking directly to SMEs about known methodology and research.
Research	Technical Writing & Documentation	Ability to create technical documentation with requisite detail for ease of interpretation by others	Providing documentation for code and results that are accessible to a diverse audience. Some previous experience with handing off code/results to another technical person and enabling them to quickly take over the work.	Experience with more detailed and thorough documentation of code, results, and publication. Able to write and facilitate full knowledge transfers.
Data Synthesis	Connecting to Data Sources	Ability to access and use data from different types of data sources	Most work is done from flat local files (mostly csv), or in an environment where a single database connection is provided. Some familiarity with connecting to cloud storage (e.g.S3).	Experience managing their own connections to databases and cloud storage. Capable of automating data pulls from public APIs and those requiring authentication (API credential management). More experience with schema driven files (e.g., parquet, JSON, etc.).
Data Synthesis	Cloud	Ability to work in and access data within cloud environments	Some exposure to various cloud environments and how they are used.	More experience working in cloud environments and how they are architected, including pushing/pulling data to/from cloud storage.
Data Exploration	Longitudinal Analysis	Ability to define populations and develop time-relevant algorithms for such datasets	Basic understanding of defining populations and developing the queries needed to build their touchpoints throughout time.	More advanced knowledge of population definition and algorithms that are applicable to longitudinal data. Larger datasets by volume and time scale.
Data Exploration	Data Wrangling	Ability to clean and interpret data within datasets	Capable of handling missing values, removing duplicate rows, basic feature engineering, all done mostly in R/Python.	Capable of handling data cleaning in larger datasets including missing values and duplicate data. Easily switches between SQL and R/Python to handle wrangling tasks. Experience translating data

				wrangling steps to automated pipelines.
Data Modeling	Supervised and Unsupervised Learning Model Methods	Ability to leverage different supervised and unsupervised learning model methods	Able to identify when these models are applicable and how to choose the appropriate model based on problem and available data. Has experience using a single model for a given problem.	Additional experience in choosing models and combining models to produce better results.
Tools	Version Control	Ability to understand and conduct repository management activities	Able to understand basic Git workflow (i.e., pull, branch, commit, push, pull, pull requests).	Able to conduct more advanced repository management activities (i.e., tagging, versions, rebasing, repository actions, merge conflicts)
Data Communication	Model Performance Metrics	Ability to understand and communicate model performance metrics and implications surrounding such metrics	High level measures of model performance and their implications (i.e., accuracy and precisions). Some experience presenting values to non-technical clients.	Knowledge of additional model performance metrics and how they relate to the problem definitions (i.e., recall, precision, specificity, errors, and bias). More experience presenting these results.
Data Communication	Data Visualization	Ability to conduct activities and leverage tools to create visualizations	Basic experience in creating static visualizations with R and Python. Some exposure to creating dynamic visualizations with tools like Shiny/Plotly. Basic understanding of how to format data to be used by BI tools.	More advanced visualization and producing publication-ready plots. Experience publishing interactive visuals from Python/R or BI tools, including error bounds and confidence intervals in plots in an understandable way when applicable.
Data Communication	Results Interpretation	Ability to interpret and communicate implications of results	Focuses on the needed results of the problem definition.	Extends how the results may be applied beyond the scope of the original problem. Presents additional interesting results that came about as part of the work and has a plan for what could come next. Future phases enabled by work completed.
Algorithm Development and Production	Geocoding	Ability to conduct and understand activities involved with geocoding data	Able to run ad-hoc geocoding tasks against an API if given clean address data. Understands the basic limitations and pitfalls of geocoded data.	Has experience with setting up pipelines to continuously geocode addresses and store the results. Experience efficiently geocoding large datasets (100Ks to 1MMs). More experience parsing and normalizing address data with something like libpostal. Experience monitoring and correcting geocoder performance.

Table 3

Using the process outlined in Data Collection and Analysis, the initial Data Science technical competency list was developed from a competency model that had been previously used at the professional services firm and included 44 technical competencies grouped into five (5) different categories. The second iteration of the Data Science technical competency list was developed from an interview with DS subject matter experts (n=2) and included 20 technical competencies across eight (8) different categories. The third iteration of the Data Science technical competency list developed from a focus group with DS high performers removed four (4) competencies to bring the total to 16 technical competencies across seven (7) different categories with clarified levels of high and low proficiency. The first three iterations of the Data Science technical competency list can be found in Appendix A.

Again, to illustrate the competency framework development process, a few quotes from the Data Science interviews that resulted in this final table are representative. DS Subject Matter Expert 1 suggests the creation of a new category and places a skill within that category, "I'd say algorithm development and production [new category]," and "So, it's [geocoding] probably within algorithm development." They also suggest reorganizing skills within existing categories, "You can put the first two under research and the next three under research and development [proof of concept and implementation]." DS High Performer 1 shares how they pruned some skills from the categories, "We removed Prem because that's a standard of knowing how to work with data […] we wouldn't hire somebody who can't do that," and "We removed C and Java Script. They aren't things that we as a data science team are expected to know." They also suggested the creation of new categories, "We changed that [model performance interpretation] into data communication […] we thought that was more broad of a parent category," and "doing data synthesis, data exploration, data modeling, we pulled those out as separate." Each of these

quotes represents a change that the subject matter expert wished to address and, in turn, was incorporated into the final competency model, as you can see in Table 3 above.

Finding #6: Key proficiency differentiators exist between an entry-level (novice) and high-performing (expert) data scientist.

The Data Science division is working on open-ended wicked/complex problems that require higher-level skills, so there are no junior staff members. The DS Subject Matter Expert 1 states, "If it's a large direction and if it's a very open problem, then that is more likely senior." The most senior members have considerable depth of experience and breadth of knowledge, including skills in Python, Tableau, and SQL. As the DS Subject Matter Expert 1 indicates, "Data science also has two arms, the data scientist and the machine learning engineer [the data scientist] looks more into the statistical pieces and [the machine learning engineer] looks more into the engineering […] any kind of productization including algorithm productization would fall under them." An important differentiator of the expert in the data science role is, according to the DS Subject Matter Expert 1, the fact that 'there are stars who can do both equally." This is another example of the primacy of cross-over competencies correlating with attaining expert status. As DS High Performer 1 notes, "Our machine learning engineers can be data scientists, but not all of our data scientists can be machine learning engineers, but some of them can depending on their skillsets and backgrounds."

Many data scientist employees also crossover between roles like data engineer and data architect. DS High Performer 1 says, "We do have a lot of people who cross with data engineering." That is why tracking who has exposure to various tools is important, as it makes it easier to staff projects. DS High Performer 1 also shares, "If somebody does come up saying that we need something with graph databases, we can go and see and look for who has

exposure." DS High Performer 1 agrees with DS Subject Matter Expert 1's definition of exposure, "actually working in the tool versus working with data that's in the tool." DS Subject Matter Expert 1 notes that in the case of graph databases exposure, the person who would more often have that experience/skillset would be "the machine learning engineer."

For the data scientist role, we see once again the different skill sets of client-facing versus not client-facing influencing expert status. DS High Performer 1 states, "Being able to communicate technical things to non-technical audiences, I think that's a call out for how one staff's a project." There is an expectation of the expert that "you should be able to create data visualizations, meaningful ones that you can show to somebody, and it adds value, and it tells the story of the data." Data visualization is not strictly a requirement of the data scientist role, but it is a necessary skill for client-facing interaction on a project. DS High Performer 1 also points out that "being able to look at all the different potential solutions and choosing the best one" is of critical importance. Here again, industry experience is also a dimension of expert status. For example, as High Performer 1 shares, you can develop an algorithm for an industry without experience within that industry, but "interpreting the results and defining the problem" requires experience/exposure in that industry.

All Research Questions: What are the competencies required of Business Intelligence (BI), Data Engineering (DE), and Data Science (DS) roles at a professional services firm?

Finding #7: We identified 8 general consulting or soft-skill competencies and their descriptors at two (2) levels of proficiency across five (5) parent categories.

The basket of client-facing skills is known as general consulting skills or soft skills. Broadly speaking, they include helping the client to clarify their goals, understand what is possible, and then deliver on that solution, being self-directed, capable of executing a design, and

developing solutions while leading a team. They serve as a key differentiator between junior and senior employees for any role or job family in the professional services firm, such as analysts, managers, directors, and vice presidents, perhaps even more so than the technical hard skills. According to BI High Performer 1, "When we are interviewing folks to kind of see where they're at with [requirements gathering], we tried to just get an idea of how comfortable they are having those conversations with clients." Relatedly, DE Subject Matter Expert 1 states, "That's a skill set we can start tracking [leading engineers] to say they've done something similar like this. Maybe they're interested in going into a data architect type role (a promotion)." Soft skills are universal across all consulting roles at the organization and have their own progression, as noted below.

Situational/Operational	Category	Skill	Novice	Expert
Situational- Humble	Empathy	Client Relations	Ability to respond to client requests, communicate status updates on in progress/outstanding work, and support the team member that hold relationships with the client	Proactive with client requests, anticipates the needs of clients, helps the client identify solutions to their pain points, presents work on behalf of others on the project. Builds trust quickly and appreciates uniqueness to a client's culture/politics.
Situational- Hungry	Passion/Expertise	Business Acumen	Have a basic understanding of the people and processes that help to make a business run.	Has extensive experience working cross functionally to know best practices for process and team effectiveness. Can contextualize oneself inside a new client company and its market
Situational- Smart	Fearless problem solving	Innovation and Creativity	Able to interpret and communicate business requirements to technical teams. They need to have a basic understanding of translating business needs into technical specifications and can think of simple solutions to solve those needs.	Excels in translating complex business requirements into technical requirements and ensuring alignment between business and technical teams. They possess strong analytical and problem-solving skills, allowing them to bridge the gap between business stakeholders and technical implementation teams. Can assist in developing solutions that may have never been done before.

Operational	Outcomes focused	Requirements Gathering	Expected to assist in gathering and documenting business requirements by conducting interviews, workshops, and surveys with stakeholders. They should have basic skills in eliciting requirements and documenting them in a clear and organized manner.	Possesses advanced skills in facilitating discussions, analyzing, and prioritizing requirements, and resolving conflicts among stakeholders. They have a deep understanding of various requirements gathering techniques and can effectively translate business needs into actionable requirements.
Operational		Scope Definition	Have a basic understanding of scoping projects and defining their boundaries. They should be able to assist in identifying project objectives, deliverables, and constraints within defined scope boundaries.	Has the expertise to define project scope effectively by conducting thorough analysis, identifying risks and assumptions, and defining clear boundaries. They are skilled in managing scope creep and ensuring projects stay on track.
Operational	Thoughtful Collaboration	Similarly Skilled Team Management	Novice ability/experience leading project work beyond your own contributions	Expert ability/experience leading project work beyond your own contributions
Operational		Variety-Skilled Team Management	Novice ability/experience leading project work beyond your own skills and expertise	Expert ability/experience leading project work beyond your own skills and expertise
Operational	Outcomes focused	Time Management	Completes assigned tasks and meets deadlines that are provided to them.	Identifies work and estimates the appropriate time it should take to complete. Establishes deadlines and works with members on the team to ensure they are hit. Appreciates budgetary constraints and the financial implications to hitting those goals on time.

Table 4

Using the process outlined in Data Collection and Analysis, the initial soft skill

consulting competency list was developed from a competency model that had been previously

used at the professional services firm and included six (6) soft skill consulting competencies

grouped into three (3) different categories. The second iteration of the soft skill consulting

competency list was developed from an interview with RMO subject matter experts (n=2). It

included six (6) different soft skill consulting competencies across three (3) different categories.

The third iteration of the soft skill consulting competency list developed from focus groups with

BI, DE, and DS subject matter experts and high performers brought the total to eight (8) soft skill consulting competencies across six (6) different categories with clarified levels of high and low proficiency. The first three iterations of the soft skills consulting competency list can be found in Appendix A.

Once again, a few quotes from the interviews that resulted in this final table are representative of the competency framework development process. Data Engineer Subject Matter Expert 1 identifies leadership as an important skill to watch for, "That's a skill set we can start tracking [leading engineers] to say they've done something similar like this. Maybe they're interested in going into a data architect type role (a promotion)." BI High Performer 1 notes that they are vigilant about client-facing skills during the hiring process, "When we are interviewing folks to kind of see where they're at with [requirements gathering], we tried to just get an idea of how comfortable they are having those conversations with clients." DS High Performer 1 also believes that the skill of working with clients is an important determinant, "Being able to communicate technical things to non-technical audiences, I think that's a call out for how one staffs a project.; can your Data Scientist be client facing."

Each of these quotes represents a change that the subject matter expert wished to address and, in turn, was incorporated into the final competency model, as you can see in Table 4 above.

VIII.   Recommendations

Based on our findings and the literature, we believe the following three recommendations are warranted and will serve the organization well if adopted.

Recommendation #1: Adopt best-practice governance of the competency framework.

As has been demonstrated in the body of this paper, the construction of the competency framework is an iterative process. We used rigorous job analysis methods in conversation with

the organization to define the language, proficiency levels, and appropriate degree of granularity for each competency and job family (Campion et al., 2011; Schippmann et al., 2000). In this way, we were sure to base the design of the competency framework with its categories, descriptors, and levels on the organizational context and ensure that it aligned with the current organizational strategy (Campion et al., 2011). Therefore, it is essential that the framework be reviewed on an annual basis and revised according to the established governance practices (see Figure 3 below and Appendix B for our proposed process). Changes to organizational strategy (business needs), emerging market trends (new skills), human resource modifications (new jobs), or operational demand (new techniques) could prompt revisions to the competency framework. Simply put, as organizational context and strategy shift, so should the competencies. We are glad that the Resource Management Office is prepared to take this vital step of creating and implementing governance practices. As RMO High Performer 1 states, "This is an iterative process; even after we get a final draft that we load into skills base, our goal is to build a process and governance around it."

Revisions to Resultant's Skills frameworks should consider evolving organizational needs and emerging market trends.

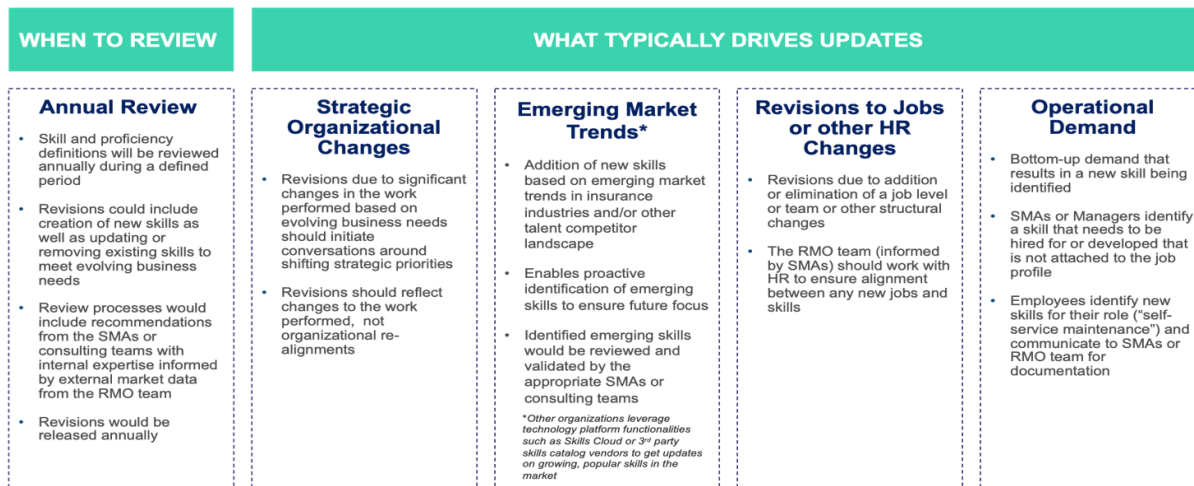| WHEN TO REVIEW	WHAT TYPICALLY DRIVES UPDATES			
Annual Review • Skill and proficiency definitions will be reviewed annually during a defined period • Revisions could include creation of new skills as well as updating or removing existing skills to meet evolving business needs • Review processes would include recommendations from the SMAs or consulting teams with internal expertise informed by external market data from the RMO team • Revisions would be released annually	**Strategic Organizational Changes** • Revisions due to significant changes in the work performed based on evolving business needs should initiate conversations around shifting strategic priorities • Revisions should reflect changes to the work performed, not organizational re-alignments	**Emerging Market Trends*** • Addition of new skills based on emerging market trends in insurance industries and/or other talent competitor landscape • Enables proactive identification of emerging skills to ensure future focus • Identified emerging skills would be reviewed and validated by the appropriate SMAs or consulting teams *Other organizations leverage technology platform functionalities such as Skills Cloud or 3rd party skills catalog vendors to get updates on growing, popular skills in the market	**Revisions to Jobs or other HR Changes** • Revisions due to addition or elimination of a job level or team or other structural changes • The RMO team (informed by SMAs) should work with HR to ensure alignment between any new jobs and skills	**Operational Demand** • Bottom-up demand that results in a new skill being identified • SMAs or Managers identify a skill that needs to be hired for or developed that is not attached to the job profile • Employees identify new skills for their role ("self-service maintenance") and communicate to SMAs or RMO team for documentation

Figure 3

Recommendation #2: Include both technical (hard) skills and managing clients (soft) skills in the competency framework.

During our rigorous job analysis process with the organization, it became vividly clear that client relations are a skill set that differentiates senior from junior level employees regardless of role within the professional services division, as is substantial experience with complex projects. It is essential, then, that both technical (hard) skills, including tools and processes, and working with and managing people (soft) skills are included in the competency framework, as both sets of skills are necessary for project success (Ravindranath, 2016) and determiners of expert status. The original scope of our project included identifying client-facing consulting skills, which were completed. However, the organization's leadership did not advance those skills into the project's next phase, which included self-assessment and framework validation. This leadership decision was made because it was felt that the client-facing skills were too much about employee evaluation and career pathing and outside the scope of the RMO's placement of talent on projects. Our findings make clear that the absence of soft consulting skills in the competency framework is an error that must be corrected. This sentiment is supported by comments made by some taking the self-assessment, such as by BI High Performer 1, "In the future, I'd also like to see some more questions around consulting skills. I feel like often during resourcing, we're specifically asked for "someone who's also a great consultant."

Recommendation #3: Align employee hiring, training, evaluation, promotion, and compensation with the competencies.

Research has made clear the competency categories and descriptors must have a direct connection to the organization's overall strategy not only to achieve critical objectives, including the financial return but also because they can and should have influence more effectively over

the entire employee lifecycle (Campion et al., 2011). Prior to the development of the competency framework for the entire professional services division, managers have been taking their own initiative. As to hiring, BI Subject Matter Expert 2 states, "For my team, at a minimum, you need to know one, but generally, we're hiring for multiple. You would need to have at least preferably used two or three. […] Usually, that is going to be Tableau, Power BI, and Looker." DE Subject Matter Expert 2 relates, "It's part of our hiring process. We test that they can do some querying that has aggregation and calculations in it." The new framework should be a touchstone for all hiring managers and used consistently during hiring activities. The same can be said for evaluation and promotion. According to DE High Performer 1, "The difference between a senior and not senior for us is the ability to really be able to lead and be able to deal with the client directly." These qualities that differentiate between a novice and an expert have now been specified in the framework and should be tracked by managers to evaluate employee development and serve as a referent for promotion decisions.

Employee behaviors ought to align with organizational strategy, even as that strategy evolves in response to the emerging market, and this has direct implications for employee talent development and career paths. The consulting organization is aware of the need to develop its employees as they have founded an internal "university." However, the curriculum on offer has yet to be aligned with the competencies identified in the framework. According to RMO High Performer 1, "People complete their skills assessment, and then we have a reoccurring process for us to continue to assess those individuals twice a year." This self-assessment, combined with their manager's, ought to provide a focused list of areas for skill development that can be pursued.

As an organization, they are trying to figure out what is unique and valuable about their approach to IT consulting. As shared by RMO High Performer 1, "We're trying to figure out what is the secret sauce that results in people that makes us different and special. By creating a competency framework that is conscientiously aligned with organization strategy through effective governance and ensuring that the framework informs every step of the employee lifecycle, they have in their grasp the "secret sauce." It remains for them to implement the competency framework at scale and link it to employee development (see Figure 4 below and Appendix B for our recommendations).

Governance Roles and Responsibilities

Role	Qualifications/Perspective	Responsibility
Steering Committee (SteerCo) The ultimate strategic authority that provides approval on critical milestones and drives alignment between the Skills Frameworks and Resultant's larger business priorities	• Ownership and clear insight into Resultant's larger strategic priorities • Executive view and leadership	• Challenges the RMO and HR teams to align the work to Resultant's business vision and strategy • Approves critical milestones and provides final decision on direction • Provides oversight to support executive decision making, program delivery, and program risk assessment and mitigation
Subject Matter Advisors The individuals who serve as decision makers to drive efficient outcomes and provide input and guidance on best practices related to their areas of expertise	• Expertise and extensive experience with consulting teams and the work being conducted	• Recommend leading practices based on their area of expertise • Advise on approvals for key decision points to ensure governance processes are appropriately designed/managed • Validate solutions proposed meet business and team needs • Share experiences and lessons learned on work in the field
Core Project Team The individuals who engage with key business stakeholders and SteerCo to ensure alignment with key design principles and maintenance of career architecture framework integrity. They also make recommendations on skills and plan design, implementation, and refinement actions	• Comprehensive knowledge of Skills Frameworks program and RMO journey to date, strategy, and activities • Active involvement in moving the program forward an ability to integrate key stakeholders across the program • Working experience with consulting teams and HR	• Engage with key business stakeholders and SteerCo to ensure alignment with key design principles • Manages the design and delivery of Skills Frameworks program • Manage/resolve escalated decisions, conflicts, and risks • Own the program outcome and value realization

Figure 4

IX.   Conclusion

A rigorously developed competency model that directly connects to an organization's strategy, that includes both technical (hard) and leadership (soft) competencies, and that aligns with human resource systems can create a competitive advantage (Campion et al., 2011). We expect the competency models developed for the Business Intelligence, Data Engineer, and Data Science roles at our partner organization will result in better project staffing. We also believe that when these models are used to support employees throughout their career lifecycle, the

company will find additional financial gain due to improved talent retention and development.

Our recommendations speak to this broader application of the competency model within the

professional services division and across the company.

X.   References

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XI.   Appendix A: Iterative Competency Model Iterations

The initial Business Intelligence list included the following 48 competencies grouped

into four (4) different categories, as shown in Table A:

Category	Subcategory	Skill
Business Analysis		Requirements Gathering
Business Analysis		Translate Business Requiremen
Business Analysis		Scope Definition
Business Analysis		Project Oversight
Business Analysis		Wireframing
Data Management		Data Querying
Data Management		Data Exploration
Data Management	ETL	Extract Data
Data Management	ETL	Transform Data
Data Management	ETL	Load Data
Data Management	Programming Languages	Python
Data Management	Programming Languages	SQL
Data Management	Programming Languages	R
Data Management	Programming Languages	C++
Data Management	ETL Tools	Talend
Data Management	Tools	Fivetran
Data Management	Tools	Pentaho
Data Management	Tools	Azure Data Factory
Data Management	Tools	Google Cloud Dataflow
Data Management	Tools	AWS Glue
Data Management	Tools	Matillion
Data Management	Tools	Hadoop
Data Management	Tools	Integrate.io
Data Management		Service/Hosting
Data Management	Database Solutions	Azure
Data Management	Database Solutions	AWS
Data Management	Database Solutions	Snowflake
Data Management	Database Solutions	BigQuery
Data Management	Database Solutions	BigTable
Data Visualization		Connect to Data Sources
Data Visualization		Data Modeling
Data Visualization		Calculations
Data Visualization		Visualization Development
Data Visualization		Device Layouts
Data Visualization		Publishing
Data Visualization	Data Visualization Tools	Tableau
Data Visualization	Data Visualization Tools	Looker
Data Visualization	Data Visualization Tools	Power BI
Data Visualization	Data Visualization Tools	Qlik
Data Visualization	Data Visualization Tools	Domo
Testing & Quality Assurance		Data Validation
Testing & Quality Assurance		Regression Testing
Testing & Quality Assurance		Test Plans
Testing & Quality Assurance		Performance Testing
Testing & Quality Assurance		Technical Documentation
Testing & Quality Assurance		Client Deliverables
Testing & Quality Assurance		Issue Identification
Testing & Quality Assurance		Troubleshooting

Table A

The second iteration of the Business Intelligence list included the following 25

competencies across the same four (4) different categories, as shown in Table B:

Category	Competency	Entry Level	High Performer
Business Analysis	Requirements Gathering	Expected to assist in gathering and documenting business requirements by conducting interviews, workshops, and surveys with stakeholders. They should have basic skills in eliciting requirements and documenting them in a clear and organized manner.	Possesses advanced skills in facilitating discussions, analyzing, and prioritizing requirements, and resolving conflicts among stakeholders. They have a deep understanding of various requirements gathering techniques and can effectively translate business needs into actionable requirements.
Business Analysis	Translate Business Requirements	Able to interpret and communicate business requirements to technical teams. They need to have a basic understanding of translating business needs into technical specifications and ensuring clarity and accuracy in the communication process.	Excels in translating complex business requirements into technical requirements and ensuring alignment between business and technical teams. They possess strong analytical and problem-solving skills, allowing them to bridge the gap between business stakeholders and technical implementation teams.
Business Analysis	Scope Definition	Have a basic understanding of scoping projects and defining their boundaries. They should be able to assist in identifying project objectives, deliverables, and constraints within defined scope boundaries.	Has the expertise to define project scope effectively by conducting thorough analysis, identifying risks and assumptions, and defining clear boundaries. They are skilled in managing scope creep and ensuring projects stay on track.
Business Analysis	Project Oversight	May have limited involvement in project oversight activities. They might assist in monitoring project progress, tracking milestones, and providing updates to stakeholders.	Takes on a leadership role and is responsible for monitoring and controlling project activities. They proactively identify and address project risks, manage stakeholder expectations, and ensure project delivery within specified timelines and budget constraints.
Business Analysis	Wireframing	Expected to have basic skills in creating wireframes or low-fidelity prototypes to visualize and communicate the layout and functionality of user interfaces. They use wireframing tools to depict the structure and navigation of report visualizations.	Possesses advanced skills in creating detailed wireframes, interactive prototypes, and mockups. They have a deep understanding of user-centered design principles, usability, and user experience (UX) best practices. Their wireframes effectively capture user requirements and serve as a blueprint for development teams.
Data Management	Data Querying	Able to write basic queries to retrieve data from databases using SQL or other query languages. They understand the fundamentals of querying databases and can perform simple data retrieval tasks.	Have advanced skills in writing complex queries and have a deep understanding of database systems, optimization techniques, and data manipulation. They can efficiently retrieve and filter large datasets, perform joins, and aggregate data for analysis purposes.

Data Management	Data Exploration	Able to explore and navigate datasets using basic data exploration techniques. They are familiar with basic statistical concepts and can summarize and visualize data to gain initial insights.	Possess advanced skills in using exploratory data analysis techniques to uncover patterns, trends, and relationships in complex datasets. They can apply statistical methods, employ data visualization tools, and identify key insights and actionable recommendations.
Data Management	Extract Data	Able to extract data from various sources such as databases, APIs, or files. They are familiar with basic data extraction methods and tools.	Have expertise in designing and implementing efficient data extraction processes. They can handle large-scale data extraction, perform data validation, and ensure data quality during the extraction process. They are also familiar with data integration and ETL (Extract, Transform, Load) processes.
Data Management	Transform Data	Able to perform basic data transformations such as cleaning and formatting data, handling missing values, and applying basic calculations.	Possess advanced skills in data cleansing, data normalization, data standardization, and data enrichment. They can develop complex data transformation pipelines and apply advanced data manipulation techniques to prepare data for analysis or reporting purposes.
Data Management	Load Data	Able to load data into databases or data storage systems following predefined procedures. They are familiar with basic data loading techniques and tools.	Have expertise in designing and optimizing data loading processes. They can handle large volumes of data, ensure data integrity during the loading process, and implement data validation and verification procedures.
Data Management	Platform Management	**Familiar with data visualization hosted platforms (Tableau Server, Power BI Service). They can navigate the platform comfortably and know how to publish visualizations to the platform.**	Has expertise in managing the front end of the data visualization platform. They can setup and manage permissions and other administrator functions on the platform, as well as advise on best practices around the front-end management of the platform.
Data Visualization	Connect to Data Sources	Able to establish connections to data sources using visualization tools or programming languages. They understand the basics of data connectivity and can retrieve data for visualization purposes.	Possess advanced skills in connecting to various data sources, including databases, APIs, and data lakes. They have expertise in data integration, data extraction, and building robust and scalable data pipelines for visualization.
Data Visualization	Data Modeling	Has a basic understanding of data modeling concepts, such as entities, attributes, and relationships. They can create simple data models and diagrams to represent data structures.	Possesses advanced skills in designing and implementing complex data models that accurately represent business requirements. They understand data modeling techniques, normalization, and optimization strategies. They can create efficient and scalable data models for visualization purposes.

Data Visualization	Calculations	Able to perform basic calculations and aggregations on data within visualization tools. They have a basic understanding of mathematical and statistical functions and can apply them to visualize data.	Has advanced skills in performing complex calculations, statistical analysis, and advanced data transformations within visualization tools. They can create calculated fields, build complex formulas, and apply advanced statistical models to derive meaningful insights from data.
Data Visualization	Visualization Development	Able to create basic visualizations, such as bar charts, line charts, and pie charts. They understand basic visualization principles and can represent data in a clear and understandable manner.	Have expertise in creating advanced and interactive visualizations using a wide range of visualization techniques and tools. They can design compelling dashboards, employ data storytelling techniques, and ensure effective data communication and engagement.
Data Visualization	Device Layouts	Possesses a basic understanding of device layouts and responsiveness. They can create simple layouts that adapt to different screen sizes and resolutions.	Possess advanced skills in designing responsive and optimized visualizations for various devices and platforms. They understand user experience considerations, accessibility, and usability principles. They can create visually appealing and user-friendly visualizations across different devices and screen sizes.
Data Visualization	Publishing	Able to publish visualizations within visualization tools or platforms. They understand the basic publishing workflows and can share visualizations with others.	Excel in publishing visualizations using advanced techniques, such as embedding visualizations in websites or applications, creating interactive presentations, and implementing scheduled data refreshes. They can effectively distribute and share visualizations with stakeholders and ensure data security and privacy.
Testing & Quality Assurance	Data Validation	Have a basic understanding of data validation techniques and can perform basic data quality checks. They can compare data against predefined rules or specifications and identify inconsistencies or anomalies.	Possess advanced skills in designing and implementing comprehensive data validation processes. They can create complex validation rules, perform data profiling, and ensure data accuracy, completeness, and consistency across multiple data sources.
Testing & Quality Assurance	Regression Testing	Able to perform basic regression testing by retesting previously tested functionalities to ensure they still work correctly after changes or updates. They understand the basics of regression testing concepts and processes.	Possess advanced skills in designing and executing regression test suites that cover a wide range of functionalities and scenarios. They have expertise in test automation, test case management, and identifying regression risks. They can ensure high-quality data by minimizing regression issues.

Testing & Quality Assurance	Test Plans	Have a basic understanding of test planning processes and can assist in creating basic test plans. They understand the importance of test coverage, test objectives, and test schedules.	Excel in developing comprehensive test plans that encompass all aspects of the testing process. They can identify testing objectives, define test scope, create test strategies, and allocate resources effectively. They ensure that testing activities align with project goals and quality standards.
Testing & Quality Assurance	Performance Testing	Have a basic understanding of performance testing concepts and can assist in executing basic performance tests to assess data visualization performance, scalability, and response times.	Possess advanced skills in diagnosing data visualization performance issues. They have expertise in performance monitoring tools, analyzing performance metrics, and identifying performance bottlenecks within data visualizations. They can optimize data visualization performance and ensure scalability and reliability.
Testing & Quality Assurance	Technical Documentation	Able to assist in creating basic technical documentation, such as test cases, test scripts, and test result reports. They understand the importance of documenting testing activities and outcomes.	Excel in creating comprehensive technical documentation that covers all aspects of testing, including test plans, test cases, test scripts, and data issue reports. They ensure that documentation is clear, well-organized, and easily accessible to stakeholders.
Testing & Quality Assurance	Client Deliverables	Have a basic understanding of client deliverables and can assist in preparing and delivering basic testing-related deliverables, such as test summaries or defect reports.	Possess advanced skills in creating and delivering high-quality data testing deliverables tailored to client requirements. They can generate detailed test reports, provide insightful recommendations, and effectively communicate testing results to clients and stakeholders.
Testing & Quality Assurance	Issue Identification	Able to identify and report basic data issues during the testing process. They have a basic understanding of data issue tracking tools and can assist in documenting and communicating issues.	Excel in identifying and analyzing complex data issues, conducting root cause analysis, and providing detailed information to development teams. They can prioritize and escalate issues effectively and collaborate with cross-functional teams to resolve issues promptly.
Testing & Quality Assurance	Troubleshooting	Have a basic understanding of troubleshooting techniques and can assist in investigating and resolving basic issues or problems encountered during testing activities.	Possess advanced troubleshooting skills and can independently investigate and resolve complex data issues or problems. They have expertise in data troubleshooting techniques and log analysis (where applicable). They can identify and implement effective solutions to ensure smooth data testing and high-quality deliverables.

Table B

The third iteration of the Business Intelligence list removed one (1) competency to bring the total to 24 technical competencies across the same four (4) different categories with clarified levels of high and low proficiency, as shown in Table C:

Category	Competency	Entry Level	High Performer
Data Management	Data Querying	Able to write basic queries to retrieve data from databases using SQL or other query languages. They understand the fundamentals of querying databases and can perform simple data retrieval tasks.	Have advanced skills in writing complex queries and have a deep understanding of database systems, optimization techniques, and data manipulation. They can efficiently retrieve and filter large datasets, perform joins, and aggregate data for analysis purposes.
Data Management	Data Exploration	Able to explore and navigate datasets using basic data exploration techniques. They are familiar with basic statistical concepts and can summarize and visualize data to gain initial insights.	Possess advanced skills in using exploratory data analysis techniques to uncover patterns, trends, and relationships in complex datasets. They can apply statistical methods, employ data visualization tools, and identify key insights and actionable recommendations.
Data Management	Extract Data	Able to extract data from various sources such as databases, APIs, or files. They are familiar with basic data extraction methods and tools.	Have expertise in designing and implementing efficient data extraction processes. They can handle large-scale data extraction, perform data validation, and ensure data quality during the extraction process. They are also familiar with data integration and ETL (Extract, Transform, Load) processes.
Data Management	Transform Data	Able to perform basic data transformations such as cleaning and formatting data, handling missing values, and applying basic calculations.	Possess advanced skills in data cleansing, data normalization, data standardization, and data enrichment. They can develop complex data transformation pipelines and apply advanced data manipulation techniques to prepare data for analysis or reporting purposes.

Data Management	Load Data	Able to load data into databases or data storage systems following predefined procedures. They are familiar with basic data loading techniques and tools.	Have expertise in designing and optimizing data loading processes. They can handle large volumes of data, ensure data integrity during the loading process, and implement data validation and verification procedures.
Data Management	Programming Languages	Experienced in SQL with an understanding of SQL syntax, queries, modifiers, and calculations.	Possess advanced skills in SQL.
Data Management	Data Management Tools	Some familiarity with data management tools, including but not limited to: - Talend - Alteryx - Fivetran - Pentaho - Azure Data Factory - Google Cloud Dataflow - AWS Glue - Matillion - Hadoop - Integrate.io	Proficiency in 2-3 of the following data management tools: - Talend - Alteryx - Fivetran - Pentaho - Azure Data Factory - Google Cloud Dataflow - AWS Glue - Matillion - Hadoop - Integrate.io
Data Management	Platform Management	Familiar with data visualization hosted platforms (Tableau Server, Power BI Service). They can navigate the platform comfortably and know how to publish visualizations to the platform.	Possesses advanced skills in data visualization hosted platform management. They can advise on, manage, and execute the initial design, set-up, and configuration of Tableau or Power BI Service for a variety of service models and client types. They are an expert in service offerings, pricing, and compatibility. They work closely with the infrastructure team to set up servers for these hosted platforms, when necessary.
Data Management	Database Solutions	Some familiarity with database solutions, including but not limited to: - Azure - AWS - Snowflake - BigQuery - BigTable	Proficiency in 2-3 of the following database solutions, including but not limited to: - Azure - AWS - Snowflake - BigQuery - BigTable

Data Visualization	Connect to Data Sources	Able to establish connections to data sources using visualization tools or programming languages. They understand the basics of data connectivity and can retrieve data for visualization purposes.	Possess advanced skills in connecting to various data sources, including databases, APIs, and data lakes. They have expertise in data integration, data extraction, and building robust and scalable data pipelines for visualization.
Data Visualization	Data Modeling	Has a basic understanding of data modeling concepts, such as entities, attributes, and relationships. They can create simple data models and diagrams to represent data structures.	Possesses advanced skills in designing and implementing complex data models that accurately represent business requirements. They understand data modeling techniques, normalization, and optimization strategies. They can create efficient and scalable data models for visualization purposes.
Data Visualization	Calculations	Able to perform basic calculations and aggregations on data within visualization tools. They have a basic understanding of mathematical and statistical functions and can apply them to visualize data.	Has advanced skills in performing complex calculations, statistical analysis, and advanced data transformations within visualization tools. They can create calculated fields, build complex formulas, and apply advanced statistical models to derive meaningful insights from data.
Data Visualization	Visualization Development	Able to create basic visualizations, such as bar charts, line charts, and pie charts. They understand basic visualization principles and can represent data in a clear and understandable manner.	Have expertise in creating advanced and interactive visualizations using a wide range of visualization techniques and tools. They can design compelling dashboards, employ data storytelling techniques, and ensure effective data communication and engagement.
Data Visualization	Device Layouts	Possesses a basic understanding of device layouts and responsiveness. They can create simple layouts that adapt to different screen sizes and resolutions.	Possess advanced skills in designing responsive and optimized visualizations for various devices and platforms. They understand user experience considerations, accessibility, and usability principles. They can create visually appealing and user-friendly visualizations across different devices and screen sizes.

Data Visualization	UI/UX Design and Wireframing	Possesses a basic understanding of visualization and UI/UX best practices with basic skills in creating wireframes or low-fidelity prototypes to visualize and communicate the layout and functionality of user interfaces. They can advise on chart types and dashboard layouts to effectively communicate data. They use wireframing tools to depict the structure and navigation of report visualizations.	Possesses advanced skills in designing highly effective visualizations, visual communications, and data stories, including creating detailed wireframes, interactive prototypes, and mockups. They have a deep understanding of user-centered design principles, accessibility, usability (testing), and user experience (UX) best practices. Expert in planning and conducting user research to optimize information architecture. Their wireframes effectively capture user requirements and serve as a blueprint for development teams. Knowledge of coding/visualization platform is required.
Data Visualization	Publishing	Able to publish visualizations within visualization tools or platforms. They understand the basic publishing workflows and can share visualizations with others.	Excel in publishing visualizations using advanced techniques, such as embedding visualizations in websites or applications, creating interactive presentations, and implementing scheduled data refreshes. They can effectively distribute and share visualizations with stakeholders and ensure data security and privacy.
Data Visualization	Data Visualization Tools	Experienced with Tableau or PowerBI with exposure to the other and all the following tools: - Qlik - Looker	Expert in Tableau or PowerBI with proficiency in the other and all the following tools: - Qlik - Looker
Testing & Quality Assurance	Data Validation	Have a basic understanding of data validation techniques and can perform basic data quality checks. They can compare data against predefined rules or specifications and identify inconsistencies or anomalies.	Possess advanced skills in designing and implementing comprehensive data validation processes. They can create complex validation rules, perform data profiling, and ensure data accuracy, completeness, and consistency across multiple data sources.

Testing & Quality Assurance	Regression Testing	Able to perform basic regression testing by retesting previously tested functionalities to ensure they still work correctly after changes or updates. They understand the basics of regression testing concepts and processes.	Possess advanced skills in designing and executing regression test suites that cover a wide range of functionalities and scenarios. They have expertise in test automation, test case management, and identifying regression risks. They can ensure high-quality data by minimizing regression issues.
Testing & Quality Assurance	Test Plans	Have a basic understanding of test planning processes and can assist in creating basic test plans. They understand the importance of test coverage, test objectives, and test schedules.	Excel in developing comprehensive test plans that encompass all aspects of the testing process. They can identify testing objectives, define test scope, create test strategies, and allocate resources effectively. They ensure that testing activities align with project goals and quality standards.
Testing & Quality Assurance	Performance Testing	Have a basic understanding of performance testing concepts and can assist in executing basic performance tests to assess data visualization performance, scalability, and response times.	Possess advanced skills in diagnosing data visualization performance issues. They have expertise in performance monitoring tools, analyzing performance metrics, and identifying performance bottlenecks within data visualizations. They can optimize data visualization performance and ensure scalability and reliability.
Testing & Quality Assurance	Technical Documentation	Able to assist in creating basic technical documentation, such as test cases, test scripts, and test result reports. They understand the importance of documenting testing activities and outcomes.	Excel in creating comprehensive technical documentation that covers all aspects of testing, including test plans, test cases, test scripts, and data issue reports. They ensure that documentation is clear, well-organized, and easily accessible to stakeholders.
Testing & Quality Assurance	Client Deliverables	Have a basic understanding of client deliverables and can assist in preparing and delivering basic testing-related deliverables, such as test summaries or defect reports.	Possess advanced skills in creating and delivering high-quality data testing deliverables tailored to client requirements. They can generate detailed test reports, provide insightful recommendations, and effectively communicate testing results to clients and stakeholders.

Testing & Quality Assurance	Issue Identification and Troubleshooting	Able to identify and report basic data issues during the testing process. They have a basic understanding of data issue tracking tools, troubleshooting techniques, and can assist in not only documenting and communicating issues but investigating and resolving basic issues or problems encountered during testing activities.	Excel in identifying and analyzing complex data issues, conducting root cause analysis, and providing detailed information to development teams. They can prioritize and escalate issues effectively and collaborate with cross-functional teams to resolve issues promptly. Possess advanced troubleshooting skills and can independently investigate and resolve complex data issues or problems. They have expertise in data troubleshooting techniques and log analysis (where applicable). They can identify and implement effective solutions to ensure smooth data testing and high-quality deliverables.

Table C

The initial Data Engineering list included the following 57 competencies grouped into

four (4) different categories, as shown in Table D:

Category	Subcategory	Skill
Pre-Development		Requirements Gathering
Pre-Development		Time Management
Pre-Development		Database Models
Pre-Development		Architectural Design
ETL		Data Connections
ETL		Data Extraction
ETL		Data Transformation
ETL		Data Loading
ETL		Data Standardization
ETL		Data Cleansing
ETL	ETL Tools	Matillion
ETL	ETL Tools	Talend
ETL	ETL Tools	FiveTran
ETL	ETL Tools	Pentaho
ETL	ETL Tools	Integrate.io
ETL	ETL Tools	Google
ETL	ETL Tools	Cloud
ETL	ETL Tools	Data
ETL	ETL Tools	Flow
ETL	ETL Tools	Azure
ETL	ETL Tools	Data
ETL	ETL Tools	Factory
ETL	ETL Tools	AWS
ETL	ETL Tools	Glue
DE- Data Management		Data Querying
DE- Data Management		Data Aggregation
DE- Data Management		Calculations
DE- Data Management		Data Modeling
DE- Data Management		Data Operations
DE- Data Management		Secure Data Connections
DE- Data Management	Programming Languages	Python
DE- Data Management	Programming Languages	C#
DE- Data Management	Programming Languages	SQL
DE- Data Management	Programming Languages	JavaScript
DE- Data Management	Programming Languages	R
DE- Data Management	Programming Languages	C++
DE- Data Management	Cloud Platforms	AWS
DE- Data Management	Cloud Platforms	Azure
DE- Data Management	Cloud Platforms	GCP
DE- Data Management	NoSQL Databases	MongoDB
DE- Data Management	NoSQL Databases	CouchDB
DE- Data Management	NoSQL Databases	Cosmos
DE- Data Management	Graph Databases	Neo4j
DE- Data Management	Graph Databases	Cosmos DB
DE- Data Management	Graph Databases	Neptune
DE- Data Management	Big Data/Distribution Tools	Hadoop
DE- Data Management	Big Data/Distribution Tools	Spark
DE- Data Management	Big Data/Distribution Tools	Cloudera
DE- Data Management	Big Data/Distribution Tools	Databricks
Testing, Quality Assurance & UAT		Data Validation
Testing, Quality Assurance & UAT		Regression Testing
Testing, Quality Assurance & UAT		Developing Testing Plans
Testing, Quality Assurance & UAT		Conducting Testing
Testing, Quality Assurance & UAT		Technical Documentation
Testing, Quality Assurance & UAT		Client Deliverables
Testing, Quality Assurance & UAT		Issue Identification
Testing, Quality Assurance & UAT		Troubleshooting

Table D

The second iteration of the Data Engineering list included the following 16

competencies grouped into four (4) different categories, as shown in Table E:

Category	Competency	Entry Level	High Performer
Business Analysis	Requirements Gathering	Expected to assist in gathering and documenting business requirements by conducting interviews, workshops, and surveys with stakeholders. They should have basic skills in eliciting requirements and documenting them in a clear and organized manner.	Possesses advanced skills in facilitating discussions, analyzing, and prioritizing requirements, and resolving conflicts among stakeholders. They have a deep understanding of various requirements gathering techniques and can effectively translate business needs into actionable requirements.
Business Analysis	Translate Business Requirements	Able to interpret and communicate business requirements to technical teams. They need to have a basic understanding of translating business needs into technical specifications and ensuring clarity and accuracy in the communication process.	Excels in translating complex business requirements into technical requirements and ensuring alignment between business and technical teams. They possess strong analytical and problem-solving skills, allowing them to bridge the gap between business stakeholders and technical implementation teams.
Business Analysis	Scope Definition	Have a basic understanding of scoping projects and defining their boundaries. They should be able to assist in identifying project objectives, deliverables, and constraints within defined scope boundaries.	Has the expertise to define project scope effectively by conducting thorough analysis, identifying risks and assumptions, and defining clear boundaries. They are skilled in managing scope creep and ensuring projects stay on track.
Business Analysis	Project Coordination	May have limited involvement in project coordination activities. They might assist in monitoring project progress, tracking milestones, and providing updates to stakeholders.	Takes on a leadership role and is responsible for monitoring and controlling project activities. They proactively identify and address project risks, manage stakeholder expectations, and ensure project delivery within specified timelines and budget constraints.
Pre-Development	Time Estimation	Able to provide accurate and detailed time estimates	

Pre-Development	Database Models	Able to design and build out database models	
Pre-Development	Architectural Design	Able to design detailed data solutions	
ETL	Data Extraction, Transformation, and Loading (ETL)	Able to design and build ETL/ELT pipelines	
ETL	Data Standardization and Cleansing	Able to apply standardization and cleansing routines, and unit testing to data pipelines	Able to identify, design and apply standardization and cleansing routines, and unit testing to data pipelines
Testing & Validation	Data Validation	Able to validate data as instructed	Able to identify what data should be validated, how it should be validated and perform validation
Testing & Validation	Regression Testing	Able to perform provided regression testing	Able to design and perform regression testing
Testing & Validation	Conducting Testing	Able to conduct basic testing involving their own code	Able to conduct basic testing, including code that is not their own
Testing & Validation	Technical Documentation	Create documentation that needs to be reviewed by separate resource	Creates detailed technical documentation that is complete enough to not need reviewed by different resource
Testing & Validation	Issue Identification & Troubleshooting	Able to assist client with identifying issue	Able to work with clients to go beyond identified issues to diagnose root cause of the problem and conduct in-depth troubleshooting, involving all aspects of the data solution.
Relationship Management	Client Relations	Ability to build relationships with clients to ensure that their needs are met, they are satisfied with the services and/or products provided, and any challenges are overcome.	
Relationship Management	Interpersonal relations and communication	Ability to develop and maintain effective relationships and communications with internal and external stakeholders.	

Table E

The third iteration of the Data Engineering list included the following 10 technical competencies grouped into three (3) different categories, as shown in Table F:

Category	Competency	Entry Level	High Performer
Pre-Development	Time Estimation	Able to provide accurate and detailed time estimates	
Pre-Development	Database Models	Able to design and build out database models	
Pre-Development	Architectural Design	Able to design detailed data solutions	
ETL	Data Extraction, Transformation, and Loading (ETL)	Able to design and build ETL/ELT pipelines	
ETL	Data Standardization and Cleansing	Able to apply standardization and cleansing routines, and unit testing to data pipelines	Able to identify, design and apply standardization and cleansing routines, and unit testing to data pipelines
Testing & Validation	Data Validation	Able to validate data as instructed	Able to identify what data should be validated, how it should be validated and perform validation
Testing & Validation	Regression Testing	Able to perform provided regression testing	Able to design and perform regression testing
Testing & Validation	Conducting Testing	Able to conduct basic testing involving their own code	Able to conduct basic testing, including code that is not their own
Testing & Validation	Technical Documentation	Create documentation that needs to be reviewed by separate resource	Creates detailed technical documentation that is complete enough to not need reviewed by different resource
Testing & Validation	Issue Identification & Troubleshooting	Able to assist client with identifying issue	Able to work with clients to go beyond identified issues to diagnose root cause of the problem and conduct in-depth troubleshooting, involving all aspects of the data solution.

Table F

The initial Data Science list included the following 44 competencies grouped into five

(5) different categories, as shown in Table G:

Category	Subcategory	Skill
Research		Problem Definition
Research		Background Research
Data Synthesis		Connecting to Data Sources
Data Synthesis		Requirements Definition
Data Synthesis		Data Synthesis
Data Synthesis		Data Retrieval
Data Synthesis		On-Prem
Data Synthesis		Cloud
Data Synthesis	Cloud Platforms	AWS
Data Synthesis	Cloud Platforms	Azure
Data Synthesis	Cloud Platforms	GCP
Data Synthesis	NoSQL Databases	MongoDB
Data Synthesis	NoSQL Databases	CouchDB
Data Synthesis	NoSQL Databases	Cosmos
Data Synthesis	Graph Databases	Neo4j
Data Synthesis	Graph Databases	Cosmos DB
Data Synthesis	Graph Databases	Neptune
Data Exploration		Data Querying
Data Exploration		Longitudinal Analysis
Data Exploration	Programming Languages	Python
Data Exploration	Programming Languages	C#
Data Exploration	Programming Languages	SQL
Data Exploration	Programming Languages	JavaScript
Data Exploration	Programming Languages	R
Data Exploration	Programming Languages	C++
Data Exploration		Data Wrangling
Data Modeling		Supervised Learning Model Methods
Data Modeling		Unsupervised Learning Model Methods
Data Modeling	Data Visualization	Data Visualization
Data Modeling	Data Visualization	Tableau
Data Modeling	Data Visualization	Looker
Data Modeling	Data Visualization	Power BI
Data Modeling	Data Visualization	Qlik
Data Modeling	Data Visualization	Domo
Data Modeling	Data Visualization	Shiny
Data Modeling	Data Visualization	Plotly
Data Modeling		Version Control
Data Modeling		Statistical Modeling
Data Modeling	Container Technologies	Docker
Data Modeling	Development Toolkit	Git
Data Modeling	Development Toolkit	Jenkins
Model Performance Interpretation		Model Performance Metrics
Model Performance Interpretation		Contextualizing Model Results
Model Performance Interpretation		Technical Communication of Results

Table G

The second iteration of the Data Science list included the following 20 competencies across eight (8) different categories, as shown in Table H:

Category	Competency	Entry Level	High Performer
Research	Problem (or Requirements) Definition	Needs a well-defined set of requirements and parameter space to start defining the job to be done (i.e., clients come to the table with a good understanding of the problem to be solved.	Able to define a problem with minimal requirements from a client to help them see the art of the possible.
Research	Background Research	Able to understand and collect previous work done around a topic from tutorials, blogs, and some academic journals if applicable.	Additional deep dives on previous techniques and results while also speaking directly to SMEs about known methodology and research.
Research	Technical Writing & Documentation	Providing documentation for code and results that are accessible to a diverse audience. Some previous experience with handing off code/results to another technical person and enabling them to quickly take over the work.	Experience with more detailed and thorough documentation of code, results, and publication. Able to write and facilitate full knowledge transfers.
Research	Model/Algorithm Selection	Based on problem definition and required work there are relatively few options to select from. Some experience comparing model performance.	The needed model is more ambiguous and requires a deep understanding of what is applicable when.
Data Synthesis	Connecting to Data Sources	Most work is done from flat local files (mostly csv), or in an environment where a single database connection is provided. Some familiarity with connecting to cloud storage (e.g.S3).	Experience managing their own connections to databases and cloud storage. Capable of automating data pulls from public APIs and those requiring authentication (API credential management). More experience with schema driven files (e.g., parquet, JSON, etc.).
Data Synthesis	Data Retrieval	Most familiar with working from flat unstructured files or single databases. Some experience using APIs.	Familiar with structured flat files. Database connection management and troubleshooting. Extensive knowledge of APIs and how to retrieve and store data.
Data Synthesis	Cloud	Some exposure to various cloud environments and how they are used.	More experience working in cloud environments and how they are architected. More experience push data to/pulling from cloud storage.

Data Exploration	Data Querying	Understanding of basic SQL methods in relational databases, including SELECT, GROUP BY, WHERE, HAVING, JOINS (LEFT, RIGHT, FULL, CROSS) and when to use them. Some experience using R/Python in unison with SQL.	Experience with more advanced SQL methods, including Window functions, Common Table Expressions/Sub queries (stored procedures, query tuning and optimization, merge into, updates, deletes, inserts), etc. and when they should be used. Some experience with non-relational databases (document stores, graph databases, etc.). More experience with R/Python in unison with SQL, including data frame APIs (Spark).
Data Exploration	Longitudinal Analysis	Basic understanding of defining populations and developing the queries needed to build their touchpoints throughout time.	More advanced knowledge of population definition and algorithms that are applicable to longitudinal data. Larger datasets by volume and time scale.
Data Exploration	Data Wrangling	Capable of handling missing values, removing duplicate rows, basic feature engineering, all done mostly in R/Python.	Capable of handling data cleaning in larger datasets including missing values and duplicate data. Easily switches between SQL and R/Python to handle wrangling tasks. Experience translating data wrangling steps to automated pipelines.
Data Modeling	Supervised and Unsupervised Learning Model Methods	Able to identify when these models are applicable and how to choose the appropriate model based on problem and available data. Has experience using a single model for a given problem.	Additional experience in choosing models and combining models to produce better results.
Data Modeling	Statistical Modeling	Understanding of basic descriptive statistics and statistical tests.	Experience with more advanced statistical tests and probabilistic programing (Bayesian methods).
Tools	Version Control	Able to understand basic Git workflow (i.e., pull, branch, commit, push, pull, pull requests).	Able to conduct more advanced repository management activities (i.e., tagging, versions, rebasing, repository actions, merge conflicts)
Data Communication	Model Performance Metrics	High level measures of model performance and their implications (i.e., accuracy and precisions). Some experience presenting values to non-technical clients.	Knowledge of additional model performance metrics and how they relate to the problem definitions (i.e., recall, precision, specificity, errors, and bias). More experience presenting these results.
Data Communication	Technical Communication of Results	Writing up results in a way that is accessible to the client.	Communicates the results in a format that is accessible to technical and non-technical audiences. Could potentially lead to publishing white papers. Experience with published work.

Data Communication	Data Visualization	Basic experience in creating static visualizations with R and Python. Some exposure to creating dynamic visualizations with tools like Shiny/Plotly. Basic understanding of how to format data to be used by BI tools.	More advanced visualization and producing publication-ready plots. Experience publishing interactive visuals from Python/R or BI tools, including error bounds and confidence intervals in plots in an understandable way when applicable.
Data Communication	Results Interpretation	Focuses on the needed results of the problem definition.	Extends how the results may be applied beyond the scope of the original problem. Presents additional interesting results that came about as part of the work and has a plan for what could come next. Future phases enabled by work completed.
Algorithm Development and Production	Geocoding	Able to run ad-hoc geocoding tasks against an API if given clean address data. Understands the basic limitations and pitfalls of geocoded data.	Has experience with setting up pipelines to continuously geocode addresses and store the results. Experience efficiently geocoding large datasets (100Ks to 1MMs). More experience parsing and normalizing address data with something like libpostal. Experience monitoring and correcting geocoder performance.
Relationship Management	Client Relations	Ability to build relationships with clients to ensure that their needs are met, they are satisfied with the services and/or products provided, and any challenges are overcome.	
Relationship Management	Interpersonal relations and communication	Ability to develop and maintain effective relationships and communications with internal and external stakeholders.	

Table H

The third iteration of the Data Science list included the following 16 technical competencies across seven (7) different categories, as shown in Table I:

Category	Competency	Entry Level	High Performer
Research	Background Research	Able to understand and collect previous work done around a topic from tutorials, blogs, and some academic journals if applicable.	Additional deep dives on previous techniques and results while also speaking directly to SMEs about known methodology and research.
Research	Technical Writing & Documentation	Providing documentation for code and results that are accessible to a diverse audience. Some previous experience with handing off code/results to another technical person and enabling them to quickly take over the work.	Experience with more detailed and thorough documentation of code, results, and publication. Able to write and facilitate full knowledge transfers.
Research	Model/Algorithm Selection	Based on problem definition and required work there are relatively few options to select from. Some experience comparing model performance.	The needed model is more ambiguous and requires a deep understanding of what is applicable when.
Data Synthesis	Connecting to Data Sources	Most work is done from flat local files (mostly csv), or in an environment where a single database connection is provided. Some familiarity with connecting to cloud storage (e.g.S3).	Experience managing their own connections to databases and cloud storage. Capable of automating data pulls from public APIs and those requiring authentication (API credential management). More experience with schema driven files (e.g., parquet, JSON, etc.).
Data Synthesis	Cloud	Some exposure to various cloud environments and how they are used.	More experience working in cloud environments and how they are architected. More experience push data to/pulling from cloud storage.

Data Exploration	Data Querying	Understanding of basic SQL methods in relational databases, including SELECT, GROUP BY, WHERE, HAVING, JOINS (LEFT, RIGHT, FULL, CROSS) and when to use them. Some experience using R/Python in unison with SQL.	Experience with more advanced SQL methods, including Window functions, Common Table Expressions/Sub queries (stored procedures, query tuning and optimization, merge into, updates, deletes, inserts), etc. and when they should be used. Some experience with non-relational databases (document stores, graph databases, etc.). More experience with R/Python in unison with SQL, including data frame APIs (Spark).
Data Exploration	Longitudinal Analysis	Basic understanding of defining populations and developing the queries needed to build their touchpoints throughout time.	More advanced knowledge of population definition and algorithms that are applicable to longitudinal data. Larger datasets by volume and time scale.
Data Exploration	Data Wrangling	Capable of handling missing values, removing duplicate rows, basic feature engineering, all done mostly in R/Python.	Capable of handling data cleaning in larger datasets including missing values and duplicate data. Easily switches between SQL and R/Python to handle wrangling tasks. Experience translating data wrangling steps to automated pipelines.
Data Modeling	Supervised and Unsupervised Learning Model Methods	Able to identify when these models are applicable and how to choose the appropriate model based on problem and available data. Has experience using a single model for a given problem.	Additional experience in choosing models and combining models to produce better results.
Data Modeling	Statistical Modeling	Understanding of basic descriptive statistics and statistical tests.	Experience with more advanced statistical tests and probabilistic programing (Bayesian methods).
Tools	Version Control	Able to understand basic Git workflow (i.e., pull, branch, commit, push, pull, pull requests).	Able to conduct more advanced repository management activities (i.e., tagging, versions, rebasing, repository actions, merge conflicts)

Data Communication	Model Performance Metrics	High level measures of model performance and their implications (i.e., accuracy and precisions). Some experience presenting values to non-technical clients.	Knowledge of additional model performance metrics and how they relate to the problem definitions (i.e., recall, precision, specificity, errors, and bias). More experience presenting these results.
Data Communication	Technical Communication of Results	Writing up results in a way that is accessible to the client.	Communicates the results in a format that is accessible to technical and non-technical audiences. Could potentially lead to publishing white papers. Experience with published work.
Data Communication	Data Visualization	Basic experience in creating static visualizations with R and Python. Some exposure to creating dynamic visualizations with tools like Shiny/Plotly. Basic understanding of how to format data to be used by BI tools.	More advanced visualization and producing publication-ready plots. Experience publishing interactive visuals from Python/R or BI tools, including error bounds and confidence intervals in plots in an understandable way when applicable.
Data Communication	Results Interpretation	Focuses on the needed results of the problem definition.	Extends how the results may be applied beyond the scope of the original problem. Presents additional interesting results that came about as part of the work and has a plan for what could come next. Future phases enabled by work completed.
Algorithm Development and Production	Geocoding	Able to run ad-hoc geocoding tasks against an API if given clean address data. Understands the basic limitations and pitfalls of geocoded data.	Has experience with setting up pipelines to continuously geocode addresses and store the results. Experience efficiently geocoding large datasets (100Ks to 1MMs). More experience parsing and normalizing address data with something like libpostal. Experience monitoring and correcting geocoder performance.

Table I

XII.   Appendix B: Governance Recommendations

Skills Frameworks

Governance Recommendations

Purpose of Governance

- The focus of governance is to establish a standard structure and processes, so **skills stay refreshed and relevant in a structured manner**

- Skills governance should **define roles, responsibilities, and decision rights** to ensure accountability for skills strategy and maintenance, regular skill reviews and updates, and alignment between skill management and business needs

- Without governance, there is a risk of the **skills frameworks becoming outdated,** diluting the positive impact skills have on talent, learning and development and matching employees to the right work

Interim State

Maintenance of 2023 Skills through POC

After completing proof of concept, processes will need to be put in place to maintain and update skills in Skills Base:

- Track changes identified during the proof of concept

- Update skills in both Excel and Skills Base, if there are any future updates until proof of concept completed

- Begin planning for governance structure for post proof of concept

Future State Governance

Post Proof of Concept

- **Define processes** to govern skills in Skills Base post proof of concept

- **Establish ownership** by assigning roles and responsibilities through governance groups to streamline efforts

- **Ensure consistency** in reviewing and revising existing skills frameworks, maintaining user experience, and confirming consistency across talent processes

Governance Guiding Principles

1. Keep it **simple and practical,** yet relevant and useful

2. Curate applicable skills that apply to **the role**, while remaining flexible to evolving business needs

3. Ensure skills are integrated **across talent processes and practices**, with a focus on how they will be tactically deployed

4. Keep the **manager and employee point of view and experience** at the center of the work, considering internal feedback and external trends

5. Focus on the **future of work, skill needs**, and Resultant's business strategy

6. Drive **Skills Base capabilities and automation** to be prescriptive in skill tracking and evaluation

Governance Objectives

Clear, specific and consistent processes for decision-making	Role clarity to drive accountability for each governing group	Swift review and approval steps managed at the appropriate responsibility level	Clear process for refining and maintaining skills frameworks and processes	Standardized use of governance templates and tools

TO ACHIEVE THESE FUTURE STATE GOALS,

WE WANT TO

- ✓ Create and maintain the **Skills Frameworks**
- ✓ **Retain the design integrity** by following consistent, simple, and effective processes
- ✓ Provide a governing framework to **support efficient RMO operations**

WE WANT TO AVOID

- ✕ **Inconsistent application** of the skills frameworks
- ✕ **Undercutting investment** in the RMO processes

What Governance Is vs. Is Not

GOVERNANCE IS...   VS   ### GOVERNANCE IS NOT…

Centered around the **right people** making the **right decisions** at the **right level**

Streamlined, simple, and structured in order to **determine ownership and accountabilities**

Strategic about leveraging **individuals' specific expertise/experience** to make **quality, efficient, and effective decisions**

Change management, which supports employee awareness, understanding, and adoption of the Skills Frameworks program

Rigid and uncompromising, as the structure can adapt based on the needs of the program and Resultant overall

Dependent upon senior leadership's approval at each step, but rather empowering key decision making at lower levels

Governance Roles and Responsibilities

Role	Qualifications/Perspective	Responsibility
Steering Committee (SteerCo) The ultimate strategic authority that provides approval on critical milestones and drives alignment between the Skills Frameworks and Resultant's larger business priorities	• Ownership and clear insight into Resultant's larger strategic priorities • Executive view and leadership	• Challenges the RMO and HR teams to align the work to Resultant's business vision and strategy • Approves critical milestones and provides final decision on direction • Provides oversight to support executive decision making, program delivery, and program risk assessment and mitigation
Subject Matter Advisors The individuals who serve as decision makers to drive efficient outcomes and provide input and guidance on best practices related to their areas of expertise	• Expertise and extensive experience with consulting teams and the work being conducted	• Recommend leading practices based on their area of expertise • Advise on approvals for key decision points to ensure governance processes are appropriately designed/managed • Validate solutions proposed meet business and team needs • Share experiences and lessons learned on work in the field
Core Project Team The individuals who engage with key business stakeholders and SteerCo to ensure alignment with key design principles and maintenance of career architecture framework integrity. They also make recommendations on skills and plan design, implementation, and refinement actions	• Comprehensive knowledge of Skills Frameworks program and RMO journey to date, strategy, and activities • Active involvement in moving the program forward an ability to integrate key stakeholders across the program • Working experience with consulting teams and HR	• Engage with key business stakeholders and SteerCo to ensure alignment with key design principles • Manages the design and delivery of Skills Frameworks program • Manage/resolve escalated decisions, conflicts, and risks • Own the program outcome and value realization

Overall Governance Model and Accountability

The various governing bodies have complementary roles in governing the Skills Frameworks and related activities
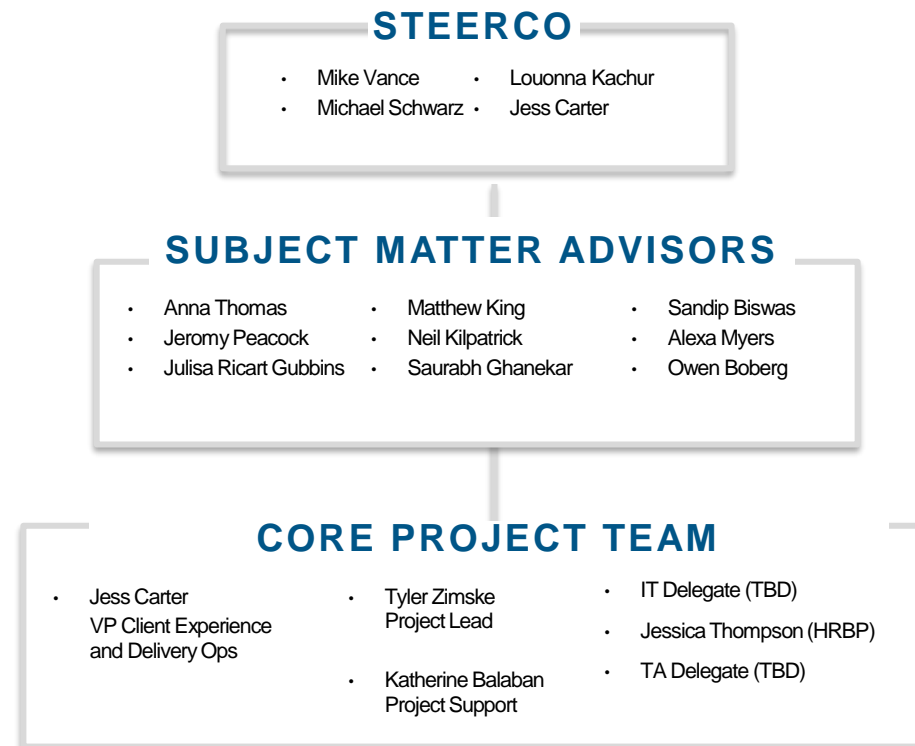
DECISION-MAKING ROLES

"Strategic"
- Set strategic direction, recommendations, and advise on funding
- Provide final approval on critical milestones and changes to frameworks
- Review annual summary activity

"Expertise"
- Leverage technical expertise
- Provide recommendations on key decision points and framework activity to drive efficient outcomes

"Ongoing Guidance"
- Engage with key business stakeholders and SteerCo to ensure alignment with key design principles and maintenance of framework integrity
- Plan and recommend skills design, implementation, procedures, technology processes, and refinement activities
- Draft key decision recommendations for SteerCo awareness and approval

STEERCO
- Mike Vance
- Michael Schwarz
- Louonna Kachur
- Jess Carter

SUBJECT MATTER ADVISORS
- Anna Thomas
- Jeromy Peacock
- Julisa Ricart Gubbins
- Matthew King
- Neil Kilpatrick
- Saurabh Ghanekar
- Sandip Biswas
- Alexa Myers
- Owen Boberg

CORE PROJECT TEAM
- Jess Carter
  VP Client Experience and Delivery Ops
- Tyler Zimske
  Project Lead
- Katherine Balaban
  Project Support
- IT Delegate (TBD)
- Jessica Thompson (HRBP)
- TA Delegate (TBD)

EXAMPLES OF KEY ACCOUNTABILITIES

"Strategic"
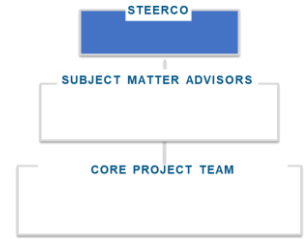- Changes to the skills frameworks
- Direction based on business needs

"Expertise"
- Design attributes that are within the guardrails

"Ongoing Guidance"
- Consistent adherence to Guiding Principles
- Surface business requests and refinements to frameworks and processes
- Document established procedures and technology processes

Steering Committee

CHARTER

PURPOSE

The Steering Committee will coordinate the development and rollout of skill framework efforts by providing guidance and decisions on priorities and policies affecting skills

KEY INTERACTIONS

Core Project Team submits progress and escalates roadblocks, requests, and policies / standards for approval

Core Project Team creates status reports for review and communicates decisions to Subject Matter Advisors

Subject Matter Advisors and Other Business Leads will be engaged to inform and review ongoing development

MEETINGS

AGENDA:
1. Status Report (Skills Base Summary)
2. Escalations for Decisions
3. Risk & Issue Resolution

Frequency: Biannually
Duration: 1 hour

Attendees: Chair, Committee Members, Stakeholders as needed

ROLES & RESPONSIBILITIES

Sponsor	Mike Vance	▪ Oversee all skills framework activities and ensures Executive Committee is well informed on progress
Chair	Jess Carter (Lead)	▪ Conduct Steering Committee meetings ▪ Develop RMO Strategy and roadmap ▪ Escalate issues to sponsor as needed
Committee Members	• Michael Schwarz, SVP Professional Services • Louonna Kachur, SVP Talent • Other Roles TBD	▪ Provide feedback on strategic priorities, goals, & KPIs for overall skills effort such as prioritization, technology enhancements, and capacity constraints ▪ Raise resource requests from Core Project Team and SMAs ▪ Raise challenges to support the resolution of risks and issues facing Core Project Team ▪ Drive and advocate for adoption of skills frameworks ▪ Monitor Skills Frameworks tech strategy/integration

Subject Matter Advisors (SMAs)
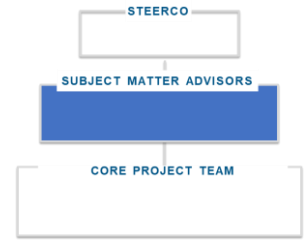
CHARTER

PURPOSE

Enable skills priorities as directed by the Steering Committee and Core Project Team, defining and overseeing activities to formalize the processes, standards, and technology by which skills frameworks will operate

INTERACTIONS

Steering Committee will provide direction and remove roadblocks to ensure group can execute tasks

Core Project Team will facilitate cross-workstream collaboration and engage Leadership as needed

Subject Matter Advisors will be engaged to make decisions that may not require escalation to the Steering Committee

MEETINGS

AGENDA:
1. Status Report (Skills Base)
2. Challenges/Risks
3. Framework Review
4. Any new change efforts

Frequency: Monthly or Quarterly
Duration: 30 mins to 1 hour

**Attendees:** Project Lead, Subject Matter Advisor Lead(s)

ROLES & RESPONSIBILITIES

SMA Lead(s)

1-2 Leads Per Subject Matter Area

SMAs are added and removed as needed. Initial leads include BI, Data Engineering, and Data Science

- Responsible for ongoing oversight of skills for individual teams
- Inform skills frameworks, conducting periodic review and updates
- Inform status reports and procedures by the Core Project Team and attend or present at Core Project Team and Steering Committee meetings as needed
- Create and oversee tactical activity-level revisions and additional POCs
- Escalate challenges and risks
- Develop recommendations for key decisions

Core Project Team
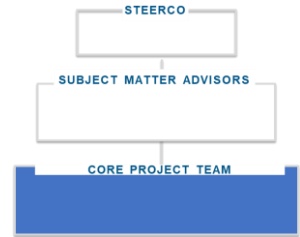
CHARTER

PURPOSE

The Core Project Team will serve as the centralized point of contact for the skills frameworks; informing, coordinating, and monitoring the teams involved with the application of the frameworks and supporting technology

INTERACTIONS

Steering Committee defines strategic direction and uses the Core Project Team to communicate decisions to Subject Matter Advisors

Subject Matter Advisors submit status reports, roadblocks, requests & deliverables to the Core Project Team for escalation

Talent Verticals will be engaged to make decisions that may not require escalation to the Steering Committee

MEETINGS

AGENDA:
1. Status Report (Skills Base)
2. Challenges/Risks
3. Framework Review

Frequency: Monthly or Quarterly
Duration: 30 mins to 1 hour

Attendees: Team Lead, Team Support, HRBP Delegate, TA Delegate, IT Delegate

ROLES & RESPONSIBILITIES

Role	Name	Responsibilities
Team Lead	Tyler Zimske	▪ Support SteerCo mtgs/exec requests and reports ▪ Facilitate Internal Core Project Team meetings ▪ Engage SteerCo Chair for decision making and updates ▪ Design and manage POCs and implementation ▪ Establish measurement approach for skills initiatives
Team Support	Katherine Balaban	▪ Support SteerCo mtgs/exec requests and reports ▪ Own master calendar & meeting logistics ▪ Track KPIs
HRBP TA Delegate	Jessica Thompson Name TBD	▪ Inform and consult on skills overlap and initiatives occurring out of HR
IT Delegate	Name TBD	▪ Maintain and support skills and RMO technology and integrations into other Resultant systems

WHEN & WHAT: Skills Governance

Revisions to Resultant's Skills frameworks should consider evolving organizational needs and emerging market trends.

WHEN TO REVIEW	WHAT TYPICALLY DRIVES UPDATES

Annual Review

- Skill and proficiency definitions will be reviewed annually during a defined period

- Revisions could include creation of new skills as well as updating or removing existing skills to meet evolving business needs

- Review processes would include recommendations from the SMAs or consulting teams with internal expertise informed by external market data from the RMO team

- Revisions would be released annually

Strategic Organizational Changes

- Revisions due to significant changes in the work performed based on evolving business needs should initiate conversations around shifting strategic priorities

- Revisions should reflect changes to the work performed, not organizational re-alignments

Emerging Market Trends*

- Addition of new skills based on emerging market trends in insurance industries and/or other talent competitor landscape

- Enables proactive identification of emerging skills to ensure future focus

- Identified emerging skills would be reviewed and validated by the appropriate SMAs or consulting teams

Other organizations leverage technology platform functionalities such as Skills Cloud or 3rd party skills catalog vendors to get updates on growing, popular skills in the market

Revisions to Jobs or other HR Changes

- Revisions due to addition or elimination of a job level or team or other structural changes

- The RMO team (informed by SMAs) should work with HR to ensure alignment between any new jobs and skills

Operational Demand

- Bottom-up demand that results in a new skill being identified

- SMAs or Managers identify a skill that needs to be hired for or developed that is not attached to the job profile

- Employees identify new skills for their role ("self-service maintenance") and communicate to SMAs or RMO team for documentation