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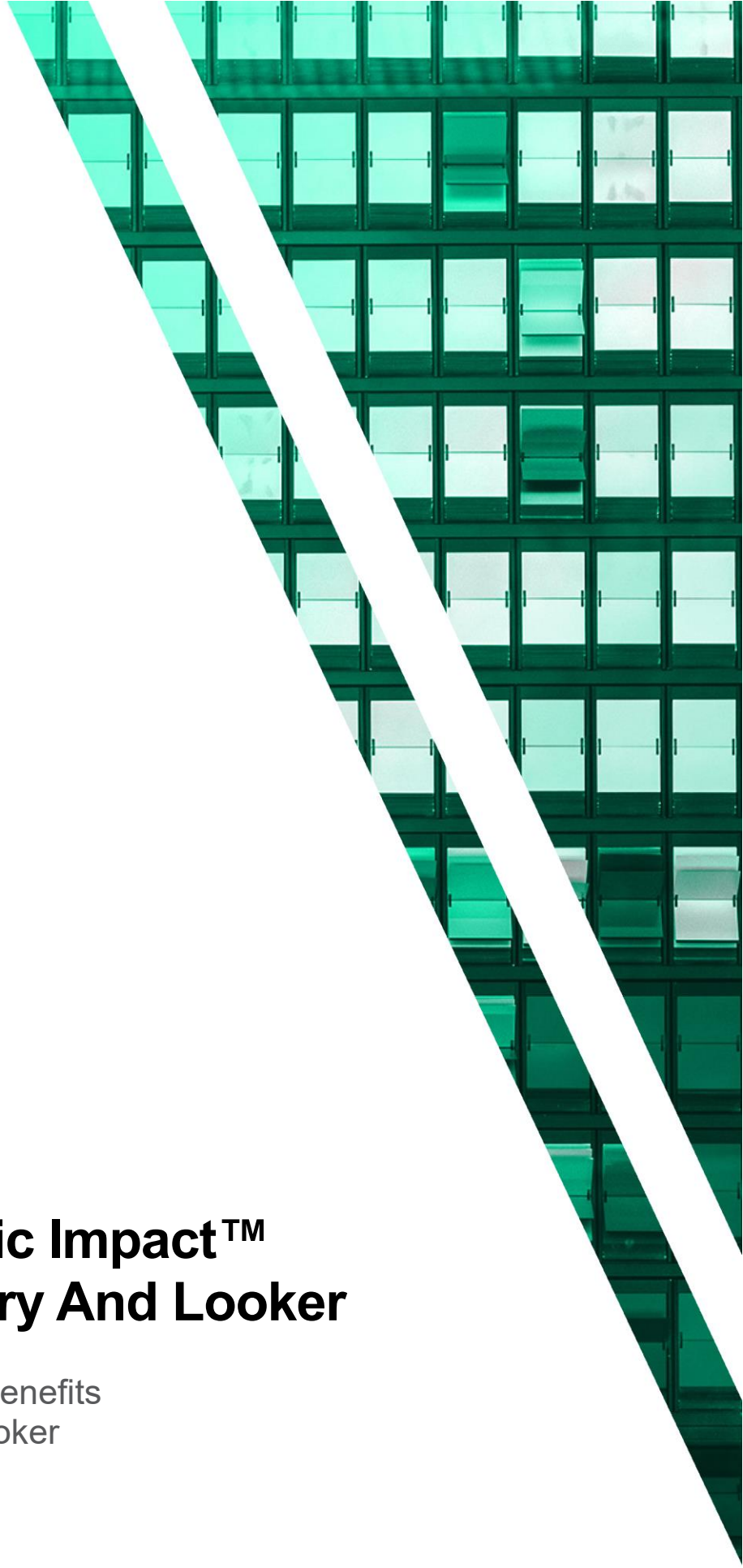

# The Total Economic Impact™ Of Google BigQuery And Looker

## Cost Savings And Business Benefits Enabled By BigQuery And Looker

**APRIL 2023**

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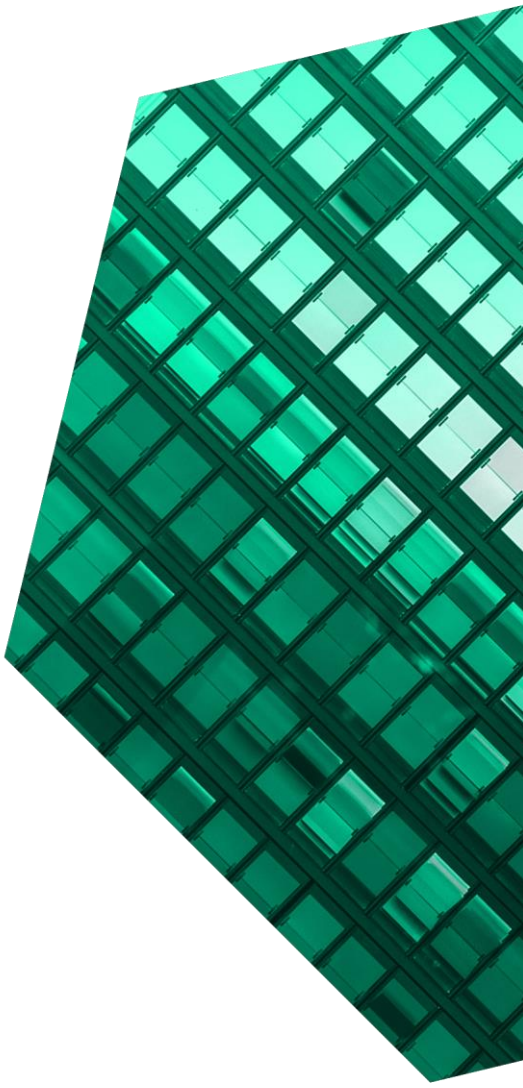

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Forrester provides independent and objective research-based consulting to help leaders deliver key transformation outcomes. Fueled by our customer-obsessed research, Forrester's seasoned consultants partner with leaders to execute on their priorities using a unique engagement model that tailors to diverse needs and ensures lasting impact. For more information, visit forrester.com/consulting.

## Executive Summary

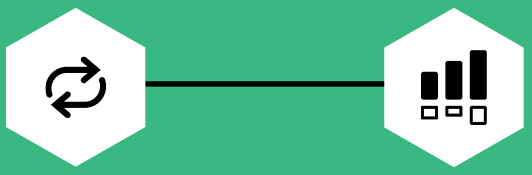
Google BigQuery and Looker enable organizations to improve and expand how their employees across their business get value from data. Increasing the efficiency of data analytics and engineering teams, giving business teams self-serve access to data and insights, and increasing data quality and availability allows organizations to benefit from improved decision-making and time savings. Ultimately, these wins can shorten time to value, increase sales, and improve customer retention.

Google BigQuery and Looker bring strong analytics and insights capabilities to the Google data cloud suite for organizations to maximize their data utilization. BigQuery is a fully managed serverless data warehouse that helps organizations analyze data at scale and supports a broad range of functions including data management, sharing and integration, querying, cross-cloud analytics, machine learning, and business intelligence (BI). Looker is a data analytics platform for BI and embedded analytics powered by a single source of truth. Its innovative semantic layer is powered by Looker Modeling Language (LookML) to extend trusted metrics to BI tools, embedded analytics, and custom data applications, and is integrated with Git for collaborative workflows and version control.

Combining BigQuery and Looker empowers non-technical employees to easily access and explore data and insights through dashboards and reports. They also allow product teams to build customer-facing data products and provide a powerful and scalable data foundation that meets the complex data needs of users across all types of teams. This enables business leaders to make decisions based on accurate and up-to-date data.

Google Cloud commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying BigQuery and Looker.[1] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of BigQuery and Looker on their organizations.

**KEY STATISTICS**



Return on investment (ROI)
**205%**

Net present value (NPV)
**$11.0M**

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed six representatives with experience using BigQuery and Looker. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single global composite organization that is a retail organization with over 10 million customers and revenue of $1 billion per year.

Prior to using BigQuery and Looker, the interviewees' organizations worked with multiple legacy tools for their data storage and analytics, often combining on-premises and cloud data services. In most cases, their existing tools could not deliver timely results and required excessive management and support. They lacked proper data visualization and insights capabilities and were unable to support the

organization's growth. These challenges meant that data was chronically underutilized across teams at the organizations and data analytics and engineering teams were already strained.

Integrating previously siloed data to BigQuery and Looker improved data quality and accessibility, and offered business teams self-serve access to data and insights. Distributed access to more connected and timely data strengthened data usage at the organization, which enhanced efficiency for technical data teams and end-users, improved decision-making, and ultimately increased sales and improved customer retention.

**KEY FINDINGS**

**Quantified benefits.** Three-year, risk-adjusted present value (PV) quantified benefits for the composite organization include:

- **Enhanced data analyst and engineer efficiencies saving $1.9 million in labor costs.** Better data, analytics, and visualization tools improves data quality and governance, enabling a team of 30 data analysts and engineers to be more efficient, thus increasing output. Data analysts do not need to wait for queries to run or face constant data requests from business teams, while data engineers can enjoy simplified internal processes for scaling data sources, pipelines, and deployments to meet growing data needs. The quickly growing organization would also have needed to hire additional data analysts to maintain operations at its natural level of growth if it had not invested in BigQuery and Looker.
- **Improved business user productivity, saving $6 million.** BigQuery and Looker provide customized reports, real-time data dashboards, and more comprehensive insights that help end-users save time with self-serve access to data and analyses. This self-sufficiency helps end-users and decision-makers make faster, more informed decisions and reduce time spent waiting for and debating key metrics.
- **Reduced reliance on legacy solutions, saving $921,000.** Investing in BigQuery and Looker eliminates the costs of legacy data storage and/or BI solutions. This includes license or subscription costs, the costs of maintenance, professional services, and resources to support the products. Systems administrators or similar resources can also be reallocated to conduct more valuable work.
- **Increased sales by 3.75% through improved time-to-market and data insights.** BigQuery and Looker encourages data usage throughout organizations to make decisions and improve business outcomes. Improved data quality, availability, and accessibility enhances productivity and helps business teams make more informed decisions. Real-time data access enhances product development and speeds up

**"BigQuery [with Looker] helps us run [queries] very fast and understand how to optimize what we are doing."**

*Technical leader, data and analytics, e-commerce*

Hours saved and reallocated by data analysts and data engineers annually:

**5,200**

new product launches. It also enables new or additional A/B testing to boost marketing efficiency, generate additional ad revenue, and improve products based on direct user data. Increased sales lead to $6.1 million in profit for the composite over three years.

- **Improved customer retention, delivering $1.4 million in profit.** BigQuery and Looker's data enrichment capabilities, improved data access, and flexibility in the design process helps detect patterns in customer behavior and preferences and improve services or products to meet customer desires and improve customer retention. BigQuery's analysis of customer data and alerts also allow identification of unhappy customers to take actions to retain them.

**Unquantified benefits.** Benefits that provide value for the composite organization but are not quantified in this study include:

- **Innovations in products and functional and competitive strategy.** Additional A/B testing and real-time data surfaced new ways to change products or services, streamline processes, and better serve customers. Business users with new exploratory data access can make discoveries by trying out additional cuts or analyses that they wouldn't have asked a data team for.
- **Flexibility in cloud decisions.** BigQuery Omni enables data transfers between clouds hosted by different cloud providers, allowing the pursuit of a multicloud strategy without sacrificing usability across the organization.
- **Reduced data errors and inconsistencies.** BigQuery and Looker's ease of use and unified access, combined with the benefit of consolidating multiple siloed data platforms, ensures KPIs and metrics are calculated consistently and efficiently. It also created a single source of truth for data users.

**"[Business users] feel like they own their data, and data is integrated with the decisions and what they are doing daily. That is just as powerful as the time savings that goes with it."**

*Senior analytics engineer, sports*

- **Empowerment of a data-driven culture and strategy mindset among business users.** Business users became more comfortable working with data directly with BigQuery and Looker, enabling increased trust in the data, and enhancing creative thinking around how to maximize their data use.
- **Improved employee experience (EX) and data literacy.** Trust in data allows for an overall cultural shift in the way employees across teams address decision-making. Decisions are no longer made without consulting data to inform strategies and track outcomes, thus increasing the likelihood of success for initiatives.
- **Better and faster decision-making.** BigQuery and Looker improves visibility and data access

**"We couldn't function without Looker just based on the amount of usage the entire company gets out of it."**

*Vice president of data and analytics, software*

for leadership, allowing decision-making based on more reliable and more up-to-date data.

- **Improved data governance.** Looker's powerful data governance controls and logs provides IT with more visibility into who has access to data queries or reports. IT also uses service accounts within BigQuery to manage access to different datasets.
- **Increased employee self-sufficiency and data responsibility.** As business employees take control and responsibility of their own data needs and usage, it improves their awareness and efficiency of their data usage.
- **Accelerated talent acquisition and employee training.** BigQuery is an easy and approachable place to teach employees SQL.

**Costs.** Three-year, risk-adjusted PV costs for the composite organization include:

- **Google technology and support costs of $3.5 million.** BigQuery pricing includes both the cost of processing queries and data storage costs, and customers can either pay according to the total amount of data processed per month or pay a flat rate fee based on the reserved quantity of resources made available for running queries. Looker has a more custom pricing model based on factors including the number and types of users, database connections, and the type of deployment. Support is sold as a percentage of cloud spend with a minimum spend.
- **Data warehouse migration and implementation costs of $575,000.** The composite spends $80,000 to work with a professional services team to help with implementation and optimization. It deploys 2.5 full time equivalent (FTE resources internally over 10 total months for the initial BigQuery data warehouse migration and testing, and 3.5 FTE resources to roll out BigQuery and Looker to all business teams over five months.
- **Training and ongoing management costs of $1.3 million.** The composite incurs internal labor costs associated with the time that about 500 technical and 1,500 business end-users of BigQuery and Looker spend on training. Ongoing management of BigQuery and Looker includes basic maintenance, support, and administration; the optimization of data architecture; and implementation of new access and usage across additional teams.

The representative interviews and financial analysis found that a composite organization experiences benefits of $16.3 million over three years versus costs of $5.3 million, adding up to a net present value (NPV) of $11 million and an ROI of 205%.

**"[In BigQuery and Looker, we found] something that connected to modern data sources, would auto scale as we got more and data and would be able to handle the complexity of our data queries more easily and modernize reporting."**

*Senior manager, BI, sports*

ROI
**205%**

BENEFITS PV
**$16.3M**

NPV
**$11.0M**

PAYBACK
**<6 months**

## Benefits (Three-Year)

## TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in BigQuery and Looker.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that BigQuery and Looker can have on an organization.

### DUE DILIGENCE

Interviewed Google stakeholders and Forrester analysts to gather data relative to BigQuery and Looker.

### INTERVIEWS

Interviewed six representatives at organizations using BigQuery and Looker to obtain data with respect to costs, benefits, and risks.

### COMPOSITE ORGANIZATION

Designed a composite organization based on characteristics of the interviewees' organizations.

### FINANCIAL MODEL FRAMEWORK

Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the interviewees.

### CASE STUDY

Employed four fundamental elements of TEI in modeling the investment impact: benefits, costs, flexibility, and risks. Given the increasing sophistication of ROI analyses related to IT investments, Forrester's TEI methodology provides a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

# The Google BigQuery and Looker Customer Journey

Drivers leading to the BigQuery and Looker investment

**Interviewees**

| Role | Industry | Region | Employees |
|---|---|---|---|
| Data platform architect | Retail | Headquartered in Europe | 88,000 |
| Technical leader of data and analytics | E-commerce | Headquartered in South America | 30,000 |
| Team lead of BI applications support | Financial services | Headquartered in North America | 11,000 |
| Senior data specialist | Retail | Headquartered in North America | 250 |
| Senior manager of BI | Sports | Headquartered in North America | 12,000 |
| Senior analytics engineer | Sports | Headquartered in North America | 12,000 |
| Vice president of data and analytics | Software | Headquartered in North America | 800 |

**KEY CHALLENGES**

Forrester spoke to representatives at six organizations with experience using BigQuery and Looker. Prior to deploying BigQuery and Looker, most of the interviewees' organizations worked with multiple legacy tools for their data storage and analytics needs, combined with on-premises and cloud data services. Larger organizations used a legacy data warehouse and BI platform while a few smaller organizations merely had a simple database and lacked a sophisticated BI tool. Often, additional software was required or utilized for data analysis, transfers, processing, or publishing.

The interviewees noted how their organizations struggled with challenges, including:

- **Excess time spent managing existing data infrastructure.** Nearly every interviewee noted that their organizations' IT, administrators, or engineers spent undue time on data preparation and managing their organization's data infrastructure. The senior data specialist at a retail organization told Forrester, "I don't want to spend time maintaining the platform, I want to spend time working with good data."
- **Limited end-user access to data and insights.** Existing data visualization or BI capabilities were

> **"Reporting in [our old tool] was pretty much impossible and it was unmaintainable. It was clunky, needed lot of development and was not user-friendly. We had rapidly growing data needs that couldn't be answered because it did not scale the way that we wanted it to, and we could not answer questions quickly enough."**
>
> *Senior data specialist, retail*

outdated, in need of development, and/or not user-friendly. Therefore, business teams across the organizations relied on centralized data analysts to run analyses and provide them with data. They had to make individual requests and wait for a data team to get to them, thus impeding them from taking full advantage of the data they could access without a time or personnel constraint.

**"I liked that everything was queried in real time."**

*Vice president of data and analytics, software*

- **A technology stack that could not support scale or handle queries within reasonable timeframes.** Prior tools lacked the power or memory to support the interviewees' organization's growth. Scaling with the same tools usually required a considerable financial investment in server deployment and capacity. When the interviewees' organizations looked to investing in a new tool, their reports needed a long time to run, and they had to be creative with how to query without running out of memory. The senior data specialist in retail said: "The backend that we had for that database did not keep up. We ran into scaling issues to the point where no data was extracting anymore because everything was just so heavy and our [tool] was not keeping up."
- **Distributed data and data analysis methods causing data inconsistencies and errors.** Without a single source of truth, multiple people often ran their own similar analyses while applying different logic and ended up with different values for the same KPI, even when presenting to leadership.
- **Disconnected tools.** Organizations using data tools or platforms from different software providers sometimes struggled to keep integrations supported and transfer data between systems. This prevented them from establishing a single source of truth between platforms and required a larger management effort.
- **Low data utilization hampering business growth and innovation.** Low data utilization stemming from time spent on low-value work and limited user access to data and insights prevented the organization from extracting the full value of its data. Analysts lacked the bandwidth and users lacked the opportunity to explore new areas for innovation or optimization, which stagnated innovation.

**INVESTMENT OBJECTIVES**

While most of the interviewees' organizations implemented and began working with BigQuery and Looker simultaneously often as part of a larger Google Cloud Platform (GCP)-centered data strategy, some started with one solution and later turned to the other to realize additional benefits from the cohesiveness of the two tools. To solve their challenges, the interviewees' organizations searched for a data warehousing solution that:

- Will enable scalability through auto-scaling and ability to handle complex queries and large datasets.
- Allows for real-time data analysis and insights.
- Is cloud-based and would require limited maintenance and database administrator (DBA) time to manage.
- Has flexible pricing options.

When looking for a BI solution, organizations wanted a tool that:

- Directly connects to modern databases without caching.
- Is developer-friendly.
- Has sophisticated data governance controls.
- Supports embedded analytics and APIs.
- Offers a high level of technical support.

Some interviewees noted Google's security, innovation, and open ecosystem across the tech stack as other reasons for choosing to deploy BigQuery and Looker among other cloud providers of data warehousing and BI solutions. Most tested the capabilities of BigQuery or Looker before committing to an investment. The vice president of data and analytics at a software organization noted the following when they were making their decision, "We loaded one day of data into BigQuery and for months, we would go back to that one day and we would throw different types of questions at it, different types of queries, and there was a whole lot of insight that we got out of that single day, just by coming up with some new types of questions."

**"The innovation that Google is trying to do everywhere on Alphabet globally, is exactly what [we are] doing internally on [our products]. They try something, sometimes it wins, sometimes it fails. What they love is to innovate. We were looking for a partner which has that mindset."**

*Data platform architect, retail*

**"Before we migrated to Looker, we heard that one number was presented in a presentation and the same number was presented in a different presentation and the two numbers were different and that would drive executives crazy. [Now] we very rarely, if at all, come across that scenario. If we do, it's usually just human error."**

*Senior analytics engineer, sports*

After evaluating multiple vendors, the interviewees' organizations chose and deployed BigQuery and/or Looker. The interviewees aimed to:

- Increase the scale, velocity, and timeliness of data usage across the organization, especially without incurring high costs.
- Democratize data and support business users' trust in data by giving them reliable self-service at scale, and reduce reliance on data analysts.
- Modernize the look and feel of their BI reporting.
- Create a single source of truth to improve data consistency and minimize errors.
- Innovate on and glean additional insights from their existing data with new capabilities.
- Consolidate tools and simplify management to reduce their costs and maintenance labor.

## COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and an ROI analysis that illustrates the areas financially affected. The composite organization is representative of the six organizations, and it is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

**Description of composite.** The global retail organization earns $1 billion in annual revenue. The organization has 4,500 employees and operates globally. The composite organization has a large customer base with over 10 million customers, and a strong online presence, with about half of its sales online. The average value of its products is $50 and its operating profit margin is 7.5%. The composite organization has a team of 16 data analysts and 14 data engineers that supports the data needs of the entire organization before the investment. The organization is growing quickly, with a 10% average annual growth rate before implementing BigQuery and Looker.

**Key Assumptions**

- **$1 billion annual revenue**
- **4,500 employees**
- **10% organic growth rate**
- **7.5% profit margin**

**Deployment characteristics.** BigQuery's technical usage grows from 200 employees in Year 1 to 300 in Year 3, and includes the data analyst and data engineering teams as well as DBAs, data architects, data scientists, IT team members, and additional distributed technical resources across business teams. There are 75 administrative and developer users of Looker. In Year 1, 920 end-users across business teams utilize BigQuery and Looker to obtain insights, including ad hoc queries and dashboards. The organization rolls out Looker with BigQuery to another 322 business end-users in Year 1 and 115 in Year 2. Main uses across the organization include data warehousing, data visualization, marketing team analytics, internal embedded analytics, simple forecasting modeling, and ad hoc queries.

**"[Our organization] is not an IT company — our job is not to maintain and manage servers. We are here to choose the best solution in the market and get insights from our data. That's exactly what we are trying to do with BigQuery."**

*Data platform architect, retail*

# Analysis Of Benefits

Quantified benefit data as applied to the composite

| Total Benefits | | | | | | |
|---|---|---|---|---|---|---|
| **Ref.** | **Benefit** | **Year 1** | **Year 2** | **Year 3** | **Total** | **Present Value** |
| Atr | Enhanced data analyst and data engineering efficiency | $443,953 | $799,394 | $1,048,104 | $2,291,452 | $1,851,707 |
| Btr | Improved business user productivity | $2,091,740 | $2,614,923 | $2,614,923 | $7,321,586 | $6,027,305 |
| Ctr | Reduced reliance on legacydata warehousing and BI solutions | $330,600 | $393,300 | $393,300 | $1,117,200 | $921,079 |
| Dtr | Increased sales | $1,912,500 | $2,629,688 | $2,892,656 | $7,434,844 | $6,085,227 |
| Etr | Improved customer retention | $419,998 | $545,760 | $756,207 | $1,721,966 | $1,401,008 |
| | Total benefits (risk-adjusted) | $5,198,791 | $6,983,065 | $7,705,191 | $19,887,047 | $16,286,326 |

### ENHANCED DATA ANALYST AND DATA ENGINEERING EFFICIENCY

**Evidence and data.** With better data quality, governance, and analytics due to the implementation of BigQuery and Looker, data analysts and engineers work more efficiently, accurately, and collaboratively. Data analysts spend less time waiting for queries to run and are no longer bogged down by constant data requests from business teams. Data engineers save time with simplified internal processes for setting up data sources and adding new pipelines, provisioning, and deployments to meet growing data needs.

For organizations that are growing quickly, additional data analysts need to have been hired to maintain operations at the organization's natural level of growth if they had not invested in BigQuery and Looker. These organizations save on hiring costs and salaries of these professionals they avoided hiring with BigQuery and Looker. The vice president of data and analytics at a software organization noted: "We save a lot of engineering resources because we can share data really easily and really quickly."

**"One of the top three [benefits] is the self-service point where the BI team no longer needs to be creating queries. Our users can create their own content in Looker… it allows the company to scale and we don't have to scale the BI team at the same rate."**

*Senior analytics engineer, sports*

- Data analysts saved the most time by offloading most day-to-day data requests to business users, sharing specific BigQuery data sets or projects with business teams and giving them access to data dashboards in Looker. Larger business teams often had the resources for team members to write their own queries and create their own content in Looker, thus saving analysts

communication and analysis time with each reduced request. The senior data specialist in retail noted, "[Before BigQuery and Looker,] I would be writing the queries to extract the data and then handing it over to the business and going through a back and forth where they decided that they needed more data to answer the question."

**"Today we can run a query against BigQuery and get results in less than a minute, in seconds. Before, we had system that would take all night to run a job."**

*Technical leader, data and analytics, e-commerce*

- Smaller teams often leveraged dashboards that were created for them. While data analysts still had to build the dashboards up front, the reduction in time spent responding to one-off or constant requests for data updates outweighed the upfront investment. The senior analytics engineer at a sports organization explained: "If something's broken, they don't have to come back to us [to fix it]. Down the road something's going to need to be changed. There may be 40 hours to learn the data and build the dashboards to begin with, but there's time saved moving forward, one hour a week or so."
- The creation of reports or dashboards was also made more efficient. Previously, analysts faced a long process to build new reporting products or even make small modifications to existing reports. With BigQuery and Looker, they could create new reports and make changes faster. Looker Blocks provide pre-built data models for common data sources, models, and analytics. Users can use Looker Blocks' SQL patterns to fully launch simple data models as starting points and then customize them to fit their own use. The senior data specialist at the retail organization said: "[With Looker Blocks], you get a pop up, fill in some data and you're good to go. Somebody else maintains that codebase, so that's always nice."
- BigQuery ensured that data was clean, accurate, and reliable, reducing the time data engineers needed to spend cleaning and pre-processing data. Data engineers trusted pipelines to run correctly and avoided monitoring and remediation time spent addressing failed queries or lack of availability. The senior data specialist in retail noted: "My whole workload changed significantly, and I went from spending days upon days just fetching and cleaning data to 'here's the configuration'. I was adjusting it every day, or week, or month — that's a huge time switch."
- BigQuery also increased data accessibility and availability to data analysts and engineers to access the data they needed more quickly, without having to spend time searching for or manually compiling data. The retail data platform architect shared, "The time it takes to enter new data and have it available at the end of the

**"In one case, metrics for sellers, we had a team of eight people, and it took three quarters or a year of development. We achieved the same result with BigQuery and Looker in one quarter."**

*Technical leader, data and analytics, e-commerce*

workflow in a visualization tool has reduced by a crazy amount, I would say from an hour to less than a minute."

- BigQuery, Looker, and the Google Cloud ecosystem provide data analysts and engineers with access to advanced analytics tools that can help them to derive insights more efficiently and effectively. These range from data visualization software to embedded analytics, to machine learning algorithms that can automate data analysis and provide new insights. The e-commerce technical leader of data and analytics described: "We had the approach to develop everything as APIs. We changed that, so it doesn't need to be an API and a service and a front end. We can do the same with just modeling the problem and embedding."
- BigQuery and Looker also facilitated collaboration by providing a common platform for data sharing and analysis between data analysts, engineers, and other stakeholders, aligning data-related activities and encouraging better communication and coordination. The vice president of data and analytics at a software company said, "What really saves us time is enabling and empowering the broader company with actionable data, and then we just focus on how you make this actionable, how you make it represent this thing that we think matters."

**"The time it takes to enter new data and have it available at the end of the workflow in a visualization tool has reduced by a crazy amount, I would say from hour to less than a minute."**

*Data platform architect, retail*

**"It gives you between 20 and 30% of your time [back], now we have more time to focus on new technology."**

*Data platform architect, retail*

- BigQuery's autoscaling, cloud APIs, and common development tools eliminated time previously spent scaling legacy data solutions and setting up new data sources for ingestion to keep pace with growing data needs. Human-intensive projects to keep up with scale were also avoided. The senior manager of BI in the sports company explained: "Data is exploding exponentially now. … With our [old] on-prem database, we would have a month-long project on 'how do we improve this? How do we get more storage and compute onto the box so that we could ramp up more storage spaces or serve our user base?' With BigQuery, it was like a click of a button."
- BigQuery and Looker allowed data teams to avoid or reallocate significant headcount. The retail data platform architect stated: "A team of 20 people were [previously] supporting and managing our cloud data platform, and now they are doing different things. Previously, they were managing the cluster, updating the machine, and preparing data. Now, they help business teams and work on analytics and visualization."
- Finally, BigQuery and Looker provided administrative savings by ensuring that data was effectively managed and shared in compliance with regulations and company policies. The senior analytics engineer in the sports company noted: "In our old BI tool, I had to pick and choose who had access to what for every report or data model we created. … Now, it's all code-based so I can go in once, set a value in our

code, and add a parameter that says, “Make sure that none of this data is shared where it shouldn’t be’ for each different dataset or BigQuery table. That’s been a big administrative saving.”

**Modeling and assumptions.** Forrester modeled the impact for the composite organization, assuming:

- It employs 16 centralized data analysts and 14 data engineers before the investment in BigQuery and Looker.
- Each pre-existing data analyst saves and reallocates 3.6 hours per week in Year 1 of using BigQuery and Looker, and 4.5 hours per week in Years 2 and 3 to other work.
- Data analysts or engineers hired after the initial period enjoy the benefits of BigQuery and Looker. However, they do not save time compared to the organization’s previous environment.
- Each pre-existing data engineer saves and reallocates 2 hours per week.
- The fully burdened annual salary of a data analyst is $146,300, or $70 per hour. The fully burdened hourly salary of a data engineer is $64.
- The total cost of hiring and training a new data analyst is 50% of the fully burdened salary, or $73,150.
- Without BigQuery and Looker, the composite would have had to hire one additional data analyst in Year 1, and two additional data analysts in each of Year 2 and Year 3 to support the natural growth of the organization.

**Risks.** The expected financial impact is subject to risks and variation based on factors including the organization’s:

- Number of data analysts and data engineers, and their compensation amounts and structures.
- The scope of deployment and use cases.
- Prior data and BI infrastructure’s capabilities and level of sophistication contributing to the actual labor for the legacy and new environments.
- Unique business requirements and complexities that may reduce potential time savings.
- Level of organic growth regardless of BigQuery and Looker.
- Business team’s level of reliance on data and analysis at the organization.
- Recapture rates of productivity on saved time.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $1.9 million.

**“[With BigQuery and Looker], we’ve saved a lot of head count.”**

*Vice president of data and analytics, software*

| Enhanced Data Analyst And Data Engineering Efficiency | | | | | |
|---|---|---|---|---|---|
| **Ref.** | **Metric** | **Source** | **Year 1** | **Year 2** | **Year 3** |
| A1 | Number of dedicated data analysts | Composite | 16 | 16 | 16 |
| A2 | Annual recaptured hours per data analyst | Interviews | 187 | 234 | 234 |
| A3 | Average fully burdened hourly salary per data analyst | TEI standard | $70 | $70 | $70 |
| A4 | Subtotal: Improved data analytics team productivity | A1*A2*A3 | $209,664 | $262,080 | $262,080 |
| A5 | Avoided data analyst head count to support baseline business growth | Interviews | 1 | 3 | 5 |
| A6 | Average fully burdened annual salary per data analyst | A3*2080 | $146,300 | $146,300 | $146,300 |
| A7 | Avoided data analysts hired per year | C1-C1[PY] | 1 | 2 | 2 |
| A8 | Cost of hiring and training new data analyst | A6*50% | $73,150 | $73,150 | $73,150 |
| A9 | Subtotal: Avoided additional data analyst headcount | A5*A6+A7*A8 | $219,450 | $585,200 | $877,800 |
| A10 | Number of data engineers using BigQuery | Composite | 14 | 14 | 14 |
| A11 | Annual recaptured hours per data engineer | Interviews | 104 | 104 | 104 |
| A12 | Average fully burdened hourly salary per data engineer | TEI standard | $64 | $64 | $64 |
| A13 | Subtotal: Improved data engineering team productivity | A10*A11*A12 | $93,184 | $93,184 | $93,184 |
| At | Enhanced data analyst and data engineering efficiency | A4+A13 | $522,298 | $940,464 | $1,233,064 |
| | Risk adjustment | ↓15% | | | |
| Atr | Enhanced data analyst and data engineering efficiency (risk-adjusted) | | $443,953 | $799,394 | $1,048,104 |
| | **Three-year total: $2,291,452** | | | **Three-year present value: $1,851,707** | |

**MPROVED BUSINESS USER PRODUCTIVITY**

**Evidence and data.** By providing customized reports, real-time data dashboards, and more comprehensive insights, BigQuery and Looker help end-users save time with almost no effort. However, non-technical users can also create their own queries and access data themselves, reducing their reliance on a team to make changes, explore data, or ask new questions of existing data. LookML also helps users without programming experience build complex queries without dealing with SQL structure, democratizing the use of data across the organization. This self-sufficiency helps end-users and decision-makers make faster, more informed decisions, better understand the impact of their work with data, and be even more efficient.

- Data independence meant end-users no longer spent time putting together data requests for a data team and were able to ensure they had what they needed at their own pace. The senior data specialist at a retail organization said: "Now [business end-users] are not complaining at all. Every now and then I go in and ask, 'What do your data needs look like? What are you missing?' and they're like, 'I'm not missing anything. Everything is good.'"

**"Quicker insights means that you can act more quickly, optimize more quickly, and catch issues more quickly. It saves time and drives additional revenue."**

*Vice president of data and analytics, software*

- Quicker data access accelerated all parts of users' daily work by reducing waiting periods every time a user requested data. As the senior analytics engineer in the sports industry shared, "If you needed a number and it took 10 hours to get to you, that's 10 hours where you could have been taking that number you got in 10 minutes and doing something else with it."

**"We want our queries, all our dashboards to return within two minutes or less and that's just led to more adoption and more people that want to use our tool because they're having a positive experience."**

*Senior analytics engineer, sports*

- The data platform architect at a retail organization noted the elimination of time spent making decisions around the tool to use or what team to ask for data access. The vice president of data and analytics working in software echoed, "It's saving time in planning and decisioning."
- Quick access to critical information allowed for more informed decision-making and improved accuracy. The team lead of BI app support in financial services told Forrester, "People would just guess if they did not have the data or try to bring it in from various other sources, and then they would have KPI fights in the boardroom over which person has the correct revenue number." The senior analytics engineer in the sports industry noted that managers would previously leave meetings to ask the analytics team to confirm numbers, which created more work to investigate potential errors.

- Business decision-makers saved time by viewing Looker outputs without needing to log in, run a report, or deal with a license. Hence, they spent less time in meetings discussing different KPI calculations or data inconsistencies and were able to spend more time simply looking at data they trusted to make decisions. The senior data specialist in retail described: "[BigQuery and Looker] definitely reduced the number of reiterations and meeting time. … Now everybody can get their data and go in there with actual insights. They don't have to be off the rails having data discussions and [can] actually make decisions instead of arguing over the numbers."

**Modeling and assumptions.** Forrester modeled the impact for the composite organization assuming:

- It rolls out BigQuery and Looker access to 920 pre-existing business team employees in Year 1, and an additional 230 in Year 2.
- Business end-users who were hired after the initial period and utilize BigQuery and Looker receive the benefits they bring. However, they do not save time compared to the organization's previous environment.
- Each business end-user saves just under 4 hours per month, that are reallocated to other value-add activities.
- Fifty-one business decision-makers in Year 1 and 62 in Years 2 and 3 each save just over 3 hours per quarter.
- The average fully burdened hourly salary of an end-user is $58, and the average fully burdened hourly salary of a decision-maker is $90.

**Risks.** The expected impact is subject to variation based on factors including the organization's:

- Number of business users and their previous level of reliance on data and analysis.
- End-user compensation amounts and structures.
- BigQuery and Looker scope of deployment and use cases.
- Unique business requirements and complexities that may reduce potential time savings.
- Recapture rates of productivity on saved time.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $6 million.

## Improved Business User Productivity

| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| B1 | Number of BigQuery and Looker business end-users | Composite | 920 | 1,150 | 1,150 |
| B2 | Annual recaptured hours per end-user | Interviews | 45 | 45 | 45 |
| B3 | Average fully burdened business end-user hourly salary | TEI Standard | $58 | $58 | $58 |
| B4 | Subtotal: Value of recaptured end-user time | B1*B2*B3 | $2,401,200 | $3,001,500 | $3,001,500 |
| B5 | Number of decision-makers using Looker | Composite | 51 | 64 | 64 |
| B6 | Annual hours recaptured per decision-maker | Interviews | 13 | 13 | 13 |
| B7 | Average fully burdened director hourly salary | TEI Standard | $90 | $90 | $90 |
| B8 | Subtotal: Value of recaptured director time | B5*B6*B7 | $59,670 | $74,880 | $74,880 |
| Bt | Improved business user productivity | B4+B8 | $2,460,870 | $3,076,380 | $3,076,380 |
| | Risk adjustment | ↓15% | | | |
| Btr | Improved business user productivity (risk-adjusted) | | $2,091,740 | $2,614,923 | $2,614,923 |
| | **Three-year total: $7,321,586** | | | **Three-year present value: $6,027,305** | |

### REDUCED RELIANCE ON LEGACY DATA WAREHOUSING AND BI SOLUTIONS

**Evidence and data.** The interviewees' organizations reduced reliance on or eliminated legacy data storage and/or BI solutions that became redundant with the use of BigQuery and Looker. Some retired multiple point solutions that were used by different parts of the organization, while some maintained a legacy database or still utilized another BI tool for a small, siloed set of data or specific use case. The associated cost savings were not limited to license or subscription costs, but included the cost of maintenance, professional services, and FTE resources to support the products. As a fully managed data warehouse, BigQuery offloads administrative tasks such as provisioning, updates, and scaling to Google Cloud.

- In addition to vendor solution costs, organizations saved on labor with more efficient data processing. The technical leader of data and analytics in e-commerce noted: "We see a lot of savings in processing. … In the past we would need a change to develop as an API, as a service to [a server]. With BigQuery and Looker and embedded analytics, we are starting to see that we can do and achieve the same with Looker and BigQuery for much less money."
- Labor cost savings with BigQuery and Looker were often equivalent to one or more full-time roles, and resources could be reallocated to conduct more valuable work to expand data utilization at the organization. The senior analytics engineer at the sports organization said: "We had a dedicated resource responsible for doing all types of administrative and DBA tasks to keep [our old data warehouse] running. When we moved to BigQuery, that was no longer needed, and this person transitioned to a classic data engineer who can now contribute to the team rather than just managing infrastructure."

**"There was a lot of time spent just doing server work that we shouldn't have been doing."**

*Senior data specialist, retail*

**Modeling and assumptions.** Forrester modeled the impact for the composite organization assuming:

- The magnitude of the organization's data usage is limited by the prior data warehouse's capacity for scale, and they anticipate and realize higher data usage with their new solution. They looked for a new BI tool to tightly integrate with their data infrastructure to help them easily expand their BI penetration across the organization.
- It spent $140,000 annually on their prior data warehouse and $90,000 on associated data infrastructure, including physical servers and backups.
- It replaces most of their data infrastructure when BigQuery and Looker went live and retired their prior data warehouse at the start of Year 2.
- A few teams at the composite organization held licenses for and used a legacy BI tool. The composite eliminated most those licenses, resulting in annual savings of $24,000.
- The organization had two FTEs dedicated to on-premises management and administrative labor associated with their prior data infrastructure and BI tool.

**Risks.** The expected financial impact is subject to risks and variation based on the composite organization's:

- Previous data and BI infrastructure and associated software.

- Maintenance costs and their ability to retire the solution after BigQuery and Looker implementation.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year, risk-adjusted total PV of $921,000.

**Reduced Reliance On Legacy Data Warehousing And BI Solutions**

| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| C1 | Decreased spend on data warehousing | Interviews | $110,000 | $140,000 | $140,000 |
| C2 | Decreased spend on data infrastructure | Interviews | $54,000 | $90,000 | $90,000 |
| C3 | Decreased spend on previous BI tool | Interviews | $24,000 | $24,000 | $24,000 |
| C4 | Prior data maintenance and administrative labor costs | Interviews | $160,000 | $160,000 | $160,000 |
| Ct | Reduced reliance on legacy data warehousing and BI solutions | C1+C2+C3+C4 | $348,000 | $414,000 | $414,000 |
| | Risk adjustment | ↓5% | | | |
| Ctr | Reduced reliance on legacy data warehousing and BI solutions (risk-adjusted) | | $330,600 | $393,300 | $393,300 |
| | **Three-year total: $1,117,200** | | | **Three-year present value: $921,079** | |

### INCREASED SALES

**Evidence and data.** BigQuery and Looker helped improve data usage throughout organizations to make decisions and improve business outcomes. Organizations prioritized extending direct data access through dashboards or direct querying to business teams who previously relied on data analysts to complete their ad hoc data requests. BigQuery improved data resiliency, availability, and scale, ing that data was always ready to meet users' demand. It also enhanced data enrichment, enabling organizations to connect more internal and external sources to make data more useful with additional context. BigQuery and Looker enabled real-time data usage and allowed teams to explore and test data more quickly and easily. This agility and instantaneous access helped teams find and deploy new data use cases, which drove additional revenue.

- Improved data speed, quality, and accessibility increased productivity and helped business teams make better and more informed decisions. The senior data specialist in retail noted that most of their traffic decisions were solely based on the data that they obtained from BigQuery and accessed with Looker. The technical leader of data and analytics at an e-commerce firm said, "BigQuery helps us run [queries] very quickly and understand how to optimize what we are doing."

**"We're able to unlock additional value without building a new product or feature just by fine-tuning how our current product or feature works."**

*Vice president of data and analytics, software*

**"Now we make decisions [faster], and the product goes to market more quickly and more often."**

*Data platform architect, retail*

- Real-time data access enhanced product development by enabling additional flexibility during development. The vice president of data and analytics at a software organization stated: "Looker and BigQuery [allows us] to make changes on the fly. We can afford to build a whole dashboard and some KPIs, show it to users, and have them say, 'I think we should tweak this or tweak that', whereas when there's engineers involved and you're building a product, you don't want to have to keep doing that."
- With more accessible data, business users spent less time waiting for answers — they could deploy campaigns and launch new products faster by months. The data platform architect at a retail organization shared that BigQuery and Looker enabled their organization to launch new products and campaigns faster with better access to data, accelerating decision-making. They said: "Before, it [took months] to deploy or have a new product. … it was time-consuming for us to analyze the KPI and decide whether to launch the campaign. Now we make this decision [faster], and the product goes to market more quickly and more often." When products and campaigns are launched faster, sales and revenue are generated sooner.
- BigQuery and Looker also identified problems with and improved existing products to unlock new revenue. The vice president of data and analytics in software noted: "We've unlocked a lot

of revenue by just finding out that the product wasn't working quite as we thought it was."

- Marketing teams often took heavy advantage of BigQuery and Lookers' data access, tying their marketing data with other data sources to get a more holistic view of their metrics. The technical leader of data and analytics in e-commerce described that before BigQuery and Looker, the marketing team's data requests would take a long time to be fulfilled that when results came, they had often already moved on, and sometimes hired external companies to get data sooner. They described: "The marketing and advertising teams were using analyst hours and resources to write SQL and create audiences based on our data. We developed an extension on top of Looker so now they can just click on the dimensions and metrics, and create those audiences based on their needs. They get results in minutes instead of days or weeks." They also described that marketers were being more creative and data-driven in creating campaigns.
- Improved access to real-time data also enabled new or additional A/B testing to make marketing more efficient, generate additional ad revenue, and improve products based on direct user data. The sports organization used A/B testing to drive the duration visitors spent on their webpage, generating additional revenue from ad sponsorships.

**Modeling and assumptions.** Forrester modeled the impact for the composite organization assuming:

- Its sales grow organically by 10% annually, starting with 20 million sales in Year 1 of their investment in BigQuery and Looker. Annual sales increase independently of the investment to 22 million in Year 2 and 24.2 million in Year 3.
- BigQuery and Looker increase the organization's total sales by 3% in Year 1 and 3.75% in Years 2 and 3 after implementation.
- The organization sees revenue of $50 per sale on average and has an operating profit margin of 7.5%.

**Risks.** The expected financial impact is subject to risks and variation based on factors including the organization's:

- Type of revenue source, annual number of sales and revenue per sale.
- Organic growth rate and operating profit margin.
- BigQuery and Looker's scope of deployment and use cases.

Prior data utilization and level of internal investment and buy-in to using insights from BigQuery and Looker to inform decision-making and optimize revenue generation efforts.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $6.1 million.

## Increased Sales

| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| D1 | Number of annual sales in prior environment | Composite | 20,000,000 | 22,000,000 | 24,200,000 |
| D2 | Increase in sales due to BigQuery and Looker | Interviews | 3.00% | 3.75% | 3.75% |
| D3 | Additional sales with BigQuery and Looker | D1*D2 | 600,000 | 825,000 | 907,500 |
| D4 | Average revenue per sale | Composite | $50 | $50 | $50 |
| D5 | Profit margin | Composite | 7.5% | 7.5% | 7.5% |
| Dt | Increased sales | D3*D4*D5 | $2,250,000 | $3,093,750 | $3,403,125 |
| | Risk adjustment | ↓15% | | | |
| Dtr | Increased sales (risk-adjusted) | | $1,912,500 | $2,629,688 | $2,892,656 |
| | **Three-year total: $7,434,844** | | | **Three-year present value: $6,085,227** | |

### IMPROVED CUSTOMER RETENTION

**Evidence and data.** BigQuery and Looker's contribution to product improvement through improved data access and flexibility in the design process helps build a loyal customer base. They also help organizations analyze customer data to identify unhappy customers and take actions to reduce churn.

- With a holistic view of customer data, organizations can detect patterns in customer behavior and preferences, identifying areas where they can improve services or products to meet customer desires. Data analyst teams began to build machine learning models with SQL queries in BigQuery machine learning (BigQuery ML) to help further understand customer patterns. The senior data specialist in retail described: "The product team uses this data to see which products customers are buying, are they good, are they bad? What are the reviews? What should we improve and fix? Everything moves on the data."

**"We put a lot more data in our users' hands than they had before so they can actually make a lot of well-informed decisions rather than having to guess half of it."**

*Senior data specialist, retail*

- BigQuery's data enrichment capabilities and speed of analysis contributed to making customer insights actionable. The senior analytics engineer in the sports industry said: "The benefit of both BigQuery and Looker is that we can join the data we get from [another platform] with the rest of the data that we have about our users in BigQuery to A/B test and say, a user that's behaving a certain way on the app is a user who is also buying X, Y, and Z. [We can then] draw insights from that using BigQuery for the data storage and writing SQL but also using Looker to visualize that data more easily for those that are consuming some of these insights based on the A/B tests."

**"Looker, BigQuery and our data is why [customers] think of us as thought leaders and why we're able to be as full service as we are."**

*Vice president of data and analytics, software*

- When organizations can identify customers who are at risk of leaving, they can take proactive steps to retain them. These actions could include targeted marketing campaigns, personalized offers, or outreach by customer service teams. The senior manager of BI in the sports company noted: "[BigQuery and Looker] are able to alert our user base in real-time when something is wrong, to say take a look or start a conversation."

**"[BigQuery and Looker are] definitely helping with data reactivity and how fast people see if there's a problem and adjust for the problem."**

*Senior data specialist, retail*

**Modeling and assumptions.** Forrester modeled the impact for the composite organization assuming:

- Its customers each makes an average of 1.5 purchases annually with a 50% retention rate prior to an investment in BigQuery and Looker.
- BigQuery and Looker improved the organization's customer retention by 1.4% in Year 1, 1.6% in Year 2, and 2% in Year 3 after BigQuery and Looker were implemented and used to improve products and services delivered to customers.
- The organization sees revenue of $75 per customer on average and has an operating profit margin of 7.5%.

**Risks.** The expected financial impact is subject to risks and variation based on factors including the organization's:

- Annual number of customers and customer retention prior to an investment in BigQuery and Looker.
- Average annual revenue per customer and operating profit margin.
- BigQuery and Looker scope of deployment and use cases.
- Prior data utilization and level of internal investment and buy-in to using insights from BigQuery and Looker to inform decision-making and optimize products and services.
- Industry and customer brand sentiment, and elasticity of customer demand according to improved product and service delivery.

**Results.** To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV of $1.4 million.

**Improved Customer Retention**

| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|
| E1 | Number of annual customers | (A1+A3[PY])/1.5)+B4[PY] | 13,333,333 | 15,160,000 | 16,804,613 |
| E2 | Customer retention in prior environment | Composite | 50% | 50% | 50% |
| E3 | Increase in customer retention due to BigQuery and Looker | Interviews | 1.40% | 1.60% | 2.00% |
| E4 | Additional customers retained with BigQuery and Looker | E1*E2*E3 | 93,333 | 121,280 | 168,046 |
| E5 | Average annual revenue per customer | Composite | $75 | $75 | $75 |
| E6 | Profit margin | D5 | 7.5% | 7.5% | 7.5% |
| Et | Improved customer retention | E4*E5*E6 | $524,998 | $682,200 | $945,259 |
| | Risk adjustment | ↓20% | | | |
| Etr | Improved customer retention (risk-adjusted) | | $419,998 | $545,760 | $756,207 |
| | **Three-year total: $1,721,966** | | | **Three-year present value: $1,401,008** | |

## UNQUANTIFIED BENEFITS

Interviewees mentioned the following additional benefits that their organizations experienced but were not able to quantify:

- **Innovation in products and functional and competitive strategy.** Additional A/B testing and flexibility in working with real-time data can surface new ways to change products or services, streamline processes, and better serve customers. Business users who can explore data themselves with BigQuery and Looker can make new discoveries by trying out additional cuts or analyses that a data team did not have time to service when they had to send specific asks.
- **Flexibility in cloud decisions.** BigQuery Omni enables data transfers between clouds hosted by different cloud providers, helping organizations pursue a multicloud strategy without sacrificing usability across an organization. The data platform architect at a retail organization described using BigQuery Omni as a cost-efficient and functional way to transfer data across clouds, as their organization had data in Asia that they did not want to move. Looker also works with over fifty dialects of SQL, enabling database connections regardless of vendor.
- **Reduced data errors and inconsistencies.** BigQuery and Looker's ease of use and unified access, combined with the benefit of consolidating multiple siloed data platforms, ensured KPIs and metrics were calculated consistently and efficiently. They also created a single source of truth for data users.
- **Improved EX and data literacy.** Business teams using BigQuery and Looker became more comfortable working with data directly. This increased trust and improved morale on the possibilities of maximizing the use of data on each team.
- **Empowerment of a data-driven culture and strategy mindset among business users.** Trust in data allows for an overall cultural shift in the way employees across teams address decision-making. Decisions were no longer made without consulting data to inform strategies and track outcomes, thus increasing the likelihood of success for initiatives. The senior analytics engineer in the sports company noted, "[End-users] feel that they are contributing and are owners of the data. We worked to change the data culture and democratize our data so they can go into meetings and say, 'We are making data-driven decisions', not, 'the IT team is making them for us.'"
- **Better and faster decision-making.** BigQuery and Looker improved visibility and data access for leadership, allowing them to make decisions based on data that was more reliable and more up-to-date. The technical leader of data and analytics at the e-commerce organization described the improvement as, "We are spending less time when we need to react [to a problem]."
- **Improved data governance.** Looker's powerful data governance controls and logs gave IT more visibility into who had access to data queries or reports. The senior analytics engineer in sports noted: "Looker provides a host of different access levels you can give to the underlying data so we can give permission at the data level and the report level. We can give somebody access to the reports but not access to the underlying data or vice versa. That's given us a lot of flexibility." They also highlighted being able to use service

**"Our users are using the tool more because they trust it."**

*Senior analytics engineer, sports*

accounts within BigQuery to manage access to different datasets. Often, the ease of data governance enabled engineering and IT leaders time savings.

- **Increased employee self-sufficiency and data responsibility.** As business employees took control of their own data needs and usage, they were more self-sufficient but also more aware and efficient in their data usage. The data platform architect at a retail organization said: "If you go into the weekend watching a query which made an infinite loop, on Monday we'll have a problem because someone has to pay. It changed the way people were thinking because they said, 'Now I'm in charge of more, I have to explain, I have to be sure the query I am doing is exactly what we need.' It helped people be more autonomous, but in the inverse, we also ask them to be more responsible."
- **Accelerated talent acquisition and employee training.** The vice president of data and analytics at the software organization noted that he found BigQuery to be an easy and approachable place to learn SQL. They also used BigQuery to build out that skillset for his team. The data platform architect at a retail organization echoed: "In hiring interviews, we test on SQL basic, not specifically BigQuery. Because of that, we've discovered so many great people that are very happy to work on BigQuery."

**"I think that BigQuery's pace of development is very impressive. I think they're really keeping up with the market, and the product has evolved so, so much."**

*Vice president of data and analytics, software*

**FLEXIBILITY**

Flexibility represents additional capability that could be turned into future business benefit, providing an organization with the ability to engage in future initiatives. The value of flexibility is unique to each customer. Scenarios in which a customer might implement BigQuery and Looker and later realize additional uses and business opportunities include:

- **Immediate access to product innovation and improvements.** As Google continues to develop the interconnectivity of its products and more fully integrate Looker into the Google ecosystem, the abilities of Looker and BigQuery will expand and become more efficient. Organizations using BigQuery and Looker will have access to new features and capabilities and will be able to dedicate fewer resources towards training and tool management with a more cohesive and seamless user experience.
- **Ease in building custom data apps and tools.** With Looker's extension framework, organizations can quickly and easily build custom JavaScript data applications and tools, including for embedded analytics. The lighter lift will help organizations using Looker to unlock additional value sooner.
- **Easily accessed ML capabilities.** BigQuery ML provides organizations with an opportunity to leverage machine learning through existing SQL tools. SQL practitioners can build models with BigQuery ML without needing to move data.

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in Appendix A).

# Analysis Of Costs

Quantified cost data as applied to the composite

| Total Costs | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Ref.** | **Cost** | **Initial** | **Year 1** | **Year 2** | **Year 3** | **Total** | **Present Value** |
| Ftr | Google technology and support | $0 | $1,105,650 | $1,437,450 | $1,703,625 | $4,246,725 | $3,473,070 |
| Gtr | Data warehouse migration and implementation | $528,034 | $51,635 | $0 | $0 | $579,669 | $574,975 |
| Htr | Training and ongoing management labor | $284,540 | $473,848 | $381,623 | $343,219 | $1,483,229 | $1,288,566 |
| | Total costs (risk-adjusted) | $812,574 | $1,631,133 | $1,819,073 | $2,046,844 | $6,309,623 | $5,336,611 |

### GOOGLE TECHNOLOGY AND SUPPORT

**Evidence and data.** BigQuery's pricing includes both the cost of processing queries and data storage. BigQuery charges separately for additional operations (e.g., the use of BigQuery Omni, BigQuery ML, BI Engine, and streaming reads and writes). BigQuery customers can either pay according to the total amount of data processed per month or opt to pay a flat rate fee based on the reserved quantity of resources made available for running queries.

Looker has a more custom pricing model based on factors such as the number and types of users, database connections, and the scale of deployment. Support is sold as a percentage of cloud spend with a minimum spend.

- Most interviewees appreciated the flexibility in BigQuery's pricing model, especially the option to switch to the more fixed price model as they grew, and their data needs grew accordingly. For smaller organizations, the pay-as-you-go model was more appropriate. The data platform architect in retail said: "I will consume only what I need, and that's perfect. That's exactly why I have chosen [BigQuery]."
- Looker's user licenses are classified as one of three types: developer (admin), standard (creator), and viewer. The team lead of BI application support in financial services described the value they observed with Looker's different license types: "In Looker, one person with a license can send a report to several people who don't have a license, which saves money and time. Say a lot of VPs want to see a report — they don't have to go to an application, log in, find the report and run it and everything, they can just get it in the email and really save time and as well the cost because they didn't have to pay for a license."

**"If we weren't using the flat price of BigQuery and running the same number of queries, we would be spending 30x more on processing than we are today."**

*Technical leader, data and analytics, e-commerce*

**“[With BigQuery], you don’t pay for what you don’t need, you don’t consume what you don’t need.”**

*Data platform architect, retail*

**Modeling and assumptions.** Forrester modeled this cost based on the following information:

- It grants Looker access to far more employees compared to their previous BI tool. The organization purchases about 1,000 Looker user licenses in Year 1, and reaches about 1,350 in Year 3.
- It pays $200,000 for Looker in Year 1 and $250,000 in Years 2 and 3, amounting to about $16 per user monthly on average.
- It takes advantage of BigQuery’s scalability and far exceeds the data usage of their prior data warehouse starting in Year 1. BigQuery analysis costs are based on pricing of $5 per terabyte (TB) monthly. For the composite, data usage starts at 500 TB per month in Year 1 and rises to 150 TB in Year 3, for a cost of $900,000.
- BigQuery storage costs are based on active physical storage costs of $0.04 per GB, for a total of $100,000 in Year 1, rising to $200,000 in Year 2, and $300,000 in Year 3.
- BigQuery ML costs depend on the amount of data used in model training and increases as the organization expands ML use cases. It pays $10,000 for BigQuery ML in Year 1, which rises to $15,000 in Year 2, and $20,000 in Year 3.
- Total support costs are calculated at 25% of Looker expenditure, including 10% of BigQuery analysis costs, totaling $152,000 in Year 3.

**Risks.** Pricing of BigQuery and Looker licenses and add-ons vary depending on:

- Their location.
- The deployment model.
- Organizational needs for number of users.
- The amount of data streaming, querying, and processing.
- The amount of data storage, and need for applications and support.
- Contact Google for additional details.

**Results.** To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $3.5 million.

## Google Technology And Support

| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|---|
| F1 | Looker subscription costs | Composite | $0 | $200,000 | $250,000 | $250,000 |
| F2 | BigQuery analysis costs | Composite | $0 | $630,000 | $765,000 | $900,000 |
| F3 | BigQuery storage costs | Composite | $0 | $100,000 | $200,000 | $300,000 |
| F4 | BigQuery ML | Composite | $0 | $10,000 | $15,000 | $20,000 |
| F5 | BigQuery and Looker support | F1*25%+F2*10% | $0 | $113,000 | $139,000 | $152,500 |
| Ft | Google technology and support | F1+F2+F3+F4+F5 | $0 | $1,053,000 | $1,369,000 | $1,622,500 |
| | Risk adjustment | ↑5% | | | | |
| Ftr | Google technology and support costs (risk-adjusted) | | $0 | $1,105,650 | $1,437,450 | $1,703,625 |
| | **Three-year total: $4,246,725** | | | **Three-year present value: $3,473,070** | | |

### DATA WAREHOUSE MIGRATION AND IMPLEMENTATION

**Evidence and data.** The interviewees' organizations incurred upfront internal labor costs from time spent on implementation and change management. Implementation timelines ranged from a few days for a smaller organization to a multi-year effort that mainly consisted of ongoing data migration. For most, it took between one and nine months. Internal labor was relatively light, but an external partner was often hired to aid in the process. Overall, timelines greatly depended on the organization's level of technical expertise and existing data infrastructure makeup.

- To migrate to BigQuery, organizations considered documentation and best practices, and security as well as technical requirements. BigQuery provides a migration service for organizations to migrate their existing data warehouse to BigQuery. The solution includes free tools to aid in each phase of migration, including assessment and planning, SQL translation, data transfer, and data validation. While the BigQuery migration API is free to use, Google charges for the storage used for input and output files.
- Looker could be deployed quickly but required some level of investment to optimize setup for business users. The senior data specialist in retail acknowledged: "The effort was spent on getting it cleaned up and getting the data structures inside modeled appropriately because the move and migration itself was just very quickly done."
- Looker provided organizations with implementation support that was highly regarded by interviewees. The technical leader of data and analytics in e-commerce described a high level of support from the Looker team, and told Forrester, "The Looker customer experience was awesome."

> **"Putting Looker on top of everything was really quick."**
>
> *Senior data specialist, retail*

**Modeling and assumptions.** Forrester modeled this cost based on the following information:

- The composite spends $80,000 to work with a professional services team to help with implementation and optimization.
- A total of 2.5 FTE technical employees spend eight months in the initial implementation period on BigQuery model development, data warehouse migration, process redesign, and testing efforts to complete the move to BigQuery. Two additional months of work are completed in Year 1 to complete testing and optimization.
- The fully burdened monthly salary of the average technical implementation resource is $10,810.
- It takes four months for 3.5 FTE internal employees, including business decision-makers and technical employees, to roll BigQuery and Looker out to the initial 80% of business users in the initial period and another month to complete rollout to the remaining 20% in Year 1.
- The fully burdened monthly salary of the average technical implementation resource is $11,640.

**Risks.** The expected investment is subject to risks and variation based on several factors that may increase costs or extend deployment, including:

- An organization's deployment size, legacy technology landscape, target technology landscape, and the level of change needed to deploy BigQuery and Looker — especially alongside any cloud migration or adoption efforts.

- An organization's unique organizational requirements, processes, or technology complexities that can limit or lengthen implementation, such as regional regulatory demands, specific integrations, or high data access and protection requirements.
- The size, expertise, and labor cost of internal or professional services teams for deployment.
- The maturity of existing processes and infrastructure, as well as ease of transferring to new environment.
- The compensation amounts and structures for each employee involved in migration and implementation efforts.

**Results.** To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV of $575,00

**Data Warehouse Migration And Implementation**

| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|---|
| G1 | Professional services costs | Interviews | $80,000 | $0 | $0 | $0 |
| G2 | Months spent on development, data warehouse migration, testing, and process redesign | Interviews | 8.0 | 2.0 | 0 | 0 |
| G3 | Number of data engineer and IT FTEs dedicated to development, migration, testing, and process redesign | Interviews | 2.5 | 1.0 | 0 | 0 |
| G4 | Average fully burdened monthly salary per data engineer or IT employee | TEI standard | $10,810 | $10,810 | $0 | $0 |
| G5 | Subtotal: Migration, development, testing, and process redesign costs | G1+(G2*G3*G4) | $296,200 | $21,620 | $0 | $0 |
| G6 | Months of implementation work | Composite | 4.0 | 1.0 | 0 | 0 |
| G7 | Number of internal data engineer, data analyst, IT, and business user FTEs needed for implementation | Interviews | 3.5 | 2.0 | 0 | 0 |
| G8 | Average fully burdened monthly salary per implementation employee | TEI Standard | $11,640 | $11,640 | $0 | $0 |
| G9 | Subtotal: Implementation labor costs | G6*G7*G8 | $162,960 | $23,280 | $0 | $0 |
| Gt | Data warehouse migration and implementation | G1*(G3*G5+G6*G9) | $459,160 | $44,900 | $0 | $0 |
| | Risk adjustment | ↑15% | | | | |
| Gtr | Data warehouse migration and implementation (risk-adjusted) | | $528,034 | $51,635 | $0 | $0 |
| | **Three-year total: $579,669** | | | **Three-year present value: $574,975** | | |

### TRAINING AND ONGOING MANAGEMENT LABOR

**Evidence and data.** Internal labor costs were incurred according to the time employees spent receiving training. Training efforts mentioned by interviewees ranged from negligible to a few months of learning. The Google support team often helped provide training. The senior manager of BI at the sports organization described training sessions with Google's resources on BigQuery in learning the terminology, how it worked and how to optimize queries, noting that the sessions were very helpful. Less training was required for BigQuery and Looker business end-users.

Multiple interviewees described the necessary administration and maintenance of BigQuery as very light, mainly consisting of access management and improving data structures and piping. Ongoing management includes basic maintenance, support, and administration; the optimization of data architecture; and implementation of new BigQuery and Looker access and usage across additional teams.

**Modeling and assumptions.** Forrester modeled this cost based on the following information:

- Two hundred technical BigQuery users each receive 12 hours of training during the initial period before Year 1. In Years 1 through 3, 50 additional users are trained each year to account for business growth and employee attrition.
- Seventy-five technical Looker users each receive 6 hours of training during the initial period before Year 1. In Years 1 through 3, 10 additional users are trained per year to account for business growth and employee attrition.
- The burdened hourly cost of technical resources is $67 and the burdened hourly cost of business resources is $58.
- New business users of BigQuery and Looker are given 1.5 hours of training each in the year before they begin using BigQuery and Looker.
- In Year 1, 1.75 FTE employees are dedicated to BigQuery management. This decreases to 1.5 FTEs in Years 2 and 3.
- In Year 1, 1 FTE employee is dedicated to Looker management. This decreases to 0.75 FTEs in Year 2, and 0.5 FTEs in Year 3.

**Risks.** Actual training and management labor costs will vary per organization depending on the following:

- The complexity of an organization's workflows, data environment and scope of BigQuery and Looker deployment, including number of employees involved.
- Unique business needs such as regional compliance, redundancy, and governance.
- The knowledge and skillsets of existing technical and business user resources.
- The training method and delivery mechanism.
- Compensation amounts and structures for each employee involved in training and ongoing management.

**Results.** To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of $1.3 million.

> **"It was an almost immediate instant tremendous improvement performance- wise and I'm happy to say, it was not much of a transition effort."**
>
> *Senior data specialist, retail*

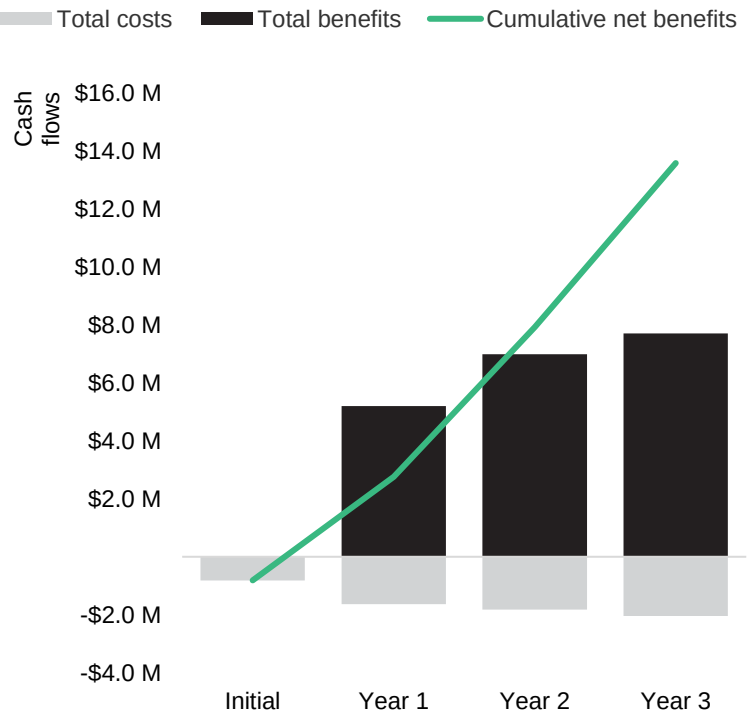
## Training And Ongoing Management Labor

| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|---|
| H1 | Number of new technical BigQuery users | Composite | 200 | 50 | 50 | 50 |
| H2 | Hours of training per new technical BigQuery user | Interviews | 12 | 12 | 12 | 12 |
| H3 | Number of new technical Looker users | Composite | 75 | 10 | 10 | 10 |
| H4 | Hours of training per new technical Looker user | Interviews | 6 | 6 | 6 | 6 |
| H5 | Average fully burdened hourly salary per technical user | TEI Standard | $67 | $67 | $67 | $67 |
| H6 | Number of new active BigQuery and Looker business users | Composite | 920 | 322 | 115 | 115 |
| H7 | Hours of training per new active BigQuery and Looker user | Interviews | 1.5 | 1.5 | 1.5 | 1.5 |
| H8 | Average fully burdened hourly salary per business user | Interviews | $58 | $58 | $58 | $58 |
| H9 | Subtotal: Training costs | ((H1*H2)+(H3*H4 ))*H5+(H6*H7*H8) | $270,990 | $72,234 | $54,225 | $54,225 |
| H10 | Data engineer FTE dedicated to BigQuery management | Interviews | 0 | 1.75 | 1.50 | 1.50 |
| H11 | Average data engineer fully burdened salary | A12*2080 | 0 | $133,000 | $133,000 | $133,000 |
| H12 | Data analyst FTE dedicated to Looker management | Interviews | 0 | 1.00 | 0.75 | 0.50 |
| H13 | Average fully burdened hourly salary per data analyst | A3 | 0 | $146,300 | $146,300 | $146,300 |
| H14 | Subtotal: Ongoing management costs | (H10+H11)*(H12+ H13) | $0 | $379,050 | $309,225 | $272,650 |
| Ht | Training and ongoing management labor | H9+H14 | $270,990 | $451,284 | $363,450 | $326,875 |
| | Risk adjustment | ↑5% | | | | |
| Htr | Training and ongoing management labor (risk-adjusted) | | $284,540 | $473,848 | $381,623 | $343,219 |
| | **Three-year total: $1,483,229** | | | **Three-year present value: $1,288,566** | | |

# Financial Summary

## CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

### Cash Flow Chart (Risk-Adjusted)




The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

**These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.**

**Cash Flow Analysis (Risk-Adjusted Estimates)**

| | Initial | Year 1 | Year 2 | Year 3 | Total | Present Value |
|---|---|---|---|---|---|---|
| Total costs | ($812,574) | ($1,631,133) | ($1,819,073) | ($2,046,844) | ($6,309,623) | ($5,336,611) |
| Total benefits | $0 | $5,198,791 | $6,983,065 | $7,705,191 | $19,887,047 | $16,286,326 |
| Net benefits | ($812,574) | $3,567,658 | $5,163,992 | $5,658,347 | $13,577,424 | $10,949,715 |
| ROI | | | | | | 205% |
| Payback period (months) | | | | | | <6 |

# Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

### TOTAL ECONOMIC IMPACT APPROACH

**Benefits** represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.

**Costs** consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.

**Flexibility** represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

**Risks** measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

### PRESENT VALUE (PV)

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.

### NET PRESENT VALUE (NPV)

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made unless other projects have higher NPVs.

### RETURN ON INVESTMENT (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

### DISCOUNT RATE

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

### PAYBACK PERIOD

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

## Appendix B: Supplemental Material

*Related Forrester Research*

“The Forrester Wave™: Cloud Data Warehouse, Q1 2021,” Forrester Research, Inc., March 24, 2021.

“The Future Of Business Intelligence,” Forrester Research, Inc., February 23, 2022.

“The Forrester Wave™: Augmented BI Platforms, Q3 2021,” Forrester Research, Inc., August 16, 2021.

## Appendix C: Endnotes

[1] Total Economic Impact is a methodology developed by Forrester Research that enhances a company’s technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.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