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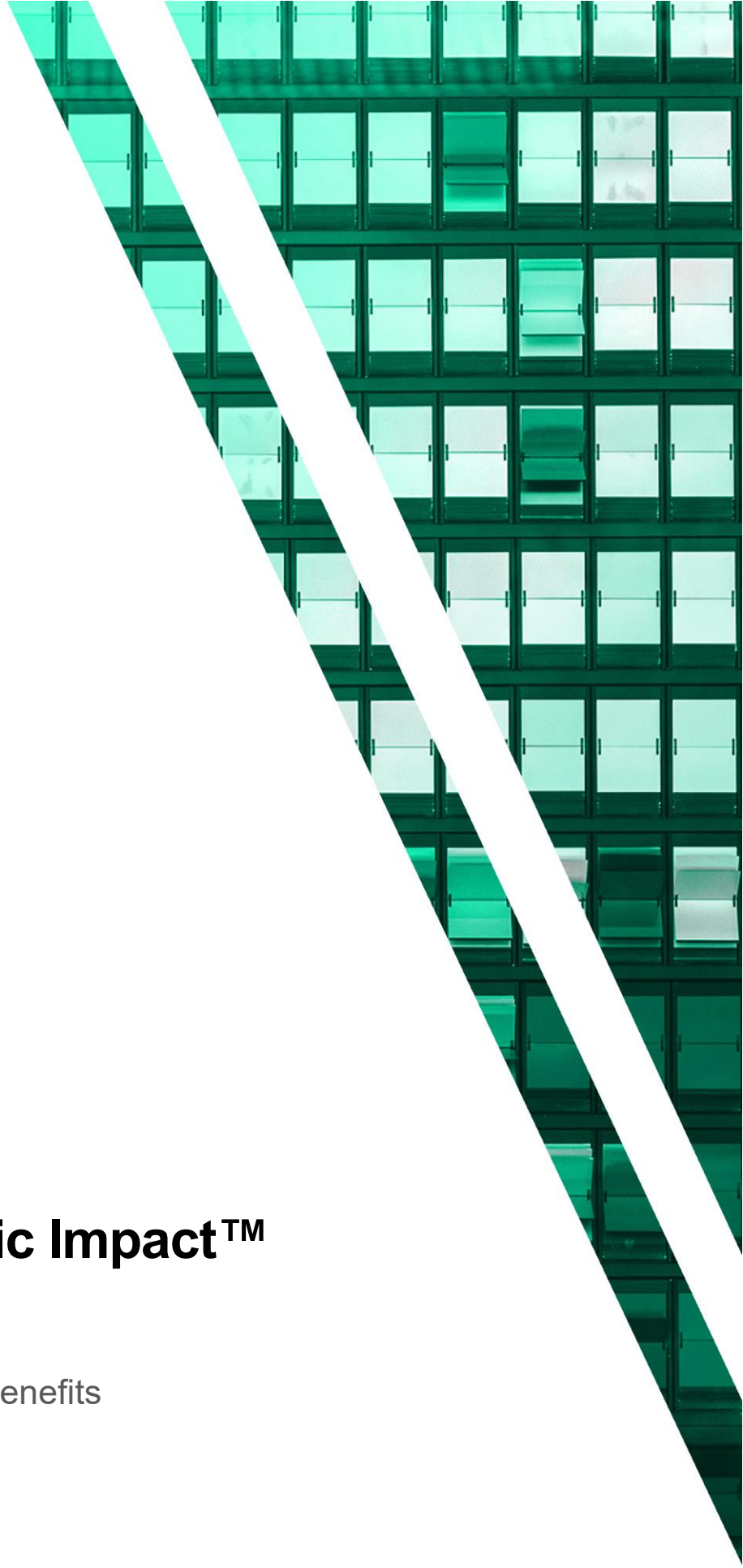

The Total Economic Impact™ Of TigerGraph

Cost Savings And Business Benefits Enabled By TigerGraph

APRIL 2022

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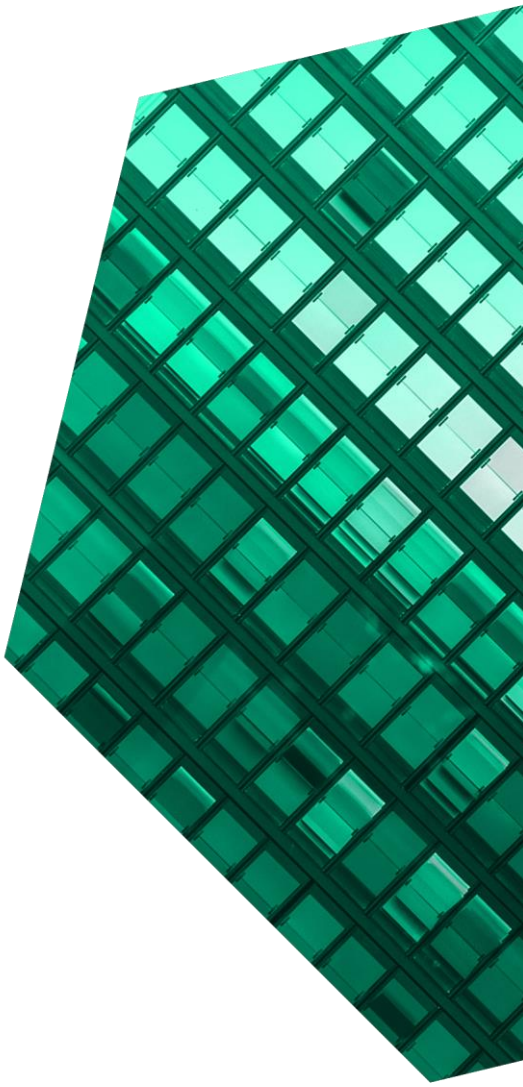

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Executive Summary

Understanding and reacting to enterprise data is a matter of strategic and competitive importance. Having a graph database with the performance, processing and loading times, and scalability to support real-time analysis is critical to an organization's ability to understand its customers, improve predictive analytics, and answer the questions at the heart of its business, as well as seize opportunities to expand into new products and services.

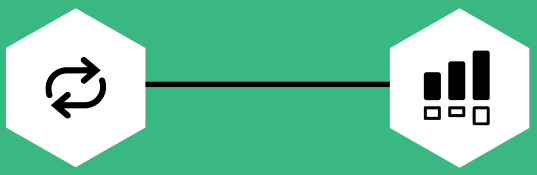
TigerGraph is a property graph database available on-premises or in the cloud that has key features to support speed and performance at scale for large and complicated data sets including structured and semistructured data. The solution combines native parallelism, compression of data, and analytics and machine learning on the same cluster, as well as a flexible schema to support complex, real-time analysis and both transactional and analytical workloads.

A range of helpful add-on features are available with TigerGraph, including the GraphStudio graphical user interface for no-code/low-code analytics, visualization toolkits, and connectors in support of integration. Access control and security features mean TigerGraph is suitable for use cases with significant compliance requirements such as healthcare and financial services.

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

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed six decision-makers with experience using TigerGraph. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization.

KEY STATISTICS



Return on investment (ROI)
600%

Net present value (NPV)
$20.81M

Prior to using TigerGraph, these interviewees noted how their organizations' reliance on relational databases limited the number of table joins possible and made it difficult or impossible to compare and understand connected data.

Prior attempts to implement graph yielded limited success, leaving companies with poor performance in the form of slow processing times and the severely limited ability to connect the data points needed to answer key questions about their business. Other graph solutions investigated were less user-friendly than TigerGraph was — requiring learning entire new programming languages — and it was difficult to implement in a way that would best support desired use cases.

These limitations led to failure to achieve time to value for important business questions and, in turn,

failure to capitalize on revenue opportunities and eliminate avoidable costs.

After the investment in TigerGraph, the interviewees' organizations not only saw productivity gains for data science teams and operational users as a result of their investment, but also experienced greater insights and business intelligence driven by graph performance and the ability to quickly write and customize algorithms. TigerGraph's support of enhanced analytic capabilities empowered businesses to avoid fraud costs, operate more efficiently, and expand into new products and services, driving growth and gains in revenue.

KEY FINDINGS

Quantified benefits. Risk-adjusted present value (PV) quantified benefits include:

- **Increased profits from new products and services valued at $9.6 million.** A greater understanding of customers and organizational data through fast and powerful analysis opened a wide variety of avenues for organizations to provide new products and services, attract new customers, and generate new revenue resulting in increased profits.

Fraud loss cost reduction

10%

- **Fraud loss costs reduced by 10%.** With TigerGraph, organizations could harness the power of data to target fraudulent activity with precision and most effectively allocate resources to stop bad actors. The composite organization sees a fraud loss cost savings of nearly $7.3 million over the course of the three-year analysis.

> **TigerGraph can hit scale to better describe customer behavior.**
>
> — SVP and data scientist, financial services

- **Retirement of $2.1 million in legacy systems.** Adopting TigerGraph enabled efficiencies in hardware and software, making it possible to safely retire legacy systems at a three-year cost savings PV of $2.1 million for the composite organization.
- **Data team productivity increase of 70%.** The data team saved time spent performing analysis and managing data and engineering databases, representing a three-year PV of $2.5 million for the composite organization.

Data science team productivity increase

70%

- **Customer service representative productivity increase by 20%.** Powerful visualizations that united data from multiple sources combined with no-code/low-code features that allowed nontechnical users to react and provide better, more efficient service, increasing productivity. This results in a three-year PV of $2.7 million for the composite organization.

Unquantified benefits. Benefits that are not quantified for this study include:

- **Multigraph.** With TigerGraph, it was possible to restrict access to data within the graph environment in support of privacy, security, and compliance. Where appropriate, decision-makers had complete information about access data and had confidence in the available security and compliance features even in highly regulated sectors.
- **Visualization.** TigerGraph supported intuitive, self-explanatory visualizations that gave a complete and unified picture of customer experiences and needs, equipping organizations to find best next-steps and resulting in improved customer satisfaction and uplift to Net Promoter Scores℠ (NPS).
- **Ease of use.** Interviewees identified several features that contributed to ease and flexibility of experience including GSQL, the proprietary, Turing-complete programming language used by TigerGraph. Graph developers on the data science team quickly adopted the tool based on its similarity to SQL. Data science professionals at interviewees' organizations found it was easy to write and customize algorithms. TigerGraph's low- and no-code capabilities enabled increased self-service for nontechnical users, allowing a range of personas to investigate and react.

Costs. Risk-adjusted PV costs include:

- **TigerGraph fees of $728,000.** The platform's fee structure is based on whether the deployment is in the cloud or on-premises, and on the amount of data ingested. Costs also depend on features selected. The three-year PV of TigerGraph fees for the composite organization is $728,000.
- **Development costs of $2.7 million.** In order to benefit from the platform, data science teams implemented and managed the data and the environment. Software engineers developed APIs and integrated the TigerGraph database as needed. The three-year PV of these efforts for the composite organization is valued at $2.7 million.

The decision-maker interviews and financial analysis found that a composite organization experiences benefits of $24.28 million over three years versus costs of $3.47 million, adding up to a net present value (NPV) of $20.81 million and an ROI of 600%.

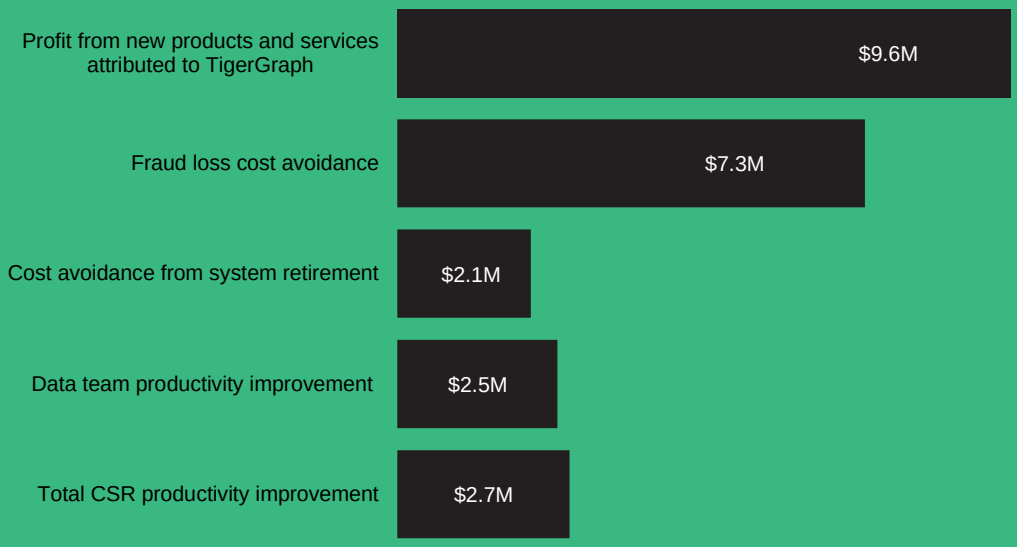
ROI
600%

BENEFITS PV
$24.28M

NPV
$20.81M

PAYBACK
<6 months

Benefits (Three-Year)



We looked at all of TigerGraph's competitors; TigerGraph was the only one that could be real time.

— SVP and data scientist, financial services

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 TigerGraph.

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 TigerGraph can have on an organization.

DUE DILIGENCE

Interviewed TigerGraph stakeholders and Forrester analyst to gather data relative to TigerGraph.

DECISION-MAKER INTERVIEWS

Interviewed six decision-makers at organizations using TigerGraph 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 decision-makers.

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.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by TigerGraph and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the study to determine the appropriateness of an investment in TigerGraph.

TigerGraph reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

TigerGraph provided the customer names for the interviews but did not participate in the interviews.

The TigerGraph Customer Journey

Drivers leading to the TigerGraph investment

Interviewed Decision-Makers

Interviewee	Industry	Region	Annual Revenue
Engineer	Healthcare	Headquartered in the US	$257 billion
Head of data engineering	Auto manufacturing	Headquartered in the UK	£23 billion
Senior fraud strategy and analytics manager	Financial services	Headquartered in the UK	£24 billion (estimated)
SVP of data fabric management	Financial services	Headquartered in the US	$74 billion
SVP and data scientist	Financial services	Headquartered in the US	$86 billion
SVP, senior director of software engineering	Financial services	Headquartered in the US	$23 billion

KEY CHALLENGES

Prior to adopting TigerGraph, the interviewees struggled to answer key questions about their organizations' customers and business. Connecting a high volume of structured and unstructured data sources was difficult or impossible, and answering queries that oftentimes required drawing together data from multiple sources required significant time for the data team as well as other business users.

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

- **Data was siloed and stored in relational databases.** Relational databases required significant engineering effort to integrate silos of data quickly enough for the needs of the business. Queries were slow or impossible to run.
- **Questions took weeks to answer or could not be answered at all.** There was no good way to integrate multiple data sources quickly into a single dashboard or report. Frequently, it was necessary to log into 10 or more systems to get a complete picture of data or execute time-consuming joins of relational databases.

> **"We needed a graph technology that would help us in a real-time, enterprise-scalable manner to tick and tie what we call non-obvious relationships together. [With] TigerGraph that can happen in a matter of seconds or minutes."**
>
> *SVP and data scientist, financial services*

- **Data could not be leveraged to full extent.** Organizations were limited in their ability to leverage data for predictive analytics and derive insights quickly that could be used to better understand their customers and their business. The consequences were missed opportunities to accurately identify fraud, answer key business intelligence questions, and introduce new products and services.

COMPOSITE ORGANIZATION

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

Description of composite. The composite organization is a $5-billion, US-based enterprise with global operations. It provides products and services to 4 million customers (both consumers and other businesses). The enterprise has 20,000 employees total including 1,000 customer service representatives and a multifunctional 20-person data science team comprised of a range of roles, including data scientists responsible for architecture as well as data analysts and investigators. The composite organization also employs software engineers for DevOps.

Deployment characteristics. The composite's TigerGraph environment is cloud-based. The graph has 1 billion vertices, 10 billion edges, 1 terabyte of RAM, and 2 terabytes of storage initially. Use cases contemplated include fraud detection, visualization, data analysis, customer 360, and entity resolution. Use cases are deployed gradually over the course of three years and the size of the environment increases over time.

"It is really the scalability of the software that attracted us. [A] billion nodes within three months is just not manageable by a lot of relational database[s] and even some of the graph databases on [the] market. For us, without this graph database, there is really no way for us to figure out the relationship[s] among all these different applications."

SVP of data fabric management, financial services

KEY ASSUMPTIONS

- **$5 billion in annual revenue**
- **20-person data scientist team**
- **1,000 customer service representatives**
- **Use cases: fraud detection, visualization, data analysis, customer 360, entity resolution**

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	Profit from new products and services attributed to TigerGraph	$2,000,000	$4,000,000	$6,000,000	$12,000,000	$9,631,856
Btr	Fraud loss cost avoidance	$800,000	$4,000,000	$4,400,000	$9,200,000	$7,338,843
Ctr	Cost avoidance from system retirement	$0	$900,000	$1,800,000	$2,700,000	$2,096,168
Dtr	Data team productivity improvement	$850,500	$1,020,600	$1,190,700	$3,061,800	$2,511,243
Etr	Total CSR productivity improvement	$0	$0	$3,600,000	$3,600,000	$2,704,733
	Total benefits (risk-adjusted)	$3,650,500	$9,920,600	$16,990,700	$30,561,800	$24,282,843

PROFIT FROM NEW PRODUCTS AND SERVICES ATTRIBUTED TO TIGERGRAPH

Evidence and data. TigerGraph enabled interviewees' organizations to uncover business intelligence insights into their data in ways that made new products and services possible, generating new revenue streams and in turn increased profits.

- Interviewed decision-makers cited TigerGraph's performance and the ability to run the appropriate algorithms quickly and at scale as keys to improving their understanding of their organizations' data and their customers' behaviors.
- Decision-makers described various applications of new products and services spanning improved supply-chain analysis, new financial services products, and improved insights and decision-making from clinical data.
- The ability to complete larger numbers of queries faster, provide targeted and compliant data, and react quickly resulted in new revenue streams.

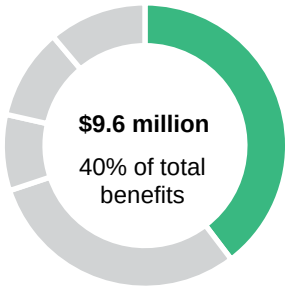
Modeling and assumptions. Forrester assumes the following for this benefit analysis:

- The composite organization is positioned to expand into a new B2B product or service.
- The annual revenue from each B2B customer is valued at $100,000 annually.
- The customer base expands over the course of the three-year analysis.
- The composite organization has profit margins of 25%.
- The composite organization prioritizes this TigerGraph use case for full production and ability to realize benefits in Year 1.

Risks. Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates. The extent to which organizations experience this benefit may vary based on:

- The nature of the new product or service and how much it depends on existing business and the extent to which the organization is positioned to expand into a new B2B product or service.
- The ability of data science teams to develop effective algorithms for the contemplated use case.
- The speed and efficacy of developers to complete integrations and build out production-ready tools and interfaces.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $9.6 million.



“We have been leveraging graph’s outputs to improve the swath of existing processes in graph, and it’s really a force multiplier because you just can’t do it without the graph database.”

SVP and data scientist, financial services

Profit From New Products And Services Attributed To TigerGraph

Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	Cumulative number of products and services for new customers	Composite	500	1,000	1,500
A2	Annual revenue from new product/service fees per customer related to new data initiatives	Interview	$100,000	$100,000	$100,000
A3	Revenue from product costs/services fees from new data initiatives	A1*A2	$50,000,000	$100,000,000	$150,000,000
A4	Attribution percentage	TEI standard	20%	20%	20%
A5	Revenue from new products and services attributable to TigerGraph	A3*A4	$10,000,000	$20,000,000	$30,000,000
A6	Profit margin	Assumption	25%	25%	25%
At	Profit from new products and services attributed to TigerGraph	A5*A6	$2,500,000	$5,000,000	$7,500,000
	Risk adjustment	↓20%			
Atr	Profit from new products and services attributed to TigerGraph (risk-adjusted)		$2,000,000	$4,000,000	$6,000,000
	Three-year total: $12,000,000			**Three-year present value: $9,631,856**	

FRAUD LOSS COST AVOIDANCE

Evidence and data. Interviewees used TigerGraph as a tool to understand and analyze links and connections in their organizations' data in service of preventing fraud and avoiding fraud-related costs.

- Fraud detection and prevention involved the use of multiple applications and sources of data.
- Data sources were complex, including real-time and transactional data.
- Interviewees found that the ability to scale to accommodate the size and nature of the data, computing performance, and the ability to create flexible and robust algorithms resulted in greater and faster ability to accurately target and prevent fraud.
- This increased ability to accurately detect and respond to fraud enabled a 10% reduction in fraud loss costs.

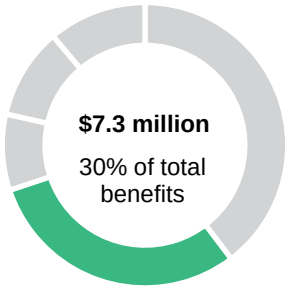
Modeling and assumptions. Forrester assumes the following for this benefit analysis:

- The TigerGraph fraud loss cost avoidance use case is developed and enters full production six months or more into Year 1. During Year 1, TigerGraph addresses less than half of the fraud the composite organization experiences.
- Fraud attempts experienced by the composite increase over time. Full benefits and the ability to address all fraud the organization experiences are not realized until Year 2.

Risks. The extent to which organizations experience this benefit may vary based on:

- The amount and type of fraud that an organization experiences.
- The complexity and characteristics of existing fraud prevention stack and environment.
- The ability of data science teams to develop effective algorithms for the contemplated use case.
- The speed and efficacy of developers in integrating as needed and building out production-ready tools and interfaces.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV of $7.3 million.



Fraud Loss Cost Avoidance

Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	Annual fraud loss addressed by TigerGraph	Composite	$10,000,000	$50,000,000	$55,000,000
B2	Fraud loss avoidance percentage	Interviews	10%	10%	10%
Bt	Fraud loss cost avoidance	B1*B2	$1,000,000	$5,000,000	$5,500,000
	Risk adjustment	↓20%			
Btr	Fraud loss cost avoidance (risk-adjusted)		$800,000	$4,000,000	$4,400,000
	Three-year total: $9,200,000			**Three-year present value: $7,338,843**	

COST AVOIDANCE FROM SYSTEM RETIREMENT

Evidence and data. Based on feedback from interviewed decision-makers, TigerGraph was frequently adopted as part of a larger digital transformation effort. TigerGraph's ability to compress data was a common factor in cost avoidance.

- Interviewees detailed how adopting TigerGraph enabled efficiencies in terms of hardware and software.
- Retiring legacy hardware and software resulted in avoided costs. Systems retired varied based on use cases and characteristics of legacy environments.

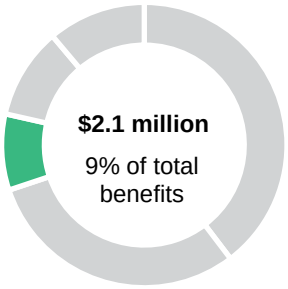
Modeling and assumptions. Forrester assumes the following for this benefit analysis:

- Costs avoided from retired systems are realized in Year 2 and increase over time.

Risks. The extent to which organizations experience this benefit may vary based on:

- The size and configuration of data stack.
- The size and type of data being managed.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $2.1 million.



Cost Avoidance From System Retirement

Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Cost avoidance from system retirement	Interviews	$0	$1,000,000	$2,000,000
Ct	Cost avoidance from system retirement	C1	$0	$1,000,000	$2,000,000
	Risk adjustment	↓10%			
Ctr	Cost avoidance from system retirement (risk-adjusted)		$0	$900,000	$1,800,000
	Three-year total: $2,700,000			**Three-year present value: $2,096,168**	

DATA TEAM PRODUCTIVITY IMPROVEMENT

Evidence and data. Data teams were engaged in efforts to manage and understand data in support of business objectives. This included engineering and management of databases, as well as performing analyses and investigations related to fraud, anti-money laundering, supply-chain management, and customer 360 along with other business intelligence initiatives.

- Interviewees found TigerGraph was a natural fit for flexibly comparing data.
- Data scientists organized, connected, and prepared data for machine learning and for readiness to generate insights. TigerGraph improved and simplified data models and could flexibly contemplate algorithms.
- As a result, managing data was more efficient and queries were completed more quickly.
- Interviewees reported productivity improvements of 70% or greater.

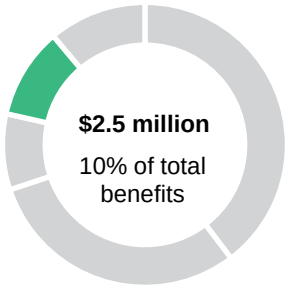
Modeling and assumptions. For the composite organization, Forrester assumes:

- Each member of the 20-person data team has a fully burdened annual salary of $189,000.
- Productivity improvement increases over the course of the three-year analysis.

Risks. The extent to which organizations experience this benefit may vary based on:

- The size and composition of data teams.
- Whether time saved is repurposed productively.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $2.5 million.



Data Team Productivity Improvement

Ref.	Metric	Source	Year 1	Year 2	Year 3
D1	Number of data team members	Composite	20	20	20
D2	Fully burdened annual salary for data team members	Assumption	$189,000	$189,000	$189,000
D3	Data team productivity improvement (percentage)	Interviews	50%	60%	70%
D4	Data team productivity total improvement	D1*D2*D3	$1,890,000	$2,268,000	$2,646,000
D5	Productivity recapture	TEI standard	50%	50%	50%
Dt	Data team productivity improvement	D4*D5	$945,000	$1,134,000	$1,323,000
	Risk adjustment	↓10%			
Dtr	Data team productivity improvement (risk-adjusted)		$850,500	$1,020,600	$1,190,700
	Three-year total: $3,061,800			**Three-year present value: $2,511,243**	

TOTAL CSR PRODUCTIVITY IMPROVEMENT

Evidence and data. Based on feedback from interviewed decision-makers, TigerGraph was a key part of applications that customer service representatives (CSRs) used at their organizations.

- 1,000 CSRs with no coding ability used a tool providing data visualization derived from a large number (10 or more) of previously siloed data sources.
- The ability to react to data quickly and effectively given high availability of all information needed to resolve customer service tasks translated into increased productivity for CSRs.
- Interviewees noted adopting TigerGraph achieved a CSR productivity improvement of 20%.

Modeling and assumptions. For the composite organization, Forrester assumes:

- Benefits are realized in Year 3 given staggered and gradual development of use cases.
- The average fully burdened annual salary of CSRs is $40,000.

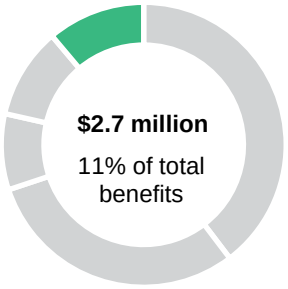
CSR productivity increase

20%

Risks. The extent to which organizations experience this benefit may vary based on:

- The number of CSRs at the organization.
- The nature of the use case and deployment.
- Whether time saved is repurposed productively.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of $2.7 million.



Total CSR Productivity Improvement

Ref.	Metric	Source	Year 1	Year 2	Year 3
E1	Number of customer service representatives	Composite	1,000	1,000	1,000
E2	Fully burdened annual salary for CSRs	Assumption	$40,000	$40,000	$40,000
E3	CSR productivity improvement (percentage)	Interviews	0%	0%	20%
E4	CSR productivity total improvement	E1*E2*E3	$0	$0	$8,000,000
E5	Productivity recapture	TEI standard	50%	50%	50%
Et	Total CSR productivity improvement	E4*E5	$0	$0	$4,000,000
	Risk adjustment	↓10%			
Etr	Total CSR productivity improvement (risk-adjusted)		$0	$0	$3,600,000
	Three-year total: $3,600,000			**Three-year present value: $2,704,733**	

UNQUANTIFIED BENEFITS

Additional benefits that customers experienced but were not able to quantify include:

- **Multigraph.** Access control and metadata helped organizations control and monitor access to data to ensure security and compliance, even for highly regulated industries such as healthcare and financial services. Graph developers had the ability to create separate graph views for various audiences with the ability to restrict sensitive data.
- **Visualization** Interviewees shared that they valued the ability of the graph to provide intuitive visualizations of data. Doing so made it possible to compare any node to another and described relationships between elements of supply chains or networks of people in a natural way. One head of data engineering at an auto manufacturing company described the visualization as "self-explaining."

  TigerGraph was a key tool to make possible member journey screens where all relevant patient data was available and visual on a single view. An engineer at a healthcare company shared that Net Promoter Scores "[took] a big jump" once this feature was adopted.
- **Ease of use.** Interviewed customers praised easy-to-use features.
  - **Self-service and low- or no-code features.** Customers valued GraphStudio, a graph data visualization interface that allowed for clear visualizations. A senior fraud strategy and analytics manager in the financial services industry said, "A number of different skills can really log into the tool and use [it]."

    An SVP of data fabric management in financial services spoke of the value of a wide group of people accessing the TigerGraph system and quickly running queries themselves: "People can come onto our system and run quer[ies] themselves, [answering] a lot of this internal stuff that used to take weeks because they are all spread across gazillions of different systems. It has one answer that's actually 'the answer' that they know is right."

    The interviewees considered the ability for staff with no coding ability to react to data to be **"**incredibly valuable" and "really powerful" according to an SVP and data scientist at a financial services company. TigerGraph allows staff with no coding ability "to see the front end of how customers are linked together and [then to] investigate."

    Interviewed decision-makers also pointed to the ease of creating algorithms. As one SVP of data fabric management in financial services related, "It's really, really easy. [TigerGraph] really took out all the hard work, having to [know] how do all these algorithms."

    Another SVP and data scientist at a financial services company added, "Flexibility really differs by vendors and TigerGraph is Turing complete, so we could run pretty much any algorithm we want and it was much more flexible than [alternative graph software]."
  - A key factor in ease of use is GSQL, the proprietary graph language for use in the platform. An SVP of data fabric management in financial services shared: "It's structured like SQL. Everyone knows SQL obviously." The same interviewee also shared that it was possible to learn the new language by spending a few hours daily over the course of one week, which stood in contrast to other graph

products. Further, “[to] learn [alternative graph software], you have to learn [proprietary languages], you have to learn the other stuff. [With TigerGraph], we were able to hit the ground running.”

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement TigerGraph and later realize additional uses and business opportunities, including:

- **Scalability.** The interviewees consistently identified scalability as a key benefit and differentiator of the solution. The SVP and data scientist in the financial services sector expressed confidence in TigerGraph to “hit scale to better describe customer behavior.” A head of data engineering at an auto manufacturer related: “[With TigerGraph], scalability wasn’t a problem. We could do exactly what we wanted to do in exactly the way we wanted to do it.”
- **Extensibility.** Interviewees described expanding use cases and making future plans for new use cases using TigerGraph. An SVP and data scientist in financial services described TigerGraph as a “force multiplier” for improving existing processes in graph. Interviewees also reported that having access to data allowed for multiple key benefits including, according to an interviewed SVP and data scientist in financial services, the ability to “reduce fraud losses, improve customer experience, and make better decisions.” The same interviewee added that for them, “data is really the new oil in terms of businesses. It’s competitive advantage for a lot of companies and creating a robust picture of our customers.”

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	TigerGraph fees	$105,000	$210,000	$236,250	$315,000	$866,250	$727,821
Gtr	Development costs	$496,125	$992,250	$850,500	$850,500	$3,189,375	$2,740,056
	Total costs (risk-adjusted)	$601,125	$1,202,250	$1,086,750	$1,165,500	$4,055,625	$3,467,877

TIGERGRAPH FEES

Evidence and data. TigerGraph licensing fees for cloud-based implementations were on a transparent schedule based on amount of data ingested into TigerGraph.

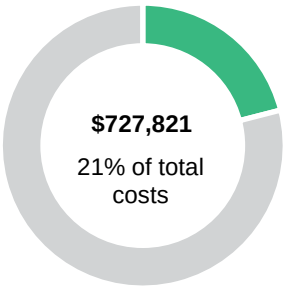
Modeling and assumptions. For the composite organization, Forrester assumes:

- The composite organization deploys TigerGraph in the cloud.
- Additional elected services include GraphStudio, Visualization Toolkit, and API connectors.

Risks. TigerGraph fees will vary at organizations based on the below factors:

- Services and features elected.
- Amount of data ingested.

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 $728,000.



TigerGraph Fees						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	TigerGraph fees	Assumption	$100,000	$200,000	$225,000	$300,000
Ft	TigerGraph fees	F1	$100,000	$200,000	$225,000	$300,000
	Risk adjustment	↑5%				
Ftr	TigerGraph fees (risk-adjusted)		$105,000	$210,000	$236,250	$315,000
	Three-year total: $866,250			**Three-year present value: $727,821**		

DEVELOPMENT COSTS

Evidence and data. After an initial proof of concept, organizations implementing TigerGraph put their data science teams to work developing a model and schema as well as determining what data should be uploaded into the graph. Initial testing and refinement of algorithms took place for a period of around six months prior to full production. Over time, the data team extended the schema to contemplate additional data sources and works with software engineers to build out application layers and other infrastructure to support new use cases.

- Software engineers engaged in developing APIs and integrating TigerGraph with systems as necessary.
- Data scientists worked to implement a schema and algorithms in support of organizational objectives

Modeling and assumptions. For the composite organization, Forrester assumes:

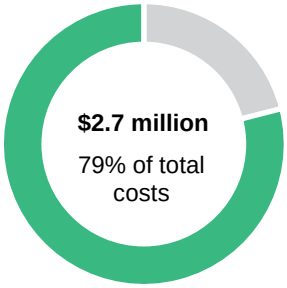
- The data science team that develops the model and writes the algorithms that make queries possible consists of three power users.
- The data science team liaises with a team of seven software engineers to develop application layers to enable use cases for TigerGraph throughout the organization, including visualizations and end-user access.
- After an intensive initial six months, the data team spends 80% of their time developing the graph.
- Time spent by software engineers to build and maintain use case interfaces tapers over the course of the three-year analysis as use cases go into full production.

> **"It has a straightforward pricing model that's based on storage [and] that really felt aligned with our growth."**
>
> *SVP and data scientist, financial services*

Risks. Development costs will vary at organizations based on the below factors:

- The size and composition of data science team.
- The size and composition of software engineering team.
- Use cases contemplated.

Results. To account for these risks, Forrester adjusted this cost upward by 25%, yielding a three-year, risk-adjusted total PV of $2.7 million.



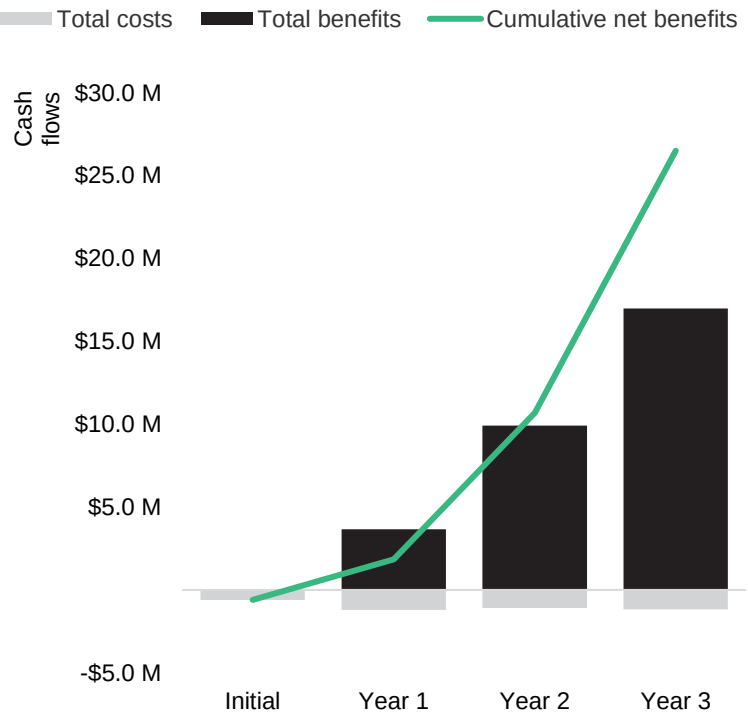
Development Costs

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
G1	Number of software engineers	Assumption	7	7	7	7
G2	Fully burdened annual salary for software engineers	TEI standard	$162,000	$162,000	$162,000	$162,000
G3	Percent time software engineers devote to integration	Assumption	10%	30%	20%	20%
G4	Data team responsible for development	Interviews	3	3	3	3
G5	Fully burdened annual salary for data development team	TEI standard	$189,000	$189,000	$189,000	$189,000
G6	Percent time data team devote to graph development	Interviews	50%	80%	80%	80%
Gt	Development costs	(G1*G2*G3)+ (G4*G5*G6)	$396,900	$793,800	$680,400	$680,400
	Risk adjustment	↑25%				
Gtr	Development costs (risk-adjusted)		$496,125	$992,250	$850,500	$850,500
	Three-year total: $3,189,375			**Three-year present value: $2,740,056**		

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	($601,125)	($1,202,250)	($1,086,750)	($1,165,500)	($4,055,625)	($3,467,877)
Total benefits	$0	$3,650,500	$9,920,600	$16,990,700	$30,561,800	$24,282,843
Net benefits	($601,125)	$2,448,250	$8,833,850	$15,825,200	$26,506,175	$20,814,966
ROI						600%
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: 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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