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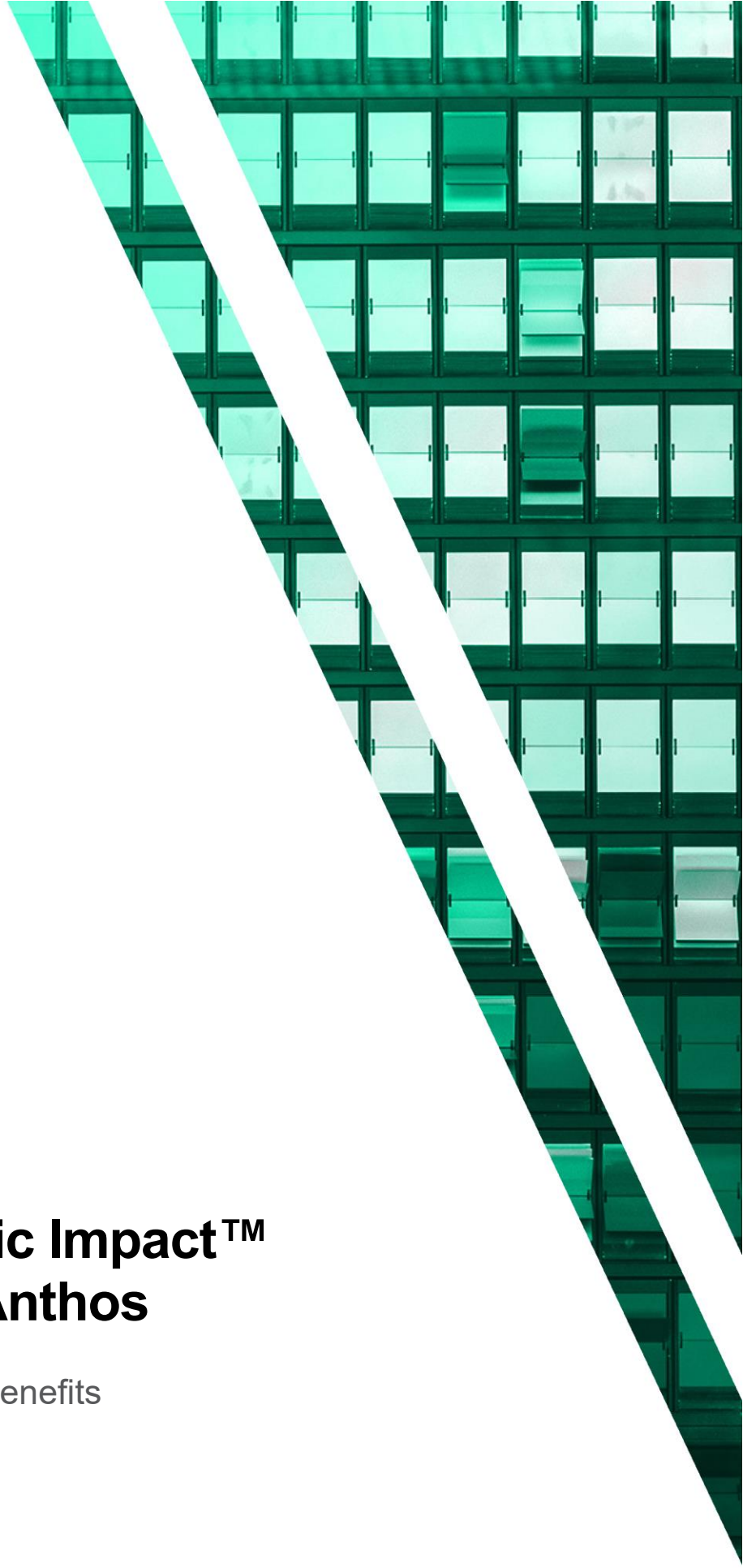

The Total Economic Impact™ Of Google Cloud Anthos

Cost Savings And Business Benefits Enabled By Anthos

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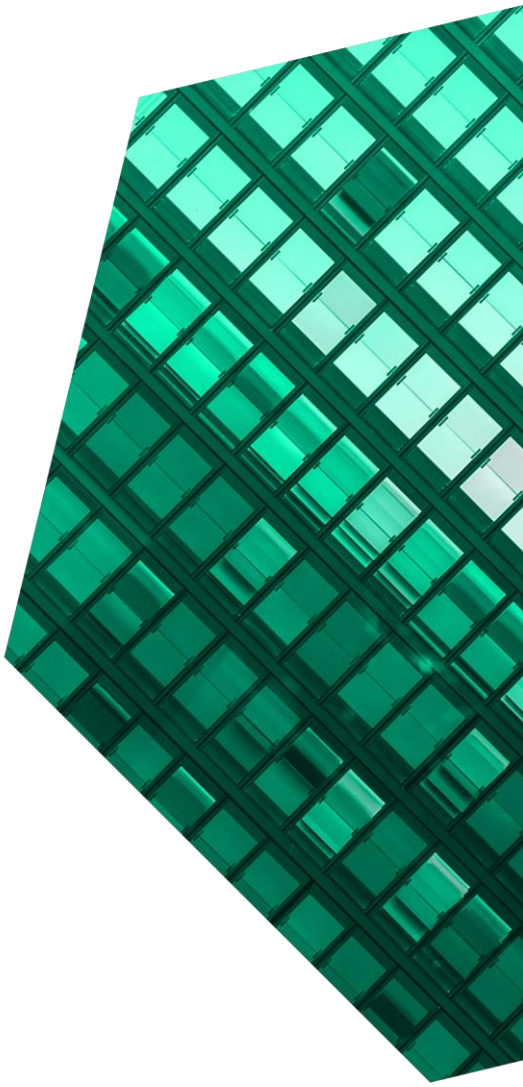

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Executive Summary

Cloud-native technologies are becoming the preferred way to modernize applications at scale to meet evolving customer expectations.[1] Enterprises require a solution to accelerate and simplify the development and operations of cloud-native apps with resiliency, manageability, and observability via full-stack cloud native capabilities. Applications must be managed at scale across growing hybrid cloud environments. Enterprises increasingly seeking managed, full-stack cloud-native platforms.

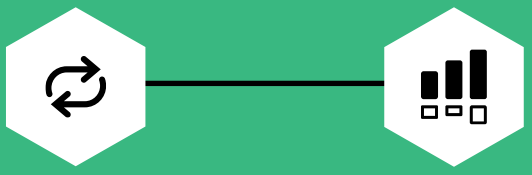
Google Cloud's Anthos is a managed application platform based on Kubernetes that is available across on-premises and multicloud environments. Based on leading open source technologies, Anthos enables organizations to build and manage enterprise-grade applications at scale. Anthos establishes operational standardization, improves developer productivity with cloud-native tooling, and automates security and policy management across deployments.

Google commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying Anthos.[2] The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Anthos on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed six representatives from five organizations with experience using Anthos. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization with $15 million in annual revenue.

These interviewees noted how, prior to using Anthos, their organizations managed their Kubernetes environments themselves in-house using a range of open source technologies. Several interviewees' organizations also managed virtualized infrastructure within their on-premises and edge environments.

KEY STATISTICS



Return on investment (ROI)
196%

Net present value (NPV)
$6.5M

However, prior attempts at implementing Kubernetes yielded limited success as the organizations struggled to consistently select, adopt, and manage cloud-native technologies to create a fully featured platform. Variance in adoption of on-premises and cloud solutions created inconsistent environments, security and misconfiguration risks, and operational toil. Combining self-managed open source technologies and legacy virtualized environments posed risks to stringent application dependability requirements. Developers spent time configuring infrastructure and security — slowing deployment velocity and innovation. Legacy platform licenses were expensive and alternative solutions created too much vendor lock-in.

The interviewees reported that after the investment in Anthos, their organizations streamlined operational efficiency, improved application availability, reduced developer toil, and saw greater deployment velocity. This allowed repurposing of legacy platform costs toward modernization initiatives.

Platform engineer productivity gains from reduction in time spent on system maintenance

45%

KEY FINDINGS

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

- **Streamlined operational efficiency resulting in $1.5 million in benefits.** The composite organization streamlines and standardizes its container operating model using Google Anthos. As a result, the composite repurposes three platform engineer FTEs and improves the productivity of existing platform engineers by 45%.
- **Cost savings from higher availability totaling $2.8 million in benefits.** The composite organization strengthens application performance, availability, resiliency, and dependability with Anthos, reducing the number of unplanned outages and service degradations by 75%. Using Anthos Service Mesh, the composite improves observability and reduces the mean time to resolution (MTTR) by 91%.
- **Developer productivity and faster time to value worth $1.7 million.** The composite's developers spend less time on infrastructure and security configuration and more time focusing on coding and higher-value business tasks with Anthos. They see a 16% reduction in the time they spend on infrastructure and security configuration. In addition, the composite reduces deployment time by 73%, enabling faster and more frequent releases.
- **Platform cost savings of $3.9 million.** The composite retires $2.2 million worth of virtualization software licensing and $270,000 worth of logging solution licensing over three years.

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

- **Google support and partnership**. The composite organization benefits from support, guidance, and product innovation provided by Google.
- **Avoided vendor lock-in**. By using Anthos, the composite organization avoids proprietary container orchestration solutions and is able to deploy Anthos consistently across multicloud and hybrid environments.
- **Simplified training and talent acquisition**. Anthos provides a unified operating model for engineers and removes operational burden from developers. This consolidates required skillsets to use Anthos, simplifying training and hiring requirements.
- **Improved employee experience.** Anthos uplifts engineers' employee experiences by reducing manual operational burden and toil and allowing developers to focus on coding.
- **Improved customer experience**. The composite organization improves availability, service quality, and product innovation speed with Anthos, driving stronger customer experience.

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

- **Implementation and training totaling $321,000.** Undergoing a major application and infrastructure change requires careful planning, design, deployment, change management, and training. The composite organization leverages professional services and internal platform engineers for change management and training to deploy and manage Anthos.
- **Ongoing licensing costs totaling $3 million.** Anthos pricing is based on the number of Anthos cluster virtual centralized processing units (vCPUs) organizations consume on public cloud and on-premises and charged on an hourly basis. The composite organization consumes 6,000 vCPUs annually.

The representative interviews and financial analysis found that a composite organization experiences benefits of $9.87 million over three years versus costs of $3.32 million, adding up to a net present value (NPV) of $6.53 million and an ROI of 196%.

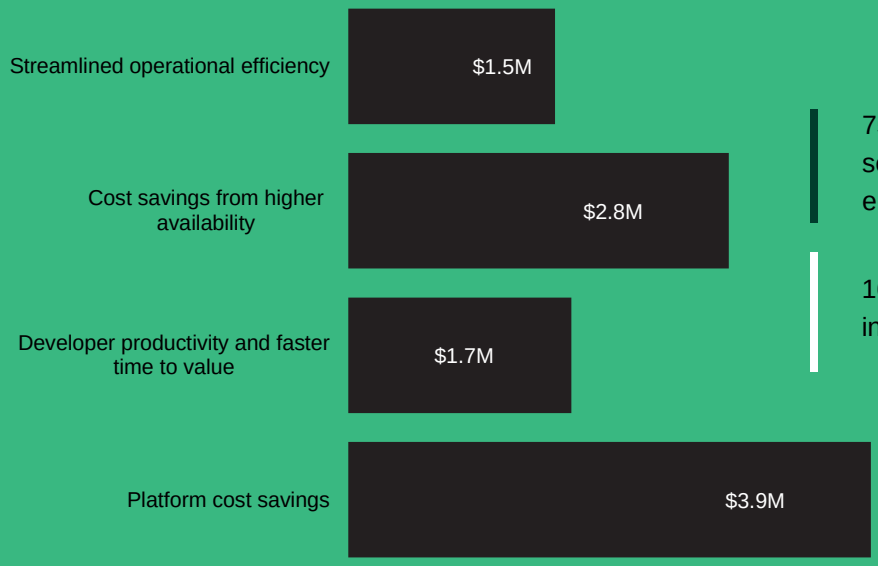
ROI
196%

BENEFITS PV
$9.87M

NPV
$6.5M

PAYBACK
<6 months

Benefits (Three-Year)



75% reduction in unplanned outages and service degradation incidents in Anthos environment

16% reduction in developer time spent on infrastructure and security configuration

“Anthos has provided us with an outcome that is categorically better than us managing open source components ourselves. It’s difficult to find very highly talented, skilled people who are capable of deploying and running those solutions.”

— Head of engineering for business services, 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 Anthos.

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 Anthos can have on an organization.

The Google Cloud Anthos Customer Journey

Drivers leading to the Anthos investment

Interviews

Role	Industry	Region	Annual Revenue
Global container engineering lead	Financial services	Global, UK HQ	$50 billion+
Head of API strategy and DevOps	Software and internet	Global, US HQ	$25 billion+
Head of engineering for business services Head of engineering for cloud enablement	Financial services	Global, Australia HQ	$15 billion+
VP of data analytics and engineering	Manufacturing	Global, US HQ	$15 billion+
Senior systems engineer	Media and entertainment	North America, US HQ	$10 billion+

KEY CHALLENGES

Forrester spoke with six interviewees at five organizations using Anthos. Prior to deploying Anthos, interviewees' organizations managed their Kubernetes environments in-house with open source solutions. Several interviewees' organizations also managed virtualized infrastructures within their on-premises and edge environments and wanted a unified solution for both container- and virtual machine-based workloads. The interviewees noted how their organizations struggled with common challenges, including:

- **Platform operations inefficiency and toil.** Prior environments lacked both standardization and automation to efficiently manage container and virtual environments. Platform operations were bogged down by manual node configuration, deployment, and maintenance. Monitoring, patching, and upgrading environments took days instead of hours. Platform operations teams struggled to scale complex infrastructure, and they ultimately dealt with day-to-day operational toil.

  The global container engineering lead of a financial services organization stated: "I was the engineering lead for years, and I hated the title because I rarely got to engineer state-of-the-art anything. We didn't have enough people, and I was busy constantly doing lower-level tasks. I was not doing my job because we just couldn't. Everything kept blowing up."

> **"Our prior environment was inefficient to manage. Deployments took longer than they needed to. General maintenance was a pain and a multiday process [when] it should not have been."**
>
> *Senior systems engineer, media and entertainment*

- **Missing skillsets and vendor support to manage multiple environments**. Finding, recruiting, and training staff to manage prior environments created additional operational burdens. Managing open source solutions required specialized skillsets and burdensome

operational labor. The senior systems engineer at a media and entertainment organization told Forrester: "We had multiple technologies from different vendors for employee training. You're not just training new employees on one technology; you're training them on multiple, and they need to be proficient in many to manage the environment."

- **Inconsistent security configuration and lack of robust monitoring capabilities led to frequent breakages.** Prior environments relied on manual configuration and policy enforcement, leading to breakage, performance issues, and loss of engineer productivity. Interviewees' organizations lacked robust capabilities to monitor, patch, conduct root cause analysis, and remediate incidents. Instead of improving observability, SLAs, and application performance, platform teams were stuck in break/fix mode, reactively addressing issues that arose in their prior states.
    - The head of API strategy and DevOps at a software and internet organization stated: "When it came to debugging work, it felt almost like guesswork because we didn't know enough about the environment. Oftentimes, we didn't even have the right staff member addressing issues. Their time is much more valuable spent elsewhere."
    - The head of engineering for business services at a financial organization told Forrester: "When we were using our old environment, on-premises infrastructure, it was probably two or three times a week that there was something broken in our infrastructure state. That meant tools [were] down, [and] productivity [was] down. That's not a problem for us at all now."
- **Developer toil from doing operational and security configuration tasks.** In the organizations' prior environments, developers spent time on infrastructure and security configuration. This created developer toil and interfered with developers' productivity to focus on creating software that created true business value.
- **Low release rate**. The organizations' prior environments limited the ability to modernize application development and to deploy canonical, consistent continuous integration/continuous delivery (CI/CD) pipelines. Release velocity was slow and inefficient. Some interviewees' organizations were limited to quarterly releases with narrow deployment windows and high developer toil.

> **"Breakages from manual configurations were a significant problem for us from a productivity perspective. We'd have an issue two or three days a week that would reduce our engineering productivity by 50% to 60%."**
>
> *Head of engineering for business services, financial services*

WHY GOOGLE ANTHOS

The interviewees' organizations searched for a solution that could:

- **Simplify container orchestration and management to increase operational productivity and proactivity.** It is expensive, time-consuming, and frustrating for operations

teams to maintain an application platform using a mixture of open source tools and virtualized infrastructure. Interviewees' organizations required a solution to unify their existing containers and virtual infrastructures to increase operational productivity, simplify developer environments, improve application stability, and drive business innovation and outcomes.

- **Automate security across hybrid environments at scale.** Interviewees' organizations face stringent security and compliance requirements, such as protecting consumer information in financial service applications or meeting SLAs for business software-as-a-service (SaaS) tools. The organizations required a solution with integrated security and configuration tools that can be defined, automated, and enforced across environments.

"Our goal is to provide a stable and robust environment for our developers to build and deploy their apps."

Senior systems engineer, media and entertainment

- **Improve visibility and monitoring with a fully managed service mesh.** Microservices architectures introduce complexity, especially in terms of visibility and risk management. Customers required features to observe, troubleshoot, and improve application performance. Customers looked to Anthos Service Mesh to reduce operational and developer burden, reduce MTTR, and improve SLA adherence and business outcomes.
- **Accelerate application delivery and standardize the development toolkit across hybrid environments**. Interviewees' organizations need to run their existing workloads and infrastructure across on-premises, edge, and multicloud environments to satisfy a variety of business needs. Interviewees stated that Anthos provides a consistent operating model that simplified the software developer workflow. This promotes modern, automated CI/CD pipelines, increases deployment velocity, and improves developer experience.
- **Support low latency applications on on-premises and edge environments.** Interviewees' organizations invested in Anthos to support running Kubernetes clusters in on-premises and edge infrastructure and to run low-latency applications. For example, running low-latency applications at the edge (factory floor) was critical for a VP of data analytics and engineering's manufacturing organization to process data reliably on the factory floor and to reduce risk of errors or faults.

"Anthos gives us the ability and flexibility to deploy applications regardless of whether they're in cloud-based clusters or on-premises based clusters. We want to have an agnostic deployment methodology for our hybrid cloud infrastructure. That also gives us the opportunity to have a single pane of glass."

Senior systems engineer, media and entertainment

- **Offload operational burden with a managed service and Google's expertise.** Interviewees trusted Google's level of support, subject-matter expertise, and product roadmap to invest fully in Anthos. Interviewees said that, compared to their organizations creating and managing open source solutions themselves, Anthos reduces operational burden, provides a high level of security, reduces the risk of outages and compliance fines, and supports developers already coding in Google Cloud.

Anthos can be deployed for a wide variety of use cases. Interviewees shared several use cases, including:

- One financial services organization uses Anthos to complement its digital transformation to Google Cloud. Anthos supports this organization's digital banking platform as well as its identity and biometrics platform.
- A media and entertainment organization uses Anthos to support on-premises and edge deployments within multiple venues to track real-time metrics to broadcast to the audience and third parties.
- Financial services organizations use Anthos to develop a variety of solutions, including secure bank-to-bank transfers, customer-facing applications, and more.
- A manufacturing organization runs Anthos on-premises to test and optimize its factory floor output with minimal latency.
- One software and internet company uses Anthos for its B2B payment security SaaS offering.

"Google Anthos is a little closer to open source alternatives and is at the forefront of the world of Kubernetes."

Head of API strategy and DevOps, software and internet

VOICE OF THE CUSTOMER

Interviewees shared:

- **"When you're rolling out Kubernetes within particularly our environment with the security controls landscape, we need to have a service-mesh capability. We need to have a high-quality config management capability. We need to have the ability to do policies and governance, management, and scale and run the environment across a fleet of multiple nonproduction and production environments."**
  – Head of engineering for cloud enablement, financial services
- **"Developers used to operate in a vacuum and were forced to develop with the tools they had previously. With microservices and all the features Anthos gives you, I like to tell people I'm going to give them their house. I'm framing it, done. Walk in that front door and go decorate any way you want."**
  – Global container engineering lead, financial services
- **"We are already realizing productivity. We staffed up in DevOps and staffed down in ops because of what the capabilities of that product offered. But that was the plan and why we chose Anthos is because it supported that."**
  – Head of API strategy and DevOps, software and internet
- **"Running Anthos on-prem provides a solid, low-latency back end. If we have any issues with our edge infrastructure, our factory production will stop. It will start backing up, we'd have to make real-time decisions on dispositioning manufactured goods, and ultimately that increases risk."**
  – VP of data analytics and engineering, manufacturing
- **"We want our staff to spend their time productively elsewhere rather than catching issues in our old environment. We no longer have the three or four staff whose job it was to maintain our old environment. We pay Google to provide that level of support for us."**
  – Head of API strategy and DevOps, software and internet
- **"If you have a line of business in the excess of $100 million and you are running it on open source software, you need to be able to manage the risk associated with that. It makes a whole lot more sense now that we're getting this level of support because it is such a central part of our system."**
  – Head of API strategy and DevOps, software and internet
- **"We have much better observability. Outages, issues, and customer questions we had are now being resolved with this new set of tooling."**
  – Head of API strategy and DevOps, software and internet

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 interviewees' 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 organization based in North America earns total revenues of $15 billion annually. Prior to deploying Anthos, the composite organization leveraged a mixture of self-managed open source container orchestration platform and virtualized infrastructure on cloud, on-premises, and edge environments.

Deployment characteristics. The composite organization replaces the DIY container platforms and VM solutions with Anthos and leverages 6,000 vCPUs annually across Google cloud, on-premises, and edge environments for application development and developer instrumentation. The composite employs 12 platform engineers to manage the environment, and it supports 60 developers.

Key Assumptions

- **$15 billion annual revenue**
- **6,000 vCPUs consumed**
- **12 platform engineers**
- **60 developers**

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	Streamlined operational efficiency	$615,600	$615,600	$615,600	$1,846,800	$1,530,906
Btr	Cost savings from higher availability	$1,132,800	$1,132,800	$1,132,800	$3,398,400	$2,817,106
Ctr	Developer productivity and faster time to value	$663,775	$663,775	$663,775	$1,991,326	$1,650,711
Dtr	Platform cost savings	$1,185,600	$1,580,800	$1,976,000	$4,742,400	$3,868,863
	Total benefits (risk-adjusted)	$3,597,775	$3,992,975	$4,388,175	$11,978,926	$9,867,586

STREAMLINED OPERATIONAL EFFICIENCY

Evidence and data. Anthos gave platform engineers a single console to configure, patch, and update Kubernetes clusters. This facilitated a common operating model for teams to communicate, gain new insights, and make greater business impacts. Interviewees' organizations leveraged the managed Kubernetes solution across on-premises and cloud environments. By defining policies at the infrastructure layer, they automated and simplified scaling clusters and enforcing policies across their cloud and on-premises environments. Anthos Service Mesh provided visibility across these hybrid environments, improving monitoring, and increasing the time to find and remediate vulnerabilities.

As a result, interviewees reported greater operational efficiency on two fronts:

- Their organizations reduced the overall number of platform operations FTEs required to manage their system environments.
- Their organizations improved platform operations productivity to manage the Anthos environment as compared to their legacy environments.

Anthos helped interviewees' organizations achieve the following results:

- **Managing Kubernetes in Anthos required less labor.** Interviewees reported repurposing headcount at their organizations because of the efficiencies realized in Anthos. A software and internet organization repurposed four platform engineering FTEs to other value-add tasks and gained further efficiencies The company's head of API strategy and DevOps noted, "One of the things we've done is cut down the 40-FTE operation support contractor team by 20% because they no longer have to do the manual operational tasks."
    - The senior systems engineer at a media and entertainment organization said his company reduced headcount by one to two FTEs. He stated: "Because we streamlined management on all of our environments with Anthos, we don't need as many people. We had an engineer leave and found that we didn't need to backfill his position because the management of the environment … was

so much easier. … We need one to two people fewer."

- The global and container engineering lead in financial services stated: "There would be no way we could support the number of apps or running instances in the VM and physical world, so you can scale down your people. The people are probably being paid more than those being replaced, but you don't need as many of them. Ultimately, we are saving money and time."

- **Improved monitoring and observability.** Anthos Service Mesh provided visibility into organizations' microservices environments, speeding up the time to conduct root cause analysis and remediation. Interviewees reported greater productivity, ease, and efficacy of monitoring and also easier hardening of apps and services.

  The head of API strategy and DevOps at a software and internet organization told Forrester: "The observability with Google allows us to get telemetry information about individual client interactions that we did not have before. Because we repurposed and no longer have the salaries associated with our group, we can use those salaries and put it towards people who are materially improving what we provide as a service. We're using it to improve the brand as well."

- **Platform engineers became more productive with Anthos.** Interviewees reported increased platform engineering productivity for Kubernetes clusters in Anthos than their organizations' prior solutions.

  - The head of engineering for business services at a financial services organization told Forrester a team of 20 site reliability engineers (SREs) expend four to five times less effort in their Anthos environment.

  - The senior systems engineer at a media and entertainment organization stated: "We [were] probably splitting our time about 50-50 between engineering and cluster maintenance before Anthos. Now we're probably about 80-20 with 80% being spent on engineering and 20% being spent on cluster maintenance."

  - The same interviewee explained: "Google gives us a single pane of glass. Our Anthos clusters are living side by side with our GKE (Google Kubernetes Engine) clusters. We don't have to have a different application to log into to manage those clusters which would require a level of context switching between different management software. It's just another GKE cluster as far as we are concerned."

Modeling and assumptions. In modeling the composite organization, Forrester assumes:

- The composite utilized 15 platform engineer FTEs to manage its prior environment and repurposes three FTEs in its current environment.

"We have 960 Kubernetes nodes on-prem. For those 960 nodes, I'm running that environment with 10 people."

Global container engineering lead, financial services

- The average fully burdened annual rate for a platform engineer is $120,000.
- The organization leverages 12 FTEs to manage the Google environment.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- Change management, learning a new system, and baseline skill sets.
- The size and scope of operation.
- Varying labor rates.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of $1.5 million.

Streamlined Operational Efficiency

Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	Number of platform engineer FTEs dedicated to legacy system maintenance	Composite	15	15	15
A2	Percent of avoided platform engineer FTEs in Anthos environment	Interviews	20%	20%	20%
A3	Avoided platform engineer FTEs with Anthos due to more efficient management of infrastructure	A1*A2	3	3	3
A4	Annual fully burdened rate of platform engineer FTE	Composite	$120,000	$120,000	$120,000
A5	Subtotal: Avoided platform engineer headcount to meet business needs	A3*A4	$360,000	$360,000	$360,000
A6	Number of platform engineers using Anthos	Composite	12	12	12
A7	Productivity gains from reduction in time spent on system maintenance	Interviews	45%	45%	45%
A8	Productivity recapture	Composite	50%	50%	50%
A9	Recaptured hours saved for system maintenance per platform engineer	2,080 hours*A7*A8	468	468	468
A10	Subtotal: Productivity savings for platform engineers	A6*A7*A8*A4	$324,000	$324,000	$324,000
At	Streamlined operational efficiency	A5+A10	$684,000	$684,000	$684,000
	Risk adjustment	↓10%			
Atr	Streamlined operational efficiency (risk-adjusted)		$615,600	$615,600	$615,600
	Three-year total: $1,846,800			**Three-year present value: $1,530,906**	

COST SAVINGS FROM HIGHER AVAILABILITY

Evidence and data. Interviewees said Anthos strengthened application performance, availability, resiliency, and dependability. Anthos configuration management helped their organizations automate and enforce policies. Changes made in one location were easily applied to and stayed consistent across clusters automatically. The organizations avoided the manual configuration that was the norm in their prior environments, preventing misconfiguration issues like performance degradation and outages. These issues were costly among the organizations, across business impacts, costs to remediate, and end-user productivity.

Interviewees said these system issues still arise in their organizations' current environments. But in such cases, Anthos equips operations teams with the tools and visibility to detect, identify, protect, respond, and recover from incidents. With Anthos, interviewees' organizations achieved the following results:

- **Higher availability and less breakage**. The organizations avoided breakages common with manual configuration in their legacy environments. The head of engineering for business services at a financial services organization stated: "A lot of breakage was config-driven because it was all manual. Now, we generate all those configs through configuration management. That reduces the amount of breakage significantly because there's no one person typing the thing in manually to do the change."

  The senior systems engineer at a media and entertainment organization explained how Anthos improved resource management and performance. He said: "We were lucky enough not to experience any major outages in the old environment, but had one occurred, we'd be running at 50% reduced capacity due to the loss of a hypervisor and VMs running on that hypervisor. In that situation, Anthos can now just reschedule the workflows on the healthy nodes. And because it's Kubernetes, resource constraints were less of a worry."

"We have all these indirect and hidden costs in the previous fully open-source world that are now gone."

Head of API strategy and DevOps, software and internet

- **Improved observability**. Interviewees' organizations overhauled their logging, monitoring and remediation efforts with Anthos service mesh. Several interviewees reported reducing MTTR, improving service quality, and reducing downtime risk. The senior systems engineer at a media and entertainment organization said his company reduced its time to monitor by 20%. He said: "[Anthos] allows us to send all our logs into a single instance in GCP (Google Cloud Platform) so they're all nice and collected into one spot which saves us time [by] not having to log into a cluster to specifically look at its logs. We can go to a single pane of glass and view the logs there. … I would say that would probably reduce our time on that by 20%"
  - A financial services organization reduced labor hours for resolution calls from up to 4 hours in its prior environment to 15 minutes with Anthos. The company's global container engineering lead told Forrester: "With Anthos, you can automate a lot of SRE (site reliability engineering) tasks. When you get the containers in Anthos, there is a good bread-crumb trail between how something started and how it broke. Now, there might be 10 things in between that could

break, but you can figure it out a heck of a lot faster. So, you're mean time to resolution just plummets."

- With Anthos, a software and internet organization improved its response rate to resolve customer inquiries and reallocated operations labor to higher business-value tasks. The head of API strategy and DevOps told Forrester: "The mean time to repair when we have a group of experts on call who are paid to answer our questions is far, far quicker. Before, we had to basically allocate time from people who are not 100% dedicated to us to research these questions. … Our SaaS product depends heavily on this."

"We would have outages due to certificate expiration and failures. With Anthos service mesh, we no longer worry about certificate rotation and short-lived certificates — all that kind of stuff."

Head of engineering for cloud enablement, financial services

Modeling and assumptions. In modeling the composite organization, Forrester assumes:

- The composite organization reduces the number of unplanned outages and service degradation incidents by 75%.
- The average hours of downtime before incidents are identified and remediated is 1.5 hours.
- Forrester models the cost of downtime and service degradation of $240,000 considering the following variables: business disruption, loss of revenue, customer churn, and loss of end-user, IT, and executive productivity.

"There's a huge amount of productivity that every team that deploys on top of Anthos realizes. The observability is huge. We have a standardized way of using the sidecar proxies for logging and telemetry. We get that same level of observability across our products. It simplifies that entire landscape."

Head of engineering for business services, financial services

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- The size, industry, applications, services, and other factors of the organization that may impact the cost of an outage.
- The severity and application types affected by the outage.
- The frequency of outages in the organization's prior state.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV of $2.8 million.

Cost Savings From Higher Availability					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
B1	Number of unplanned outages and service degradation incidents per year before Anthos	Composite	4	4	4
B2	Reduction in incidents in Anthos environment	Interviews	75%	75%	75%
B3	Avoided incidents involving downtime and degradation of services	B1*B2	3	3	3
B4	Average hours of downtime and degradation per incident	Composite	1.5	1.5	1.5
B5	Cost per hour of downtime	Composite	$240,000	$240,000	$240,000
B6	Subtotal: Cost savings from avoided outages	B3*B4*B5	$1,080,000	$1,080,000	$1,080,000
B7	Reduced MTTR in Anthos environment	Composite	91%	91%	91%
B8	Number of unplanned outages in Anthos environment	B1-B3	1	1	1
B9	Reduced average hours of degradation or downtime per incident	B4*B7	1.4	1.4	1.4
B10	Subtotal: Avoided costs from faster resolution	B5*B9	$336,000	$336,000	$336,000
Bt	Cost savings from higher availability	B6+B10	$1,416,000	$1,416,000	$1,416,000
	Risk adjustment	↓20%			
Btr	Cost savings from higher availability (risk-adjusted)		$1,132,800	$1,132,800	$1,132,800
	Three-year total: $3,398,400			**Three-year present value: $2,817,106**	

DEVELOPER PRODUCTIVITY AND FASTER TIME TO BUSINESS VALUE

Evidence and data. Interviewees said developers spent less time on infrastructure and security configuration and more time focusing on higher-value business tasks with Anthos. Anthos automated security and policy management, helped to decrease errors, hardened security postures, and alleviated developers from learning different tools and processes. Anthos also fostered greater container adoption, prompted more migrations, and facilitated modern deployment frameworks such as automated CI/CD pipelines. This transformed development life cycles and enabled faster deployment velocity, speed, and efficiency. Interviewees' organizations achieved the following results with Anthos:

- **Less infrastructure management**. Developers spent less time configuring and managing infrastructure with Anthos. The global container engineering lead at a financial services firm said: "It's about shift left; giving developers the ability to do things infrastructure people used to have to do for them. It's much faster."
  - The senior systems engineer of a media and entertainment organization explained: "When [developers deployed] their applications, they would have to log into the machine — like the physical servers — to verify that their applications had been deployed correctly and there weren't any issues. That has been completely

removed. They no longer even need access to the physical hardware."

- The same interviewee added, "I'd say maybe 15% of [developers'] time was [spent] worrying about making sure the infrastructure was available and enough for what they needed."

- **Better security.** Interviewees told Forrester that Anthos improved security posture and lowered risk while reducing developer and security engineering toil. They noted that Anthos eliminated the manual security configuration processes required in legacy environments and streamlined important security tasks like encryption and traffic management. For developers, this freed up time to focus on coding.
  - The head of engineering for business services at a financial services organization told Forrester: "Doing things like periodic change configuration auditing and config compliance scans and all of that kind of stuff is dramatically reduced. The focus is lowering a risk without increasing the amount of toil for our engineers to worry about."
  - The same interviewee added: "Most engineers shouldn't have to worry about deploying network and security policies. If you're an engineer who's just writing a business application, learning how to secure a cluster is incredibly complex. We don't want to train 300 engineers in this. Most of them don't want to get to that level of depth on hardening a Kubernetes cluster."
- **Accelerate software delivery.** Interviewees said Anthos is fundamental in helping their organizations accelerate app modernization and container adoption by giving developers the tools they need to deploy faster. Moving to Anthos from a legacy virtualized environment eliminated the need to set up maintenance windows and coordinate downtime before ultimately releasing code, often with some lag.

  The senior systems engineer at the media and entertainment organization reported: "Anthos has reduced our time to deployment by at least 50%. It allows the developers to quickly and easily deploy their applications with minimal assistance from the infrastructure team. They are, in essence, given the tools they need to just go ahead and do their job."
- The head of engineering for business services at a financial services organization stated: "We've done so many things to improve our speed. Across all my teams on our digital banking platform [which includes] about 15 squads doing software delivery for customer-facing pages, they … can release whenever they want."

"Our baseline for our security posture in our Anthos environment, would probably be 10 times better than any of our previous environments, which is a great thing. What we've tried to do is avoid introducing toil or additional work as part of that."

Head of engineering for business services, financial services

Modeling and assumptions. In modeling the composite organization, Forrester assumes:

- Developers previously spent 4,800 hours of development efforts in a quarterly release cadence.
- Developers save a total of 16% of their time using Anthos.
- The annual fully burdened rate for a developer in the composite organization is $120,000 or $58 an hour.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- The level of developer expertise and skillsets.
- Variation in developer fully burdened rates.
- The organization's prior deployment capabilities and velocity.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of $1.7 million.

"Developers use other things like circuit breaking, routing, canary deployments, [and] stuff that was impossible to do in the virtual world without a ton of extra work. Here, they can all do it themselves. It's really about empowering a developer."

Global container engineering lead, financial services

Developer Productivity And Faster Time To Value					
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**
C1	Number of developers using Anthos	Composite	60	60	60
C2	Percentage of developer time recouped from elimination of infrastructure configuration	Interviews	10%	10%	10%
C3	Percentage of developer time recouped from elimination of security configuration	Interviews	6%	6%	6%
C4	Hourly fully burdened rate for developer	TEI standard	$58	$58	$58
C5	Productivity recapture	Composite	50%	50%	50%
C6	Hours saved per developer annually	2080 hours*(C2+C3)*C5	166	166	166
C7	Subtotal: Improved developer productivity	C1*C4*C6	$577,680	$577,680	$577,680
C8	Hours of wasted deployment effort in legacy environment	Composite	4,800	4,800	4,800
C9	Decreased time to deploy with Anthos	Interviews	73%	73%	73%
C10	Total labor hours saved deploying with Anthos	C8*C9	3,504	3,504	3,504
C11	Subtotal: Faster deployment time	C4*C10	$203,232	$203,232	$203,232
Ct	Developer productivity and faster time to value	C7+C11	$780,912	$780,912	$780,912
	Risk adjustment	↓15%			
Ctr	Developer productivity and faster time to value (risk-adjusted)		$663,775	$663,775	$663,775
	Three-year total: $1,991,326			**Three-year present value: $1,650,711**	

PLATFORM COST SAVINGS

Evidence and data. Investing in Anthos allowed several interviewees' organizations to eliminate licensing costs for legacy virtualization and repurpose those cost savings into modernization initiatives. For example, a media and entertainment organization replaced millions in licensing fees spent on virtualization software with Anthos.

Interviewees said Anthos helps organizations modernize how they log, monitor, and troubleshoot apps and infrastructure, which helps reduce tech debt from aging vendor software. The head of API strategy and DevOps at a software and internet organization told Forrester: "We couldn't have done the replacement of our monitoring and logging tool for our analytics solution [without] Google Anthos. … [The legacy solution vendor] wanted $2 million for our next three-year license."

Modeling and assumptions. In modeling the composite organization, Forrester assumes:

- The composite previously used a mix of open source tools and paid $2.2 million annually for virtualization licensing costs in its prior environment.
- The composite paid $270,000 annually for a monitoring and logging tool in its prior environment.

- By Year 3, all licensing and consumption of the specified legacy virtualization and logging solutions are avoided.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- Variation in environment infrastructure.
- Licensing costs.
- Technological needs.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV of $3.9 million.

Platform Cost Savings

Ref.	Metric	Source	Year 1	Year 2	Year 3
D1	Annual virtualization licensing costs prior to Anthos	Composite	$2,200,000	$2,200,000	$2,200,000
D2	Annual logging licensing costs prior to Anthos	Composite	$270,000	$270,000	$270,000
D3	Percent of legacy technology decommissioned	Composite	60%	80%	100%
Dt	Platform cost savings	(D1+D2)*D3	$1,482,000	$1,976,000	$2,470,000
	Risk adjustment	↓20%			
Dtr	Platform cost savings (risk-adjusted)		$1,185,600	$1,580,800	$1,976,000
	Three-year total: $4,742,400			**Three-year present value: $3,868,863**	

UNQUANTIFIED BENEFITS

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

- **Trusted partnership with high quality from Google.** Interviewees frequently cited the strong partnership, support, and thought leadership from Google as a core benefit of using Anthos. The global container engineering lead at a financial services organization stated: “The partnership with Google and their engineering teams is something I have never experienced in my career. I’ve worked with all the big vendors, and I always thought those were great relationships until we had this one.”
- **Simplified training and talent acquisition.** Interviewees said Anthos provided a unified operating model for engineers and removed operational burdens from developers. This enabled their organizations to consolidate training to a common set of skills centered on Anthos, simplifying both training costs and hiring requirements.
- **Improved employee experience.** Anthos uplifted the organizations’ own developer talent by reducing manual operations, allowing developers to focus on coding. The senior systems engineer at a media and entertainment organization told Forrester: “Anthos has improved [employee] experience just with the stability it has brought for developers and other members of our organization. … It’s had a great impact on DevOps experience.”

- **Improved customer experience.** Interviewees' organizations improved availability and service quality for their own customers with Anthos. Further, these organizations developed and delivered software faster — bringing more and better product innovations to their customers. By improving customer experience with the help of Anthos, the organizations could stay more competitive and aimed to improve retention, renewal, and acquisition.

"[Anthos] makes for happy developers [and] happy developers make great products. … Developers that are excited to do these jobs are going to create incredible tools and stability because they have that power now."

Global container engineering lead, financial services

FLEXIBILITY

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

- **Avoidance of vendor lock-in.** Interviewees shared that Anthos can reduce risk because it can be used with a wide variety of Google, third-party, and open source technologies and can be deployed in the cloud, on-premises, and at the edge. Avoiding lock-in to Google or other proprietary technologies can help decision-makers adapt to technology changes, keep pace with product development strategies, and gain flexibility to negotiate or find a new vendor when prices increase.
- **Support for multicloud environments.** The VP of data analytics and engineering at a manufacturing organization said one factor that drove their company's investment in Anthos was having the option to run Google clusters on other clouds. He said: "Anthos was a leader with all the containerization, Kubernetes, [and] everything. The technology stack made sense. We decided Anthos might be our best bet because even later on, if we want to use Anthos on other vendor clouds, we could potentially do that."
- **Building new features and revenue streams.** With new capabilities enabled by Anthos, organizations can unlock new revenue streams. The senior systems engineer at a media and entertainment organization attested: "I will go ahead and just say that it has allowed us to start developing new revenue streams … There are some technologies we're working on with Anthos that I think will bring benefit in the future." Similarly, the global container engineering lead at a financial services firm stated, "You [could potentially grow] your customer base and the services you sell."
- **Access product innovation from Google.** Interviewees said they view Google as a leader in containers and Kubernetes and expressed optimism for future return as their organizations' partnerships with Google Cloud grow. The VP of data analytics and engineering at a manufacturing organization said: "Google is leading and developing solutions that continue to make it easy to deploy containers. They are their own consumers. That translates to business value for us as customers and reduces our total cost of ownership as we go forward."

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**
Etr	Implementation and training	$320,964	$0	$0	$0	$320,964	$320,964
Ftr	Ongoing licensing costs	$0	$1,209,600	$1,209,600	$1,209,600	$3,628,800	$3,008,096
	Total costs (risk-adjusted)	$320,964	$1,209,600	$1,209,600	$1,209,600	$3,949,764	$3,329,060

IMPLEMENTATION AND TRAINING

Evidence and data. Undergoing a major application and infrastructure change requires careful planning, design, deployment, change management, and training. Interviewees' organizations incurred professional services costs for Google and third-party support along with internal labor to migrate and deploy to Anthos. Platform engineers also needed to conduct change management and training to ensure successful launches and seamless transitions.

Modeling and assumptions. In modeling the composite organization, Forrester assumes:

- The composite spends $250,000 on professional services for change planning, change management, and implementation of Anthos.
- All platform engineers undergo 80 hours of training.

Risks. The expected financial impact is subject to risks and variation based on several factors, including:

- The organization's legacy architecture, existing infrastructure, and desired scope of the Anthos deployment.
- Additional complexity, knowledge, and labor required to deploy.

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 $321,000.

> **"The majority of the effort was pulling out old technology and then installing Anthos. The Anthos portion itself was actually very easy."**
>
> *Senior systems engineer, media and entertainment*

Implementation And Training						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
E1	Professional services	Composite	$250,000			
E2	Number of platform engineers needing training	Composite	12			
E3	Training/change management hours	Interviews	80			
E4	Fully burdened hourly salary for platform engineer	Composite	$58			
Et	Implementation and training	E1+(E2*E3*E4)	$305,680	$0	$0	$0
	Risk adjustment	↑ 5%				
Etr	Implementation and training (risk-adjusted)		$320,964	$0	$0	$0
	Three-year total: $320,964			**Three-year present value: $320,964**		

ONGOING LICENSING COSTS

Evidence and data. Anthos pricing is based on the number of Anthos cluster vCPUs organizations consume on public cloud and on-premises, charged on an hourly basis. There are two pricing options for Anthos: pay-as-you-go and subscription pricing, which provides a discounted price for a committed term.

Modeling and assumptions. In modeling the composite organization, Forrester assumes:

- The composite organization consumes 6,000 vCPUs annually.
- The cost per vCPU is an amalgamation of pricing for Anthos on public cloud and Anthos on-premises.
- Pricing may vary. Contact Google for additional details.

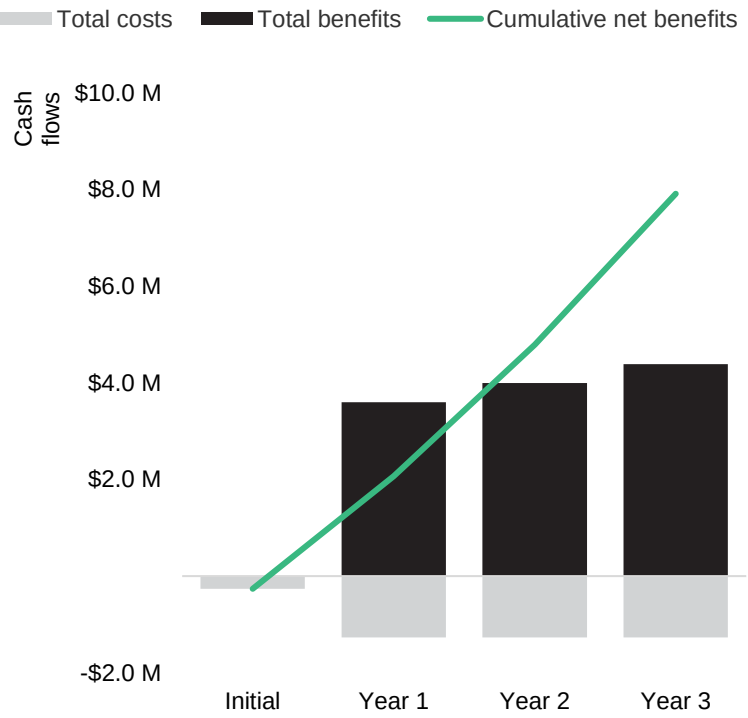
Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year, risk-adjusted total PV of $3 million.

Ongoing Licensing Costs						
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**
F1	Total number of vCPUs in Anthos	Composite		6,000	6,000	6,000
F2	Cost per vCPU per month	Composite		$16	$16	$16
Ft	Ongoing licensing costs	F1*F2*12	$0	$1,152,000	$1,152,000	$1,152,000
	Risk adjustment	↑5%				
Ftr	Ongoing licensing costs (risk-adjusted)		$0	$1,209,600	$1,209,600	$1,209,600
	Three-year total: $3,628,800			**Three-year present value: $3,008,096**		

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	($320,964)	($1,209,600)	($1,209,600)	($1,209,600)	($3,949,764)	($3,329,060)
Total benefits	$0	$3,597,775	$3,992,975	$4,388,175	$11,978,926	$9,867,586
Net benefits	($320,964)	$2,388,175	$2,783,375	$3,178,575	$8,029,162	$6,538,526
ROI						196%
Payback						<6 months

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] Source: The Forrester Wave™: Public Cloud Container Platforms, Q1 2022.

[2] 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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