

The Total Economic Impact™ Of Cloud Workstations From Google Cloud

Cost Savings And Business Benefits Enabled By Cloud Workstations

A Forrester Total Economic Impact™ Study Commissioned By Google, April 2024

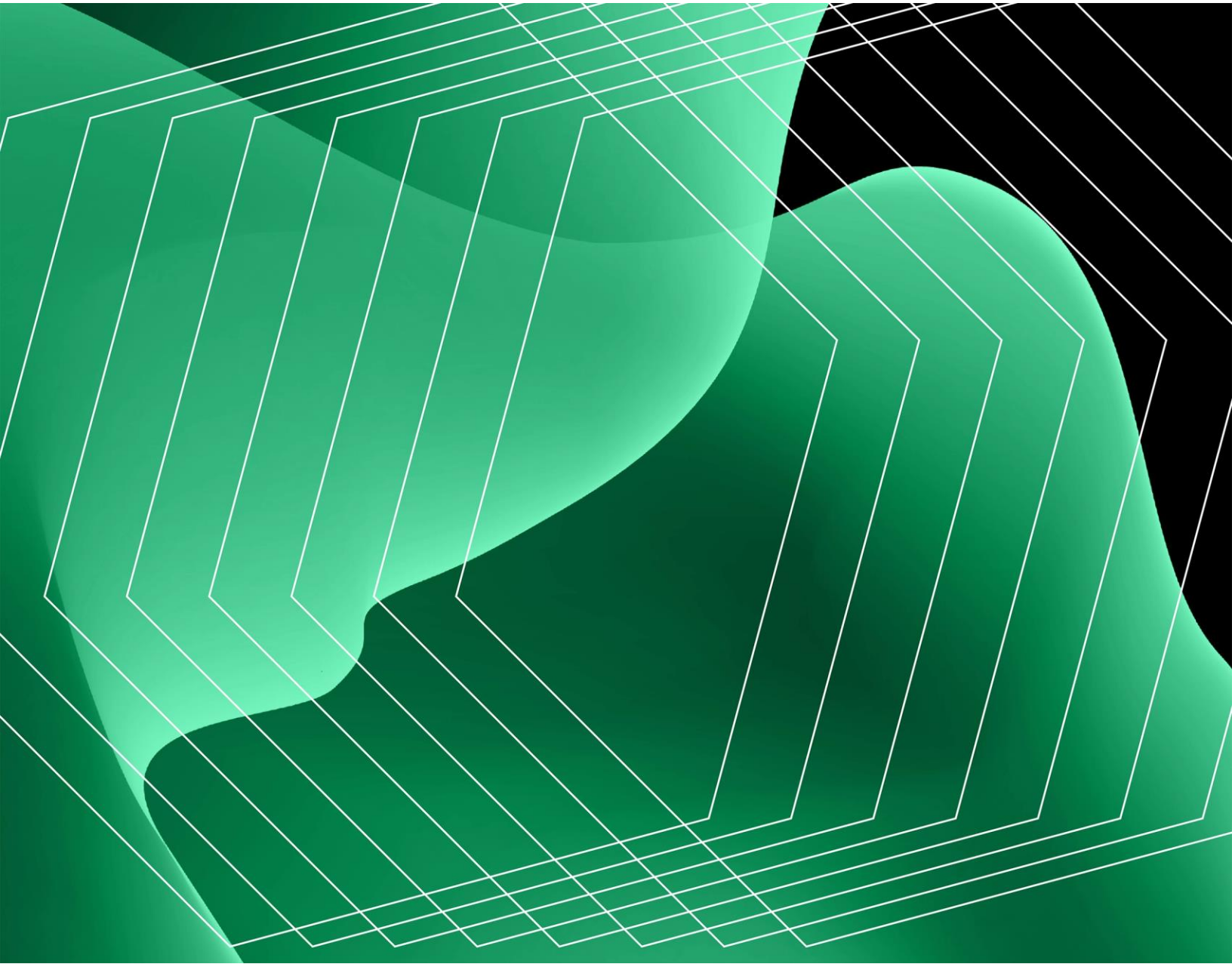


Table Of Contents

Executive Summary	3
The Cloud Workstations From Google Cloud Customer Journey	11
Analysis Of Benefits	16
Analysis Of Costs	29
Financial Summary	33

Consulting Team:

Maria Kulikova

Sarah Lervold

ABOUT FORRESTER CONSULTING

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

© Forrester Research, Inc. All rights reserved. Unauthorized reproduction is strictly prohibited. Information is based on best available resources. Opinions reflect judgment at the time and are subject to change. Forrester®, Technographics®, Forrester Wave, and Total Economic Impact are trademarks of Forrester Research, Inc. All other trademarks are the property of their respective companies.

Executive Summary

Organizations looking to scale their development teams are often met with complex onboarding processes, inconsistent workflow environments, and local code storage practices. These challenges threaten enterprise security and impede efficiency. In response, organizations are seeking a solution that provides developers with a consistent and secure toolset without the need for costly on-premises resources.

[Cloud Workstations](#) from Google Cloud provide developers with a secure managed development environment that simplifies onboarding and accelerates workflow productivity. Accessible via browser or local IDE, administrators and platform teams provision preconfigured workstations for developers to apply customization as needed. Cloud Workstations include a native integration with Gemini Code Assist, an AI-powered collaborator, to further assist developers in problem-solving code and building applications faster.

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 Cloud Workstations.¹ The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Cloud Workstations on their organizations.



Return on investment (ROI)
293%



Net present value (NPV)
\$2.32M

“The rationale of what drove us to use Cloud Workstations is security and security overhead. From a security standpoint, we’re able to control access to our code base. We can assure that you can use other elements of Google’s identity management to ensure that only our developer team can access Cloud Workstations.”

LEAD, COLLABORATIVE TOOLS, GOVERNMENT

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed five representatives with experience using Cloud Workstations. For the purposes of this study, Forrester aggregated the interviewees’ experiences and combined the results into a single [composite organization](#) that is a global enterprise with 10,000 employees. Developers, data scientists, and IT admins are users of Cloud Workstations. The composite maintains four clusters in four global regions (europe-west4, us-central-1, asia-southeast-1, southamerica-east-1), and each workstation is comprised of 4 vCPU, 16 GB RAM, and 200 GB of storage.

“Developers can use any laptop, connect to Workstations, and start coding without any additional installation requirements on their laptop. They can work from anywhere ... and the performance has been really good.”

HEAD, INFRASTRUCTURE, IT CONSULTING

Interviewees explained how, prior to Cloud Workstations, their organizations' IT admins devoted a significant amount of time to provisioning new hardware for each developer and on maintenance to adhere to compliance and security protocols. This impeded workflow efficiency for both the admin and development teams. By developing code locally on individualized machines, developers and data scientists lacked the ability to collaborate with their peers as every machine was configured in a unique way. The interviewees' organizations were also unable to enforce proper identity management practices and ensure their intellectual property was secure, as code lived across disparate machines.

"What we have right now is the 1D policy. 1D means you need one day to get code from development to production, with all the testing [and] the approvals in between. [Before Cloud Workstations, this] took at least a week, if not two weeks. Now you have all-in-one kind of integration. Developer productivity is really high. Everything they need is there, and you can even access AI now."

HEAD, CYBER CENTER OF EXCELLENCE, FINANCIAL SERVICES

After the investment in Cloud Workstations, the interviewees shared that their organizations' IT admins, developers, and data scientists gained efficiencies in their respective onboarding, coding, and project setup tasks. Standardized workstations fostered collaboration amongst their organizations' users and demonstrated the advantage of deploying Cloud Workstations more broadly across their teams in the future. Gemini Code Assist afforded these users additional productivity gains by automating traditionally manual tasks and introducing ways to tackle new tasks (such as code translation) that were previously impossible.

“One important point is that we have 350 developer users, but we are at the start of the production. The users will grow massively, by 3x or 5x maybe, in the next year.”

PRODUCT OWNER, AUTOMOTIVE MANUFACTURER

KEY FINDINGS

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

- **Increase of up to 30% in developer productivity.** Cloud Workstations’ convenient browser-based IDE, flexible connectivity to workstations, and automatic patching of updates create efficiencies for the composite’s developers. Gemini Code Assist provides additional productivity gains by assisting with generating, validating, and documenting code, thus enabling developers to build applications faster. Developer productivity gains are worth \$2.9 million over three years.
- **Increase of 80% in IT admin efficiencies for developer onboarding and support.** With Cloud Workstations, the composite’s IT admins no longer devote significant time to onboarding and offboarding developers and maintaining costly machines and servers according to strict security standards. As a managed service, Cloud Workstations provides preconfigured workstations that are easy to set up and distribute across development teams for immediate use. IT admin efficiencies total \$103,000 over three years.
- **Time savings of 15% for data scientists’ project setup.** Cloud Workstations automatically updates the software and infrastructure required to access the latest data libraries for projects. These project setup efficiencies allow the composite’s data scientists to focus on data analysis. Data scientist time savings equate to \$66,000 over three years.

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

- **Fosters a collaborative developer environment.** Standardized Cloud Workstations afford the composite's developers and data scientists the opportunity to brainstorm and resolve issues collaboratively, as each workstation layout and code behaves the same on every machine.
- **Meets enterprise security requirements.** The composite's IT admins can successfully enforce identity management policies to ensure only compliant users are accessing the enterprise's intellectual property. Cloud Workstations meet the requirement needs of both geographically distributed and highly regulated organizations.
- **Customer focus.** Cloud Workstations' product team listens to the composite's development teams to understand how to best optimize the managed environment and remove roadblocks where necessary. The Cloud Workstations product team designs solutions with the end user in mind.

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

- **Annual infrastructure costs and managed service fee.** The composite organization pays annual infrastructure costs and a managed service fee to grant each user access to a workstation and Gemini Code Assist. This fee accounts for four clusters to account for latency management across four global regions (europe-west4, us central 1, asia southeast 1, southamerica east 1). Each workstation is comprised of 4 vCPU, 16 GB RAM, and 200 GB of storage. Together, these resources total \$466,000 over three years.
- **Implementation and ongoing costs.** The composite organization dedicates five months to configuring workstations and ensuring security standards are met at the onset of deployment. One IT admin dedicates 30% of their time to ongoing management of the platform. Each new user receives 8 hours of platform training per year. Together, these resources total \$325,000 over three years.

The representative interviews and financial analysis found that a composite organization experiences benefits of \$3.1 million over three years versus costs of \$791,000, adding up to a net present value (NPV) of \$2.3 million and an ROI of 293%.

“We see a lot of benefits from Cloud Workstations that can support us on the productivity improvements ... with Gemini Code Assist, the security patches, self-serving capabilities, [and] identity management. Those benefits [provide] productivity improvements for both developers and for the admins.”

HEAD, INFRASTRUCTURE, IT CONSULTING

“We don’t want to manage operating systems. We don’t want to manage basic software. We want to have the simplicity of a button, click on it, and have the environment run under our configuration. This is exactly what Cloud Workstation does.”

HEAD, CYBER CENTER OF EXCELLENCE, FINANCIAL SERVICES

EXECUTIVE SUMMARY



Return on investment
(ROI)

293%



Benefits PV

\$3.11M



Net present value
(NPV)

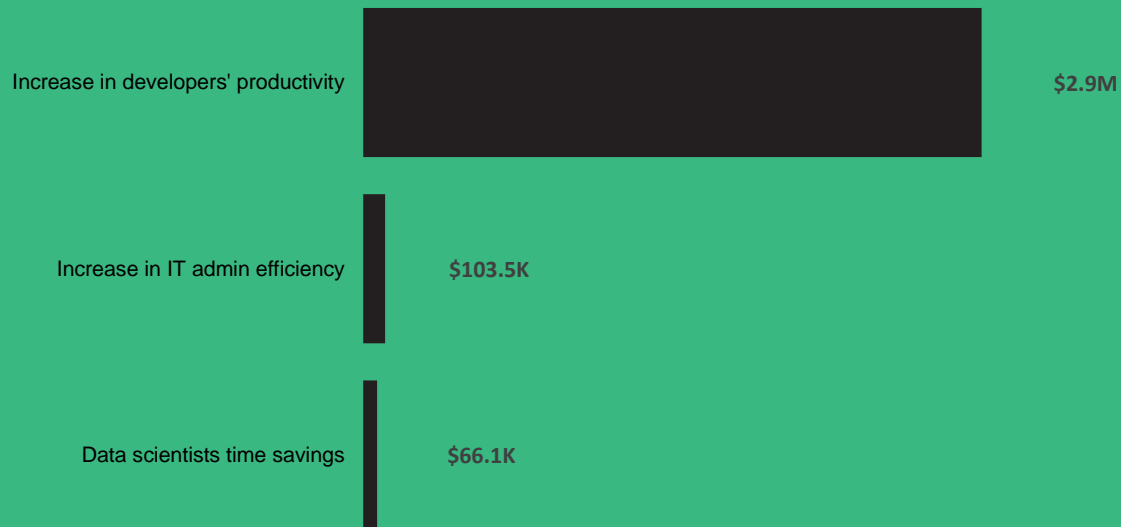
\$2.32M



Payback

7 months

Benefits (Three-Year)



TEI FRAMEWORK AND METHODOLOGY

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

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 Cloud Workstations can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Google 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 Cloud Workstations.

Google 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.

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

Due Diligence

Interviewed Google stakeholders and Forrester analysts to gather data relative to Cloud Workstations.

Interviews

Interviewed five representatives at organizations using Cloud Workstations to obtain data about costs, benefits, and risks.

Composite Organization

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

Financial Model Framework

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

Case Study

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

The Cloud Workstations From Google Cloud Customer Journey

Drivers leading to the Cloud Workstations investment

Interviews				
Role	Industry	Region	Users And Employees	Time Since Cloud Workstations Deployment
Lead, collaborative tools	Government	United States	<ul style="list-style-type: none"> • 20 (developer/admin) • 5,400 employees 	6 months
Head, cyber center of excellence	Financial services	Germany	<ul style="list-style-type: none"> • 350 developers • 100 data scientists • 50 operators • 48,000 employees 	15 months
Head, infrastructure	IT consulting	Global	<ul style="list-style-type: none"> • 200 developers • 5,000 employees 	6 months
<ul style="list-style-type: none"> • DevOps engineer • Product owner 	Automotive manufacturer	France	<ul style="list-style-type: none"> • 350 developers • 120,000 employees 	12 months

KEY CHALLENGES

Prior to Cloud Workstations, four of the interviewees noted their organizations deployed on-premises workstations while the fifth interviewee noted their organization had a cloud-based workstation solution. For those with on-premises solutions, interviewees detailed the significant cost required to maintain servers and the IT admin overhead required to manually onboard and offboard each developer. Additionally, with local machines, the interviewees’ organizations struggled to enforce proper security measures and developers remained siloed in their workflows. The interviewee whose organization used a cloud-based infrastructure explained how the solution was significantly more costly than Cloud Workstations and lacked the flexibility their developers needed. This interviewee also noted how their previous solution did not prioritize energy-saving activities, such as shutting down after periods of inactivity.

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

- **The burden and high cost of maintaining infrastructure at scale.** Interviewees stressed the time-consuming nature required to maintain a fleet of machines and servers according to strict compliance and regulatory standards. Tasks such as security vulnerability patching distracted IT admin from focusing on more strategic initiatives. One interviewee detailed their previous on-premises solution's workflow, stating, "Developer machines needed to be issued, maintained, [de-risked, and secured] by us instead of the cloud service provider."
- **Storing local code, which caused fragmentation.** With code stored across developers and data scientists' disparate laptops, interviewees' organizations lacked the ability to ensure intellectual property remained protected in their ecosystems. The lead of collaborative tools at a government organization told Forrester, "The fragmentation and other headaches associated with having code split across different laptops are significant." Interviewees also explained how developing and iterating on code locally remained at risk if events such as a laptop breaking occur.
- **Lack of a collaborative developer environment.** Interviewees explained that with each local machine configured differently, developers were unable to effectively support one another when code-based issues or questions arose in a timely manner. Their organizations struggled to establish onboarding and coding best practices as teams scaled without a standard workstation available to all.
- **Inability to enforce identity management practices.** Given the sensitivity of keeping code secure, the interviewees stressed the need to accurately enforce strict access permissions. The head of infrastructure at an IT consulting organization who previously deployed a different cloud infrastructure solution commented: "Previously, we had to worry if there was a monthly audit to make sure only valid users had access. ... The manual audit process was very tedious and troublesome for us."

“First is integration. Integration into our ecosystem, enabling all the developers. Second is security and compliance. Third is working together with Google because they listened to what we needed from them and they adapted, which is great.”

HEAD, CYBER CENTER OF EXCELLENCE, FINANCIAL SERVICES

“During our pilot, we identified 60% of the cost reduction for the same configuration for the workstation that we provide on [our previous cloud provider] versus the one we have on Google Cloud Platform.”

HEAD, INFRASTRUCTURE, IT CONSULTING

“We decided to use Cloud Workstation to secure the code into this cloud environment. The policy is really no-code on local computer.”

PRODUCT OWNER, AUTOMOTIVE MANUFACTURER

INVESTMENT OBJECTIVES

The interviewees' organizations searched for a solution that could:

- Act as a managed service.
- Meet security and regulatory requirements globally.
- Scale with increasing number of developers and data scientists.
- Support necessary developer integrations.

“If an admin from the cloud service provider is trying to access our Cloud Workstations, we need to approve it. There needs to be transparency about who has access and what they are doing with it. It needs to be certified under security standards such as ISO 27001. It's a long list of requirements, but Google has all the checkmarks.”

HEAD, CYBER CENTER OF EXCELLENCE, FINANCIAL SERVICES

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 five interviewees, 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 composite organization is a global enterprise with 10,000 employees. Developers, data scientists and admin are active users of Cloud Workstations. Prior to deployment, the composite used a combination on-premises and cloud-based infrastructure to support its development environment.

Deployment characteristics. The composite implements Cloud Workstations over four months. The composite maintains four clusters to account for latency management across four global regions, and each workstation is comprised of 4 vCPU, 16 GB RAM, and 200 GB of storage. In Year 1, 50 developers and 15 data scientists use Cloud Workstations. In Year 2, the user count increases to 100 and 20, respectively, and in Year 3, the user count increases to 150 and 25, respectively. Two IT administrators maintain the platform across all three years.

Key Assumptions

Global enterprise

10,000 employees

50 developers and 15 data scientists in Year 1

Two platform admin

Four clusters

Four global regions

Workstation; 4 vCPU, 16 GB RAM, 200 GB of storage

Analysis Of Benefits

Quantified benefit data as applied to the composite

Total Benefits							
Ref.	Benefit	Initial	Year 1	Year 2	Year 3	Total	Present Value
Atr	Increase in developers' productivity	\$0	\$360,000	\$1,200,000	\$2,160,000	\$3,720,000	\$2,941,848
Btr	Increase in IT admin efficiency	\$0	\$41,600	\$41,600	\$41,600	\$124,800	\$103,453
Ctr	Data scientists time savings	\$0	\$20,250	\$27,000	\$33,750	\$81,000	\$66,080
Total benefits (risk-adjusted)		\$0	\$421,850	\$1,268,600	\$2,235,350	\$3,925,800	\$3,111,381

INCREASE IN DEVELOPERS' PRODUCTIVITY

Evidence and data. Interviewees explained that their organizations' developers gained efficiencies because of Cloud Workstation's convenient, browser-based IDE solution. Developers also experienced less downtime required for scheduled maintenance activities, such as security patching, with Cloud Workstations. Interviewees commented that Gemini Code Assist provided additional productivity gains for developers, assisting with documenting and validating code and generating unit tests. Interviewees expected to realize significant increases in productivity from Gemini Code Assist over time.

- The head of the cyber center of excellence at a financial services organization noted that writing and delivering code was reduced from five days to one day with Cloud Workstations. The interviewee noted: "Every developer does a lot of customization, a lot of setup time, because you have all these different systems that are not integrated into each other. You had to do a lot of sets manually. Now all of this is done automatically."
- With Gemini Code Assist, the same interviewee explained their organization's access to new capabilities, namely code translation, which were previously

impossible for developers to complete. They said, “We are using it to translate code from Java to Python or from COBOL to Java.”

- The head of infrastructure at an IT consulting organization estimated a 50% increase in developer productivity as a result of Cloud Workstations. Sharing an example, they told Forrester: “One of the big benefits for the Cloud Workstations is that it provides a browser-based IDE. For example, if a developer’s local laptop breaks down when he was writing the code ... instead of trying to fix the laptop locally, they can use another laptop’s browser to connect to their Cloud Workstation. Without the browser IDE solution, the individual has to actually fix the local laptop or local IDE before he can continue to work on the code.”
- The same interviewee noted their IT consulting organization conducted a two-month pilot test for Gemini Code Assist by assessing the number of pull requests submitted in a constant timeframe. The result was a 30% productivity improvement for developers.
- The lead of collaborative tools at a government organization estimated a 50% to 100% productivity improvement for junior or intern developers using Gemini Code Assist in use cases such as fixing errors in code. The interviewee shared the kinds of questions junior and intern developers asked of Gemini Code Assist, “Why is this error the way it is?” “Can you debug my code?” “Can you look for anything different in this code?”
- The product owner at an automotive manufacturer discussed how Gemini Code Assist contributed to generating unit tests, validating code and documentation, and speeding up integrations. The interviewee estimated a time savings of 10% for developers.

Modeling and assumptions. Based on the interviews, Forrester assumes the following about the composite organization:

- There are 50 developers in Year 1, 100 in Year 2, and 150 in Year 3.
- The average fully burdened annual salary of a developer is \$150,000.
- Developers spend 80% of their time on coding and documentation tasks.
- With Cloud Workstations, developers save 10% in Year 1 and 15% in Years 2 and 3.

ANALYSIS OF BENEFITS

- With Gemini Code Assist, developers save an additional 5% in Year 1, 10% in Year 2, and 15% in Year 3.
- Forrester applies a productivity recapture of 50%. Not all time savings translate into completion of additional work. Employees convert 50% of hours saved into productive time.

Risks. The benefit of improved developer productivity may vary based on:

- The adoption rate of using Cloud Workstations.
- The average fully burdened annual salary of employees.
- The tools used for developers prior to the implementation of Cloud Workstations.

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 \$2.9 million.

Up to 30%

Time saved per developer using Cloud Workstations and Gemini Code Assist

“Cloud Workstations comes with the Gemini Code Assist coding assistant. We did an initial pilot on Gemini Code Assist a while ago [which was] not directly associated with the workstation. ... I conducted another survey AI by comparing the PR accounts for developer who’s working with Gemini Code Assist. For that survey, we saw 30% of productive improvements.”

HEAD, CYBER CENTER OF EXCELLENCE, FINANCIAL SERVICES

“Now developers don’t have to write the documentation. They ask Gemini Code Assist to generate the documentation and afterwards only fix some words. It also allows for structured documentation, because documentation across developers might look completely different. Now when you use the same prompt to generate the documentation, it will look similar and will have a structure which makes it much easier to consume.”

HEAD, CYBER CENTER OF EXCELLENCE, FINANCIAL SERVICES

“With Gemini Code Assist, they are currently using it for code translation. ... With the AI, you are translating code files into a modern language and then you can read and understand the code. This is where code written long ago with a valid use case can be modernized.”

HEAD, CYBER CENTER OF EXCELLENCE, FINANCIAL SERVICES

ANALYSIS OF BENEFITS

Increase In Developers' Productivity						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
A1	Number of developers onboarded	Composite		50	100	150
A2	Average fully burdened developer salary (annual)	TEI standard		\$150,000	\$150,000	\$150,000
A3	Percentage of time spent on coding and documentation tasks before	Interviews		80%	80%	80%
A4	Percentage of time saved on coding with Cloud Workstations	Interviews		10%	15%	15%
A5	Percentage of time saved due to Gemini Code Assist	Interviews		5%	10%	15%
A6	Subtotal: Percentage of time saved in total	A4+A5		15%	25%	30%
A7	Productivity recapture	TEI standard		50%	50%	50%
At	Increase in developers' productivity	$A1 \cdot A2 \cdot A3 \cdot A6 \cdot A7$	\$0	\$450,000	\$1,500,000	\$2,700,000
	Risk adjustment	↓ 20%				
Atr	Increase in developers' productivity (risk-adjusted)		\$0	\$360,000	\$1,200,000	\$2,160,000
Three-year total: \$3,720,000			Three-year present value: \$2,941,848			

INCREASE IN IT ADMIN EFFICIENCY

Evidence and data. Interviewees explained that in their organizations' previous environments, their IT admin were responsible for onboarding and offboarding developers. Aside from initial setup, this included configuring and monitoring all machines to adhere to necessary compliance and security standards. With Cloud Workstations, IT admin no longer orchestrated these time-consuming responsibilities for on-premises equipment.

- The lead of collaborative tools at a government organization shared, "We are at a point where onboarding includes a template that allows deployment at scale very, very quickly." Specifically, the interviewee noted the following:
 - Reduced workstation creation (creating new VM, curation management, and tuning) from one day to 1 hour.
 - Saved three weeks per year for 15 to 20 developers on compliance documentation.
 - Saves one day per month on maintaining devices.

- The same interviewee also noted the time savings associated with a cloud-based solution, stating, “We would have had to keep 20 VMs orchestrated to be compliant by government standards.”
- The head of the cyber center of excellence at a financial services organization referenced device setup efficiencies, stating: “It takes a lot of time to configure the software on the machine. Now the time goes down from a week or two to some seconds. You can automate all this which was impossible before.”
- The product owner at an automotive manufacturer noted their organization saves three to four times the amount of admin time previously required to manage its on-premises machines.
- The head of infrastructure at an IT consulting organization commented that their team reallocated half of the time IT admin’s spent on onboarding and offboarding activities in their previous environment.
- The same interviewee explained the security patching process, stating: “The way Cloud Workstations manages security patching is that it provisions the machine from an image every time you start the machine. The machine will automatically catch up with all the system updates.”

“Because of the flexibility of the management and the product of Cloud Workstations, we can open the access to the entire R&D team. Anybody can come to the platform [and] provision their own Cloud Workstation without additional support from IT team. Previously for onboarding offboarding system management, we had to have a dedicated IT team to help. Now everything has been fully integrated, so there’s no IT intervention required for getting engineers onboard and offboard. We can save a lot of IT bandwidth.”

HEAD, INFRASTRUCTURE, IT CONSULTING

Modeling and assumptions. Based on the interviews, Forrester assumes the following about the composite organization:

- There are two IT admin team members dedicated to Cloud Workstations.
- The average fully burdened annual salary of an IT admin is \$130,000.
- IT admin spend 50% of their time on developer onboarding and support.
- With Cloud Workstations, IT admin save 80% of their time on these tasks.
- Forrester applies a productivity recapture of 50%. Employees convert 50% of hours saved into productive time.

Risks. The benefit of increase in IT admin efficiency may vary based on:

- The number of IT admin.
- The average fully burdened salary of employees.
- The process for onboarding new developers prior to Cloud Workstation.

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 \$103,000.

80%

Percentage of IT admin time saved on onboarding and support

“I can scale to 50 people with Cloud Workstations with no more toil to our security and monitoring people than if I had the same 15. It’s the same essential overhead as opposed to VMs. If I multiply the number of users by 10, the workload also went up by 10.”

LEAD, COLLABORATIVE TOOLS, GOVERNMENT

Increase In IT Admin Efficiency						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
B1	Number of IT admin team members	Composite		2	2	2
B2	Average fully burdened IT admin salary (annual)	TEI standard		\$130,000	\$130,000	\$130,000
B3	Percentage of time spent on onboarding and support for developers before	Interview		50%	50%	50%
B4	Percentage of time saved with Cloud Workstations	Interview		80%	80%	80%
B5	Productivity recapture	TEI standard		50%	50%	50%
Bt	Increase in IT admin efficiency	$B1*B2*B3*B4*B5$	\$0	\$52,000	\$52,000	\$52,000
	Risk adjustment	↓20%				
Btr	Increase in IT admin efficiency (risk-adjusted)		\$0	\$41,600	\$41,600	\$41,600
Three-year total: \$124,800			Three-year present value: \$103,453			

DATA SCIENTISTS TIME SAVINGS

Evidence and data. The head of the cyber center of excellence at a financial service organization explained that their organization's data scientists used Cloud Workstations to run tests on data and stage the data to databases. With Cloud Workstations, this user group gained efficiencies from no longer setting up VMs at the start of each new data project due to required software and infrastructure updates that allowed access to the latest data libraries. With these time savings, data scientists could focus on running and analyzing more code.

The head of the cyber center of excellence at a financial service organization shared: "The big time savings for data scientists is that they don't have to set up their own VM to manage everything. It's just two clicks away. They're getting rid of a setup time [that] previously [took them] two weeks, [and now] goes down to 2 seconds."

Up to 15%

Time saved on project setup for data scientists with Cloud Workstations

Modeling and assumptions. Based on the interviews, Forrester assumes the following about the composite organization:

- There are 15 data scientists in Year 1, 20 in Year 2, and 25 in Year 3.
- The average fully burdened annual salary of a data scientist is \$150,000.
- Data scientists spend 15% of their time setting up projects.
- With Cloud Workstations, data scientists save 15% each year on project setup.
- Forrester applies a productivity recapture of 50%. Employees convert 50% of hours saved into productive time.

Risks. The benefit of data scientists' productivity will vary based on:

- The adoption rate of data scientists using Cloud Workstations.

ANALYSIS OF BENEFITS

- The average fully burdened annual salary of employees.
- The tools used by data scientists prior to the implementation of Cloud Workstations.

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 \$66,000.

Data Scientists Time Savings						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
C1	Number of data scientists	Composite		15	20	25
C2	Average fully burdened data scientist salary (annual)	TEI standard		\$150,000	\$150,000	\$150,000
C3	Percentage of time spent on project setup before	Interview		15%	15%	15%
C4	Percentage of time saved on project setup with Google Cloud Workstations	Interview		15%	15%	15%
C5	Productivity recapture	TEI standard		50%	50%	50%
Ct	Data scientists time savings	$C1 \times C2 \times C3 \times C4 \times C5$	\$0	\$25,313	\$33,750	\$42,188
	Risk adjustment	↓20%				
Ctr	Data scientists time savings (risk-adjusted)		\$0	\$20,250	\$27,000	\$33,750
Three-year total: \$81,000			Three-year present value: \$66,080			

UNQUANTIFIED BENEFITS

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

- **Fosters a collaborative developer environment.** With access to standardized workstations across the team, the interviewees noted their developers gained the ability to work together and resolved issues with their colleagues seamlessly. The lead of collaborative tools at a government firm told Forrester: “It provides us a collaborative development environment because these Cloud Workstations are the same as each other, so the code behaves the same on every developer’s

machine. They can work locally but also work together and see each other's or pair programmer or whatever they need to do.”

- **Meets enterprise security requirements.** Cloud Workstations allowed the interviewees' organizations' IT admin to properly enforce identity management to ensure only authorized users access the underlying code base within the platform and establish best practices for offboarding users in a compliant way. This was of particular importance for global development teams that needed to meet strict international security standards.
 - The head of infrastructure at an IT consulting firm shared: “The Workstation is enforced with the enterprise identity. The moment that the developer leaves the company, identities are disabled [and] access to the Cloud Workstation is revoked. All company intellectual property on a Workstation will be protected. It's much less concern of a potential security incident.”
 - The same interviewee shared another example: “Previously in our workspace solution, identity management was not strictly enforced. Any user of workspace could invite another noncompany email address to access the machine by the access code. That's a big security concern. We want to make sure that anybody who has access to the machine will have a valid enterprise account. Now in the Cloud Workstation solution, all the access to the Cloud Workstation is managed through the same identity management as part of the Google Cloud solution. Admin can enforce owning enterprise identity can access those workstations.”

“A cloud-based system like this allows developers to avoid the risk of malware or of software being downloaded on the local machine, on the network that can go lateral.”

LEAD, COLLABORATIVE TOOLS, GOVERNMENT

- **Customer focus.** Interviewees noted that the Cloud Workstations' product team collaborated with their admin, developers, and data scientists to understand any roadblocks within Cloud Workstations and offered a solution with the end user in mind.
 - The product owner at an automotive manufacturer said: "What I really appreciate is having the roadmap of the Cloud Workstation. When we request new features, we see it's taken into account. I have multiple meetings with the product manager of Cloud Workstation. I'm really happy with the product and really happy of the team we have in front of us."
 - The head of infrastructure at an IT consulting organization explained: "We have a very close working relationship with the Cloud Workstations team. ... They actively support us on new issues on the solution."

FLEXIBILITY

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

- **Expanding licenses across new users.** Interviewees unanimously shared their intent to grant additional Cloud Workstation licenses across their developers and data scientist teams to further enhance productivity and continue to standardize and establish best practices.
 - The lead of collaborative tools at a government organization stated, "If we have a research group that wants to deploy an application and they need to manage their application in a 'production-grade development,' we would mandate the use of Cloud Workstations."
 - In reference to license expansion the head of the cyber center of excellence at a financial services organization commented: "Our plan is to expand to more users per category and then also expand in the number of categories. Right now, we have these three categories, and we might get from 500 users to 5,000. Developers, data scientists, operators are our main target audience for this."

- **Retiring on-premises machinery.** Interviewees recognized the significant cost savings their organizations will realize once servers (which also require ongoing maintenance expense) are officially retired. The transition to cloud infrastructure also allows users to swap out more expensive laptops for more economical options.
 - The head of the cyber center of excellence at the financial services organization estimated between 60% and 70% cost savings switching to the pay-as-you-go consumption model from servers and equipment running constantly. The interviewee explained: “We have two goals. One is to downgrade the actual machine and two is to downgrade the number of machines per person.”
 - The lead of collaborative tools at a government organization echoed a similar sentiment regarding the type of equipment required, “I don’t have to care if they’re on a Mac or on Windows.”
- **Integrating future tools.** To expand capabilities without leaving the Cloud Workstation, interviewees shared excitement for future integrations. The head of the cyber center of excellence at a financial services organization told Forrester: “I’m looking forward to third-party integrations like the R programming language and to more use cases for GPUs that can speak within Cloud Workstations. This is where we are going to test. And, of course, having an even more integrations with Gemini Code Assist.”

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

“I think Gemini Code Assist is at an amazing starting point, kind of wild where it could go.”

LEAD, COLLABORATIVE TOOLS, GOVERNMENT

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
Dtr	Annual infrastructure costs and managed service fee	\$0	\$110,240	\$194,340	\$273,517	\$578,097	\$466,327
Etr	Implementation and ongoing costs	\$115,920	\$88,265	\$81,641	\$81,641	\$367,466	\$324,970
	Total costs (risk-adjusted)	\$115,920	\$198,505	\$275,980	\$355,158	\$945,563	\$791,297

ANNUAL INFRASTRUCTURE COSTS AND MANAGED SERVICE FEE

Evidence and data. Each interviewee's organization paid Google an annual infrastructure cost and managed service fee to grant their user access to a workstation and Gemini Code Assist.

Modeling and assumptions. Based on the interviews, Forrester assumes the following about the composite organization:

- The fee paid to Google is \$95,861 in Year 1, \$168,991 in Year 2, and \$237,841 in Year 3.
- This assumes four clusters in four global regions (europe-west4, us central 1, asia southeast 1, southamerica east 1).
- Each Cloud Workstation is comprised of 4 vCPU, 16 GB RAM, and 200 GB of storage.
- The total number of users is divided equally across four global regions.
- This fee is billed monthly. Please contact Google for additional price details.

Risks. The cost of annual infrastructure and managed service fee may vary based on:

- The number of Cloud Workstation users.

ANALYSIS OF COSTS

- Calculation of resource cost (VM compute, VM memory, GPU, Disk)
- Cloud Workstation management cost charged by Google.

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$466,000.

Annual Infrastructure Costs And Managed Service Fee						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
D1	Annual infrastructure and managed service fee	Composite		\$95,861	\$168,991	\$237,841
Dt	Annual infrastructure costs and managed service fee	D1	\$0	\$95,861	\$168,991	\$237,841
	Risk adjustment	↑15%				
Dtr	Annual infrastructure costs and managed service fee (risk-adjusted)		\$0	\$110,240	\$194,340	\$273,517
Three-year total: \$578,097			Three-year present value: \$466,327			

IMPLEMENTATION AND ONGOING COSTS

Evidence and data. Interviewees explained that Cloud Workstations' implementation included workstation setup and configuring access to meet security standards. Some interviewees noted their organizations dedicated additional time to customizations across their development environments. In general, interviewees noted that users spent a few weeks on onboarding and initial training.

- The product owner at an automotive manufacturer told Forrester implementation took six months for three team members. They said, "Once we have a minimum viable project to be deployed, we choose 15 people to do beta testing ... then we increased to 300 developers."
- The head of infrastructure at an IT consulting organization explained their organization conducted a pilot for two months and then migration took one month. They explained: "To adopt Cloud Workstations, you just need to go to the console and create a cluster and then set up the configurations. It's a very small onboarding preparation that we had to do before we can allow every developer to come to platform to self-provision their own work sessions. That's pretty minimal work. They have step-by-step instructions for how to go through to configure the

ANALYSIS OF COSTS

machine type, create a configuration and then manage and configure the access.”

- The lead of collaborative tools at a government organization told Forrester: “It took between four to six weeks to deploy. I want to asterisk that we did not use the out-of-the-box like point, click, go. We could have deployed it in 10 minutes, but we wanted to build a custom container for VS code. We wanted to minimize the vulnerabilities in VS [Visual Studio] code, and we customize a lot of what we deployed through Cloud Workstations. That took some time just from a technical standpoint to kind of go through that process.”

Modeling and assumptions. Based on the interviews, Forrester assumes the following about the composite organization:

- Initially, two IT admin spent five months on implementation.
- The average fully burdened hourly salary of an IT admin is \$63.
- Each year, one IT admin team member dedicates 30% of their workload to maintain Cloud Workstations.
- In Year 1, 65 users are trained on Cloud Workstation for 8 hours. In Years 2 and 3, this number of users trained decreases to 55.
- The average fully burdened hourly salary of an employee is \$72.

Risks. The cost of implementation and ongoing costs may vary depending on:

- The number and type of employees involved with implementation.
- The average fully burdened hourly salary of employees.
- Extent of training per new user.

Results. To account for these risks, Forrester adjusted this cost upward by 15%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$325,000

“The same person who was a skeptic was the same person who had to set up all the VMs. ... Once all the quirks of the deployment work during that four-to-six-week period got ironed out, I think I never heard anything ever again.”

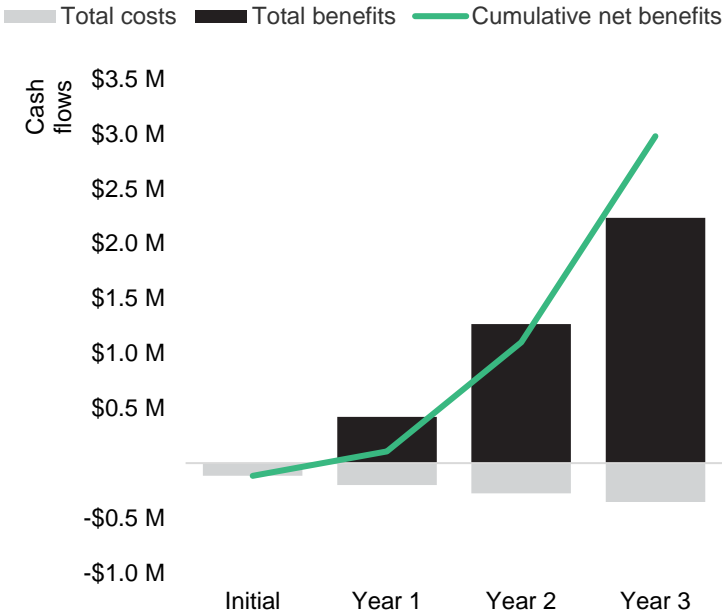
LEAD, COLLABORATIVE TOOLS, GOVERNMENT

Implementation And Ongoing Costs						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
E1	Number of IT admin team members	Composite	2	1	1	1
E2	Number of hours spent	Interview	800	624	624	624
E3	Average fully burdened IT admin salary (hourly)	TEI standard	\$63	\$63	\$63	\$63
E4	Subtotal: Implementation and ongoing admin costs	E1*E2*E3	\$100,800	\$39,312	\$39,312	\$39,312
E5	Number of users to be trained	Y1: (A1+C1) Y2 and Y3: (A1+C1)-E5 _{PY}		65	55	55
E6	Training hours	Interview		8	8	8
E7	Average fully burdened employee salary (hourly)	TEI standard		\$72	\$72	\$72
E8	Subtotal: Training	E5*E6*E7		\$37,440	\$31,680	\$31,680
Et	Implementation and ongoing costs	E4+E8	\$100,800	\$76,752	\$70,992	\$70,992
	Risk adjustment	↑15%				
Etr	Implementation and ongoing costs (risk-adjusted)		\$115,920	\$88,265	\$81,641	\$81,641
Three-year total: \$367,466			Three-year present value: \$324,970			

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	(\$115,920)	(\$198,505)	(\$275,980)	(\$355,158)	(\$945,563)	(\$791,297)
Total benefits	\$0	\$421,850	\$1,268,600	\$2,235,350	\$3,925,800	\$3,111,381
Net benefits	(\$115,920)	\$223,345	\$992,620	\$1,880,192	\$2,980,237	\$2,320,084
ROI						293%
Payback						7 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."

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.

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.

APPENDIX B: SUPPLEMENTAL MATERIAL

Related Forrester Research

Christopher Condo and Andrew Cornwall, “[Should You Care About Developer Productivity?](#),” Forrester Blogs.

“[TuringBots Offer A Peek Into The Next Generation Of Software Development](#),” Forrester Research, Inc., November 21, 2022.

“[Five Levers Of Developer Experience For Developers](#),” Forrester Research, Inc., September 6, 2023.

“[Understand Developer Experience To Improve Business Outcomes](#),” Forrester Research, Inc., June 21, 2023.

APPENDIX C: ENDNOTES

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

FORRESTER®