

FORRESTER®

The Total Economic Impact™ Of Amazon Web Services End-User Computing

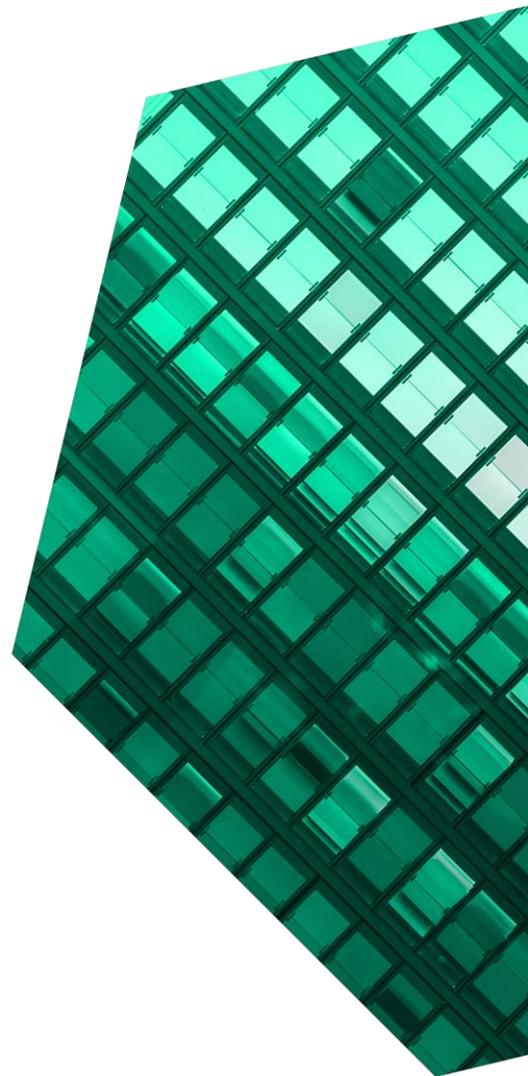
Cost Savings And Business Benefits
Enabled By End-User Computing

DECEMBER 2021

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ABOUT FORRESTER CONSULTING

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Executive Summary

The surge towards remote working during the COVID-19 pandemic has driven organizations that historically invested in on-premises virtual desktop infrastructure (VDI) to explore cloud-hosted desktops, desktop as a service, and hybrid models to deliver virtual end-user computing. Recent Forrester research noted three main reasons that drive this trend towards cloud VDI: 1) faster procurement than traditional hardware, 2) improved security for personally owned endpoints, and 3) improved infrastructure management.¹

Amazon Web Services (AWS) offers its cloud-native application and desktop virtualization service under its End-User Computing (EUC) category, which consists of: 1) Amazon AppStream 2.0, its solution for cloud-native, non-persistent application and desktop virtualization; and 2) Amazon WorkSpaces, its solution for cloud-native, persistent desktop virtualization.

AWS commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying AppStream 2.0 and WorkSpaces as part of AWS [End-User Computing \(EUC\)](#).² The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of AWS EUC on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed six decision-makers from four organizations with experience using AWS EUC. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single [composite organization](#).

Prior to using AWS EUC, these interviewees noted how their organizations had various degrees of exposure to VDI, with most of the experiences as on-premises applications. However, these attempts to use on-premises VDI yielded limited success, as interviewed decision-makers' organizations faced an inflexible environment and inconsistent performance

KEY STATISTICS



Return on investment (ROI)

282%



Net present value (NPV)

\$14.36M

of the VDI system as the use case scaled. Another continuous struggle organizations faced was maintaining the relevant internal skills to run and optimize a VDI environment. At a higher level, senior leaders were pushing for digital transformation and migration efforts from on-premises systems to cloud technology.

The combination of these factors drove the interviewed decision-makers' organizations to invest in AWS EUC, and they adopted WorkSpaces, AppStream 2.0, or both. Key results from the investment include increased staff productivity after shifting from on-premises to cloud VDI, as well as newfound business agility and EUC flexibility. Interviewed decision-makers' organizations found that AWS's solutions allowed them to experiment with bring-your-own-device (BYOD) policies and better meet employee EUC needs. Organizations that adopted BYOD saw a faster time-to-productivity for new workers, driving top line growth.

“AWS EUC positions us very well for today’s reality of working anywhere, from any device, anytime. It has really given us an advantage in terms of agility and remote access in a secure manner.”

Director of end-user service, healthcare

KEY FINDINGS

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

- **Increased gross profit from improved business agility resulting in both new clients gained and existing clients retained.** Interviewed decision-makers noted that the investment in AWS EUC allowed their organizations to be more agile, which served as a competitive advantage. This meant being able to stay in business by retaining its existing clients while also gaining new ones, with some interviewed decision-makers noting their organizations grew as much as 30%. Over three years, the increased gross profit from being more agile is worth close to \$11.5 million to the composite organization.
- **Faster onboarding of new workers resulting in faster time-to-productivity.** Interviewed decision-makers shared that using WorkSpaces and AppStream 2.0 helped their organizations onboard new workers faster, which meant they could be more productive sooner. They noted the time to onboard new hires before using AWS EUC could take weeks or even months. AWS EUC essentially cut that time down to days by ensuring new hires had access to the

applications and desktops they needed to be productive. Over three years, the faster onboarding of new workers is worth more than \$5.7 million to the composite organization.

- **Introduced BYOD for staff and contractors resulting in significant cost savings.** Interviewed decision-makers said the scalability and flexibility of implementing WorkSpaces and AppStream 2.0 meant that organizations could introduce this function and capability into more business units, compared to the cautious approach when using the on-premises VDI. As a result, a larger percentage of the organizations’ units could provide a BYOD model to their staff. In certain circumstances this allowed them to eliminate the costs to provision physical laptops. Over three years, the cost savings from introducing BYOD for contractors is worth more than \$1.3 million to the composite organization.
- **Recaptured IT staff time resulting in further productivity due to automation and using a fully managed service.** Interviewed decision-makers highlighted that AWS EUC is a fully managed service, which eliminated a lot of the support and maintenance work that their EUC IT staff had to do when using an on-premises VDI solution. AWS EUC being a true desktop-as-a-service (DaaS) cloud offering meant introducing automations in the infrastructure management and capacity planning process for tasks that their IT staff routinely had to do. Related to BYOD, setting up WorkSpaces or AppStream 2.0 accounts for end users was significantly faster than provisioning laptops. This again opened up the IT teams’ time to be reallocated to other more value-add work. Over three years, the recaptured time and increased IT staff productivity is worth more than \$881,000 to the composite organization.

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

- **Ensuring a secure, agile environment.** While the interviewed decision-makers noted benefitting from the increased agility, scalability, and flexibility that comes with using AWS EUC, they said security was a key determinant to making the change and investing in a technology such as AWS EUC. Because AppStream 2.0 and WorkSpaces use AWS Virtual Private Cloud (VPC), organizations were able to provide the benefits of remote work while increasing the level of security compared to an on-premises environment.
- **Partnership and collaboration with the AWS ecosystem.** Interviewed decision-makers also said that one of the key drivers of investing in AWS EUC is its integration and overall compatibility with the other tools and solutions in the AWS and Amazon ecosystem. They highly respected AWS and Amazon as brands, and that translated into their expectations of the solution. Additionally, they found that the AWS support organization responded quickly and was able to resolve any issues that IT admins or users experienced.
- **Improved EUC user experience.** Interviewed decision-makers noted that WorkSpaces and AppStream 2.0 users had a better end-user experience. Compared with their previous experience using on-premises VDI, they noted suffering fewer disruptions using AWS EUC.

Costs. Risk-adjusted PV costs include:

- **AWS EUC fees.** WorkSpaces provides the flexibility to pay for monthly or hourly usage. For AppStream 2.0, users can choose between an always-on or on-demand hourly model, which impacts the user price. Both services are billed monthly in a consumption-based, pay-as-you-go (PAYGO) model.

“With WorkSpaces, we are able to provision machines within minutes, automatically shut down if it is not used, and even discontinue when it is no longer needed. That is flexibility that we did not have with the physical space.”

CTO, financial services

- **Internal costs related to implementation, support, and management.** The implementation of AWS EUC at the interviewed decision-makers’ organizations mainly required involvement from the IT EUC teams. In certain organizations, a small group of users were involved as a pilot or proof of concept. In terms of support and maintenance, the fact that AWS EUC is a fully managed service meant there was very little expectation for involvement from the organizations in terms of ongoing management.

The decision-maker interviews and financial analysis found that a composite organization experiences benefits of \$19.46 million over three years versus costs of \$5.10 million, adding up to a net present value (NPV) of \$14.36 million and an ROI of 282%.



ROI
282%



BENEFITS PV
\$19.46M

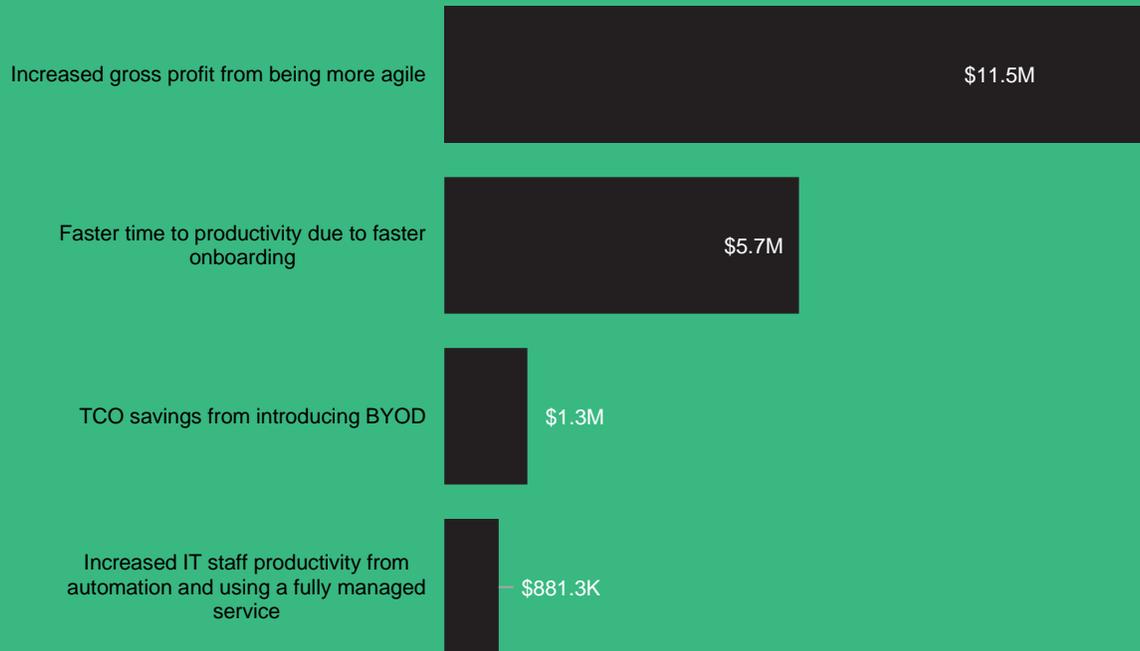


NPV
\$14.36M



PAYBACK
<6 months

Benefits (Three-Year)



TEI FRAMEWORK AND METHODOLOGY

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

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 AWS EUC can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by AWS 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 AWS EUC.

AWS 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.

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



DUE DILIGENCE

Interviewed AWS stakeholders and Forrester analysts to gather data relative to AWS EUC.



DECISION-MAKER INTERVIEWS

Interviewed six decision-makers at four organizations using WorkSpaces, AppStream 2.0, or both as part of AWS EUC to obtain data with respect to costs, benefits, and risks.



COMPOSITE ORGANIZATION

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



FINANCIAL MODEL FRAMEWORK

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



CASE STUDY

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

The AWS EUC Customer Journey

Drivers leading to the AWS EUC investment

| Interviewed Decision-Makers | | | | |
|---|-----------------------|---------------|-------------------------|-----------------|
| Interviewee | Industry | Region | Number of AWS EUC users | Total employees |
| Director of end-user service | Healthcare | Global | 45,000 | 135,000 |
| Principal architect | Professional services | Global | 30,000 | 35,000 |
| Chief risk and innovation officer; VP of infrastructure and security | Back-office solutions | North America | 700 | 1,000 |
| Chief technology officer; Associate director | Financial services | Global | 1,500 | 4,000 |

KEY CHALLENGES

The interviewed decision-makers' organizations came to VDI with varying degrees of exposure and knowledge, with the majority of them having experience with on-premises VDI. These organizations used VDI mainly for their call centers or for contractors they engage with.

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

- **Challenges in internally maintaining an on-premises VDI environment.** Interviewed decision-makers noted that maintaining their on-premises VDI environment meant they had to spend extra resources and brain power that could have been allocated elsewhere. The principal architect in a professional services firm said: "We had to worry about recovering everything in the event of a disaster. We had times where servers went down, and the fault tolerance was not set up correctly. We had outages. We lost data at times."
- **Cost-prohibitive scaling efforts translated to limited use case of on-premises VDI.** Interviewed decision-makers shared that their previous use case of VDI was limited to certain areas of their organization because scaling it would have been too expensive. The director of

end-user services in healthcare shared: "We didn't scale our on-prem, legacy [VDI] environment to other use cases because it did not meet management expectations of what would be required to shift operations to cloud technology. Expanding this environment [without] doing the right user research and demand forecast would have made the operation very costly."

"Expanding our previous VDI would mean investing in additional hardware. It would have taken a long time to procure, set up, and roll out. That means taking away users that we could have used to service clients on time, so there are revenue implications."

*Associate director
financial services*

- **Risk-averse environment with demanding operational and security requirements.** Some of the interviewed decision-makers worked with demanding clients that were hesitant about the security measures of a cloud solution. The chief risk and innovation officer in a back-office solution firm noted: “Our clients are household names with very demanding operational and security requirements. They [severely] scrutinize everything we do, as they should. They were always very averse to cloud solutions. [Then], during the pandemic, we were all forced to work from home, and it became a challenge to provide our staff the same things at their homes that we do at the office.”

SOLUTION REQUIREMENTS

The interviewees’ organizations searched for a solution that is:

- **Scalable and secure.** Interviewed decision-makers highlighted they were looking for a solution that could scale as their business grew yet did not compromise on the security of their environment.

The principal architect in a professional services firm noted, “One of the reasons we didn’t go with on-prem VDI was that we would still have to manage the servers and all the underlying hardware beneath the system.”

- **Easy to use.** Interviewed decision-makers shared not wanting something that would be complicated for their employees working from home to use, which could then cause stress and errors. The VP of infrastructure and security at a back-office solution firm said, “We did not want something that required our people to know how the engine under the hood works.”
- **Cloud solutions.** Interviewed decision-makers shared the high-level push to migrate towards cloud solutions and away from on-premises servers and data centers. The director of end-user service in healthcare explained, “As an organization, there was a strategy to reduce our footprint in our data centers [when] we can move services that makes sense to the cloud.”

“We wanted to maintain the same level of security on the cloud as we would on premises. We were looking to [provide] a secure environment that can scale as we use it.”

CTO, financial services

- **Fully managed.** Interviewed decision-makers said they didn’t want to repeat the pain points of needing to manage their own on-premises infrastructure and accurately forecasting demand.

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 decision-makers from four companies that Forrester interviewed and is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

Description of composite. The composite is a global professional services company with an annual revenue of \$500 million and 5,000 employees. It works with a number of contractors, hiring 1,000 per year. It has 15 IT staff members managing its entire end-user computing environment consisting of laptops, desktops, and VDI.

Deployment characteristics. The composite migrated from an on-premises VDI solution to AWS EUC, which covers 50% of its end users. Thus, about 2,500 of its employees are AWS EUC users, in addition to the 1,000 new contractors hired per year for a total of 3,500 users. Out of those, 80% are WorkSpaces users, while the remaining 20% are AppStream 2.0 users. Since using AWS EUC, the composite has also been able to introduce a BYOD model for contractors.

Key assumptions

- **\$500 million in annual revenue**
- **5,000 employees + 1,000 new contractors per year**
- **15 IT staff members managing end-user computing**

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 | Increased gross profit from being more agile | \$4,620,000 | \$4,620,000 | \$4,620,000 | \$13,860,000 | \$11,489,256 |
| Btr | Faster time to productivity due to faster onboarding | \$1,797,120 | \$2,605,824 | \$2,605,824 | \$7,008,768 | \$5,745,113 |
| Ctr | TCO savings from introducing BYOD | \$540,000 | \$540,000 | \$540,000 | \$1,620,000 | \$1,342,900 |
| Dtr | Increased IT staff productivity from automation and using a fully managed service | \$354,375 | \$354,375 | \$354,375 | \$1,063,125 | \$881,278 |
| Total benefits (risk-adjusted) | | \$7,311,495 | \$8,120,199 | \$8,120,199 | \$23,551,893 | \$19,458,547 |

INCREASED GROSS PROFIT FROM BEING MORE AGILE

Evidence and data. Interviewed decision-makers shared that using WorkSpaces and AppStream 2.0 made their organizations more agile when shifting to remote work or quickly scaling up resources after winning a project bid. Interviewed decision-makers said that their investment in AWS EUC was crucial in helping them establish remote work for all their employees. This allowed them to protect their existing business while also gaining new clients throughout the pandemic.

- The principal architect at a professional services firm said: “About 75% to 80% of our business is impacted by WorkSpaces. Some of our major contracts would not have happened without WorkSpaces because there is no way we could have scaled the 15K users in a matter of weeks that the project required.”
- The VP of infrastructure and security at a back-office solution firm noted, “Our adoption of WorkSpaces allowed us to pivot and make adjustments that some of our competitors couldn’t, which unfortunately meant some of them had to go out of business.”

- The associate director in financial services added: “Deploying WorkSpaces and AppStream [2.0] protected 40% of our company’s revenue during the pandemic. There was no billing loss during the pandemic, and we have grown more than 30%.”

“We retained 100% of our customers during the pandemic because we were able to continue delivering services to them.”

CTO, financial services

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

- The estimated percentage of business that would have been lost without the agility offered by AWS EUC allowing the composite to quickly shift to remote work is 10% per year.

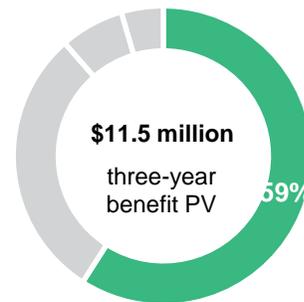
- The estimated percentage of new business gained due to the agility that AWS EUC can offer is also 10% per year.
- A 33% percentage attribution is included to take into account that both not losing business and gaining new business can be a product of the technology (i.e., AWS EUC), the know-how of their staff, and the organizational process that exists in the organization.
- The composite organization's gross margin is assumed to be 35%.

Risks. Benefits from increased gross profit from being more agile may vary, and specific considerations include:

- The size of the business in terms of annual revenue and the percentage of the organization that regularly uses AWS EUC.
- Other technology implemented around AWS EUC

- The existing knowledge among current employees and staff members.
- The organization's structure and processes that could support (or hinder) the potential benefits from AWS EUC.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a three-year, risk-adjusted total PV of almost \$11,500,000.



| Increased Gross Profit From Being More Agile | | | | | |
|--|--|---|---|---------------|---------------|
| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
| A1 | Annual revenue | Composite | \$500,000,000 | \$500,000,000 | \$500,000,000 |
| A2 | Estimated percentage of the business that regularly uses AWS EUC | Assumption | 50% | 50% | 50% |
| A3 | Estimated percentage of business lost without AWS EUC | Interview | 10% | 10% | 10% |
| A4 | New business gained due to agility offered by AWS EUC | Interview | 10% | 10% | 10% |
| A5 | Percentage attribution to AWS EUC | Assumption | 33% | 33% | 33% |
| A6 | Gross margin | Assumption | 35% | 35% | 35% |
| At | Increased gross profit from being more agile | $(A1 \cdot A2 \cdot A3 + A1 \cdot A2 \cdot A4) \cdot A5 \cdot A6$ | \$5,775,000 | \$5,775,000 | \$5,775,000 |
| | Risk adjustment | ↓20% | | | |
| Atr | Increased gross profit from being more agile (risk-adjusted) | | \$4,620,000 | \$4,620,000 | \$4,620,000 |
| Three-year total: \$13,860,000 | | | Three-year present value: \$11,489,256 | | |

that could share attribution in improving the agility and ease of shifting to remote work.

FASTER TIME-TO-PRODUCTIVITY DUE TO FASTER ONBOARDING

Evidence and data. Interviewed decision-makers shared that provisioning WorkSpaces or AppStream 2.0 accounts as opposed to providing physical laptops to new hires significantly shortened the onboarding process. This meant that these workers could be productive sooner.

- The director of end-user service in healthcare noted: “In our previous environment, it could easily average weeks to months for a new contractor to get a PC. In the WorkSpaces world, you can onboard an employee within 3 hours.”
- The principal architect at a professional services firm said: “New hires are provisioned WorkSpaces even before their start date. All they have to do is get plugged into the system and it automatically creates a notice for them with all the onboarding information.”
- The VP of infrastructure and security at a back-office solution firm added: “The switch from working from the office to working from home was seamless. We didn’t need to do any trainings. People picked right up how they had been working prior to the pandemic. Within 1.5 weeks, we were already able to send 50% of our staff home. Within three weeks, we had all client approvals.”

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

- The company hires 1,000 new contractors per year. Additionally, the composite assumes a 9% churn rate, which translates to an additional 450 new hires in Year 2 and 3.
- Onboarding time per user prior to AWS EUC is assumed to be two weeks. One working week is assumed to be 40 hours.

“Migrating a newly acquired company means migrating all their existing systems, laptops, desktop, workstations, and VDI software. The whole process can take six to 12 months. Now, we can go ahead and give them access to WorkSpaces. All that is now instant.”

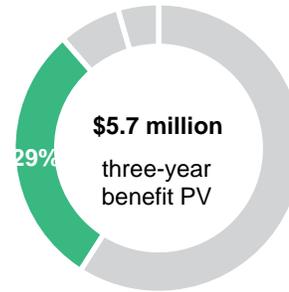
*Principal architect,
professional services*

- Onboarding time per user with AWS EUC is assumed to be two days. Each working day is assumed to be 8 hours.
- The average fully burdened hourly rate of an employee is \$48.

Risks. Benefits from faster time-to-productivity due to faster onboarding may vary, and specific considerations include:

- The exact industry and work done by the organization, which impacts the number of new hires per year.
- The resources and capabilities of the organization’s human resources organization which impacts the onboarding time per user prior to AWS EUC and how much is improved with the solution.
- The geographic presence of the organization and where it is acquiring talent, which impacts the assumed hourly rate of a business worker.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of over \$5,700,000.



| Faster Time-To-Productivity Due To Faster Onboarding | | | | | |
|--|--|--------------|--|-------------|-------------|
| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
| B1 | Number of new hires per year | Composite | 1,000 | 1,450 | 1,450 |
| B2 | Onboarding time per user prior to AWS EUC (hours) | Composite | 80 | 80 | 80 |
| B3 | Onboarding time per user with AWS EUC (hours) | Composite | 16 | 16 | 16 |
| B4 | Time saved per user (hours) | B2-B3 | 64 | 64 | 64 |
| B5 | Average fully burdened hourly rate | TEI standard | \$48 | \$48 | \$48 |
| B6 | Productivity recapture | Assumption | 65% | 65% | 65% |
| Bt | Faster time to productivity due to faster onboarding | B1*B4*B5*B6 | \$1,996,800 | \$2,895,360 | \$2,895,360 |
| | Risk adjustment | ↓10% | | | |
| Btr | Faster time to productivity due to faster onboarding (risk-adjusted) | | \$1,797,120 | \$2,605,824 | \$2,605,824 |
| Three-year total: \$7,008,768 | | | Three-year present value: \$5,745,113 | | |

TCO SAVINGS FROM INTRODUCING BYOD

Evidence and data. Interviewed decision-makers said that their organizations having AWS EUC services meant they could introduce a BYOD model. Employees could choose to use their own personal device, which means the organizations could reduce, if not completely eliminate, the practice of purchasing physical laptops and desktops to provision to their employees. This cost savings extends beyond just the cost of the physical device into the annual cost of licensing any related software, such as a VPN, that would be installed on it.

- The director of end-user services in healthcare shared: “We constantly hire 2,000 to 3,000 new contractors per month. So, just by getting out of the hardware business, [we don’t have to pay] the cost involved in returning, reimaging, and redeploying 3,000 PCs a month.”
- The principal architect in professional services said: “[With BYOD], we don’t have to ship laptops to everybody. That’s a \$5,000 per-user savings just in the laptop hardware, VPN software, and other costs when laptops get lost or broken.”
- The CTO in financial services said: “In our previous environment, we would spend \$1 million

annually for physical PCs and another \$1.5 million annually for servers, storage, and networking. With WorkSpaces, we have been able to avoid 40% [of our previous] operational costs.”

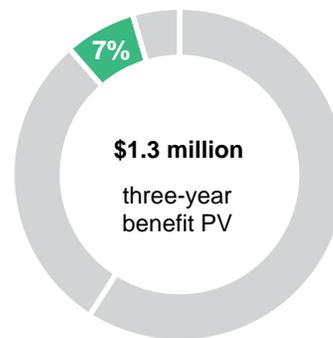
Modeling and assumptions. For the composite organization, Forrester assumes that:

- Each contractor is provisioned a physical laptop, and thus the number of laptops provisioned annually prior to AWS EUC is the same as the number of new contractors hired per year, i.e., 1,000.
- The cost per laptop, inclusive of the hardware and related software costs, is \$1,000.
- Switching to AWS EUC is assumed to reduce 60% in total cost of ownership (TCO), assuming that not all contractors wish to use their own device for work, and will still require being provisioned a physical laptop/PC.

Risks. Benefits from TCO savings from introducing BYOD may vary, and specific considerations include:

- Security and operational requirements that may prevent adoption of BYOD at the organization.
- Nature of work that contractors are doing, which impacts the exact devices they can use.
- Supply chain and procurement capabilities at the organization.
- Geographic region where the organization operates.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of over \$1,300,000.



| TCO Savings From Introducing BYOD | | | | | |
|--------------------------------------|---|------------|--|-----------|-----------|
| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
| C1 | Number of laptops provisioned annually prior to AWS EUC | Composite | 1,000 | 1,000 | 1,000 |
| C2 | Cost per laptop (including hardware and software) | Assumption | \$1,000 | \$1,000 | \$1,000 |
| C3 | Estimated percentage of reduction in TCO due to AWS EUC | Interview | 60% | 60% | 60% |
| Ct | TCO savings from introducing BYOD | C1*C2*C3 | \$600,000 | \$600,000 | \$600,000 |
| | Risk adjustment | ↓10% | | | |
| Ctr | TCO savings from introducing BYOD (risk-adjusted) | | \$540,000 | \$540,000 | \$540,000 |
| Three-year total: \$1,620,000 | | | Three-year present value: \$1,342,900 | | |

INCREASED IT STAFF PRODUCTIVITY FROM AUTOMATION AND USING A FULLY MANAGED SERVICE

Evidence and data. Interviewed decision-makers noted that AWS EUC's fully managed service automated various aspects of the work that their IT staff previously had to do manually. This translated to recaptured time in the IT teams' schedules that they can reallocate to other productive work.

Additionally, some of the interviewed customers noted that not having to provision physical laptops also saved them from having to hire additional IT team members to maintain hardware as the business grew. These decision-makers noted that, before the investment in AWS EUC, they assumed that as the business grew the number of laptops that must be provisioned annually to people would grow as well. By making the IT staff provision WorkSpaces and AppStream 2.0 accounts instead, they gained time that they can allocate elsewhere.

- The director of end-user services highlighted: "We would probably need a number of additional employees or partners to manage our environment [without WorkSpaces]. We automate a lot of our environment with WorkSpaces. If we had to manage our own infrastructure, we would probably need 8 to 10 more people."
- The principal architect in professional services noted: "We are able to more easily manage our environment centrally. From a compliance perspective, [using WorkSpaces means] we make sure all users are updated with the latest patch. This saves probably 2 hours a day per person."
- The associate director in financial services said: "If we had to provision physical laptops during the pandemic to 100% of our employees without WorkSpaces, we would have needed four to six more engineers, and then two to three more [engineers] in the backend. Perhaps also another

two to three people to run and support [the effort]. That represents 35% to 40% additional manpower that we can avoid by using WorkSpaces."

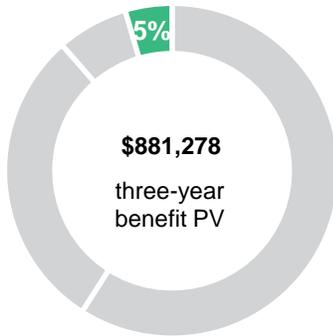
Modeling and assumptions. For the composite organization, Forrester assumes that:

- The number of IT staff managing the entire end-user computing environment is 15 people.
- Twenty-five percent of the time initially spent on EUC maintenance and security patch updates is now recaptured.
- Forty-five percent of the time initially spent on provisioning laptops is recaptured by shifting to BYOD.
- The average annual, fully burdened salary of an IT staff member is \$75,000.
- Time savings that are recaptured and reintroduced into further productivity is 50%.

Risks. Benefits from increased IT staff productivity from automation and using a fully managed service may vary, and specific considerations include:

- The size of the organization and the IT staff that manages the end-user computing environment.
- The capabilities of the IT staff to take advantage of the time savings recaptured.
- The end-user computing environment prior to AWS EUC being introduced, including the degree of automation that already exists.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of over \$881,000.



| Increased IT Staff Productivity From Automation And Using A Fully Managed Service | | | | | |
|---|---|---|--|-----------|-----------|
| Ref. | Metric | Source | Year 1 | Year 2 | Year 3 |
| D1 | Number of IT staff managing EUC environment | Composite | 15 | 15 | 15 |
| D2 | Percentage of time spent on EUC maintenance and security patch recaptured | Interview | 25% | 25% | 25% |
| D3 | Percentage of time recaptured from no longer provisioning laptops and shifting to BYOD | Interview | 45% | 45% | 45% |
| D4 | Average annual, fully burdened salary of IT staff | Assumption | \$75,000 | \$75,000 | \$75,000 |
| D5 | Productivity recaptured | Assumption | 50% | 50% | 50% |
| Dt | Increased IT staff productivity from automation and using a fully managed service | $D1 \cdot D2 \cdot D4 \cdot D5 + D1 \cdot D3 \cdot D4 \cdot D5$ | \$393,750 | \$393,750 | \$393,750 |
| | Risk adjustment | ↓10% | | | |
| Dtr | Increased IT staff productivity from automation and using a fully managed service (risk-adjusted) | | \$354,375 | \$354,375 | \$354,375 |
| Three-year total: \$1,063,125 | | | Three-year present value: \$881,278 | | |

UNQUANTIFIED BENEFITS

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

- **Maintaining network and infrastructure security amid increased agility.** Interviewed decision-makers said that the security that accompanies their newfound flexibility and scalability was a key differentiator for AWS EUC. The VP of infrastructure and security at a back-office solution firm noted: “From a security perspective, WorkSpaces provides an isolation layer. So, while technically you can still be hacked, the probability is significantly lower than if you provision laptops for people to bring home.”
- **Being a part of the larger AWS ecosystem.** Interviewed decision-makers noted that the integration and overall compatibility that AWS EUC offers with the other tools and solutions under the AWS and Amazon ecosystem as another key benefit. The chief risk and innovation officer at a back-office solution firm said: “One of the benefits of working with an Amazon tool is that system management is very straightforward from tool to tool. It’s consistent, intuitive, and provides feedback when you make mistakes. Additionally, AWS support is very helpful whenever we face any kind of challenges.”
- **Having a better end-user experience.** Interviewed decision-makers said that users of WorkSpaces and AppStream 2.0 had better experiences. Compared with their previous experience using an on-premises VDI, they noted fewer disruptions using AWS EUC. The principal architect at a professional services firm said: “We definitely have had [fewer] disruptions than we had with our previous VDI. The on-premises VDI was having problems every week or every other week.”

“Having WorkSpaces allows our company landscape and environment to be more prepared than ever before for future projects that we can capture. Our technology roadmap is now less daunting because we have that level of flexibility and agility.”

*Chief risk and innovation officer,
back-office solution*

FLEXIBILITY

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

- **Creating a standardized, agile, and flexible environment that can quickly adjust to market demand.** The principal architect in professional services noted: “The fact that we now can spin up call centers much faster and with greater agility is probably the biggest advantage that we’ve seen. This has far-reaching impacts for our new projects, new bids, and things like that. We can get projects going quickly.”
- **Simplified management of EUC environment.** The VP of infrastructure and security at a back-office solution firm noted, “If you think about the instances of being able to do hundreds of things with only a few clicks [using the cloud], that is the power of WorkSpaces and AppStream 2.0.”

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 | AWS EUC fees | \$0 | \$1,948,236 | \$1,948,236 | \$1,948,236 | \$5,844,707 | \$4,844,973 |
| Ftr | Implementation, support, and management | \$49,500 | \$82,500 | \$82,500 | \$82,500 | \$297,000 | \$254,665 |
| | Total costs (risk-adjusted) | \$49,500 | \$2,030,736 | \$2,030,736 | \$2,030,736 | \$6,141,707 | \$5,099,638 |

AWS EUC FEES

Evidence and data. WorkSpaces customers have the flexibility to pay for monthly or hourly usage, billed monthly. With monthly usage, they pay a fixed monthly fee for unlimited usage during the month, which is ideal for full-time employees using WorkSpaces as their primary desktop. With AppStream 2.0, customers pay an hourly rate for each hour an AppStream 2.0 instance is used plus a nominal fee each hour an instance is not in use. Customers typically also choose to purchase enterprise support to ensure optimum usage of the technology.

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

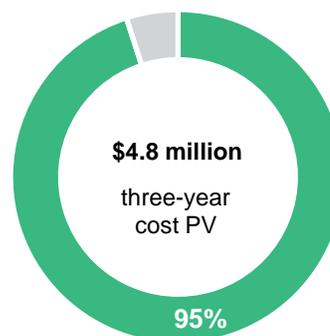
- There is a total of 3,500 AWS EUC users, composed of 50% of the organization's total employees and 1,000 new hires per year.
- Eighty percent of those are WorkSpaces users, while the remaining 20% are AppStream 2.0 users.
- Enterprise support is assumed to be 10% of total annual cost.
- WorkSpaces fee per user is assumed to be \$43 per month for a persistent desktop.³ The AppStream 2.0 fee per user is assumed to be

\$19 per month for non-persistent apps and desktop, plus \$0.68 per month for user profile storage.⁴

Risks. The following factors could affect the exact AWS EUC pricing an organization may receive:

- Number of users in the organization.
- Hourly usage of WorkSpaces and AppStream 2.0.
- Geographic location of the organization.
- Use case of WorkSpaces and AppStream 2.0, which can impact the storage requirement and enterprise support.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of more than \$4,800,000.



| AWS EUC Fees | | | | | | |
|--------------------------------------|-----------------------------------|--|--|-------------|-------------|-------------|
| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
| E1 | WorkSpaces Users | Composite | | 2,800 | 2,800 | 2,800 |
| E2 | Cost per WorkSpaces user | AWS | | \$516 | \$516 | \$516 |
| E3 | Enterprise support for WorkSpaces | 10% of total annual spend for WorkSpaces | | \$144,480 | \$144,480 | \$144,480 |
| E4 | Total WorkSpaces fees | $E1 * E2 + E3$ | | \$1,589,280 | \$1,589,280 | \$1,589,280 |
| E5 | AppStream users | Composite | | 700 | 700 | 700 |
| E6 | Cost per AppStream user | AWS | | \$228 | \$228 | \$228 |
| E7 | Persistent user storage | AWS | | \$8.16 | \$8.16 | \$8.16 |
| E8 | Enterprise support for AppStream | 10% of total annual spend for AppStream | | \$16,531 | \$16,531 | \$16,531 |
| E9 | Total AppStream fees | $E5 * (E6 + E7) + E8$ | | \$181,843 | \$181,843 | \$181,843 |
| Et | AWS EUC fees | $E4 + E9$ | \$0 | \$1,771,123 | \$1,771,123 | \$1,771,123 |
| | Risk adjustment | ↑10% | | | | |
| Etr | AWS EUC fees (risk-adjusted) | | \$0 | \$1,948,236 | \$1,948,236 | \$1,948,236 |
| Three-year total: \$5,844,707 | | | Three-year present value: \$4,844,973 | | | |

IMPLEMENTATION, SUPPORT, AND MANAGEMENT

Evidence and data. The time, effort, and resources allocated to implement AWS EUC in their respective organizations, as well as the assets for support and management, differed by interviewed decision-makers.

- The director of end-user service in healthcare noted that: “We took some time for our security team and AWS to go through an integration. We did benefit from the fact that our IT strategy had already been a cloud-first strategy, so a lot of the security and compliance discussions were already done. We also spent time working through the specifics with all the different

stakeholders, convincing people that this technology really saves you money.”

- The principal architect in professional services said: “Our implementation process involved four people, including people from VDI, network engineering, and an architect. Setting everything up took three months. In terms of ongoing management, we have four to five people maintaining AWS EUC from our side, plus one manager.”
- The VP of infrastructure and security for the back-office solutions firm explained: “We had four people involved: a VP overseeing the project, an executive, and then two administrators. The whole [project] took one week to set up. In terms

of ongoing management, we have three people dedicating no more than 5% of their time.”

- The associate director in financial services said: “Implementing WorkSpaces involved three people, although only one was full time, and the others dedicated a small percentage of their time. We had a three-month proof of concept, and then one week setting everything up. In terms of ongoing management, we have two people dedicating about 10% to 20% of their time for AWS EUC.”

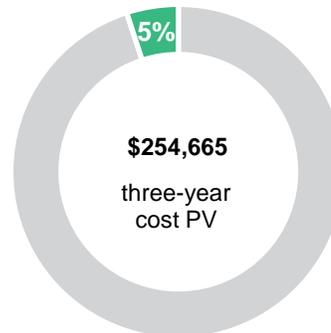
Modeling and assumptions. For the composite organization, Forrester assumes that:

- All 15 people of the end-user computing team are involved in implementing AWS EUC to various degrees. The average percentage of time dedicated to implementation is 50%.
- The average annual, fully burdened salary of IT staff is \$75,000.
- Implementation took one/ month.
- Out of the 15-person end-user computing team, 10 are involved in ongoing management, dedicating 10% of their time.

Risks. The cost related to implementation, support, and management may vary depending on the following factors:

- The number of users and degree of adoption of WorkSpaces and AppStream 2.0 in the organization, which impacts the number of people that needs to be involved in both implementation and ongoing management.
- The skills and knowledge of the existing IT staff managing the end-user computing environments in general, which impacts the percentage of time they have to dedicate as well as the implementation length.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV of about \$255,000.

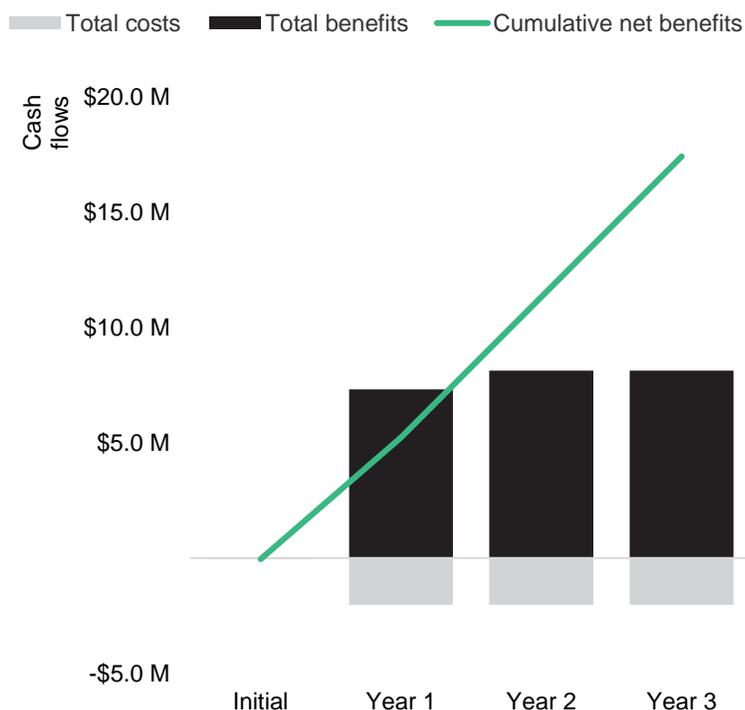


| Implementation, Support, And Management | | | | | | |
|---|---|------------|--|----------|----------|----------|
| Ref. | Metric | Source | Initial | Year 1 | Year 2 | Year 3 |
| F1 | Number of people involved in implementation | Composite | 15 | | | |
| F2 | Average annual, fully burdened salary of IT staff | Assumption | \$75,000 | | | |
| F3 | Time for implementation (years) | Interview | 0.08 | | | |
| F4 | Percentage of time dedicated to implementing AWC EUC | Assumption | 50% | | | |
| F5 | Number of people managing AWC EUC | Composite | | 10 | 10 | 10 |
| F6 | Percentage of time dedicated to managing AWC EUC | Interview | | 10% | 10% | 10% |
| F7 | Average annual, fully burdened salary of IT staff | Assumption | | \$75,000 | \$75,000 | \$75,000 |
| Ft | Implementation, support, and management | | \$45,000 | \$75,000 | \$75,000 | \$75,000 |
| | Risk adjustment | ↑10% | | | | |
| Ftr | Implementation, support, and management (risk-adjusted) | | \$49,500 | \$82,500 | \$82,500 | \$82,500 |
| Three-year total: \$297,000 | | | Three-year present value: \$254,665 | | | |

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 | (\$49,500) | (\$2,030,736) | (\$2,030,736) | (\$2,030,736) | (\$6,141,707) | (\$5,099,638) |
| Total benefits | \$0 | \$7,311,495 | \$8,120,199 | \$8,120,199 | \$23,551,893 | \$19,458,547 |
| Net benefits | (\$49,500) | \$5,280,759 | \$6,089,463 | \$6,089,463 | \$17,410,186 | \$14,358,909 |
| ROI | | | | | | 282% |
| 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 State Of VDI, 2021,” Forrester Research, Inc., October 20, 2021.

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.

³ The WorkSpaces fee per user of \$43 per month for a persistent desktop is specified as being for the “Windows Bundle Option – Bundle Your Own License (BYOL) **” option in the US East region. Source: “Amazon WorkSpaces Pricing” (<https://aws.amazon.com/workspaces/pricing/?nc=sn&loc=3>).

⁴ The AppStream 2.0 fee per user of \$19 per month for non-persistent desktop and apps is specified as being for the standard.medium instance running 154 hours monthly and 1 GB Amazon S3 user profile storage in the US East region. Source: “Amazon AppStream 2.0 pricing” (<https://aws.amazon.com/appstream2/pricing/>).

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