

A Forrester Total Economic Impact™
Study Commissioned By Microsoft
July 2018

The Total Economic Impact™ Of The Modern Desktop With Microsoft 365

Cost Savings And Business Benefits
Enabled By The Modern Desktop

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ABOUT FORRESTER CONSULTING

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Executive Summary

Digital transformation and the modernization of IT are essential priorities for companies seeking a competitive advantage in today's quickly changing technology landscape. The primary factors driving this transformation include increasing agility by providing users with the right tools to work collaboratively on innovative ideas, supporting an increasingly mobile workforce that uses multiple devices to be productive, leveraging analytics and automation to streamline IT, and securing end user devices, customer information, and corporate IP. Organizations need technology solutions that empower users, simplify IT operations, and improve security to meet these new demands.

The modern desktop with Microsoft 365, consisting of Windows 10, Office 365 ProPlus, and Enterprise Mobility + Security (EMS), is a complete solution that securely provides the collaboration and productivity tools that users require and the modern management features that IT needs to support business goals. Its always-up-to-date delivery model ensures users and IT staff have the newest features to increase their efficiency. Device management features provide workers the flexibility to securely access information and applications and start their work from any device before completing their tasks on a Windows 10 device. IT can leverage analytics and security features to proactively identify and resolve device health and security events, and automation enabled by the cloud delivery model simplifies IT operations and reduces costs.

Microsoft commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) enterprises may realize by deploying the modern desktop. The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of a modern desktop investment on their organizations. To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed and surveyed several customers with experience using the modern desktop.

Prior to using the modern desktop, these interviewed and surveyed organizations managed an increasingly complex environment with both Microsoft and third-party on-premises solutions. The organizations struggled to manage business growth and changing end user requirements. On-premises solutions were costly to maintain, and the complexity of the environments resulted in downtime for users that disrupted their productivity. The organizations needed a solution that could reduce costs, simplify the environments, and increase security while enabling IT to deliver the tools end users required to be productive.

After the modern desktop investment, these organizations shifted to a cloud-enabled delivery model that increased the automation of IT processes and provided self-service access to end users. The organizations replaced third-party tools with native Microsoft solutions, streamlining management and increasing device performance. The organizations reduced capex costs related to their on-premises environments and further reduced IT administration effort with simplified deployment. End users can now access new productivity and collaboration tools from any device without sacrificing security. Overall, the organizations believe that the modern desktop investment has modernized IT delivery and improved both IT and end user efficiency and satisfaction.

Key Benefits



End user productivity savings by Year 3, across 5,000 users:

Over 190,000 hours



Reduced risk of a major security breach:

40%



Total cost of ownership (TCO) reduction from reduced help desk calls, provisioning savings, and reduced license, infrastructure, and management costs:

\$7.15 million

Key Findings



ROI
108%



Benefits PV
\$27 million



NPV
\$14 million



Payback
13 months

“The top four areas of benefits [from the modern desktop] are ease of management, improved overall platform performance, better automation, and out-of-the-box solutions rather than relying on customization. These are overall just the top four that go pretty much across all the solutions.”

Senior IT manager, international holding company



Quantified benefits. The following risk-adjusted present value (PV) quantified benefits are representative of those experienced by the organizations interviewed and surveyed:

- › **Modern desktop users save 2.3 hours per week due to more efficient collaboration and communication.** Knowledge workers have access to the newest collaboration and communication features, including coauthoring documents and using Skype for Business to replace in-person meetings. Mobile users have secure access to applications on their mobile devices to begin their work before completing tasks on a Windows 10 device with Office 365 ProPlus, creating 1.5 hours per week of additional productivity outside of the office.
- › **Four thousand downtime events are avoided each year due to the improved analytics and security features in the modern desktop.** Secure access to systems from any device, the complete experience on a Windows 10 device, and improved visibility into the health of the environment reduce downtime events by 20%.
- › **Modern desktop security features reduce the risk of a breach by 40% and reduce the number of end user security incidents by 20%.** Information protection, security management features, identity and access management, and the simplicity and frequency of updates reduces the number and severity of end user security events and the time it takes to remediate them. Organizations also use these security features to reduce the risk of a successful breach.
- › **Self-service functionality and insights that enable proactive IT reduce help desk calls by 20%.** Self-service functionality like password resets or application provisioning reduce help desk calls, and improved device management enables proactive remediation so that issues don't impact a large number of users.
- › **Organizations save 2.5 hours per device with automated provisioning.** Using Windows Autopilot and EMS to streamline and automate device provisioning helps organizations save 2.5 hours per device compared to previous imaging processes.
- › **The modern desktop reduces the time IT spends on application provisioning by 45% and the time IT spends on application testing by 70%.** Windows Analytics reduces testing time by proactively identifying application compatibility issues and delivering more frequent, targeted operating system updates. End users can self-provision applications thanks to the integration with several app exchanges, saving expensive calls to the help desk.
- › **Organizations save an average of \$5.3 million in total cost of ownership (TCO) by moving to the modern desktop.** Moving to the cloud reduces license, infrastructure, and deployment costs. Organizations can leverage built-in capabilities to replace third-party antivirus and mobile device management solutions. Overall simplification and automation reduce the IT administration effort by an average of five full-time employees (FTEs).

Costs. The organizations experienced the following risk-adjusted PV costs:

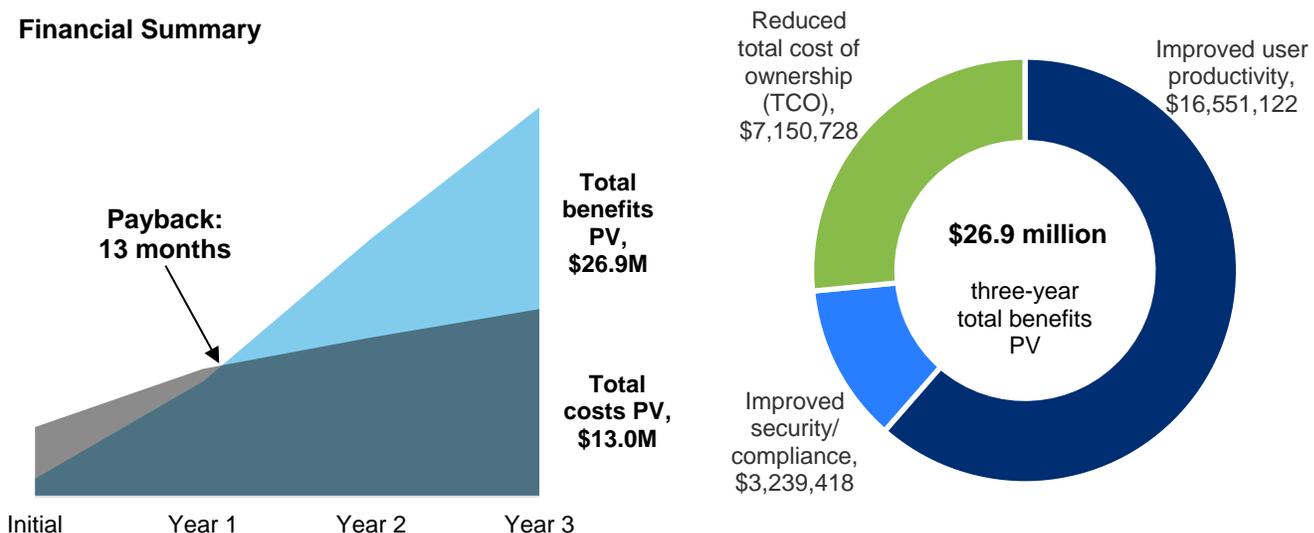
- › **Organizations purchase Microsoft 365 subscription licenses.** To access the modern desktop, organizations pay \$32 per user per month

for the M365 E3 license. Subscription license costs begin when licenses are deployed to users during the phased rollout.

- > **Organizations use both internal staff and professional services for implementation and deployment.** Interviewed and surveyed organizations vary considerably in their implementation and deployment effort. On average, the initial phase takes 10 months before full deployment to users. Organizations require an average of two FTEs for ongoing administration and management.
- > **End users and IT staff participate in training.** IT FTEs spend five days on upfront training and two days per year on ongoing training to understand new features. End users spend 3 hours on upfront training and 1 hour per year on ongoing training.

Forrester's interviews with four existing customers, survey of 53 customers, and subsequent financial analysis found that an organization based on these customers experienced benefits of \$27 million over three years versus costs of \$13 million, adding up to a net present value (NPV) of \$14 million and an ROI of 108%.

Financial Summary



The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

TEI Framework And Methodology

From the information provided in the interviews and survey, Forrester has constructed a Total Economic Impact™ (TEI) framework for those organizations considering implementing the Microsoft 365 modern desktop.

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 the Microsoft 365 modern desktop can have on an organization:



DUE DILIGENCE

Interviewed Microsoft stakeholders and Forrester analysts to gather data relative to the modern desktop.



CUSTOMER INTERVIEWS AND SURVEY

Interviewed four organizations and surveyed 53 organizations using the modern desktop to obtain data with respect to costs, benefits, and risks.



COMPOSITE ORGANIZATION

Designed a composite organization based on characteristics of the interviewed and surveyed organizations.



FINANCIAL MODEL FRAMEWORK

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



CASE STUDY

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

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Microsoft 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 report to determine the appropriateness of an investment in the Microsoft 365 modern desktop.

Microsoft 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.

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

The Modern Desktop Customer Journey

BEFORE AND AFTER THE MODERN DESKTOP INVESTMENT

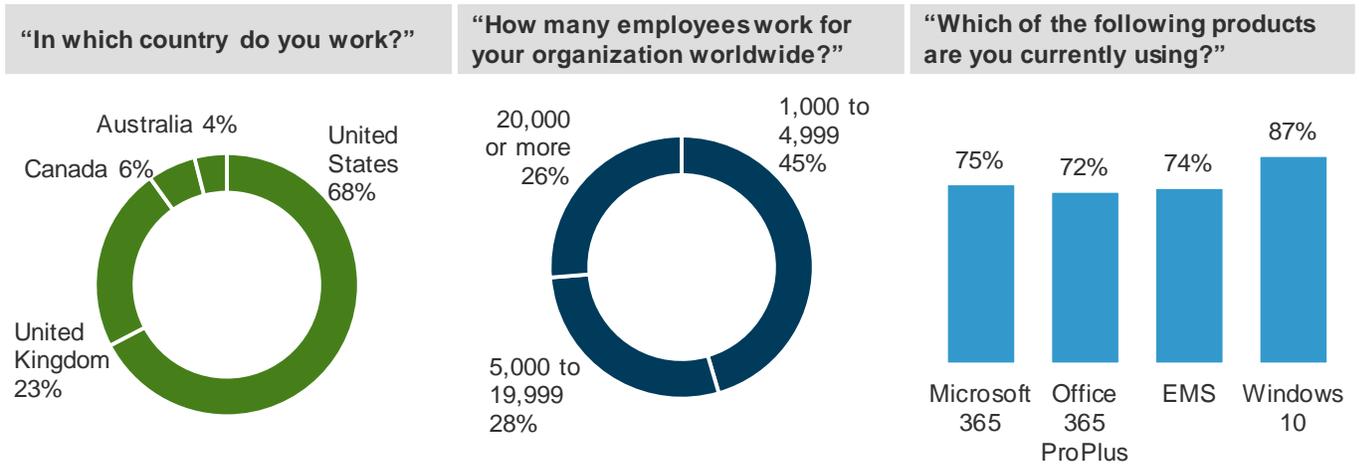
Interviewed Organizations

For this study, Forrester conducted four interviews with Microsoft 365 modern desktop customers. Interviewed customers include the following:

INDUSTRY	REGION	INTERVIEWEE	DEPLOYMENT
Construction/engineering	Headquartered in the United States, customers globally	Manager of software systems	Windows 10, Office 365 E3
Professional services	Headquartered in the United Kingdom, customers globally	Service architect	Windows 10, Office Professional Plus
International holding company	Headquartered in the United Arab Emirates, customers globally	Senior IT manager	Microsoft 365 E5
Government	Headquartered in the United States	Enterprise IT architect	Windows 10, Office 365 ProPlus, EMS

Surveyed Organizations

For this study, Forrester surveyed 53 IT decision makers using Windows 10, Office 365 ProPlus, and/or EMS.



Base: 53 IT decision makers using Windows 10, Office 365 ProPlus, and/or EMS

Note: Percentages may not total 100 because of rounding.

Source: A commissioned study conducted by Forrester Consulting on behalf of Microsoft, July 2018

Key Challenges

The interviewed and surveyed organizations shared several challenges they faced with their previous on-premises solutions, including:

- › **Meeting end user expectations for their work devices and tools.** Employee expectations for their work devices and systems had shifted, increasingly demanding anytime, anywhere, any-device access to their productivity and collaboration tools. Organizations wanted to reduce downtime and disruption to end users while also increasing their ability to work more collaboratively, efficiently, and effectively.
- › **An increasingly complex on-premises environment that required significant cost and time to maintain.** On-premises Microsoft and third-party tools increased time spent on ongoing management and capex costs. Rising complexity increased the possibility of user downtime. Organizations wanted a cloud-powered modern IT platform that shifted capex to opex, supported multiple device platforms, automated processes, increased analytics and insights, and provided self-service features to improve the end user experience.
- › **Responding to more frequent and sophisticated security risks.** Interviewed and surveyed organizations wanted the best security tools to defend against, identify, and quickly remediate security breaches. Major security breaches provided significant disruption to employees and could be very costly for businesses, both in remediation and in lost business or customer trust. Third-party tools created additional complexity in management and increased costs.

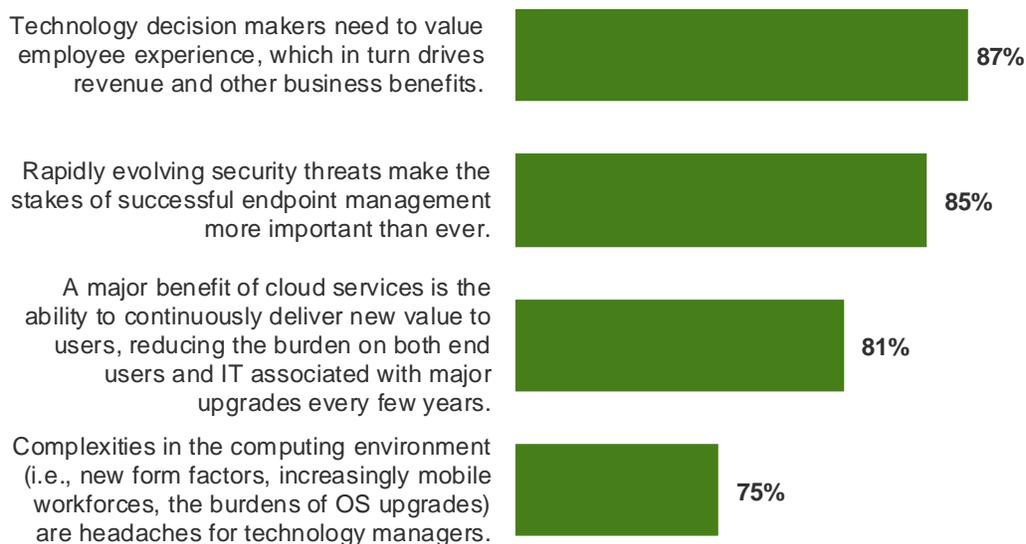
“We want to be the number one technology-enabled professional services firm. From our recruitment perspective, it’s really important because the average age within [our company] is relatively young. So, we really want to give that best user experience.”

Service architect, professional services



“On a scale of 1 to 5, how much do you agree with the below statements. Please select one answer for each row:”

(4 or 5 on a scale of 1 [Strongly disagree] to 5 [Agree])



Base: 34 IT decision makers using Windows 10, Office 365 ProPlus, and/or EMS

Source: A commissioned study conducted by Forrester Consulting on behalf of Microsoft, July 2018

Key Results

The interviews and survey data revealed that key results from the modern desktop investment include the following:

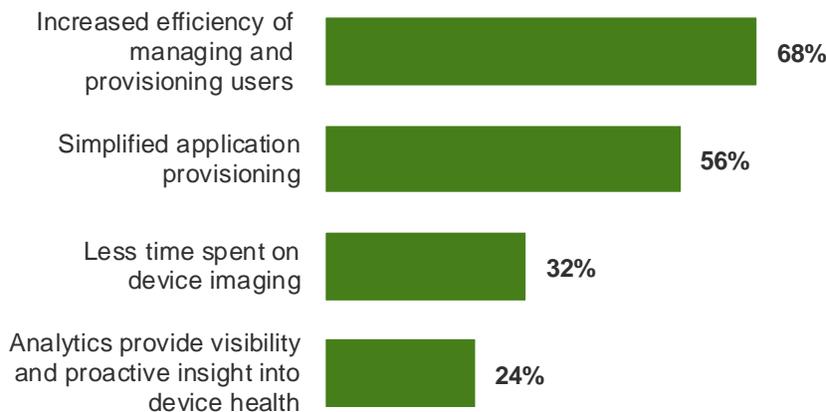
- › **The modern desktop provides an improved user experience that generates incremental productivity.** The modern desktop provides end users with productivity tools, like coauthoring with Office 365 ProPlus, online meetings with Skype for Business, and file storage and sharing with OneDrive, that are always up to date with the newest features. End users have the flexibility to securely access their applications and begin their work on mobile devices before completing their work with the best experience on their Windows 10 device. IT can provide self-service access for password resets, application provisioning, and recovery from ransomware and malware to improve the user experience and reduce lost productivity from help desk interactions.
- › **Modernizing the IT environment and IT processes reduces costs.** Organizations can shift from capex to opex by moving their Microsoft environments to the cloud. Organizations save on license costs, infrastructure purchases, and deployment complexity. The modern desktop is easy to manage and deploy through cloud-based tools and processes. IT can increase automation to reduce costs, including providing self-service access to users to reduce IT time spent on device and application provisioning. Features like Windows Analytics allow organizations to be more proactive in diagnosing and fixing issues, reducing overall remediation efforts.

“One of the biggest benefits of Office 365 ProPlus is we don’t have to push big waves of upgrades, service packs, etc., anymore, because the upgrades come automatically down from the cloud. With EMS it’s just standardizing, it’s much more integrated with the operating system, and it is much easier to manage than having various different tools, for various different vendors.”

Senior IT manager, international holding company



“Please select where your organization has seen improved IT productivity.”



Base: 34 IT decision makers using Windows 10, Office 365 ProPlus, and/or EMS

Source: A commissioned study conducted by Forrester Consulting on behalf of Microsoft, July 2018

- › **Improved security features provide peace of mind.** Broad security and compliance tools safeguard customer data, company data, and intellectual property with intelligent security embedded into Windows 10 and Office 365 ProPlus. Organizations use features included in Windows Defender ATP technologies (attack surface reduction, next-generation antivirus, behavior monitoring, web and exploit protection,

post-breach endpoint detection and response, automation) to reduce their security risk. The always-up-to-date functionality of the modern desktop ensures that devices have the latest security features installed. The results are reduced risk exposure, reduced security incidents, and reduced remediation efforts.

Composite Organization

Based on the interviews and survey, Forrester constructed a TEI framework, a composite company, and an associated ROI analysis that illustrates the areas financially affected. The composite organization is representative of the four companies that Forrester interviewed and the 53 organizations Forrester surveyed, 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 is a global organization serving employees and customers in multiple regions. The organization has 7,000 employees; 5,000 of those employees are knowledge workers who use the modern desktop, and the remaining 2,000 employees don't need access to the modern desktop for their roles.

Deployment characteristics. The organization rolls out Microsoft 365 E3 licenses to its 5,000 users in phases. The organization begins with a planning, testing, and pilot period before deploying Microsoft 365 to users more broadly. The organization migrates to EMS, Windows 10, and Office 365 E3, which includes Office 365 ProPlus. Forrester did not account for the benefits of the following Office 365 services that are also included in Microsoft 365 E3: Exchange Online, Microsoft Teams, SharePoint Online, Yammer, and Delve.



Key assumptions

5,000 knowledge workers

700 highly mobile users

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	Improved collaboration and communication	\$0	\$4,018,605	\$8,038,110	\$8,038,110	\$20,094,825	\$16,335,495
Btr	Reduced user downtime	\$0	\$86,697	\$86,697	\$86,697	\$260,091	\$215,603
Ctr	Improved security and compliance	\$0	\$1,270,968	\$1,320,854	\$1,320,854	\$3,912,676	\$3,239,418
Dtr	Reduced TCO — reduction in help desk calls	\$0	\$57,000	\$57,000	\$57,000	\$171,000	\$141,751
Etr	Reduced TCO — device provisioning savings	\$0	\$326,563	\$326,563	\$326,563	\$979,688	\$812,113
Ftr	Reduced TCO — application provisioning savings	\$0	\$256,781	\$355,008	\$473,779	\$1,085,568	\$882,789
Gtr	Reduced TCO — technology infrastructure cost savings	\$1,236,436	\$1,392,564	\$1,782,064	\$1,782,064	\$6,193,129	\$5,314,076
	Total benefits (risk-adjusted)	\$1,236,436	\$7,409,178	\$11,966,296	\$12,085,067	\$32,696,977	\$26,941,245

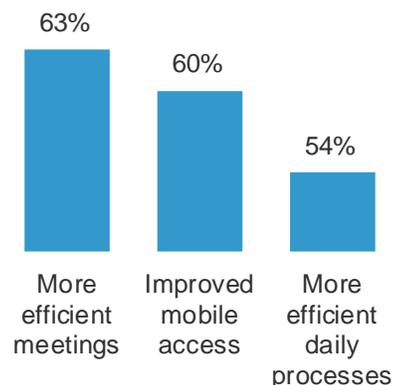
Improved Collaboration And Communication

One of the most important results from the modern desktop investment is improved end user productivity. Interviewed organizations and survey respondents experience significant time savings from improved collaboration, communication, and mobile access. With Office 365 and OneDrive for Business, end users can easily share and coauthor documents; mobile users can start by accessing, creating, and editing documents from any device before completing their tasks with the best experience on Windows 10 devices with Office 365 ProPlus; and desktop and mobile users can collaborate in real time. The modern desktop provides secure access to information and systems for mobile users, increasing their productivity outside of the office. End users also use Skype for Business to easily connect with colleagues and share information, and online meetings are easy to schedule, reduce travel, and are more effective with tools like screen sharing. Interviewed organizations deliver updates every six months, so end users get access to new features faster than the three- to four-year upgrade cycle of the previous environments. Interviewed organizations mentioned the following areas of benefit:

- › “One of the key things we wanted to do was deliver a great end user experience, and I think we have achieved that. Windows 10 has definitely been a really key part of that.”

The table above shows the total of all benefits across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total benefits to be a PV of almost \$27 million.

“Please select where your organization has seen improved end user productivity.”



- › “I see more and more staff using search instead of hunting and pecking through a menu because it’s faster.”
- › “If you thought about having to go back to using a phone instead of using Skype for calling, it would be awful. That you can right click on anybody’s name, anywhere, and call them — it’s just so valuable and it’s so easy and it’s such a time saver that you don’t have a directory of phone numbers.”
- › “It’s really the easiness of use, and also in Office, the newer features of collaboration, coauthoring, etc., is something that a lot of people really like.”
- › “With 100% certainty, the ability for Skype to federate with external entities has greatly improved communications with partner counties and jurisdictions and sped up activities such as court scheduling and information sharing between execs to compare strategies.”

Forrester made the following assumptions for the composite analysis:

- › The composite has 5,000 knowledge workers. These users save 2.3 hours per week due to improved collaboration and communication with the modern desktop. The organization realizes fifty percent of this benefit in Year 1 as the phased rollout is completed and users go up the learning curve. Twenty-five percent of this productivity is captured for additional productive work.
- › The composite has 700 highly mobile users, including sales and marketing roles that require more frequent travel. Mobile users save 1.5 hours per week due to secure access to applications from any device, anywhere. Fifty percent of this benefit is realized in Year 1. Seventy-five percent of this productivity is captured.
- › The average knowledge worker fully burdened cost (including all benefits and taxes) is \$45.63 per hour, or \$94,940 annually.
- › With Skype for Business, the organization can avoid up to 241 trips per year by using remote Skype meetings instead of in-person meetings. The average cost per trip is \$1,000.
- › While interviewees indicated that these collaboration tools not only increased efficiency but also increased the effectiveness of their work, Forrester was not able to quantify the impact of improved outcomes from collaborative work.

The following risks can affect this benefit estimate:

- › The opportunity for productivity improvements in daily processes will depend on the prior environment. Organizations can choose the frequency with which they deliver new features to users, and adoption of new features by users will vary based on the amount of training and awareness provided.
- › The adoption of online meetings and the opportunity to replace in-person meetings with online meetings will vary based on the organization’s culture and by department.
- › Mobile productivity will vary based on prior limitations on mobile access and on the importance of mobile access for end users.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of \$16.3 million.



Modern desktop users save 2.3 hours per week with improved collaboration and communication tools.

Impact risk is the risk that the business or technology needs of the organization may not be met by the investment, resulting in lower overall total benefits. The greater the uncertainty, the wider the potential range of outcomes for benefit estimates.

Improved Collaboration And Communication: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
A1	Number of modern desktop users	Interviews/survey	5,000	5,000	5,000
A2	Weekly time savings (hours)	50% Year 1	1.15	2.30	2.30
A3	Productivity capture — modern desktop users	Assumption	25%	25%	25%
A4	User fully loaded hourly compensation	Assumption	\$45.63	\$45.63	\$45.63
A5	Total modern desktop user productivity benefit	$A1 * A2 * 52$ $\text{weeks} * A3 * A4$	\$3,410,843	\$6,821,685	\$6,821,685
A6	Number of mobile users	Interviews/survey	700	700	700
A7	Weekly time savings (hours)	Interviews/survey	0.75	1.50	1.50
A8	Productivity capture — mobile users	Assumption	75%	75%	75%
A9	Total mobile user productivity benefit	$A6 * A7 * 52$ $\text{weeks} * A8 * A4$	\$934,274	\$1,868,549	\$1,868,549
A10	Total number of avoided trips for remote meetings per year	Survey	120	241	241
A11	Average cost per trip	Assumption	\$1,000	\$1,000	\$1,000
A12	Total trip costs avoided	$A10 * A11$	\$120,000	\$241,000	\$241,000
At	Improved collaboration and communication	$A5 + A9 + A12$	\$4,465,117	\$8,931,234	\$8,931,234
	Risk adjustment	↓10%			
Atr	Improved collaboration and communication (risk-adjusted)		\$4,018,605	\$8,038,110	\$8,038,110

Reduced User Downtime

The analytics and security components of the modern desktop enable organizations to reduce the impact of device health or security incidents on end users. Windows Analytics allows organizations to quickly review the health of the environment and resolve application or driver compatibility issues before they affect users more broadly. The security features built in to Windows 10, Office 365, and EMS, and the more frequent delivery of security updates, enable more secure access to information, systems, and people, reducing the number of security events. Interviewed organizations said the following:

- › “We can identify problems quicker. Before, it would take us two months to correlate information and identify a driver issue, and that would affect hundreds of users. Some would go to the help desk three to six times before we figured it out. Now we can resolve the problem proactively in less than half the time.”
- › “For example, people have an issue with the security patch not being upgraded or people have issues with Outlook or in the Office product. These are incidents where people can’t use the device anymore, it hangs, the system is slow. We’ve had an overall reduction of incidents by about 23% so far.”

Forrester made the following assumptions for the composite analysis:



“End users are more productive due to reduced downtime or a reduction in help desk interactions.”

- › On average, each user has four events per year that result in device downtime. With the modern desktop, there is a 20% reduction in the number of downtime events, resulting in 4,000 events avoided. On average, each event results in 2 hours of downtime. Twenty-five percent of this productivity is captured.
- › The average knowledge worker fully burdened cost (including all benefits and taxes) is \$45.63 per hour, or \$94,940 annually.
- › End users can also recoup productivity during remaining downtime events by accessing their applications on a separate device. Forrester was not able to quantify the impact of this benefit for this study.

The following risks can affect this benefit estimate:

- › The amount and length of downtime events in the previous environment is highly variable based on prior tools and security practices. The ability to reduce the number of downtime events will depend on the use of analytics and security features in the modern desktop solution.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of over \$215,603.

Reduced User Downtime: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
B1	Device downtime events avoided per year	4 events per user per year, 20% reduction	4,000	4,000	4,000
B2	Hours of downtime per incident	Interview/survey	2	2	2
B3	User fully loaded hourly compensation	Assumption	\$45.63	\$45.63	\$45.63
B4	Productivity capture	Assumption	25%	25%	25%
Bt	Reduced user downtime	$B1*B2*B3*B4$	\$91,260	\$91,260	\$91,260
	Risk adjustment	↓5%			
Btr	Reduced user downtime (risk-adjusted)		\$86,697	\$86,697	\$86,697

Improved Security And Compliance

The suite of security tools across the M365 solutions reduces the risk of a major security breach, the number of end user security incidents, and the time it takes to remediate those events. The modern desktop provides better visibility, identity and access management, mobile device and application management, and information protection, and it ensures that people can access information easily and securely from any device. Organizations can use single-sign on for both cloud and on-premises applications, provision or deprovision users rapidly, and, with regular security patches, can stay up to date with the latest security features. Interviewed organizations noted the following benefits:

- › “Simplicity usually reduces risk. The feature updates are simple to run, and it reduces the risk significantly by getting feature updates on the machine and keeping Windows 10 up to date. Insights are now centralized. You can see where the problems are, whereas before, it’s



“Improved security features reduce security risk and the number of security incidents at our organization.”

much more fragmented. And the reduction in risk has been a significant advantage for us, definitely. I would say that that exposure has probably been reduced by 30% to 50%.”

- › “We are leveraging Windows Defender ATP technologies (including Secure boot, AppLocker, and Credential Guard) for antivirus, application control, and hardware base isolation to protect credentials. We also are exploring always-on VPN to reduce the risks of connecting to potentially less secure networks.”
- › “We have moved over to the best-of-breed security for the desktop. So, we’re using BitLocker. We’re using Windows Defender ATP technologies. All these kind of security enhancements from Windows 10, we use, and they have been very, very good.”

Forrester made the following assumptions for the composite analysis:

- › Forrester used data from the 2017 Ponemon “Cost of Data Breach Study” to arrive at an average cost of breach due to business impact of almost \$1.9 million and an average probability of a breach of 13.85% per year.¹ By deploying the modern desktop security features, the composite reduces its risk of a breach by 40%. Fifty percent of this benefit is realized in Year 1 as the rollout expands to more devices and more security solutions are deployed.
- › In the prior environment, the organization had 475 end user security incidents per year. After the migration, the organization sees a 20% reduction in the number of incidents and a 20% reduction in the time-to-resolve each incident. The organization saves 98.4 hours for each of the 95 incidents avoided, and the organization saves 24.6 hours on the remediation of the remaining 380 incidents.
- › The average IT fully burdened cost (including all benefits and taxes) is \$68.75 per hour, or \$130,000 annually. Forrester does not include a productivity capture for this time savings because it’s time saved on a discrete task and not overall time savings.

The following risks can affect this benefit estimate:

- › The Ponemon Institute data represents global average figures. An organization’s actual risk level may differ from these figures based on size, industry, region, and other factors.
- › The ability to reduce the number of incidents and the time-to-remediate them depends on the security features implemented, training for IT on how to use them, user behavior, and time spent educating and training users on security best practices.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$3.2 million.

“We have moved over to the best-of-breed security for the desktop. So, we’re using BitLocker. We’re using Windows Defender ATP technologies. All these kind of security enhancements from Windows 10, we use, and they have been very, very good.”

Service architect, professional services



Organizations using the modern desktop reduce the risk of a security breach by 40%.

Improved Security And Compliance: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
C1	Average cost of a breach — business impact	Ponemon	\$1,895,714	\$1,895,714	\$1,895,714
C2	Average probability of a breach	Ponemon	13.85%	13.85%	13.85%
C3	Reduction in risk	Interviews/survey	20%	40%	40%
C4	Reduced risk of breach — total	$C1 * C2 * C3$	\$52,511	\$105,023	\$105,023
C5	End user security incidents avoided	475 incidents, 20% reduction	95	95	95
C6	Time saved from avoided security incidents (hours)	123 hours*(1-0.2)	98.4	98.4	98.4
C7	Time saved on remaining security incidents (hours)	123 hours*0.2	24.6	24.6	24.6
C8	IT fully loaded hourly compensation	Assumption	\$68.75	\$68.75	\$68.75
C9	IT time saved due to a reduction in remediation for incidents	$((C5 * C6) + (380 * C7)) * C8$	\$1,285,350	\$1,285,350	\$1,285,350
Ct	Improved security and compliance	$C4 + C9$	\$1,337,861	\$1,390,373	\$1,390,373
	Risk adjustment	↓5%			
Ctr	Improved security and compliance (risk-adjusted)		\$1,270,968	\$1,320,854	\$1,320,854

Reduced TCO — Reduction In Help Desk Calls

The modern desktop includes some self-service functionality, like the ability for users to reset passwords or provision new applications, which reduces the number of help desk calls for simple tasks. The Windows Analytics functionality provides improved visibility into the environment and device health so that IT can proactively address issues before they impact more users. Interviewees mentioned the following savings:

- › “What we see especially on the help desk is a reduction of calls. While we are still growing and more and more employees are joining the group, I don’t need to increase headcount to manage the larger state.”
- › “We’re proactively resolving issues, so we have less first-call people on the help desk.”

Forrester made the following assumptions for the composite analysis:

- › In the prior environment, the composite organization had on average three help desk calls per user per year. With the modern desktop implementation, there is a 20% reduction in help desk calls.
- › The cost per call is \$20.

The following risks can affect this benefit estimate:

- › Benefits will vary based on the implementation and training of users on self-service features and the use of Windows Analytics to proactively address device health issues before they affect a larger number of users.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$141,751.



20% reduction in help desk calls with self-service and device health features

Reduced TCO — Reduction In Help Desk Calls: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
D1	Number of help desk calls related to Microsoft products, prior state	3 calls per user per year	15,000	15,000	15,000
D2	Reduction in calls	Interviews/survey	20%	20%	20%
D3	Cost per call	Assumption	\$20	\$20	\$20
Dt	Reduction in help desk calls	$D1 * D2 * D3$	\$60,000	\$60,000	\$60,000
	Risk adjustment	↓5%			
Dtr	Reduction in help desk calls (risk-adjusted)		\$57,000	\$57,000	\$57,000

Reduced TCO — Device Provisioning Savings

In the prior environment, IT would image devices manually, resulting in significant time spent on creating and maintaining images and provisioning devices to users. With the modern desktop investment, IT can now securely provision devices over the cloud using Windows AutoPilot and EMS (Intune and Azure Active Directory) to automate provisioning. Files On-Demand makes all of a user's files available in seconds after logging in to a new device. Automated provisioning programs for other devices are also supported by EMS. By defining a set of compliance policies and configuration profiles, IT no longer needs to handle every device individually. Interviewees described the following benefits:

- “With Windows 10, the biggest benefit is how we deploy devices. We’ve switched to provisioning from imaging. Traditionally, we would use wipe and load imaging. We would get a computer, boot it to the network, and apply our Windows 7 image to it. It was a 92-step process that started by reformatting the computer, then the image was applied, then all the drivers, and lastly all the software. With Windows 10, we stopped deploying images cold turkey, and we switched to dynamic provisioning. We can provision any computer from any vendor, and they all come out looking the same, they all come out looking like they were imaged. The difference is now it takes us 27 minutes start to finish versus the hour and a half it used to take per machine, and it is zero touch. We’ve really taken all the complexity out of the imaging process — so it’s less expensive, it’s faster, and it’s easier to maintain. I can’t believe there’s anybody not doing it this way.”
- “I need to serve all our employees, and the ability to have them take whatever device into the cloud and then use the modern workplace to get what they need to work without us having to build an image, etc., is obviously a massive improvement and drives down cost drastically.”

Forrester made the following assumptions for the composite analysis:

- The composite provisions 1.2 devices per user over a three-year refresh cycle. This translates to approximately 2,000 devices provisioned each year. The composite saves 2.5 hours per device due to automated provisioning.
- The average IT fully burdened cost (including all benefits and taxes) is \$68.75 per hour, or \$130,000 annually. Forrester does not include a

“We’ve really taken all the complexity out of the imaging process [with the modern desktop] — so it’s less expensive, it’s faster, and it’s easier to maintain. I can’t believe there’s anybody not doing it this way.”

*Manager of software systems,
construction/engineering*



2.5 hours saved per device with automated device provisioning

productivity capture for this time savings because it's time saved on a discrete task and not overall time savings.

The following risks can affect this benefit estimate:

- > This benefit will vary based on the number of devices being provisioned, the ability to automate device provisioning processes, and any previous outsourcing or other solutions in place for provisioning.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$812,113.

Reduced TCO — Device Provisioning Savings: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
E1	Number of devices added/replaced	5,000 users*1.2 devices/three-year refresh	2,000	2,000	2,000
E2	Device provisioning time saved (hours per device)	Interviews/survey	2.5	2.5	2.5
E3	IT fully loaded hourly compensation	Assumption	\$68.75	\$68.75	\$68.75
Et	Device provisioning savings	E1*E2*E3	\$343,750	\$343,750	\$343,750
	Risk adjustment	↓5%			
Etr	Device provisioning savings (risk-adjusted)		\$326,563	\$326,563	\$326,563

Reduced TCO — Application Provisioning Savings

Windows 10 and EMS provide self-service and automation tools for application provisioning, reducing the time that IT spends on this task and reducing the time it takes for end users to access applications they need to be productive. Windows 10 integrates with tools and services such as the Microsoft Store and the Microsoft Store for Business. End users can access and install many applications without calling their help desk, and IT can ensure that users install the right version of the right application. Additionally, the modern desktop investment reduces the application testing time required for major operating system (OS) releases. OS releases are no longer the major, every two- or three-year undertakings that come with new and updated features in virtually every area. Instead, operating system updates come incrementally, most commonly twice a year feature updates and monthly quality updates. Applications that don't interact with a new or updated feature likely don't need testing. Interviewees said:

- > "With EMS, we are planning to provide more applications via the Microsoft stores."
- > "We can identify applications that will have compatibility issues with the next version of Windows 10 and selectively test only those six applications instead of testing all 200 of our applications. That's a significant time savings."

Forrester made the following assumptions for the composite analysis:

- > In the prior environment, IT spent 1,000 hours per year on application provisioning. This initially decreases by 15%, improving to a 45% reduction as more applications are moved to the app store.



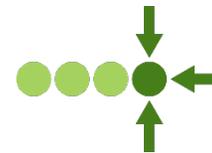
45% reduction in application provisioning time with self-service access

- > In the prior environment, IT spent 8,000 hours per year on application compatibility testing. By selectively testing applications, this decreases by 50% in Year 1, improving to a 70% reduction by Year 3.
- > The average IT fully burdened cost (including all benefits and taxes) is \$68.75 per hour, or \$130,000 annually. Forrester does not include a productivity capture for this time savings because it's time saved on a discrete task and not overall time savings.

The following risks can affect this benefit estimate:

- > This benefit will depend on the previous application provisioning processes, number of application requests from end users, the total number of applications in the portfolio, and the amount of application testing required in the prior environment.
- > Some organizations had difficulty adjusting to the new frequency of updates and the resulting need to test applications more frequently. Organizations also found that their third-party vendors struggled to keep up with the new frequency of updates, creating more compatibility issues for those applications.

To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year risk-adjusted total PV of \$882,789.



70% reduction in application testing time with targeted testing

Reduced TCO — Application Provisioning Savings: Calculation Table

REF.	METRIC	CALC.	YEAR 1	YEAR 2	YEAR 3
F1	Hours spent per year by IT on application provisioning	Interviews/survey	1,000	1,125	1,266
F2	Reduction in application provisioning time	Interviews/survey	15%	30%	45%
F3	IT fully loaded hourly compensation	Assumption	\$68.75	\$68.75	\$68.75
F4	Total IT time saved — application provisioning	$F1 * F2 * F3$	\$10,313	\$23,203	\$39,155
F5	Application testing time per year, prior state (hours)	Interviews/survey	8,000	9,000	10,125
F6	Reduction in testing time	Interviews/survey	50%	60%	70%
F7	IT fully loaded hourly compensation	Assumption	\$68.75	\$68.75	\$68.75
F8	Total IT time saved — application testing	$F5 * F6 * F7$	\$275,000	\$371,250	\$487,266
Ft	Application provisioning savings	$F4 + F8$	\$285,313	\$394,453	\$526,421
	Risk adjustment	↓10%			
Ftr	Application provisioning savings (risk-adjusted)		\$256,781	\$355,008	\$473,779

Reduced TCO — Technology Infrastructure Cost Savings

Organizations can replace third-party security and device management tools with functionality in the modern desktop. Windows Defender replaces the third-party antivirus, and EMS replaces the endpoint management tool. Organizations also receive total cost of ownership

savings by moving their on-premises environments to Microsoft 365. Organizations switch to subscription license fees, reducing capex license costs. Organizations can also avoid purchases of on-premises infrastructure. By simplifying and modernizing their environments, organizations also reduce the amount of IT support needed for administration and management.

- > “With Windows 10, we felt there was a level of maturity on the Microsoft security products that we wanted to start using them to replace our third-party security suites.”
- > “We’ve saved about a million dollars by replacing third-party management, device management, and device security tools.”
- > “We were able to reduce the antivirus/malware toolsets with the improvements in Windows Defender ATP technologies. We are looking to also replace our VPN tool.”
- > “We now have slower infrastructure growth as we have decreased the number of tools we needed to purchase, and we’ve reassigned staff because there is less need for people for software deployment and patches.”
- > “The way we manage Office 365 is once a month, our test group is incremented to the next version and then after a week or so, as long as we’re happy with that, the rest of the company is incremented to the next version. So one person spends 10 minutes, if that, to change a number somewhere. And that’s how we upgrade the 4,800 computers in our firm to the next version of Office each month. So big 10 minutes.”

Forrester made the following assumptions for the composite analysis:

- > The composite saves \$30 per user by replacing its third-party antivirus with Windows Defender ATP’s antivirus capability. The composite saves \$18 per user and \$100,000 of infrastructure spend by replacing its on-premises device management tool. The organization gets 75% of this benefit in Year 1 as it completes its phased rollout.
- > By switching to M365 subscription license costs, the organization can reduce its Microsoft license costs by 30%.
- > The organization avoids \$350,000 in on-premises infrastructure purchases and resulting maintenance costs, and the organization also saves 20% of its initial deployment effort by moving to the modern desktop cloud environment instead of migrating to new on-premises solutions.
- > By simplifying the overall environment, moving to the cloud, and increasing automation, the organization reduces its IT administration staff by 5 FTEs. The average IT fully burdened cost (including all benefits and taxes) is \$130,000 annually. Fifty percent of this benefit is realized in Year 1.

The following risks can affect this benefit estimate:

- > This benefit will vary based on the previous third-party solutions that can be replaced and negotiated pricing for those solutions.
- > License and infrastructure costs will vary from organization to organization.

To account for these risks, Forrester adjusted this benefit downward by 5%, yielding a three-year risk-adjusted total PV of \$5.3 million.



“We are able to eliminate third-party tools to save costs and administration time.”



“With the move to cloud deployment/ cloud services, we can eliminate on-premises costs.”



\$5.3 million in TCO saved by migrating to the modern desktop

Reduced TCO — Technology Infrastructure Cost Savings: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
G1	Antivirus license savings	\$30 per user, 75% Year 1		\$112,500	\$150,000	\$150,000
G2	Mobile device management license savings	\$18 per user, 75% Year 1		\$67,500	\$90,000	\$90,000
G3	Mobile device management infrastructure savings	75% Year 1		\$75,000	\$100,000	\$100,000
G4	Reduction in Microsoft license costs	30% reduction	\$411,429	\$822,857	\$822,857	\$822,857
G5	Eliminated on-premises costs	Assumption	\$350,000	\$63,000	\$63,000	\$63,000
G6	Reduction in initial deployment costs	20% reduction	\$540,083			
G7	Reduction in ongoing IT administration	5 FTEs, 50% Year 1		\$325,000	\$650,000	\$650,000
Gt	Technology infrastructure cost savings	G1+G2+G3+G4 +G5+G6+G7	\$1,301,512	\$1,465,857	\$1,875,857	\$1,875,857
	Risk adjustment	↓5%				
Gtr	Technology infrastructure cost savings (risk-adjusted)		\$1,236,436	\$1,392,564	\$1,782,064	\$1,782,064

Flexibility

The value of flexibility is clearly unique to each customer, and the measure of its value varies from organization to organization. There are multiple scenarios in which a customer might choose to implement modern desktop and later realize additional uses and business opportunities, including:

- › **Delivering feature updates more frequently to continue modernization of the workplace.** With the modern desktop, organizations can deliver new features in smaller increments more frequently, most commonly every six months. End users and IT staff get access to improved functionality faster than before, increasing their opportunity to collaborate, automate, and simplify processes.
- › **Increasing the adoption of productivity-generating features.** With updates being delivered more frequently, organizations have additional opportunities to increase awareness and provide training for new features that can help end users and IT staff increase their productivity-related time savings.

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

Flexibility, as defined by TEI, represents an investment in additional capacity or capability that could be turned into business benefit for a future additional investment. This provides an organization with the "right" or the ability to engage in future initiatives but not the obligation to do so.

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
Htr	License costs	\$1,008,000	\$2,016,000	\$2,016,000	\$2,016,000	\$7,056,000	\$6,021,494
Itr	Planning, implementation, and deployment costs	\$2,970,458	\$1,897,500	\$335,500	\$335,500	\$5,538,958	\$5,224,797
Jtr	Training costs	\$836,798	\$518,490	\$271,058	\$271,058	\$1,897,403	\$1,735,816
	Total costs (risk-adjusted)	\$4,815,256	\$4,431,990	\$2,622,558	\$2,622,558	\$14,492,361	\$12,982,107

License Costs

These are the costs paid to Microsoft to access the modern desktop.

- > The composite organization purchases 5,000 M365 E3 licenses. Licenses cost \$32 per user per month. The organization incurs six months of license costs in the initial period due to upfront testing and deployment. The rollout ends during Year 1, which represents the first full year of license costs for all users.

The following risks can affect this cost estimate:

- > License costs are variable based on volume discounts, other products licensed from the same vendor, or other discounts.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of over \$6 million.

The table above shows the total of all costs across the areas listed below, as well as present values (PVs) discounted at 10%. Over three years, the composite organization expects risk-adjusted total costs to be a PV of almost \$13 million.

Implementation risk is the risk that a proposed investment may deviate from the original or expected requirements, resulting in higher costs than anticipated. The greater the uncertainty, the wider the potential range of outcomes for cost estimates.

License Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
H1	Number of licenses	A1	5,000	5,000	5,000	5,000
H2	M365 E3 license cost	\$32 per user per month [6 months initial]	\$192	\$384	\$384	\$384
Ht	License costs	H1*H2	\$960,000	\$1,920,000	\$1,920,000	\$1,920,000
	Risk adjustment	↑5%				
Htr	License costs (risk-adjusted)		\$1,008,000	\$2,016,000	\$2,016,000	\$2,016,000

Planning, Implementation, And Deployment Costs

Planning, implementation, and deployment costs vary significantly based on the length of deployment, professional services used, which solutions are deployed, and the number of devices. Most organizations use

professional services initially to speed up deployment time and help with configuration and integrations.

- > The composite has a 10-month initial deployment period. During this time, the organization stands up the solutions and completes early testing and deployments.
- > The composite uses \$1.8 million in professional services during the initial period and \$900,000 in professional services to complete the rollout during Year 1.
- > Eight internal FTEs are involved with implementation and deployment in the initial 10 months. Four FTEs complete the rollout during Year 1. The composite requires two FTEs for ongoing management to support and configure Microsoft solutions, manage user accounts, and roll out new solution components.
- > The average IT fully burdened cost (including all benefits and taxes) is \$130,000 annually.
- > The migration requires \$45,000 in annual additional technology spend, 75% of which is incurred in the initial period.



10 months
Initial implementation
and deployment time

The following risks can affect this cost estimate:

- > Costs will vary based on the size and scope of the deployment, the number of FTEs required, and the amount of professional services support needed. The adoption of videoconferencing will affect the increase in bandwidth costs.

To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year risk-adjusted total PV of \$5.2 million.

Planning, Implementation, And Deployment Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
I1	Number of months	Interviews/survey	10	12	12	12
I2	Internal FTEs for planning and implementation	Interviews/survey	8	4		
I3	Professional services costs	Assumption	\$1,800,000	\$900,000		
I4	Additional technology costs	Interviews/survey	\$33,750	\$45,000	\$45,000	\$45,000
I5	Internal FTEs for ongoing deployments	Interviews/survey		2	2	2
I6	IT fully loaded annual compensation	Assumption	\$130,000	\$130,000	\$130,000	\$130,000
It	Planning, implementation, and deployment costs	$((I1/I2)*(I2+I5)*I6)+I3+I4$	\$2,700,417	\$1,725,000	\$305,000	\$305,000
	Risk adjustment	↑10%				
Itr	Planning, implementation, and deployment costs (risk-adjusted)		\$2,970,458	\$1,897,500	\$335,500	\$335,500

Training Costs

Both IT staff and end users require training on new features and functionality.

- > The composite spends \$75,000 to make initial training materials and spends \$15,000 per year to update training materials with new features.
- > Fifteen IT staff participate in training, including five days initially, three days in Year 1, and two days each year after deployment ends to train on new functionality. The average IT fully burdened cost (including all benefits and taxes) is \$500 per day, or \$130,000 annually.
- > All 5,000 end users participate in both formal and on-the-job training, including three hours initially, two hours in Year 1, and 1 hour per year after deployment ends to train on new features. The average knowledge worker fully burdened cost (including all benefits and taxes) is \$45.63 per hour, or \$94,940 annually.



Five days
Initial IT training

3 hours
Initial end user training

The following risks can affect this cost estimate:

- > Training efforts will vary based on the frequency of updates and the effort to spread awareness of new features. Ongoing training to accompany new feature updates is a critical component of ongoing productivity benefits.

To account for these risks, Forrester adjusted this cost upward by 5%, yielding a three-year risk-adjusted total PV of \$1.7 million.

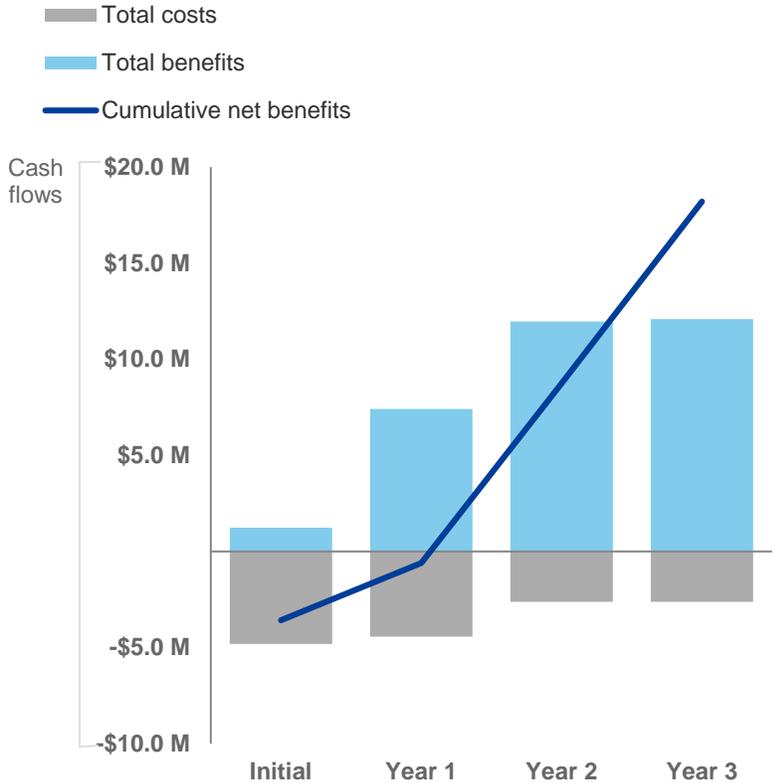
Training Costs: Calculation Table

REF.	METRIC	CALC.	INITIAL	YEAR 1	YEAR 2	YEAR 3
J1	Development of training materials	Interviews/survey	\$75,000	\$15,000	\$15,000	\$15,000
J2	Number of IT staff participating in training	Interviews/survey	15	15	15	15
J3	Days of IT training	Interviews/survey	5	3	2	2
J4	IT fully loaded daily compensation	Assumption	\$500	\$500	\$500	\$500
J5	Number of end users	Interviews/survey	5,000	5,000	5,000	5,000
J6	Hours of end user training	Interviews/survey	3	2	1	1
J7	User fully loaded hourly compensation	Assumption	\$45.63	\$45.63	\$45.63	\$45.63
Jt	Training costs	$J1+(J2*J3*J4)+(J5*J6*J7)$	\$796,950	\$493,800	\$258,150	\$258,150
	Risk adjustment	↑5%				
Jtr	Training costs (risk-adjusted)		\$836,798	\$518,490	\$271,058	\$271,058

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 Table (Risk-Adjusted)

	INITIAL	YEAR 1	YEAR 2	YEAR 3	TOTAL	PRESENT VALUE
Total costs	(\$4,815,256)	(\$4,431,990)	(\$2,622,558)	(\$2,622,558)	(\$14,492,361)	(\$12,982,107)
Total benefits	\$1,236,436	\$7,409,178	\$11,966,296	\$12,085,067	\$32,696,977	\$26,941,245
Net benefits	(\$3,578,820)	\$2,977,188	\$9,343,738	\$9,462,509	\$18,204,616	\$13,959,138
ROI						108%
Payback period						13 months

The Modern Desktop With Microsoft 365: Overview

The following information is provided by Microsoft. Forrester has not validated any claims and does not endorse Microsoft or its offerings.

Modern desktop combines Windows 10 and Office 365 ProPlus to deliver the most productive and secure computing experience for business. For IT, a modern desktop with Microsoft 365 means simplified device and update management, transforming the role of IT and lowering TCO.

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: Cost of a Data Breach Study (<https://www.ibm.com/security/data-breach>).