Eye to AI:
Computer Vision Impact on Federal Missions

Underwritten by

Government Acquisitions

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Introduction

Computer vision (CV) is quickly becoming the front line of analytics for visual data. CV is already widely used in the private sector, healthcare, and law enforcement. But, despite the technology's maturation, CV has yet to make a major impact across the Federal government.

MeriTalk, in partnership with Government Acquisitions, Inc. (GAI) and NVIDIA, surveyed **150 Federal IT decision-makers** across Federal Civilian agencies and the DoD to explore:

- Federal awareness of CV applications and benefits

- Adoption barriers, including IT infrastructure gaps
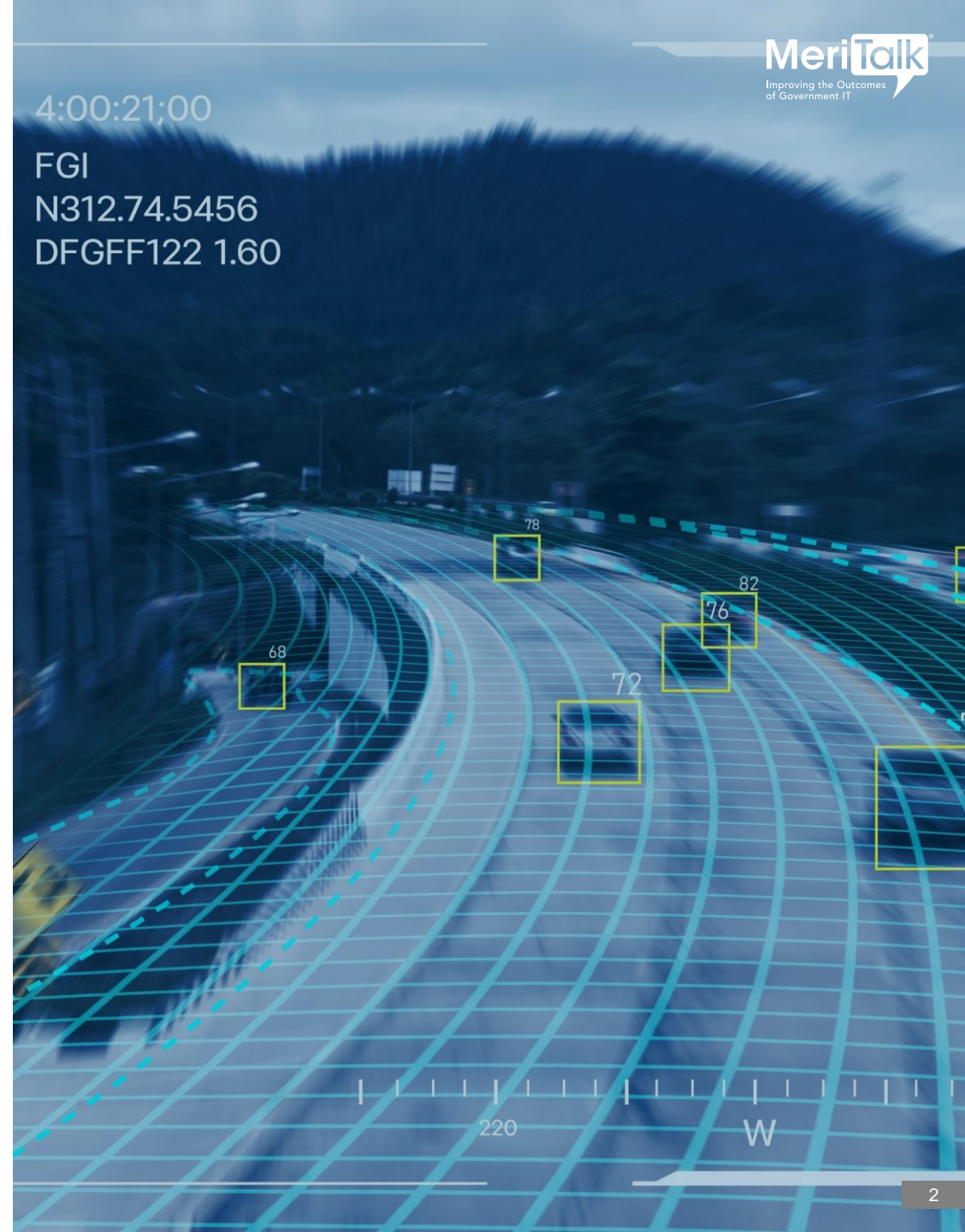
- What CV leaders are learning

Note: For this study, CV Users are defined as those currently piloting at least one CV application or having at least one fully functional application

For this survey, we defined **computer vision (CV)** as:

A field of technology within Artificial Intelligence (AI) that uses computer systems to find meaningful information from digital images, videos, text, or other inputs. CV then uses the information to either take action or make recommendations for human consideration. Some popular examples are monitoring social media images, reading license plates on toll roads, and extracting printed or handwritten text from documents, such as applications, invoices, reports, and contracts.

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Executive Summary

Federal IT decision-makers have a strong desire for CV:

99% say deriving meaning from imagery or video is important to their agency's mission; **65%** say it's very important

87% feel CV is underutilized by the Federal government

Outdated infrastructure and the workforce skills gap hinder adoption:

Despite interest, only **23%** have a fully functional CV application

Just **13%** of agencies feel their infrastructure is fully capable of handling CV, and **39%** say lack of a skilled workforce is holding their agency back

Agencies need more information on CV availability and applications:

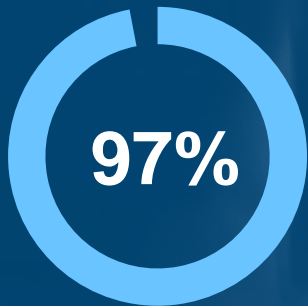Three in ten (**30%**) are still in the process of gathering information about CV

49% say a better understanding of available CV technology would help advance their usage
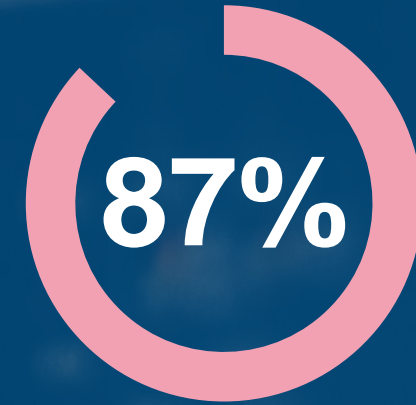
Computer Vision is Vital

99% say **deriving meaning** from imagery or video is important to their agency's mission, and

97% agree CV is one of the **most useful** AI technologies
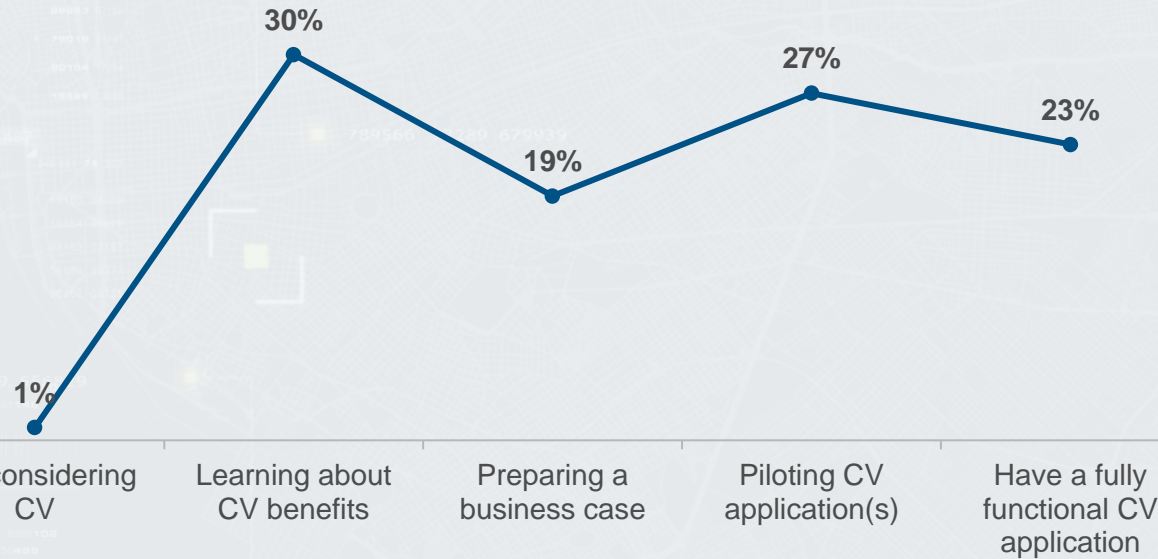
But …

87% feel CV is **underutilized** by the Federal government

CV Opportunity

87%

say their agency has at least one problem CV could **help solve**

What is the biggest opportunity CV technology can offer the Federal government?

> *Automating repetitive tasks in assisting the public when interacting with Federal databases and models such as filling out forms and directing them to resources."*

> *The ability to handle to small jobs that we do now so we can better focus on more important things."*

> *Build a graphics system algorithm that enable bias-free decision metrics."*

> *Real-time monitoring of all moving objects, monitoring of abnormal activities, and danger blocking through image recognition to improve overall safety."*

> *Leverage deep learning to properly analyze data, improve services, make better decisions and policies, and save costs."*

> *Help us in keeping the data of different individuals safe; with its capabilities we would be able to operate digitally in an effective way."*
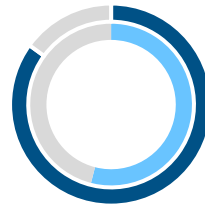
Aptitude for CV

Where do agencies feel proficient?
(**CV users** vs **non-users**)

Model selection
(**61%** vs **49%**)
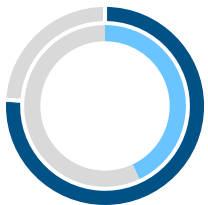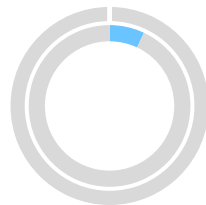
Data selection
(**64%** vs **58%**)

Training and
testing/evaluation
(**85%** vs **54%^**)

Deployment/
execution
(**76%** vs **43%^**)

Updates/
maintenance
(**53%** vs **37%**)

Not proficient
at **any** stage
(**0%** vs **7%**)

TAKEAWAY:
Proficiency with **training/testing** and **development** set CV users apart

^Denotes difference is statistically significant at the *p*<0.05 level

What Inhibits Agencies?

INSIGHT:
1 in 10 **non-users** are unsure where their agency could use CV
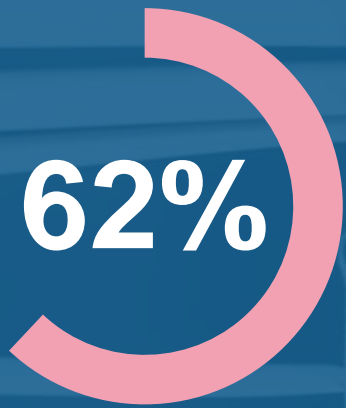
What is **holding agencies back** from adopting or expanding CV?*

Lack of skilled internal **workforce**

Challenges with **culture** issues/change management

Outdated or insufficient **infrastructure**

Concern technology is not yet **mature/reliable**

Costs associated with CV are too high

*Respondents asked to select all that apply
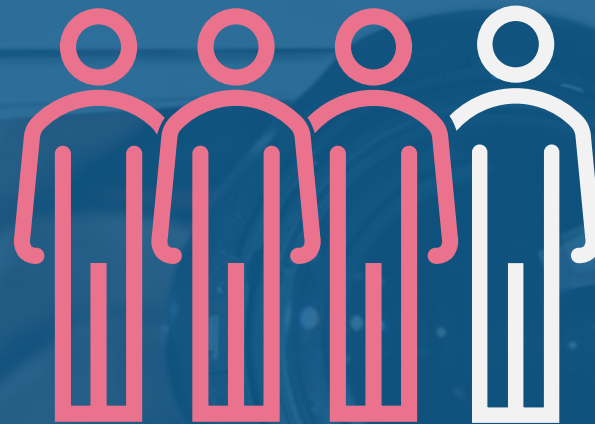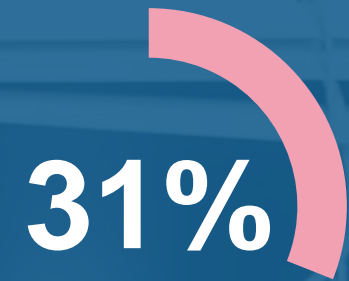
Infrastructure Needs an Upgrade
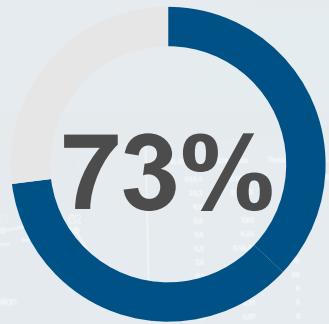
73% have **concerns** about their agency's **infrastructure** being able to handle CV
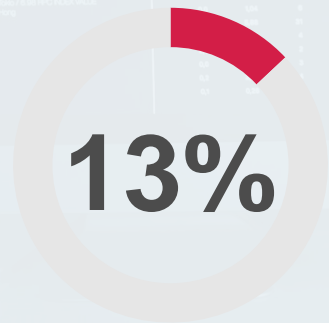
Only …

13% of agencies feel their infrastructure is **fully capable** of handling CV

Where are infrastructures falling short?*

#1 Lack of scalability

#2 Limited cloud access

#3 Lack of integration with open-source models

*Respondents asked to select all that apply

TAKEAWAY:
Agencies should look to cloud for scalability and connectivity

Mission Impacts

What do you see as the biggest benefits to CV?*

Improved **workforce** efficiency
55%

Improved **data utilization**/usability
50%

Improved visibility across the **network**
50%

Accelerated **data analysis**
49%

Automation of repetitive tasks
47%

Accelerated **decision-making**
46%

Improved **forecasting**
43%

Greater **adaptability** to combat adversaries
43%
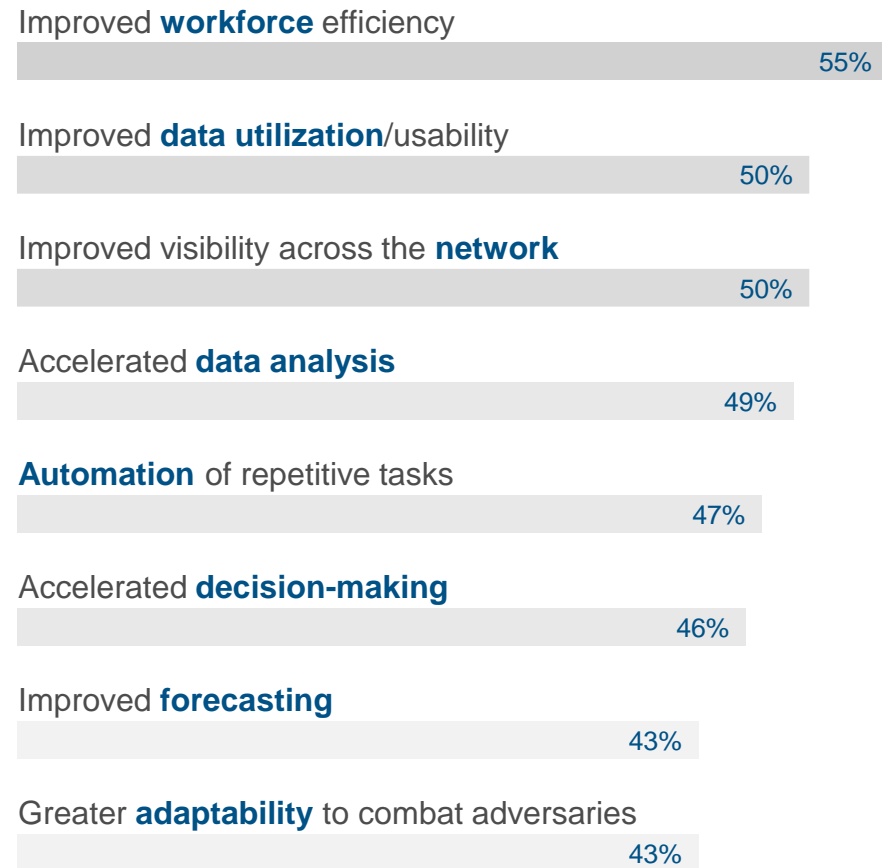
INSIGHT:
CV users are significantly more likely to see benefits in **workforce efficiency**, **adaptability**, and **forecasting**

*Respondents asked to select all that apply

CV Users' Applications and Priorities

Top CV use cases?**

1 Object **recognition** (68%)

2 Image **processing** (66%)

3 **Virtual surveillance** of the network (61%)

4 **Fraud detection** of digital activities (59%)

5 Physical **surveillance** (51%)

5 Virtual **assistants** (51%)

Which techniques are CV users prioritizing?**

■ Currently use   ■ Implementing within 2 years

Classification - determining and classifying what object is in an image or video frame
73% | 26%

Detection - locating and localizing an object or multiple objects within an image or a video frame
62% | 36%

Image synthesis - creating or artificially generating images containing certain desired objects or content
57% | 35%

Segmentation - locating objects or regions of interest precisely in an image by assigning a label to every pixel in an image
53% | 39%

**Only reporting those who say they currently use CV (n=74), respondents asked to select all that apply

Views from the Frontline

CV Users: What has been the most valuable/surprising outcome since your organization began CV implementation?

> *We were surprised at the **level of sophistication** and automation that already exists or is available from industrial vendors."*

> *The **speed of processing** data is greatly increased, and hazards are automatically detected."*

> *The **outcome of the findings** that were otherwise gone unnoticed."*

> *[Our ability to] automatically classify and retrieve documents in the system to **reduce manual error rates**."*

> *It enables us to **manage complicated tasks** inside the organization with ease."*

Wants Versus Haves

What CV technologies do agencies rate very valuable compared to what they have already implemented?**

Most Valuable

#1 Detecting anomalies in pictures/images

#2 Seeing beyond human vision

#2 Automatic classification of images or text

#4 Automated video monitoring

#5 Image recognition

#6 Optical character recognition (OCR)

Being Using

#1 Image recognition

#2 Automatic classification of images or text

#3 Detecting anomalies in pictures/images

#4 Automated video monitoring

#5 Optical character recognition (OCR)

#6 Seeing beyond human vision

TAKEAWAY:
While many find value in the ability to see beyond human vision (such as infrared), few have begun to implement it

**Only reporting those who say they currently use CV (n=74)

CV Wishlist for Non-Users

Non-users: Where would you like to see CV applied?*

Image processing
45%

Natural language processing
42%

Fraud detection of digital activities
41%

Motion tracking
39%

Virtual surveillance of the network
38%

55%
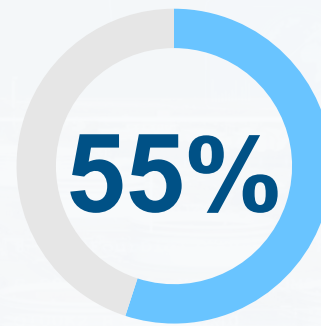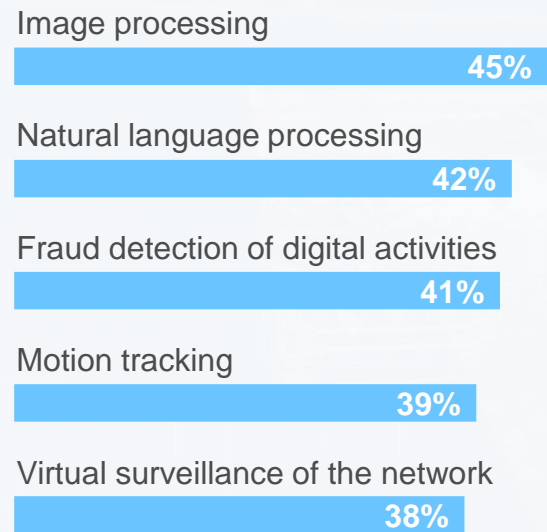
of non-CV users say their agency will prioritize **object detection** in the next 1-2 years**

*Only reporting those who say they currently do not use CV (n=76), respondents asked to select all that apply
**Only reporting those who say they currently do not use CV

Areas for Assistance

What would help agencies accelerate their CV adoption?*

■ Users ■ Non-Users

Better **understanding** of available CV technology or applications
- Users: 55%
- Non-Users: 43%

Streamlined processes and **data governance**
- Users: 49%
- Non-Users: 43%

Increased **hiring/training** to grow internal CV expertise
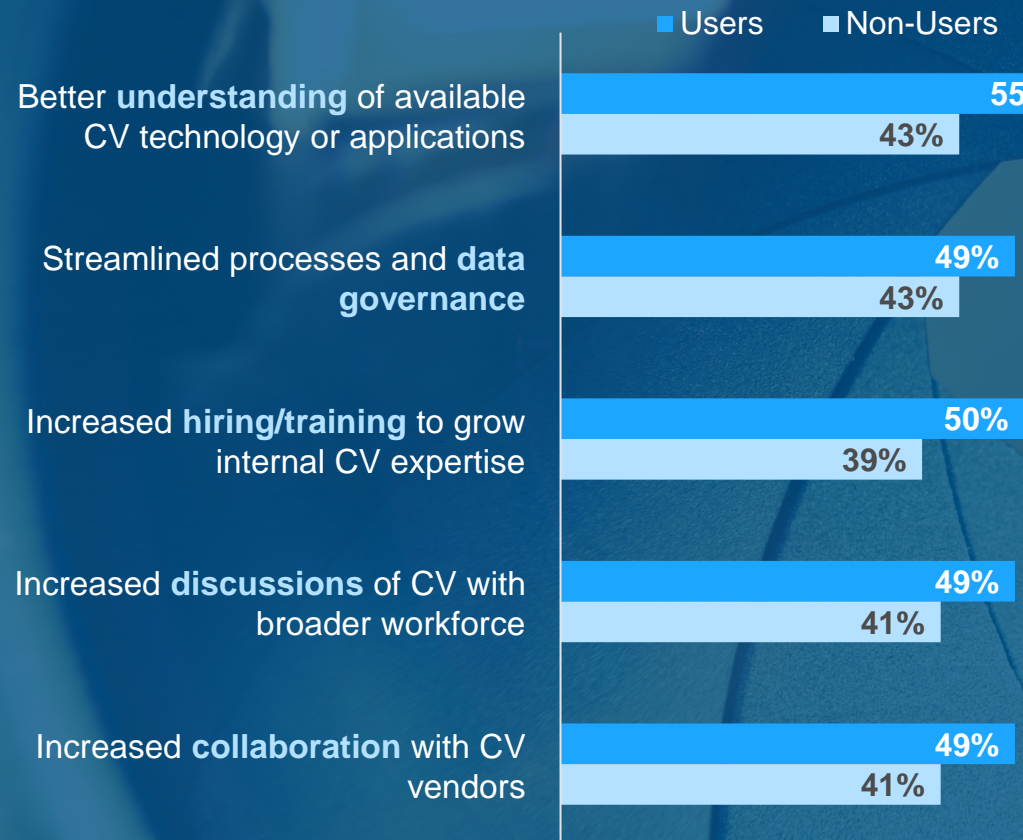- Users: 50%
- Non-Users: 39%

Increased **discussions** of CV with broader workforce
- Users: 49%
- Non-Users: 41%

Increased **collaboration** with CV vendors
- Users: 49%
- Non-Users: 41%

Additionally,

- 50%
- 29%

CV users are nearly twice as likely to say foundational investments in **modern infrastructure** will accelerate CV adoption^

*Respondents asked to select all that apply
^Denotes difference is statistically significant at the *p*<0.05 level

Recommendations

Fill Gaps in Workforce Knowledge

Nearly all Federal IT decision makers see benefits to CV technology in their agency. But two of the top deterrents are workforce knowledge and agency culture issues.

It's no surprise both CV users and non-users say a better understanding of CV availability and applications would accelerate their adoption.

Agencies should work with trusted vendor partners to learn about the current state of CV technology and opportunities for applications. Vendors can help support workforce development by sharing Federal-specific case studies and offering guidance to help technologists educate non-IT staff on CV benefits.

Modernize Infrastructure for a Future-Proof Foundation

Behind workforce knowledge, infrastructure is the next biggest roadblock to CV implementation and advancement. Three out of four IT decision-makers are concerned their agency's infrastructure can't handle CV as it stands.

The most common places infrastructures fall short are scalability, cloud access, and integration with open-source models.

Federal IT leaders should keep CV needs and use cases in mind as they strive to modernize outdated infrastructure and advance secure cloud adoption. Cloud Service Providers (CSPs) can help both IT and non-IT decision-makers see how moving to a modern cloud ecosystem can support CV adoption.

Demystify Cybersecurity Concerns

Approximately one in three Federal IT decision-makers say a fear of breaches hinders their CV adoption. Most also feel CV will entice malicious actors to strike.

The fear of cybersecurity threats is shared across the staff, with many IT decision makers seeing mistrust among non-IT colleagues as well. At the same time, CV users listed network surveillance and digital fraud detection as top use cases for CV.

Cybersecurity is a major concern for all government agencies. It is natural for technologies that are not fully understood to breed mistrust. IT leaders should work with vendors to educate agencies and share real-world examples on how CV can be a useful tool in their cybersecurity journeys.

Methodology

Respondent job titles

C-suite	26%
IT Director/Supervisor	39%
AI/ML Program Manager or Specialist	17%
Cloud Program Manager or Specialist	5%
Cybersecurity Manager or Specialist	4%
Software/Applications Development Manager	3%
Data Center/Network Manager or Specialist	3%
Data Scientist	1%
Other IT Manager	2%

Employer

Federal Government: Civilian Agency	73%
Federal Government: DoD or Intelligence Agency	27%

Expertise

100% of qualifying respondents are familiar with their organization's current use of or plans for next-generation analytics tools, like artificial intelligence, machine learning, and computer vision technology

MeriTalk conducted an online survey of 150 Federal IT decision-makers familiar with their organization's use and plans for next-generation analytics tools across civilian and DoD agencies in October 2022. The report has a margin of error of ±7.97% at a 95% confidence level.

Thank You

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Appendix I: Software Development Preferences

There is not one ideal way for agencies to obtain CV software.

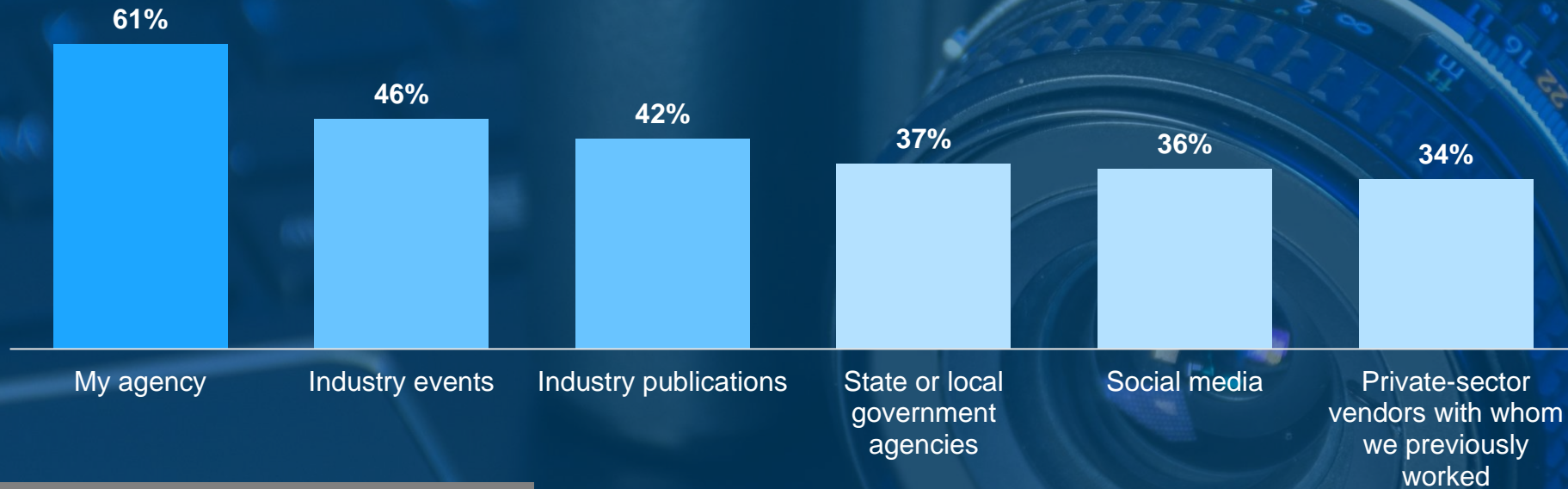Which of the following most closely describes the ideal way to obtain CV software?

29%

35%

31%

5%

Software is completely developed by my agency

Software is developed in cooperation with other agencies

Software is developed in cooperation with trusted private-sector partners

Software is completely developed by a private-sector partner

I N S I G H T :
Non-users are significantly more likely to want their CV software to be developed completely by their agency (37% vs 22%)

Appendix II: CV Communication

Where have IT managers heard about CV?*

61%	My agency
46%	Industry events
42%	Industry publications
37%	State or local government agencies
36%	Social media
34%	Private-sector vendors with whom we previously worked

INSIGHT:
Big opportunity to increase CV information and education across the Federal ecosystem

*Respondents asked to select all that apply