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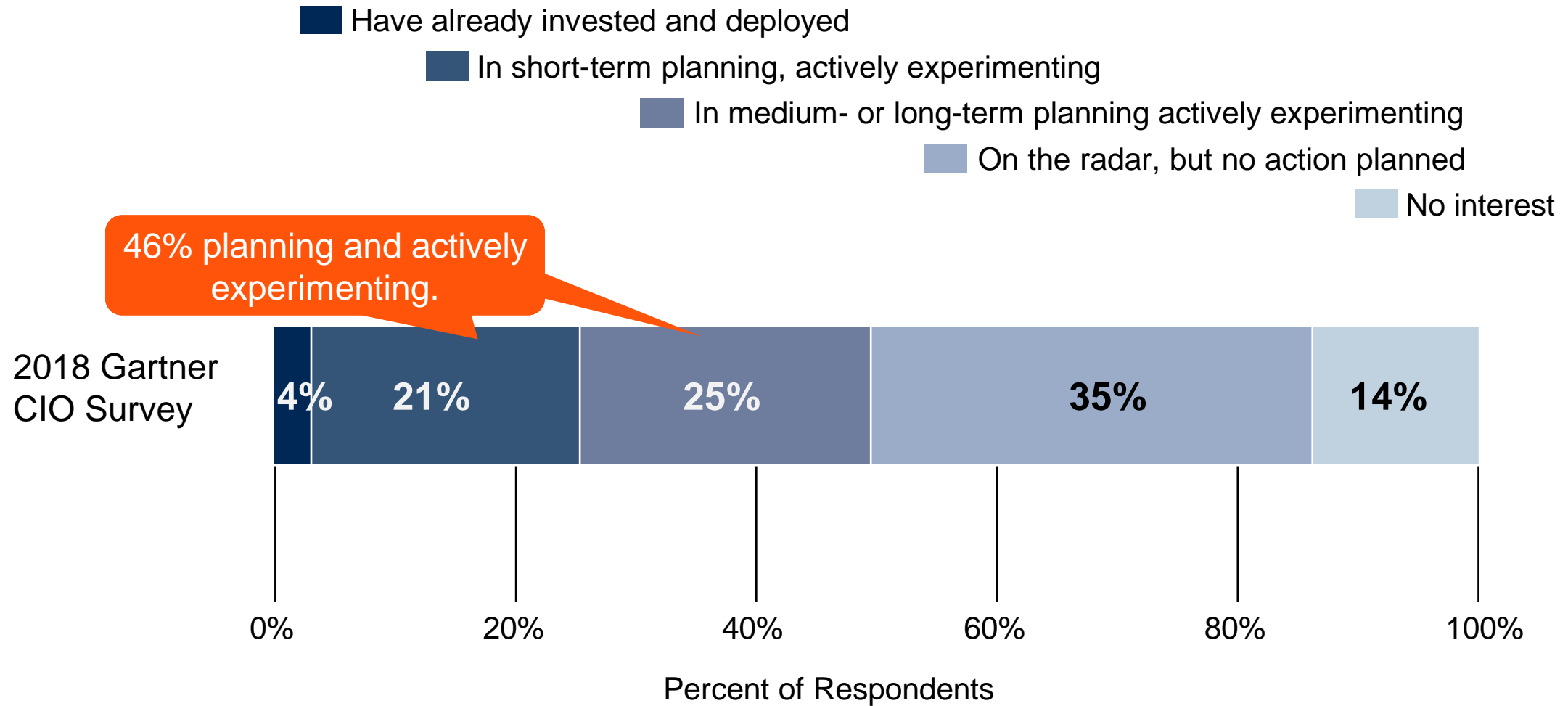
Georgia Technology Summit
May 13, 2019

Key Trends in Applying Real-World AI

Bern Elliot

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Plans for Artificial Intelligence, 2018



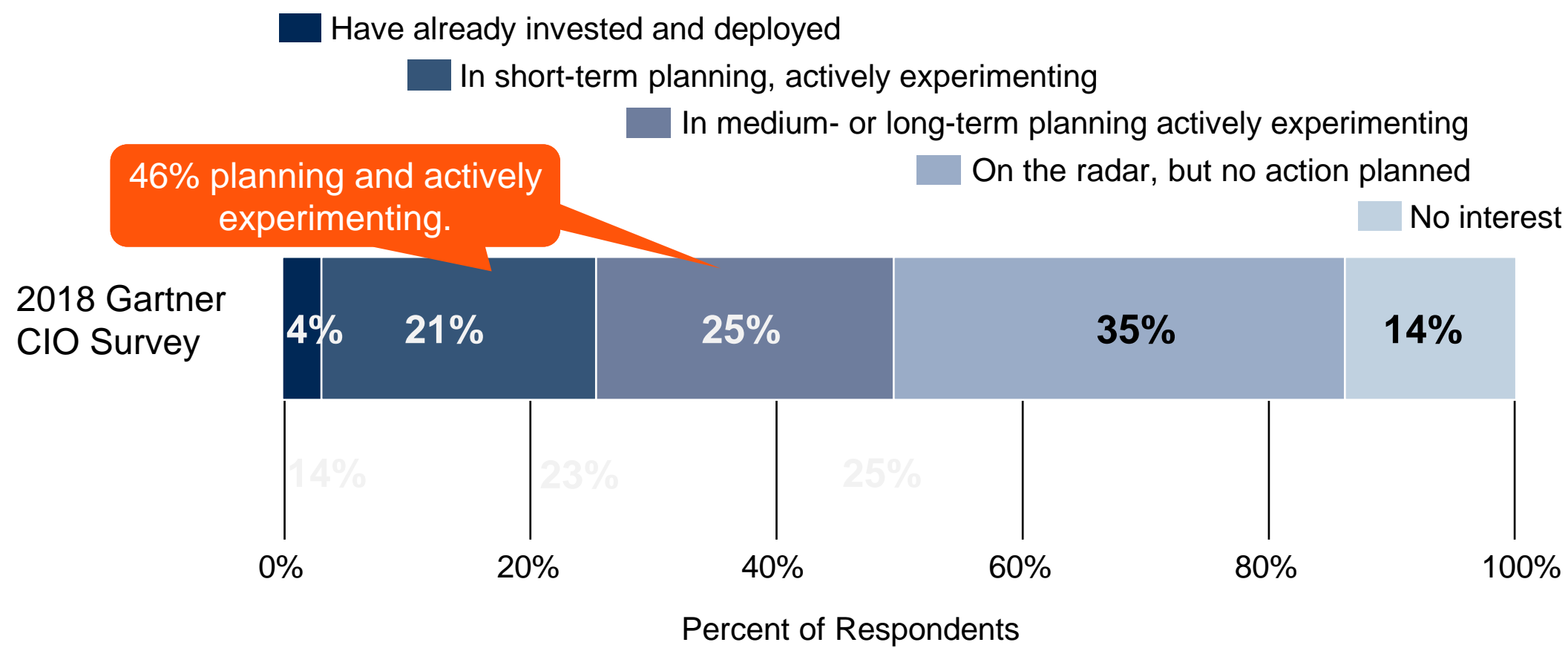
Base: Respondents to the 2018 Gartner CIO Survey, excludes DK, n = 3,138

Question: What are your organization's plans in terms of the following digital technologies and trends?

Source: ["Lessons From Early AI Projects."](#) (G00328115)

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Plans for Artificial Intelligence, 2018 vs. 2019

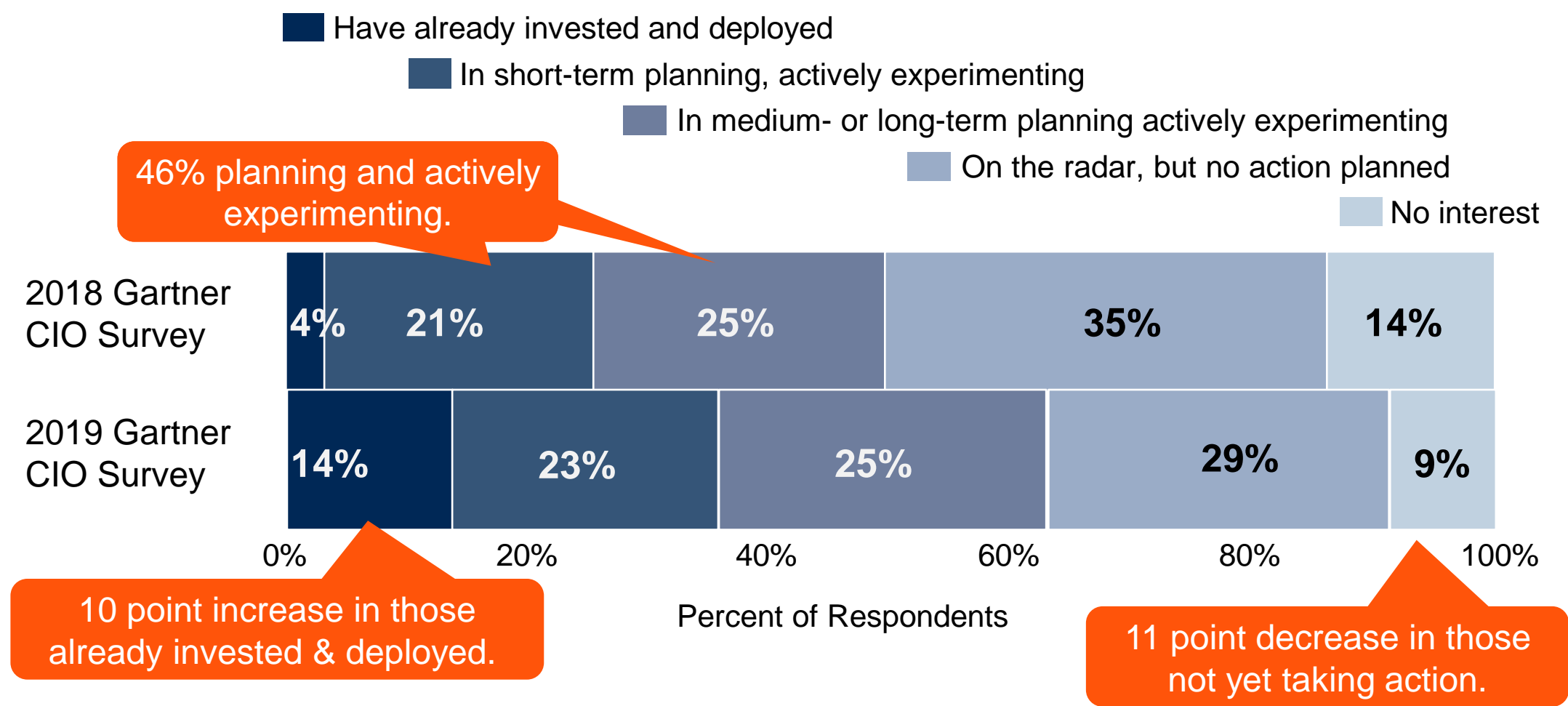


Base: Respondents to the 2018 Gartner CIO Survey, excludes DK, n = 3,138
Question: What are your organization's plans in terms of the following digital technologies and trends?

Source: ["Lessons From Early AI Projects."](#) (G00328115)

Base: Respondents to the 2019 Gartner CIO Survey, excludes DK, n = 2,882
Question: What are your organization's plans in terms of artificial intelligence?

Plans for Artificial Intelligence, 2018 vs. 2019



Base: Respondents to the 2018 Gartner CIO Survey, excludes DK, n = 3,138
Question: What are your organization's plans in terms of the following digital technologies and trends?

Source: ["Lessons From Early AI Projects."](#) (G00328115)

Base: Respondents to the 2019 Gartner CIO Survey, excludes DK, n = 2,882
Question: What are your organization's plans in terms of artificial intelligence?

Key Issues

Categories: What types of AI should you consider?

2. Examples: What is really being done with AI?
3. Benefits & Risks of AI.

Three Common Technology Areas Driving AI Solutions



Note: All three may be leveraged for a complete solution



Deep Neural Network Machine Learning

Pattern recognition, data mining, train on large datasets. Basis for advances in NLP, computer vision, analytics.



Natural Language Processing (NLP)

Translation, speech transcription, virtual assistants, sentiment analysis, language generation, content moderation ...



Computer Vision

Label extraction from image (car, person, tree, etc.), face recognition, image attributes (face gender), OCR to text ...

Three Common Focuses for AI Solution Benefits



Note: All three may be leveraged for a complete solution



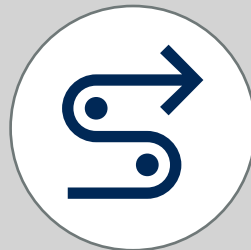
Insights

- Uses DNNs and predictive analytics, as well as established analytic methods to identify patterns and trends
- E.g., Modeling, optimizing, forecasting, personalization, fraud detection



User Experience

- Uses AI methods, including NLP language, specialized devices, and other software to improve the user experiences
- E.g., Natural language assistant, language translation



Process Improvement

- Uses broad range of AI methods to improve automation and processes flows.
- E.g., IoT, robots, AI imbedded and with business applications

Differentiate Your Operational and Strategic AI Solutions

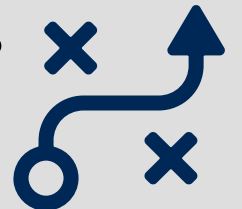
Operational Applications

- Existing applications
- Departmental purchase
- Easier integration and configuration
- < 2-year ROI
- Operated by bus person
- E.g., HR candidate SW

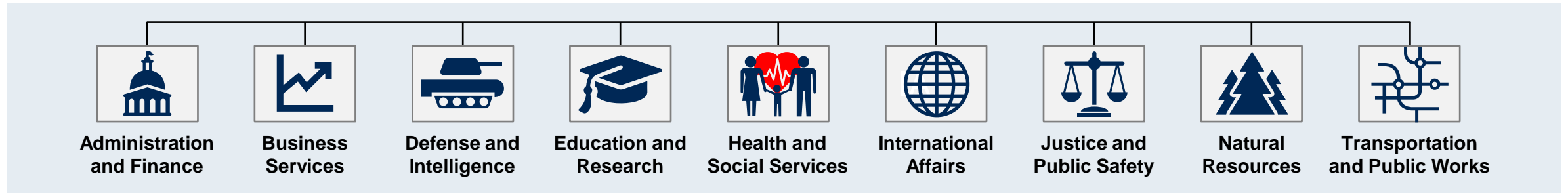


Strategic Applications

- Unique initiatives
- Competitive differentiation
- Extensive curation of data
- Significant, multiyear, initiative and long-term ROI
- Operated by AI/ML experts
- E.g., medical imaging

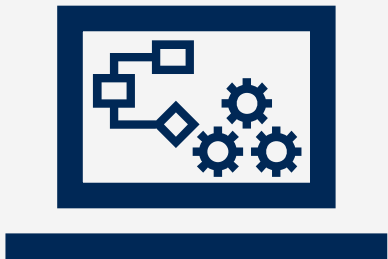


AI Uses Across All Public Sector Verticals



35%

Robotic Process Automation



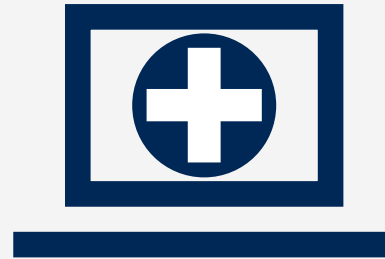
31%

Chatbot



27%

Computer-Assisted Diagnostics



25%

Virtual Assistant



25%

Fraud Analysis



Total answering: Respondents who are using AI for any application, excludes "Not sure" and "None of the above", n = 271

Robotic Process Automation Includes Computer-Assisted Process Optimization and Process Optimization Tools

Virtual Assistants Includes Call-Center Virtual Customer Assistants (VCAs) and Virtual Personal Assistants (VPAs)

Multiple Responses Allowed

Source: 2019 Gartner CIO Agenda Survey

Key Issues

1. Categories: What types of AI should you consider?

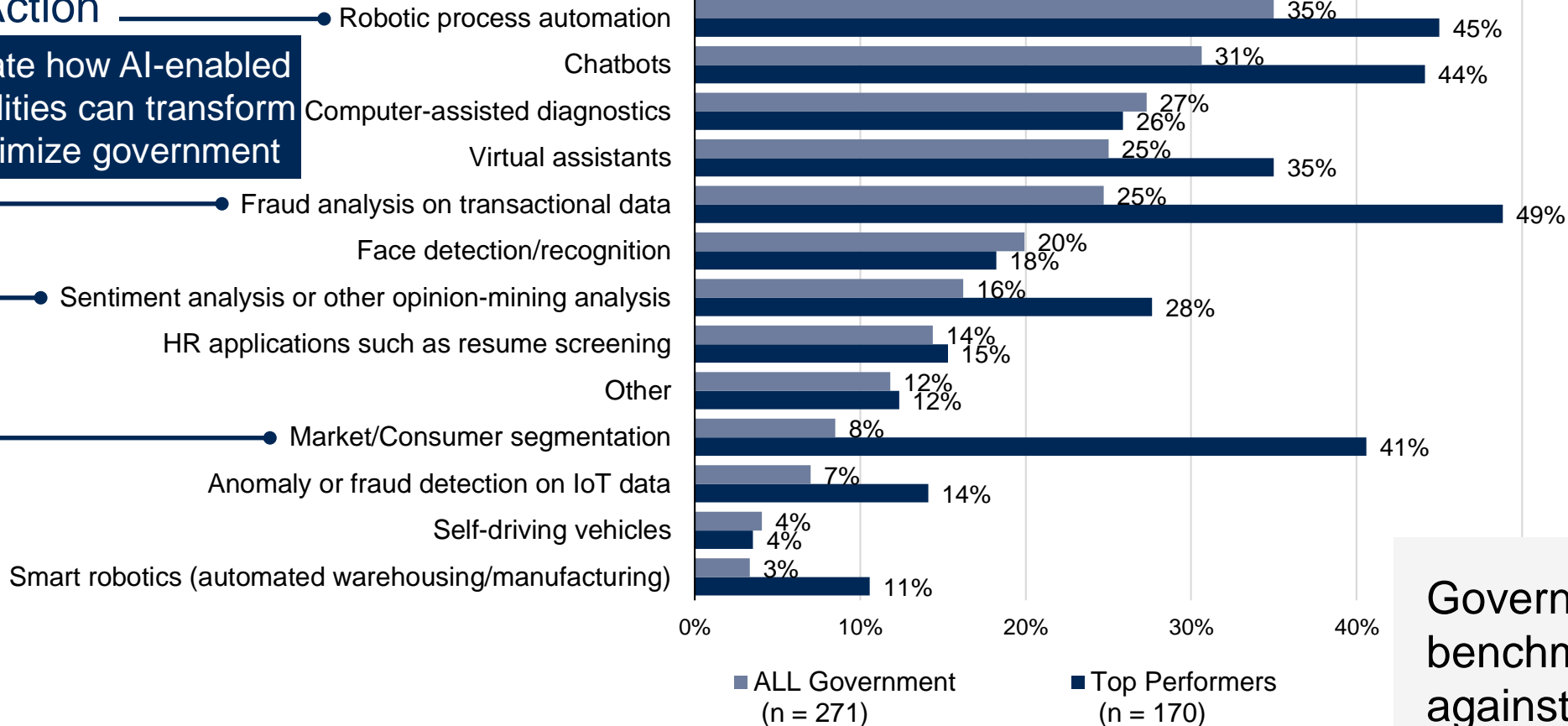
Examples: What is really being done with AI?

3. Benefits & Risks of AI

Top Uses of AI for Government and Top Performers, 2019

CIO Action

Evaluate how AI-enabled capabilities can transform or optimize government



Government must benchmark progress against top performing companies

Total answering: Respondents who are using AI for any application, excludes "Not sure" and "None of the above"
 Robotic Process Automation Includes Computer-Assisted Process Optimization and Process Optimization Tools
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 Multiple Responses Allowed
 Source: 2019 Gartner CIO Agenda Survey

Program Integrity with Enhanced Fraud Detection



Opportunity

- Stem the loss of fraud on improper health insurance payments, which can cost taxpayers \$70 billion annually.

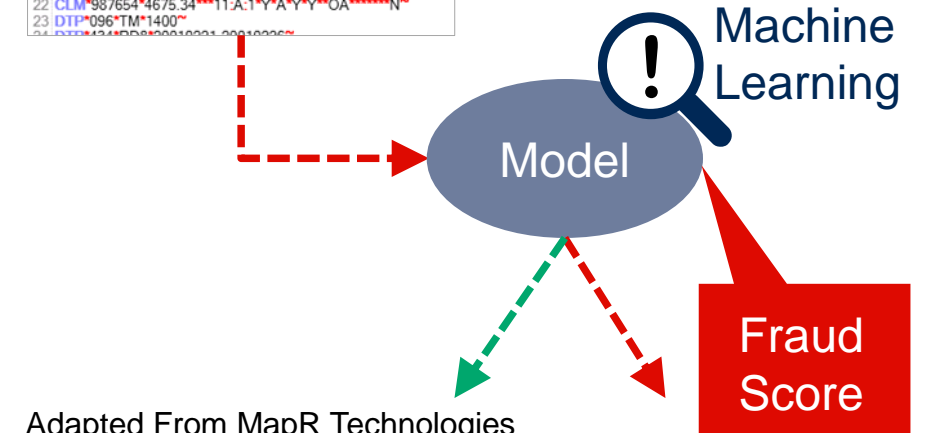
What was transformed and how

- The U.S. Department of Health and Human Services established an office of the chief data officer.
- The OCDO accelerated data analytics capabilities for use in audits, investigations and evaluations.

Results

- Criminal and civil charges for 301 individuals accused of participating in healthcare fraud schemes totaling \$900 million.
- Prior year success: 243 individuals accused of participating in healthcare fraud schemes totaling \$700 million.
- Arrests can have a deterrent effect that further reduces criminal or fraudulent claims submissions by \$1 billion.

Electronic Medical Claim

[illegible]

Adapted From MapR Technologies

Open for Business 24/7 — Putting a Virtual Face on Government Procurement

Opportunity

- Provide businesses interested in city bids with an excellent customer service experience and immediate access to information.

What was transformed and how

- An avatar named Laura helps business users register as a vendor, how to work with special programs, where to find bids and other FAQs.
- Unanswered questions are retained and reviewed to support continuous learning and monthly program updates.

Results

- Laura can answer basic questions and reduces call volumes.
- First year with implementation and purchasing the software was \$20,140. Estimates annual costs savings \$26,252.
- Plans to deploy to Department of Planning and Inspection and the El Paso International Airport websites.



Hi. I am Ask Laura! The City's Virtual Information Officer. How May I Help You?



Enter Your Question Here

Tags

Categories

Have a Question?



Made in the Shade — Preserving the Canopy of Downtown Montréal



Opportunity

- The cost of growing, transporting and planting one tree ranges from \$1,000 and \$6,750. The city replants thousands of trees per year.
- Montreal has roughly 1.2 million trees, 265,000 of which are street trees, with a total estimated worth of \$1.2 billion.

What was transformed and how

- AI system is shown images of healthy trees and compares them with recent photos to identify unhealthy trees that need care or replacement.

Results

- Develop and maintain a comprehensive inventory of urban trees.
- Protect city assets by monitoring newly planted trees for the first three to four years, when it is most vulnerable to damage or disease.

Montréal 
infra.ai by ELEMENT^{AI}



Government Use Cases Increase as AI/ML Matures



Detect

- Human Trafficking
- “Fake” News
- Tax evasion
- Identity of unconscious individuals
- Security intrusion, anomaly or outlier
- Judicial bias



Automate

- Program eligibility
- Dynamic taxation
- Mediation services
- Job application scoring and matching
- License renewal and fee collection
- Meeting scheduling



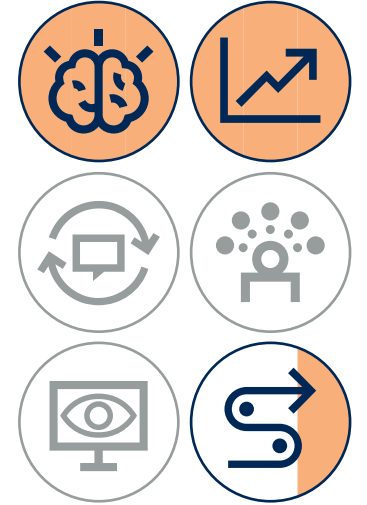
Anticipate

- Disease outbreak
- Recidivism risk
- Transport needs
- Shifts in population sentiment
- Policy impacts on compliance
- Infrastructure maintenance

Deep Learning Applied to Diabetic Retinopathy Detection

- Diagnosis requires regular retinal image scanning; ~ 7 images of each eye.
- AI program diagnosed 96%
- Faster results, earlier detection, better case management.
- Working on TB, breast cancer, lung cancer diagnosis.

Dubai Health Authority (DHA)
AI for eye disease diagnosis,
working with Artelus.com.



Source: ["AI Diagnoses Eye Disease With 96pc Accuracy."](#) Gulf Digital News

Image source: <http://artelus.com/>

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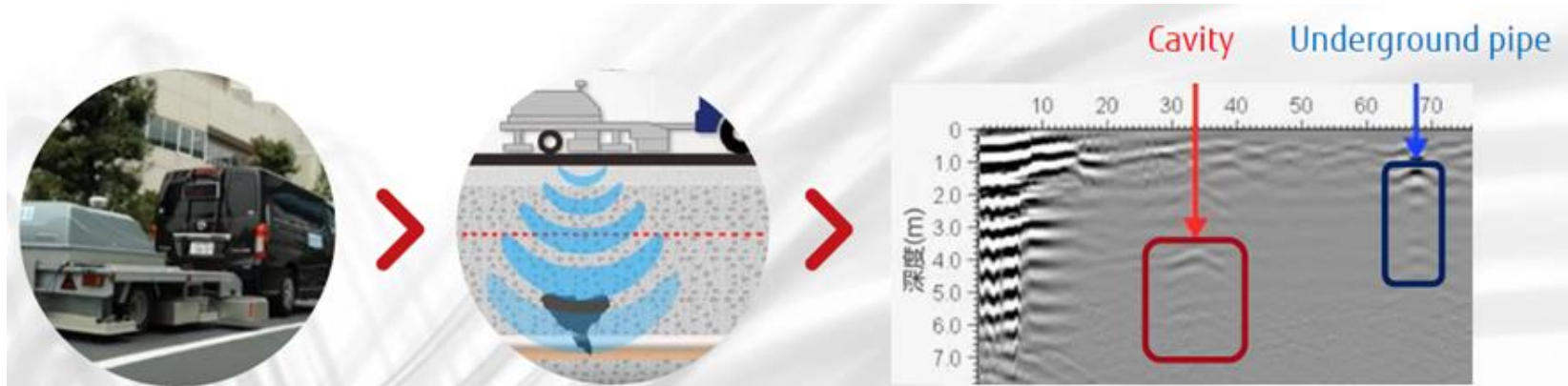
ML and Analytics for Road and Bridge Maintenance



FUJITSU Zinrai AI Solutions

Bridge damage and deterioration detection from vibrations.

Source: ["Fujitsu Deep Learning Technology Successfully Estimates Degree of Internal Damage to Bridge Infrastructure."](#) Fujitsu



Underground cavities detected with ultrasound using deep learning from AI image analysis.

Source: ["Fujitsu AI Technology Helps Prevent Sinkholes in Support of Kawasaki Geological Engineering's Road Cavity Surveys."](#) Fujitsu

Procure-to-Pay Vendor AI Capabilities

Mapping of inbound supplier invoice formats to the procure-to-pay suite format for automated data entry.

Matching of invoice to purchase order, including evaluating exceptions (e.g., on deliver fees and order quantity.)

“Guided buying” to help users identify and use the correct suppliers, contracts, catalogues, e-forms and policies for spending.



From [“Magic Quadrant for Procure-to-Pay Suites.”](#) 29 May 2018 (G00311367).

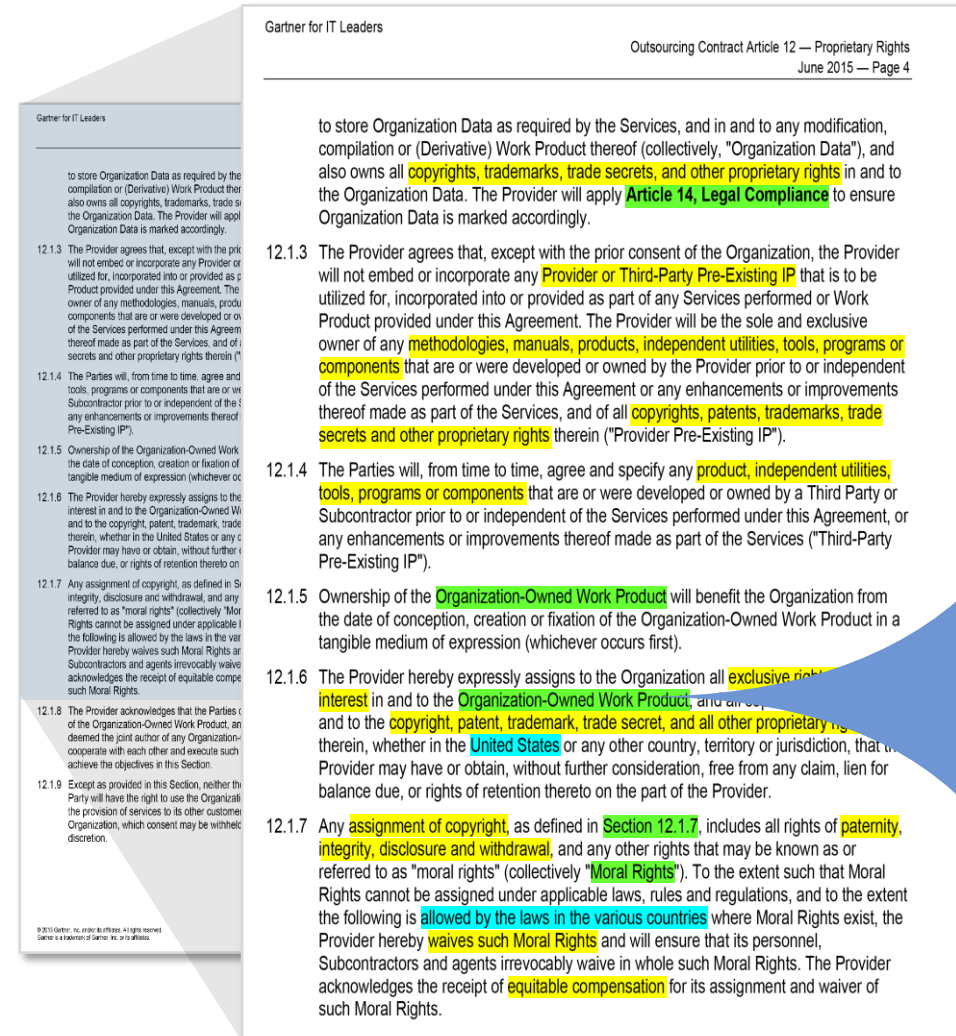
Vendor survey conducted as part of this report — some reported using cloud AI providers like Amazon or IBM Watson. Others were developing capability in-house.

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Contract Negotiation and Management

- Alerts of near-term contract expiration.
- Suggestions for contract improvements.
- Highlight clause with risks for review by legal team.
- Enforces contract consistency.



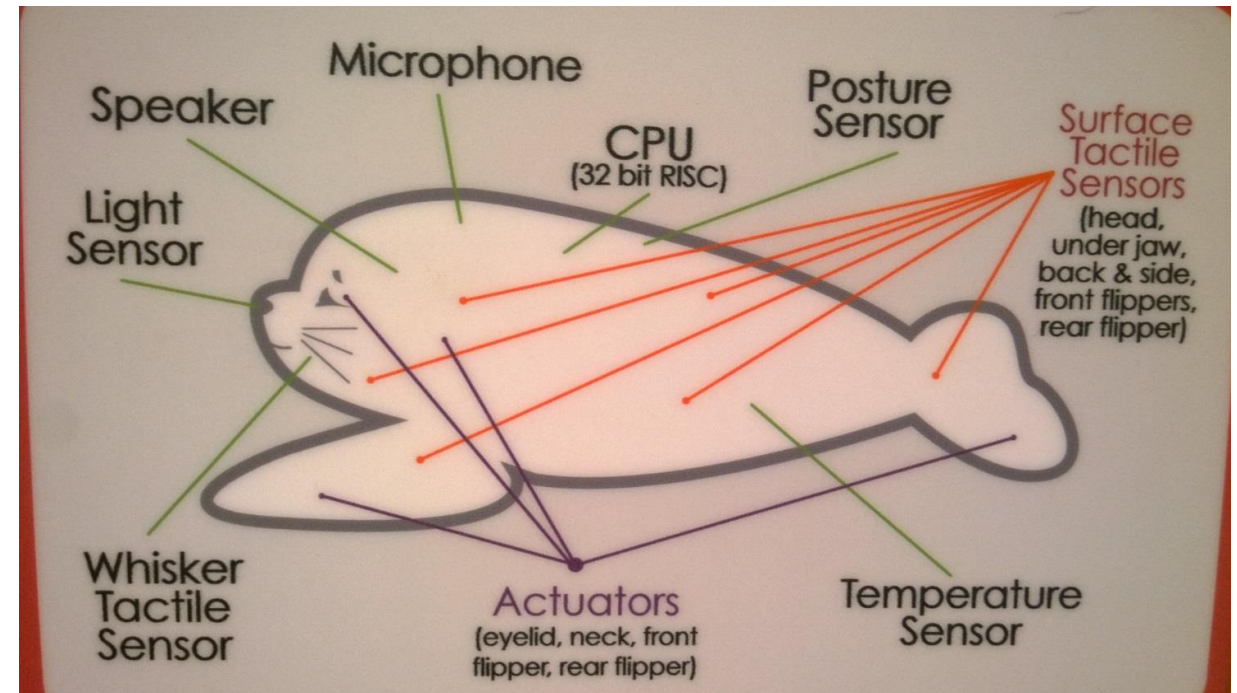
Risk
level
87%

Emotbot and AI for Elderly Care

Seal has sensors, application learns the individual facial expression and vitals. Alerts attendants of critical changes.



Image © 2018 AIST (National Institute of Advanced Industrial Science and Technology, Japan) used with permission



© 2018, PARO Robots & AIST

Facial Recognition

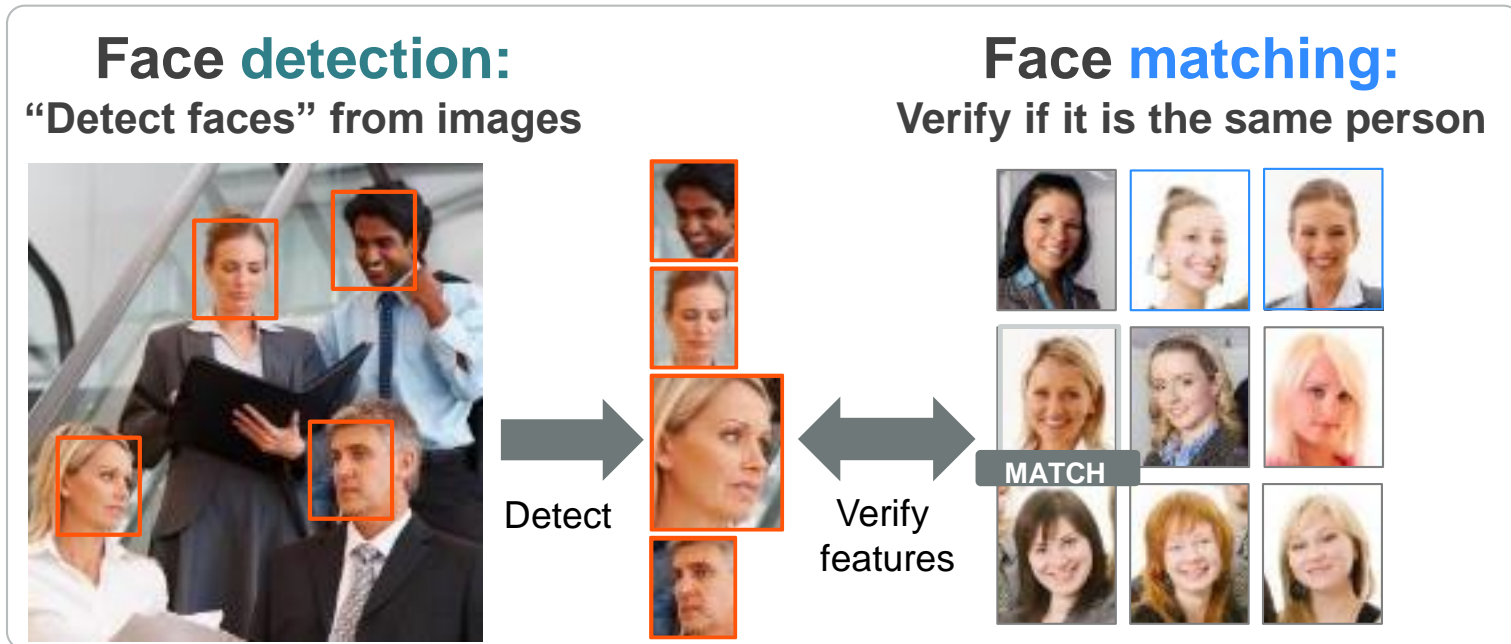


Image © 2018 curtesy of NEC

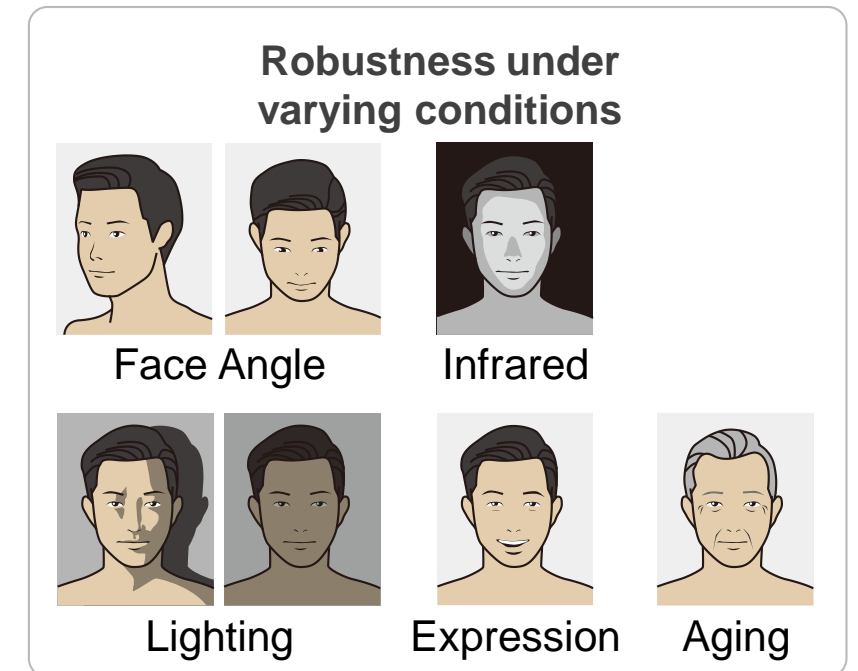
Faces recognition through 2 processes: “face **detection**” and “face **matching**”

Use case 1: NEC facial recognition for 2020 Tokyo Olympics

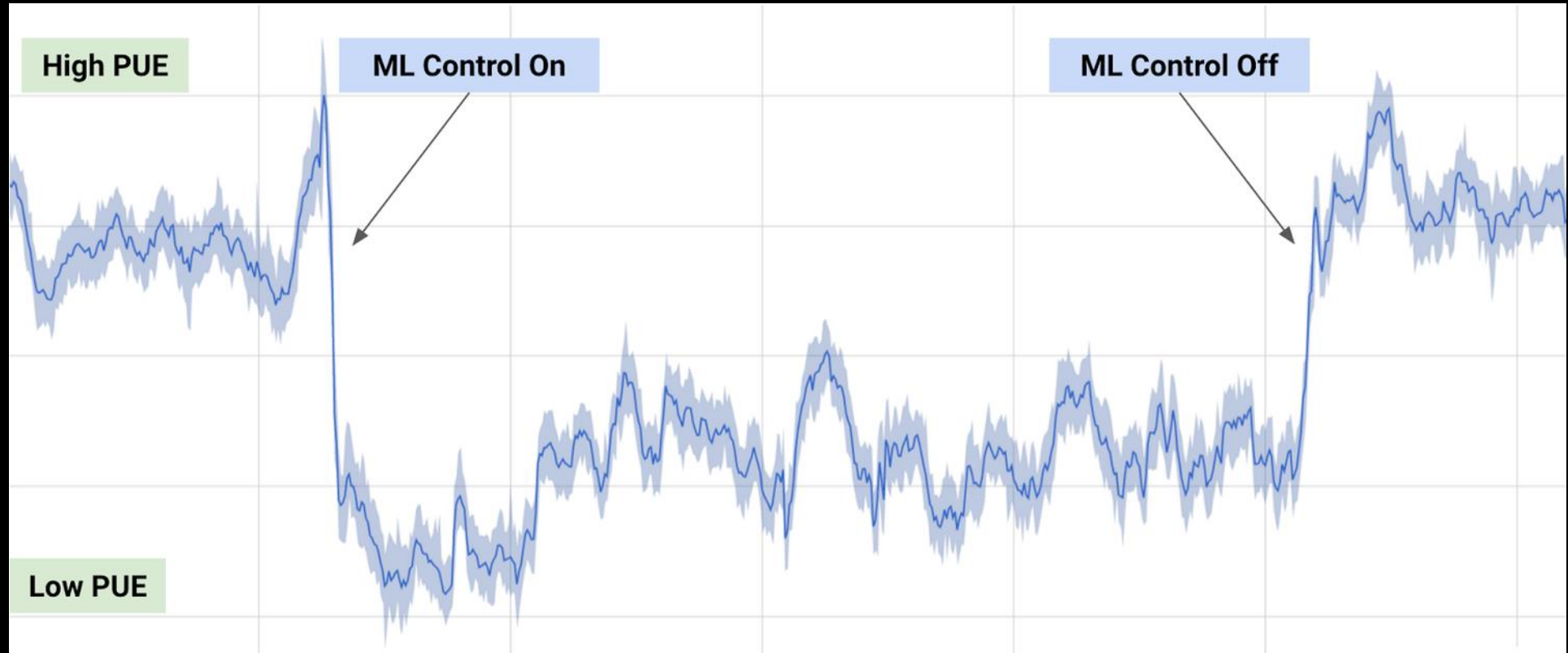
Source: [“NEC unveils facial recognition system for 2020 Tokyo Olympics.”](#) The Verge

Use case 2: Dubai CCTVs centralized feeds from 1000s of cameras

Source: [“Dubai CCTV cameras to use AI, face recognition.”](#) Gulf News



Use Case: Power Consumption



Cooling bill reduced up to 40%

Use Case Power Consumption details

Use Case: Power Consumption Management

Here is a great example of how AI can substantially impact cost of power consumption while positively contributing to sustainability initiatives.

- This use case is an example of effectively consuming a resource we all use — power. AI (machine learning) is deployed to substantially impact cost and realize sustainability improvements.
- This was a power study conducted in a Google Data Center.
- What are our high consumption processes?
- They took data such as temperatures, power, pump speeds, setpoints, etc. — and used it to train an ensemble of deep neural networks. The result?
 - Cooling bill reduced up to 40%.
 - Compared to five years ago, they get ~3.5 times the computing power out of the same amount of energy, and they continue to make improvements with changing conditions.
- Because the algorithm manages consumption to optimally perform.

Use Case: Machine Vision

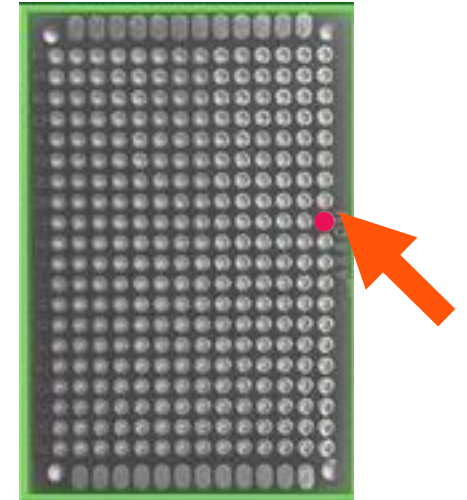
This example is a circuit board, but you can also envision seal surface, fill accuracy, or any number of inspections in a highly regulated industry.

- **If your company believes “x” number of defects will occur, but quality or specificity are essential, consider something like AI machine vision.**

Extracted Image



Defect Detection

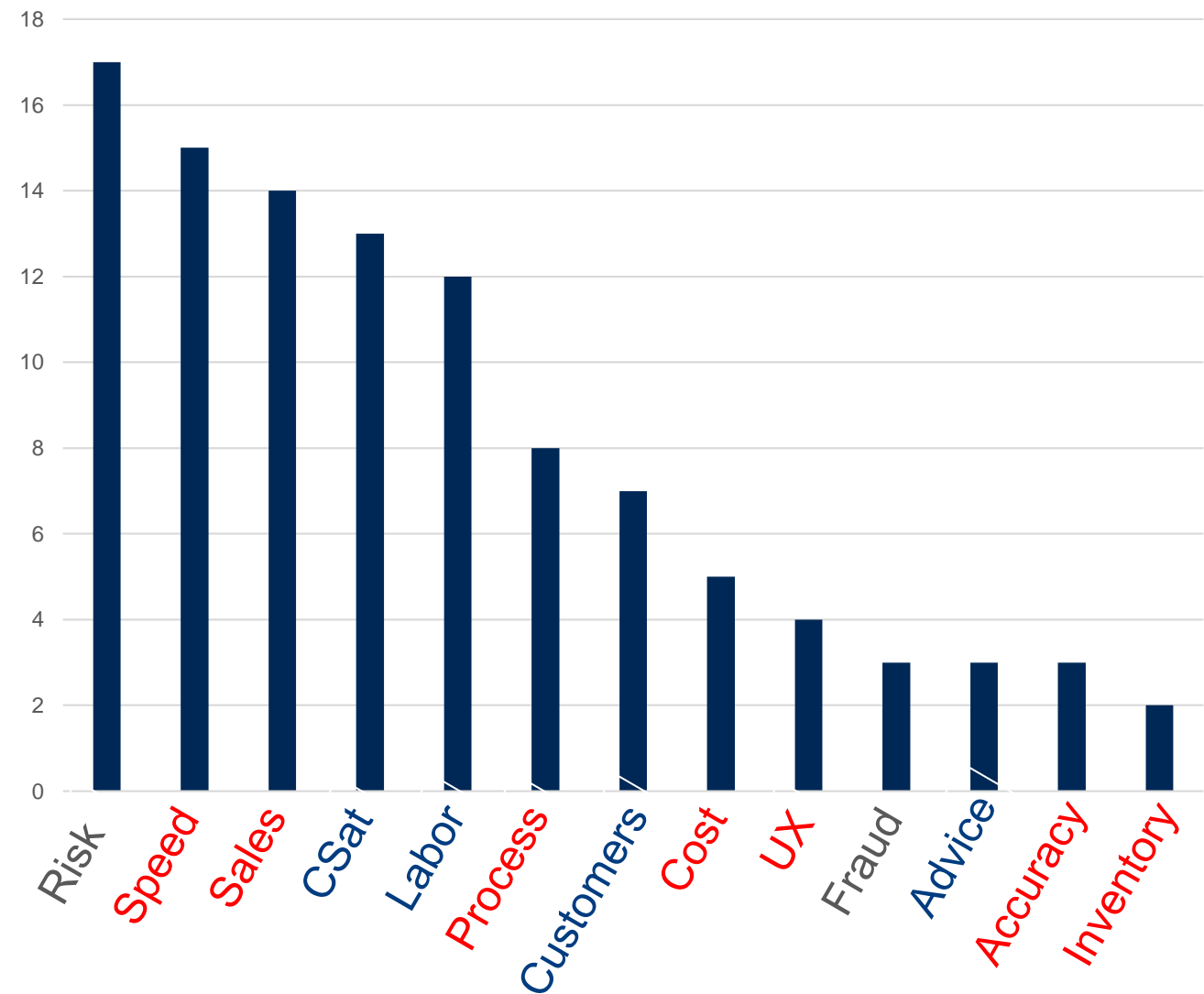


Key Issues

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2. Examples: What is really being done with AI?

Benefits & Risks of AI

Benefits cited in 100 AI projects



Risk, Fraud = insurance?

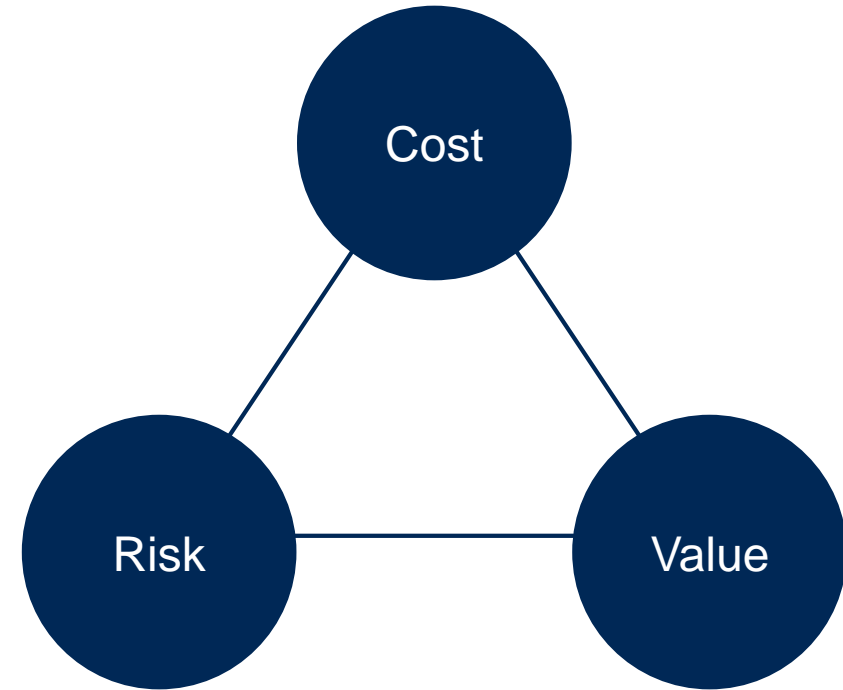
Red = often clearest to quantify

Blue = often less clear to quantify

From: AI Benefits – Learning from 100 Examples
(to be published May 2019)

Common Risks in AI Projects

- Operational— breakdowns
- Financial — cost overruns
- Privacy — inadvertent leaks
- Legal — regulatory, compliance
- Brand — reputation, perception
- Market — alter existing success
- Information — biases, bad data
- Geopolitical — social, job, econ.



Business Use Case

Note that in government, increased business value is synonymous with increased public value

Call to Action

- ✓ Develop, categorize and prioritize your use cases.
 - Use cases is the way you define your projects
 - Underlying technologies: ML, NLP, CV
 - Key solution benefits: insights, UX, process improvements
- ✓ Develop an AI Center of Excellence.
- ✓ Leverage pre-developed solutions where possible.
- ✓ Be sure AI planning incorporates your governance, risk and compliance structure early.
- ✓ Explore and curate data you have that is strategic.

Recommended Gartner Research

- ▶ [A Framework for Applying AI in the Enterprise](#)
Bern Elliot, Whit Andrews, Jim Hare (G00368243)
- ▶ [Artificial Intelligence Maturity Model](#)
Whit Andrews, Frances Karamouzis, Erick Brethenoux and Pieter den Hamer (G00358062)
- ▶ [Magic Quadrant for Data Science and Machine-Learning Platforms](#)
Carlie Idoine, Peter Krensky, Erick Brethenoux, Jim Hare and Others (G00326456)
- ▶ [Artificial Intelligence Hype: Managing Business Leadership Expectations](#)
Erick Brethenoux (G00343734)
- ▶ [Market Guide for AI Portfolio Cloud Service Providers](#)
Bern Elliot and Jim Hare (G00353063)
- ▶ [Toolkit: How to Select and Prioritize AI Use Cases Using Real Domain and Industry Examples](#)
Svetlana Sicular, Melissa Davis and Shubhangi Vashisth (G00352311)