Then: automate, automate, automate!
Now: AI, AI, AI!

Presented by:

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13th August 2024

About Me

Key Test Areas
- Functional Testing
- Test Management
- Test Automation
- Test Maturity
- Continuous Improvement

Key Focus
- Technology
- Delivery

Years in Testing
- 15

Test Automation
- IBM RFT
- HP QTP
- Selenium
- Playwright
- Other proprietary tools

Certifications
- ISTQB
- iSQI
- SAFe
- HP ALM
- IBM RFT

Testing
- Custom
- Web
- Mobile
- API
- Desktop
- SaaS
- ERP
- Payroll
- CRM
- HRIS

Personal
- Philippines
- Married
- Fur Parent
- Travel
- Skiing
- Cinephile

Testing Trends

Dedicated test team

1950s

Record and playback tools

1980s

Framework-based tools

2000s

1970 Test automation

1990s Script-based tools

2010s

Continuous Testing – CI/CD
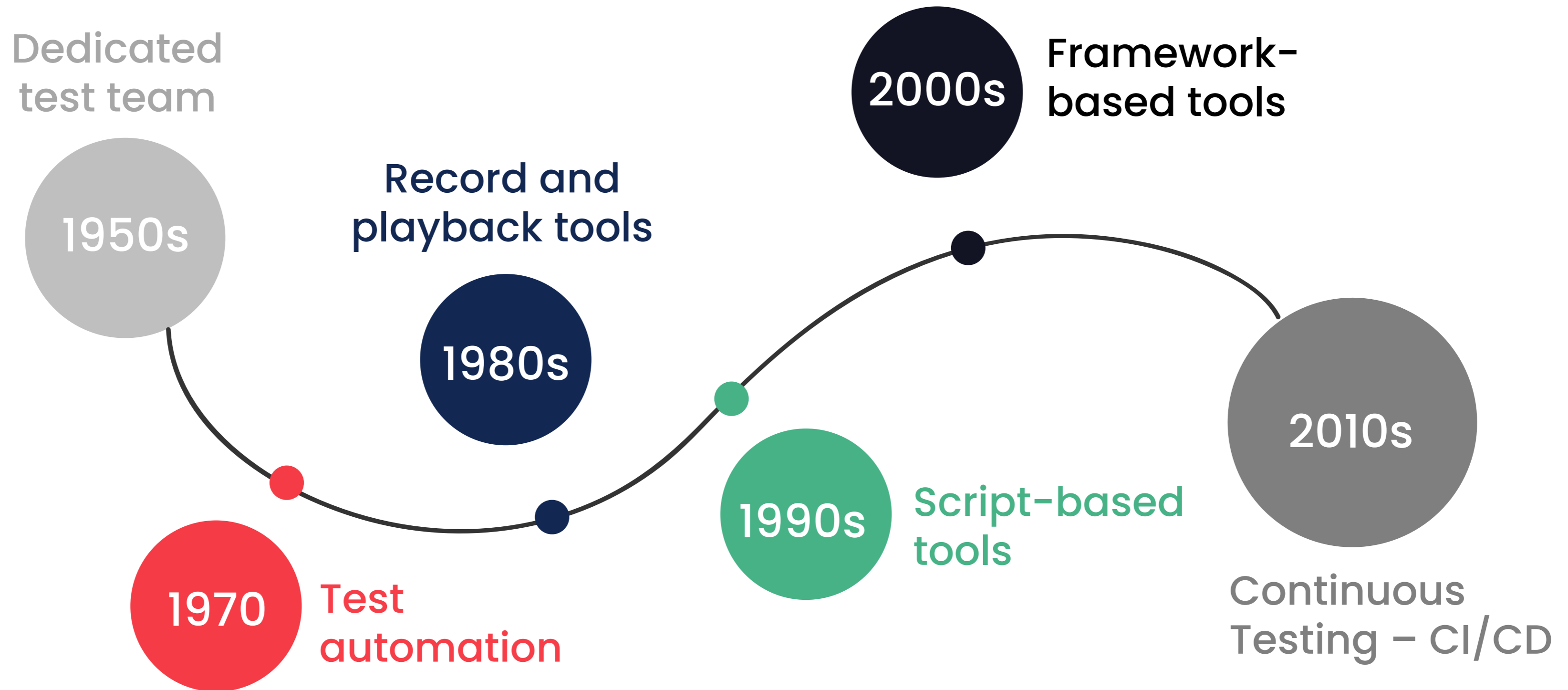
Automate, automate, automate!

EXPECTATIONS

Save Costs and Maximise ROI

Test at Scale

Increased Test Coverage

Faster Feedback Loop

Guarantees Higher Accuracy
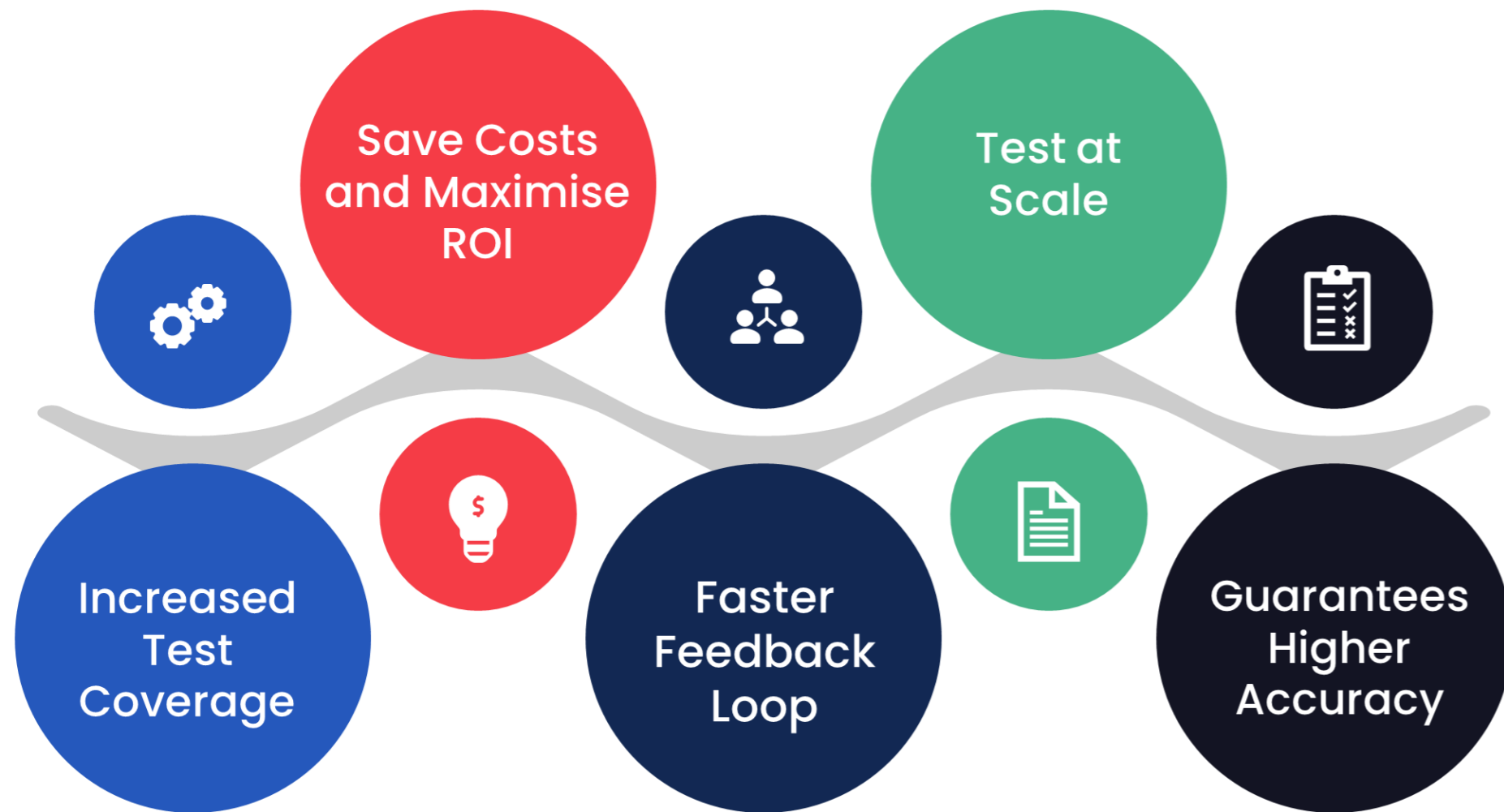
Benefits of test automation

REALITY

Lack of time and skilled resources

Results interpretation

Right Tool / Framework
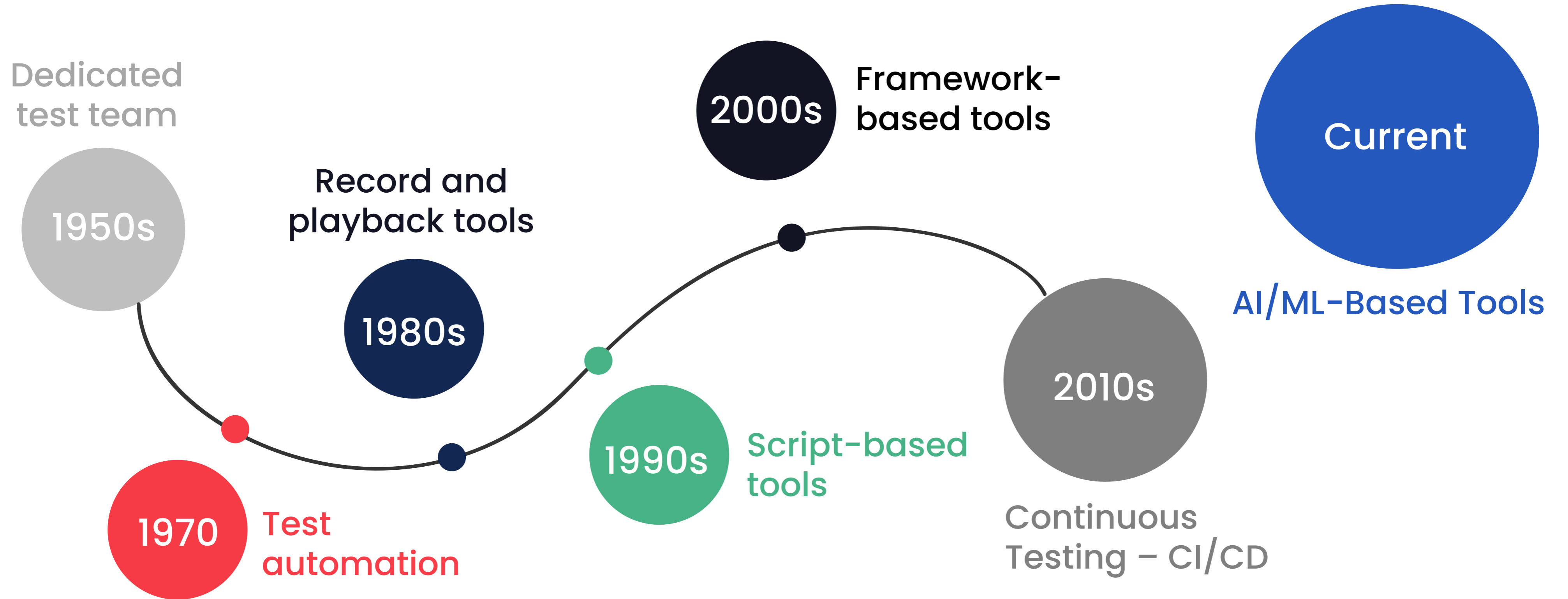
Communication and Collaboration

Test Flakiness
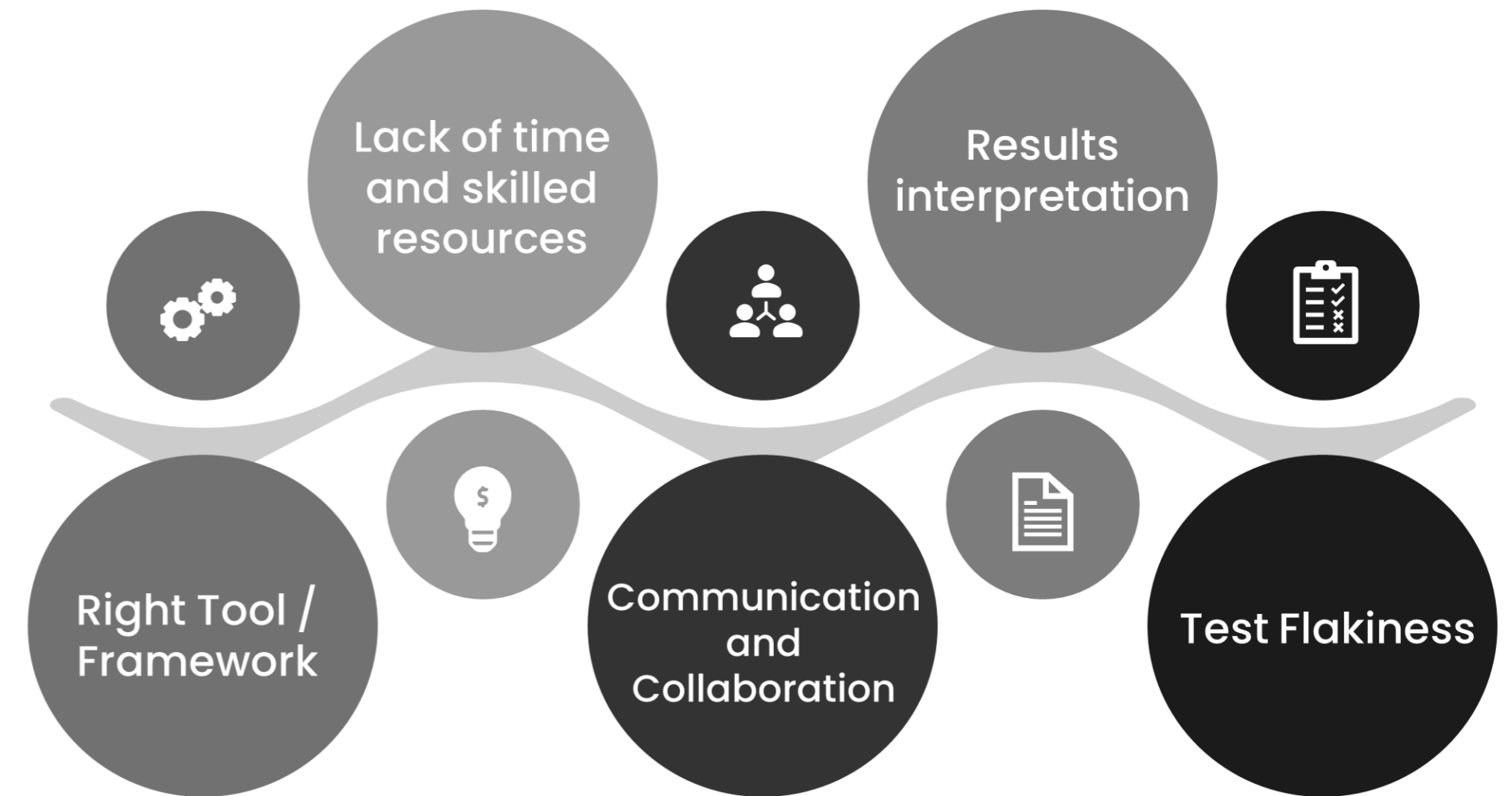
Challenges of test automation

Test automation is only beneficial *if done right*.
Manual testing is never going away.

Testing Trends

Dedicated test team

1950s

Record and playback tools

1980s

2000s Framework-based tools

Current

AI/ML-Based Tools

1970 Test automation

1990s Script-based tools

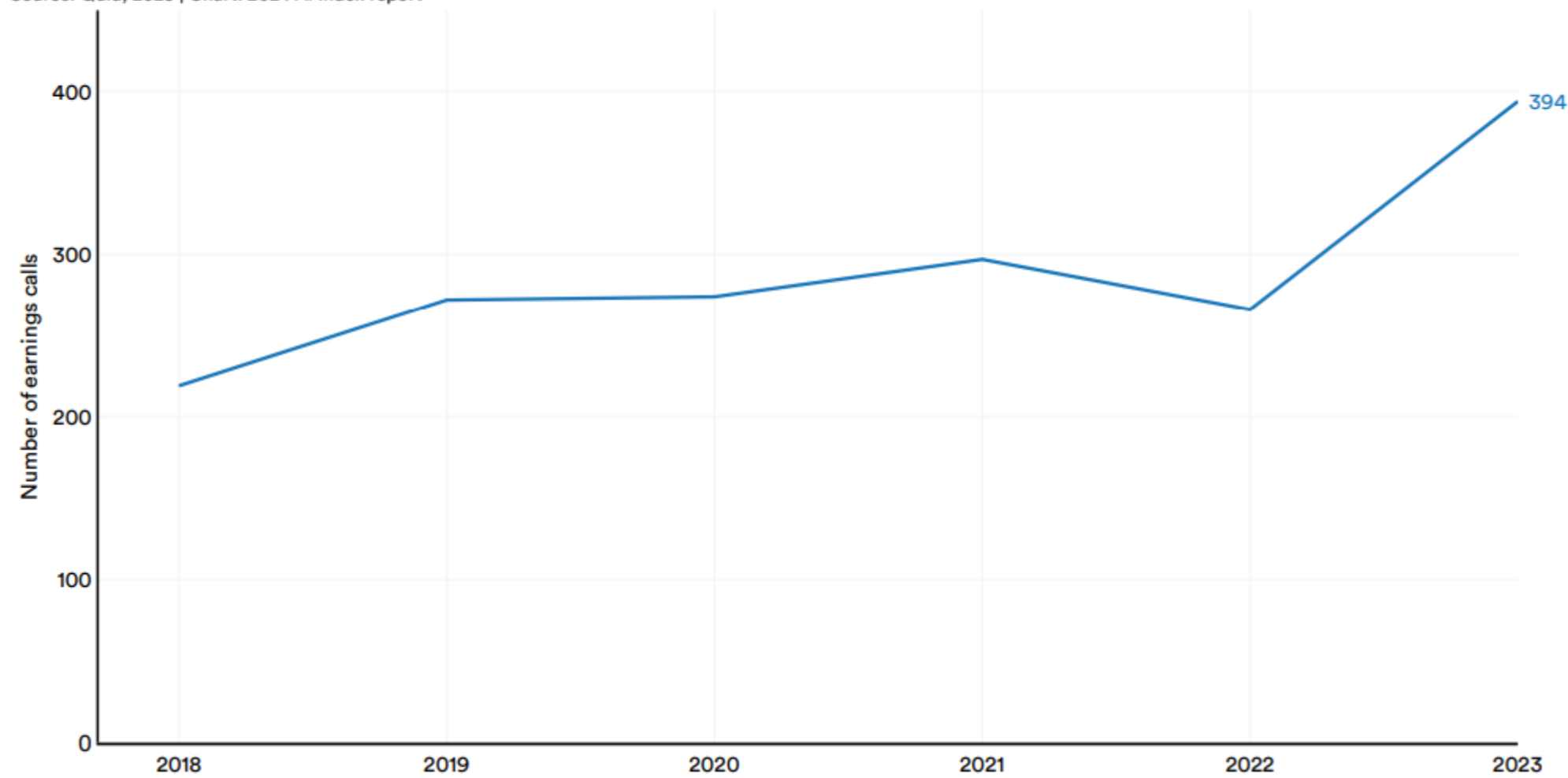**2010s**

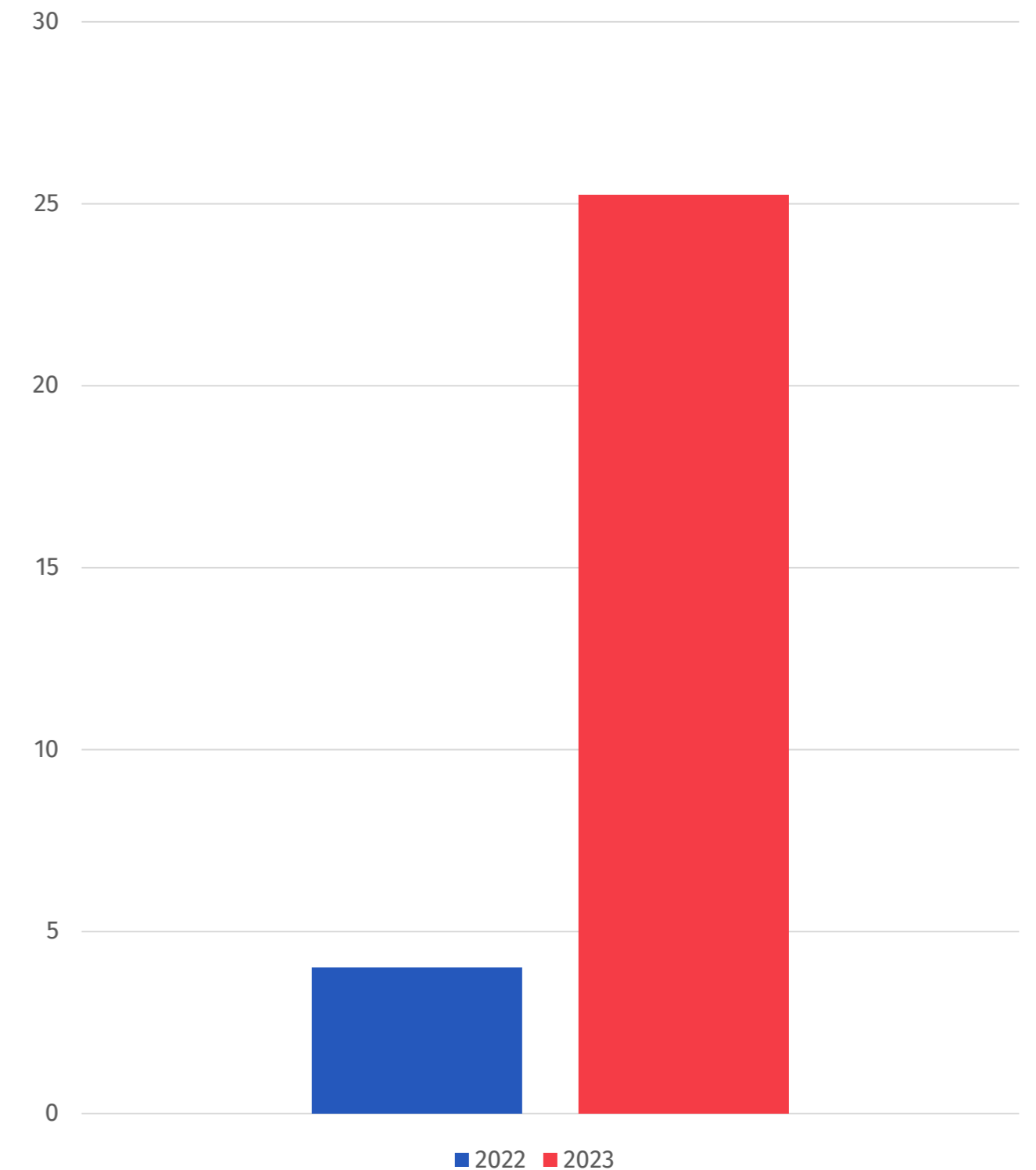Continuous Testing – CI/CD

AI, AI, AI!

Fortune 500 Companies are talking about AI on their earnings calls and investing significantly in growing their capacity to leverage AI.

Number of Fortune 500 earnings calls mentioning AI, 2018–23
Source: Quid, 2023 | Chart: 2024 AI Index report

Spend On AI Research, Infrastructure, & Governance

Everything is AI...

Things Marketing Teams Call Artificial Intelligence

Artificial
Intelligence

Machine
Learning
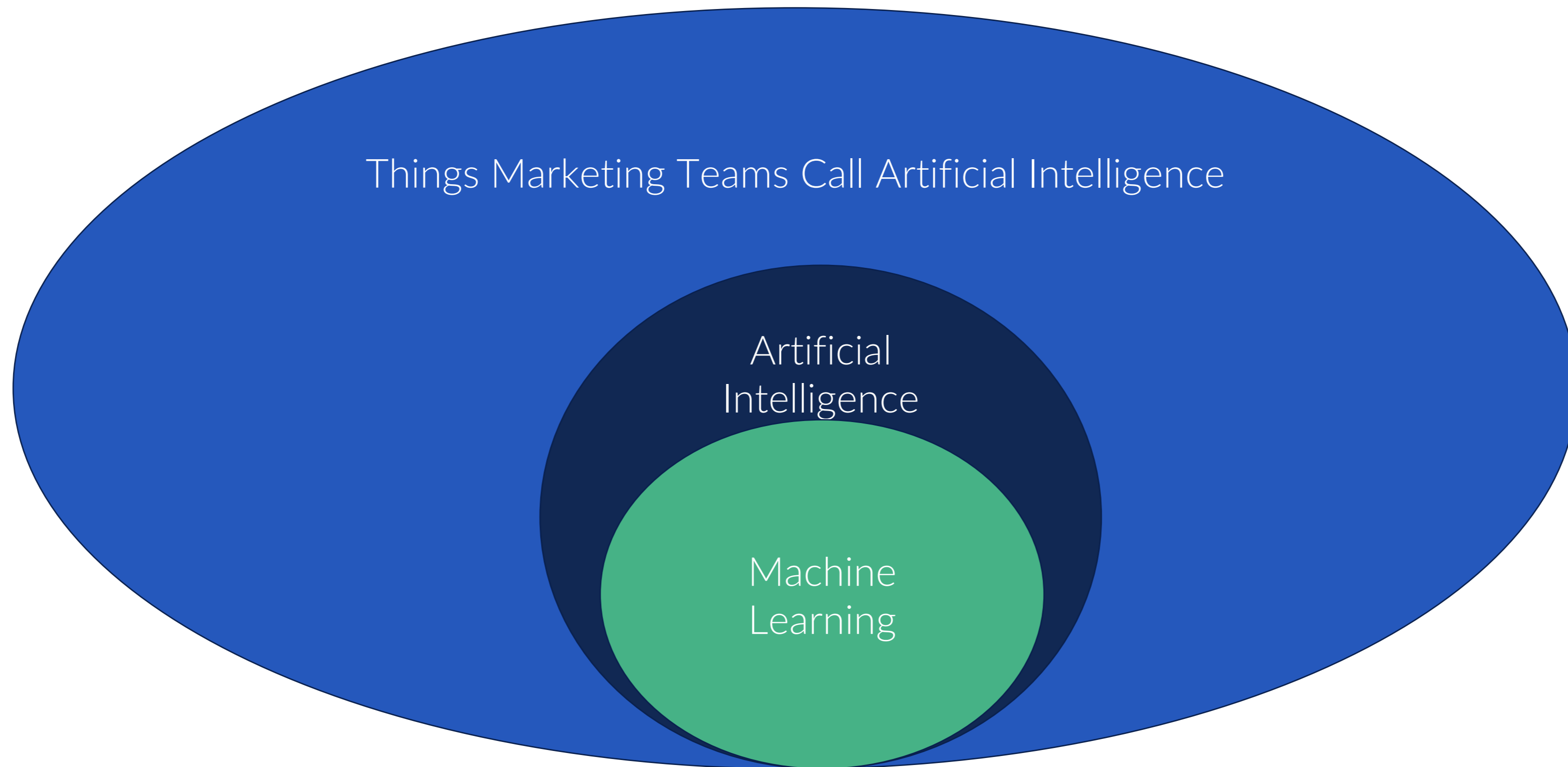
What is AI?
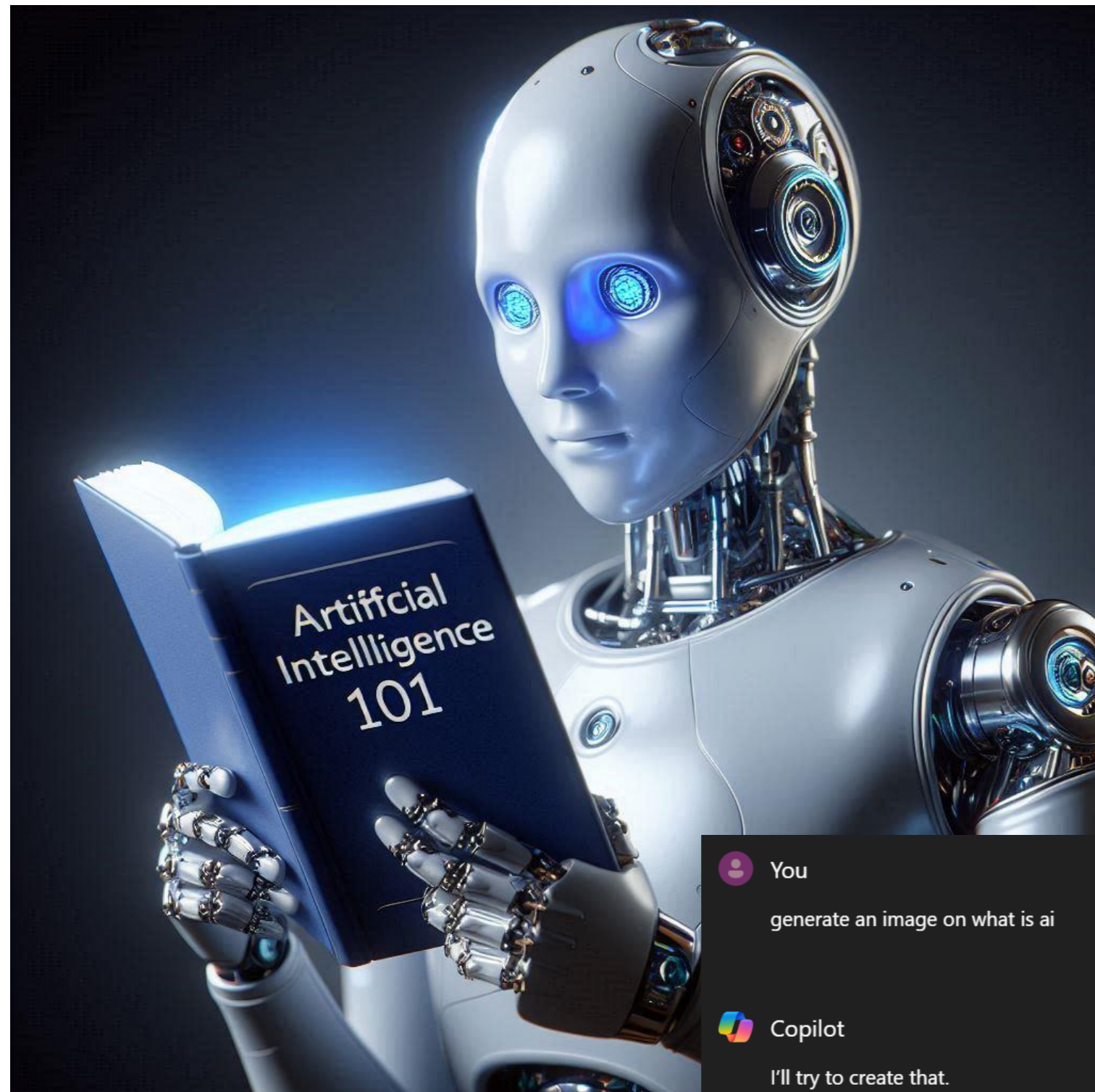
> *"Any sufficiently advanced technology is indistinguishable from magic"*
> – Arthur C. Clarke

A system can be said to be using AI if, the output of system **emerges** from the system as if by **magic**, *even to the people who created the system.*

Magic → **Not Completely Understood**

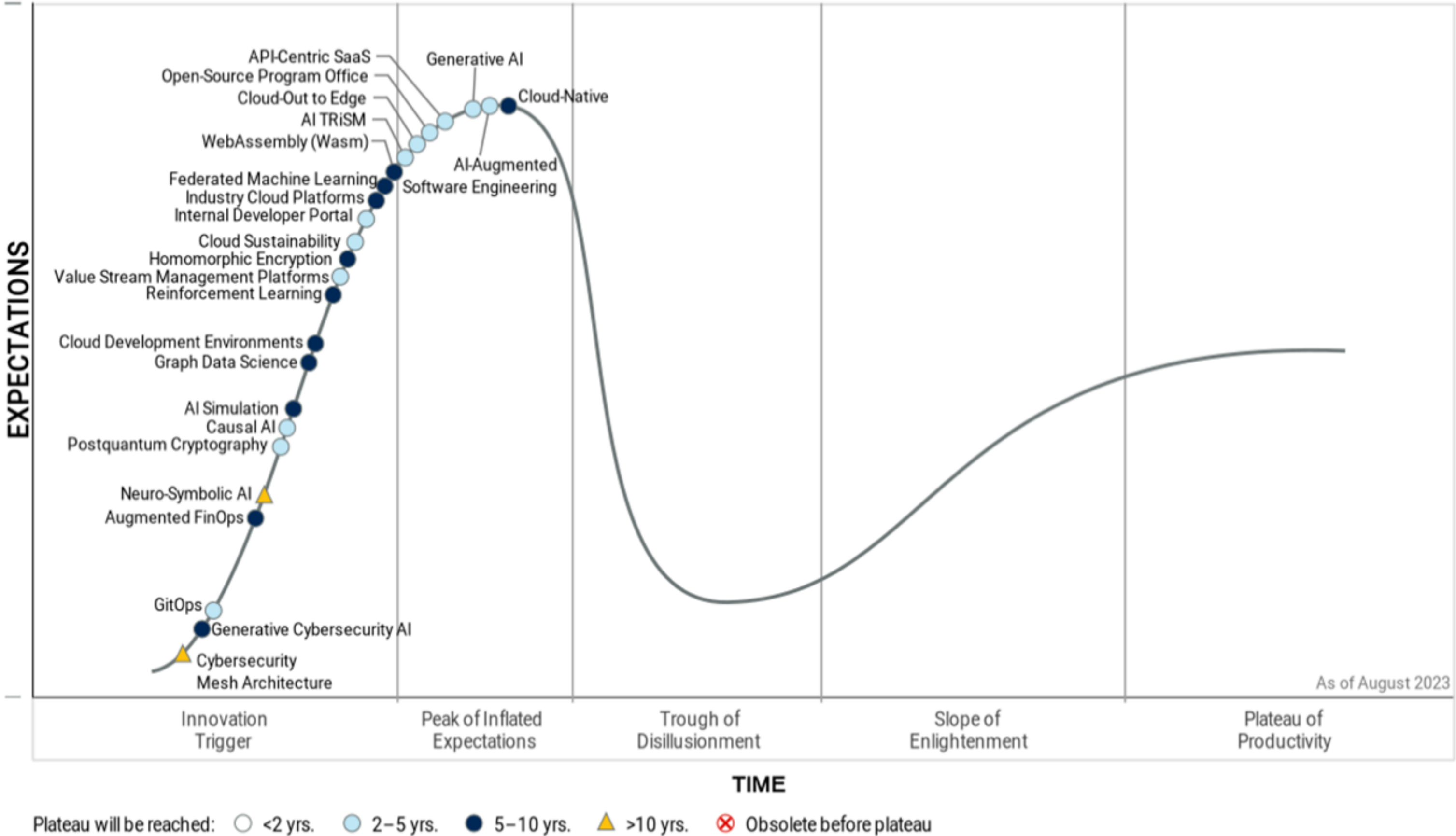# State of AI in Businesses

EXPECTATIONS

API-Centric SaaS
Open-Source Program Office
Cloud-Out to Edge
AI TRiSM
WebAssembly (Wasm)
Federated Machine Learning
Industry Cloud Platforms
Internal Developer Portal
Cloud Sustainability
Homomorphic Encryption
Value Stream Management Platforms
Reinforcement Learning
Cloud Development Environments
Graph Data Science
AI Simulation
Causal AI
Postquantum Cryptography
Neuro-Symbolic AI
Augmented FinOps
GitOps
Generative Cybersecurity AI
Cybersecurity
Mesh Architecture

Generative AI
Cloud-Native
AI-Augmented
Software Engineering

As of August 2023

Innovation
Trigger

Peak of Inflated
Expectations

Trough of
Disillusionment

Slope of
Enlightenment

Plateau of
Productivity

TIME

Plateau will be reached: ○ <2 yrs. ○ 2–5 yrs. ● 5–10 yrs. ▲ >10 yrs. ⊗ Obsolete before plateau

There are many claims by technology companies about their adoption of AI and its effectiveness in their products which are **not yet proven.**

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Gartner.

AI Adoption Studies

Significantly Increasing Concerns
Top Gen AI Concerns 2023 v. 2024

Legend: ■ 2023 ■ 2024

Concern	2023	2024	Multiplier
Job Displacement	5%	9%	2x
Data Security	17%	46%	3x
Decision Transparency	9%	35%	4x
Response Accuracy	7%	36%	5x
Implementation Cost	3%	43%	14x

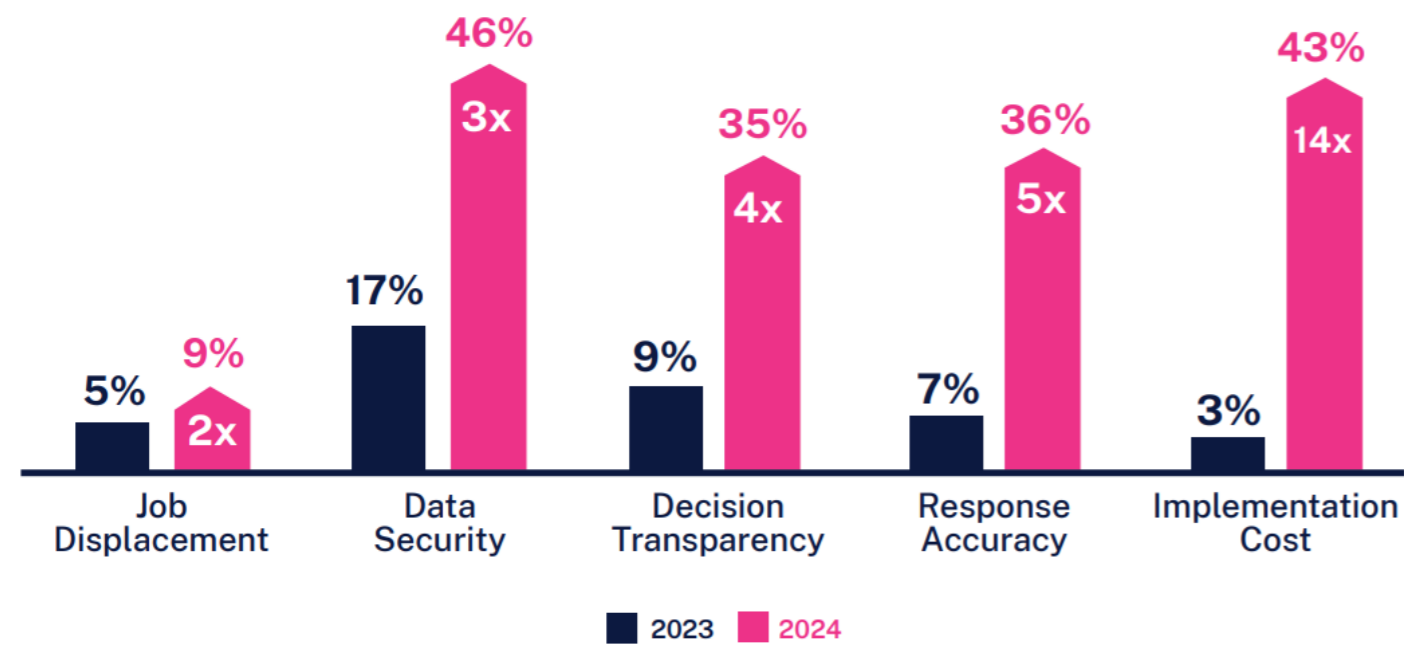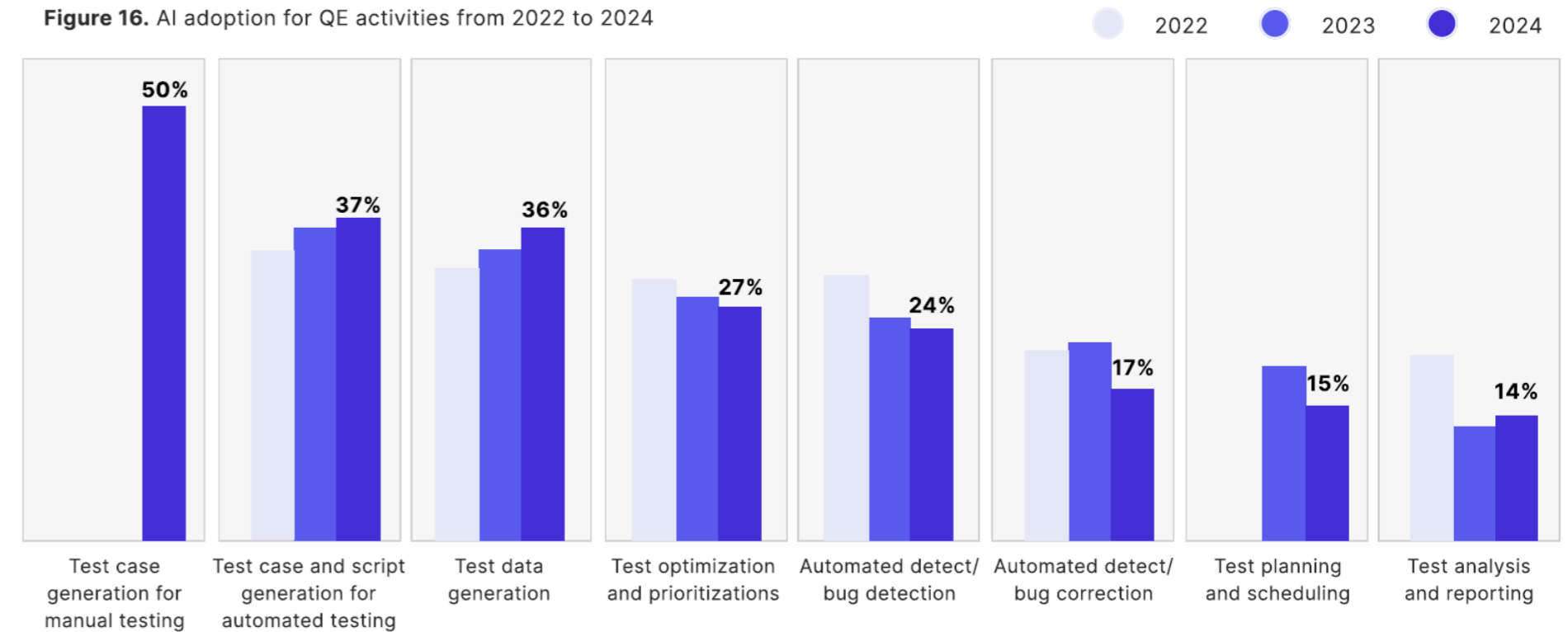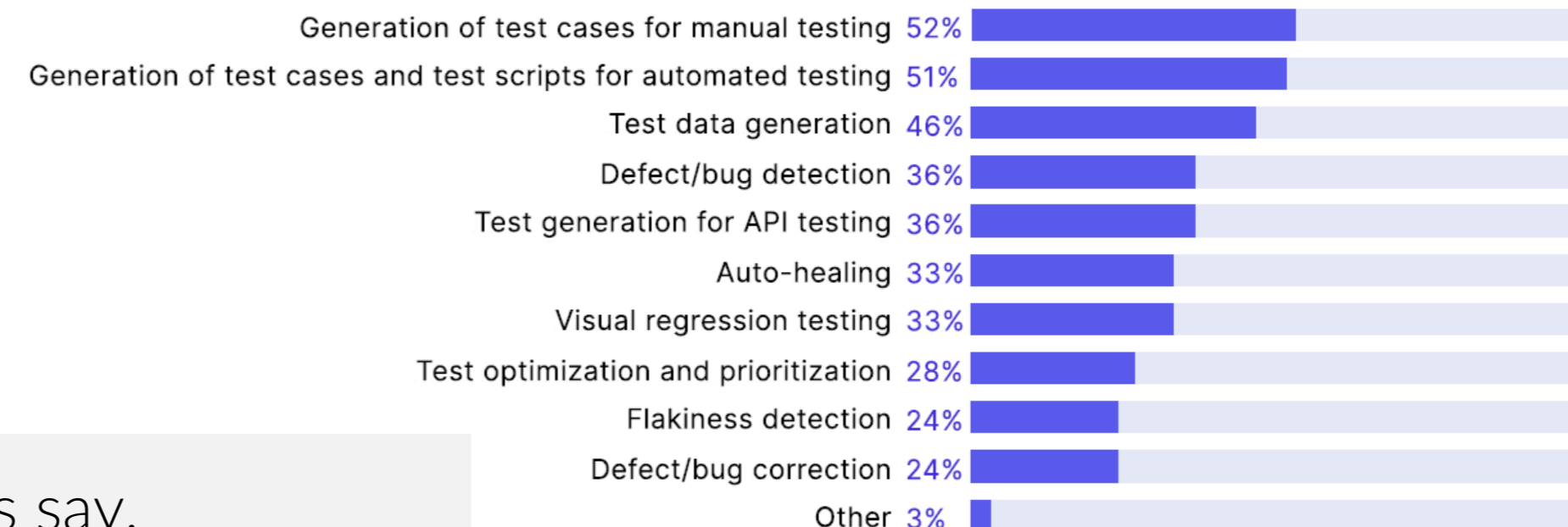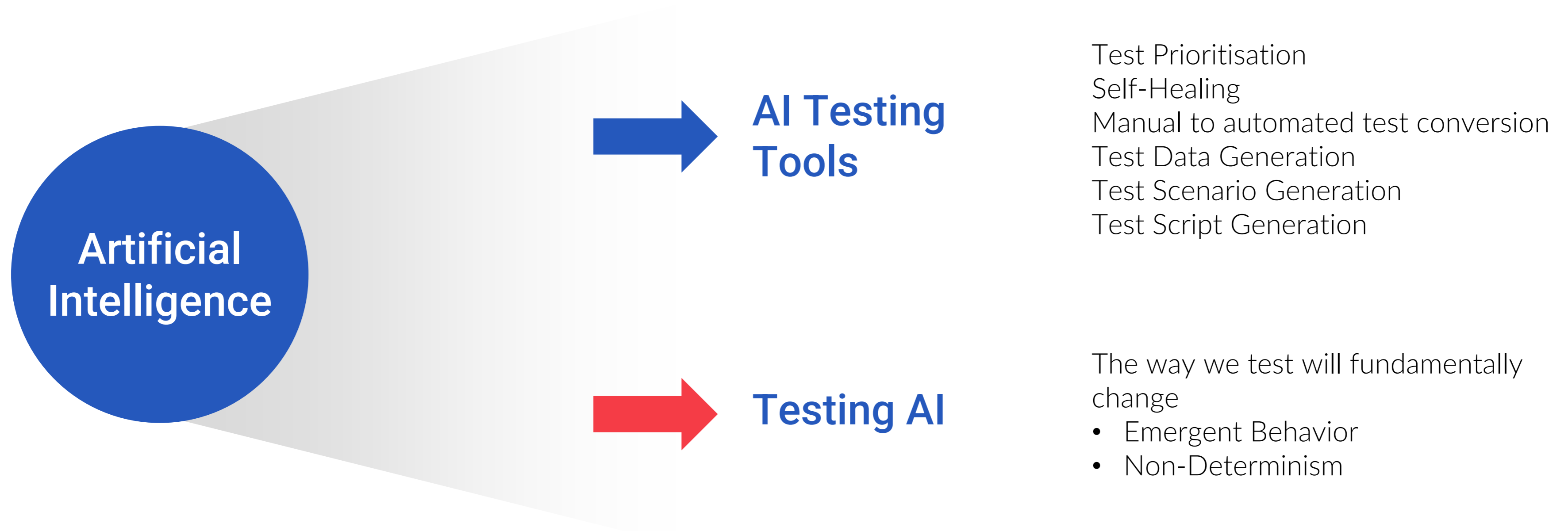| GOVERNANCE	GENERAL & ADMINISTRATIVE COST REDUCTION
Companies understand the critical need for responsibility around data privacy, transparency, and fairness as they adopt new generative AI practices.	Today, with concerns around implementation costs skyrocketing, the need to balance innovation with costs is top of mind for business leaders.
Most Successfully Deployed Governance AI Initiatives: > Standard Gen AI tools and models defined to ensure alignment > Restricted access to Gen AI tools and data based on role > Gen AI guidelines defined and distributed to minimize risk	**Most Successfully Deployed G&A Cost Reduction AI Initiatives:** > Gen AI for QA testing and debugging code > Provide employees with help and FAQs > Gen AI generates first draft of new code

Figure 16. AI adoption for QE activities from 2022 to 2024

Legend: 2022, 2023, 2024

Activity	2024
Test case generation for manual testing	50%
Test case and script generation for automated testing	37%
Test data generation	36%
Test optimization and prioritizations	27%
Automated detect/bug detection	24%
Automated detect/bug correction	17%
Test planning and scheduling	15%
Test analysis and reporting	14%

Figure 21. AI-augmented capabilities expected in the coming years

Capability	%
Generation of test cases for manual testing	52%
Generation of test cases and test scripts for automated testing	51%
Test data generation	46%
Defect/bug detection	36%
Test generation for API testing	36%
Auto-healing	33%
Visual regression testing	33%
Test optimization and prioritization	28%
Flakiness detection	24%
Defect/bug correction	24%
Other	3%

Experts say,
AI is here to STAY

AI Impact to the Testing Industry

Artificial Intelligence

AI Testing Tools

Test Prioritisation
Self-Healing
Manual to automated test conversion
Test Data Generation
Test Scenario Generation
Test Script Generation

Testing AI

The way we test will fundamentally change
- Emergent Behavior
- Non-Determinism

AI Testing Tools Overview – July 2024

Real World Performer

Leading AI

Real World Value

Incorporation of AI/ML

Future Potential

Breakthrough Potential

Healenium

Mutahunter

TONIC
THE FAKE DATA COMPANY

KEYSIGHT

opentext™

applitools

Tricentis

Appsurify

ACCELQ

mabl

functionize

appvance

Testing AI

What movie do these Emojis describe? 👧🐟🐠🐡

<table>
<tr>
<th>Simplest LLMs</th>
<th>Medium-Complexity LLMs</th>
<th>Most Complex LLMs</th>
</tr>
<tr>
<td>"The movie is a movie about a man who is a man who is a man"</td>
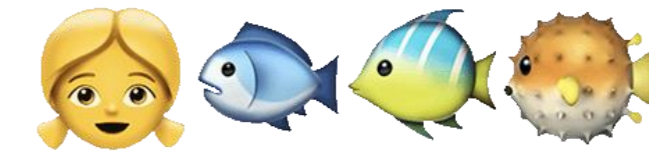<td>"The Emoji Movie"</td>
<td>"Finding Nemo"</td>
</tr>
</table>

Emergent Behaviour

Emergent behaviours in AI are capabilities that were not explicitly programmed into the models but appear as a result of the model's complexity and extensive training.
.

Although designed primarily for text prediction, GPT-3 has demonstrated the ability to perform arithmetic, translate languages, and even generate creative writing. These capabilities were *not directly programmed into the model* but **emerged** as it processed vast amounts of text data during training.

These lead **to challenges in testing models** – small changes having a large impact, difficulty in isolating the impact of a change, lack of transparency/visibility, and unintended negative impacts of changes.

* Large Language Models (LLM) - the computational engines behind AI chatbots such as ChatGPT

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Testing AI

"Draw me a photo of tabby cats playing ball on the moon"

Non-Determinism

In the realm of artificial intelligence (AI), defining the boundaries of testing presents a unique challenge due to the inherently non-deterministic nature of its outputs.

* Non-Determinism algorithm - even for the same input, can exhibit different behaviours on different runs

Each generated image may adhere to the prompt in its own way, making it increasingly difficult to establish definitive criteria for success or failure.

Traditional testing methodologies rely on consistency and predictability, whereas AI outputs are influenced by a multitude of factors, including the underlying algorithms, training data, and even random elements introduced during processing. This makes **typical testing approaches difficult to implement**.

What does testing look like in the age of AI?

AI Tools, Containers, SRE, Fully automated checks, CI/CD

Good testing principles and foundation; Efficient and skilled testing

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What does testing *really* look like in the age of AI?

End Users get amazed by AI-Driven Apps and expect everything to be Easy

AI/LLM Help Produce Code Changes Faster

Test

AI/LLM Increase chances that changes are introduced we don't fully understand

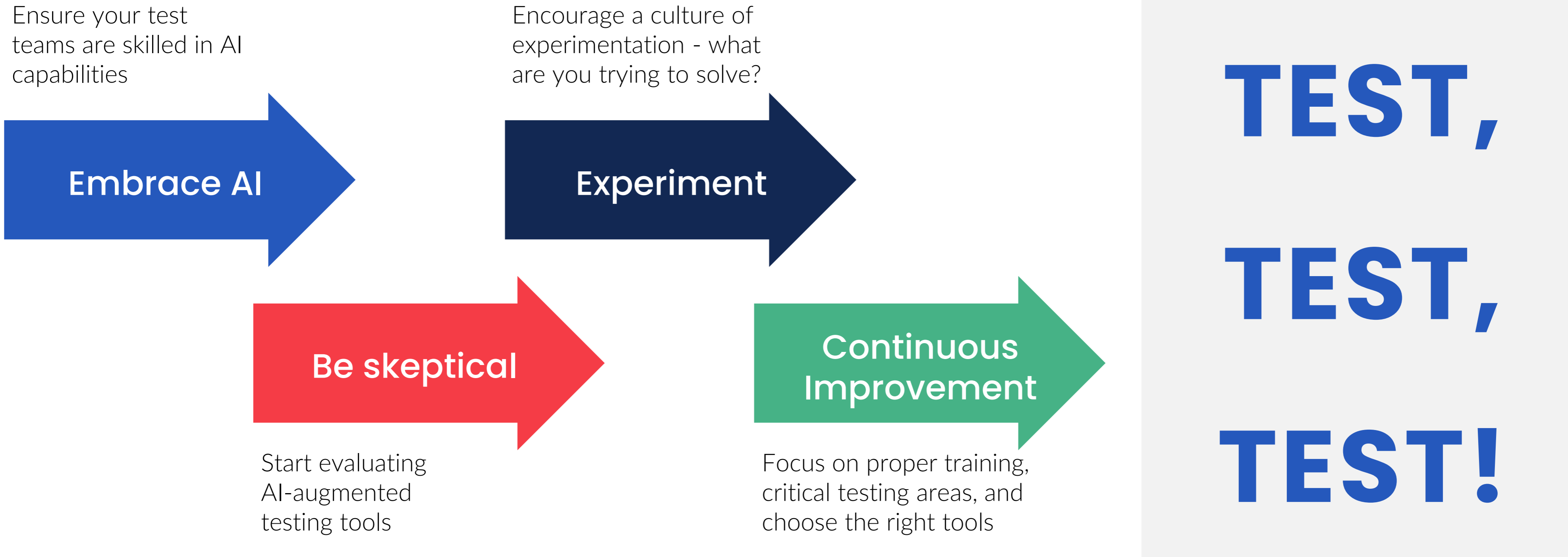Testers get squeezed – efficient, skilled testing becomes even more important

iTutor Group's recruiting AI rejects applicants due to age

In August 2023, tutoring company iTutor Group agreed to pay $365,000 to settle a suit brought by the US Equal Employment Opportunity Commission (EEOC). The federal agency said the company, which provides remote tutoring services to students in China, used AI-powered recruiting software that automatically rejected female applicants ages 55 and older, and male applicants ages 60 and older.

Air Canada ordered to pay customer who was misled by airline's chatbot

Company claimed its chatbot 'was responsible for its own actions' when giving wrong information about bereavement fare

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What now?

Ensure your test teams are skilled in AI capabilities

Embrace AI

Encourage a culture of experimentation - what are you trying to solve?

Experiment

Be skeptical

Start evaluating AI-augmented testing tools

Continuous Improvement

Focus on proper training, critical testing areas, and choose the right tools

TEST, TEST, TEST!

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