

Recording-based Game Test Automation Tools

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**ÉCOLE DE
TECHNOLOGIE
SUPÉRIEURE**
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Ottawa, ON - Canada
2025

Universidade Federal do Paraná

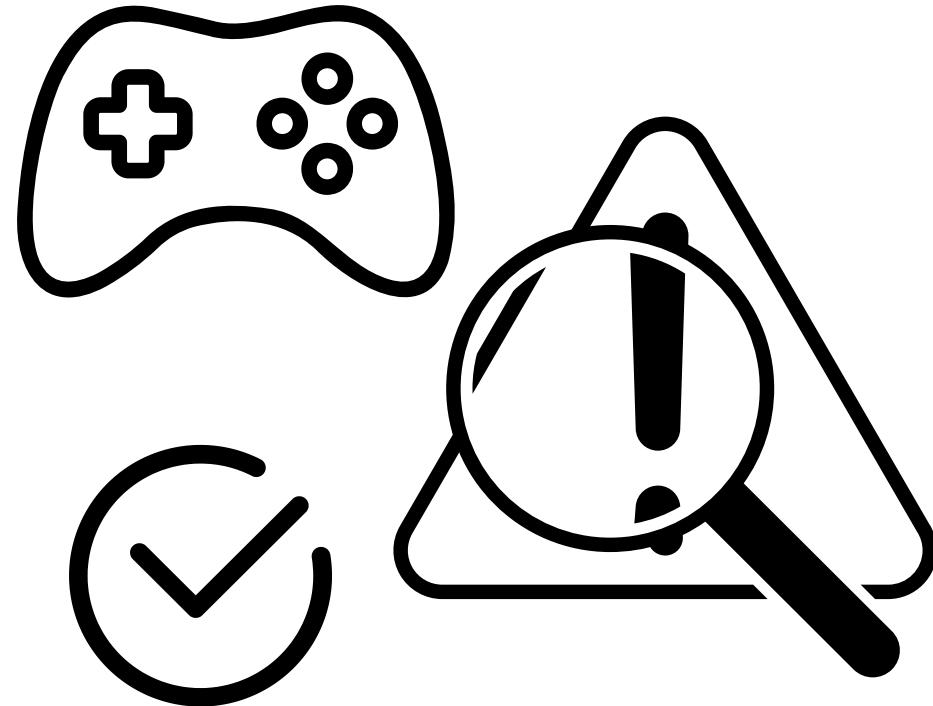
- BSc. Computer Science

École de Technologie Supérieure

- Mitacs: Globalink Research Internship



Acknowledgements



The Problem

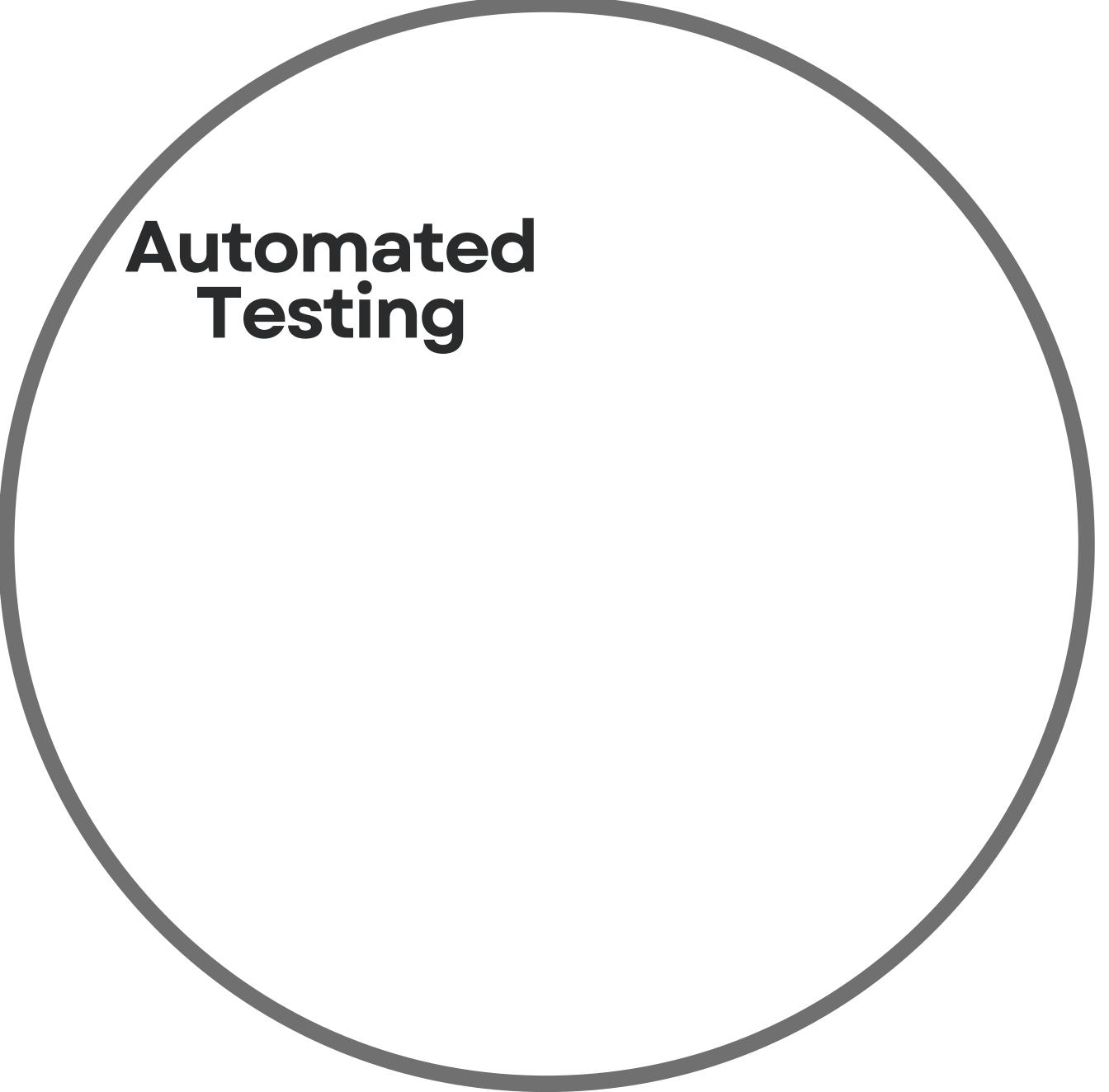
Video Game Testing

- We were researching on AI-based testing
- Simple Features vs Complex Features
- Automate the steps to get a specific state

Recording-based Tools

- What are the recording-based game test automation tools?
- What are the main features of the identified tools?

Software Testing



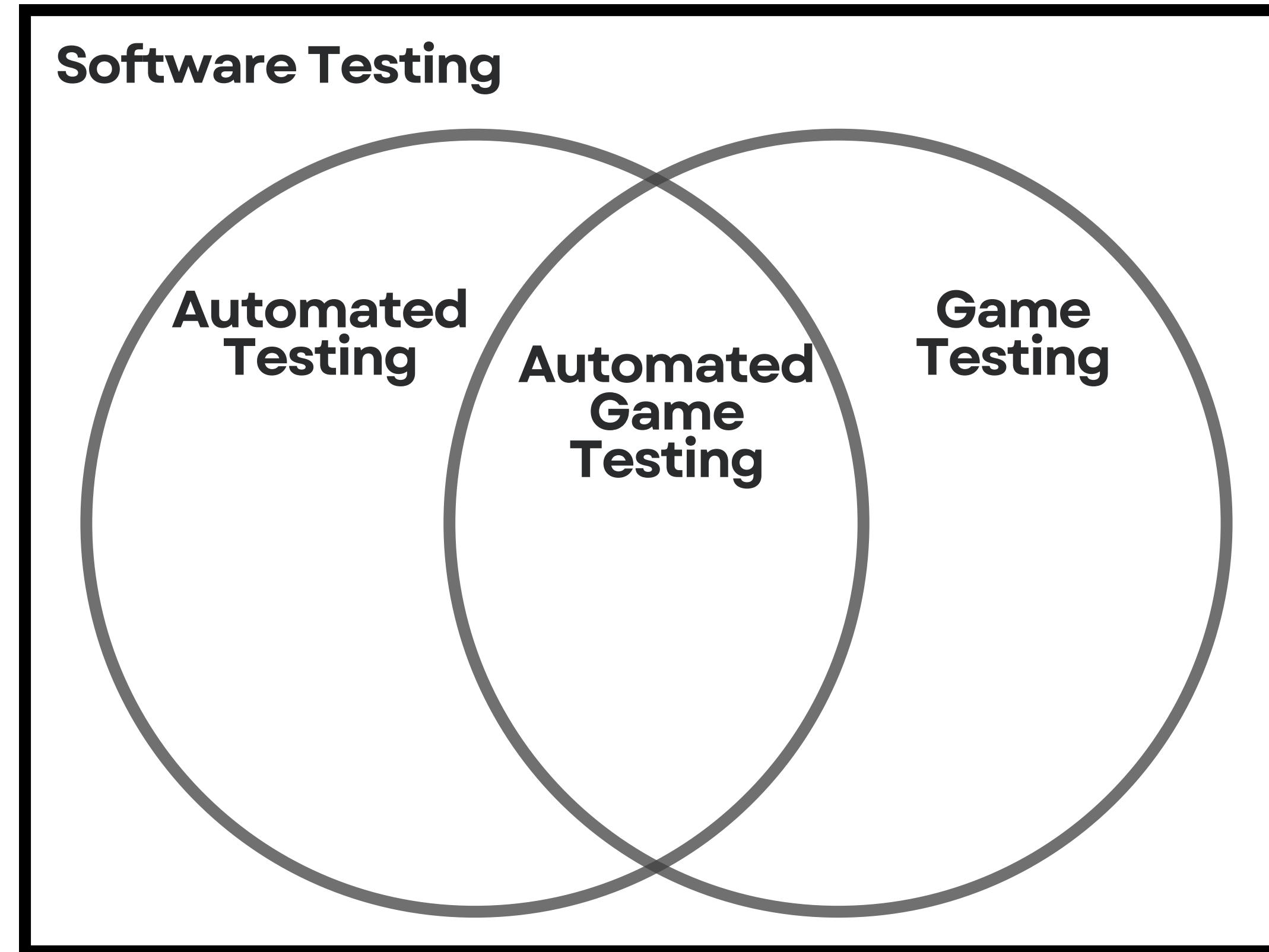
**Automated
Testing**

Software Testing

**Automated
Testing**

**Automated
Game
Testing**

**Game
Testing**



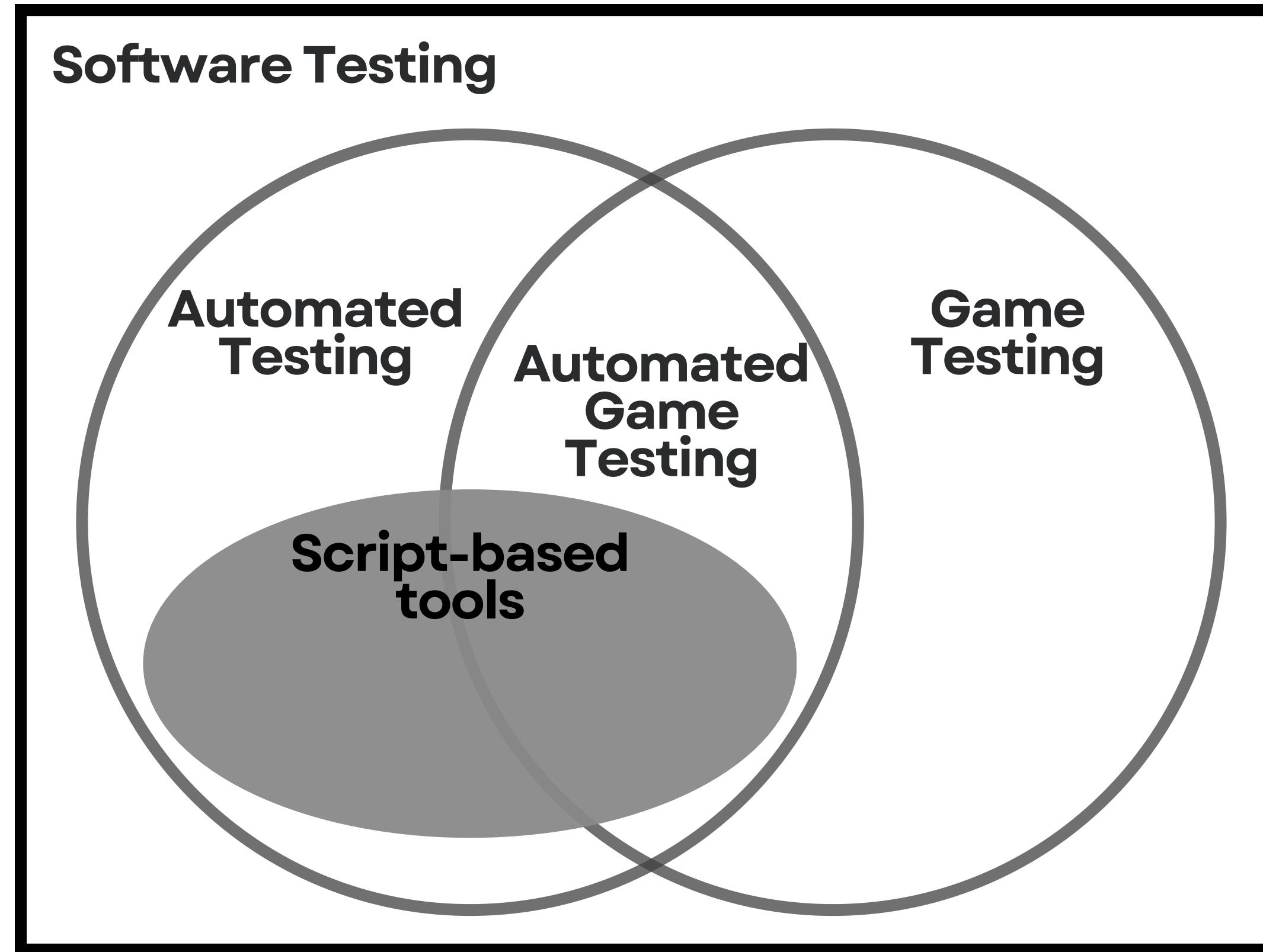
Software Testing

**Automated
Testing**

**Automated
Game
Testing**

**Script-based
tools**

**Game
Testing**



Software Testing

**Automated
Testing**

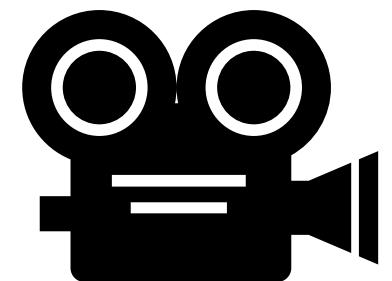
**Automated
Game
Testing**

**Script-based
tools**

**Recording
tools**

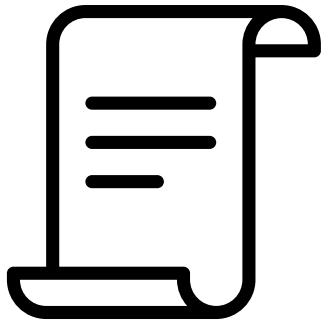
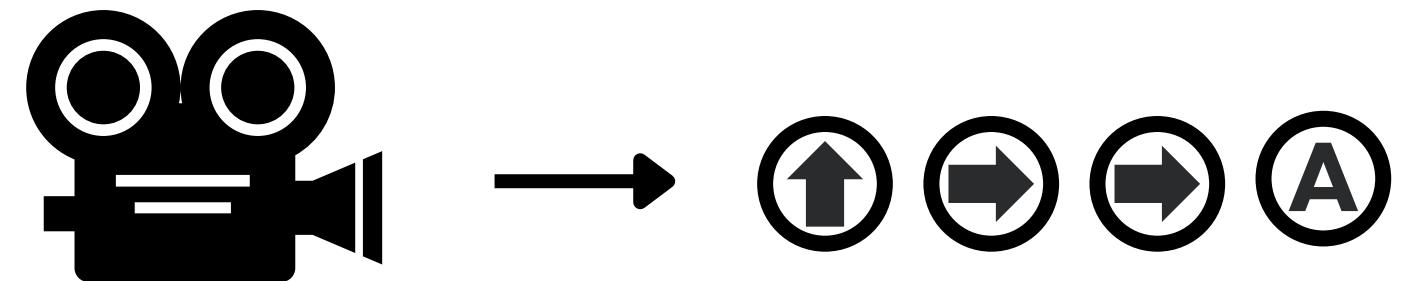
**Game
Testing**

Recording-based Tools



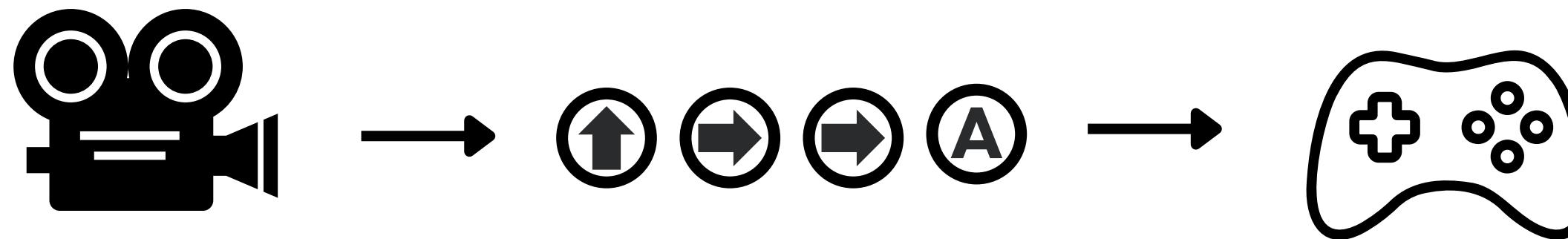
● REC

Recording-based Tools

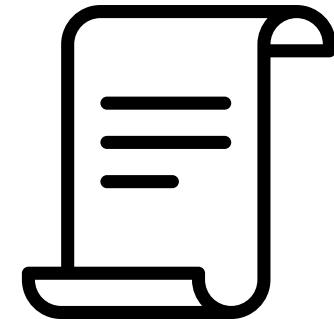


REC

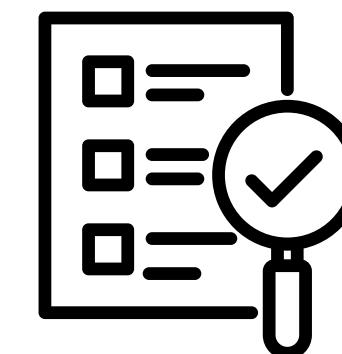
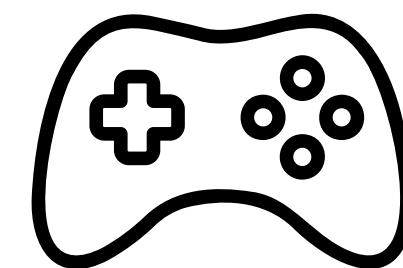
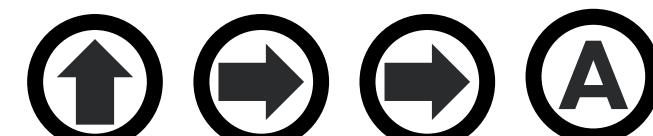
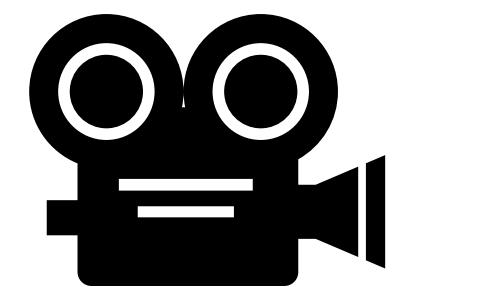
Recording-based Tools



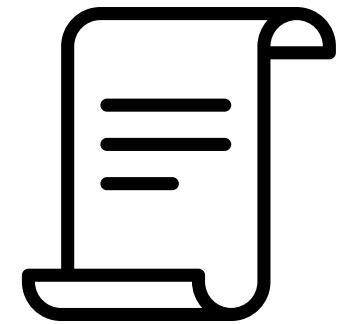
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Recording-based Tools



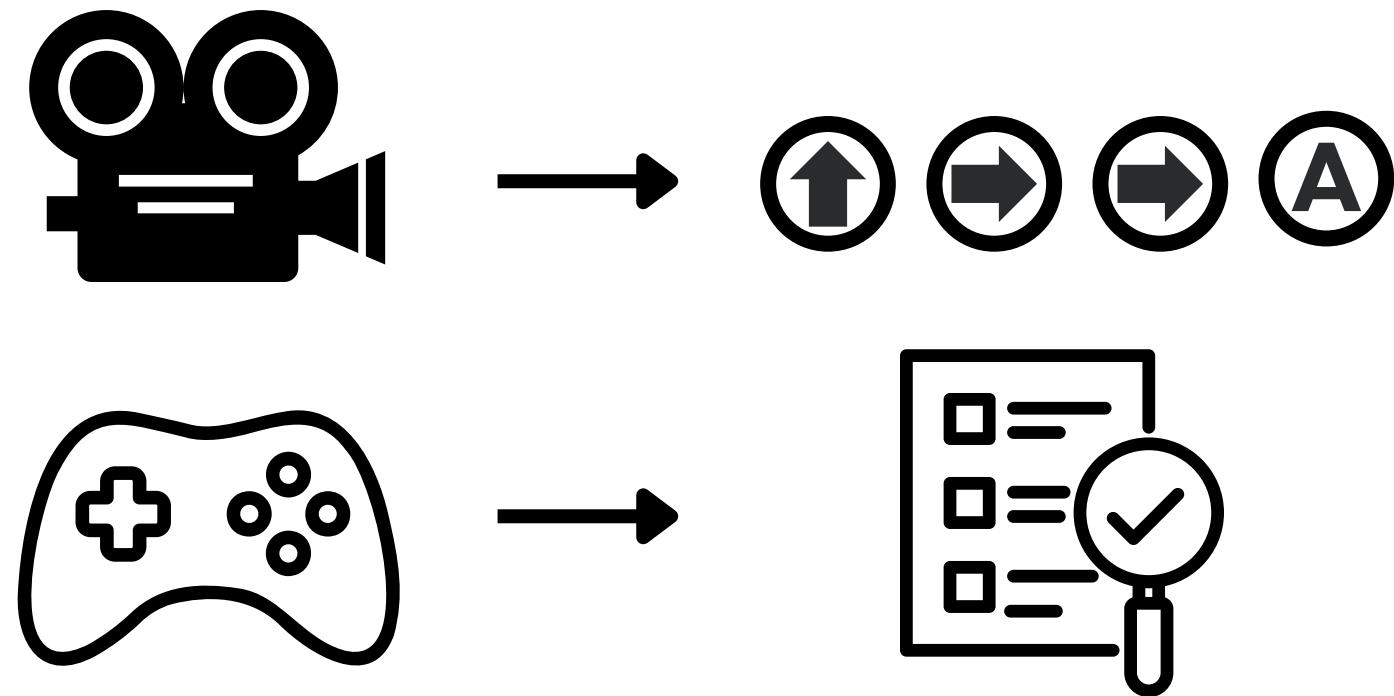
Test Results



REC

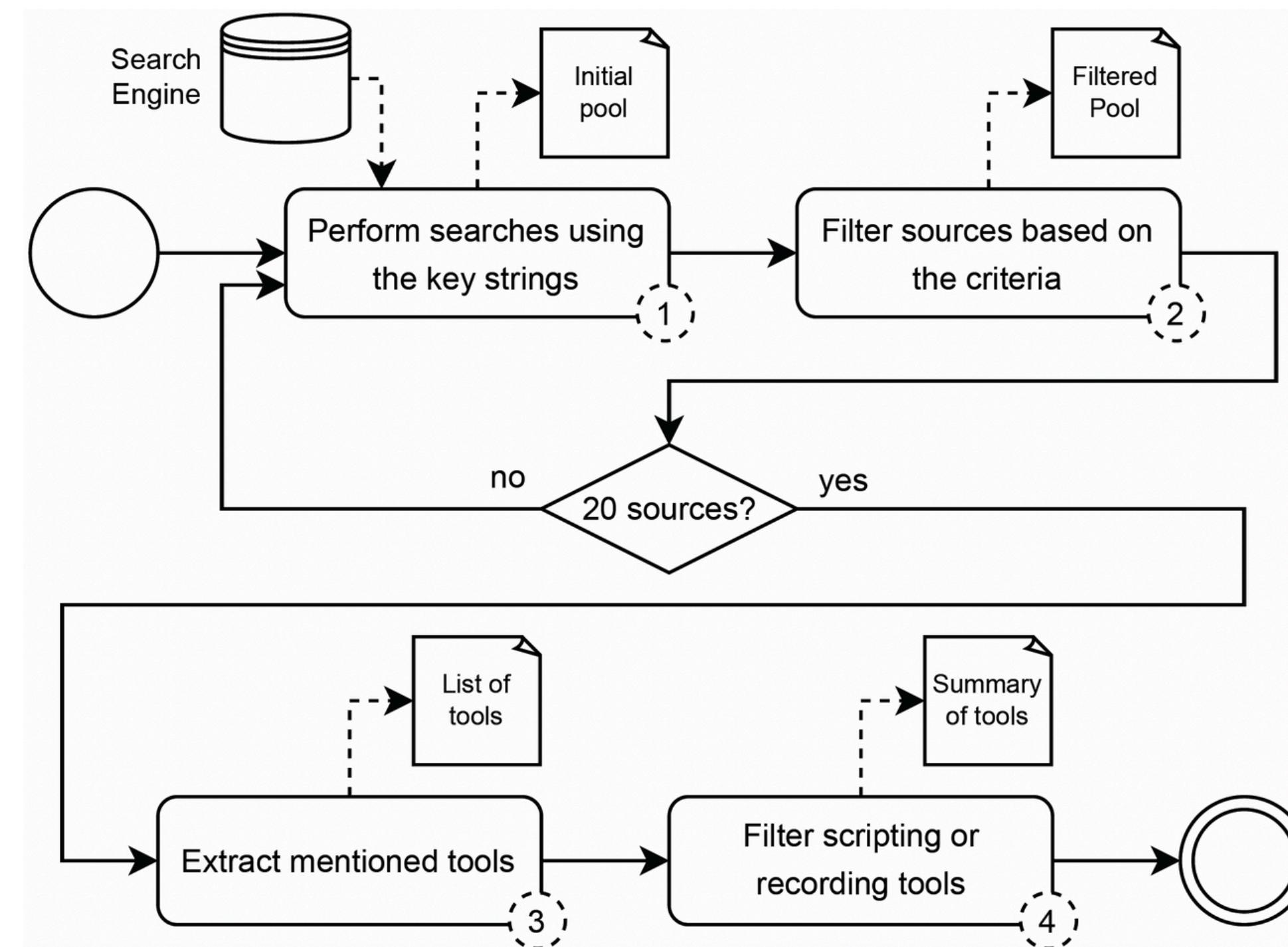


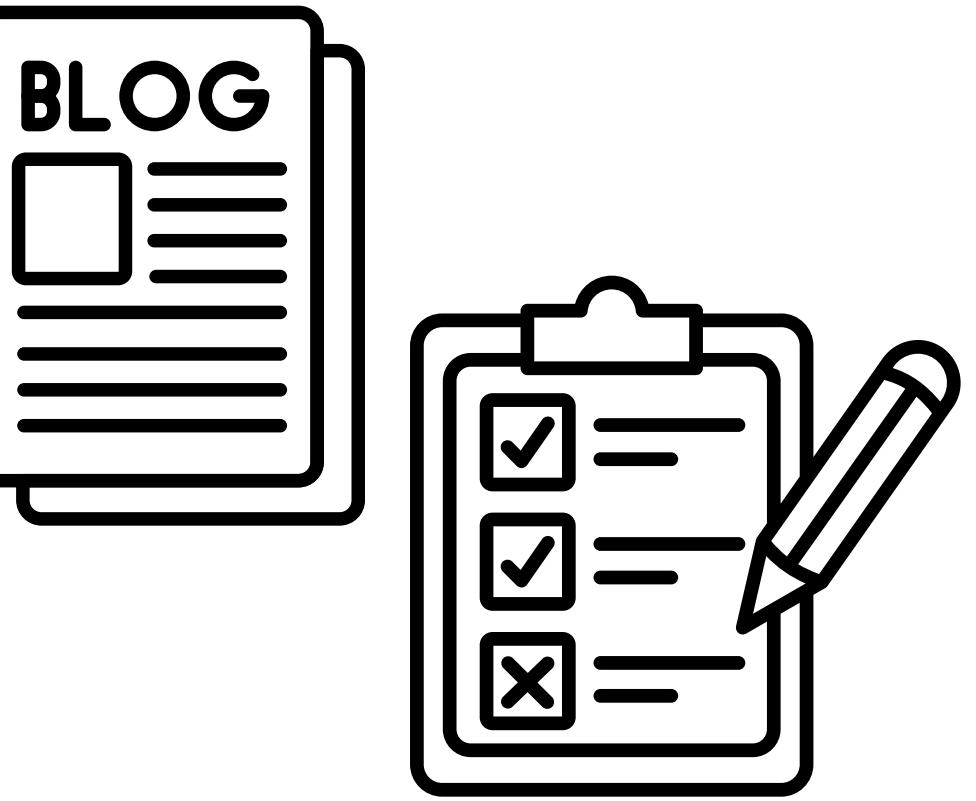
Recording-based Tools



Record
&
Replay

Finding the Tools





The Criteria

Inclusion

- *IC1*: blog posts that cite or compare game test automation tools
- *IC2*: discuss game test automation frameworks focused on recording-and-replay
- *IC3*: include a review, case studies, or testimonial of a tool for automating game test

Exclusion

- *EC1*: blog posts older than 5 years
- *EC2*: posts not written in English
- *EC3*: posts about gamification

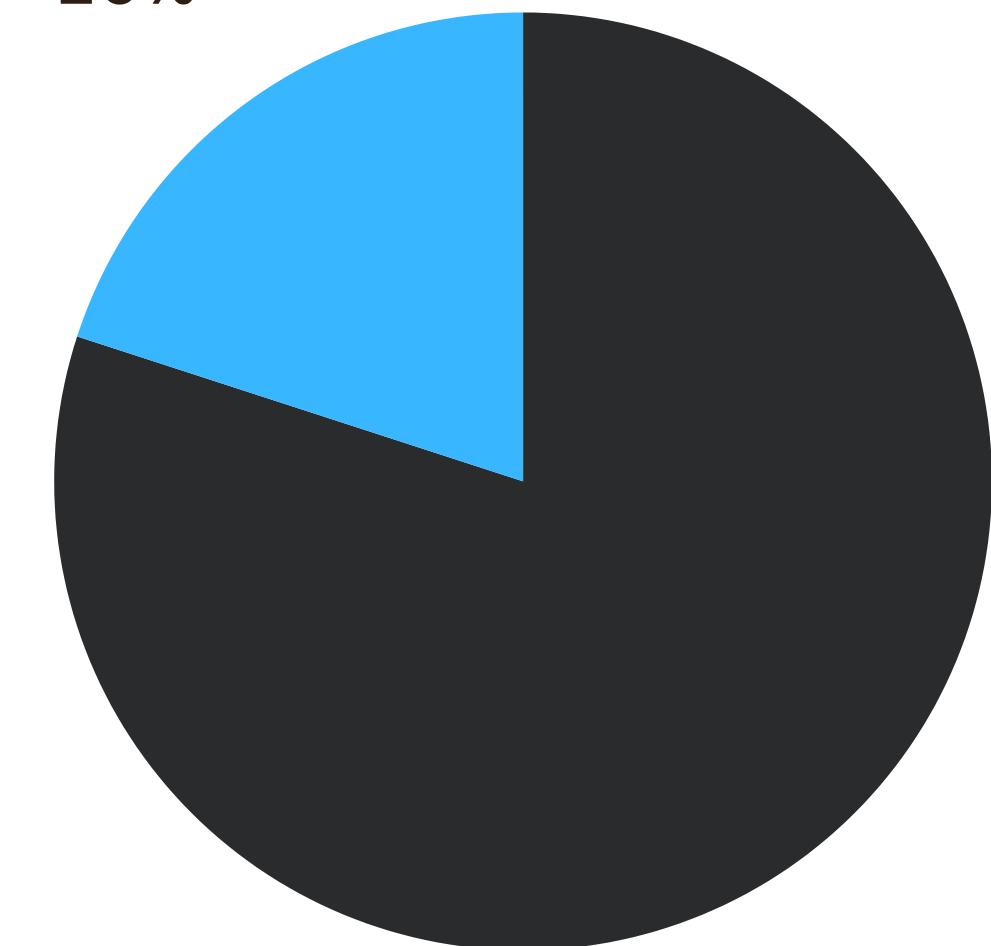
The search was completed on October 10, 2024.

| Ref | Title | Source | IC1 | IC2 | IC3 |
|------|---|--------------|-----|-----|-----|
| [13] | Game Test Automation Tools – A Comprehensive Review and Comparison | iXie | ✓ | ✓ | |
| [14] | Top 6 Game Testing Tools You Need to Know | Test Sigma | ✓ | ✓ | |
| [15] | The Top Game Test Automation Tools You Need to Know About | iXie | ✓ | | |
| [16] | Automated Game Testing Tools: 10 Types Worth Knowing | modl.ai | ✓ | ✓ | |
| [17] | What Tools do You Need to Automate Video Game Testing? | zappletech | ✓ | ✓ | |
| [18] | How to Automate Video Game Tests | Test Guild | ✓ | | ✓ |
| [19] | Game Automation Testing: Things to Consider Before You Go to Market | QAble | ✓ | ✓ | |
| [20] | Game Testing Automation 101: Basic Tips and Strategies (with Case Studies) | VNEXT Global | ✓ | ✓ | ✓ |
| [21] | A Practical Guide to Test Automation Tools for Mobile Games | TestDevLab | ✓ | | ✓ |
| [22] | Level Up Your Game Development: The Power of Game Test Automation | T-Plan | ✓ | | |
| [23] | Adding test automation to your game development project | AltTester | | | ✓ |
| [24] | Top 10 Game Testing Tools Every Developer Should Know About | KiwiQA | ✓ | ✓ | |
| [25] | Video Game Test Automation: Factors to Consider Before Starting | iXie | ✓ | | |
| [26] | Game Testing Tutorial: A Comprehensive Guide With Best Practices And Examples | LambdaTest | ✓ | ✓ | ✓ |
| [27] | 10 Best Mobile Game Testing Tools in 2024 | HeadSpin | ✓ | | |
| [28] | Enhance the performance of mobile games with automation testing | QAonCloud | ✓ | ✓ | |
| [29] | Automating Gameplay with TestComplete | SmartBear | | | ✓ |
| [30] | Is Game Automation the Next Generation of Testing? | QAble | ✓ | | |
| [31] | Appium together with AltTester Unity SDK | Medium | | | ✓ |
| [32] | Automating Mobile Game Testing | Yarsa Labs | ✓ | | |

List of Blogs

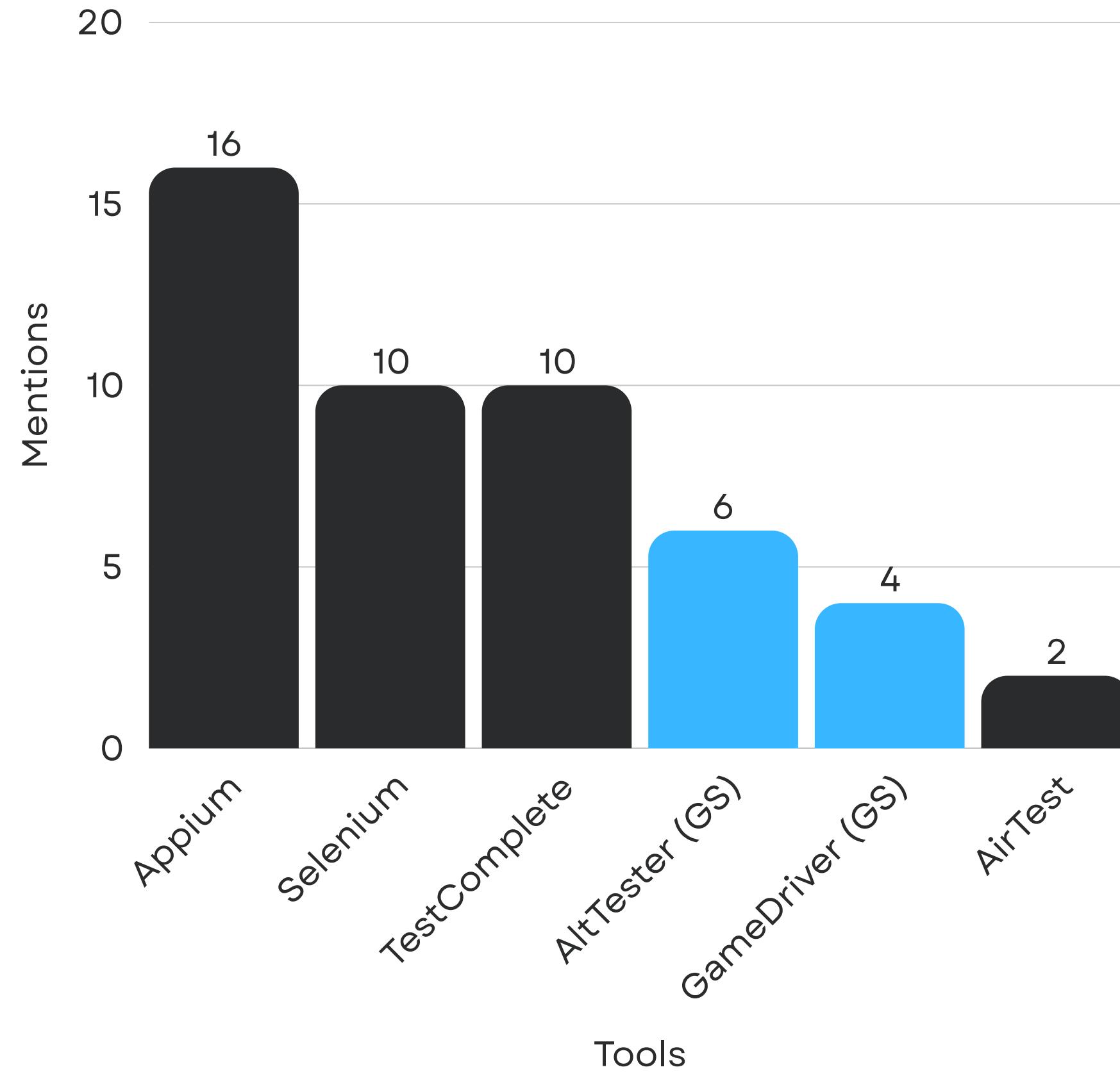
| ID | Tool | References | # |
|----|----------------------|---|----|
| 1 | Appium | [14], [15], [17]–[22], [24]–[28] [30]–[32] | 16 |
| 2 | Selenium | [14]–[19], [22], [24], [27], [28] | 10 |
| 3 | TestComplete | [14]–[17], [19], [20], [22], [24] [27], [29] | 10 |
| 4 | AltTester (GS) | [13], [14], [21], [23], [31], [32] | 6 |
| 5 | GameDriver (GS) | [13], [18], [20], [22] | 4 |
| 6 | AirTest ² | [13], [21] | 2 |
| 7 | ZAPTEST | [13] | 1 |
| 8 | TestSigma | [14] | 1 |
| 9 | BrowserStack | [16] | 1 |
| 10 | Ranorex | [16] | 1 |
| 11 | Applitools | [19] | 1 |
| 12 | Repeato | [21] | 1 |
| 13 | Kobiton | [21] | 1 |
| 14 | Katalon | [21] | 1 |
| 15 | TestRigor | [21] | 1 |
| 16 | Perfecto | [21] | 1 |
| 17 | TestGrid | [21] | 1 |
| 18 | T-Plan Robot | [22] | 1 |
| 19 | LambdaTest | [26] | 1 |
| 20 | HeadSpin | [27] | 1 |

Game Specific
20%



General Software
80%

List of Tools



**All of the other 14 tools
were mentioned only once**

Systems and support

| ID | Tool | License | Language | Windows | macOS | GNU/Linux | Cloud |
|----|--------------|-------------|------------|---------|-------|-----------|-------|
| 1 | Appium | Apache | Multiple | ✓ | ✓ | ✓ | |
| 2 | Selenium | Apache | Multiple | ✓ | ✓ | ✓ | |
| 3 | TestComplete | Proprietary | Multiple | ✓ | | | |
| 4 | AltTester | GPL | Multiple | ✓ | ✓ | ✓ | |
| 5 | GameDriver | Proprietary | C# | ✓ | ✓ | ✓ | |
| 6 | Airtest | Apache | Python | ✓ | ✓ | ✓ | |
| 7 | ZAPTEST | Proprietary | Multiple | ✓ | ✓ | ✓ | |
| 8 | TestSigma | Apache | Java | ✓ | ✓ | ✓ | ✓ |
| 9 | BrowserStack | MIT | Multiple | ✓ | ✓ | ✓ | ✓ |
| 10 | Ranorex | Proprietary | Multiple | ✓ | | | |
| 11 | Applitools | Proprietary | Multiple | | | ✓ | |
| 12 | Repeato | Proprietary | JavaScript | ✓ | ✓ | | |
| 13 | Kobiton | Proprietary | Multiple | ✓ | ✓ | | ✓ |
| 14 | Katalon | Proprietary | Groovy | ✓ | ✓ | ✓ | ✓ |
| 15 | TestRigor | MIT | JavaScript | ✓ | ✓ | ✓ | ✓ |
| 16 | Perfecto | Proprietary | Multiple | | | ✓ | |
| 17 | TestGrid | Proprietary | Multiple | | | ✓ | |
| 18 | T-Plan Robot | Proprietary | Java | ✓ | ✓ | ✓ | |
| 19 | LambdaTest | Proprietary | Multiple | | | ✓ | |
| 20 | HeadSpin | Proprietary | Multiple | | | ✓ | |

15 13 11 10

Licensing

- 7 are **Open Source**
- 13 have **Proprietary License**

Support

13 tools

support 3 or more
prog. languages

11 tools

support the 3
operating systems

Cloud / SaaS

10 tools

allow to create and
execute the tests in a
cloud environment

Platforms

Most are made for **Mobile and **Web**, 17 and 16, respectively**

Engines

General-purpose Tools are design to work with a wide range of apps and platforms

In contrast, **Game Specific Tools** support game engine integration

| ID | Tool | Platforms | | | Game engines | | | | | |
|----|--------------|-----------|-----|---------|--------------|--------|--------|-------|-------|-------|
| | | Mobile | Web | Desktop | Unity | Unreal | Custom | Godot | Cocos | Egret |
| 1 | Appium | ✓ | ✓ | ✓ | | | | | | |
| 2 | Selenium | | ✓ | | | | | | | |
| 3 | TestComplete | ✓ | ✓ | ✓ | | | | | | |
| 4 | AltTester | | | | ✓ | | | | | |
| 5 | GameDriver | | | | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 6 | Airtest | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 7 | ZAPTEST | ✓ | ✓ | ✓ | | | | | | |
| 8 | TestSigma | ✓ | ✓ | ✓ | | | | | | |
| 9 | BrowserStack | ✓ | ✓ | | | | | | | |
| 10 | Ranorex | ✓ | ✓ | ✓ | | | | | | |
| 11 | Applitools | ✓ | ✓ | ✓ | | | | | | |
| 12 | Repeato | ✓ | | | | | | | | |
| 13 | Kobiton | ✓ | | | | | | | | |
| 14 | Katalon | ✓ | | ✓ | | | | | | |
| 15 | TestRigor | ✓ | ✓ | ✓ | | | | | | |
| 16 | Perfecto | ✓ | ✓ | | | | | | | |
| 17 | TestGrid | ✓ | ✓ | ✓ | | | | | | |
| 18 | T-Plan Robot | ✓ | ✓ | ✓ | | | | | | |
| 19 | LambdaTest | ✓ | ✓ | ✓ | | | | | | |
| 20 | HeadSpring | ✓ | ✓ | | | | | | | |
| | | 17 | 16 | 12 | 3 | 2 | 2 | 1 | 1 | 1 |

| ID | Tool | Use plugins/extensions | CI/CD support | Integrated with Selenium | Integrated with Appium | Appium-based | Selenium-based |
|----|--------------|------------------------|---------------|--------------------------|------------------------|--------------|----------------|
| 1 | Appium | ✓ | | | | | ✓ |
| 2 | Selenium | ✓ | ✓ | | | | |
| 3 | TestComplete | ✓ | ✓ | ✓ | ✓ | | |
| 4 | AltTester | ✓ | | ✓ | ✓ | ✓ | |
| 5 | Game Driver | ✓ | ✓ | ✓ | ✓ | | |
| 6 | Airtest | ✓ | | ✓ | ✓ | | |
| 7 | ZAPTEST | ✓ | | ✓ | | | |
| 8 | TestSigma | ✓ | ✓ | | | | |
| 9 | BrowserStack | ✓ | ✓ | ✓ | ✓ | | |
| 10 | Ranorex | ✓ | ✓ | ✓ | | ✓ | |
| 11 | Applitools | ✓ | ✓ | ✓ | ✓ | | |
| 12 | Repeato | | ✓ | | ✓ | | |
| 13 | Kobiton | ✓ | ✓ | | | ✓ | |
| 14 | Katalon | ✓ | ✓ | ✓ | | ✓ | |
| 15 | TestRigor | ✓ | ✓ | | | | |
| 16 | Perfecto | ✓ | ✓ | ✓ | ✓ | | |
| 17 | TestGrid | ✓ | ✓ | | ✓ | ✓ | |
| 18 | T-Plan Robot | ✓ | ✓ | ✓ | | | |
| 19 | LambdaTest | ✓ | ✓ | ✓ | ✓ | | |
| 20 | HeadSpin | ✓ | ✓ | ✓ | ✓ | | |
| | | 19 | 16 | 13 | 9 | 5 | 2 |

Workflow

- 19 tools allow **plugins and extensions**
- 16 have **CI/CD support**

Appium and Selenium Integration

13 tools
support **Selenium**
integration

9 tools
support **Appium**
integration

Appium and Selenium Based

**5 tools were created on top of
Appium, 2 on top of Selenium,
including Appium itself**

Inputs simulations

- Mouse (click) and touch: 19
- Keyboard: 16 Joystick: 2 XR: 1

Scripting

16 tools

allow to create
script by using
GUI

9 tools

have a **low-code**
scripting mode

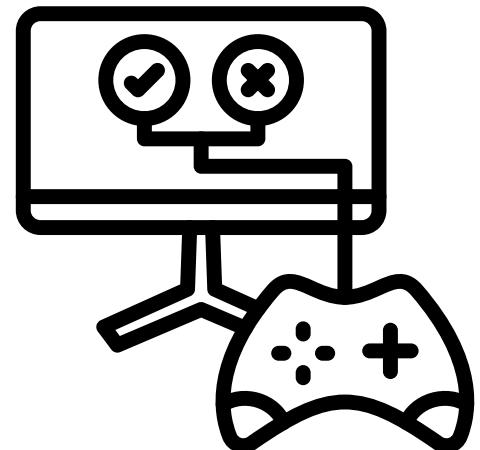
AI Support (Evolving field + AI hype)

- By that time only 4 tools **feature AI**
- Today, probably more

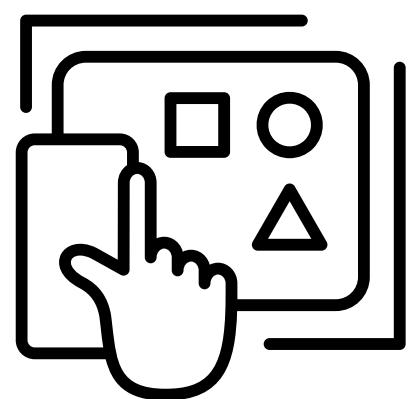
| ID | Tool | Inputs simulations | | | | Scripting | | |
|----|--------------|--------------------|----------|----------|----|-----------|----------------|-----------|
| | | Mouse/Touch | Keyboard | Joystick | XR | Using GUI | Using low-code | Using LLM |
| 1 | Appium | ✓ | ✓ | | | | | |
| 2 | Selenium | ✓ | ✓ | | | | | |
| 3 | TestComplete | ✓ | ✓ | | | | ✓ | ✓ |
| 4 | AltTester | ✓ | ✓ | ✓ | | | | |
| 5 | GameDriver | ✓ | ✓ | ✓ | ✓ | | | |
| 6 | Airtest | ✓ | ✓ | | | ✓ | | |
| 7 | ZAPTEST | ✓ | ✓ | | | ✓ | | ✓ |
| 8 | TestSigma | | | | | ✓ | ✓ | ✓ |
| 9 | BrowserStack | ✓ | ✓ | | | ✓ | ✓ | |
| 10 | Ranorex | ✓ | ✓ | | | ✓ | ✓ | |
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| 12 | Repeato | ✓ | | | | ✓ | | |
| 13 | Kobiton | ✓ | | | | ✓ | | |
| 14 | Katalon | ✓ | | ✓ | | ✓ | ✓ | |
| 15 | TestRigor | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| 16 | Perfecto | ✓ | ✓ | | | ✓ | ✓ | |
| 17 | TestGrid | ✓ | ✓ | | | ✓ | | |
| 18 | T-Plan Robot | ✓ | ✓ | | | ✓ | ✓ | |
| 19 | LambdaTest | ✓ | ✓ | | | ✓ | | ✓ |
| 20 | HeadSpin | ✓ | | | | ✓ | | |
| | | 19 | 16 | 2 | 1 | 16 | 9 | 4 |

General-purpose vs Game-specific - A clear gap

- Only 2 dedicated **game-specific tools** (AltTester, GameDriver)
 - Integration with **game engines**
 - Validation of physics, game-level components, mechanics, etc.

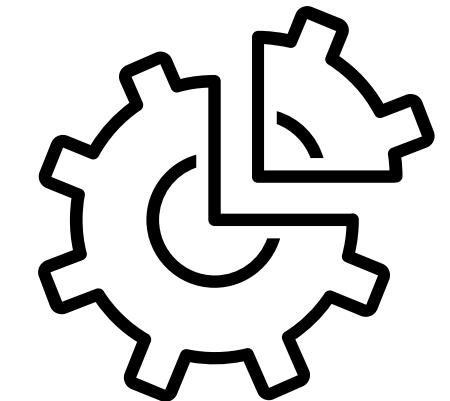
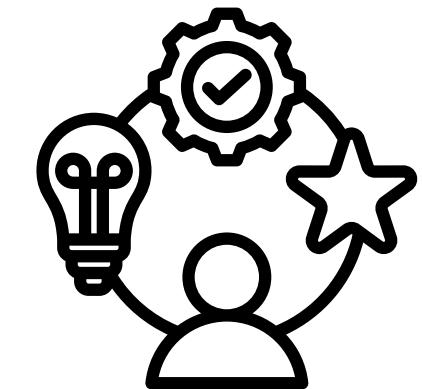


- Appium, Selenium, TestComplete **dominate blog mentions**
- General-purpose is **limited to UI testing**



Lack of Content and Research

- Few content showing hands-on or testimonials of the tools, specially in the game development context
- No real-world reports analyzing effectiveness, limitations, or maintenance costs of these tools in actual game projects
 - This lack of content in the grey literature extends to academic works



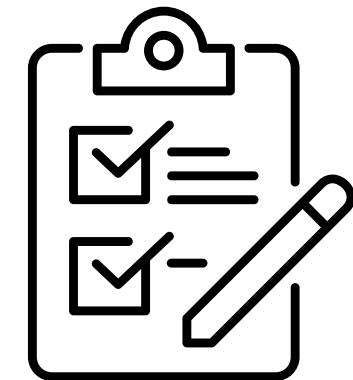
Validation of the Tools

- Even for the game-specific tools, which have deep game-level integration, we still need to validate
 - Do they help to solve game industry problems in terms of testing automations?



Future Work

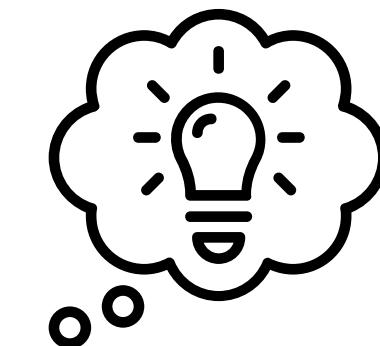
- **Survey with Practitioners**
 - Validate the quality of the tools
 - Finding other tools



- **Benchmark the tools of our mapping**
 - Hands-on and experiments
 - Understanding how to use a tool properly



- **Potential for new solutions for game test automation**
 - Evolving field: tools and problems
 - AI-driven trend



Thank you!

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