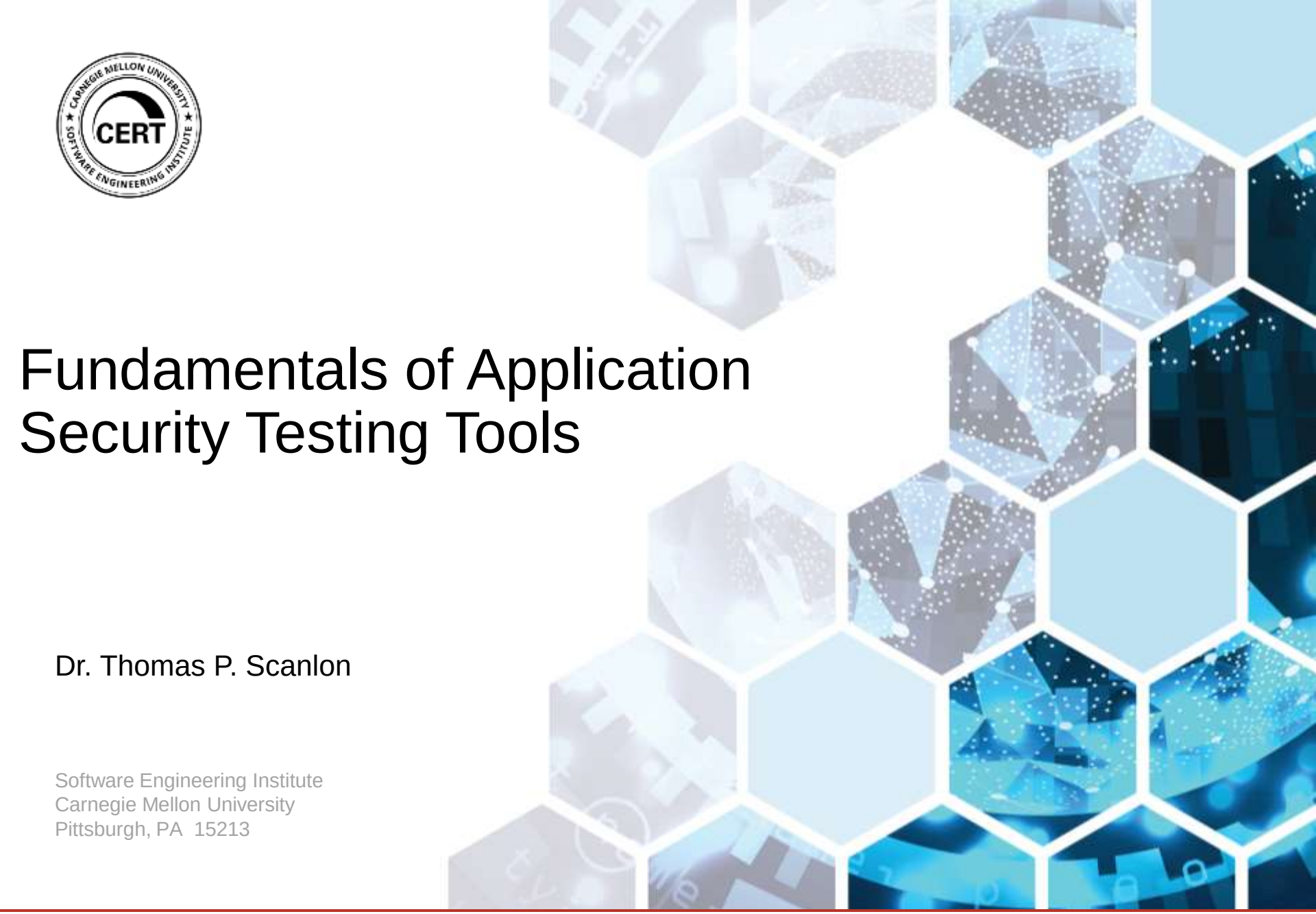

Fundamentals of Application Security Testing Tools

Dr. Thomas P. Scanlon

Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

We Have Lawyers

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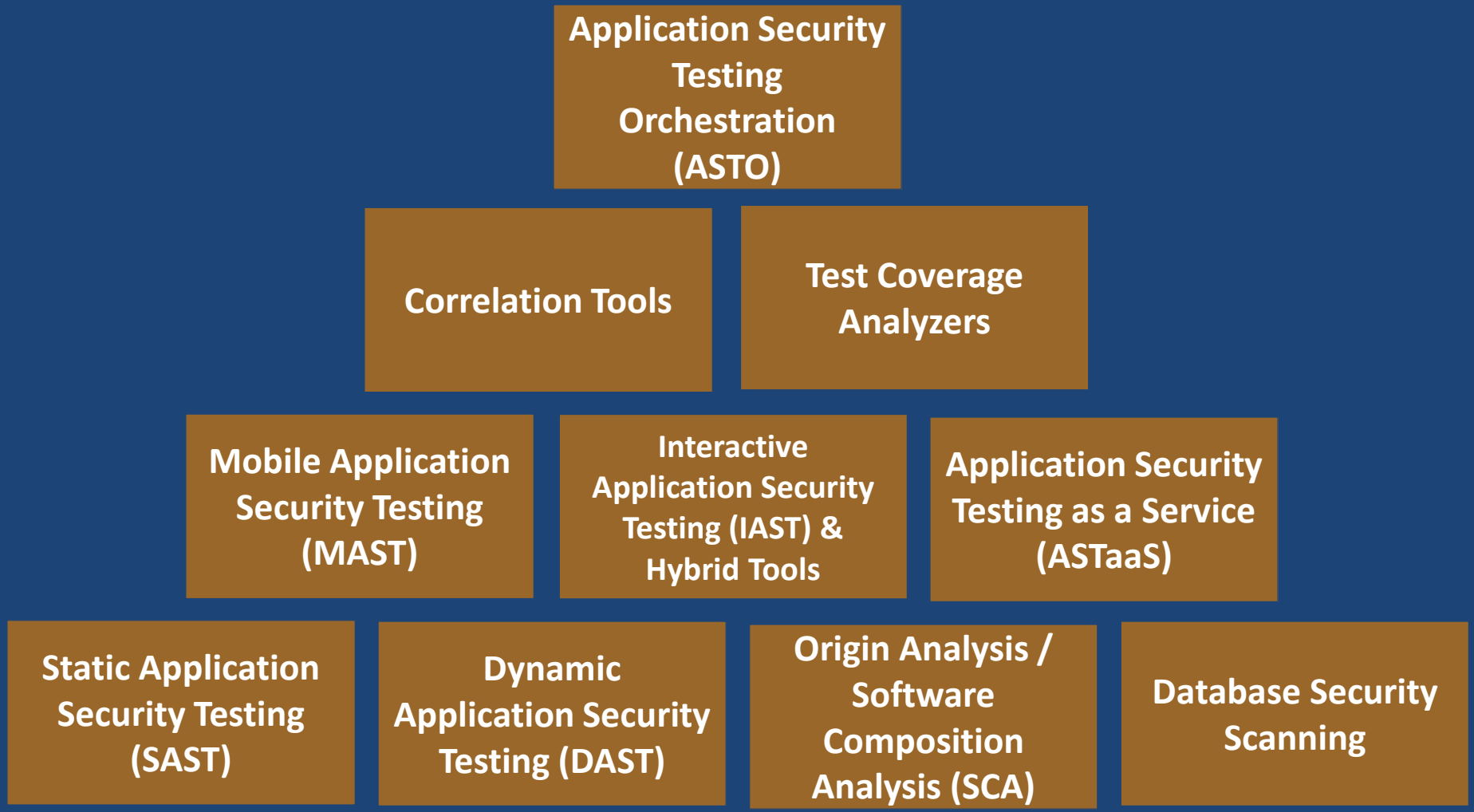
AST Tools Benefits

- **Increase speed, efficiency, and coverage paths**
- **Repeatable**
- **Scale well**
- **Find known vulnerabilities, issues and weaknesses**
- **Triage and classify findings**
- **Assist in remediation workflow, especially verification**
- **Can be used for correlation and identification of trends and patterns**

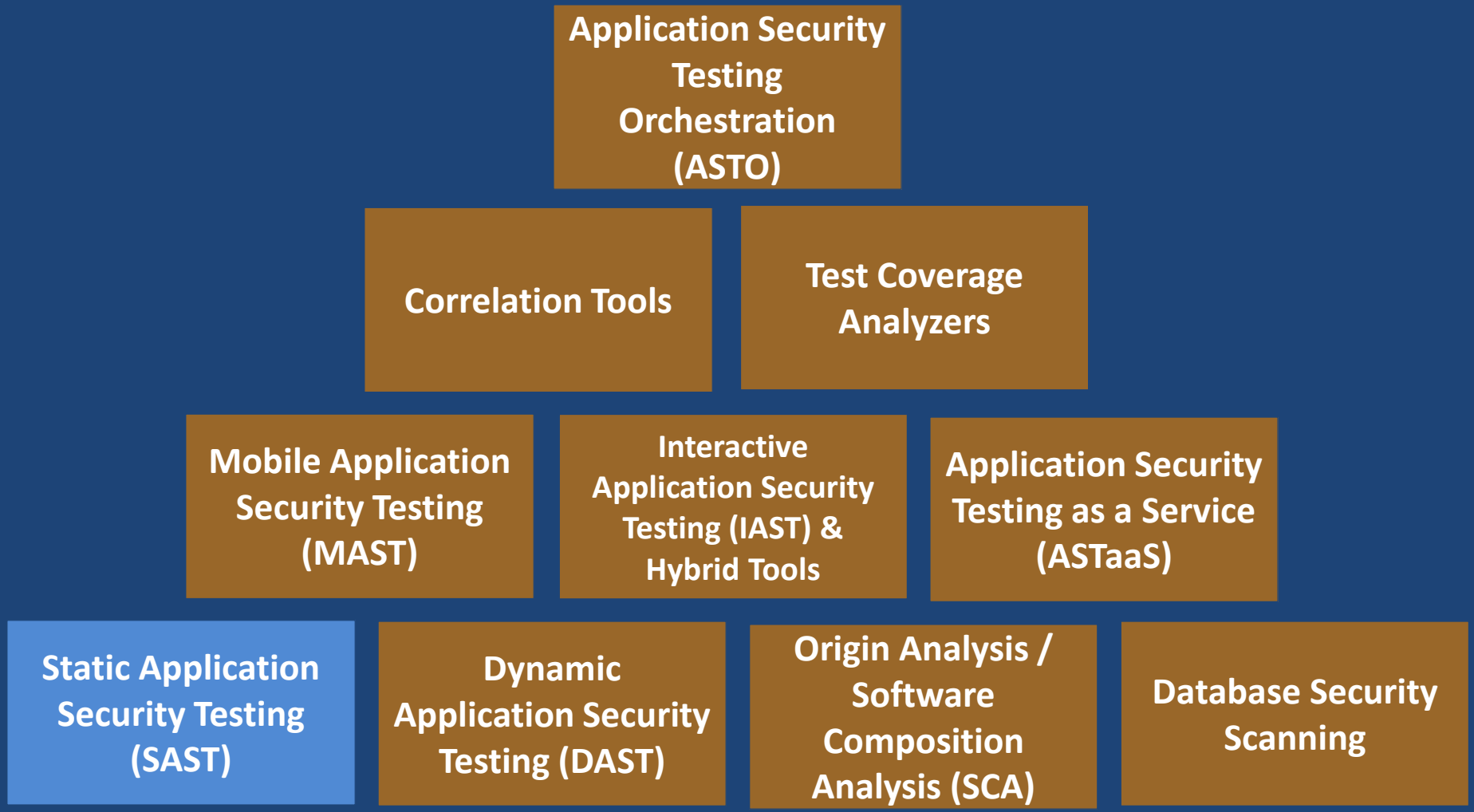
Types of Application Security Testing Tools

https://insights.sei.cmu.edu/blog/10-types-of-application-security-testing-tools-when-and-how-to-use-them/

Application Security Testing Tools Pyramid



Application Security Testing Tools Pyramid



Static Application Security Testing (SAST)

Static Application Security Testing (SAST)

Can be thought of as white-hat or white-box testing

- "Examine source code (at rest) to detect and report weaknesses that can lead to security vulnerabilities" – NIST[1]
- Source code analyzers can run on non-compiled code checking for things like numeric errors, input validation, race conditions, path traversals, pointers and references, and more
- Binary and Byte Code analyzers do the same on built and compiled code
- Some tools run on source only, compiled only, or both

NIST[1] - https://samate.nist.gov/index.php/Source_Code_Security_Analyzers.html

CWEs and CVEs

Common Weakness Enumerations (CWEs)

CWEs are classes of problems

Does not focus on a specific product, system, or piece of software

CWEs represent concepts/behaviors software developers should avoid

Examples: Integer Overflow; Use of Hard-coded credentials; Generation of Predictable Numbers

Common Vulnerabilities and Exposures (CVEs)

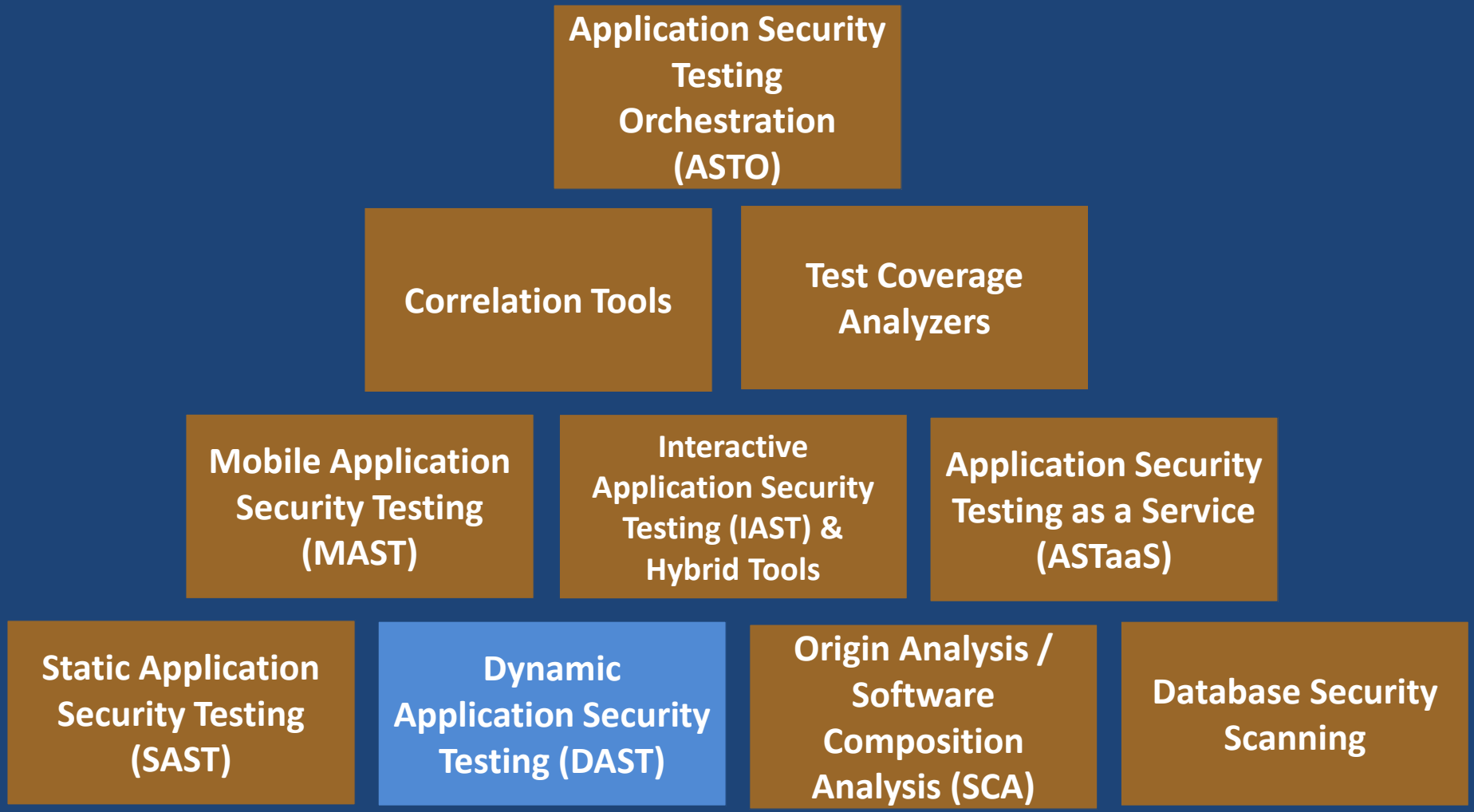
CVEs are instances of problems (instances of CWEs in some respects)

Does pertain to a specific product, system, or piece of software

CVEs represent weaknesses software developers could bring into their software via use of & inclusion of tools, libraries, products, other software

Example: CVE-2015-3429 Cross-site scripting (XSS) vulnerability in example.html in Genericons on Debian Linux before 3.3.1, as used in WordPress before 4.2.2, allows remote attackers to inject arbitrary web script or HTML via a fragment identifier.

Application Security Testing Tools Pyramid



Dynamic Application Security Testing (DAST)

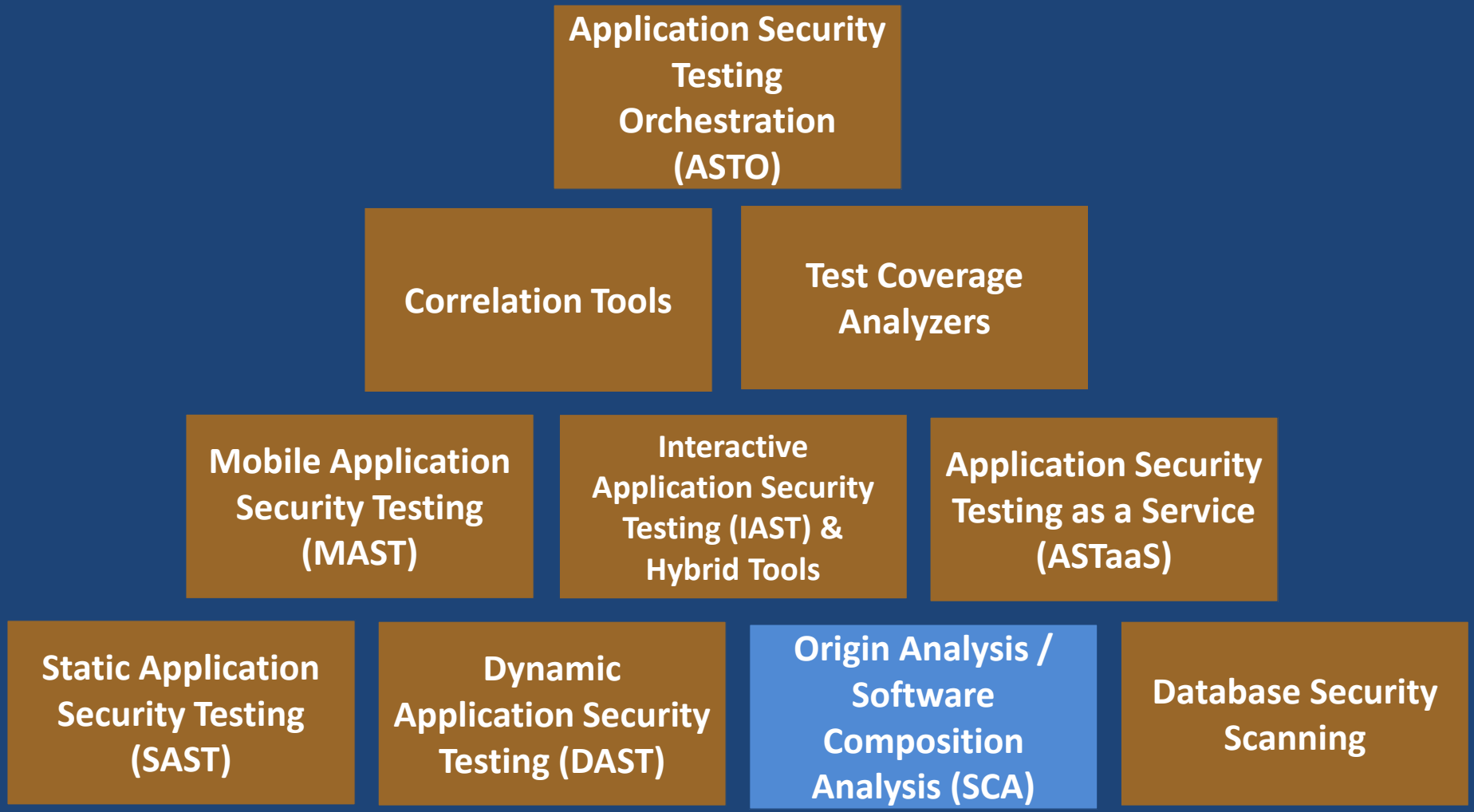
Dynamic Application Security Testing (DAST)

Can be thought of as black-hat or black-box testing

- "Detect conditions indicative of a security vulnerability in an application in its running state" – Gartner[1]
- DAST tools run on operating code detecting issues with interfaces, requests, responses, scripting (i.e. JavaScript), data injection, sessions, authentication and more
- Fuzzing is throwing known invalid and unexpected test cases at an application, often in large volume

Gartner[1] - http://www.gartner.com/it-glossary/dynamic-application-security-testing-dast

Application Security Testing Tools Pyramid



Origin Analysis / Software Composition Analysis (SCA)

Origin Analysis / Software Composition Analysis (SCA)

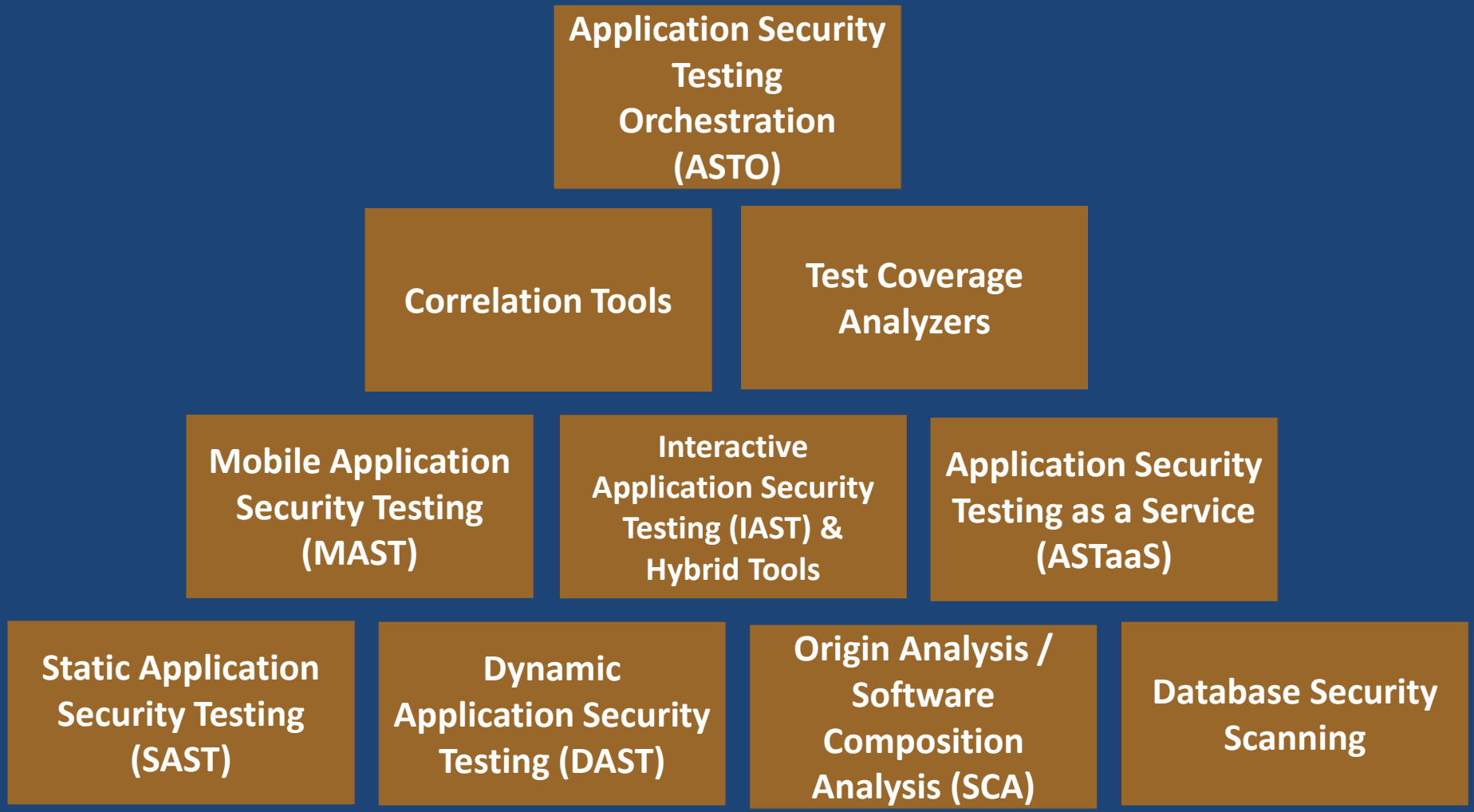
"Software Governance processes that depend on manual inspection are guaranteed to fail."

- Diego Lo Guidice, Forrester[1]

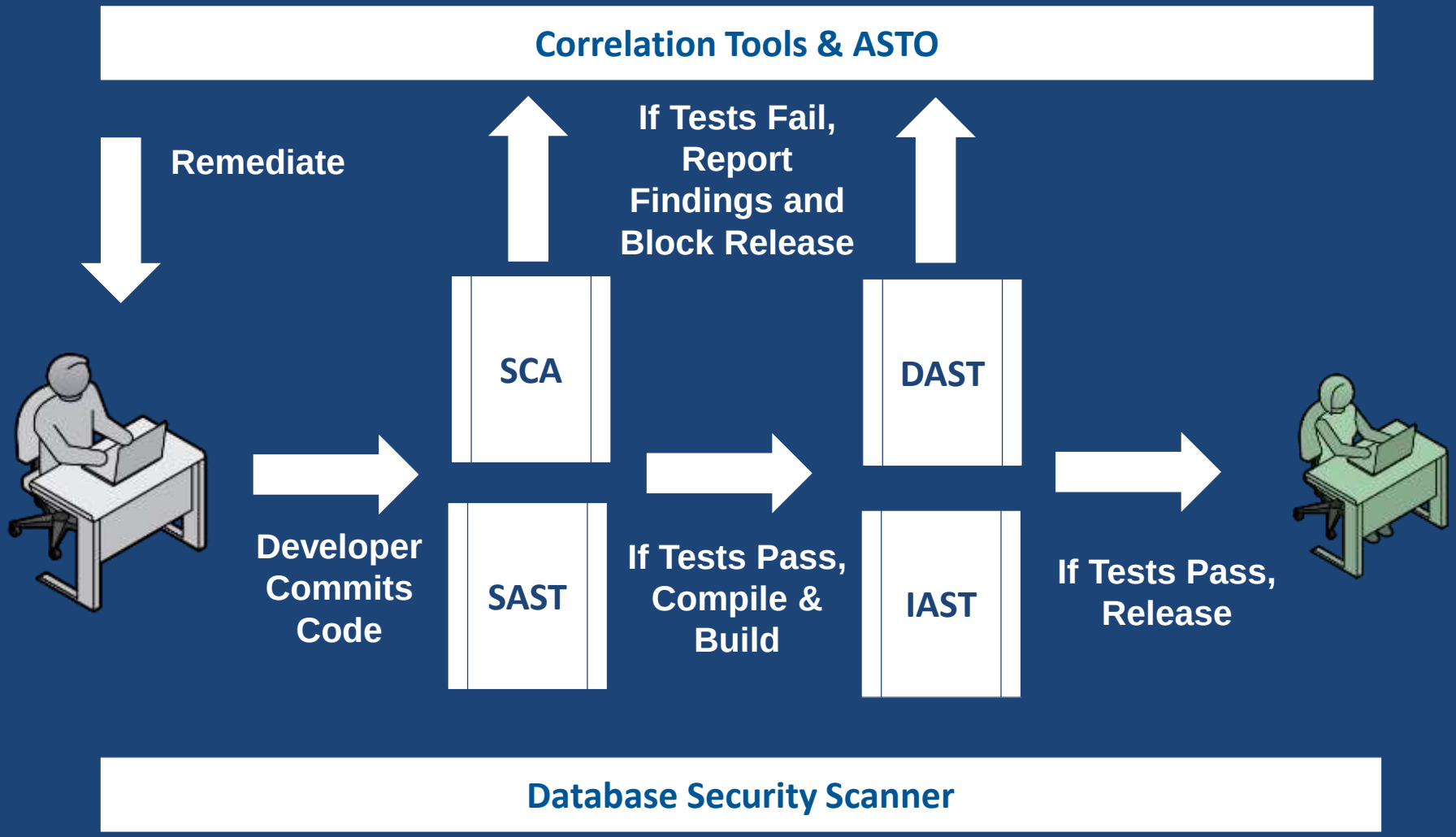
- SCA tools examine software to determine the origins of all components and libraries
- Most effective finding common and popular libraries and components, particularly open source pieces
- Compares modules found in code to list of known vulnerabilities
- Almost all use NIST National Vulnerability Database CVEs: https://nvd.nist.gov/
- Finds components that are out of date and/or have patches available
- Tools can run on source code, byte code, binary code or some combination

1 – Lo Guidice, Diego. Use DevOps And Supply Chain Principles To Automate Application Delivery Governance. *Forrester*. November 10, 2016.

Application Security Testing Tools Pyramid

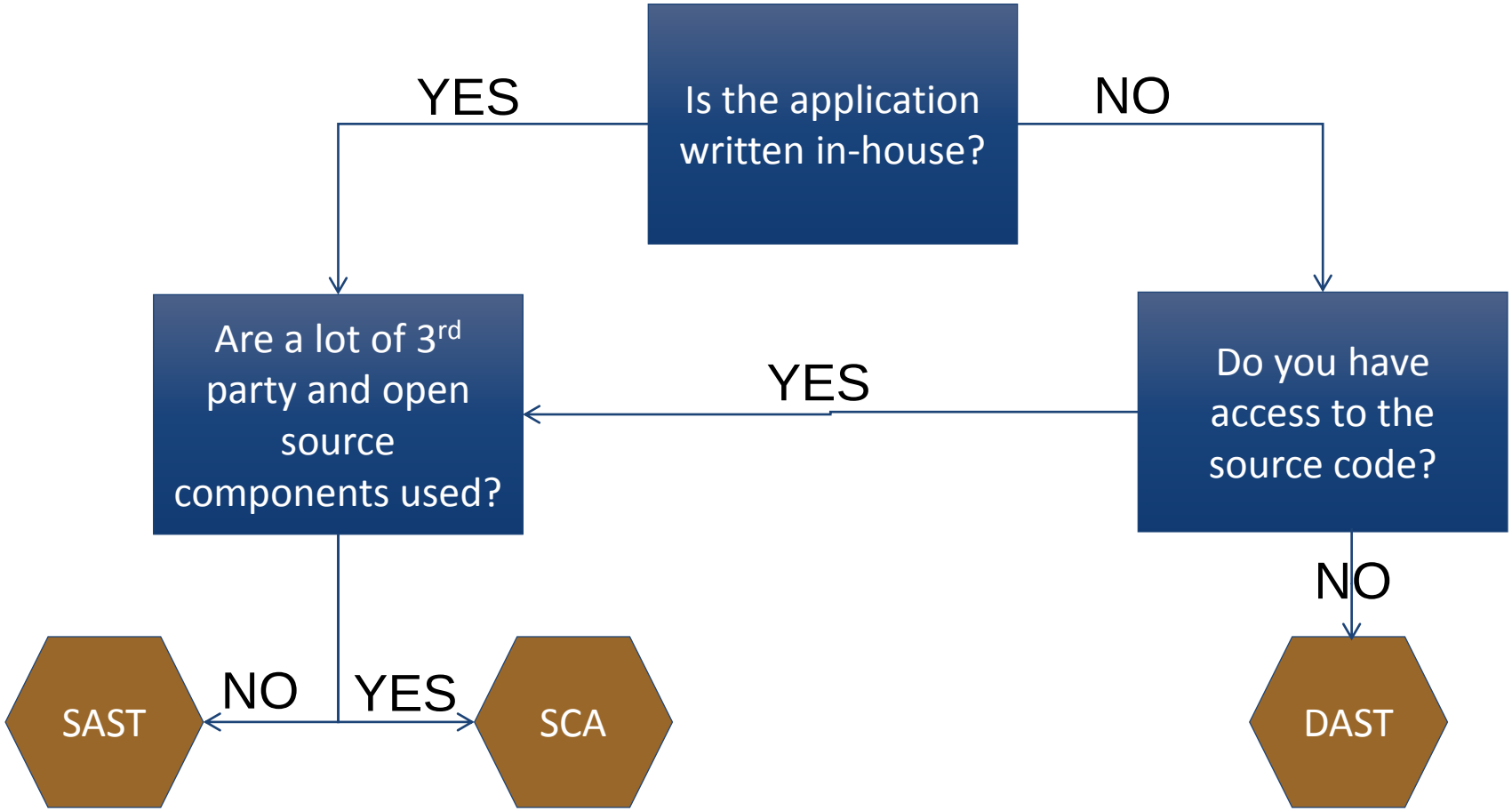


Application Security Testing Tools Reference Model CI/CD Development Project

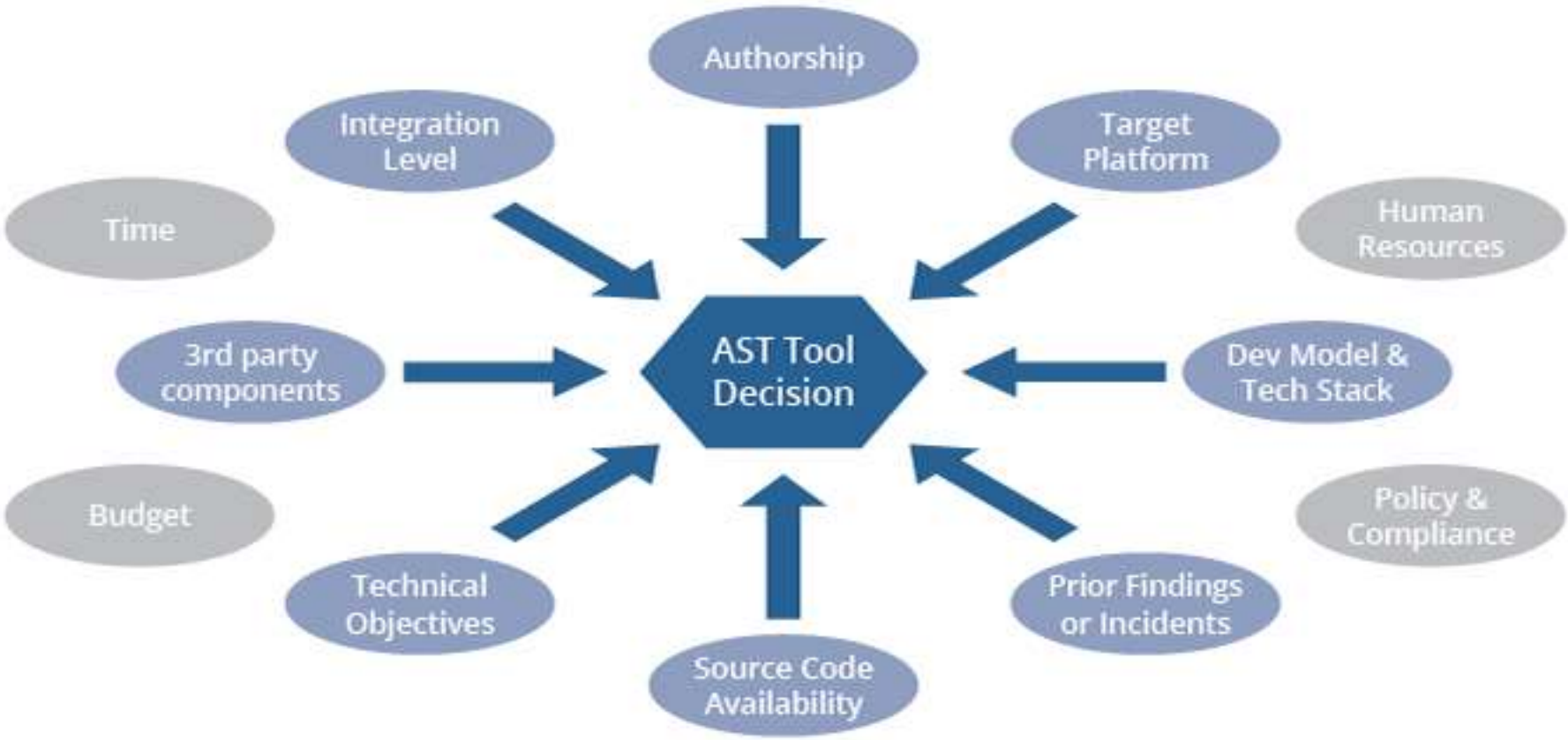


A Simple AST Decision Flow

If I can only implement one AST tool, which type should I use?



AST Tool Type Decision Factors



AST Tool Type Decision Factors Summary

- **Examining each factor will allow you to build a list of AST Tool types to consider.**
- **Some factors may push you to a certain type and other factors will push you away from that tool type.**
- **Ideally you will implement a combination of tools. SAST, DAST, and SCA should be used in combination whenever possible. Use IAST and Hybrid tools if needed to get the most coverage.**
- **In cases where only one or two tool types can be considered, the decision factors should help you prioritize what can be done.**
- **A strong understanding of traditional SAST, DAST, and SCA is useful for make decisions on MAST, IAST, and ASTaaS**
- **Correlation, Test Coverage and ASTO tools can improve the performance and impact of the other AST tool types.**