

# Twenty Years of OWASP Top 10



Open Worldwide Application Security Project  
Top 10 of Web Application Risks  
2003-2025

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# OWASP Top 10



Open *Worldwide* Application Security Project

founded 2001

name changed from Web to Worldwide in 2024

Best (only?) known for **Top 10 of Web Application Risks**

The Top 10 is

- **great for awareness**
- **a great first step in improving security**

but...

- **only a first step**
- **not a 'standard' (unlike OWASP ASVS)**

# Other Top Ns

- OWASP Top 10 for **LMM Applications & GenAI**
- OWASP **Mobile** Top 10
- OWASP **API** Top 10
- OWASP **Kubernetes** Top 10
- ...



Top Ns by other organisations:

- **CWE Top 25 Software Weaknesses**, annually since 2019
- **CWE Top 25 Hardware Weaknesses**, since 2021



# 2025 edition of OWASP Top 10

1. Broken Access Control
2. Security Misconfiguration
3. Software Supply Chain Failures ★
4. Cryptographic Failures
5. Injection
6. Insecure Design
7. Authentication Failures
8. Software & Data Integrity Failures
9. Logging & Alerting Failures ★
10. Mishandling Exceptional Conditions

8 categories based on data,  
2 based on community survey ★

Honourable mentions:

- Lack of application resilience
- Memory corruption
- AI-assisted coding

## 4. Injection Attacks

CWE-89	SQL Injection	CWE-20	Improper Input Validation
CWE-79	Cross-site Scripting (XSS)	CWE-116	Improper Encoding or Escaping of Output
CWE-77	Command Injection		
CWE-78	OS Command Injection	CWE-115	Misinterpretation of Output
CWE-90	LDAP Injection	CWE-112	Missing XML Validation
CWE-98	PHP Remote File Inclusion	CWE-129	Improper Validation of Array Index
CWE-91	XML Injection		
CWE-88	Argument Injection	CWE-470	Unsafe Reflection
CWE-93	CRLF Injection	CWE-493	Public Variable Without Final Modifier
CWE-643	XPath Injection	CWE-500	Public Static Field Not Marked Final
CWE-94	Code Injection	CWE-610	Externally Controlled Reference to a Resource in Another Sphere
CWE-96	Static Code Injection	...	
CWE-95	Eval Injection	...	
CWE-97	Server-Side Includes (SSI)	...	
CWE-99	Resource Injection		
CWE-917	Expression Language Injection		
CWE-113	HTTP Response Splitting		
			<b>Path traversal attacks are included in Broken Access Control</b>
CWE-74	Improper Neutralization of Special Elements Used by a Downstream Component ('Injection')		
CWE-76	Improper Neutralization of Equivalent Special Elements		
CWE-83	Improper Neutralization of Script in Attributes in a Web Page		
CWE-86	Improper Neutralization of Invalid Characters in Identifiers in Web Pages		
CWE-644	Improper Neutralization of HTTP Headers for Scripting Syntax		
CWE-159	Improper Handling of Invalid Use of Special Elements		

## 6. Insecure Design

### Access control

- CWE-362 Race Condition
- CWE-266 Incorrect Privilege Assignment
- CWE-269 Improper Privilege Management
- CWE-286 Incorrect User Management

### Misc.

- CWE-602 Client-Side Enforcement of Security
- CWE-501 Trust Boundary Violation
- CWE-653 Insufficient Compartmentalization
- CWE-656 Reliance on Security Through Obscurity
- CWE-657 Violation of Secure Design Principles
- CWE-693 Protection Mechanism Failure
- CWE-799 Improper Control of Interaction Frequency
- CWE-841 Improper Enforcement of Behavioral Workflow
- CWE-1125 Excessive Attack Surface

### Information leakage

- CWE-256 Unprotected Storage of Credentials
- CWE-312 Cleartext Storage of Sensitive Info
- CWE-313 Cleartext Storage in a File or on Disk
- CWE-316 Cleartext Storage of Sensitive Info in Memory
- CWE-522 Insufficiently Protected Credentials
- CWE-419 Unprotected Primary Channel
- CWE-525 Use of Web Browser Cache for Sensitive Info
- CWE-311 Missing Encryption of Sensitive Data
- CWE-539 Use of Persistent Cookies for Sensitive Info
- CWE-598 GET Requests With Sensitive Query Strings

### UI

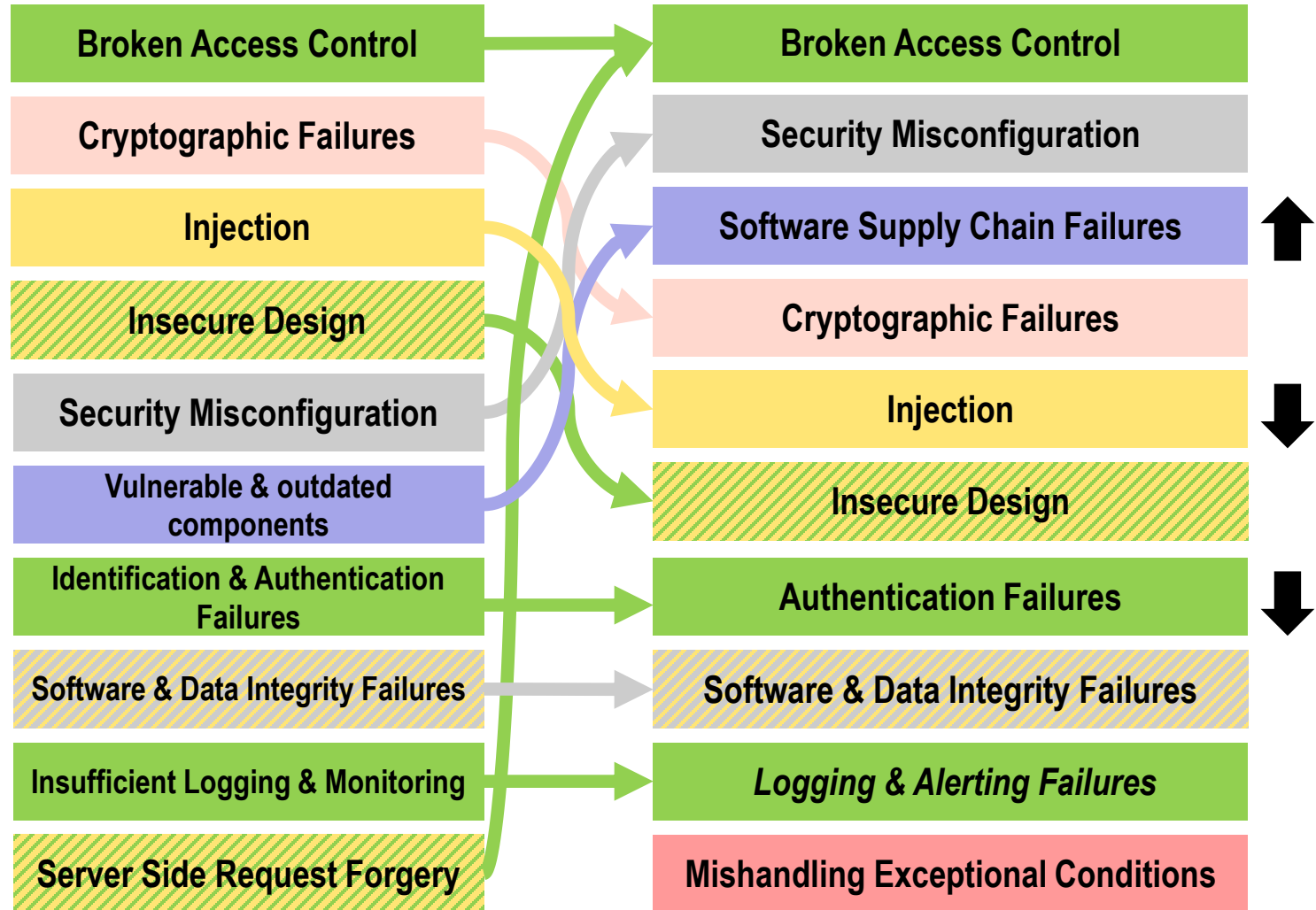
- CWE-451 UI Misrepresentation of Critical Information
- CWE-1021 Improper Restriction of Rendered UI Layers
- CWE-1022 Untrusted Link with window.opener Access

### Input handling

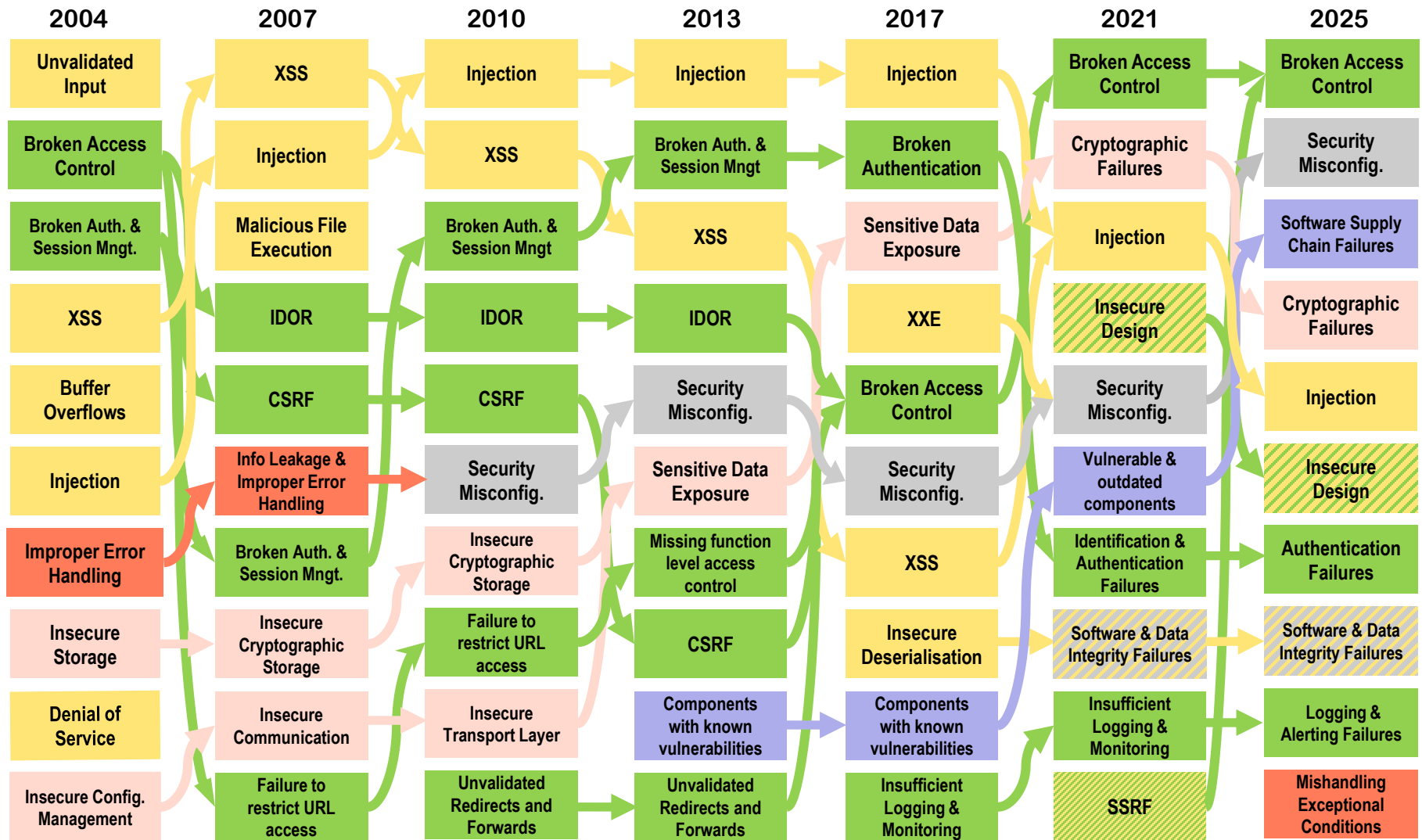
- CWE-183 Permissive List of Allowed Inputs
- CWE-434 Upload of File with Dangerous Type
- CWE-436 Interpretation Conflict
- CWE-444 HTTP Request Smuggling
- CWE-73 External Control of File Name or Path
- CWE-642 External Control of Critical State Data
- CWE-646 Reliance on File Name or Extension of  
External File
- CWE-807 Reliance on Untrusted Inputs in Security  
Decision
- CWE-454 External Initialization of Trusted Variables  
or Data Stores
- CWE-472 External Control of Assumed-Immutable  
Web Parameter
- CWE-676 Use of Potentially Dangerous Function
- CWE-382 J2EE Bad Practices: Use of System.exit()
- CWE-628 Function Call with Incorrectly Specified  
Arguments

**2021**

**2025**

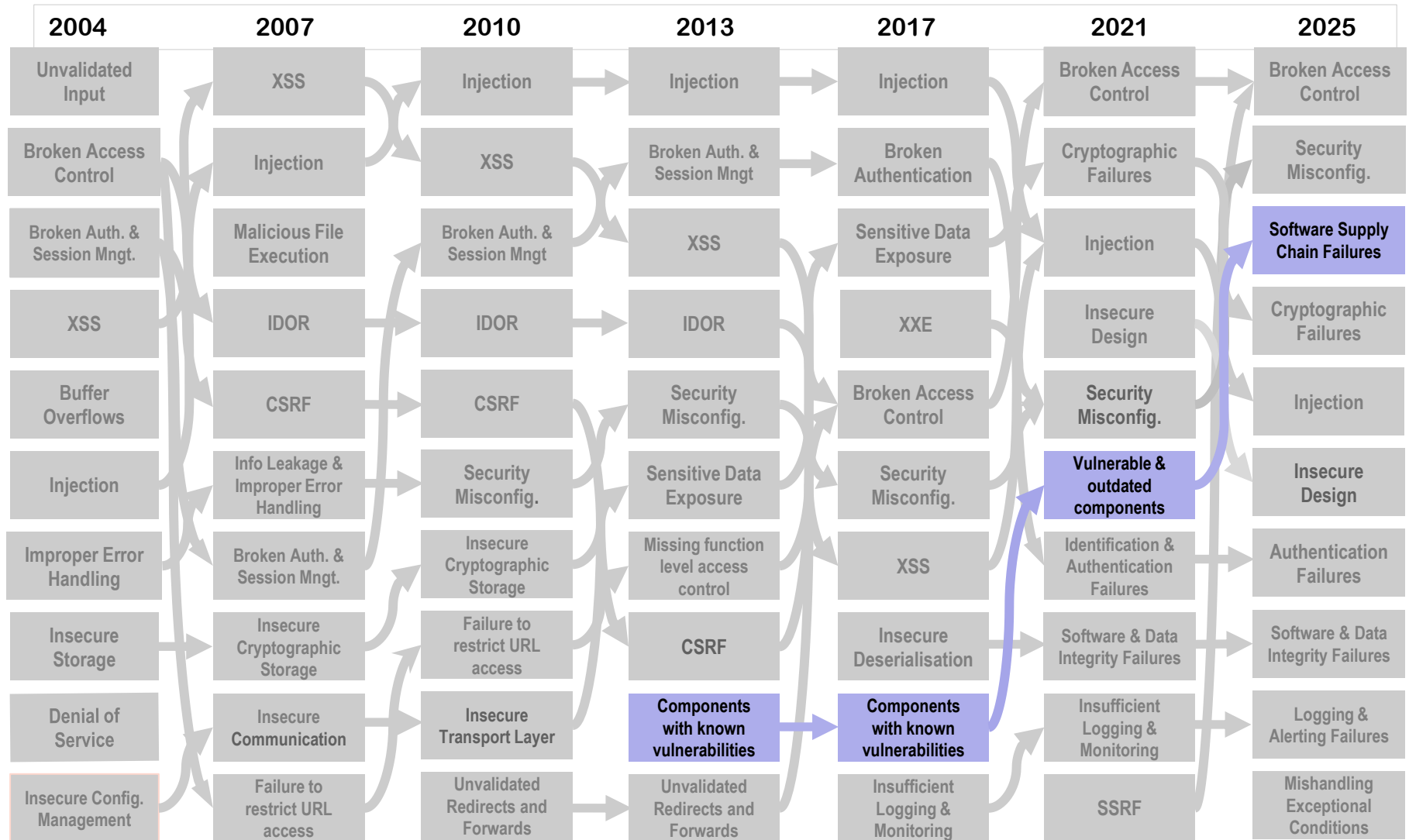


# Evolution of the OWASP Top 10

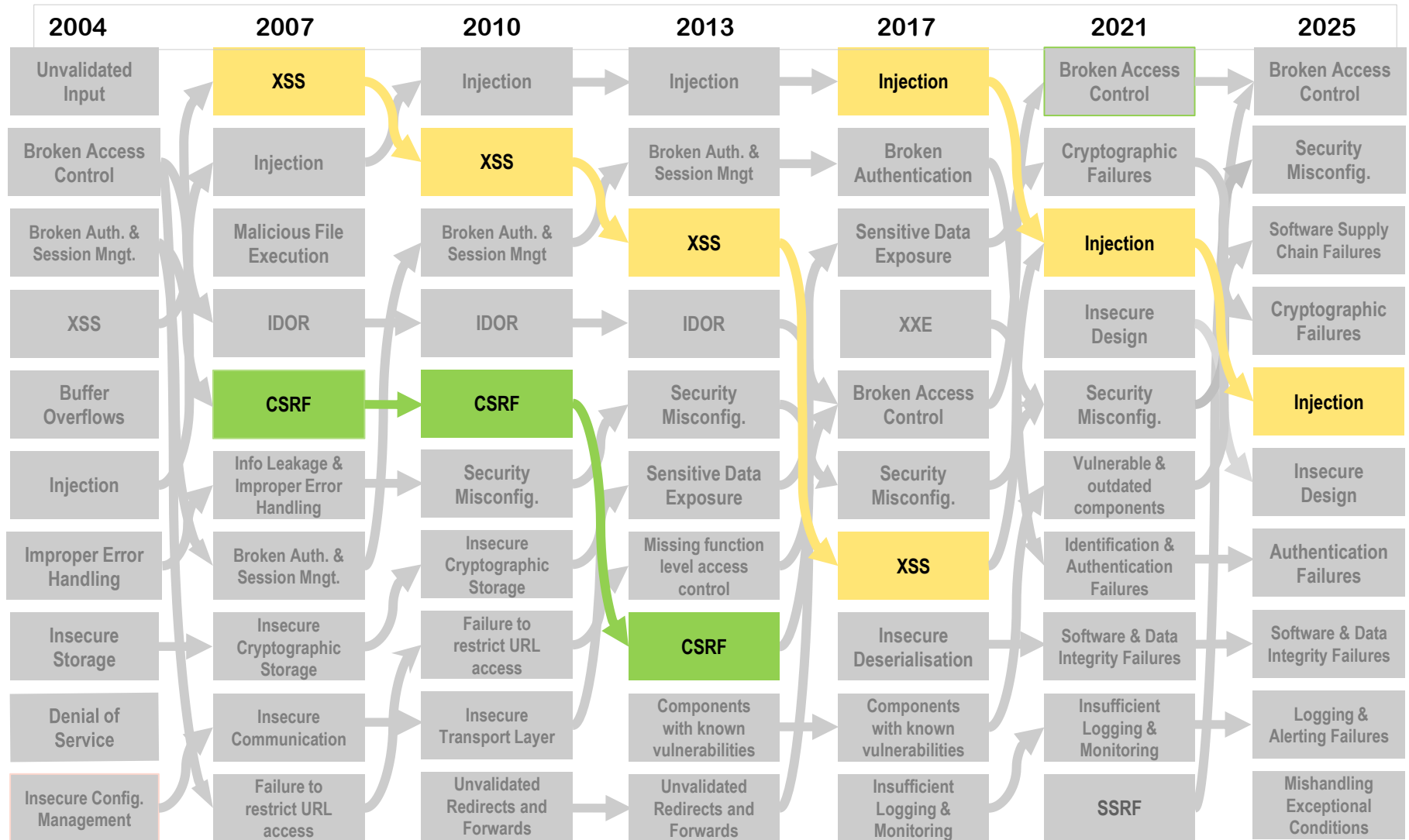




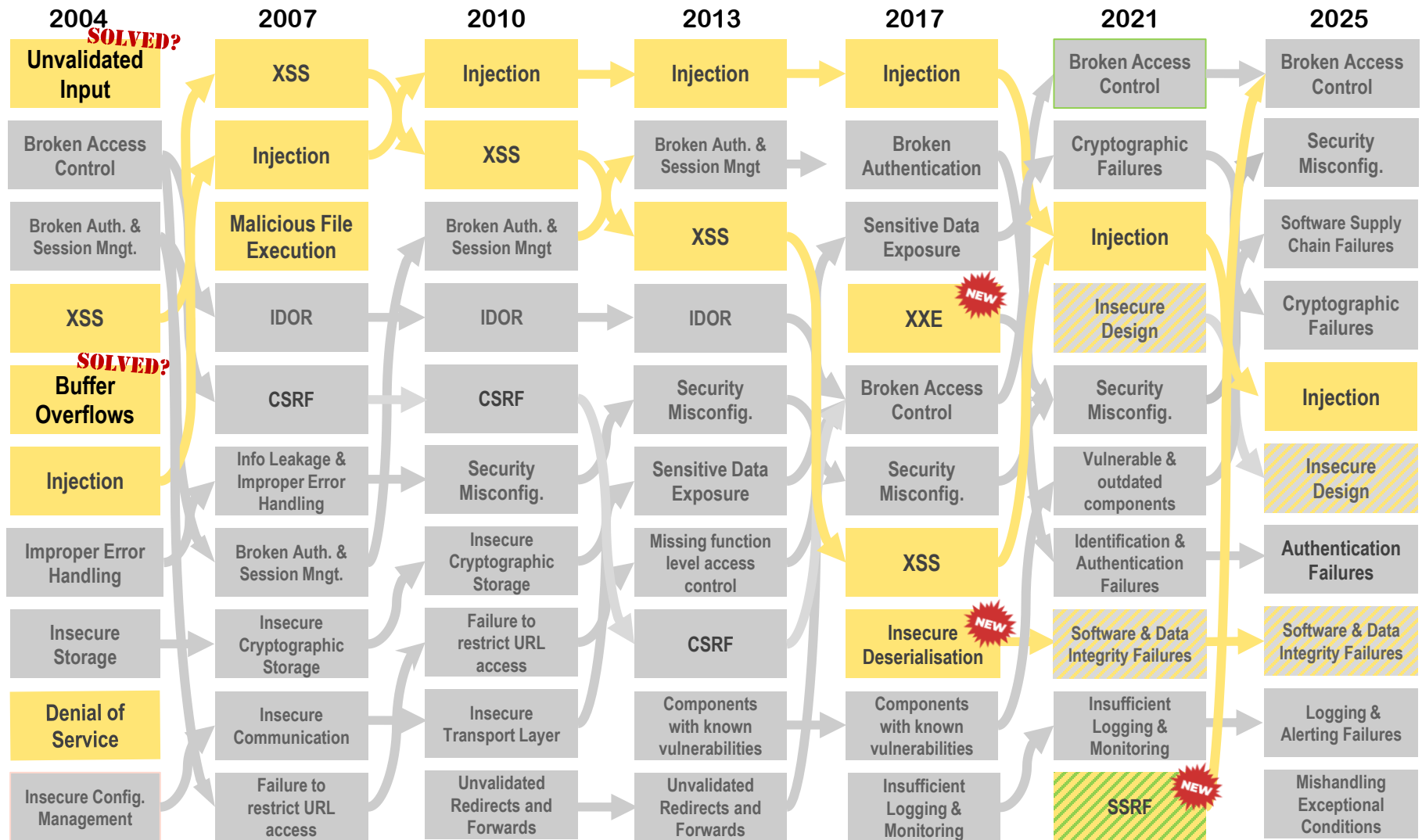
# Upwards trends



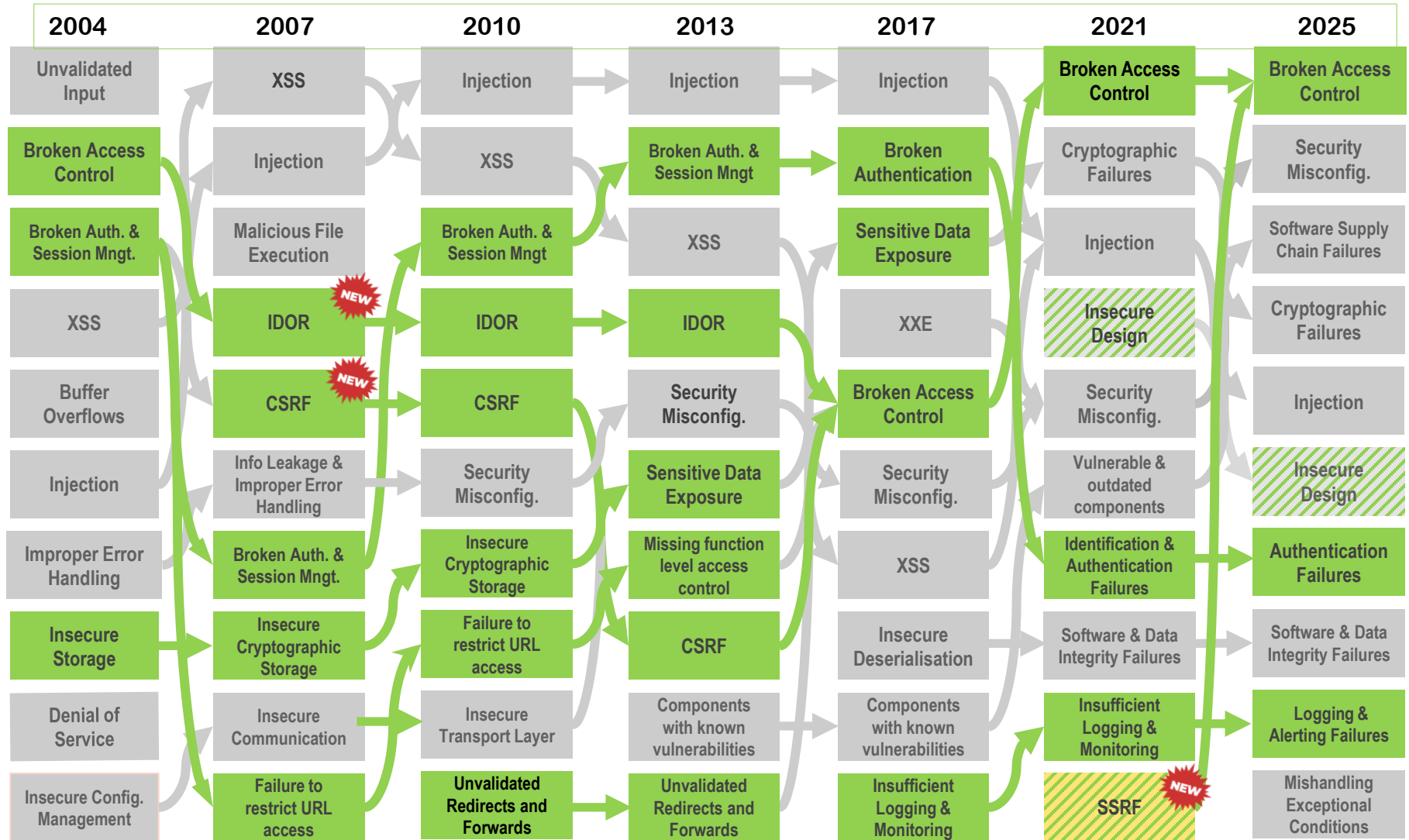
# Downward trends



# All issues due to input handling



# All issues due to access control



# 2025 CWE Top 25 – based on CVE data



- |                                      |                                       |
|--------------------------------------|---------------------------------------|
| 1 Cross-Site Scripting               | 14 <b>Stack-based Buffer overflow</b> |
| 2 SQL Injection                      | 15 Deserialization of Untrusted Data  |
| 3 Client-side Request Forgery (CSRF) | 16 Heap-based Buffer Overflow         |
| 4 Missing Authorization              | 17 Incorrect Authorization            |
| 5 <b>Out-of-bounds Write</b>         | 18 Improper Input Validation          |
| 6 Path Traversal                     | 19 Improper Access Control            |
| 7 <b>Use After Free</b>              | 20 Exposing Info to Unauthorized User |
| 8 <b>Out-of-bounds Read</b>          | 21 Missing Authentication             |
| 9 OS Command Injection               | 22 Server-Side Request Forgery (SSRF) |
| 10 Code Injection                    | 23 Command Injection                  |
| 11 <b>Classic Buffer Overflow</b>    | 24 Authorization Bypass               |
| 12 Upload of Dangerous File          | with User-Controlled Key              |
| 13 <b>NULL pointer dereference</b>   | 25 Allocation of Resources            |
|                                      | without Throttling                    |

This ranking is based on [frequency](#) (# CVEs)

The OWASP Top 10 is based on [incidence](#) (# applications) & [impact](#)

# OWASP Top 10

# vs 2025 CWE Top 25

Broken Access Control

Security Misconfiguration

Software Supply Chain Failures

Cryptographic Failures

Injection

Insecure Design

Authentication Failures

Software & Data Integrity Failures

Logging & Alerting Failures

Mishandling Exceptional Conditions

1 Cross-site Scripting

2 SQL Injection

3 Cross-Site Request Forgery (CSRF)

4 Missing Authorization

5 Out-of-bounds Write

6 Path Traversal

7 Use After Free

8 Out-of-bounds Read

9 OS Command Injection

10 Code Injection

11 Classic Buffer Overflow

12 Upload of Dangerous File

13 NULL pointer dereference

14 Stack-based Buffer overflow

15 Deserialization of Untrusted Data

16 Heap-based Buffer Overflow

17 Incorrect Authorization

18 Improper Input Validation

19 Improper Access Control

20 Exposing Info to Unauthorized User

21 Missing Authentication

22 Server-Side Request Forgery (SSRF)

23 Command Injection

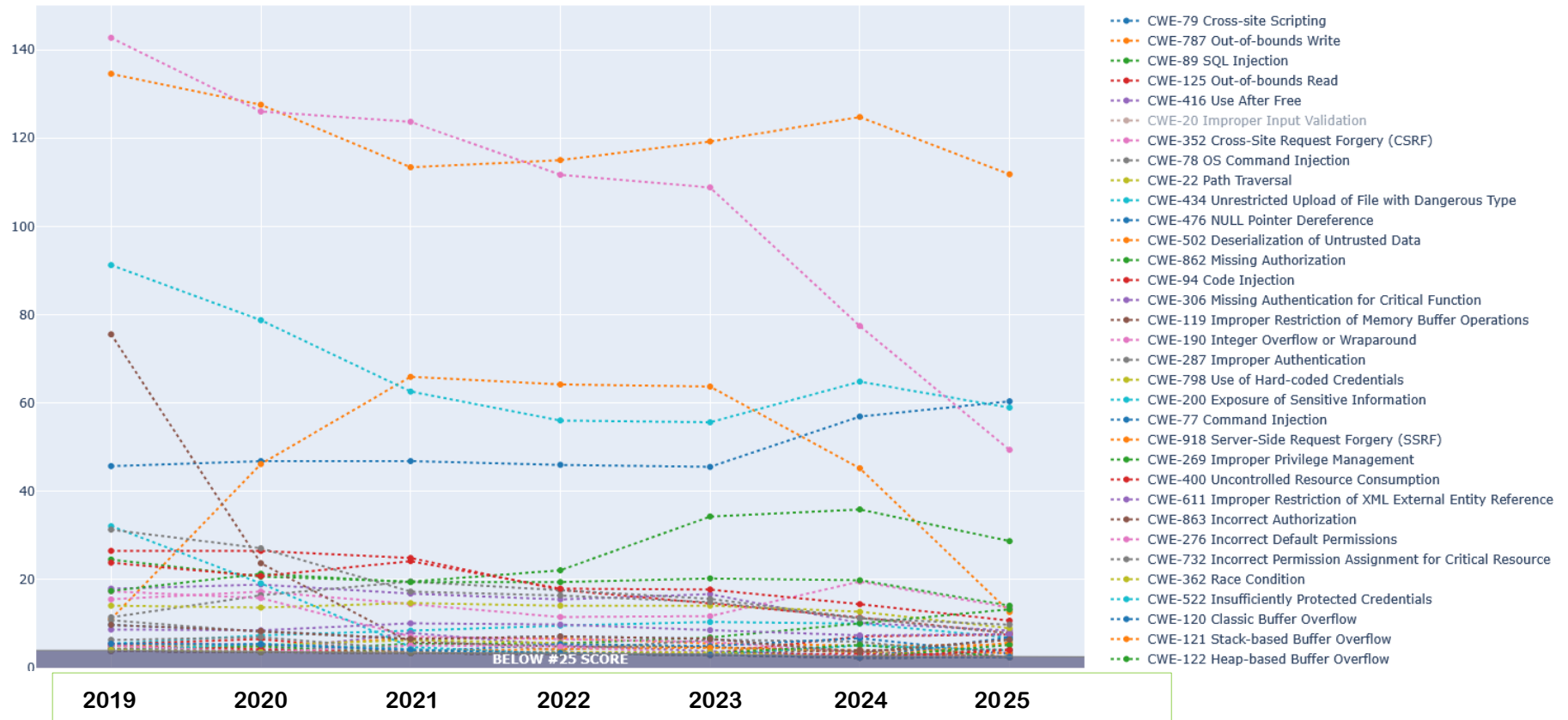
24 Authorization Bypass with User-Controlled Key

25 Allocation of Resources Without Throttling

Big difference, due to

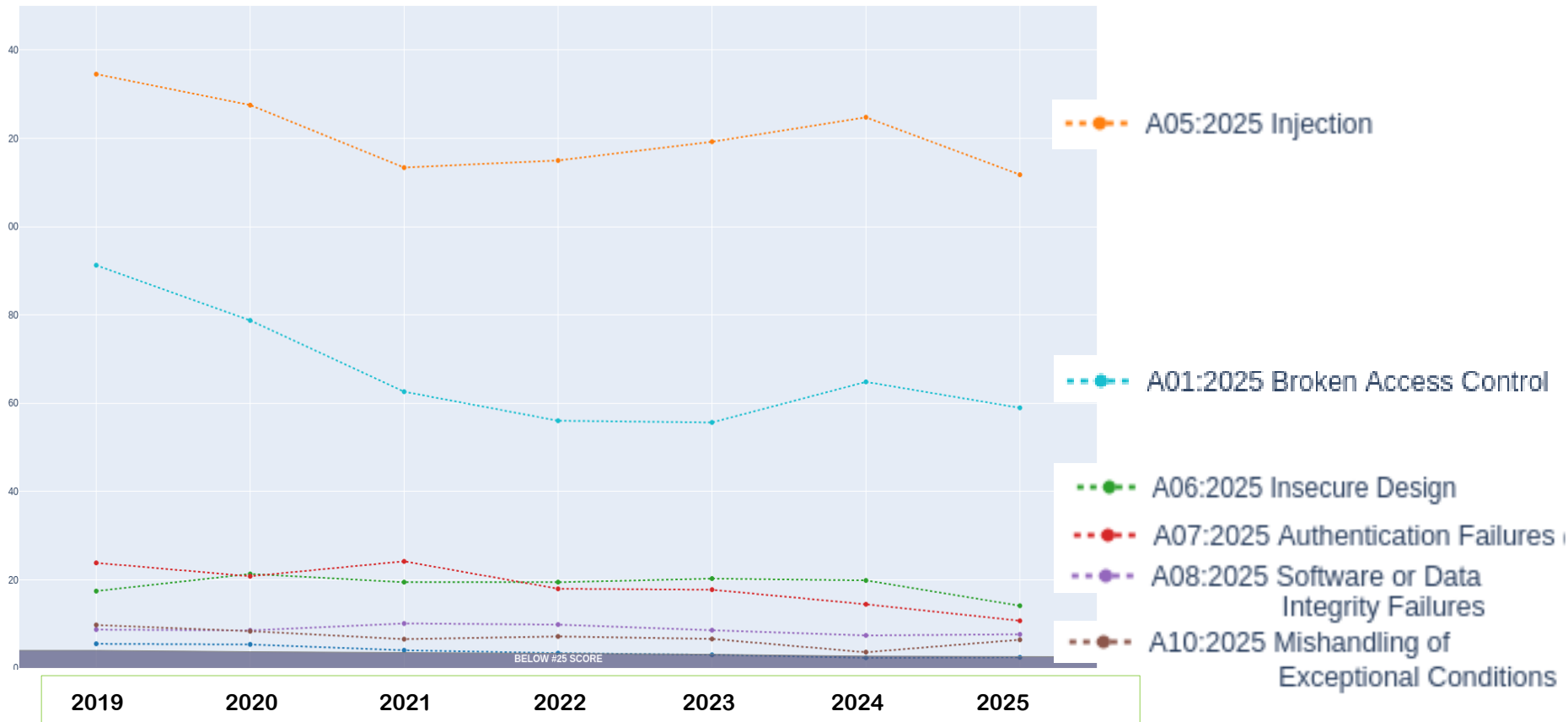
1. looking at **incidence** vs **frequency**
2. some flaws not showing up as CVEs

# CWE Top 25 trends (i.e. CVE trends)



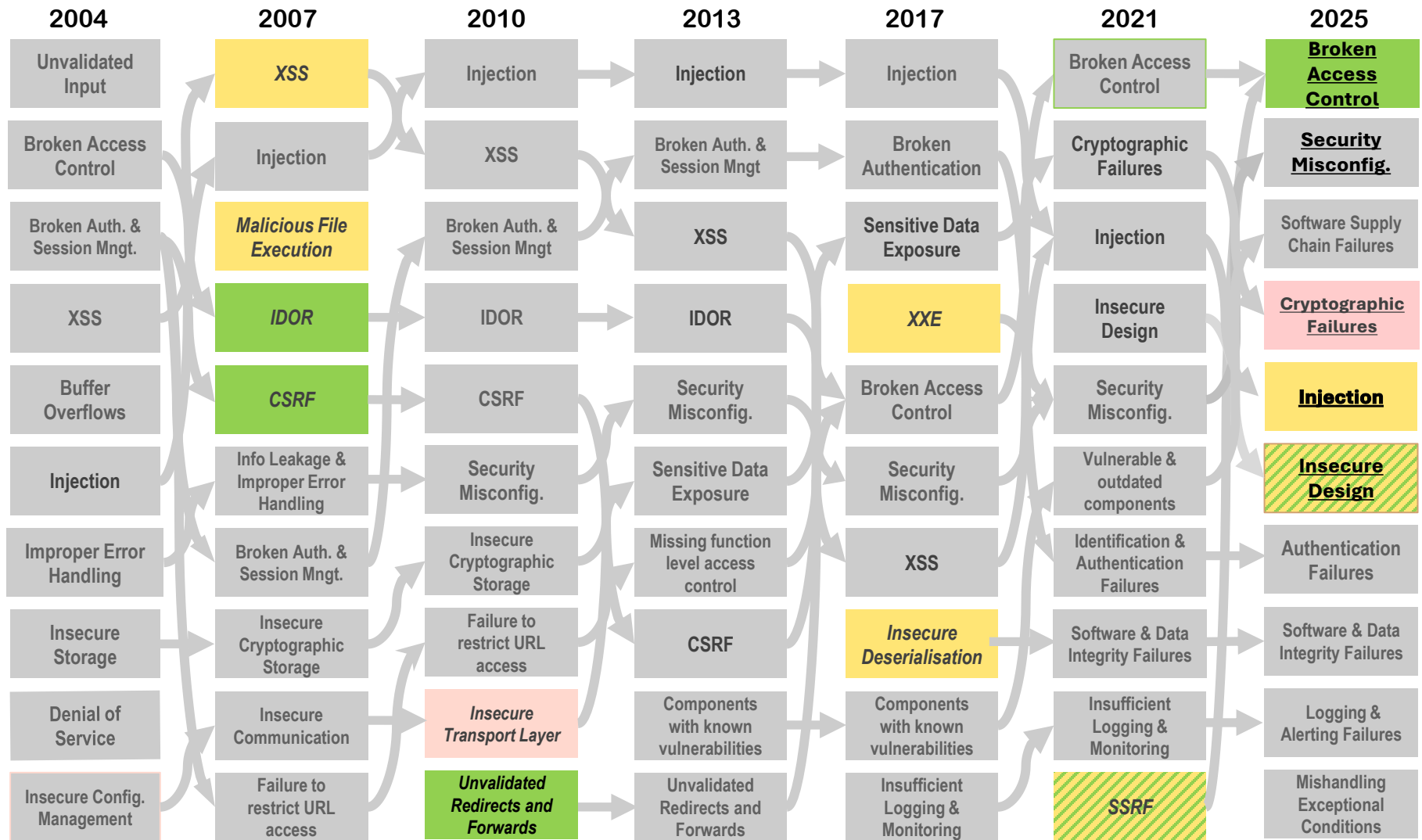
[faizilham.com/lab/cwe-owasp/ranks.html](https://faizilham.com/lab/cwe-owasp/ranks.html)

# CVE trends – aggregated in the OWASP Top 10 categories





# OWASP Trend: *specific* → generic Bad for awareness/actionability?



## 4. Cryptographic Failures

### (Password) Hashing

- CWE-261 Weak Encoding for Password
- CWE-328 Reversible One-Way Hash
- CWE-759 One-Way Hash without a Salt
- CWE-760 One-Way Hash with a Predictable Salt
- CWE-916 Password Hash With Insufficient Computational Effort

### Key management

- CWE-321 Use of Hard-coded Cryptographic Key
- CWE-320 Key Management Errors (Prohibited)

### Not using crypto

- CWE-523 Unprotected Transport of Credentials
- CWE-319 Cleartext Transmission of Sensitive Info

### Logic Flaws

- CWE-296 Improper Following of a Certificate Chain
- CWE-324 Use of a Key Past its Expiration Data
- CWE-347 Improper Verification of Crypt. Signature
- CWE-322 Key Exchange without Entity Authentication
- CWE-323 Reusing a Nonce, Key Pair in Encryption
- CWE-325 Missing Required Cryptographic Step
- CWE-757 Algorithm Downgrade

### Insecure crypto – i.e. real crypto failures?

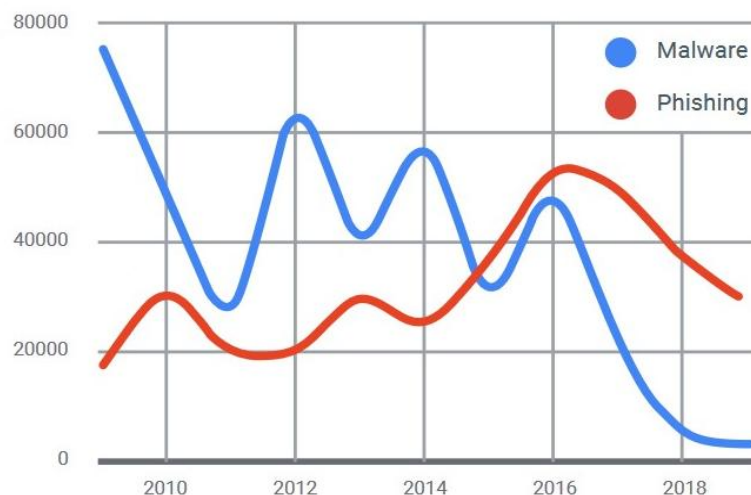
- CWE-326 Inadequate Encryption Strength
- CWE-327 Broken or Risky Cryptographic Algorithm
- CWE-780 RSA Algorithm without OAEP
- CWE-1240 Crypto Primitive with Risky Implementation

### Randomness

- CWE-329 Not Using a Random IV with CBC Mode
- CWE-330 Use of Insufficiently Random Values
- CWE-331 Insufficient Entropy
- CWE-332 Insufficient Entropy in PRNG
- CWE-334 Small Space of Random Values
- CWE-335 Incorrect Usage of Seeds in PRNG
- CWE-336 Same Seed in PRNG
- CWE-337 Predictable Seed in PRNG
- CWE-338 Use of Cryptographically Weak PRNG
- CWE-1241 Use of Predictable Algorithm in RNG
- CWE-340 Generation of Predictable Numbers or Identifiers
- CWE-342 Predictable Exact Value from Previous Values

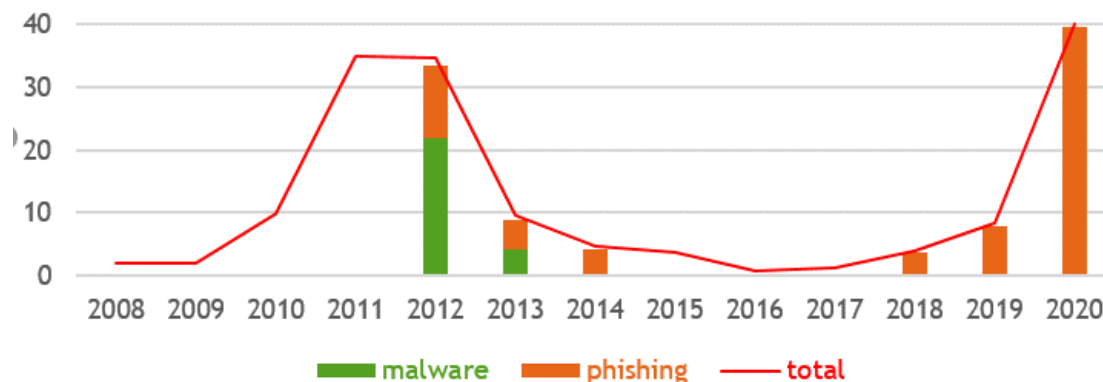
# Bigger trend: software vs wetware flaws

Exploit malware vs phishing detected by Google



[Source: Safe Browsing/  
Google Transparency Report]

## Internet banking losses in the Netherlands



[Source: Betaalvereniging]

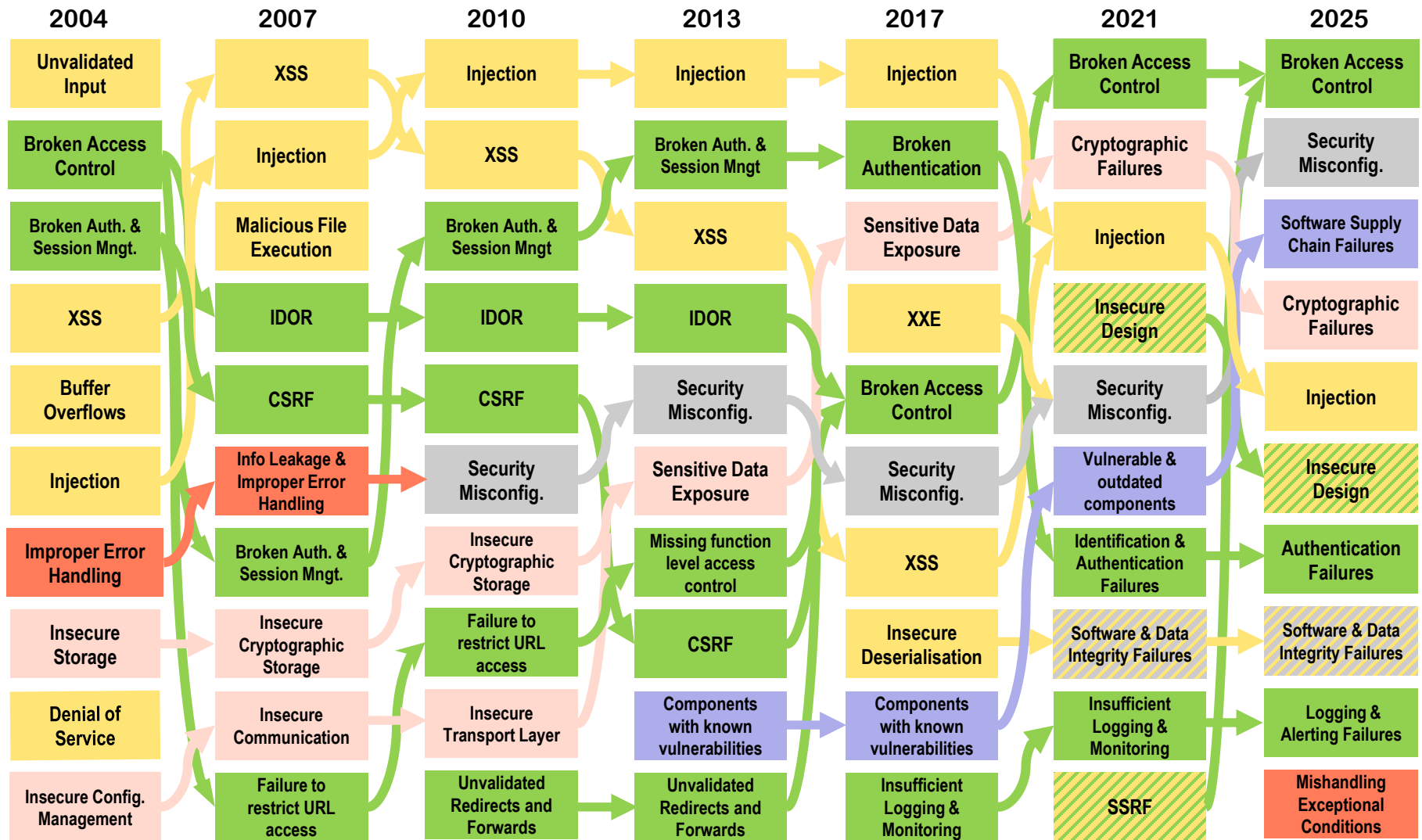
# Conclusions

- Classification and ranking security vulnerabilities is a messy business
- Trends are hard to spot, but
  - Supply chain issues on the rise
  - Injection problems on decline (thanks to better platforms & APIs?) but not if you look at frequency instead of incidence
  - Misconfiguration on the rise, due to more platforms & APIs?
- How to maximise awareness and actionability?

[faizilham.com/lab/cwe-owasp/ranks.html](https://faizilham.com/lab/cwe-owasp/ranks.html)



# Evolution of the OWASP Top 10



# 8. Software & Data Integrity Failures

## Input handling

- CWE-345 Insufficient Verification of Data Authenticity
- CWE-353 Missing Support for Integrity Check
- CWE-426 Untrusted Search Path
- CWE-427 Uncontrolled Search Path Element
- CWE-502 Deserialization of Untrusted Data
- CWE-565 Reliance on Cookies without Validation and Integrity Checking
- CWE-784 Reliance on Cookies without Validation and Integrity Checking  
in Security Decision
- CWE-915 Improperly Controlled Modification of Dynamically-Determined  
Object Attributes

## Code handling/software supply chain issues

- CWE-494 Download of Code Without Integrity Check
- CWE-829 Inclusion of Functionality from Untrusted Control Sphere
- CWE-830 Inclusion of Web Functionality from an Untrusted Source
- CWE-926 Improper Export of Android Application Components
- CWE-506 Embedded Malicious Code
- CWE-509 Replicating Malicious Code (Virus or Worm)

## 2. Security Misconfiguration

- CWE-15 External Control of System or Configuration Setting
- CWE-16 Configuration
- CWE-260 Password in Configuration File
- CWE-547 Use of Hard-coded, Security-relevant Constants
- CWE-489 Active Debug Code
- CWE-5 J2EE Misconfiguration: Data Transmission Without Encryption
- CWE-11 ASP.NET Misconfiguration: Creating Debug Binary
- CWE-13 ASP.NET Misconfiguration: Password in Configuration File
- CWE-1174 ASP.NET Misconfiguration: Improper Model Validation

### Cookies & CORS

- CWE-315 Cleartext Storage of Sensitive Information in a Cookie
- CWE-614 Sensitive Cookie in HTTPS Session Without 'Secure' Flag
- CWE-1004 Sensitive Cookie Without 'HttpOnly' Flag
- CWE-526 Exposure of Sensitive Information Through Environment Variables
- CWE-942 Permissive Cross-domain Policy with Untrusted Domains

### Injection attacks

- CWE-611 Improper Restriction of XML External Entity Reference
- CWE-776 XML Entity Expansion