Open Web Application Security Project

Welcome to OWASP

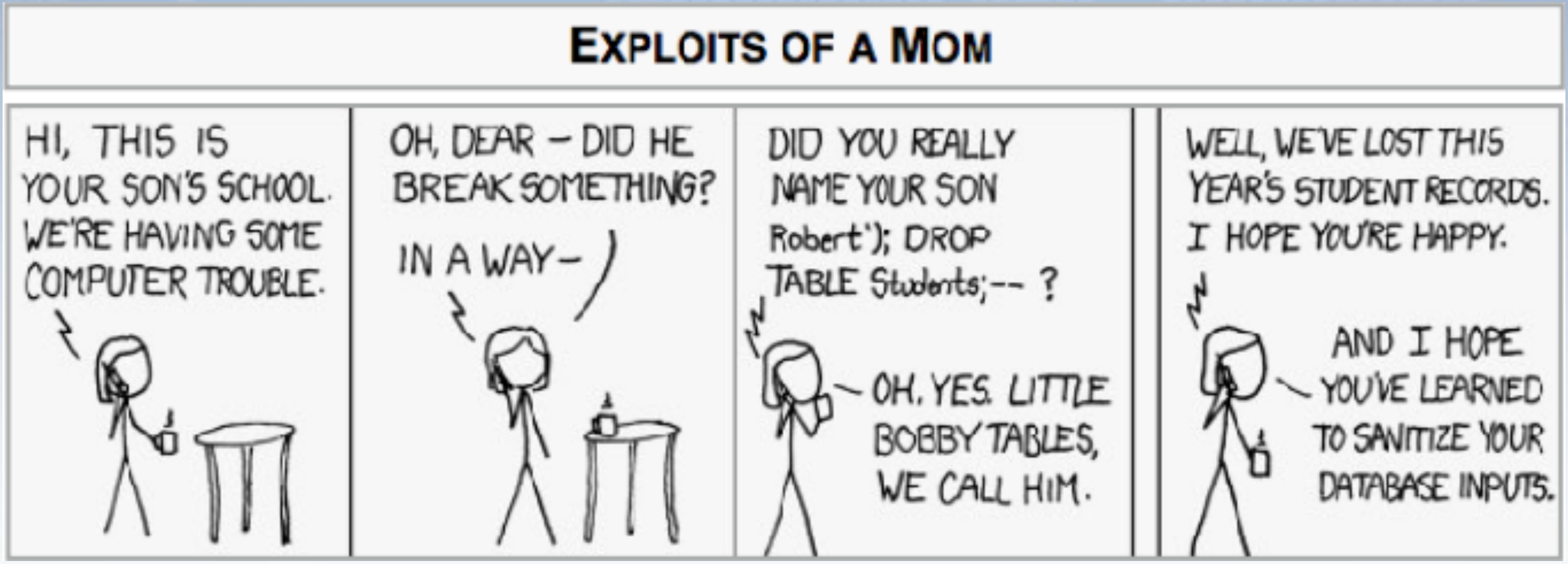
Sioux Falls Chapter

paul.kern@owasp.org

PAUL KERN

Announcements

- Infragard meeting this Thursday, Jan.18
  - Food at 1:00 - meeting at 1:30
  - University Center Room 253
  - Open to the public


EXPLOITS OF A MOM
HI, THIS IS YOUR SON'S SCHOOL. WE'RE HAVING SOME COMPUTER TROUBLE.
OH, DEAR – DID HE BREAK SOMETHING?
IN A WAY–
DID YOU REALLY NAME YOUR SON Robert'); DROP TABLE Students;-- ?
OH. YES. LITTLE BOBBY TABLES, WE CALL HIM.
WELL, WE'VE LOST THIS YEAR'S STUDENT RECORDS. I HOPE YOU'RE HAPPY.
AND I HOPE YOU'VE LEARNED TO SANITIZE YOUR DATABASE INPUTS.

https://xkcd.com/

https://www.explainxkcd.com/wiki/index.php/327:_Exploits_of_a_Mom

About OWASP

- Founded in December, 2001
- Open professional organization
- Focused on educating others about secure application development
- Numerous major projects being sponsored by the organization
- Projects need volunteers!

What OWASP Is

- 501c3 Non-Profit Professional Organization
- An international organization
- Free and open to anyone interested in learning about application security
- Maintainer of the OWASP Top 10 Project
- Maintainer of numerous open tools
- The sum of its **volunteer** members

What OWASP Is Not

- Affiliated with any technology company *
- A hacker club *
- Exclusionary
- An opportunity to advertise
- Solely beholden to application security

Why Sioux Falls?

- Growing community of IT pros
- Training options are limited
- Collaboration is good
- South Dakota has great resources
  - DSU, SDSM&T, SDSU, USD, et al.
  - Black Hills InfoSec/Wild West Hack Fest
- Why not Sioux Falls?
- Why not South Dakota?

Who Should Attend OWASP?

- Operational IT professionals of all stripes
- Executives and management
- Novices and students
- Hobbyists
- Anyone looking to learn
- CISSPs looking to earn more CPE credits

Membership

- Don’t have to be a member to attend
- Don’t have to be a member to present
- Don’t have to be a member to lead
- $50 a year if you decide to join
- 40% of dues can go to the local chapter
- Membership dues help our chapter operate
- https://www.owasp.org/index.php/Membership

Sioux Falls OWASP

- Leadership
  - Paul Kern - chapter leader
  - Joey Henkel - chapter co-leader
  - Scott Francis
  - Amanda Marczak
  - You?
- Chapter leaders will be voted on every two years.

Meeting Ideas

- We are always looking for meeting ideas
  - Speakers
  - Topics
  - Format suggestions
  - Venue suggestions
  - Time and date
- We aim to have quarterly meetings
- paul.kern@owasp.org
- joey.henkel@owasp.org

More Information

- https://www.owasp.org/index.php/Main_Page
- https://www.owasp.org/index.php/About_The_Open_Web_Application_Security_Project
- https://www.owasp.org/index.php/Sioux_Falls
- https://twitter.com/siouxfallsowasp
- https://www.facebook.com/OWASP-Sioux-Falls-1633373690053738/

OWASP WEB AP TOP 10

What is the OWASP Web Top 10?

- Original intent was to raise awareness.
- Has become the de facto application security standard.
- The latest version of the list was just released at the end of 2017.
- Previous version was released in 2013.
- Lots has changed in four years.

WHAT HAS CHANGED SINCE 2013?

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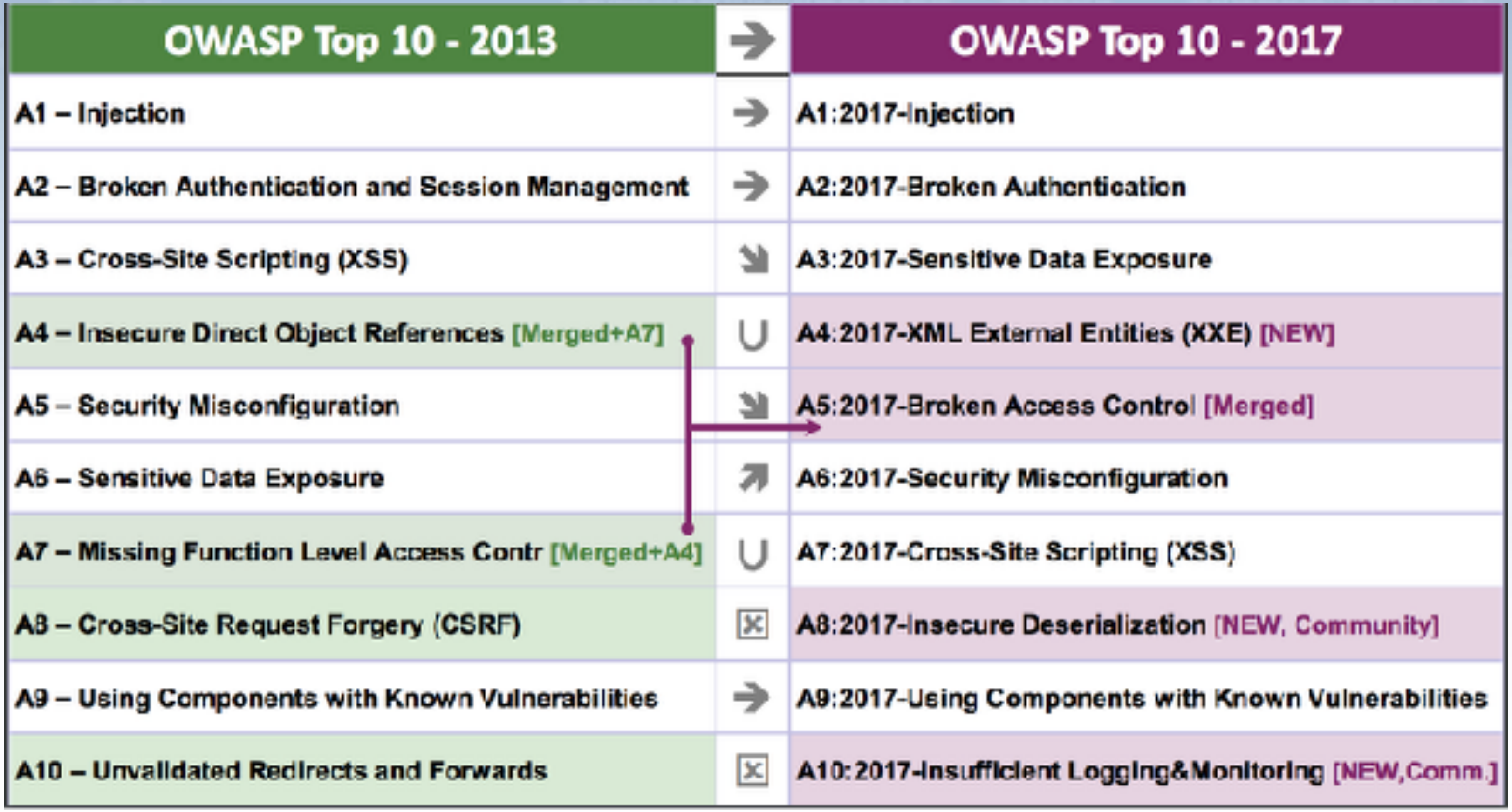
What has changed since 2013?

- JavaScript is now the king.
- Angular, Bootstrap, React, etc. on the client-side.
- Node.js handling the server-side
- Monolithic applications now being replaced with microservices.
- Advantages and drawbacks abound.

What has chanced since 2013?



OWASP Top 10 - 2013	→	OWASP Top 10 - 2017
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A8 – Cross-Site Request Forgery (CSRF)	☒	A8:2017-Insecure Deserialization [NEW, Community]
A9 – Using Components with Known Vulnerabilities	→	A9:2017-Using Components with Known Vulnerabilities
A10 – Unvalidated Redirects and Forwards	☒	A10:2017-Insufficient Logging&Monitoring [NEW,Comm.]

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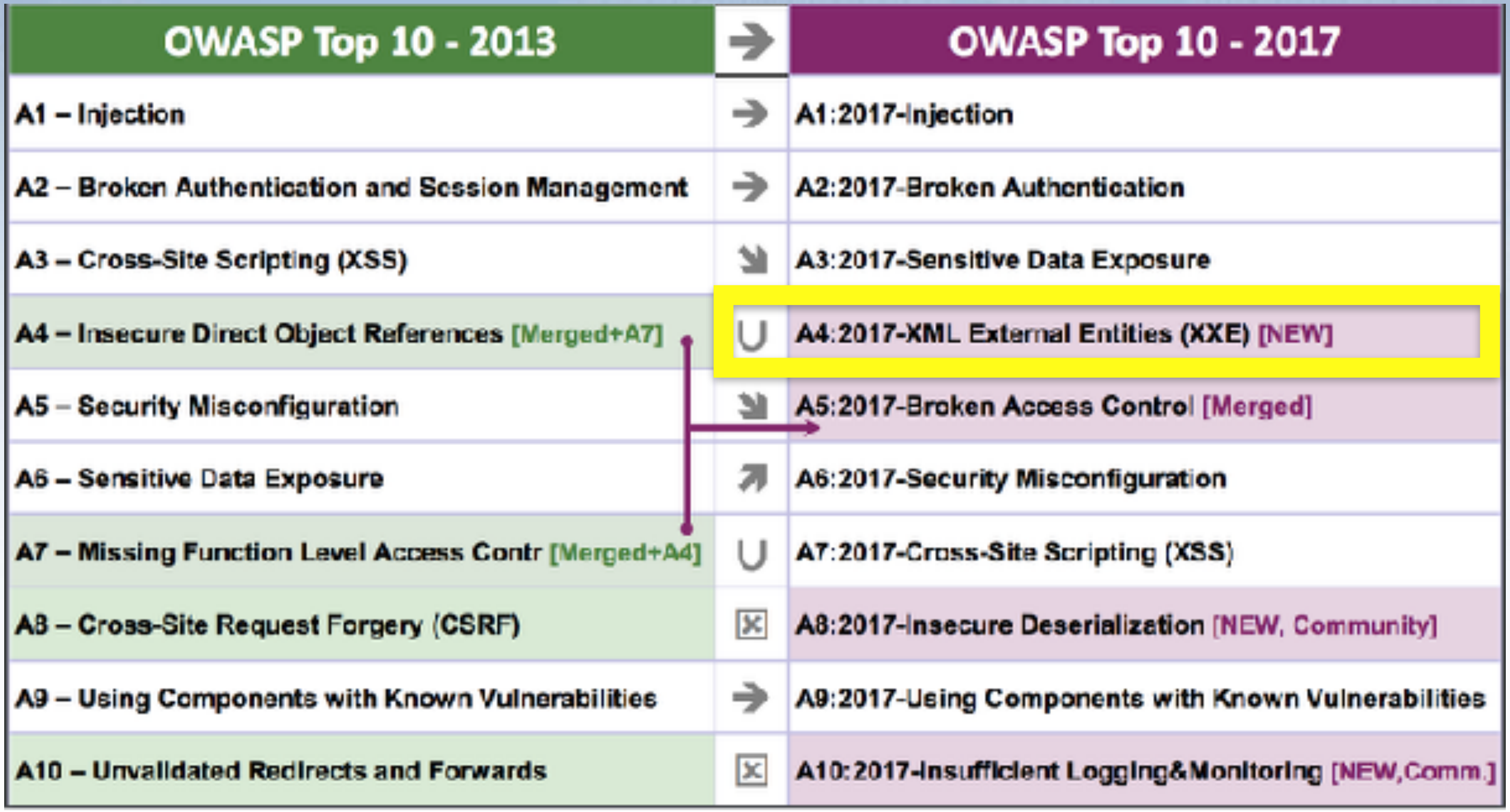
A4:2017 - XML External Entities (XXE)



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A4:2017 - XML External Entities (XXE)

Attack Vector

- Exploit vulnerable XML processors
  - many older XML processors allow access to external entities (aka URIs)
  - URIs are evaluated during XML processing
  - exploit XML processor using hostile content
  - extract data from system
  - remote code execution on server

A4:2017 - XML External Entities (XXE)

Example

The attacker attempts to extract data from the server:

```
<?xml version="1.0" encoding=“ISO-8859-1"?>
<!DOCTYPE foo [
<!ELEMENT foo ANY >
<!ENTITY xxe SYSTEM "file:///etc/passwd" >]>
<foo>&xxe;</foo>
```

A4:2017 - Who is at risk?

- Application accepts and processes direct XML or XML uploads
- XML processors or SOAP-based web services with document type definitions (DTD) enabled.
- Application uses SAML for SSO
- SOAP pre version 1.2

A4:2017 - What can be done?

- Use less complex formats like JSON
- Disable XML external entity and DTD processing
- Positive server-side input validation, filtering, sanitation
- W3C XML validation (XSD)
- https://www.owasp.org/index.php/XML_External_Entity_(XXE)_Prevention_Cheat_Sheet

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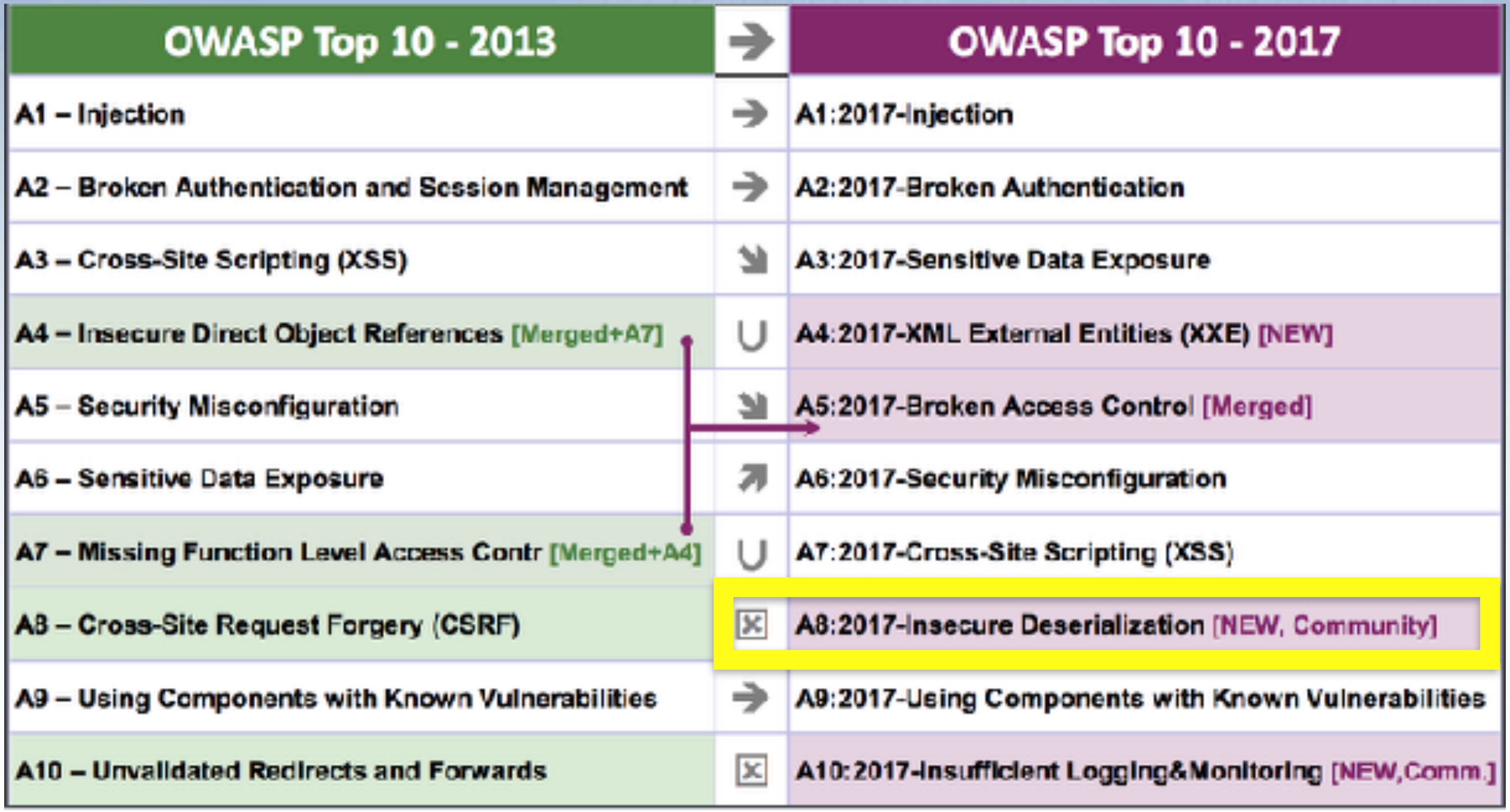
A8:2017 - Insecure Deserialization



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- Serialization - process of converting an object into a format that can be persisted to disk or sent across a network.
  - Can be binary
  - Structured Data (JSON and XML)
- Deserialization - the opposite. Converting data from a file, stream or network to an object to processed on the system.
- Affects most programming languages (JAVA)

A8:2017 - Insecure Deserialization

Attack Vector

- Occurs when untrusted data is used to abuse the logic of an application to cause DoS or cause remote code execution
- Somewhat difficult to pull off
- Off-the-shelf exploits almost always require tweaks to the underlying code
- Advanced Skill-set

A8:2017 - Insecure Deserialization

Example

A PHP forum uses PHP object serialization to save a "super" cookie, containing the user's user ID, role, password hash, and other state:

```
a:4:{i:0;i:132;i:1;s:7:"Mallory";i:2;s:4:"user";i:3;s:
32:"b6a8b3bea87fe0e05022f8f3c88bc960";}
```

An attacker is able to send tampered, serialized cookie data to give herself admin privileges when it is deserialized:

```
a:4:{i:0;i:1;i:1;s:5:”Alice";i:2;s:5:"admin";i:3;s:
32:"b6a8b3bea87fe0e05022f8f3c88bc960";}
```

A8:2017 - Who is at risk?

- Applications or APIs that could potentially deserialize tampered objects
- Pretty vague, huh?
- There are multiple ways that it can be accomplished.
- Varies by language, application structure, data flow, etc.

A8:2017 - What can be done?

- If possible, don’t accept serialized object from untrusted sources
- If possible, restrict to only primitive data types
- Integrity checks/digital signatures
- Isolate and run deserialization code in low privilege environments
- Logging and monitoring
- https://www.owasp.org/index.php/Deserialization_Cheat_Sheet

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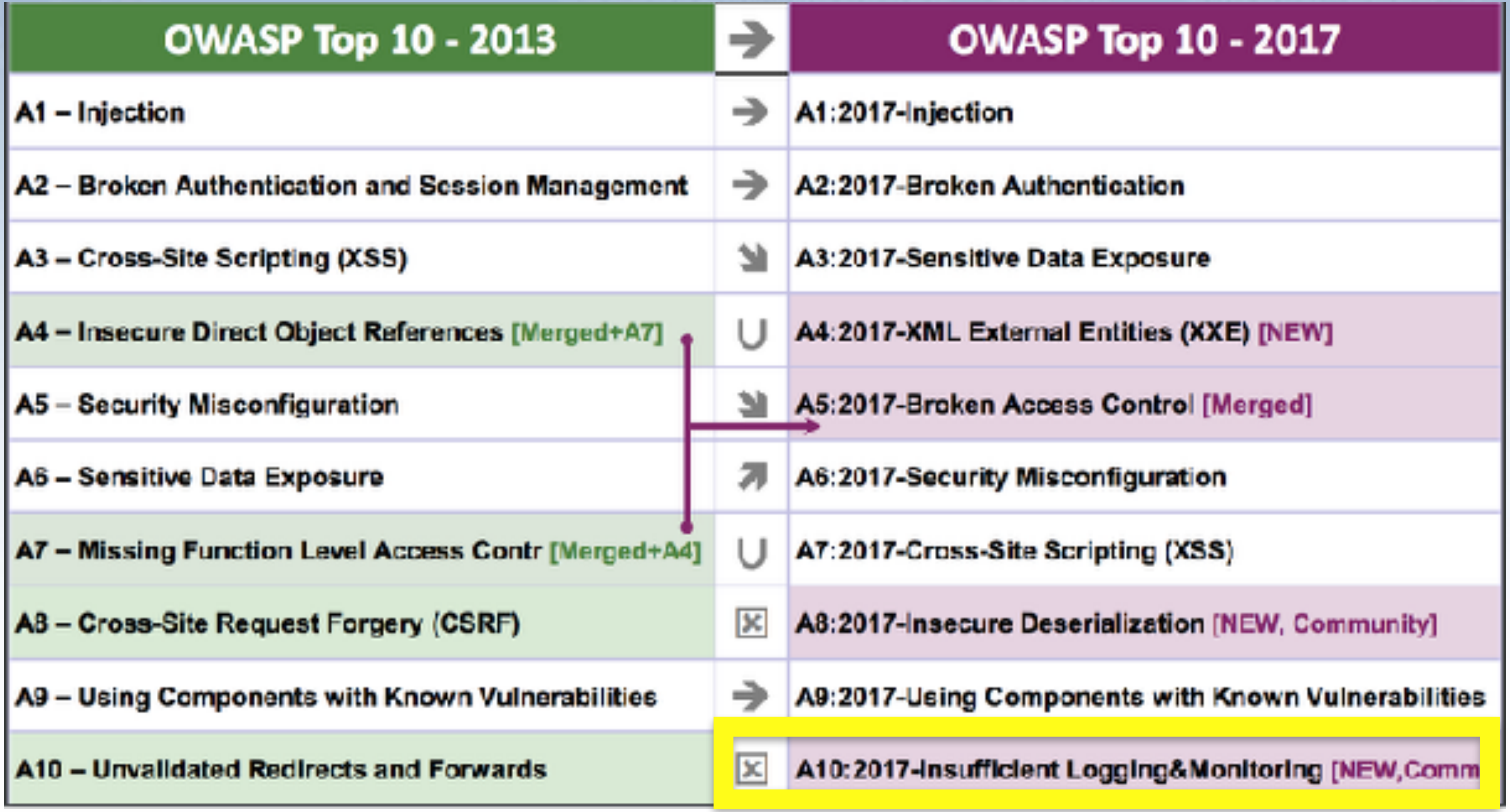
A10:2017 - Insufficient Logging & Monitoring



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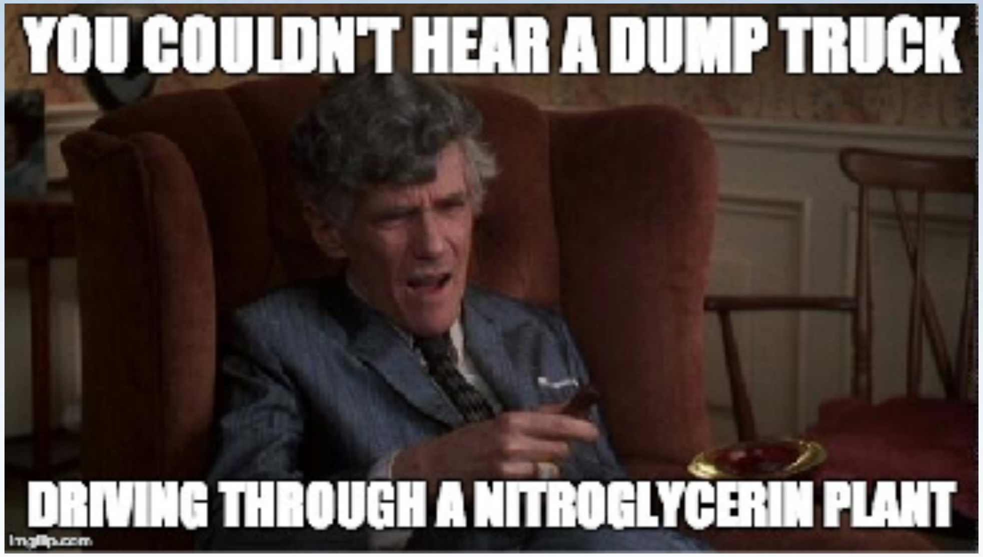
A10:2017 - Insufficient Logging & Monitoring

Attack Vector

- Nearly all major incidents have this item as their foundation
- Response time is critical
- Attackers rely on slow response times and poor logging to successfully pull off their attacks.


YOU COULDN'T HEAR A DUMP TRUCK
DRIVING THROUGH A NITROGLYCERIN PLANT
imgflip.com

A10:2017 - Who is at risk?

- Are you logging all authorization attempts, failed or otherwise?
- Are you logging warnings and errors?
- Are logs stored local to the application?
- Who is monitoring the logs and how often?
- What are alerting thresholds?
- Is alerting real-time?

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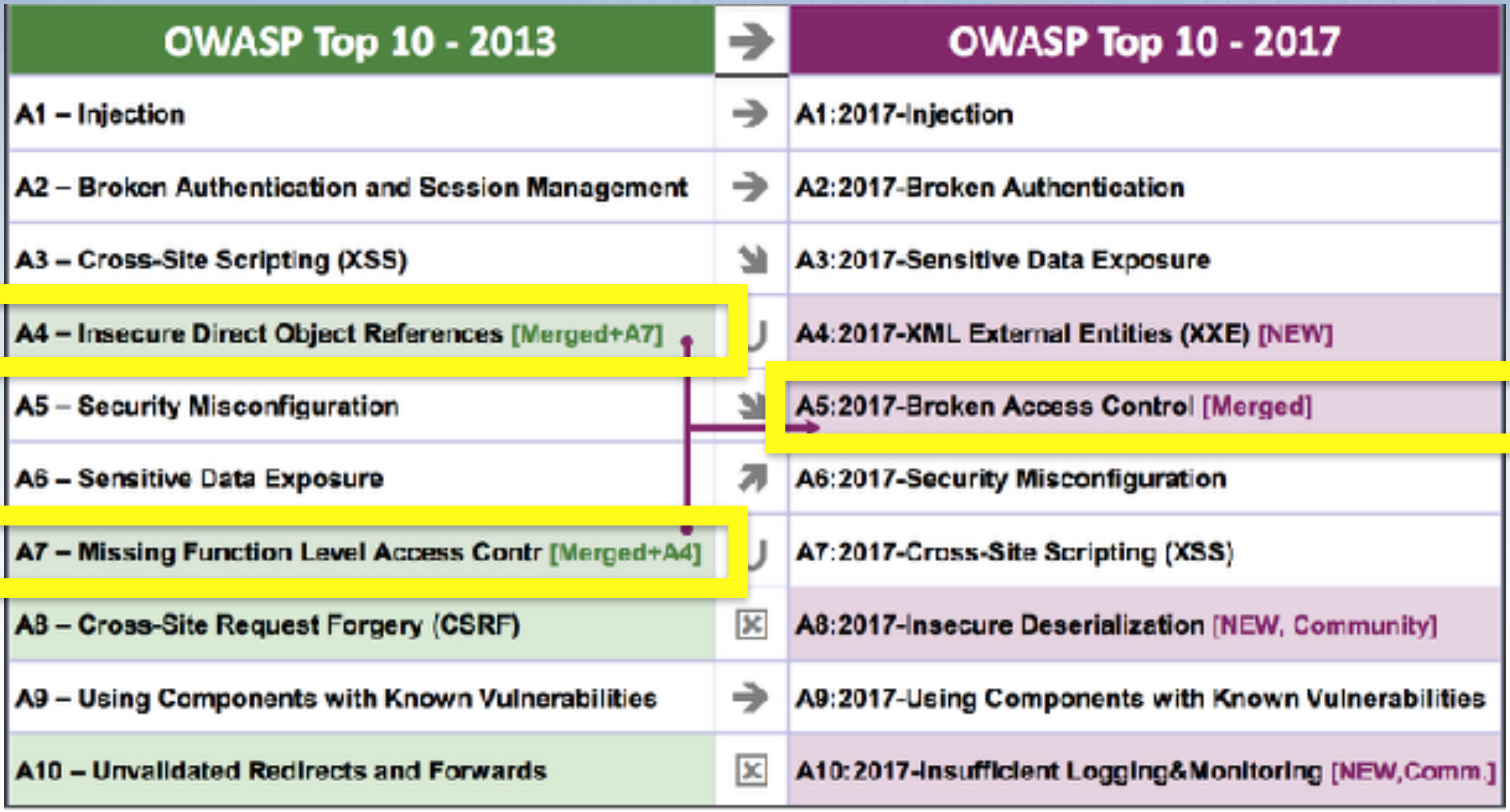
A10:2017 - What can be done?

- Standardize application logs and make sure they can be consumed by a SIEM
- Strong log monitoring processes
- Log all authentication attempts, warnings, input validation errors, etc.
- Identify and log high value transactions
- Develop an incident response plan
- https://www.owasp.org/index.php/Logging_Cheat_Sheet

A5:2017 - Broken Access Control



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A5:2017 - Broken Access Control

Attack Vector

- Core skill for most attackers
- This topic is very broad and not specific
- Multiple scenarios that can fall in this category
- SAST and DAST can test for absence of security controls, but can't verify functionality.
- Manual testing required

A5:2017 - Broken Access Control

Example

An application uses unverified data in a SQL call that is accessing account information:

```
pstmt.setString(1, request.getParameter(“acct"));
ResultSet results = pstmt.executeQuery( );
```

An attacker simply modifies the 'acct' parameter in the browser to send whatever account number they want. If not properly verified, the attacker can access any user's account.

http://example.com/app/accountInfo?acct=notmyacct

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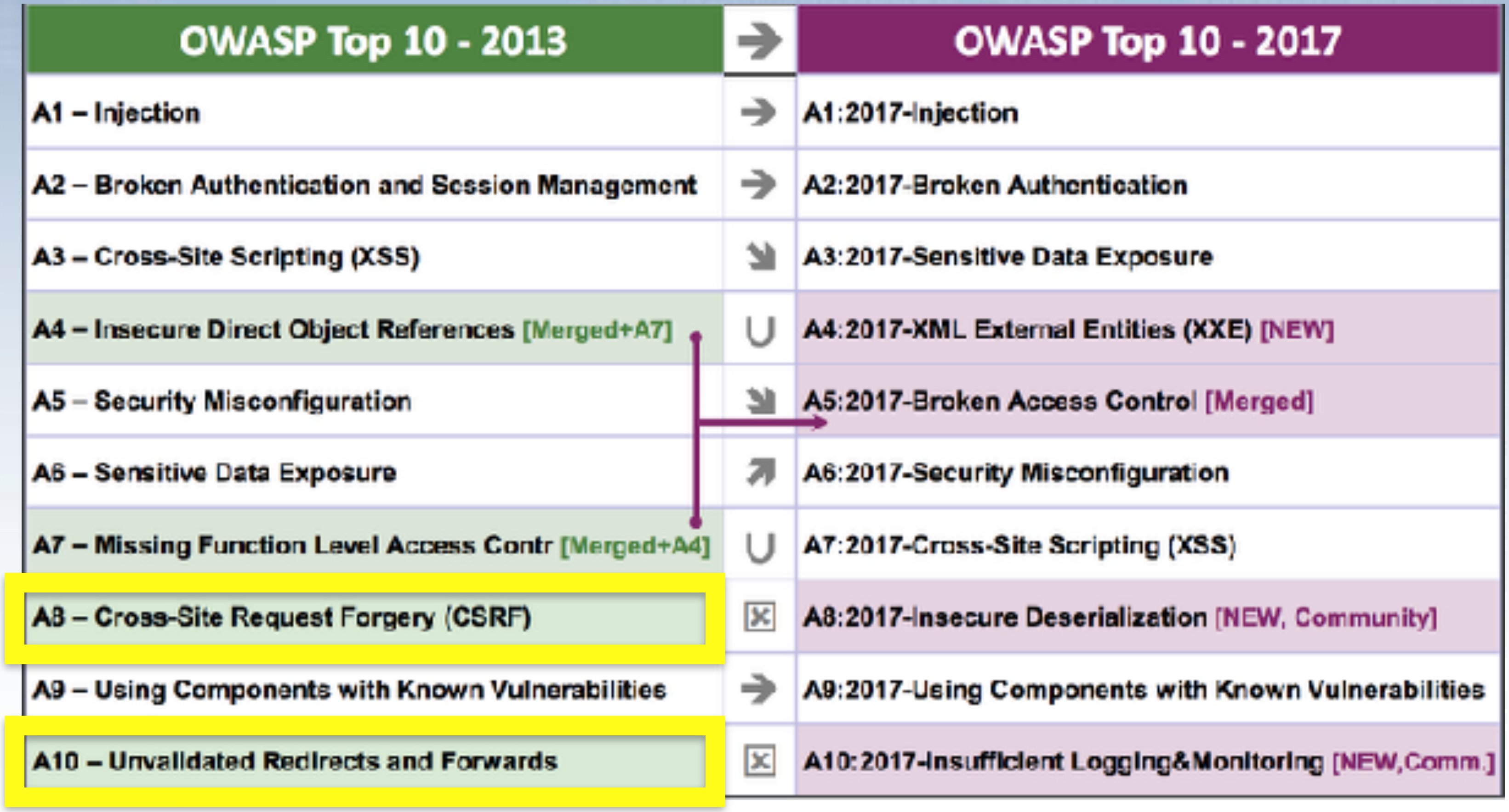
A5:2017 - Who is at risk?

- Can access control be bypassed by modifying the URL, HTML, or application state?
- Can I alter a DB primary key and access another user’s data?
- Can I accomplish privilege escalation?
- Can I force browse to authenticated pages an unauthenticated user?
- Can I force browse to admin as a non admin?

A5:2017 - What can be done?

- Non public resources? Deny by default.
- Implement access control mechanisms once and reuse them.
- Enforce user record ownership controls
- Disable directory listing/clean up root
- https://www.owasp.org/index.php/Access_Control_Cheat_Sheet

Gone, But Not Forgotten



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Gone But Not Forgotten

- **A8 Cross Site Request Forgery**
  - Less than 5% of the data set today supports CSRF. Places it at about number 13.
- **A10 Unvalidated redirects and forwards.**
  - Less than 1% of the data set supports this issue today. Places it around number 25
- **Do we ignore these if found?**

OWASP 2017 Top 10 RC2

https://www.owasp.org/images/7/72/OWASP_Top_10-2017_%28en%29.pdf.pdf

QUESTIONS?

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