Penerapan Vulanerability Assessment dan Penetration Test Bagi Pelaksanaan Audit Keamanan Informasi Sektor Pemerintah

BADAN SIBER DAN SANDI NEGARA

Anggrahito, S.ST., S.T.
Sandiman Muda padaPusat Pengkajian dan Pengembangan Teknologi Keamanan SIber dan Sandi

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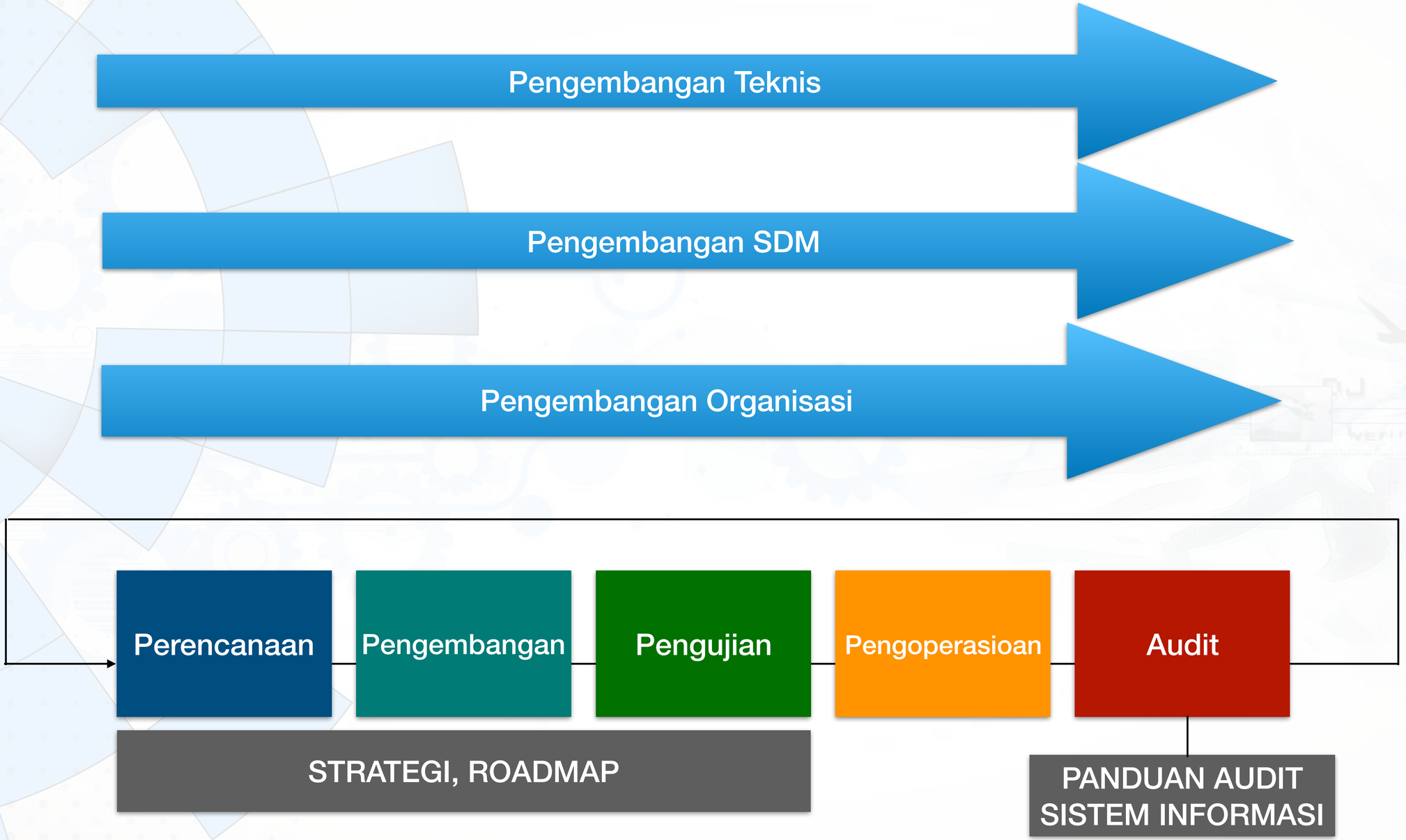
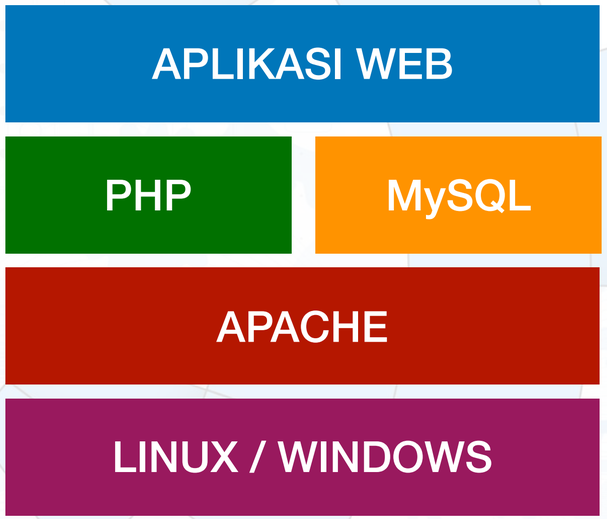
E-GOV PROBLEMS

- Tidak Berkesinambungan antara pengembangan sistem secara multiyear
- Tidak Mampu Bertukar Data
- Beragam Sistem :
  - Beragam metode pengembangan dari pihak ke-3
  - Beragam jenis Teknologi
  - Beragam Jenis Format Data
  - Beragam Jenis Program
- Kurangnya Dukungan Organisasi dan SDM
- Tidak Terverifikasi ;
  - Sistem yang dikembangkan dan kebutuhan pengguna tidak sesuai
  - Rendahnya kinerja sistem dikarenakan tidak adanya tahapan ujicoba yang telah ditetapkan

KESINAMBUNGAN SISTEM



APLIKASI WEB PADA UMUMNYA



Apakah struktur tersebut cukup aman?

- Kesalahan terbanyak terjadi di aplikasi web (SQL injection, XSS, Denial of Service dan sebagainya)
- Bila aplikasi web (misal CMS, menggunakan aplikasi populer yang “Free” apakah tidak beresiko?
- Kebanyakan situs pemerintah down karena request besar

CELAH KERAWANAN APLIKASI SIPKD (HTTP.sys)

Celah kerawanan pada file :

- /js/lookup.js
- /js/common.js

Celah kerawanan dengan merequest file tersebut sebesar 18446744073709551615 Bytes Maka Windows Server akan Crash (DOS)

Vulnerability Name:	**HTTP.sys Allows Remote Code Execution (MS15-034, Network Check)**
Test ID:	17622
Risk:	High
Category:	Web servers
Type:	Attack
Summary:	HTTP.sys in Microsoft Windows 7 SP1, Windows Server 2008 R2 SP1, Windows 8, Windows 8.1, and Windows Server 2012 Gold and R2 allows remote attackers to execute arbitrary code via crafted HTTP requests, aka "HTTP.sys Remote Code Execution Vulnerability."
Impact:	A remote attacker can exploit this to execute arbitrary code with SYSTEM privileges.
Solution:	https://technet.microsoft.com/en-us/library/security/ms15-034
CVE:	CVE-2015-1635
More Information:	https://technet.microsoft.com/en-us/library/security/ms15-034
Nist NVD (CVSS):	AV:N/AC:L/Au:N/C:C/I:C/A:C
CVSS Score:	10.0

Microsoft Patch : https://docs.microsoft.com/en-us/security-updates/securitybulletins/2015/ms15-034

CELAH KERAWANAN FRAMEWORK LOKOMEDIA

Masih banyak Website Pemerintah menggunakan Framework gratis yang belum dilakukan verifikasi dalam membuat Sistem Informasi, sebagai contoh penggunaan Framework Lokomedia CMS

view-source:http://[redacted].go.id/[redacted]union

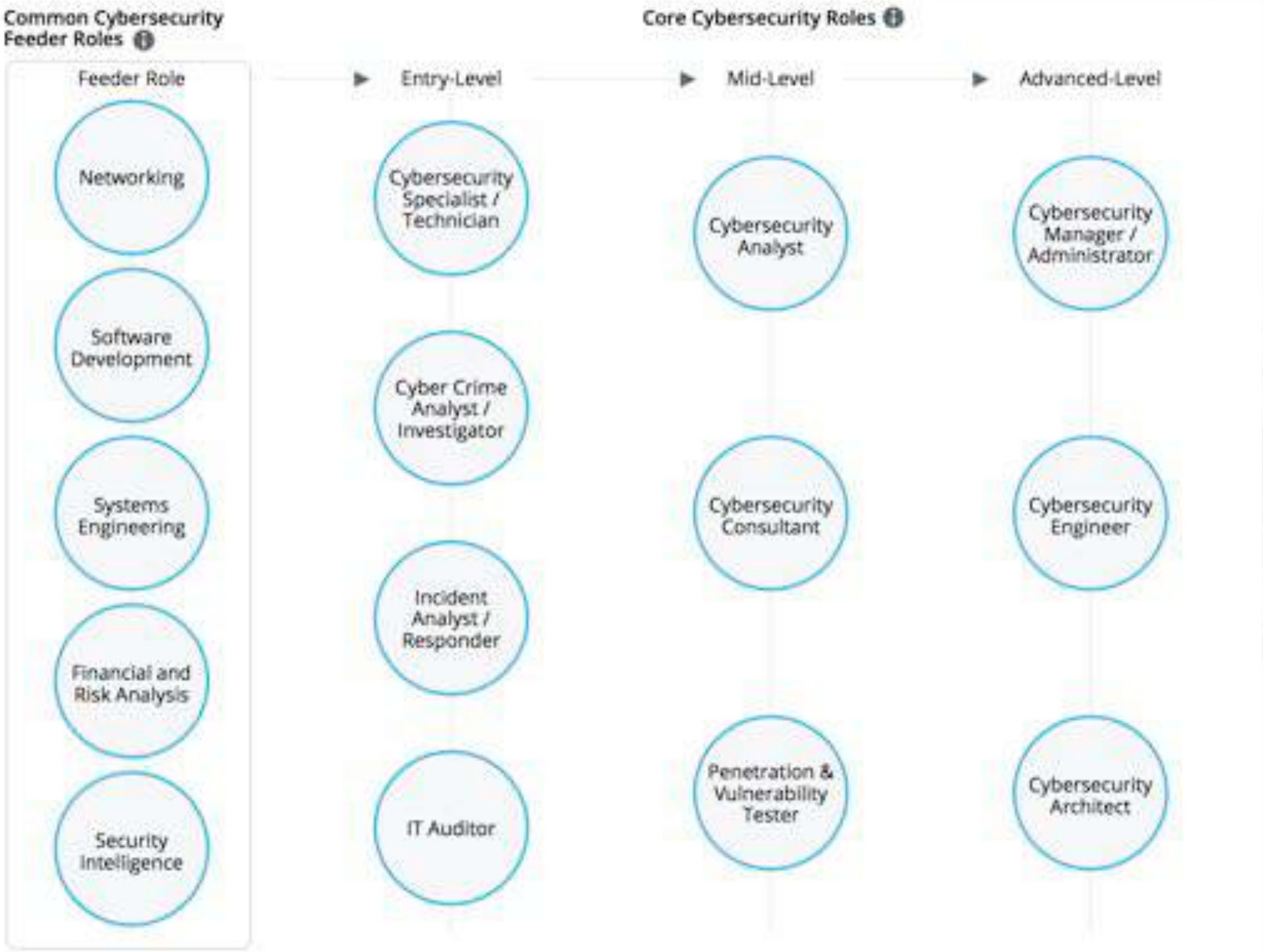
```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-tr
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<title>admin 43347a112[redacted]</title>

<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<meta name="robots" content="index, follow">
<meta name="description" content="admin 43347a[redacted]">
<meta name="keywords" content="admin 43347[redacted]">
<meta http-equiv="Copyright" content="lokomedia">
<meta name="author" content="[redacted]">
<meta http-equiv="imagetoolbar" content="no">
<meta name="language" content="Indonesia">
<meta name="revisit-after" content="7">
<meta name="webcrawlers" content="all">
<meta name="rating" content="general">
<meta name="spiders" content="all">

<link rel="shortcut icon" href="favicon.ico" />
<link rel="alternate" type="application/rss+xml" title="RSS 2.0" href="rss.xml" />
<link rel="stylesheet" href="templates/eljquery-yahoo/css/style.css" type="text/css" />
<link rel="stylesheet" href="templates/eljquery-yahoo/css/ticker.css" type="text/css" />
<link rel="stylesheet" href="templates/eljquery-yahoo/themes/base.css" type="text/css" />
<link rel="stylesheet" href="templates/eljquery-yahoo/themes/default/theme.css" type="text/css" />
<link rel="stylesheet" href="templates/eljquery2/css/style.css" type="text/css" />

<script src="templates/eljquery-yahoo/js/jquery-1.4.min.js" type="text/javascript"></script>
<script type="text/javascript" src="templates/eljquery-yahoo/js/flowplayer-3.2.4.min.js"></script>
<script src="templates/eljquery-yahoo/js/superfish.js" type="text/javascript"></script>
<script src="templates/eljquery-yahoo/js/hoverIntent.js" type="text/javascript"></script>

<script src="templates/eljquery2/js/jquery-1.4.js" type="text/javascript"></script>
<script src="templates/eljquery2/js/jquery.tipsy.js" type="text/javascript"></script>
```

Penggunaan Lokomedia CMS pada website Pemerintah perlu diantisipasi karena memiliki celah kerawanan yang critical

BSSN

CYBERSECURITY CAREER PATHWAY

Pada gambar disamping memperlihatkan jenjang karir yang ideal dibidang keamanan siber. Terdapat beberapa tingkat yaitu mulai dari Feeder Role - Entry Level - Mid Level - Advanced Level



Sumber : https://www.cyberseek.org/pathway.html
di akses Tanggal : 18 Juli 2018

Peraturan Menteri Kominfo No. 4 Tahun 2016 Tentang Sistem Manajemen Pengamanan Informasi

Sistem Elektronik	Definisi (draft)	Tenaga Ahli	Penerapan	Penyelenggaraan
SE Strategis	sistem elektronik yang **berdampak serius** terhadap kepentingan umum, pelayanan publik, kelancaran **penyelenggaraan negara, atau pertahanan dan keamanan negara.**	Internal/ Eksternal WNI	SNI 27001	Wajib Sertifikasi SNI 27001 oleh Lembaga Sertifikasi
SE beresiko Tinggi	Sistem elektronik yang berdampak terhadap tercapainya **tujuan organisasi.**	Internal/Ekternal	SNI 27001	Wajib Sertifikasi SNI 27001 oleh Lembaga Sertifikasi
SE beresiko Rendah	Sistem Elektronik yang tidak termasuk Sistem Elektronik Strategis dan Sistem Elektronik Tinggi.	Internal/ Eksternal	Indeks KAMI	Dapat dilakukan

SECURITY PLAN

Elements of IT Security Program

- Good Planning
- Good Operations
- Continous Assessment
- Good Management Oversight

ISO 27001 Control Objective A12.6 (Technical Vulnerability Management) menyatakan bahwa "informasi tentang kerentanan teknis dari sistem informasi yang digunakan harus diperoleh secara tepat waktu, paparan organisasi terhadap kerentanan tersebut dievaluasi dan tindakan yang tepat diambil untuk mengatasi risiko terkait".

Penetration testing membantu mengindentifikasi celah kerawanan dan memberikan detail tentang celah kerawanan atau ancaman yang terdapat pada sistem, serta memberikan panduan bagaimana cara mengatasinya. Serangan dan celah kerawanan yang teridentifikasi sebagai input risk *assessment*, dan menjadi informasi bagi tindakan perbaikan pada kontrol audit.

- Proses Pentest akan memberikan kontribusi signifikan terhadap proses audit ISMS sebagai bagian dari analisis resiko. Kerentanan apliaksi web, sistem internal dan aplikasi dapat diidentifikasi terkait dengan ancamannya;
- Sebagai bagian dari rencana perawatan resiko yang memungkinkan untuk memastikan semua tindakan yang dilaksanakan berfungsi sebagai mana mestinya;
- Sebagai bagian dari perbaikan terus menerus dari proses untuk memastikan bahwa langkah-langkahnya berfungsi dengan baik dan bahwa ancaman serta kerentanan baru yang muncul diidentifikasi dan diperbaiki.

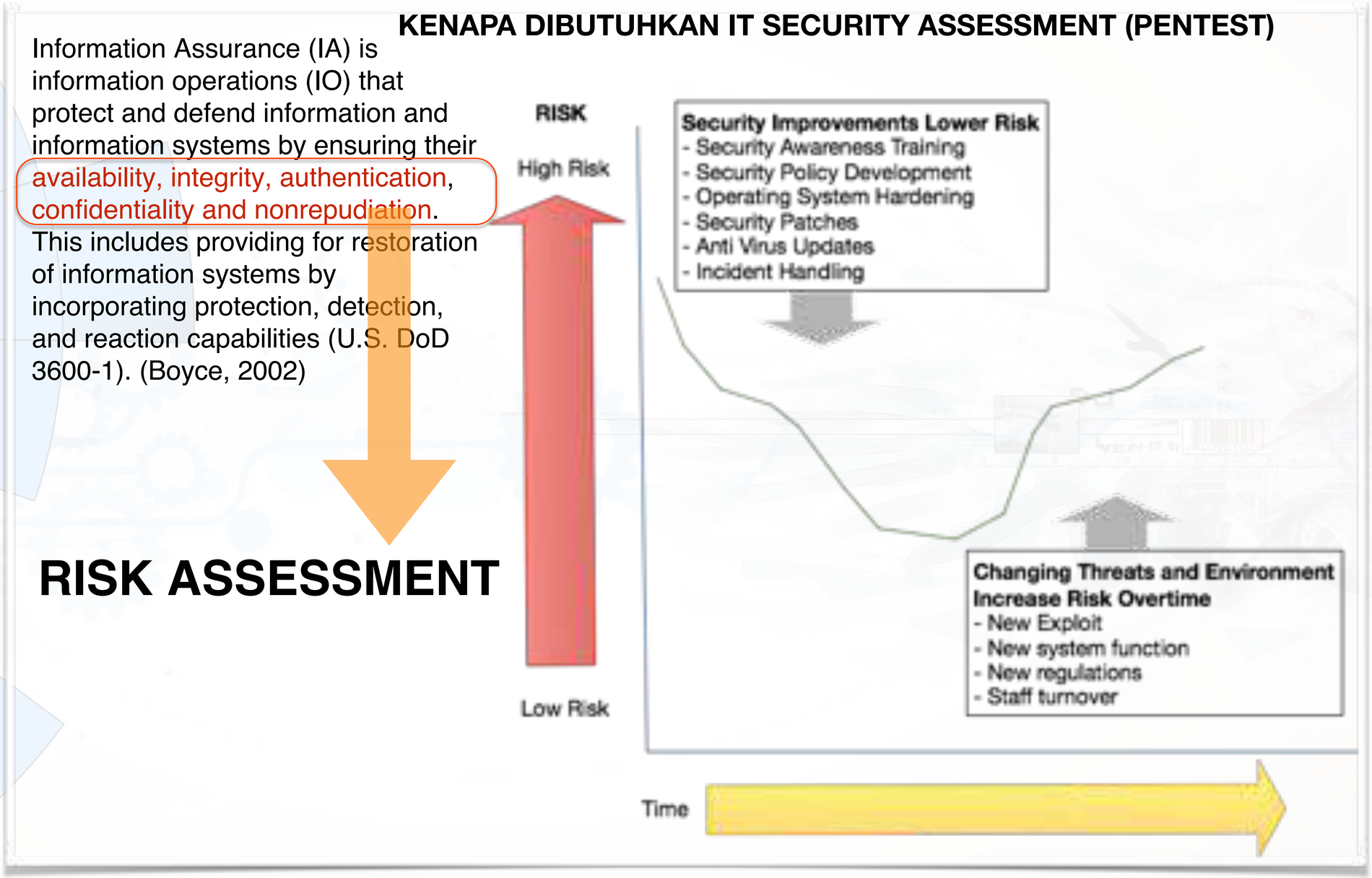
WHY..?

Penetration Test is one of the most effective ways to identify weakness and deficiencies in these Programs

KENAPA DIBUTUHKAN IT SECURITY ASSESSMENT (PENTEST)

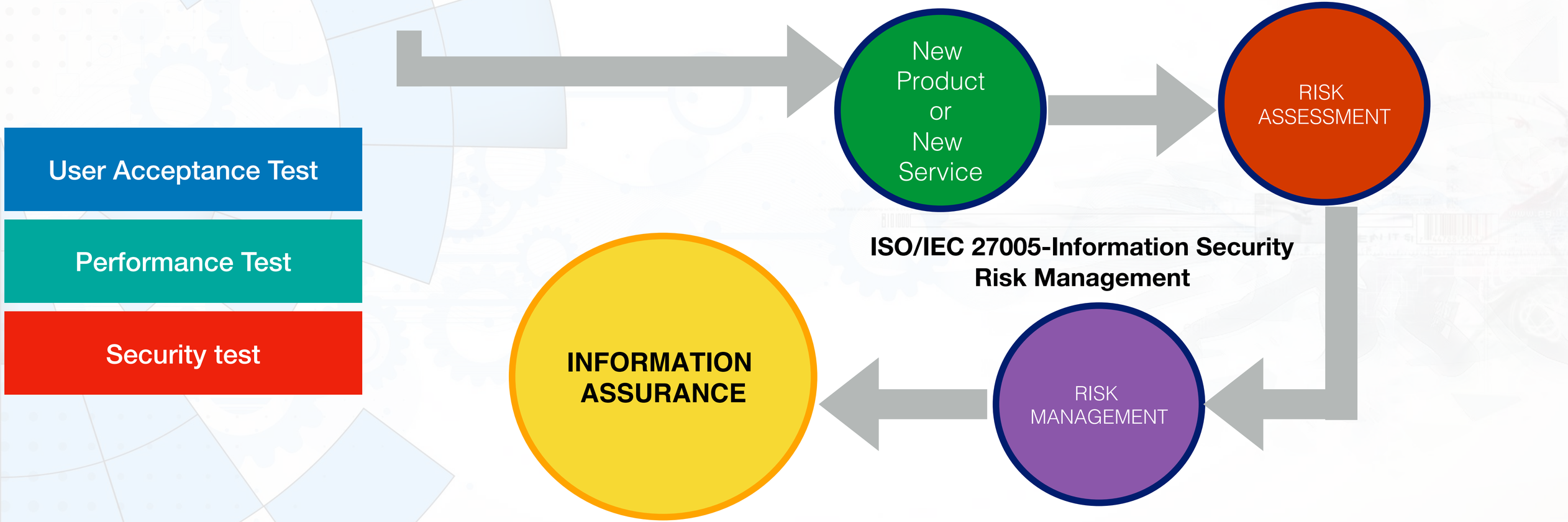
Information Assurance (IA) is information operations (IO) that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality and nonrepudiation. This includes providing for restoration of information systems by incorporating protection, detection, and reaction capabilities (U.S. DoD 3600-1). (Boyce, 2002)

RISK ASSESSMENT



WHEN— KAPAN DILAKUKAN IT SECURITY ASSESSMENT (PENTEST)

Standar Penilaian IT Sec. Assessment Lemsaneg :
TOP 10 OWASP & Risk Rating OWASP



OWASP TOP 10 VULNERABILITIES

OWASP Top 10 - 2013	→	OWASP Top 10 - 2017
A1 – Injection	→	A1:2017-Injection
A2 – Broken Authentication and Session Management	→	A2:2017-Broken Authentication
A3 – Cross-Site Scripting (XSS)	↘	A3:2017-Sensitive Data Exposure
A4 – Insecure Direct Object References [Merged+A7]	∪	A4:2017-XML External Entities (XXE) [NEW]
A5 – Security Misconfiguration	↘	A5:2017-Broken Access Control [Merged]
A6 – Sensitive Data Exposure	↗	A6:2017-Security Misconfiguration
A7 – Missing Function Level Access Contr [Merged+A4]	∪	A7:2017-Cross-Site Scripting (XSS)
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.]

RISK = LIKELIHOOD * IMPACT

STEP 1 : Identifying Risk
STEP 2 : Factors for Estimating Likelihood
STEP 3 : Factors for Estimating Impact
STEP 4 : Determining Severity of the Risk
STEP 5 : Decideing What to Fix
SETP 6 : Costumizing Your Risk Rating Model

OWASP RISK RATING

Sumber : https://www.owasp.org/images/5/5b/OWASP_Risk_Rating_Template_Example.xlsx

Likelihood								
Threat agent factors					Vulnerability factors			
Skill level	Motive	Opportunity	Size		Ease of discovery	Ease of exploit	Awareness	Intrusion detection
4 - Advanced computer user	1 - Low or no reward	4 - Special access or resources required	5 - Partners		3 - Difficult	3 - Difficult	4 - Hidden	3 - Logged and reviewed
Overall likelihood:			3,375	MEDIUM				

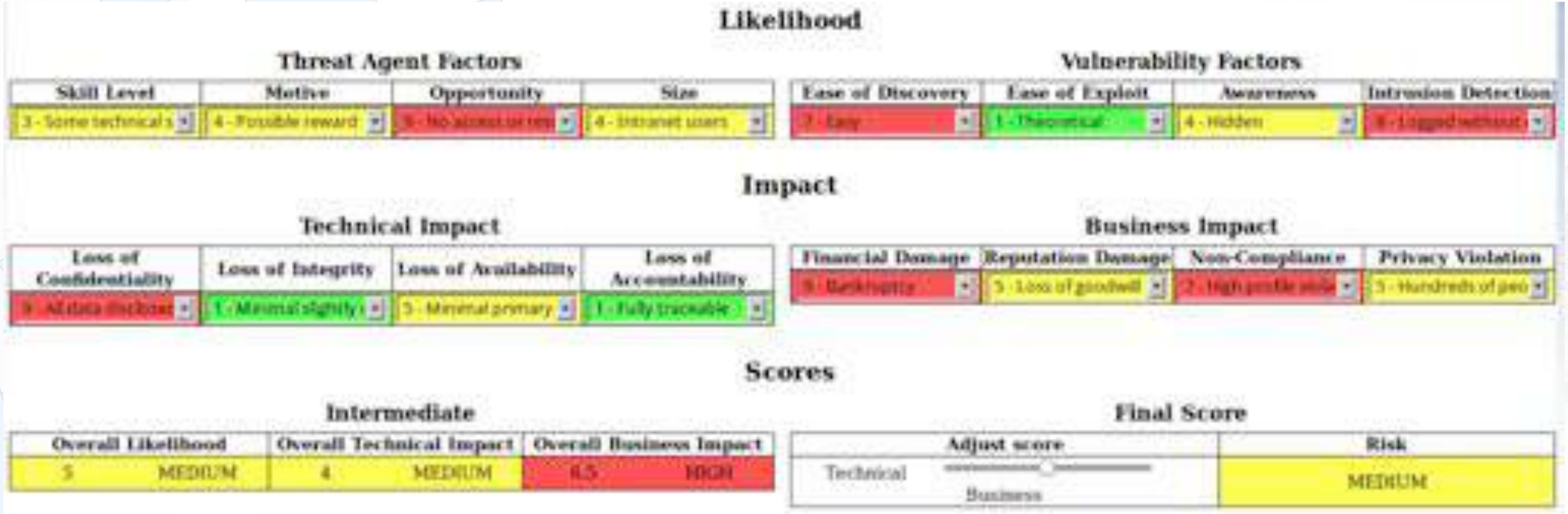
Technical Impact					Business Impact			
Loss of confidentiality	Loss of integrity	Loss of availability	Loss of accountability		Financial damage	Reputation damage	Non-compliance	Privacy violation
2 - Minimal non-sensitive data disclosed	1 - Minimal slightly corrupt data	5 - Minimal primary services interrupted, extensive secondary services interrupted	9 - Completely anonymous		1 - Less than the cost to fix the vulnerability	1 - Minimal damage	5 - Clear violation	5 - Hundreds of people
Overall technical impact:		4,250	MEDIUM		Overall business impact:		3,000	MEDIUM
Overall impact:			3,625	MEDIUM				

Overall Risk Severity = Likelihood x Impact				
Impact	HIGH	Medium	High	Critical
	MEDIUM	Low	Medium	High
	LOW	Note	Low	Medium
		LOW	MEDIUM	HIGH
		Likelihood		

Likelihood and Impact Levels	
0 to <3	LOW
3 to <6	MEDIUM
6 to 9	HIGH

OWASP RISK RATING

Sumber : https://gist.github.com/ErosLever/f72bc0750af4d2e75c3a



Likelihood

Threat Agent Factors

Skill Level	Motive	Opportunity	Size
3 - Some technical s	4 - Possible reward	3 - No access or res	4 - Intranet users

Vulnerability Factors

Ease of Discovery	Ease of Exploit	Awareness	Intrusion Detection
7 - Easy	1 - Theoretical	4 - Hidden	8 - Logged without

Impact

Technical Impact

Loss of Confidentiality	Loss of Integrity	Loss of Availability	Loss of Accountability
9 - All data disclosed	1 - Minimal slightly c	5 - Minimal primary	1 - Fully traceable

Business Impact

Financial Damage	Reputation Damage	Non-Compliance	Privacy Violation
9 - Bankruptcy	5 - Loss of goodwill	7 - High profile viola	5 - Hundreds of peo

Scores

Intermediate

Overall Likelihood	Overall Technical Impact	Overall Business Impact
5 MEDIUM	4 MEDIUM	6.5 HIGH

Final Score

Adjust score	Risk
Technical ——— Business	MEDIUM

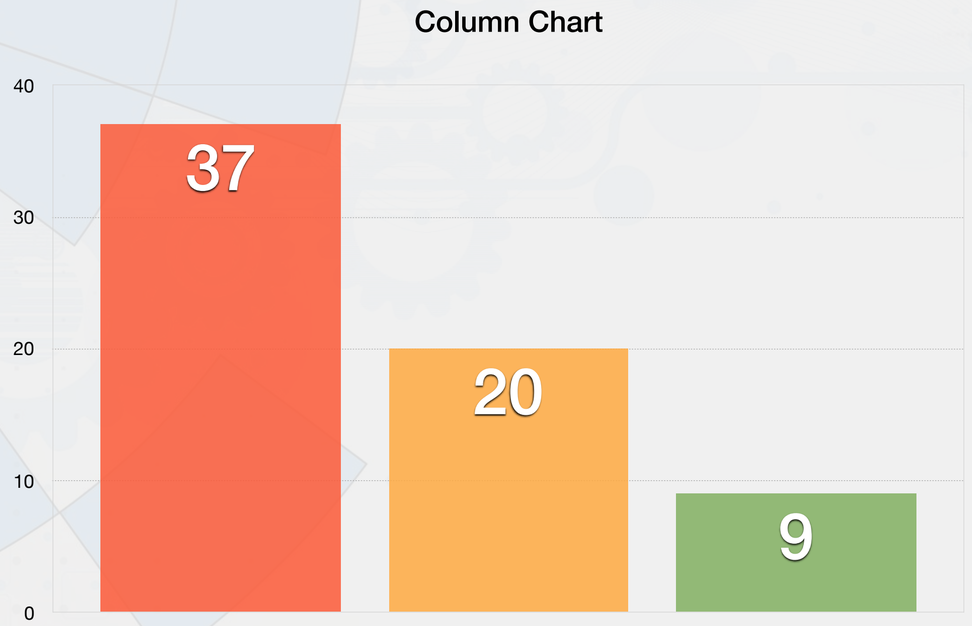
RISK LEVEL TAHUN 2016 (Charts)

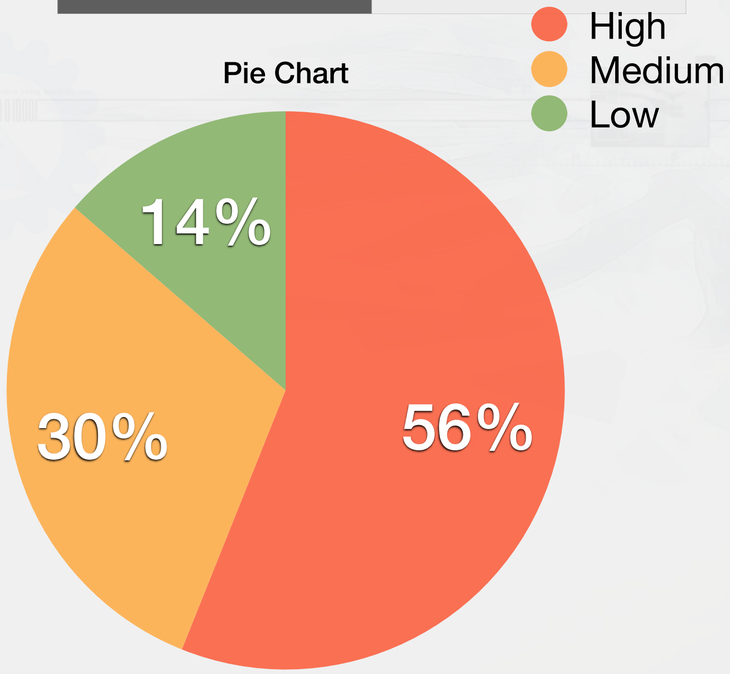
Rekapitulasi Risk Level Tahun 2016

1. **66 Sistem Informasi**
2. **16 Instansi Pemerintah**.
3. Hasil yang didapatkan dalam presentase yaitu **56 % High Risk**, **30 % Medium Risk**, dan **14% Low Risk**

RISK LEVEL

Level	Jumlah Sistem Web
High	37
Medium	20
Low	9
Total	66

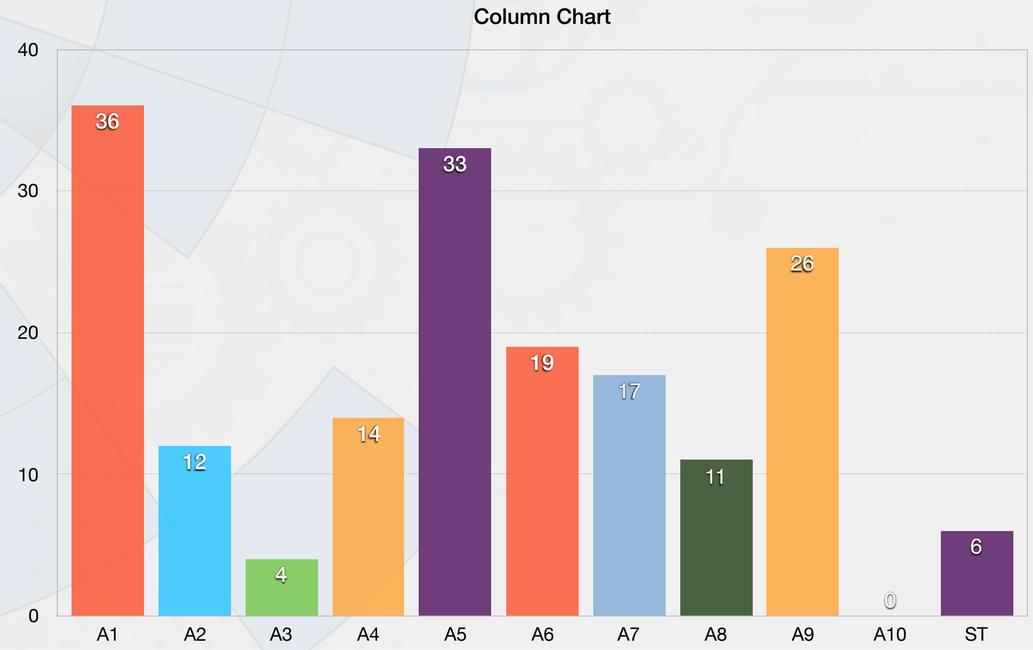




CELAH KERAWANAN OWASP TAHUN 2016

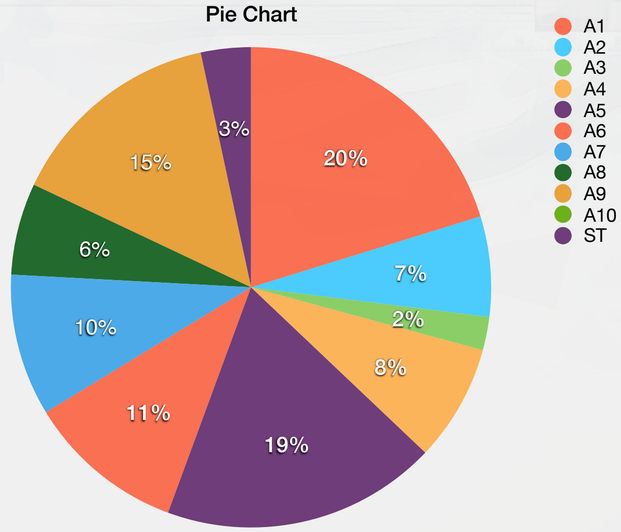
Rekapitulasi OWASP VULNERABILITIES Tahun 2016

- Hasil tertinggi dari celah kerawanan yang ditemukan dalam bentuk presentase yaitu **Database SQL Injection sebesar 20 %.**



OWASP VULNERABILITES

VULNERABILITY POINTS	JUMLAH
A1 Database SQL Injection	36
A2 Improper Session Management	12
A3 Cross Site Scripting (XSS)	4
A4 Insecure Direct Object Reference	14
A5 Security Misconfiguration	33
A6 Sensitive Data Exposure	19
A7 Missing Function Level Access Control	17
A8 Crose Site Request Forgery (CSRF)	11
A9 Using Known Vulnerabile Control	26
A10 Unvalidated Redirects & Forwards	0
ST DOS	6



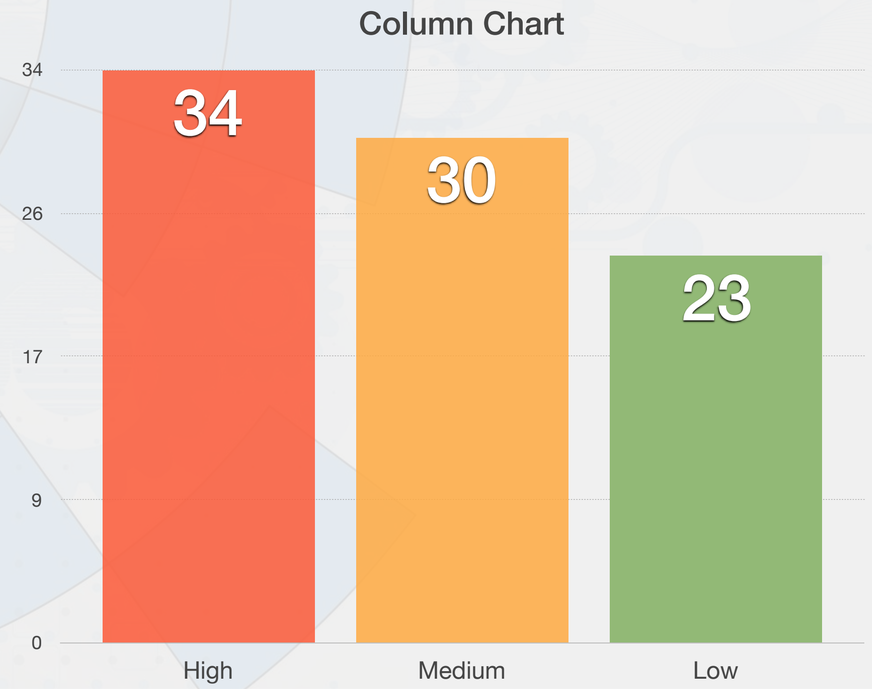
RISK LEVEL TAHUN 2017 (Charts)

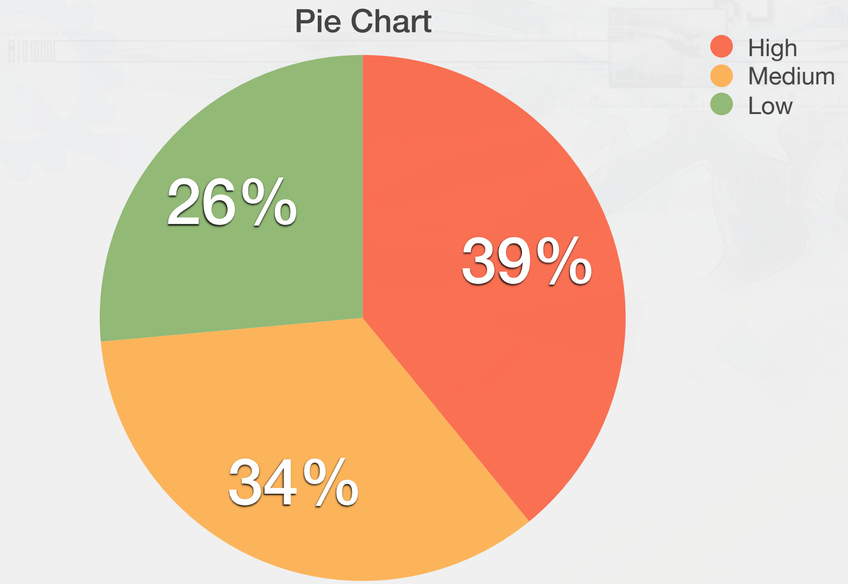
Rekapitulasi Risk Level Tahun 2017

1. 87 Sistem Informasi
2. 21 Instansi Pemerintah.
3. Hasil yang didapatkan dalam presentase yaitu **35% High Risk**, **34 % Medium Risk**, dan **26 % Low Risk**

Risk Level

Level	Jumlah Sistem Web
High	34
Medium	30
Low	23
Total	87

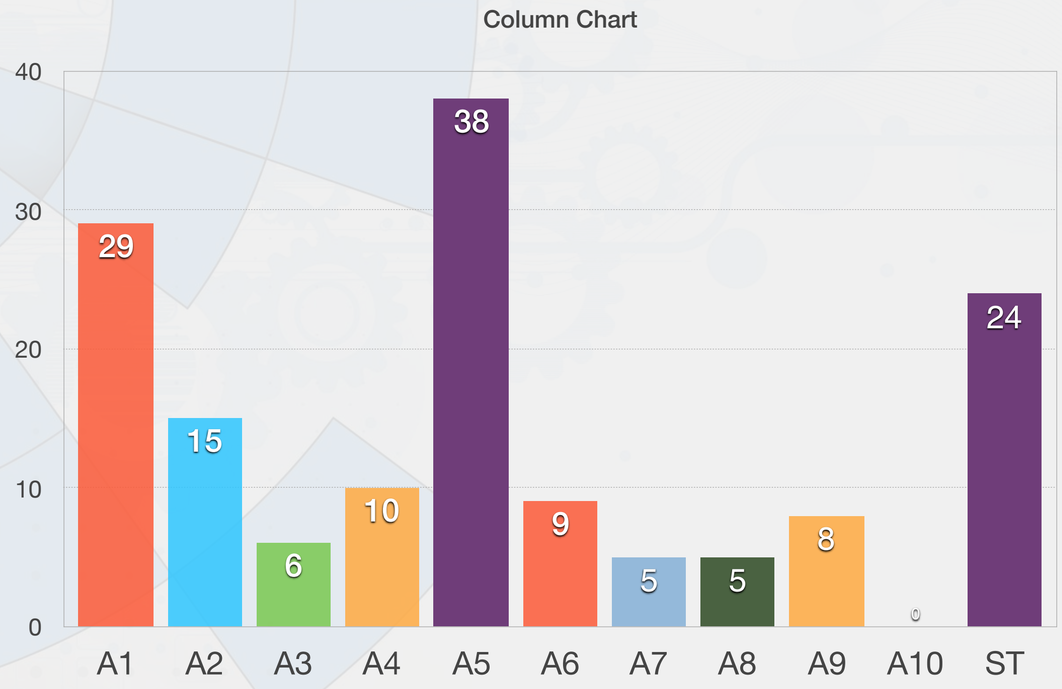




CELAH KERAWANAN OWASP TAHUN 2017

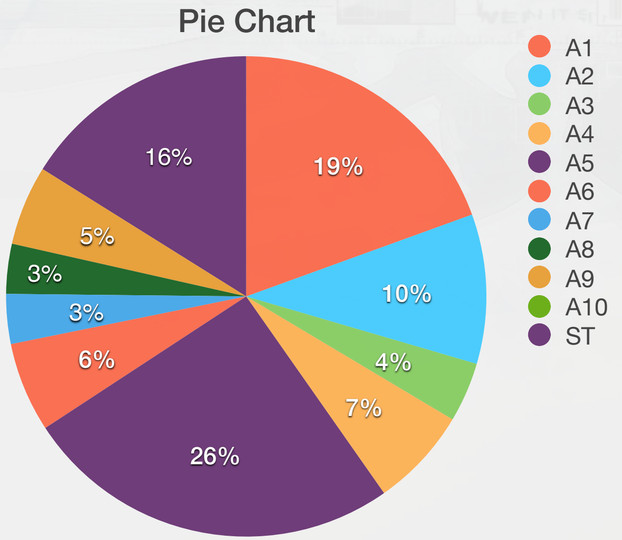
Rekapitulasi OWASP VULNERABILITIES Tahun 2017

- Hasil tertinggi dari celah kerawanan yang ditemukan dalam bentuk presentase yaitu **26 % Kesalahan Konfigurasi Keamanan, dan 19 % Kerawanan SQL Injection.**

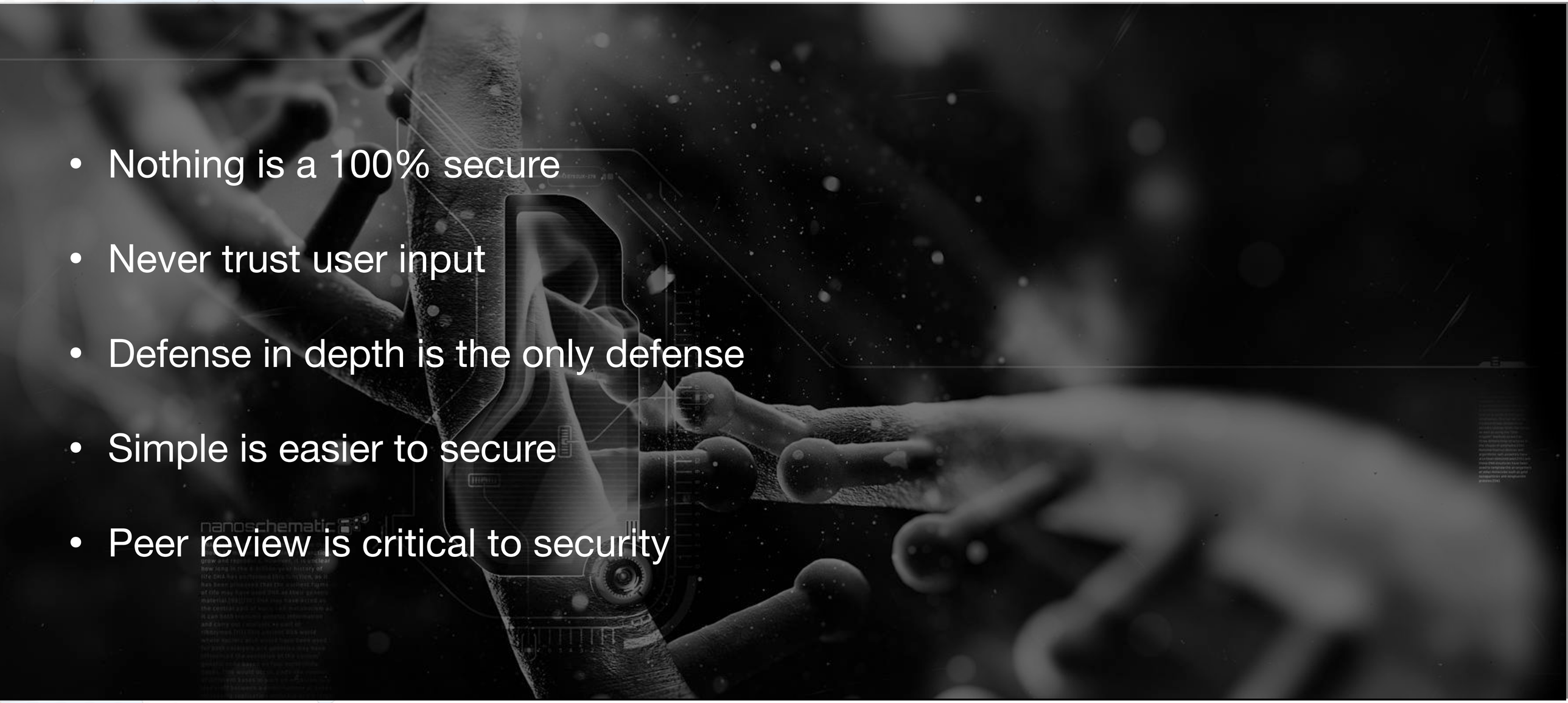


OWASP VULNERABILITES

	VULNERABILITY POINTS	JUMLAH
A1	Injection	29
A2	Broken Authentication and Session Management	15
A3	Cross Site Request Forgery (XSS)	6
A4	Insecure Direct Object References	10
A5	Security Misconfiguration	38
A6	Sensitive Data Exposure	9
A7	Missing Function Level Access Control	5
A8	Cross Site Request Forgery (CSRF)	5
A9	Using Component With Known Vulnerabilities	8
A10	Unvaildated Redirects and Forwards	0
ST	Denial of Service (DOS)	24



FIVE GOOD HABITS OF SECURITY



- Nothing is a 100% secure
- Never trust user input
- Defense in depth is the only defense
- Simple is easier to secure
- Peer review is critical to security