Topic No 1: What is Information Security?

- Protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction.
- **IT Security** is information security applied to technology
- **Information security** also covers physical security, human resource security, legal & compliance, organizational, and process related aspects
- **IT Security functions:**

- Network security
- Systems security
- Application & database security
- Mobile security

- **InfoSec functions:**

- Governance
- Policies & procedures
- Risk management
- Performance reviews

- **What is Cyber Security?**

- Precautions taken to guard against unauthorized access to data (in electronic form) or information systems connected to the internet
- Prevention of crime related to the internet

- Three Pillars of Information Security:

- **Confidentiality**: keeping information secret
- **Integrity**: keeping information in its original form
- **Availability:** keeping information and information systems available for use

Topic No 02: Why Is Information Security Needed?

- **Bangladesh Bank SWIFT Hack – Feb 2016:** Hackers used SWIFT credentials of Bangladesh Central Bank employees to send more than three dozen fraudulent money transfer requests.

- Requests sent to the Federal Reserve Bank of New York asking the bank to transfer millions of the Bangladesh Bank's funds to bank accounts in the Philippines, Sri Lanka and other parts of Asia.

- USD 81 million stolen

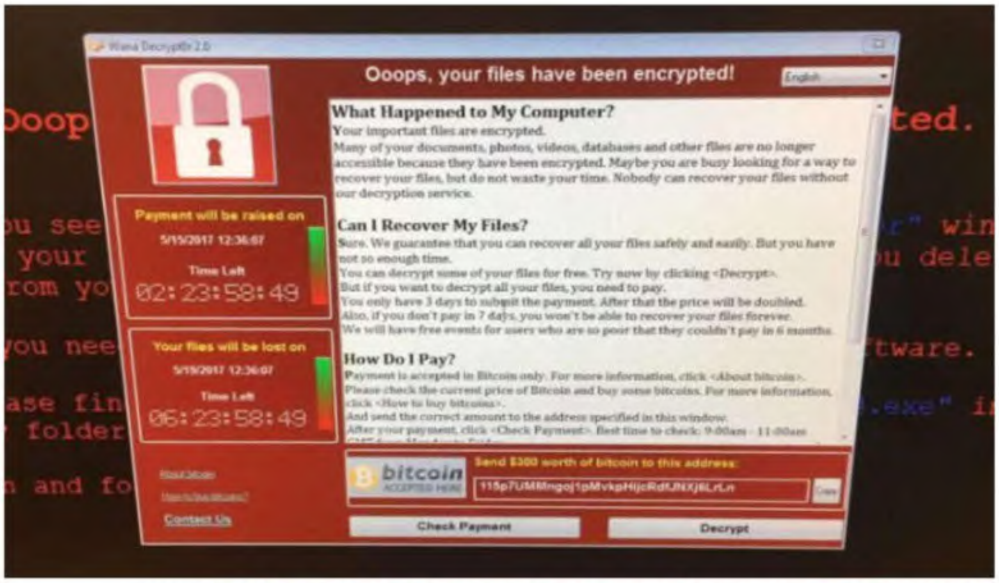
- Total impact could have been USD 1 billion

NHS

NHS cyberattack is 'biggest ransomware outbreak in history'

The NHS hack using Wanna Decryptor ransomware has shut down IT systems with 75,000 attacks in 99 countries

Ransomware attack hits 99 countries with UK hospitals among targets – live updates



Ooops, your files have been encrypted!

What Happened to My Computer?

Your important files are encrypted.

Many of your documents, photos, videos, databases and other files are no longer accessible because they have been encrypted. Maybe you are busy looking for a way to recover your files, but do not waste your time. Nobody can recover your files without our decryption service.

Can I Recover My Files?

Sure. We guarantee that you can recover all your files safely and easily. But you have not so enough time.

You can decrypt some of your files for free. Try now by clicking <Decrypt>.

But if you want to decrypt all your files, you need to pay.

You only have 3 days to submit the payment. After that the price will be doubled.

Also, if you don't pay in 7 days, you won't be able to recover your files forever.

We will have free events for users who are so poor that they couldn't pay in 6 months.

How Do I Pay?

Payment is accepted in Bitcoin only. For more information, click <About bitcoin>.

Please check the current price of Bitcoin and buy some bitcoins. For more information, click <How to buy bitcoins>.

And send the correct amount to the address specified in this window.

After your payment, click <Check Payment>. Best time to check: 9:00am - 11:00am

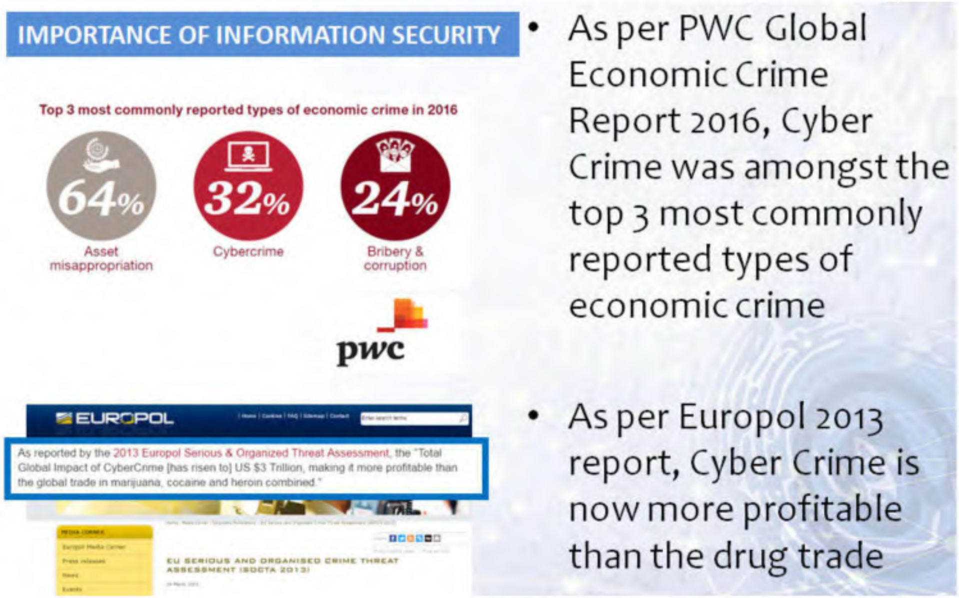
Send $300 worth of bitcoin to this address:

115p7UMMngoj1pMvkpHijcRdfJNXj6LrLn

Screenshot of the suspected ransomware message on a GP's computer in the Greater Preston area CREDIT: PA

- **The Importance Of Information**
  - IT is pervasive in our society & critical to the Ops & Mngmt of all organizations

  - IT is an enabler for business and govt
  - Personal information is vital for individuals to function in society
  - Information holds value



IMPORTANCE OF INFORMATION SECURITY

Top 3 most commonly reported types of economic crime in 2016
64%
Asset misappropriation
32%
Cybercrime
24%
Bribery & corruption
pwc
EUROPOL
| Home | Careers | FAQ | Sitemap | Contact
MEDIA CORNER
Europol Media Corner
Press releases
News
Events
EU SERIOUS AND ORGANISED CRIME THREAT ASSESSMENT (SOCTA 2013)

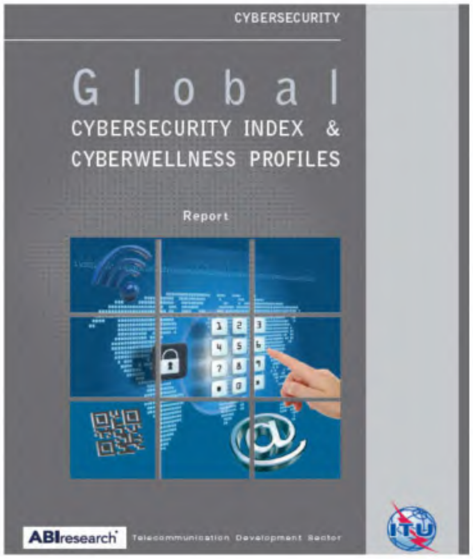
As reported by the 2013 Europol Serious & Organized Threat Assessment, the "Total Global Impact of CyberCrime [has risen to] US $3 Trillion, making it more profitable than the global trade in marijuana, cocaine and heroin combined."

- As per PWC Global Economic Crime Report 2016, Cyber Crime was amongst the top 3 most commonly reported types of economic crime
- As per Europol 2013 report, Cyber Crime is now more profitable than the drug trade

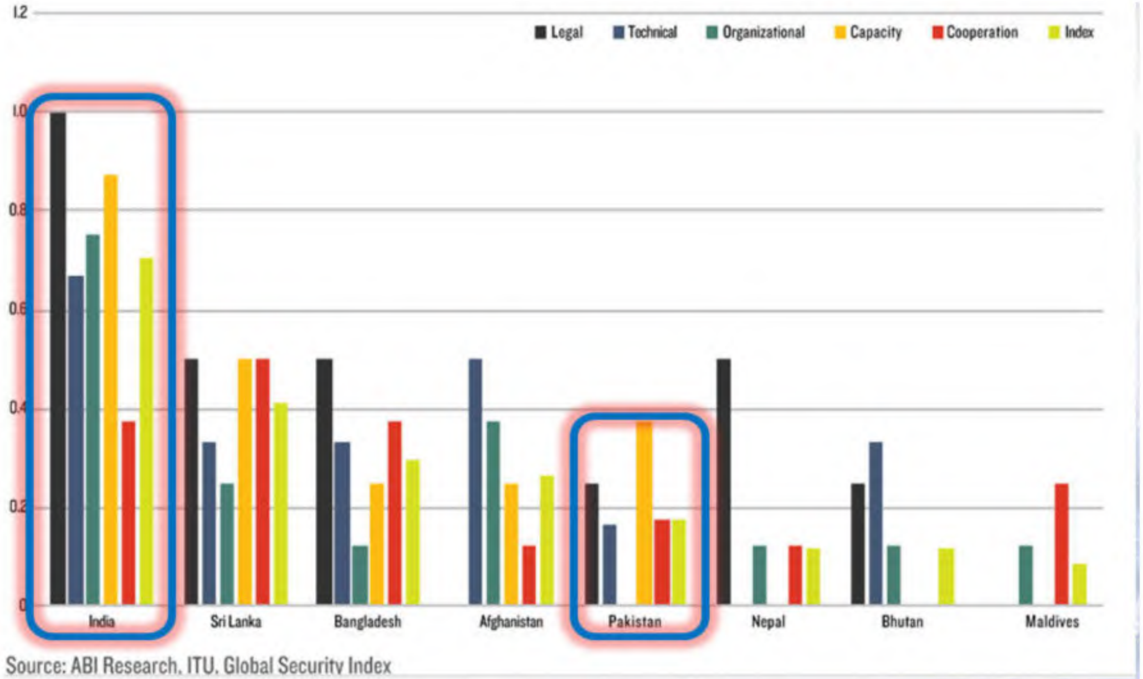
Topic No 03: Who Is Information Security For?

- **Personal:**
  - Social media passwords and safe usage
  - Online banking and email account passwords
  - Home PC/laptop security
  - Mobile security
- **Organizational:**
  - Board and executive leadership (management commitment)
  - CISO (responsible to drive security program)
  - IT staff and business users (following information security policies & procedures)
- **Govt and national:**
  - Law enforcement
  - Legal and policy making

  - National database
  - Critical infrastructure
  - Regulation
  - Standards and certification
  - Capacity-building and coordination


CYBERSECURITY
Global
CYBERSECURITY INDEX & CYBERWELLNESS PROFILES
Report
ABIresearch
Telecommunication Development Sector
ITU

- Legal
- Technical
- Organizational
- Capacity building
- Cooperation



Source: ABI Research, ITU, Global Security Index

- Pakistan ranked almost at the bottom of the table in International ranking by ITU
- Information security is everyone’s responsibility
- Pakistan Cyber Security Association (PCSA) formed to address Pakistan’s international ranking

Topic No 04: How Is Information Security Implemented?

- **Three pillars of information security:**
  - People
  - Process
  - Technology

People
Process
Technology

- **Leadership commitment:**
  - “Tone at the top”
  - Information security policy and objectives
  - Assigning responsibility and authority
  - Resource allocation
  - Performance reviews
  - Ensuring accountability
- **Information Security Manager or CISO:**
  - Heads department responsible for implementing information security program

    Directs planning, implementation, measurement, review, and continual improvement of program
- **IT user:**
  - Understand policies
  - Conduct security/risk assessment
  - Design effective security architecture
  - Develop SOPs and checklists
  - Implement controls
  - Report incidents
  - Conduct effective change management
- **Business user:**
  - Security awareness and training
  - Follow information security policy
  - Develop and implement secure business processes

  - Role-based access control and periodic reviews
  - Reporting incidents

- **Information security program**
  - Assessing security risks and gaps
  - Implementing security controls
  - Monitoring, measurement, & analysis
  - Management reviews and internal audit

    Accreditation/testing

Topic No 05: Who Are The Players In Information Security?

- Government
- Industry & sectors
- International organizations
- Professional associations
- Academia and research organizations
- Vendors and suppliers
- **Government:**
  - Policy making
  - Law enforcement
  - Legal system
  - National cyber security strategy and standards
  - International coordination
  - Computer Incident Response Team (CIRT)
- **Industry & sectors:**
  - Financial institutions
  - Telecoms
  - Armed forces
  - Federal and provincial IT boards

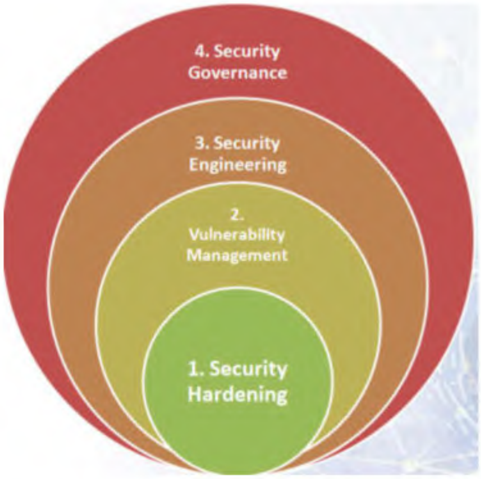
- Enterprises
- Various other sectors (manufacturing, automotive, health, insurance, etc)

- **International organizations:**
  - APCERT (www.apcert.org)
  - European Union Agency for Network & Information Security - ENISA (www.enisa.org)
  - ITU IMPACT (http://www.impact-alliance.org)
- **Professional associations:**
  - ISACA (isaca.org)
  - ISC2 (www.isc2.org)
  - OWASP (www.owasp.org)
  - Cloud Security Alliance
  - Pakistan Cyber Security Association (PCSA)

- **Academia & research organizations:**
  - Universities and research programs
  - SANS (www.sans.org)
  - Center for Internet Security (www.cisecurity.org)

Topic No 06: Infosec Transformation Framework 4 Layers

1. Security hardening
2. Vulnerability management
3. Security engineering
4. Security governance



1: Security hardening:

- Compile IT assets
- Establish minimum security baseline (MSB)
- Research security controls and benchmarks
- Pilot (test)

- Implement controls
- Monitor and update controls

2: Vulnerability management:

- Purchase internal tool (NESSUS, Qualys, etc)
- Conduct vulnerability assessment
- Prioritize and remediate
- Report
- Repeat cycle on quarterly/monthly basis

3: Security engineering:

- Assess risk profile
- Research security solutions
- Design security architecture
- Implement security controls & solutions
- Test and validate security posture

4: Security governance:

- Policies and procedures
- Risk management
- Core governance activities (change management, incident management, internal audit)
- Training & awareness
- Performance reviews

Topic No 07: What Is Information Security Hardening?

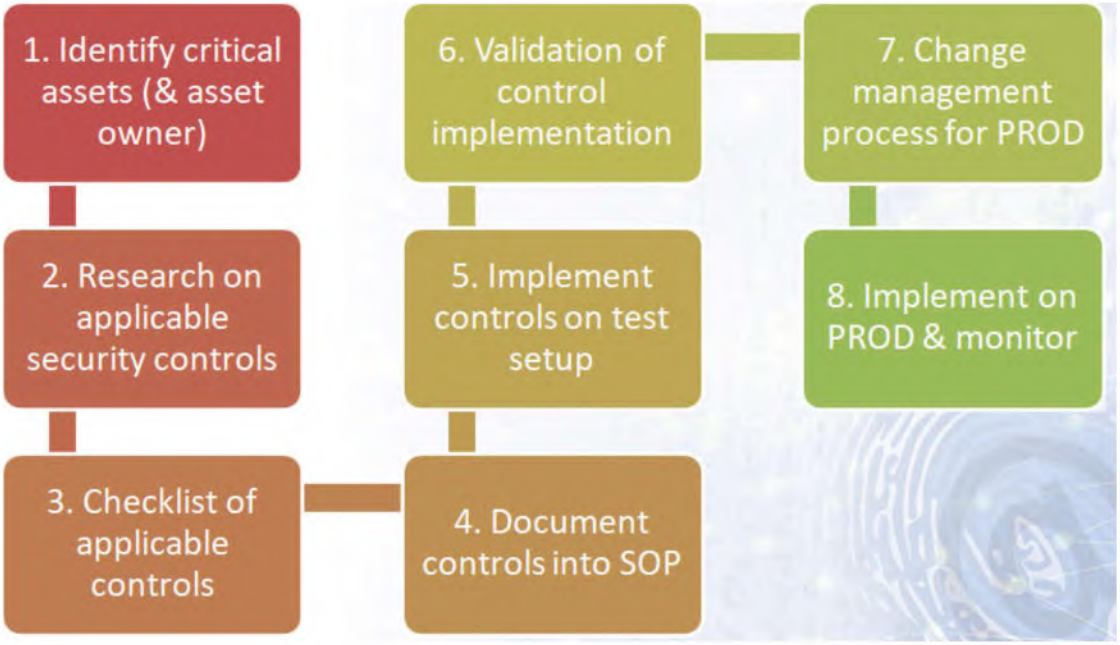
- **IT assets** (network, systems, application, databases, mobile, physical security) come with default settings which are not suitable for security
- **Security hardening** is the process of configuring IT assets to maximize security of the IT asset and minimize security risks

- **Security in the "trenches:"**

− Security at the most fundamental operational layer

− Security where it matters most

− Usually (but not always) involves junior staff who need extra guidance, training, and scrutiny


1. Identify critical assets (& asset owner)
2. Research on applicable security controls
3. Checklist of applicable controls
4. Document controls into SOP
5. Implement controls on test setup
6. Validation of control implementation
7. Change management process for PROD
8. Implement on PROD & monitor

- **Why is security hardening at the first step in the security transformation model?**
  - Most basic security settings
  - If not adequately addressed here, rest of the security measures hardly matter

- **Short example of Cisco router security hardening:**
  - Remote access through SSH and not through telnet
  - Turn of all unused services
  - Session timeout and password retry lockout

Topic No 08: What Is Information Security Governance?

- Information security governance in simpler terms just means effective management of the security program

- Responsibility for governance is associated with the Board and senior management

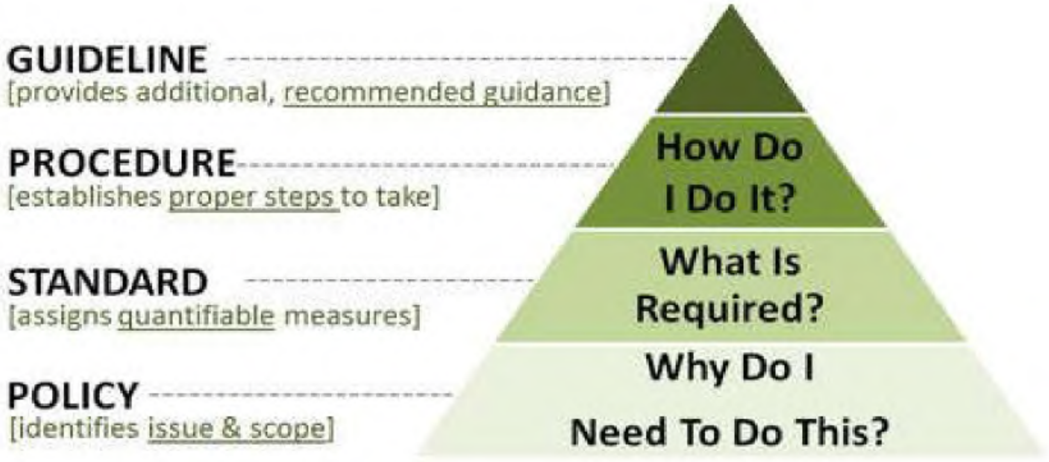
- **IT Governance Institute Definition:**

"Security governance is the set of responsibilities and practices exercised by the board and executive management, with the goal of providing strategic direction, ensuring that objectives are achieved, ascertaining that risks are managed appropriately and verifying that the enterprise's resources are used responsibly."

- **ISO27001:2013 – ISMS (Information Security Management System)** is the world's leading and most widely adopted security governance standard
- **ISO27001** "provides a model for establishing, implementing, operating, monitoring, reviewing, maintaining and improving an information security management system."
- Ten short clauses and a long Annex with 114 controls in 14 groups
- 27000+ certifications globally in 2015

Topic No 09: Difference Between Policy, SOP, & Guideline

- **Policy:**
  - Formal and high level requirement for securing the organization and its IT assets (mandatory)


GUIDELINE
[provides additional, recommended guidance]
PROCEDURE
[establishes proper steps to take]
STANDARD
[assigns quantifiable measures]
POLICY
[identifies issue & scope]
How Do I Do It?
What Is Required?
Why Do I Need To Do This?

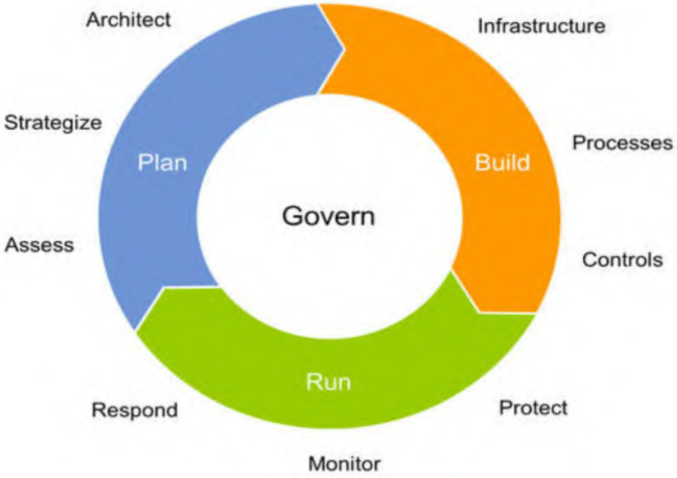
- **Policy:**
  - Scope is across organization so should be brief and focusing on desired results
  - Signed off by senior management
- **Procedure / SOP:**
  - More detailed description of the process; who does what, when, and how
  - Scope is predominantly at a department level having specified audience
  - May be signed off by departmental head

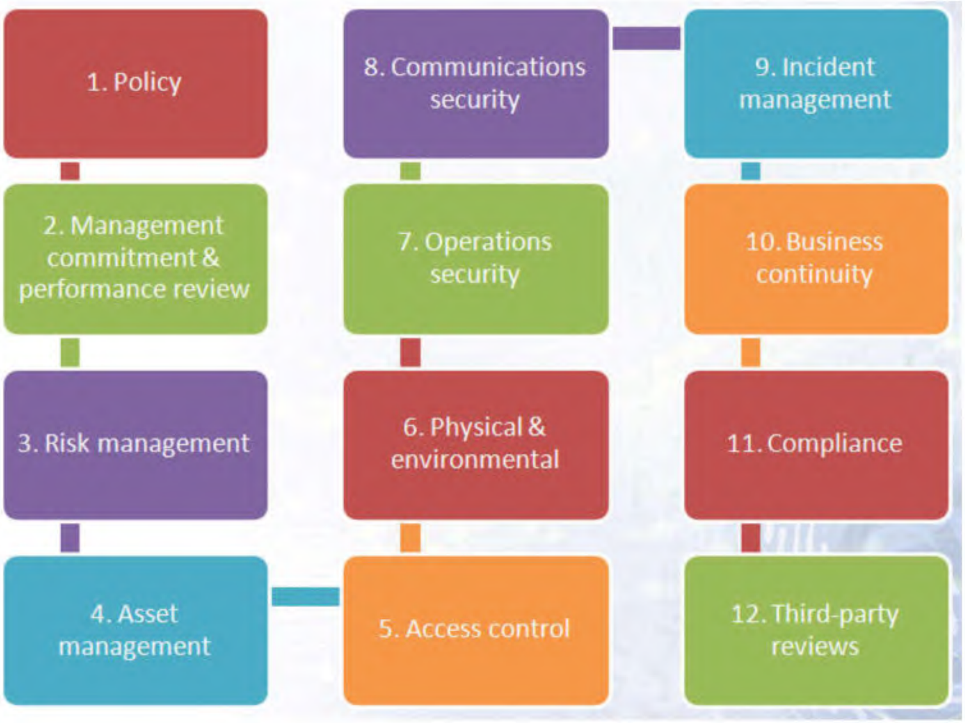
- **Guideline:**
  - General recommendation or statement of best practice
  - Not mandatory
  - Further elaborates the related SOP
- **Standard:**
  - Specific and mandatory action or rule
  - Must include one or more specifications for an IT asset or behavior
  - Yardstick to help achieve the policy goals
- **In practice:**
  - Policy recommended to be a single document applicable at the organizational level (wide audience)
  - Sub-policies may be defined at a departmental level
  - Policies and standards are mandatory (exception approval)
- **Examples:**
  - Information security policy
  - System administrator password sub-policy
  - User ID & Access Management SOP
  - Vulnerability Management standard
  - Social engineering prevention guideline

Topic No 10: What Is An Information Security Program?

- **Project definition:**
  - A project has a defined start and end point and specific objectives that, when attained, signify completion
- **Program definition:**
  - A program is defined as a group of related projects managed in a coordinated way to obtain benefits not available from managing the projects individually

- **Security program:**
  - Sum-total of all activities planned and executed by the organization to meet its security objectives





1. Policy

2. Management commitment & performance review

3. Risk management

4. Asset management

5. Access control

6. Physical & environmental

7. Operations security

8. Communications security

9. Incident management

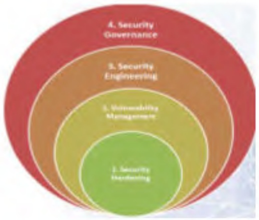
10. Business continuity

11. Compliance

12. Third-party reviews

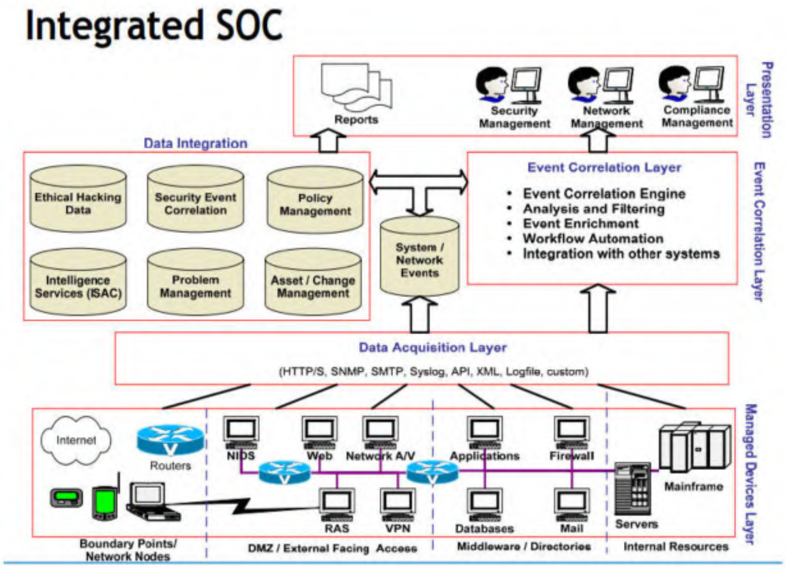
ISO27001:2013 (ISMS) REQUIREMENTS AND CONTROLS

- 4-layer security transformation model may be implemented as an ideal security program
- After establishing a basic policy, the sequence of the program (steps 1 through 4) is paramount in order to achieve constructive results



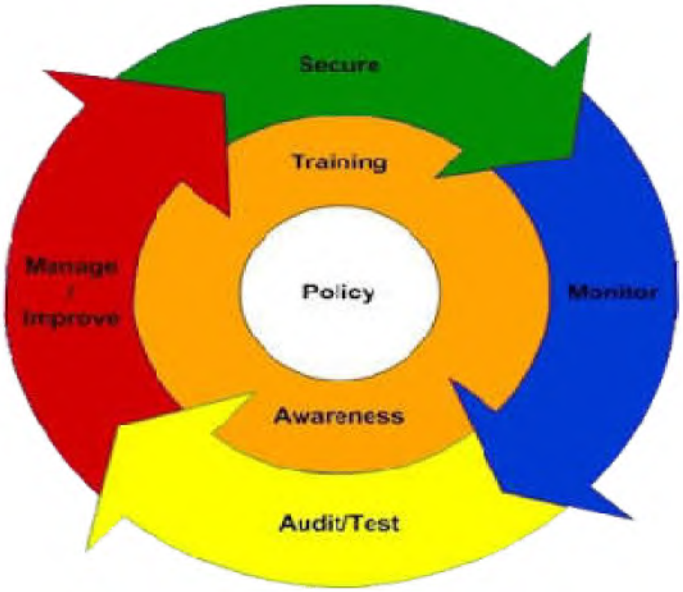
Topic No 11: Role of People, Process, and Tech In InfoSec

- People, process, and technology are together referred to as the Information Security Triad
- All three aspects help to form a holistic view of Information Security
- All three are important and cannot be overlooked in an Information Security program or activity
- **People:**
  - People must be trained to effectively & correctly follow policies, information security processes, and implement technology
  - Social engineering and phishing are aspects that people must be trained to handle appropriately
- **Processes** are fundamental to effective information security
  - User access management
  - Backups
  - Incident management
  - Change management
  - Vulnerability management
  - Risk management
- **Technology plays a central role in the Information Security program:**
  - Firewalls
  - Antivirus
  - Email anti-spam filtering solution
  - Web filtering solution
  - Data loss prevention (DLP) solution



Topic No 12: Role Of An Information Security Manager

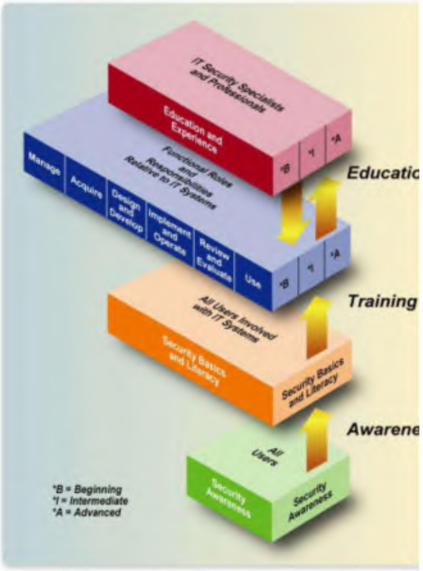
- The Information Security Manager (Head Of Information Security or CISO) is delegated and authorized by senior management to run the Information Security program and meet its objectives
- The Information Security Manager develops a policy to regulate the Information Security program which is signed off by senior management
- Assigned resources and authority to plan, assess, implement, monitor, test, and accredit the Information Security activities



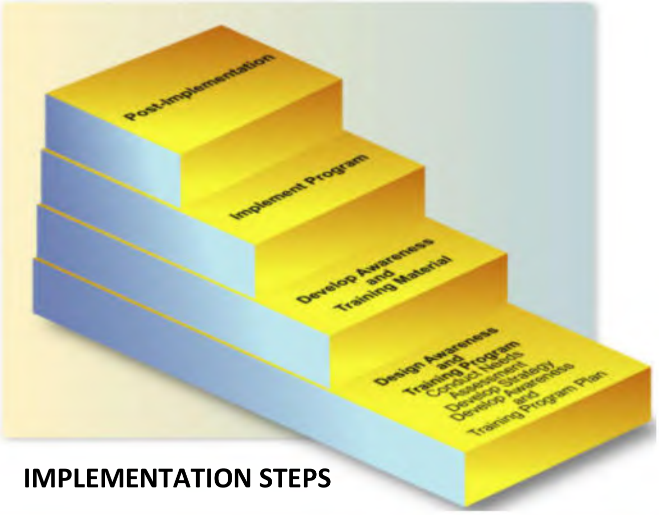
- InfoSec Manager Tasks:
  - Develop policy
  - Training & awareness
  - Design security architecture
  - Design security controls
  - Ensure controls are implemented
  - Conduct risk assessment
  - Conduct security testing
  - Monitor vulnerability management program
  - Facilitate incident management process
  - Sign-off critical change management activities

Topic No 13: What Is Information Security Awareness?

- **Ensure employees are aware of :**
  - The importance of protecting sensitive information
  - What they should do to handle information securely
  - Risks of mishandling information
- **NIST Special Publication 800-50 (Building An IT Security Awareness & Training Program)**
  - Awareness
  - Training
  - Education



- **Awareness:**
  - Awareness is not training
  - Purpose of awareness is simply to focus attention on security
  - Change behavior or reinforce good security practices
- **Training:**
  - “Strives to produce relevant and needed security skills and competencies”
  - Seeks to teach skills
  - E.g. IT Security course for system administrators covering all security aspects
- **Education:**
  - Integrates all of the skills and competencies into a common body of knowledge
  - E.g. a degree program
- **Don’ts:**
  - Share your password
  - Click on suspicious email links
  - Install unlicensed software on your PC
- **Do’s:**
  - Logout when getting up from your system
  - Report security incidents


Post-Implementation
Implement Program
Develop Awareness and Training Material
Design Awareness and Training Program
Conduct Needs Assessment
Develop Strategy/
Develop Awareness and Training Program Plan

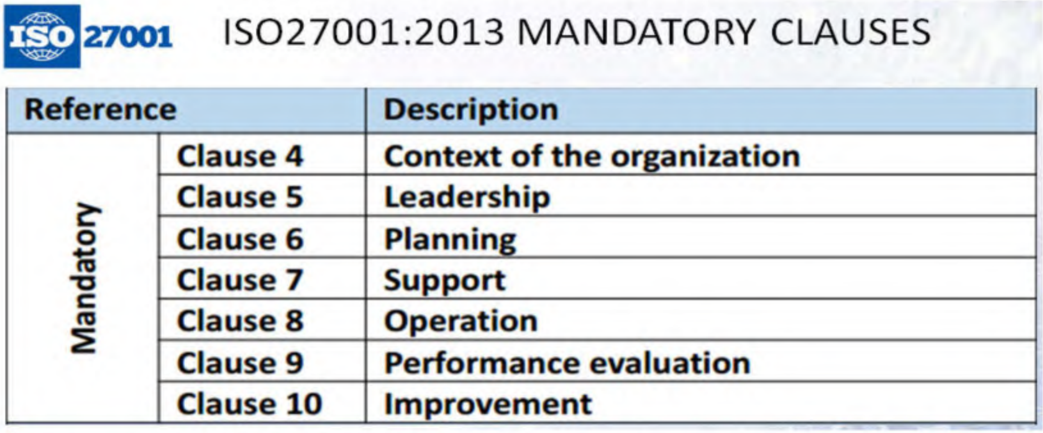
IMPLEMENTATION STEPS

Topic No 14: Leading Security Standards & Frameworks

- A standard or framework is a blueprint or roadmap for achieving Information Security objectives
- Examples are ISO27001:2013 (ISMS), PCI DSS, & COBIT

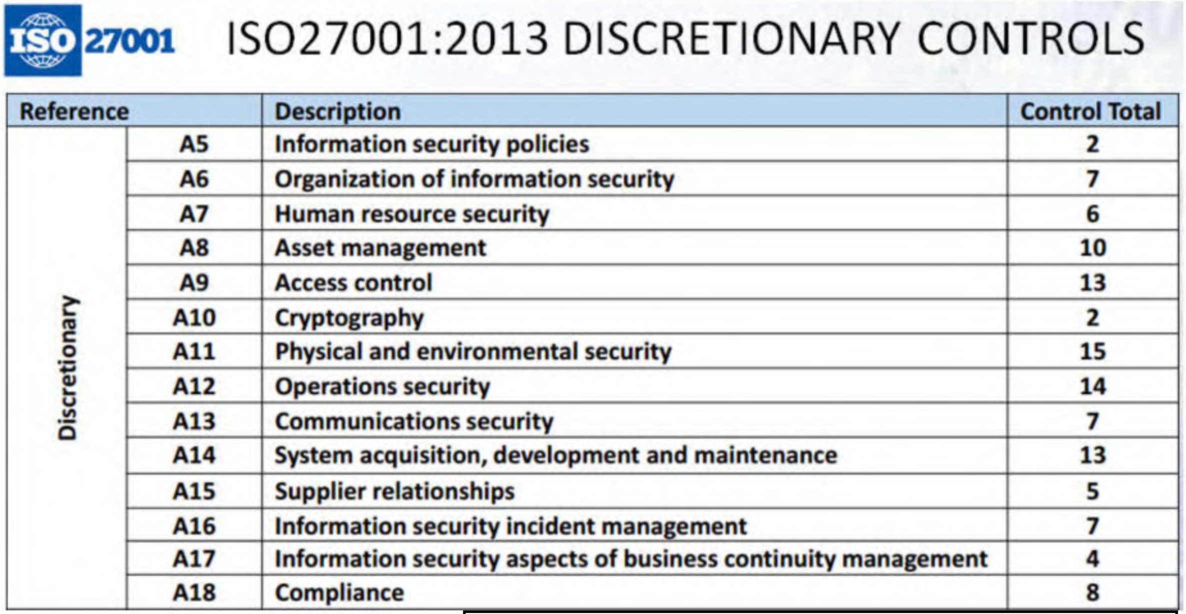
The Payment Card Industry Data Security Standard (PCI DSS)

- ISO27001:2013 (ISMS)
  - Specifies the requirements for establishing, implementing, maintaining and continually improving an information security management system
  - Ten short clauses
  - Long annex



ISO 27001 ISO27001:2013 MANDATORY CLAUSES

Reference		Description
Mandatory	Clause 4	Context of the organization
	Clause 5	Leadership
	Clause 6	Planning
	Clause 7	Support
	Clause 8	Operation
	Clause 9	Performance evaluation
	Clause 10	Improvement



ISO 27001 ISO27001:2013 DISCRETIONARY CONTROLS

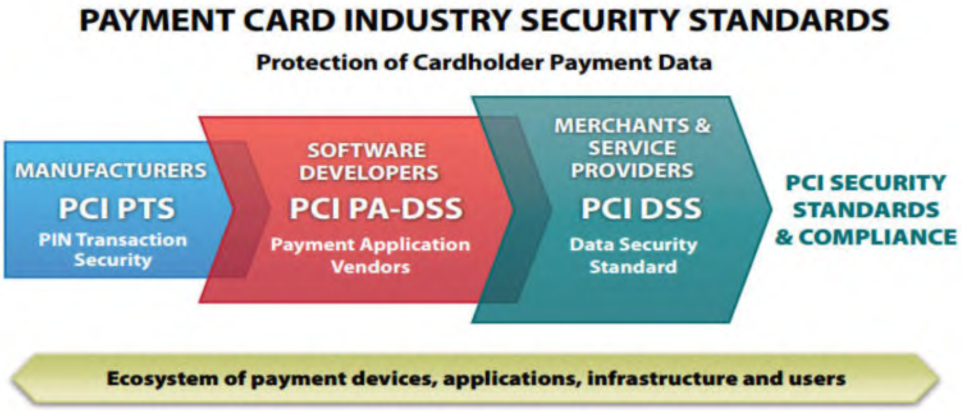
Reference		Description	Control Total
Discretionary	A5	Information security policies	2
	A6	Organization of information security	7
	A7	Human resource security	6
	A8	Asset management	10
	A9	Access control	13
	A10	Cryptography	2
	A11	Physical and environmental security	15
	A12	Operations security	14
	A13	Communications security	7
	A14	System acquisition, development and maintenance	13
	A15	Supplier relationships	5
	A16	Information security incident management	7
	A17	Information security aspects of business continuity management	4
	A18	Compliance	8

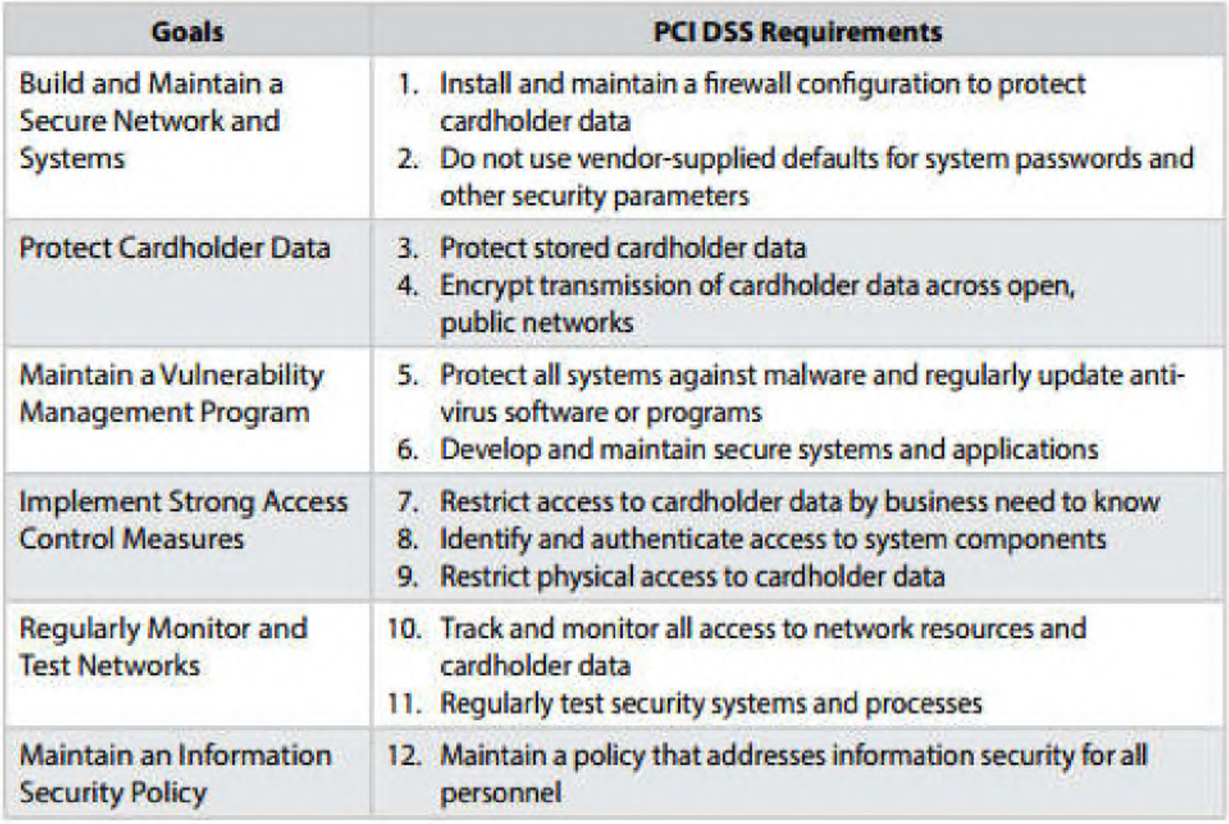
- **PCI Data Security Standard (DSS):**

The Payment Card Industry Data Security Standard (PCI DSS) is a widely accepted set of policies and procedures intended to optimize the security of credit, debit and cash card transactions and protect cardholders against misuse of their personal information.

  - Designed to ensure that ALL companies that accept, process, store or transmit credit card information maintain a secure environment
  - Managed by Security Standards Council

- SSC is an independent body that was created by the major payment card brands (Visa, MasterCard, American Express, Discover and JCB
- 6 Broad goals and 12 requirements


PAYMENT CARD INDUSTRY SECURITY STANDARDS
Protection of Cardholder Payment Data
MANUFACTURERS
PCI PTS
PIN Transaction Security
SOFTWARE DEVELOPERS
PCI PA-DSS
Payment Application Vendors
MERCHANTS & SERVICE PROVIDERS
PCI DSS
Data Security Standard
PCI SECURITY STANDARDS & COMPLIANCE
Ecosystem of payment devices, applications, infrastructure and users

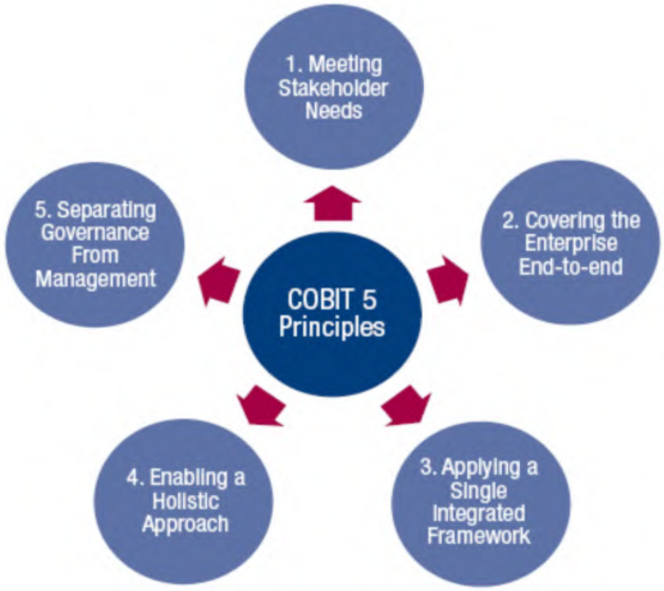


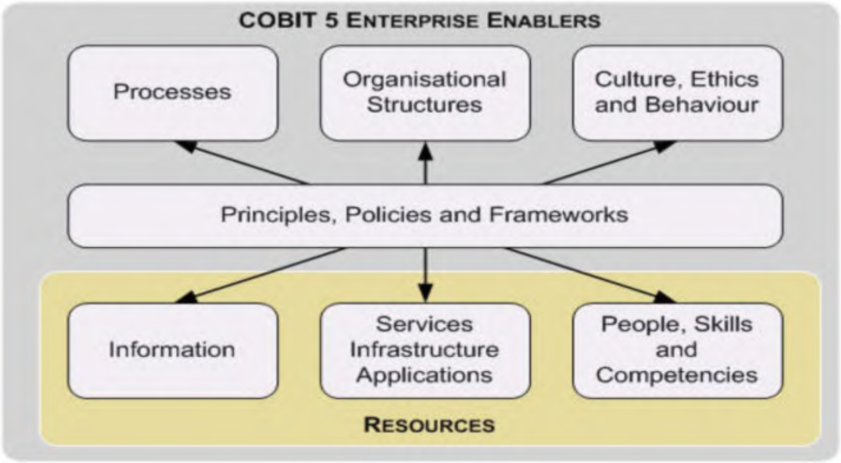
Goals	PCI DSS Requirements
Build and Maintain a Secure Network and Systems	1. Install and maintain a firewall configuration to protect cardholder data 2. Do not use vendor-supplied defaults for system passwords and other security parameters
Protect Cardholder Data	3. Protect stored cardholder data 4. Encrypt transmission of cardholder data across open, public networks
Maintain a Vulnerability Management Program	5. Protect all systems against malware and regularly update anti-virus software or programs 6. Develop and maintain secure systems and applications
Implement Strong Access Control Measures	7. Restrict access to cardholder data by business need to know 8. Identify and authenticate access to system components 9. Restrict physical access to cardholder data
Regularly Monitor and Test Networks	10. Track and monitor all access to network resources and cardholder data 11. Regularly test security systems and processes
Maintain an Information Security Policy	12. Maintain a policy that addresses information security for all personnel

- **COBIT:**
  - ISACA framework for IT Governance
  - COBIT 5 helps enterprises to create optimal value from IT by maintaining a balance between realising benefits and optimising risk levels and resource use (ISACA)

COBIT is the acronym for Control Objectives for Information and Related Technologies. The COBIT framework was created by ISACA to bridge the crucial gap between technical issues, business risks and control requirements.

- COBIT 5 brings together five principles that allow the enterprise to build an effective governance and management framework (ISACA)
- Based on a holistic set of seven enablers that optimises IT investment and use for the benefit of stakeholders (ISACA)


1. Meeting Stakeholder Needs
2. Covering the Enterprise End-to-end
COBIT 5 Principles
5. Separating Governance From Management
4. Enabling a Holistic Approach
3. Applying a Single Integrated Framework


COBIT 5 Enterprise Enablers
Processes
Organisational Structures
Culture, Ethics and Behaviour
Principles, Policies and Frameworks
Information
Services Infrastructure Applications
People, Skills and Competencies
Resources

- A standard or framework is a blueprint or roadmap for achieving Information Security objectives
- Examples are ISO27001:2013 (ISMS), PCI DSS, & COBIT

Topic No 15: What Is Information Security Risk?

- Risk is a fundamental concept that drives all security standards, frameworks, and activities
- In simple terms, Information Security Risk refers to the potential damage or loss that may be caused to an organization in the absence of appropriate controls
- A process aimed at achieving an optimal balance between realizing opportunities for gain and minimizing vulnerabilities and loss
- Usually accomplished by ensuring that impact of threats exploiting vulnerabilities is within acceptable limits at an acceptable cost
- **Risk is managed so that:**

− It does not materially impact the business process in an adverse way

− Acceptable level of assurance and predictability to the desired outcomes of any organizational activity

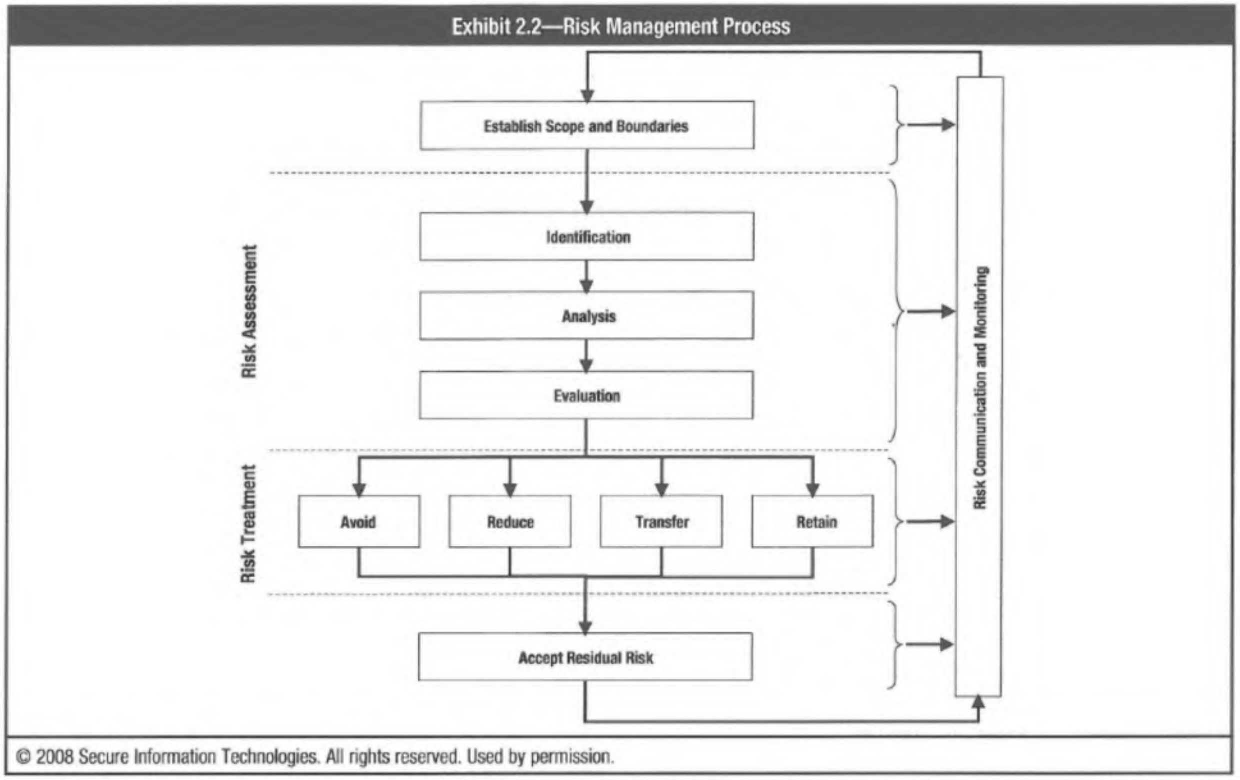


Exhibit 2.2—Risk Management Process

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- **Risk Assessment:**
  - Foundation for effective risk management
  - Solid understanding of the risk universe
  - Nature and extent of risk to IT resources and potential impact on organizations activities

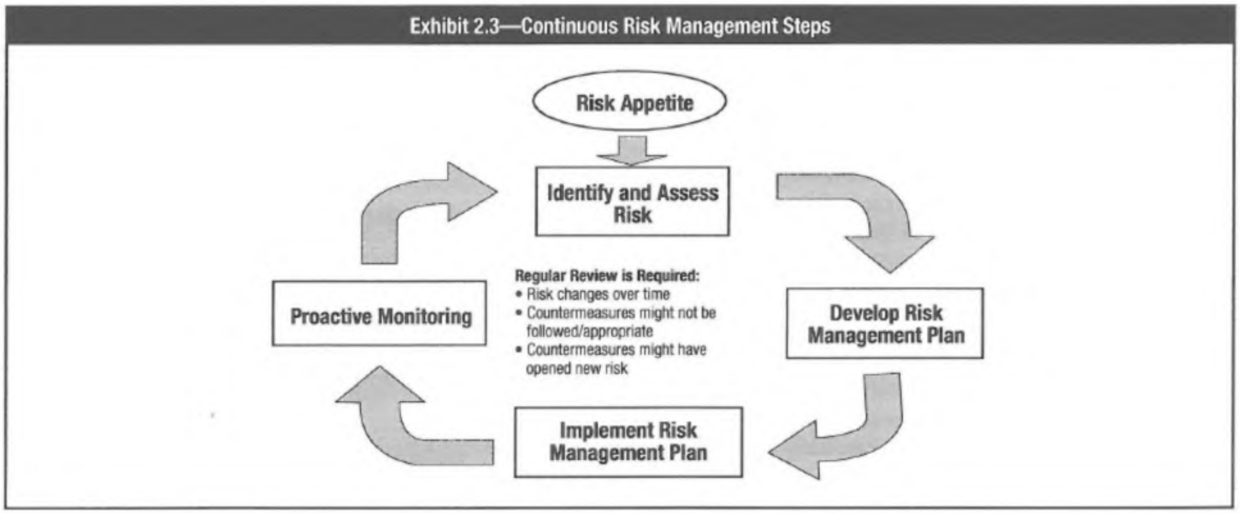


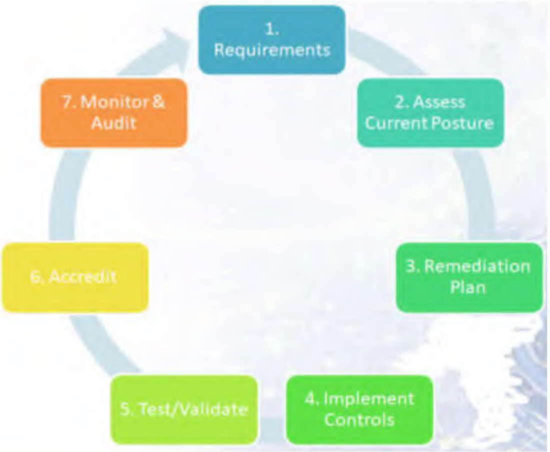
Exhibit 2.3—Continuous Risk Management Steps

Risk Appetite
Identify and Assess Risk
Develop Risk Management Plan
Implement Risk Management Plan
Proactive Monitoring
Regular Review is Required:
• Risk changes over time
• Countermeasures might not be followed/appropriate
• Countermeasures might have opened new risk

- **Challenges with risk focused approach:**
  - In an environment where controls are absent, a risk based approach may become too academic
  - Effort should focus on 4-Step Security Transformation Framework

Topic No 16: Information Security Lifecycle

- An Information Security lifecycle represents the recommended sequence to adequately address security during any project or activity
- It is a process to ensure that all security projects and activities consistently follow the same sequence and steps
- **Step 1: Requirements**
  - Established by policy, or security program
  - Could also be driven by security transformation program
  - Establish security exposure, determine risk and priority
- **Step 2: Assess Current Security Posture**
  - Conduct gap analysis
  - Could also be a risk assessment and evaluation
- **Step 3: Remediation Plan**
  - Methodology & framework
  - Controls



- Resources
- Approvals and communication
- Timeline
- Project monitoring and review
- Develop SOP

- **Step 4: Implement Controls**
  - Pilot
  - Test/validate in pilot
  - Change management
  - Implement in production/live environment
  - Roll-back if unexpected response
  - Maintain SOP
- **Step 5: Test/Validate**
  - Security team or independent review of correctness and coverage of security control implementation
  - Ensure SOP/checklist developed and followed
- **Step 6: Security Accreditation**
  - Review process has been followed (change management, SOP, sign-offs)
  - Establish monitoring mechanism
  - Awareness training
  - Issue formal accreditation
- **Step 7: Monitor & Audit**
  - Monitoring mechanism (KPIs, reporting, review)
  - Incident management
  - Internal audit

Topic No 17: Management Commitment

- **What is management commitment?**
  - Management commitment is the expression of the intent, relevant actions, and allocation of sufficient resources to ensure the InfoSec program is properly implemented
- **ISO2700:2013 (ISMS) Clause 5.1:**

a) Policy and objectives are established (compatible with strategic direction)

b) Integration of ISMS reqmts into processes

c) Resources

d) Communicating importance

e) Intended outcomes are achieved

f) Directing and supporting persons

g) Promoting continual improvement

h) Supporting other management roles

- **"Tone at the top"**
  - Management closely watches the actions of executive leadership (culture)
  - The importance given to InfoSec by the executive leadership becomes the minimum threshold for rest of the organization
- **In practice:**
  - Security policy
  - Security responsibility delegated to head (CISO) or dept
  - Security steering committee (board level)
  - Quarterly or frequent management reviews of information security program

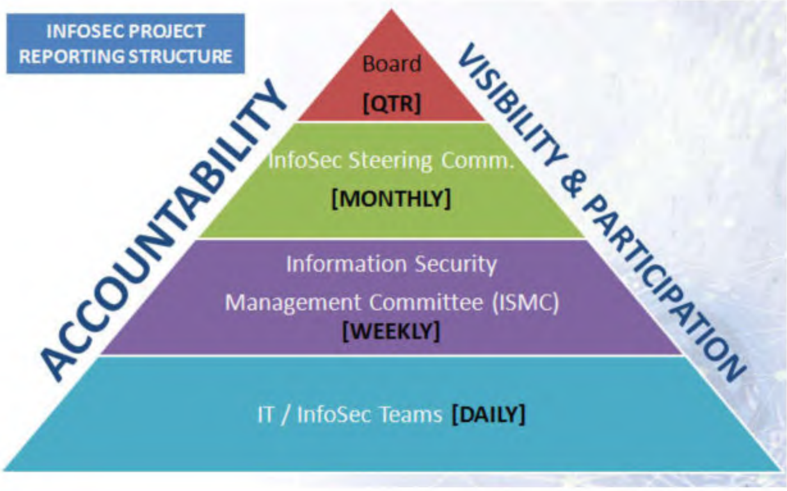
Topic No 18: Information Security Responsibility

- **Default organizational perception:**
  - Security is responsibility of one person or one department
  - Can get away with "security as an after-thought"

  - Reactive

- **Security is everyone's responsibility:**
  - Management commitment & tone at the top
  - Security awareness campaigns/program
  - A strong and effective security program
  - Allocation of sufficient resources

- **Security involvement & accountability:**
  - Effective security implementation should be built into the performance KPIs of key team members (management, technical, business)
  - Annual appraisals, security awards and recognition

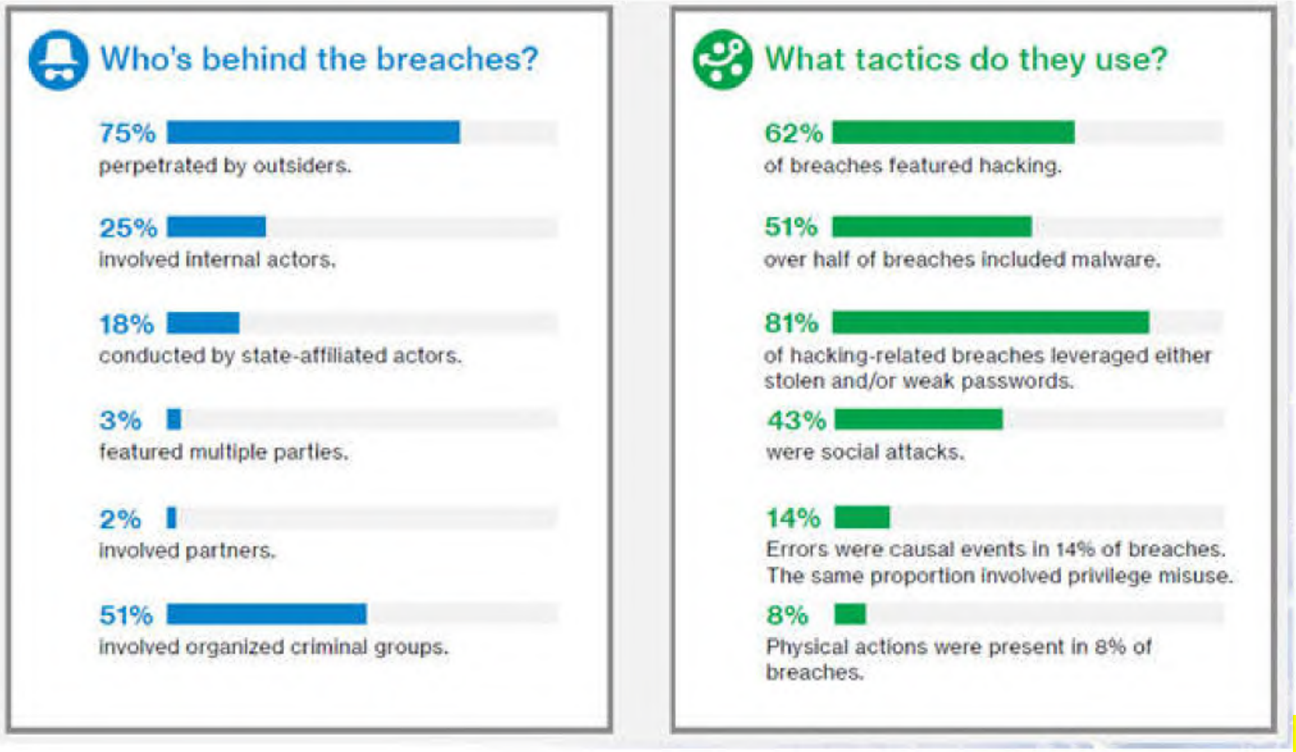

INFOSEC PROJECT REPORTING STRUCTURE
Board
[QTR]
InfoSec Steering Comm.
[MONTHLY]
Information Security
Management Committee (ISMC)
[WEEKLY]
IT / InfoSec Teams [DAILY]
ACCOUNTABILITY
VISIBILITY & PARTICIPATION

- Security is everyone's responsibility and has to gradually take its place in org culture

Topic No 19: Cyber Security Breaches

- Fox News Video: "World's Biggest Cyber Attacks"
  - http://video.foxnews.com/v/5435057924001/?#sp=show-clips
- World's Biggest Data Breaches:
  - http://www.informationisbeautiful.net/visualizations/worlds-biggest-data-breaches-hacks/
- Leading Global Reports:
  - Verizon 2017 Data Breach Investigations Report (DBIR)

– Symantec 2017 Internet Security Threat Report (ISTR)



Who's behind the breaches?

75% perpetrated by outsiders.

25% involved internal actors.

18% conducted by state-affiliated actors.

3% featured multiple parties.

2% involved partners.

51% involved organized criminal groups.

What tactics do they use?

62% of breaches featured hacking.

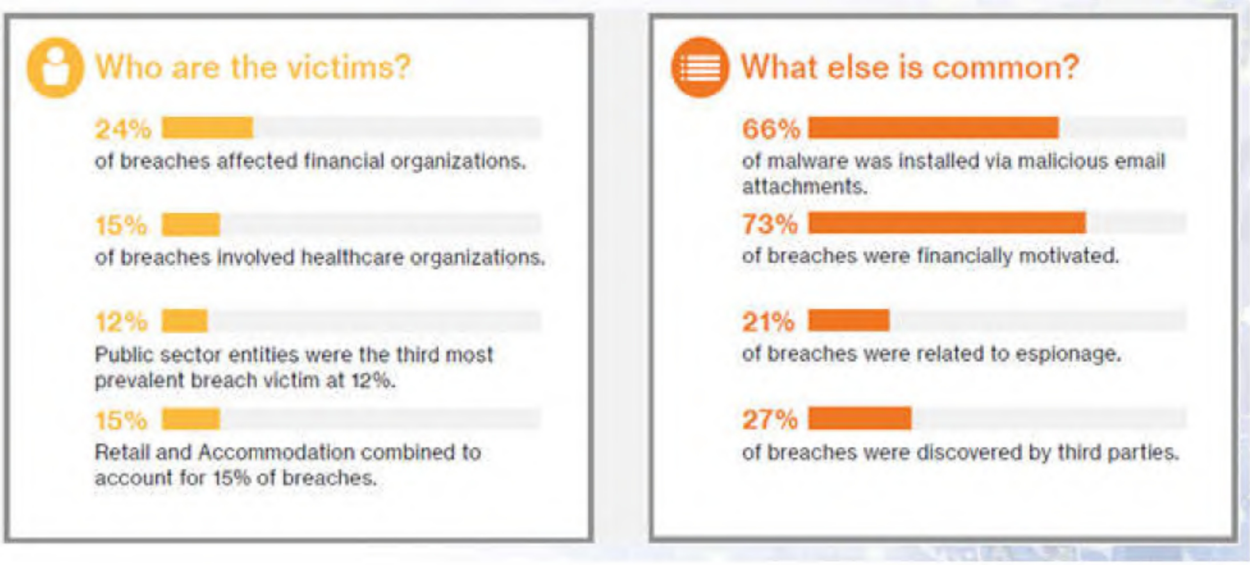
51% over half of breaches included malware.

81% of hacking-related breaches leveraged either stolen and/or weak passwords.

43% were social attacks.

14% Errors were causal events in 14% of breaches. The same proportion involved privilege misuse.

8% Physical actions were present in 8% of breaches.



Who are the victims?

24% of breaches affected financial organizations.

15% of breaches involved healthcare organizations.

12% Public sector entities were the third most prevalent breach victim at 12%.

15% Retail and Accommodation combined to account for 15% of breaches.

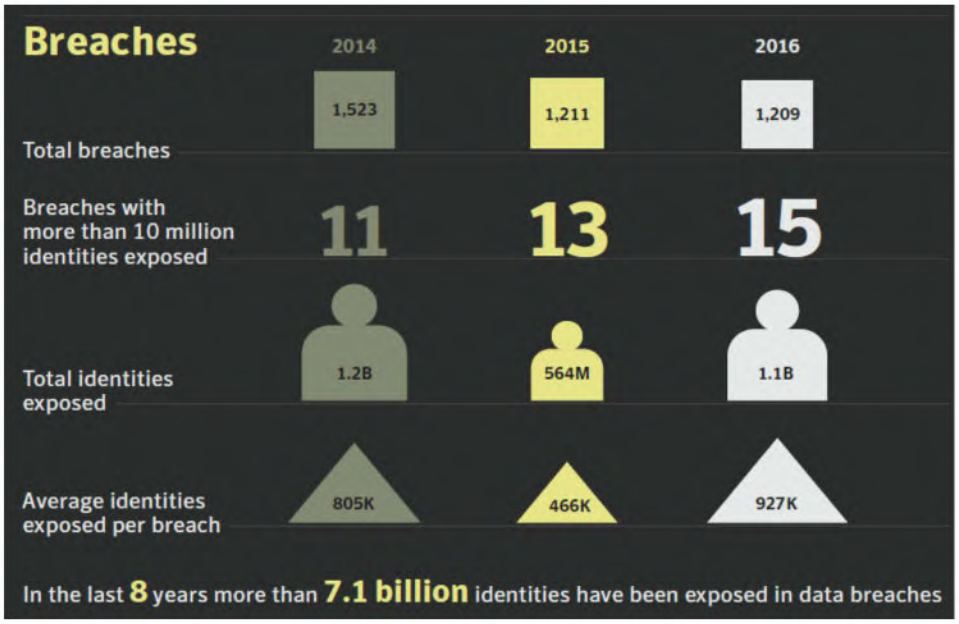
What else is common?

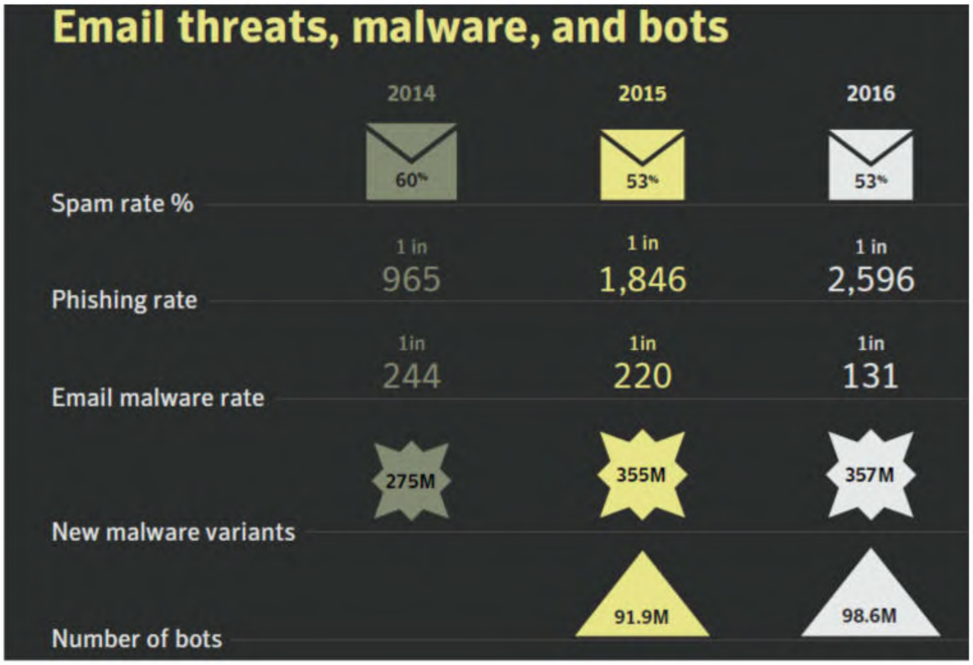
66% of malware was installed via malicious email attachments.

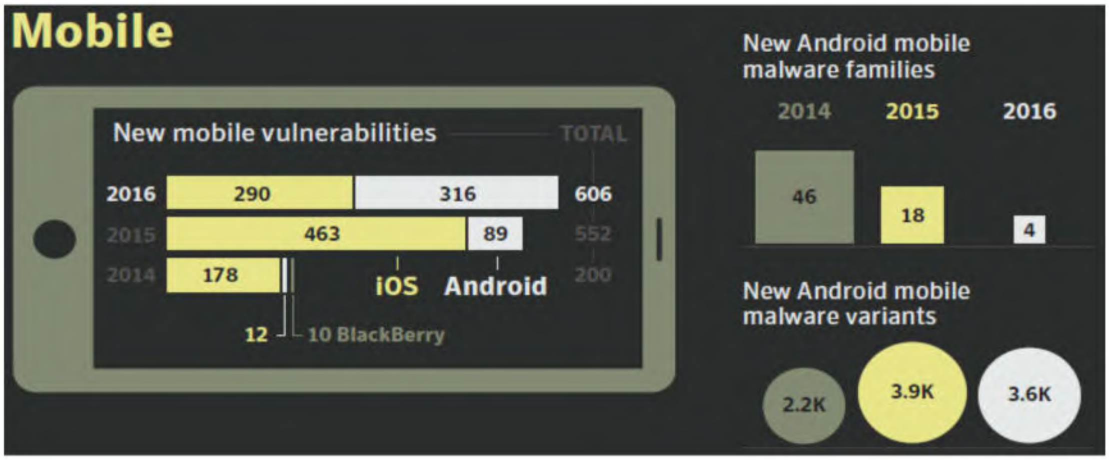
73% of breaches were financially motivated.

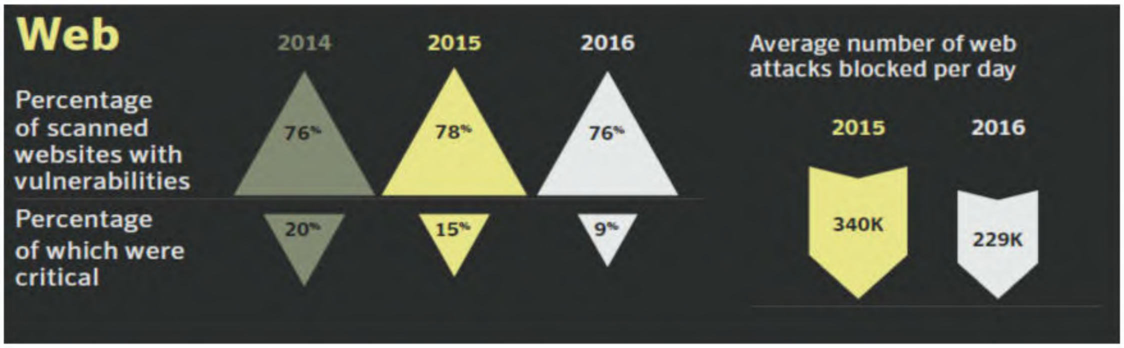
21% of breaches were related to espionage.

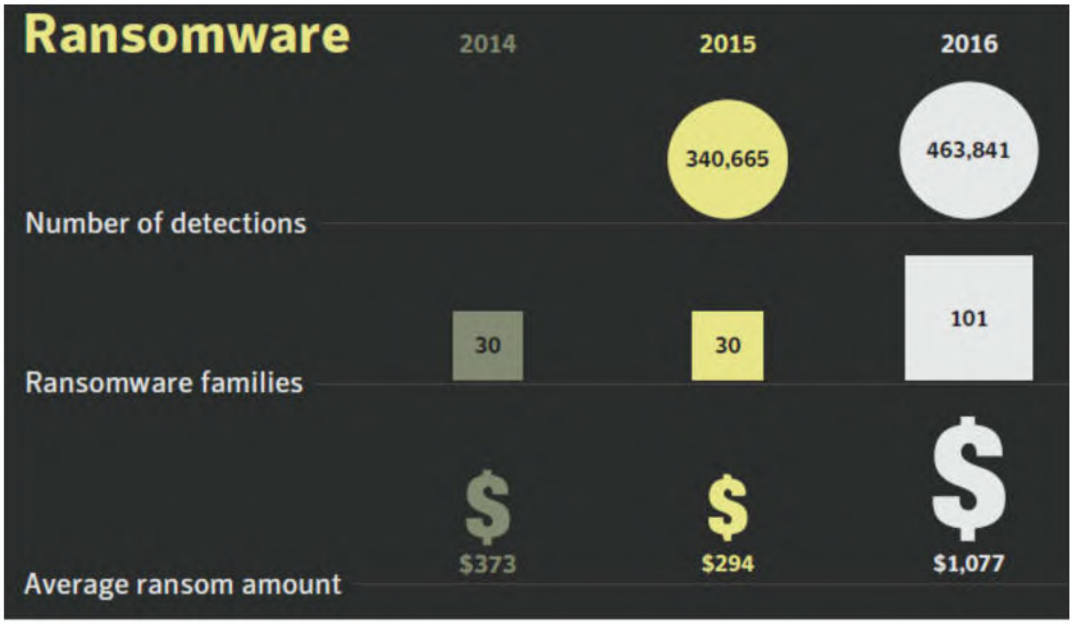
27% of breaches were discovered by third parties.

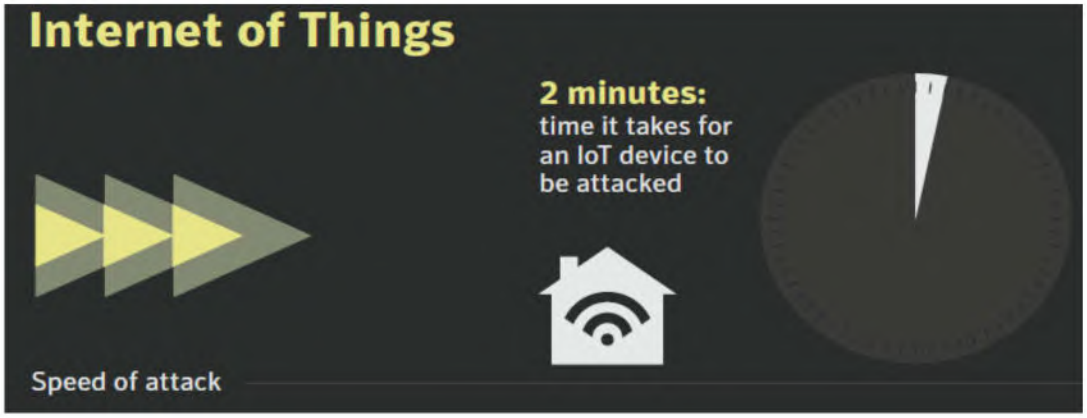

Breaches
2014
2015
2016
Total breaches
1,523
1,211
1,209
Breaches with more than 10 million identities exposed
11
13
15
Total identities exposed
1.2B
564M
1.1B
Average identities exposed per breach
805K
466K
927K
In the last 8 years more than 7.1 billion identities have been exposed in data breaches


Email threats, malware, and bots
2014
2015
2016
Spam rate %
60%
53%
53%
Phishing rate
1 in 965
1 in 1,846
1 in 2,596
Email malware rate
1in 244
1in 220
1in 131
New malware variants
275M
355M
357M
Number of bots
91.9M
98.6M


Mobile
New mobile vulnerabilities
TOTAL
2016
290
316
606
2015
463
89
552
2014
178
200
iOS
Android
12
10 BlackBerry
New Android mobile malware families
2014
2015
2016
46
18
4
New Android mobile malware variants
2.2K
3.9K
3.6K



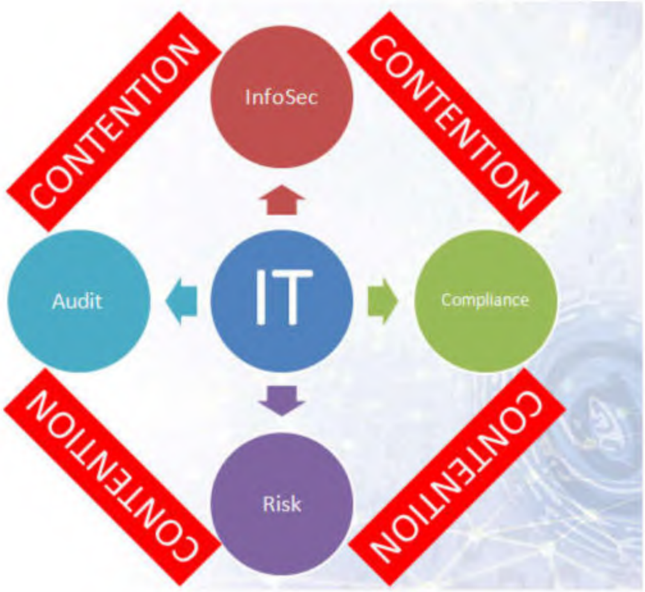




- **Leading Global Reports:**
  - Verizon 2017 Data Breach Investigations Report (DBIR)
  - Symantec 2017 Internet Security Threat Report (ISTR)

Topic No 20: Challenges Of InfoSec Implementation

- **Challenges Of IT:**
  - Complex and difficult to manage
  - Under pressure from business groups
  - Lack of sufficient competent resources
  - Lack of process culture
  - IT not aligned to perform diligent security work



- **Challenges Of InfoSec:**
  - Silos & lack of coherent ownership
  - Lot of time & energy wasted in traversing dept boundaries
  - Enabling environment for tough security work missing
  - Security hardening glaringly absent
- **Pakistan Industry Security Characteristics:**
  - Wavering management commitment
  - Superficial “dressing” security
  - Reactive to regulator audit/compliance mandate
  - Industry in denial

Topic No 21: Role Of A Regulator

- Cyber attack can have devastating consequences causing financial loss and disruption of critical infrastructure
- Cyber security has become a key risk factor putting under threat not only consumer rights protection, but also viability and health of the industry itself
- A **cybersecurity regulation** comprises directives that safeguard information technology and computer systems with the purpose of forcing companies and organizations to protect their systems and information from cyber-attacks (Wikipedia)
- Industry regulators including banking regulators have taken notice of the risk from cybersecurity and have either begun or are planning to begin to include cybersecurity as an aspect of regulatory examinations (Wikipedia)
- **Role Of Regulator In Cyber Security:**

– Regulations, guidelines, and audit

– Engagement of key stakeholders

– Technical and industry expertise

– Regional and international cooperation

- Regionally, the most well developed cyber security strategy and framework developed by Singapore (ITU rank # 1), Malaysia (ITU rank # 3), and Oman (ITU rank # 4)
- **Singapore**:

– Cyber Security Agency (2015); strategy, education, outreach, eco-system development

– National Cyber Security Master Plan 2018 (created 2013)

– Cyber Security Strategy (created 2016)

- **Pakistan; Ministry of IT (MOIT):**

– National IT Policy 2016 (draft)

– Digital Pakistan Policy 2017

- **Pakistan; State Bank Of Pakistan (SBP):**

– Enterprise Technology Governance & Risk Management Framework for Financial Institutions (30 May 2017)

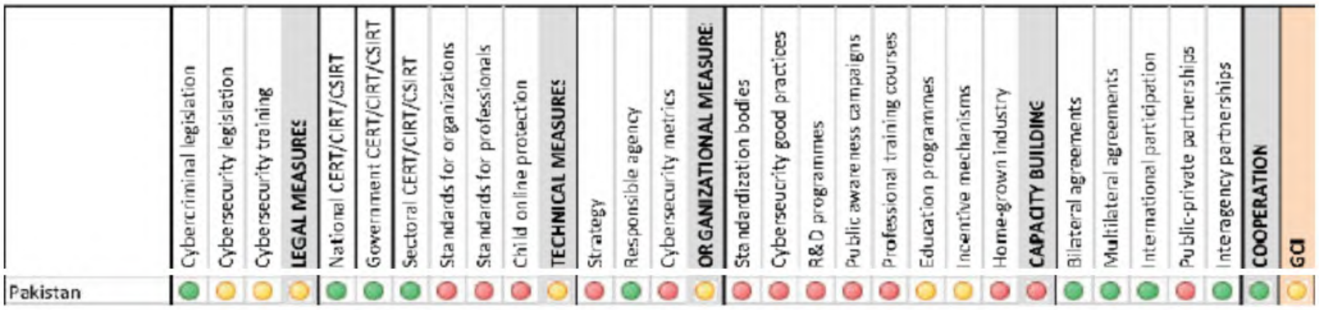
- **Pakistan lacks:**

– National cyber security strategy

- National cyber security master plan
- National cyber security agency
- National certification & accreditation body
- National Computer Emergency Response Team (CERT)

Topic No 22: Status Of InfoSec in Pakistan

- Pakistan Electronic Crimes Act (PECA) enacted as late as 2016
- Cyber security strategy, eco-system still missing
- Research program, capacity building, standardization, & certification bodies absent
- Condition of InfoSec in industry largely dismal



	Cybercriminal legislation	Cybersecurity legislation	Cybersecurity training	LEGAL MEASURES	National CERT/CIRT/CSIRT	Government CERT/CIRT/CSIRT	Sectoral CERT/CIRT/CSIRT	Standards for organizations	Standards for professionals	Child online protection	TECHNICAL MEASURES	Strategy	Responsible agency	Cybersecurity metrics	ORGANIZATIONAL MEASURE	Standardization bodies	Cyberseucrity good practices	R&D programmes	Public awareness campaigns	Professional training courses	Education programmes	Incentive mechanisms	Home-grown industry	CAPACITY BUILDING	Bilateral agreements	Multilateral agreements	International participation	Public-private partnerships	Interagency partnerships	COOPERATION	GCI
Pakistan	🟢	🟡	🟡	🟡	🟢	🟢	🟢	🔴	🔴	🔴	🟡	🔴	🟢	🔴	🟡	🔴	🔴	🔴	🔴	🔴	🟡	🟡	🔴	🔴	🟢	🟢	🟢	🔴	🟢	🟢	🟡

Global Cyber Security Index 2017 (ITU):

Pakistan ranked 67th with a score of 0.44/1

Bangladesh ranked 53rd with a score of 0.524/1

India ranked 23rd with a score of 0.683/1

- **Pakistan cyber security posture (industry):**
  - Superficial security
  - Reactive
  - Emphasis on governance
  - Security hardening of IT assets largely absent
  - Industry has been in denial for last decade
- **Reasons for poor security posture:**
  - Archaic digitalization and commerce
  - Perception that Pakistan is immune

- Lack of awareness and management commitment
- Lack of effective regulations

- **Changing dynamics (PK):**
  - Pakistan financial industry rocked by Bangladesh SWIFT hack 2016
  - Wannacry (May 2017) badly hit several dozen organizations in Pakistan
  - Increasing e-commerce, electronic banking
- **Pakistan needs:**
  - Necessary measures by the Government in line with what Malaysia, Oman have done for cyber security
  - Development of the security eco-system as an enabler in order to drive strong security posture

Topic No 23: Solution For InfoSec Improvement (PK)

- Generally, Pakistan Information Security is one generation behind IT deployment
- Four-layer security transformation model provides the correct sequence and focus in order to address organizational security gaps

1. Security Hardening; Security controls on IT assets & process
2. Vulnerability Management; patching
3. Security Engineering; More complex security design & solutions
4. Security Governance; Managing the information security program

- **Solution for strong security posture:**
  - Management commitment (Board)
  - 4 layer transformation model as security program
  - Allocation of resources
  - Periodic reviews for assessing progress
- **Don't repeat the same mistakes:**
  - Too much governance without the underlying security hardening
  - Reactive rather than intrinsic

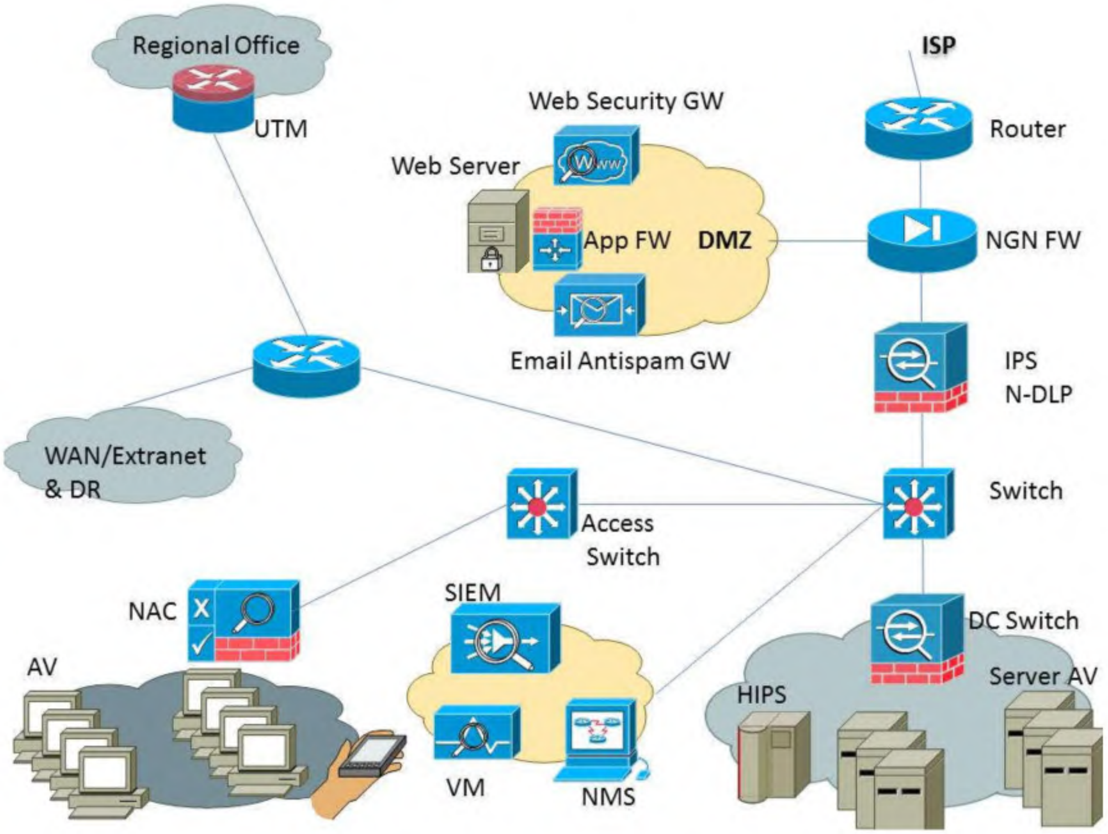
- Lack of resources (10% of what allocated for IT)
- Management interest

Chapter 2:

Typical Enterprise IT Architecture & Security Overlay

Topic No 24: Typical Enterprise IT Network

- What does a typical enterprise IT network look like ?



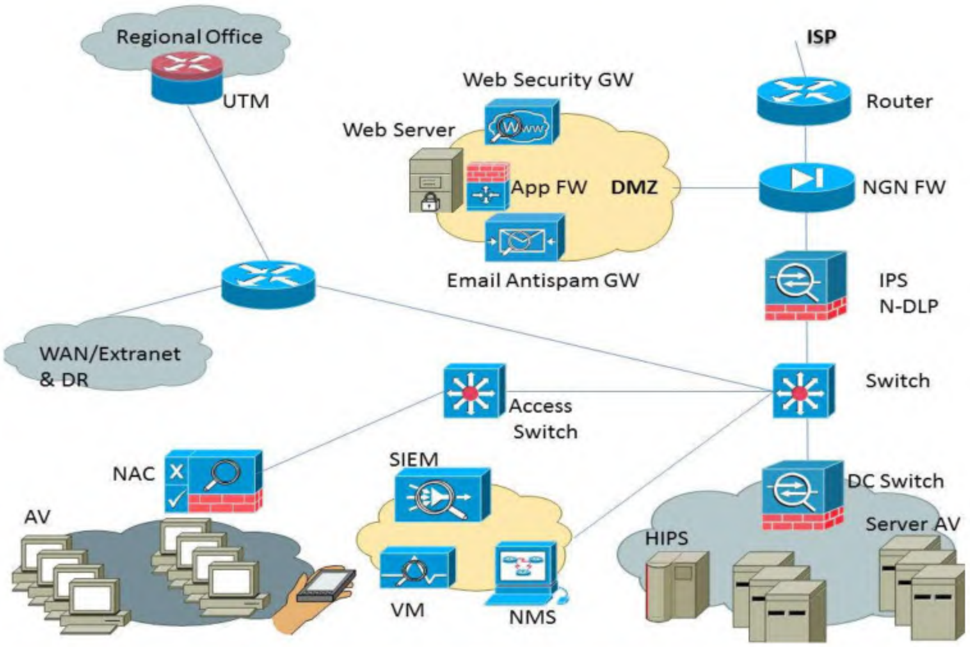
- Edge router
- NGN FW
- DMZ:
  - Web security GW/Proxy
  - Application security FW
  - Web server
  - Email antispam GW
- IPS & N-DLP

- Distribution switch
- Data center switch & FW
- Access switch
- NAC
- SOC:
  - SIEM
  - VM
  - Other SOC tools
- System AV
- Server HIPS
- UTM
- Mobile device - MDM

Topic No 25: Major Components: Enterprise IT Network

- **Edge router**
  - WAN interfaces
  - Edge filtering (access lists)
  - DDOS protection
- **NGN FW**

  Capable of APT attack prevention, malware filtering, web security, email security, application bandwidth filtering

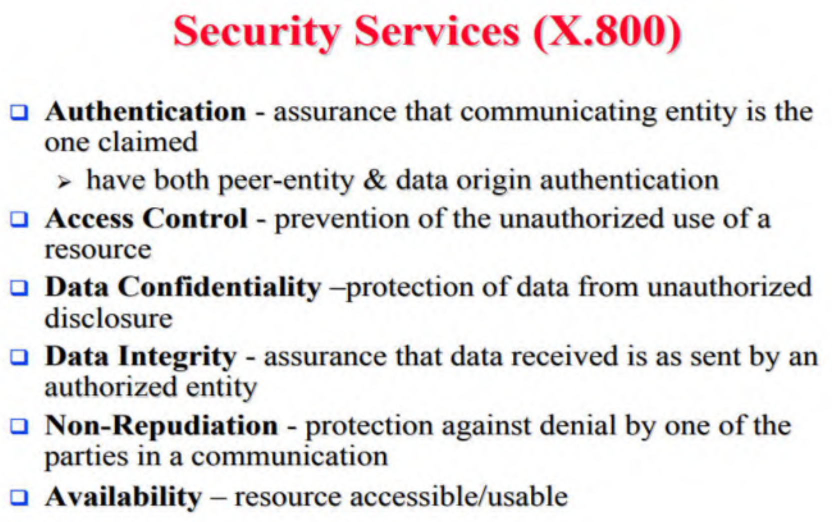


- **DMZ:**
  - Security zone with placement of published web server, web & email security GWs, app security GW
- **IPS:**
  - Intrusion prevention (signature based)
  - May be feature in NGN-FW
- **Distribution switch**
  - Connectivity to access switches, external exit point (WAN), and DC switch
- **Data center switch & FW**
  - Data center filtering (malware & access-lists)
- **Access switch**
  - User connectivity
  - Switchport security & access switch security
- **NAC**
  - Network admission control (IEEE802.1X)
- **SIEM**
  - Logging & dashboard for events, root cause analysis, event correlation
- **Vulnerability Manager**
  - Vulnerability scanning and asset tracking
- **System AV**
  - Signature based malware prevention
- **Server HIPS**
  IPS features for servers, also file integrity checkin
- **UTM**
  - Multi-featured NGN FW device
- **Mobile device – MDM**
  - Security features for mobile devices

Topic No 26: OSI Security Architecture

- ITU-T X.800, Security Architecture For OSI ('91)
- Defines a technique for defining security requirements, and characterizes the approaches to satisfy those requirements
- Defines security attack, mechanism, and service
- Security attack: action that compromises the security of information owned by an organization (or person)
  - Passive: aims to learn or make use of system information only
  - Active: attempts to alter system resources/operation
- Security service is a service that ensures adequate security of the system or data transfer

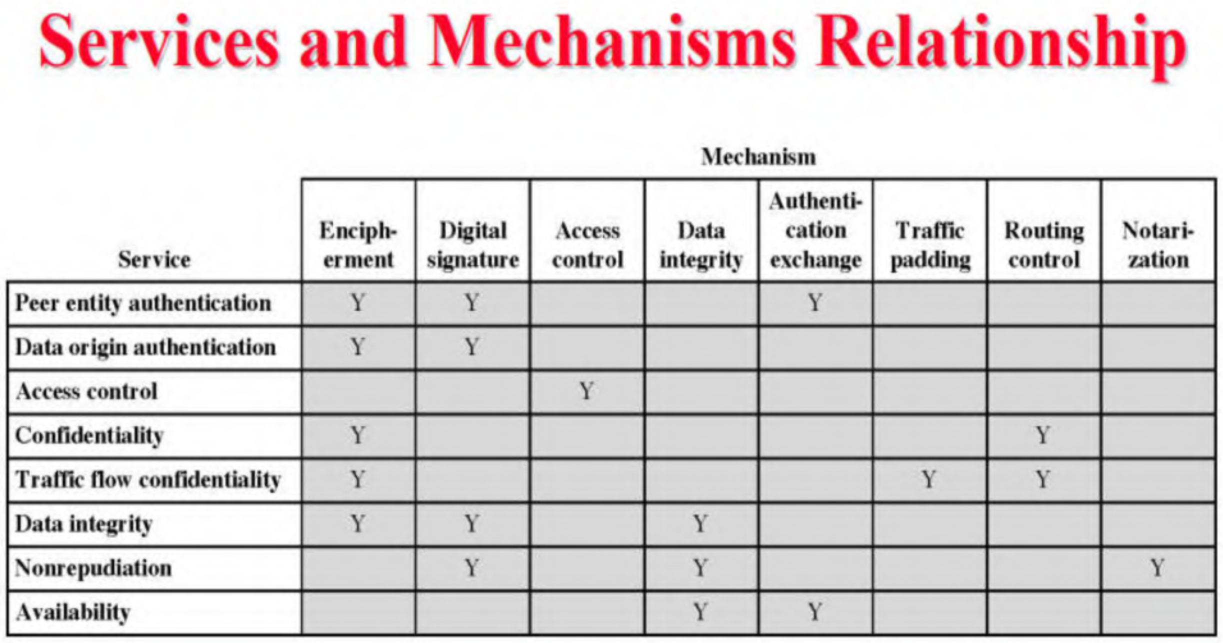
- Authentication
- Access control
- Data confidentiality
- Data integrity
- Non-repudiation
- Availability



Security Services (X.800)

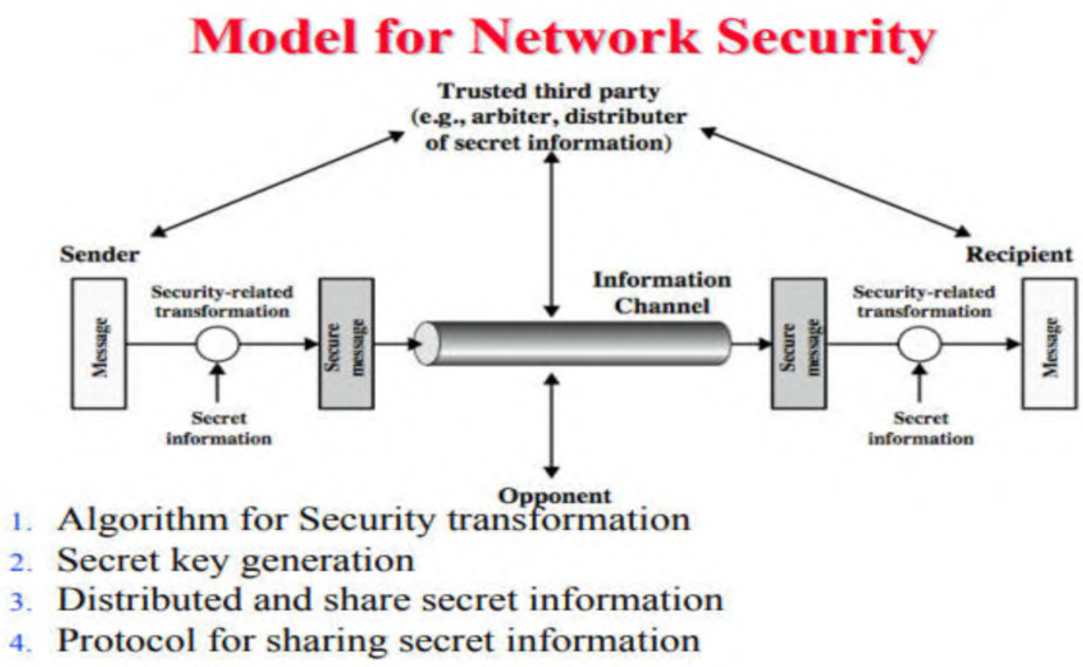
- **Authentication** - assurance that communicating entity is the one claimed
  - have both peer-entity & data origin authentication
- **Access Control** - prevention of the unauthorized use of a resource
- **Data Confidentiality** –protection of data from unauthorized disclosure
- **Data Integrity** - assurance that data received is as sent by an authorized entity
- **Non-Repudiation** - protection against denial by one of the parties in a communication
- **Availability** – resource accessible/usable

- **Security mechanism:**
  - Feature designed to detect, prevent, or recover from a security attack
  - Cryptography underlies many of the mechanisms



Services and Mechanisms Relationship

	Mechanism							
Service	Encipherment	Digital signature	Access control	Data integrity	Authentication exchange	Traffic padding	Routing control	Notarization
Peer entity authentication	Y	Y			Y			
Data origin authentication	Y	Y						
Access control			Y					
Confidentiality	Y						Y	
Traffic flow confidentiality	Y					Y	Y	
Data integrity	Y	Y		Y				
Nonrepudiation		Y		Y				Y
Availability				Y	Y			



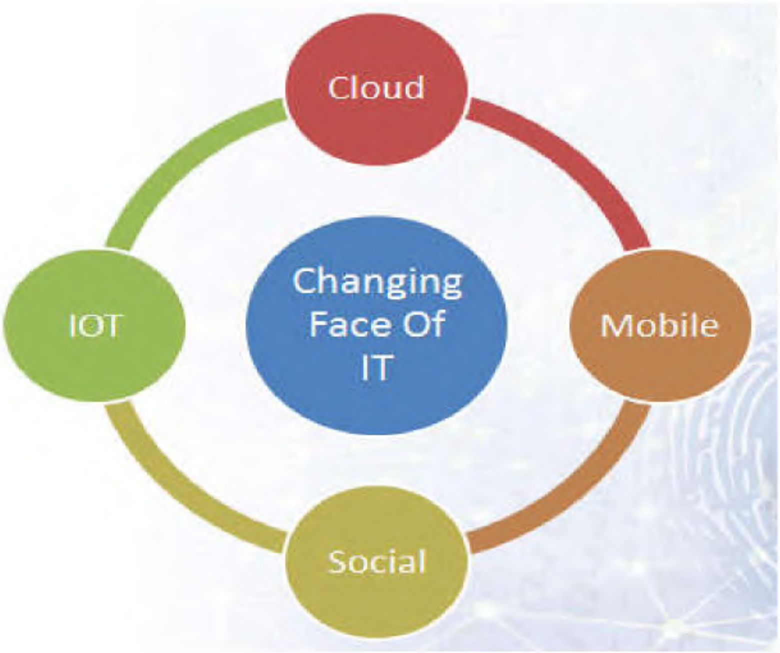
Model for Network Security

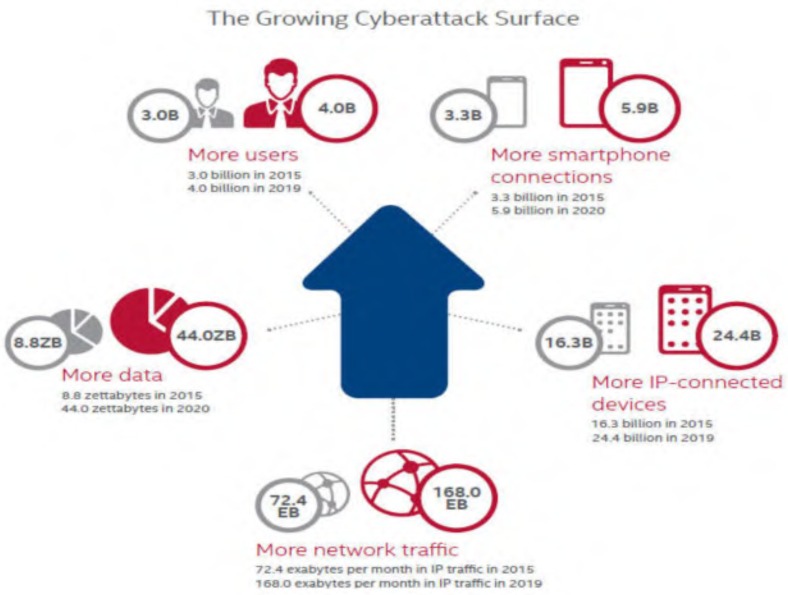
1. Algorithm for Security transformation
2. Secret key generation
3. Distributed and share secret information
4. Protocol for sharing secret information

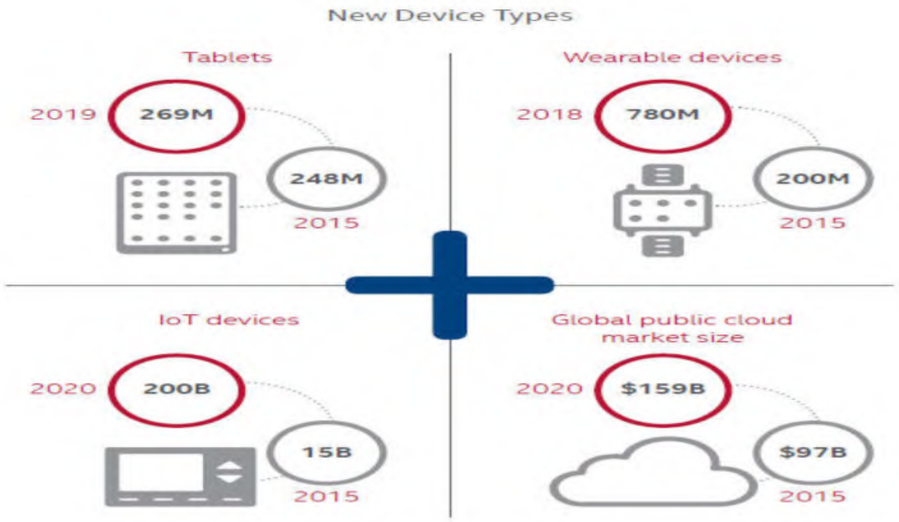
- ITU-T X.800, Security Architecture For OSI is dated from 1991

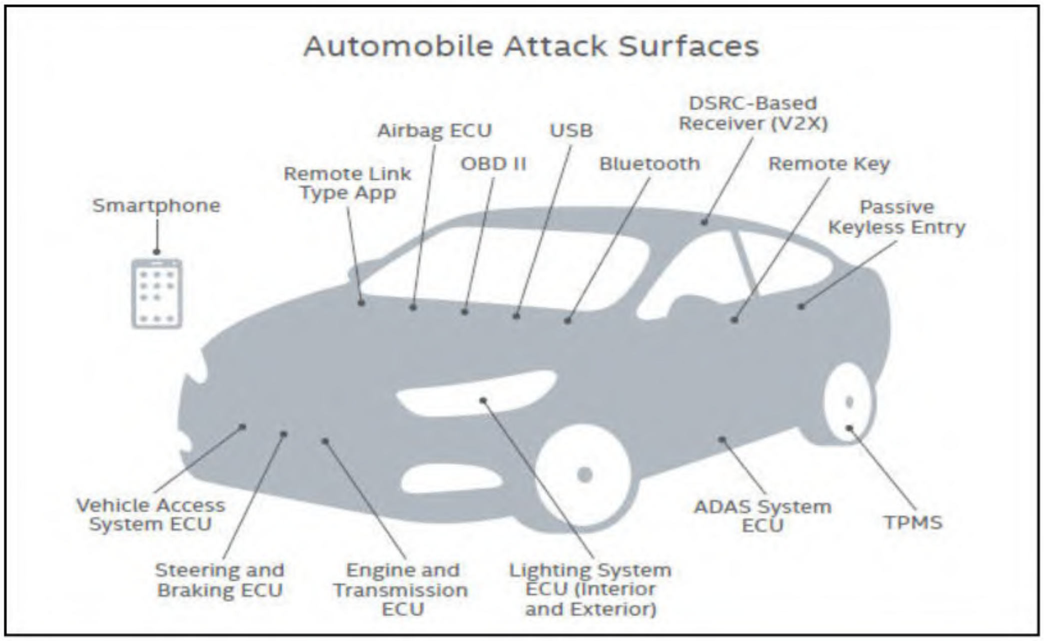
Topic No 27: New IT Frontiers: Cloud, Mobile, Social, IOT

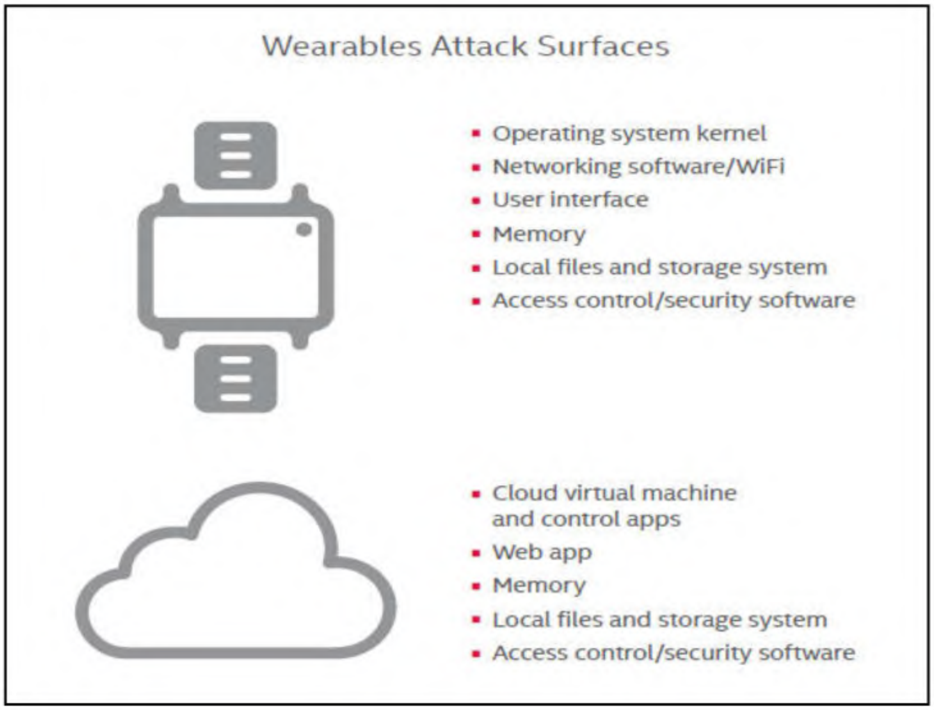
- IT dynamics are changing the way we communicate, work, and live
- These disruptive new IT frontiers have significant security consequences




The Growing Cyberattack Surface
3.0B
4.0B
More users
3.0 billion in 2015
4.0 billion in 2019
3.3B
5.9B
More smartphone connections
3.3 billion in 2015
5.9 billion in 2020
8.8ZB
44.0ZB
More data
8.8 zettabytes in 2015
44.0 zettabytes in 2020
16.3B
24.4B
More IP-connected devices
16.3 billion in 2015
24.4 billion in 2019
72.4 EB
168.0 EB
More network traffic
72.4 exabytes per month in IP traffic in 2015
168.0 exabytes per month in IP traffic in 2019


New Device Types
Tablets
2019
269M
248M
2015
Wearable devices
2018
780M
200M
2015
IoT devices
2020
200B
15B
2015
Global public cloud market size
2020
$159B
$97B
2015


Automobile Attack Surfaces
Smartphone
Remote Link Type App
Airbag ECU
OBD II
USB
Bluetooth
DSRC-Based Receiver (V2X)
Remote Key
Passive Keyless Entry
Vehicle Access System ECU
Steering and Braking ECU
Engine and Transmission ECU
Lighting System ECU (Interior and Exterior)
ADAS System ECU
TPMS



Wearables Attack Surfaces

- Operating system kernel
- Networking software/WiFi
- User interface
- Memory
- Local files and storage system
- Access control/security software

- Cloud virtual machine and control apps
- Web app
- Memory
- Local files and storage system
- Access control/security software

Topic No 28: Virtualization Environment Security

- Cloud Security Alliance: “Best Practices For Mitigating Risks In Virtual Environments” (PDF)
- **Virtualization security classified into three areas:**
  - Architectural
  - Hypervisor software
  - Configuration

1. VM Sprawl
2. Sensitive data within VM
3. Security of offline and dormant VMs
4. Security of Pre-configured (Golden Image) VMs
5. Lack of visibility into virtual networks

- **Risk # 1 (VM Sprawl)**
  - Impact: VMs can be created quickly, self-provisioned, or moved between physical servers, avoiding conventional change management process
  - Proliferation of VMs causing performance and security risks

- **Controls:** Policies, procedures and governance of VM lifecycle management
- Control creation, storage and use of VM images with a formal change management process
- Discover VMs & apply security controls
- **Controls:** keep a small number of identified, good and patched images of a guest operating system separately for fast recovery & restoration of systems

- **Risk # 2 (Sensitive Data Within a VM)**
  - **Impact:** VM images and snapshots can be copied easily via USB or console of hypervisor installed elsewhere
  - **Controls:** Encrypt data stored on virtual and cloud servers
  - Policies to restrict storage of VM images and snapshots
  - Image change management process with approvals
  - Logging & monitoring

Topic No 29: Case Study – Enterprise Network (Small Org)

- **Organizational characteristics:**
  - Location: Karachi
  - 70 total staff
  - 10 IT staff
  - 8 servers
  - 1 main DC, no DR site
  - IT service oriented business delivered to banks, telcos, enterprises
- **Organizational culture:**
  - Small IT oriented profitable business
  - Mostly chaotic culture with no defined or documented processes
  - Organization lacks discipline (execution)
  - Quality of resources: average

- **IT setup:**
  - Windows 2010/2012, Linux server OS
  - ASP.net 4.x, PHP applications (total 10)
  - Windows 8/10 desktops (50+)
  - 1 Cisco ASA FW in DC
  - No DR site or offsite backup
  - Free AV, no AD, no licenses
- **Security posture:**
  - Completely absent
  - No hardening done
  - No vulnerability management
  - No security management or governance
  - No policy or staff dedicated for
  - No management commitment (prior)
- **Security requirement:**
  - Customers are banks and telcos
  - Desired ISO27001:2013 (ISMS) certification for customer RFPs
- **Driving change ?**
  - Executive management facing security questions from top clients
  - COO approaches security consulting company for pen-testing
  - Consultant advises project for security transformation
- **Security transformation project:**
  - Project initiation: 2 Mths
  - Layer 1: security hardening of IT assets (6 Mths)
  - Layer 2: VM (1 Mth)
  - Layer 3: security engineering (1 Mth)
  - Layer 4: Governance & ISO cert.(3 Mths)

- **Conclusion:**
  - Absence of a process oriented, organized culture makes it difficult for security implementation
  - Adhoc culture is difficult to transform
  - Executive management support and commitment was the success factor

Topic No 30: Case Study – Enterprise (Medium Org)

- **Organizational characteristics:**
  - Location: Lahore
  - 350 total staff (group)
  - 15+ IT staff
  - 25 servers
  - 1 main DC, 1 DR site, 1 backup site
  - IT service business in media industry
- **Organizational culture:**
  - Medium sized, profitable IT business
  - Good internal culture (several employees with org since 10 yrs)
  - Organization lacks processes
  - Teams have execution discipline
  - Senior resources are experienced
- **IT setup:**
  - Windows 2010/2012, Linux server OS
  - Oracle & MS-SQL databases
  - ASP.net 4.x applications (total 15)
  - Windows 8/10 desktops (300+)
  - 1 Cisco ASA FW in DC; MicroTik routers as edge routers
  - Asterisk voice server for call center (10 seats, 6-8 lines)
  - 1 DR site (offshore) and 1 backup site (PK)
  - Panda AV, AD, unlicensed windows

  - Mdaemon for email server, migrating to MS Exchange

- **Security posture:**
  - Completely absent
  - No hardening done
  - No vulnerability management
  - No security management or governance
  - No policy or staff dedicated for security
  - No management commitment (prior)

- **Security requirement:**
  - Security incident; competitive data leakage to third-party by internal employee
  - License renewal due by regulator; demonstration of security commitment imperative

- **Driving change ?**
  - Executive management concerned about information security & security culture
  - CEO approaches security consulting company
  - Consultant advises project for security transformation

- **Security transformation project:**
  - Project initiation: 15 days
  - Layer 1: security hardening of IT assets (3 Mths)
  - Layer 2: VM (1 Mth)
  - Layer 3: security engineering (4 Mths)
  - Layer 4: Governance & ISO cert.(3 Mths)

- **Conclusion:**
  - Senior resources in the organization were committed
  - Demonstration of security commitment was essential for organizations survival
  - ISO27001:2013 (ISMS) serves as credible credential for customers/regulator

Topic No 31: Case Study – Enterprise (Large Org)

- **Organizational characteristics:**
  - Location: Karachi
  - 10,000+ total staff
  - 150 IT staff
  - 200 servers
  - 1 main DC, 1 DR site
  - Energy & distribution sector
- **Organizational culture:**
  - Large sized privatized org
  - Strong internal culture
  - Organization lacks process culture
  - Teams have high execution discipline
  - Good quality & qualification of IT resources
- **IT setup:**
  - Windows 2010/2012, Linux, AIX OS
  - Oracle & MS-SQL databases
  - Over 100 internal applications (Sharepoint, GIS, ASP.net)

    Windows 7/8/10 desktops (5500+)
  - Asterisk voice server for voice communication
  - 1 DR site (hosted)
  - Licensed AV, AD, & windows
  - Complete SAP ERP suite & internal development
- **Security posture:**
  - Superficial
  - No hardening done

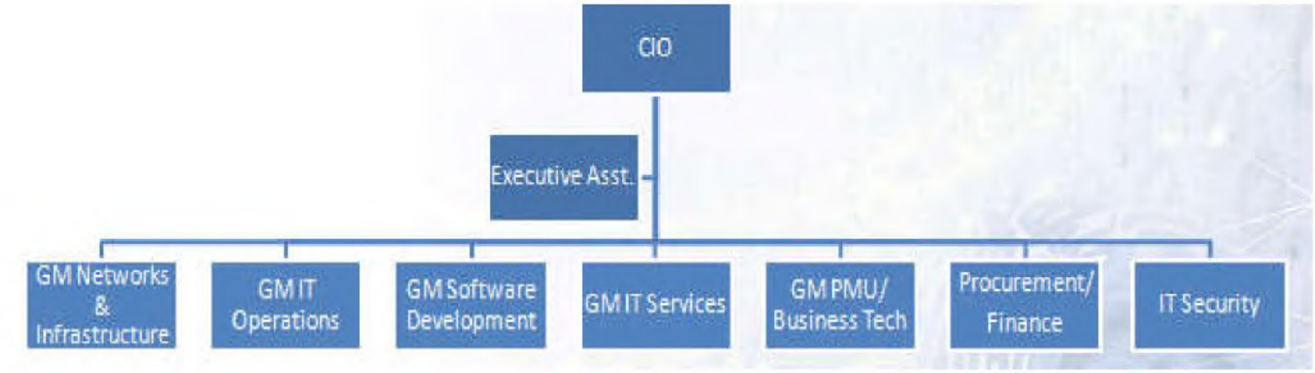
  - Weak vulnerability management
  - Poor security management/ governance
  - Security team exists
  - No management commitment (prior)
- **Security requirement:**
  - Security incident; servers hacked causing financial loss
- **Driving change ?**
  - Executive management concerned about information security & security culture
  - Board drives IT to hire consultant
  - Consultant convinces IT to go for security transformation
- **Security transformation project:**
  - Project initiation: 15 days
  - Layer 1: security hardening of IT assets (6 Mths)
  - Layer 2: VM (1 Mth)
  - Layer 3: security engineering (1 Mths)
  - Layer 4: Governance & ISO cert.(5 Mths)
- **Conclusion:**
  - Strong commitment of the Board & IT Director drove the implementation of the security transformation project
  - ISO27001:2013 (ISMS) achieved as a security credential

Topic No 32: Structure Of An IT Team

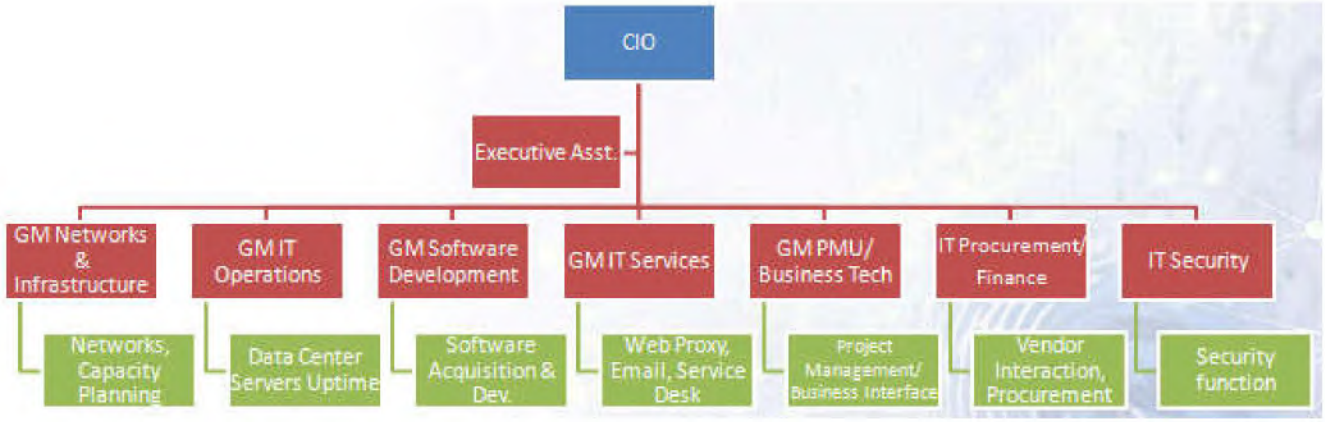
- Typical organogram of an IT team
- Job functions
- Additional tasks
- Large sized org
- Medium sized org

- Small sized org

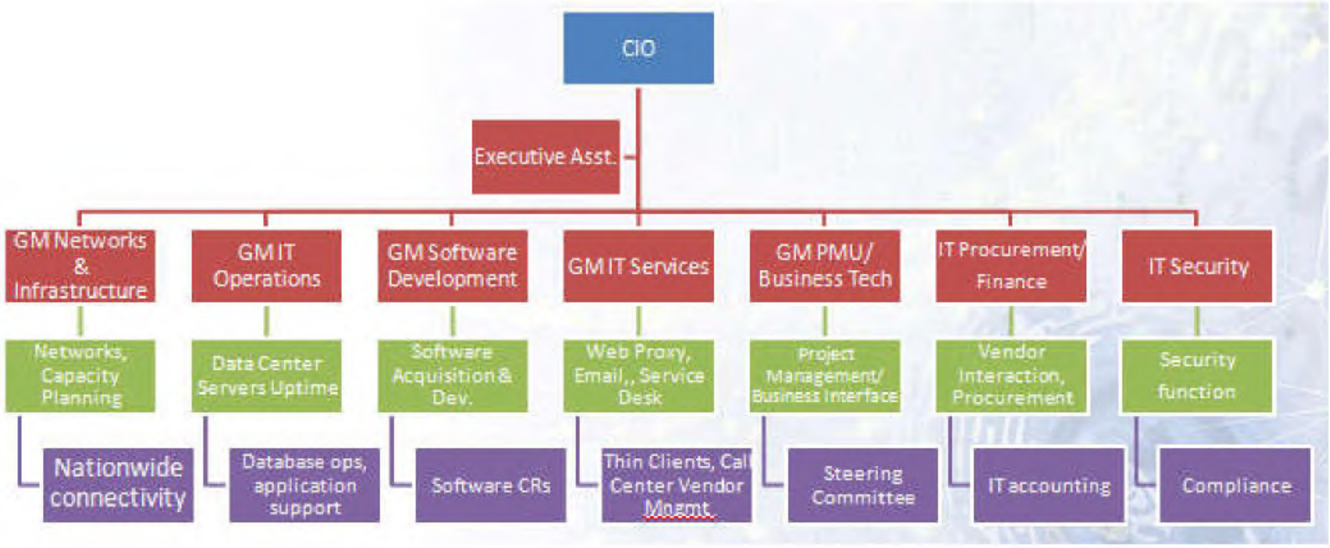
GENERAL STRUCTURE



JOB FUNCTIONS

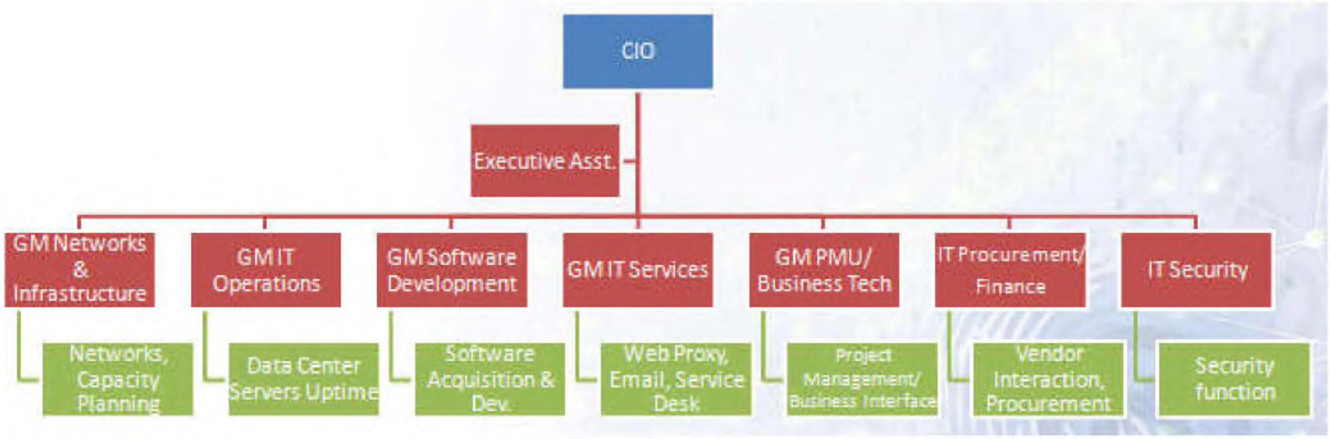

CIO
Executive Asst.
GM Networks & Infrastructure
GM IT Operations
GM Software Development
GM IT Services
GM PMU/ Business Tech
IT Procurement/ Finance
IT Security
Networks, Capacity Planning
Data Center Servers Uptime
Software Acquisition & Dev.
Web Proxy, Email, Service Desk
Project Management/ Business Interface
Vendor Interaction, Procurement
Security function

ADDITIONAL TASKS

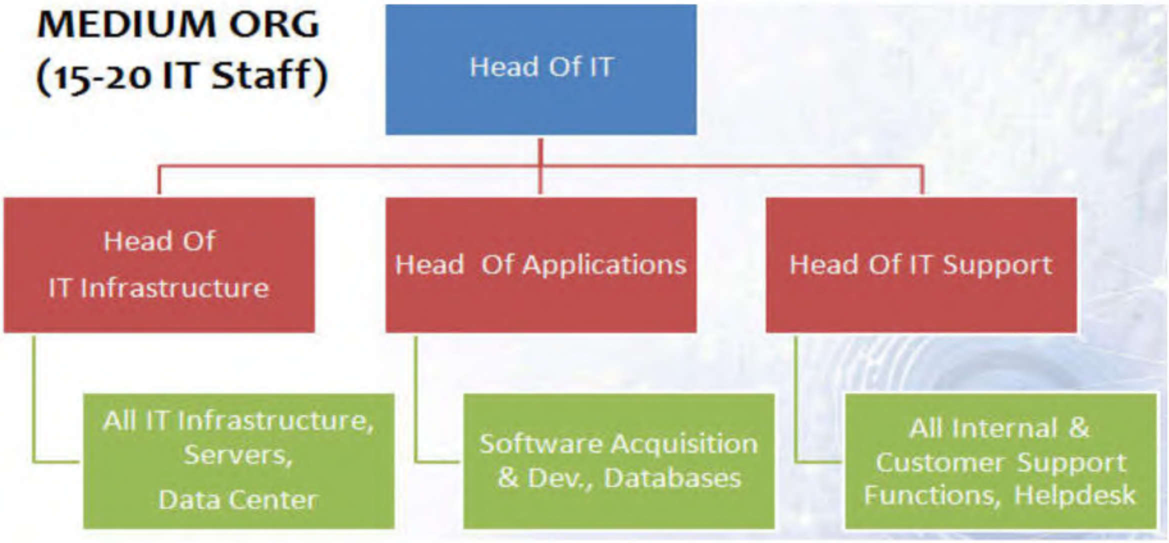

CIO
Executive Asst.
GM Networks & Infrastructure
GM IT Operations
GM Software Development
GM IT Services
GM PMU/ Business Tech
IT Procurement/ Finance
IT Security
Networks, Capacity Planning
Data Center Servers Uptime
Software Acquisition & Dev.
Web Proxy, Email,, Service Desk
Project Management/ Business Interface
Vendor Interaction, Procurement
Security function
Nationwide connectivity
Database ops, application support
Software CRs
Thin Clients, Call Center Vendor Mngmt.
Steering Committee
IT accounting
Compliance

LARGE ORG

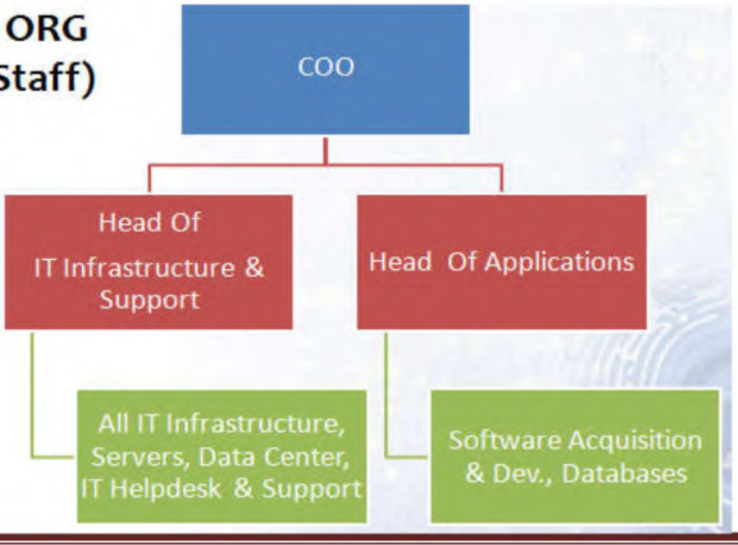
(150 IT Staff)


CIO
Executive Asst.
GM Networks & Infrastructure
GM IT Operations
GM Software Development
GM IT Services
GM PMU/ Business Tech
IT Procurement/ Finance
IT Security
Networks, Capacity Planning
Data Center Servers Uptime
Software Acquisition & Dev.
Web Proxy, Email, Service Desk
Project Management/ Business Interface
Vendor Interaction, Procurement
Security function

MEDIUM ORG (15-20 IT Staff)


Head Of IT
Head Of IT Infrastructure
Head Of Applications
Head Of IT Support
All IT Infrastructure, Servers, Data Center
Software Acquisition & Dev., Databases
All Internal & Customer Support Functions, Helpdesk

SMALL ORG (7-8 IT Staff)


COO
Head Of IT Infrastructure & Support
Head Of Applications
All IT Infrastructure, Servers, Data Center, IT Helpdesk & Support
Software Acquisition & Dev., Databases

- IT teams come in various structures, however there are set industry best-practices and organizations should follow tried & tested best-practices

- IT is today an enabler forming the engine for business automation, but also carries with it security hazards

Topic No 33: Objectives, Performance KPIs, Priorities Of IT

- IT is a challenging domain which requires skill, experience, structure, and spending to run efficiently

- Business is making steep demands on IT for agile delivery of applications in order to keep up with competition

- Running IT requires a diverse skillset

- Primary objective set for IT by management is to:
  - Setup the infrastructure with least cost in the minimum time
  - To maintain the network with minimum disruption and maximum performance requiring the least resources
- **Performance KPIs:**
  - Minimal network disruption
  - Timely completion of new projects
  - Quick and efficient changes to existing applications (change-requests) to meet business requirements
- **Priorities of IT:**
  - To meet the performance KPIs
  - To meet adhoc and unplanned business requirements
- **General IT teams performance in Banking:**
  - Extremely large number of applications (hundreds) & legacy
  - Heavy-weight business teams and IT seen as a cost-center
  - Technologists generally poor at banking (business)
- **General IT teams performance in Telcos:**
  - More professional and qualified workforce
  - Most telco have been setup in the last 10 years so have clean greenfield networks (no legacy)
  - Fewer applications; IT supports business
- **General IT teams performance in Enterprise:**
  - Competence and professionalism of IT teams matches culture of organization
  - IT efficiency driven by top management commitment and interest
- **Security posture:**
  - Surprisingly in 95% of all orgs in Pakistan (all types and sizes), security posture has been found to be deficient
  - Lack of awareness in the country has contributed to this deficient and poor security posture

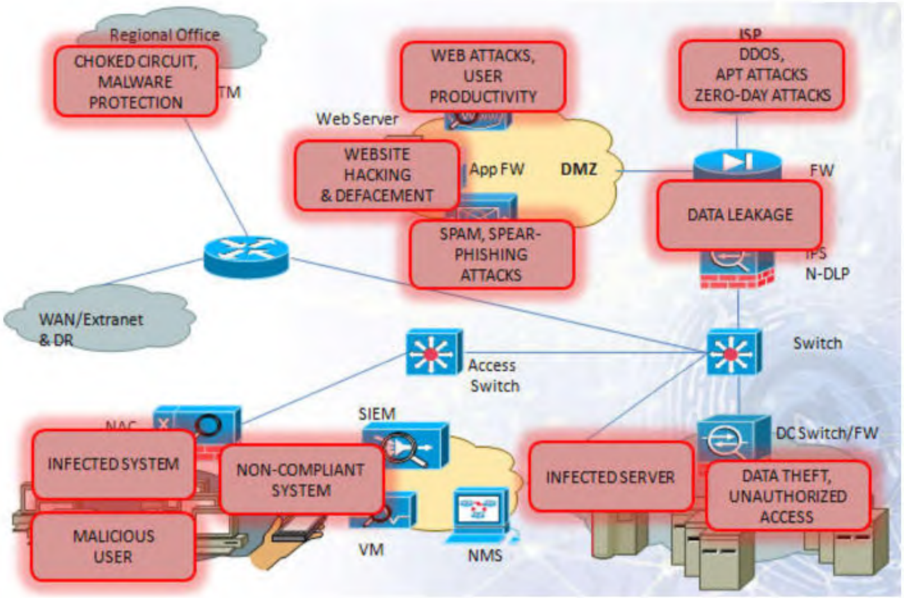
Topic No 34: IT Team Interaction With Other Stakeholders

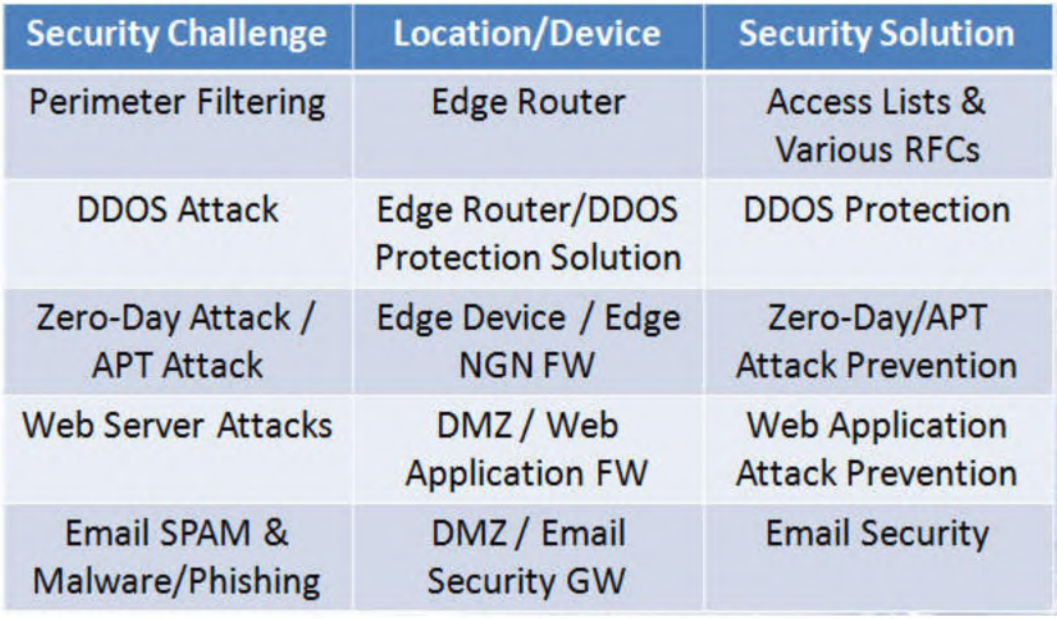
- IT budget/projects approved by IT Steering Committee (annual)
- Business requirements & new projects
- Audit & compliance requirements
- Expansion (branches) & maintenance
- IT support for computing (helpdesk)
- Business continuity & DR
- IT budget/projects approved by IT Steering Committee (annual):
    - Capex and opex layout
    - Includes new projects & licensing / maintenance of operations
      New hirings

- **Business requirements & new projects:**
    - New upcoming business projects
    - Change requests (CRs) and expansion of existing business projects
    - Vendor management for business solutions
    - UAT (testing) of business applications
- **Audit & compliance requirements:**
    - External audit
    - Internal audit
    - Compliance
    - Information security & risk depts
- **Expansion (branches) & maintenance:**
    - IT requirements for business expansion (new branches, new locations, new territories)
    - Maintenance of existing IT infrastructure (UPS, networking, bandwidth circuits)
- **IT support for computing (helpdesk):**
    - New software and versions rollout (e.g. migration of AV or email program)
    - IT support for business functions (application not working, speed slow, etc)
    - Software bugs
- **Business continuity & DR:**
    - DR is a technology function for which interaction with business functions is required (testing)
    - Business continuity is handled under business operations for which IT also participates

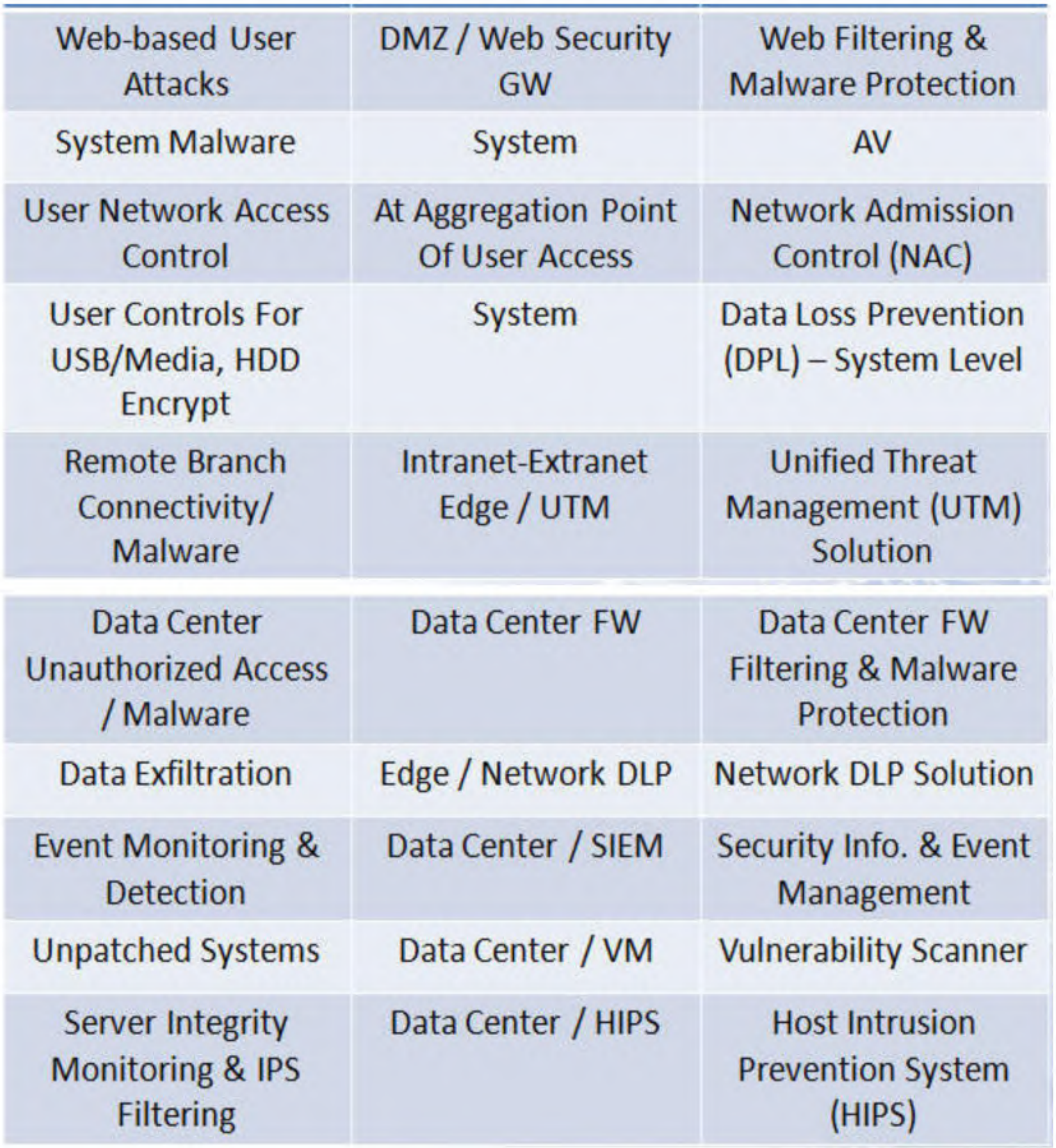
Topic No 35: Security Overlay Of Enterprise (Part 1)

- How is the enterprise secured with the help of various components and security design ?


Regional Office
CHOKED CIRCUIT, MALWARE PROTECTION
TM
Web Server
WEB ATTACKS, USER PRODUCTIVITY
ISP
DDOS, APT ATTACKS ZERO-DAY ATTACKS
WEBSITE HACKING & DEFACEMENT
App FW
DMZ
FW
DATA LEAKAGE
SPAM, SPEAR-PHISHING ATTACKS
IPS
N-DLP
WAN/Extranet & DR
Access Switch
Switch
SIEM
NAC
INFECTED SYSTEM
NON-COMPLIANT SYSTEM
MALICIOUS USER
VM
NMS
INFECTED SERVER
DC Switch/FW
DATA THEFT, UNAUTHORIZED ACCESS



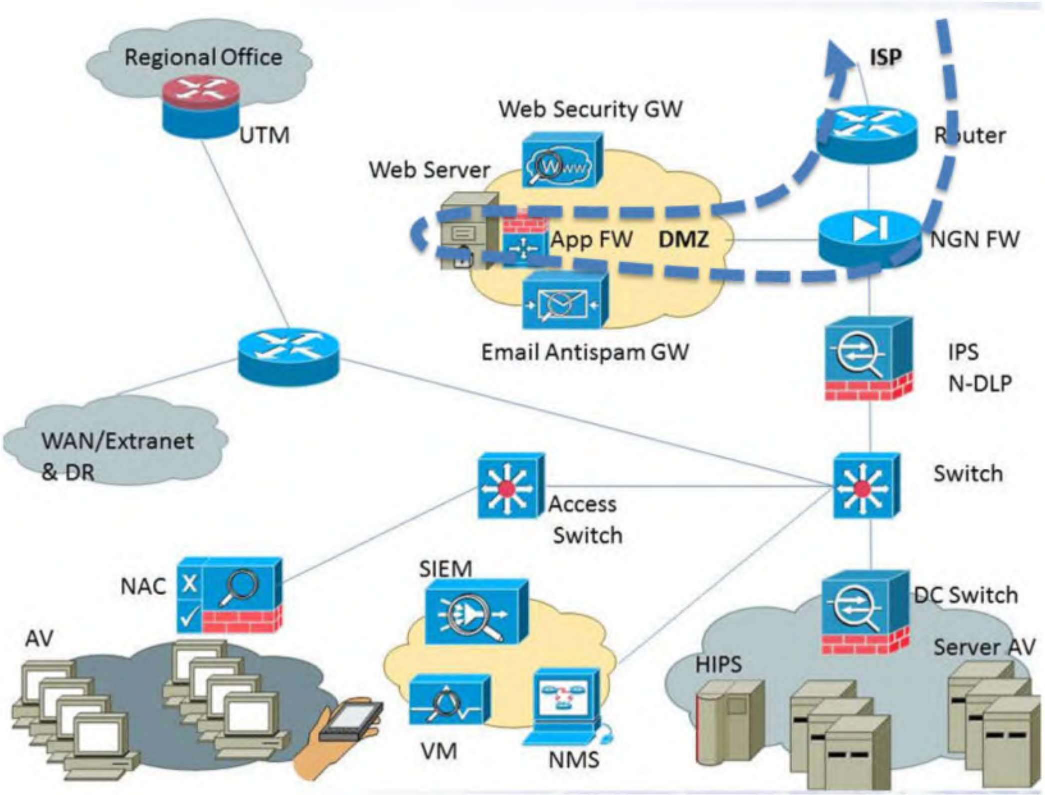
Security Challenge	Location/Device	Security Solution
Perimeter Filtering	Edge Router	Access Lists & Various RFCs
DDOS Attack	Edge Router/DDOS Protection Solution	DDOS Protection
Zero-Day Attack / APT Attack	Edge Device / Edge NGN FW	Zero-Day/APT Attack Prevention
Web Server Attacks	DMZ / Web Application FW	Web Application Attack Prevention
Email SPAM & Malware/Phishing	DMZ / Email Security GW	Email Security

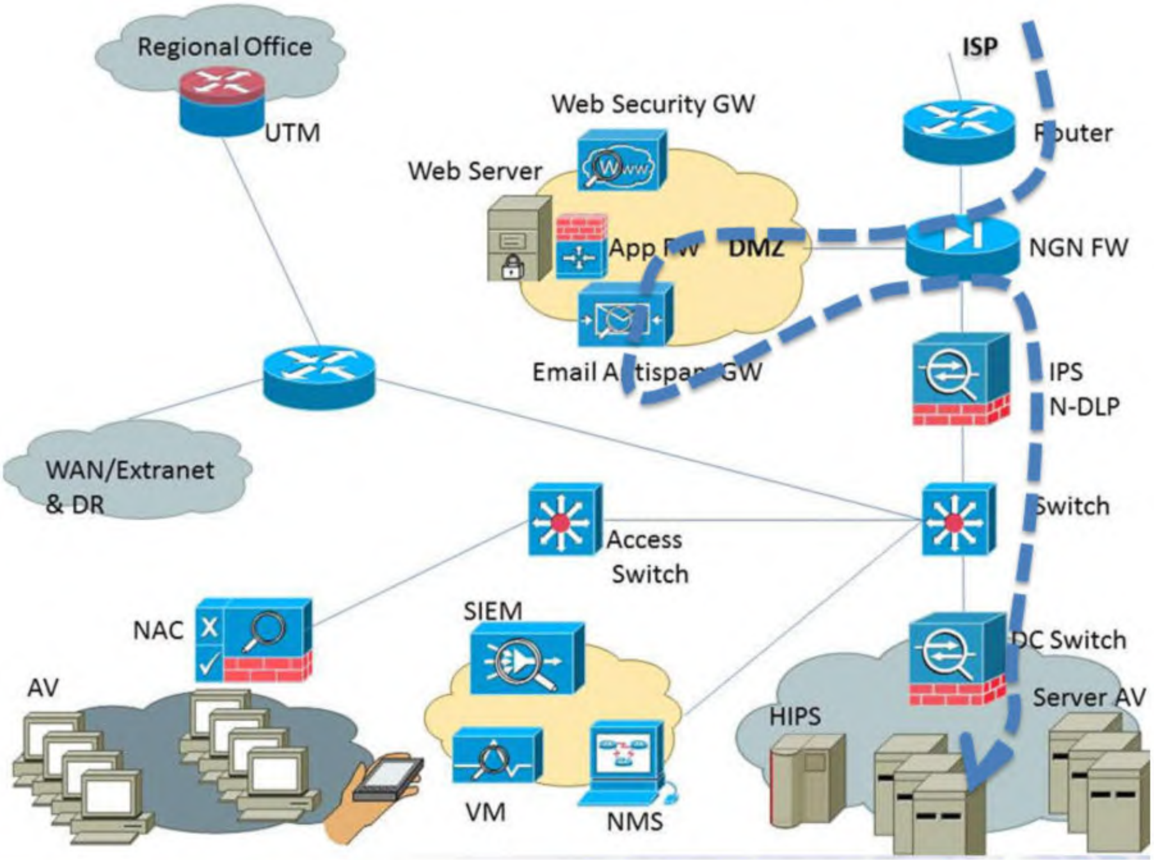


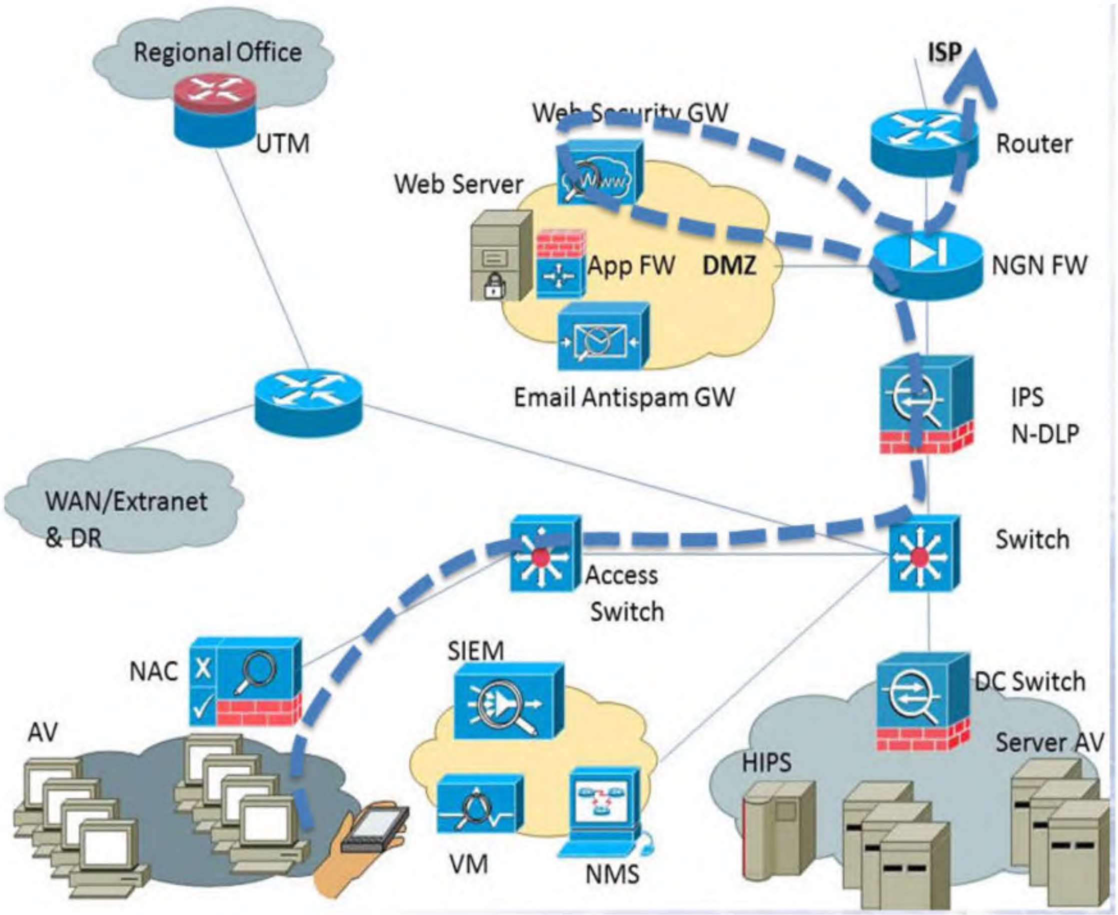
Web-based User Attacks	DMZ / Web Security GW	Web Filtering & Malware Protection
System Malware	System	AV
User Network Access Control	At Aggregation Point Of User Access	Network Admission Control (NAC)
User Controls For USB/Media, HDD Encrypt	System	Data Loss Prevention (DPL) – System Level
Remote Branch Connectivity/ Malware	Intranet-Extranet Edge / UTM	Unified Threat Management (UTM) Solution
Data Center Unauthorized Access / Malware	Data Center FW	Data Center FW Filtering & Malware Protection
Data Exfiltration	Edge / Network DLP	Network DLP Solution
Event Monitoring & Detection	Data Center / SIEM	Security Info. & Event Management
Unpatched Systems	Data Center / VM	Vulnerability Scanner
Server Integrity Monitoring & IPS Filtering	Data Center / HIPS	Host Intrusion Prevention System (HIPS)

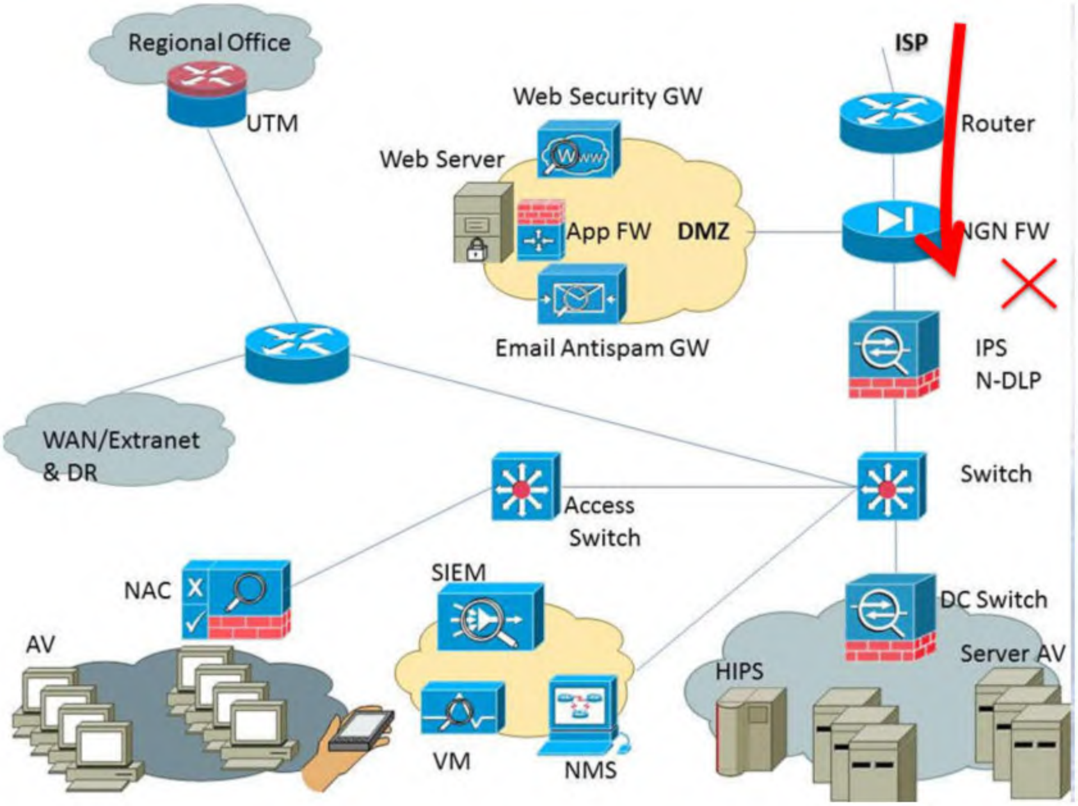
Topic No 36: Security Overlay Of Enterprise (Part 2)

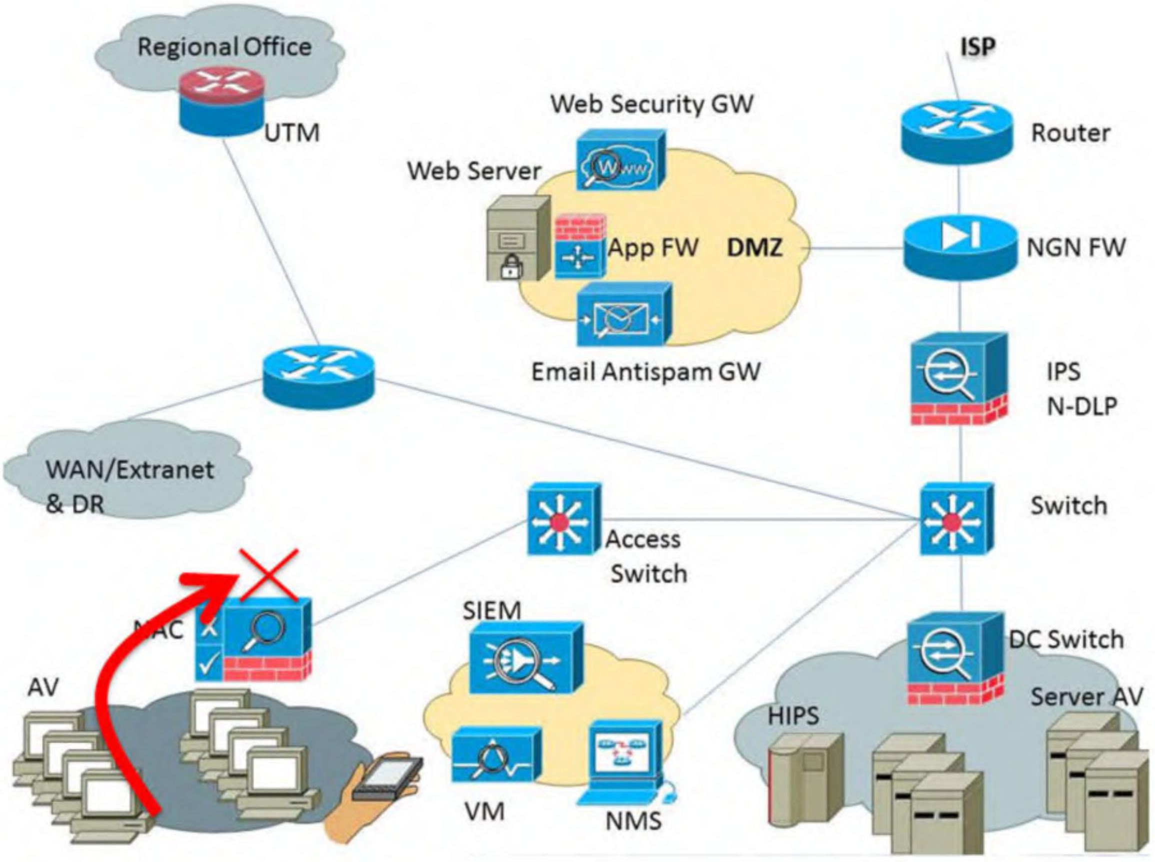
- What are the traffic flows specific to good security design ?

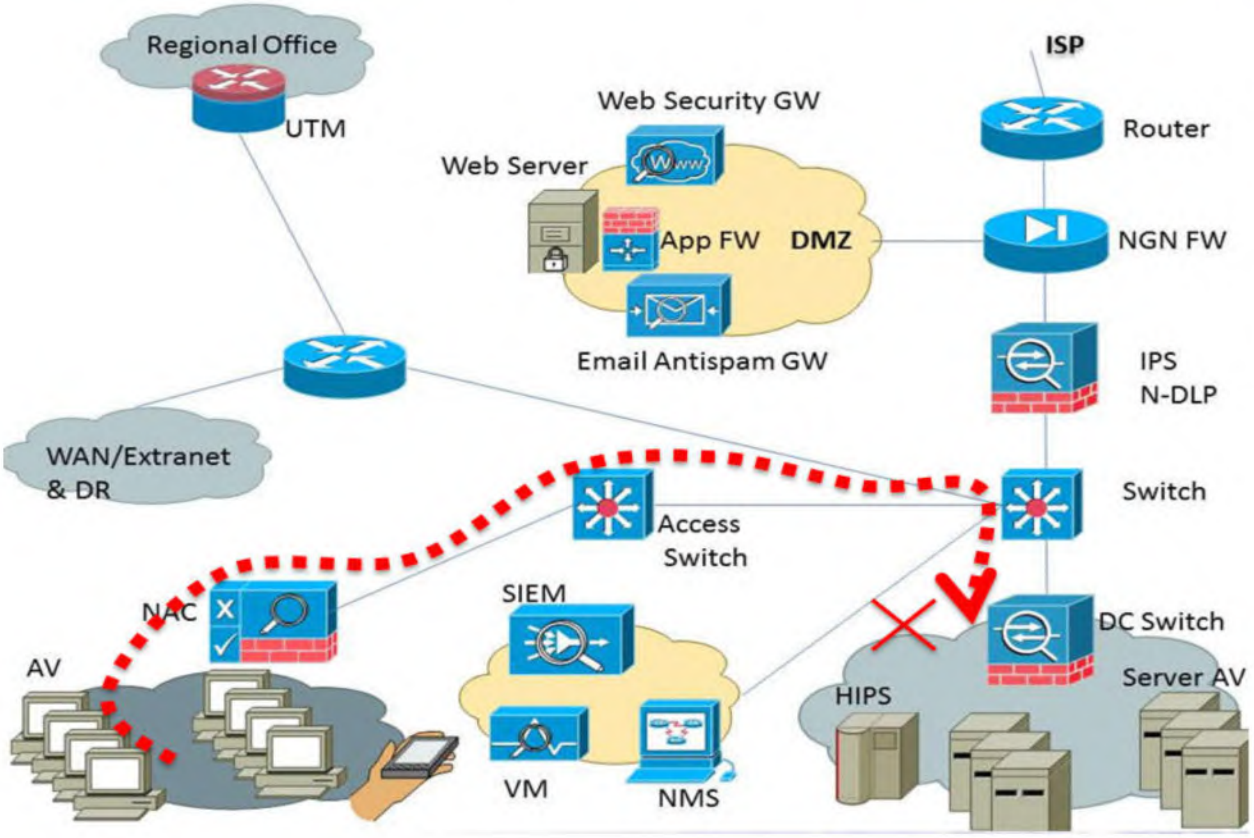


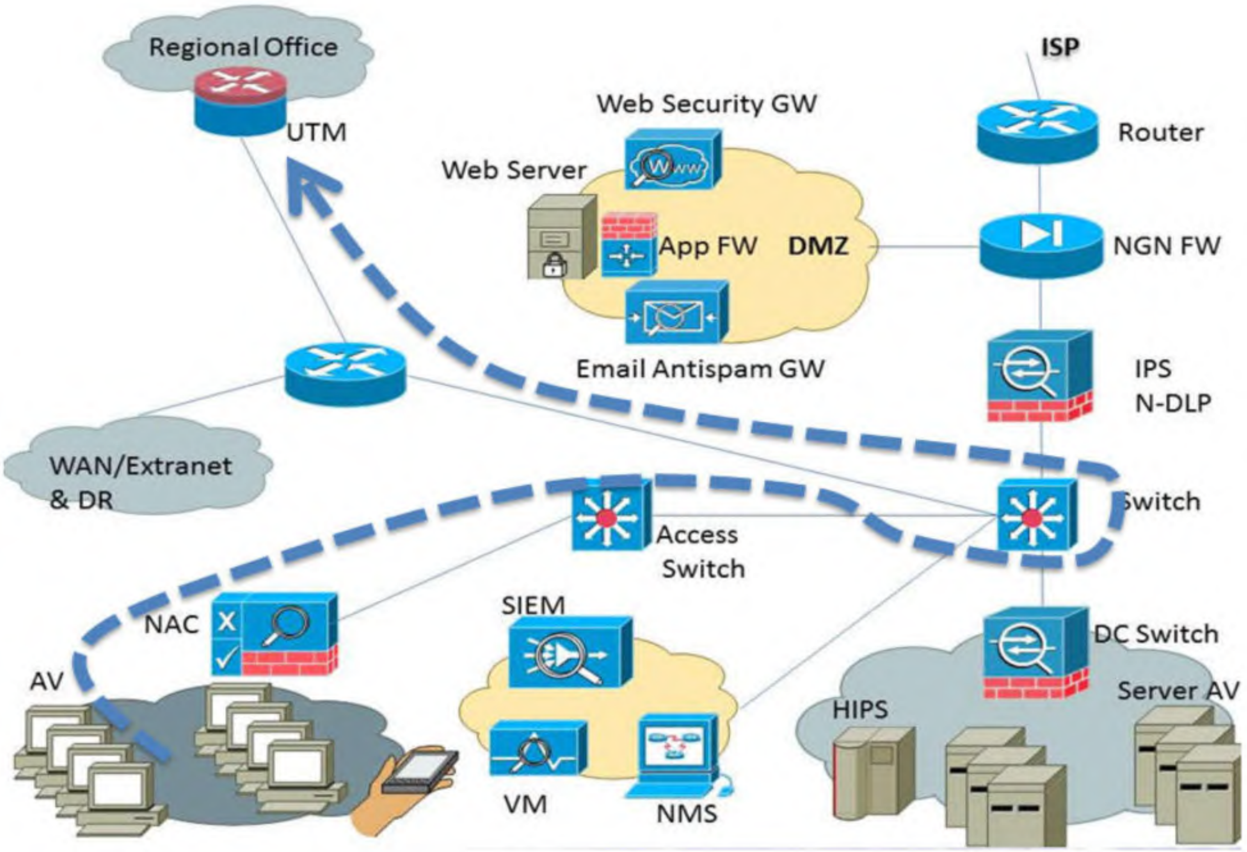


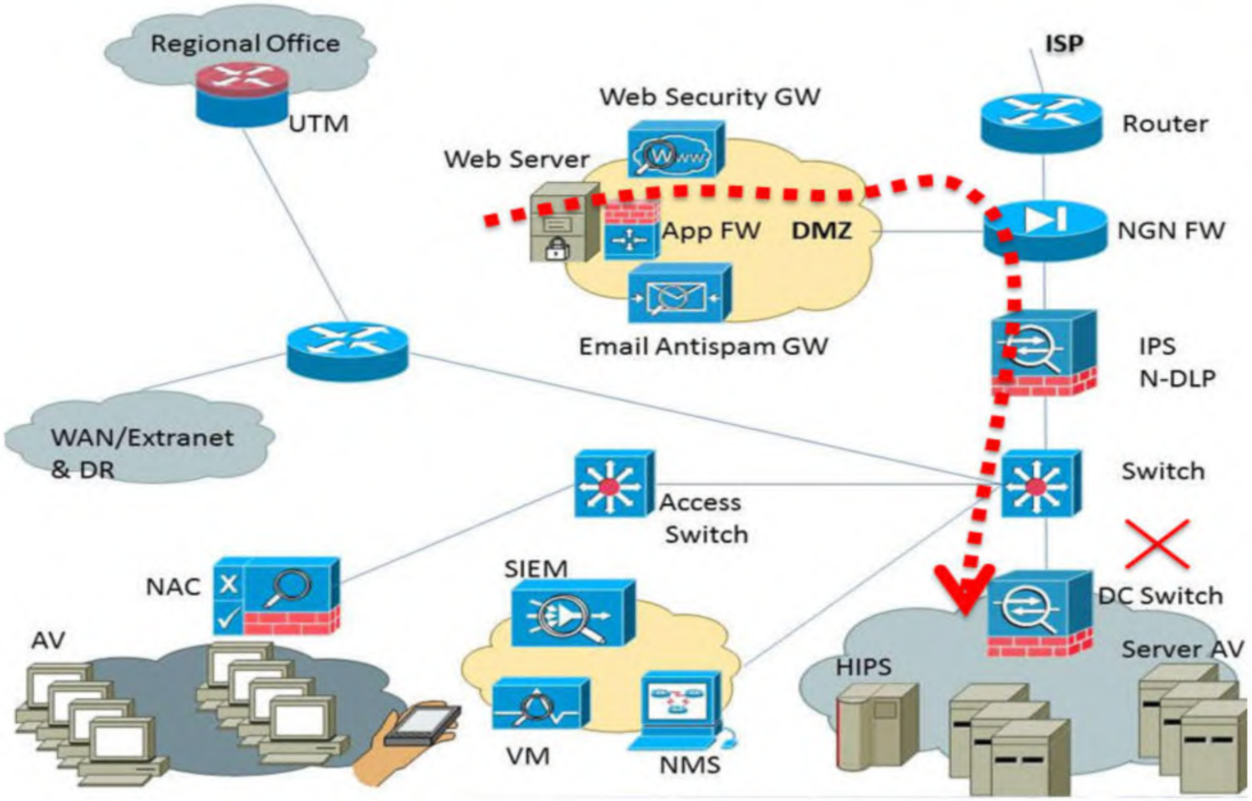

Regional Office
UTM
ISP
Web Security GW
Router
Web Server
App FW
DMZ
NGN FW
Email Antispam GW
IPS
N-DLP
WAN/Extranet
& DR
Switch
Access
Switch
NAC
SIEM
DC Switch
AV
Server AV
HIPS
VM
NMS


Regional Office
UTM
ISP
Web Security GW
Router
Web Server
App FW
DMZ
NGN FW
Email Antispam GW
IPS
N-DLP
WAN/Extranet
& DR
Switch
Access
Switch
NAC
SIEM
DC Switch
AV
Server AV
HIPS
VM
NMS


Regional Office
UTM
Web Security GW
Web Server
App FW
DMZ
Email Antispam GW
ISP
Router
NGN FW
IPS
N-DLP
WAN/Extranet
& DR
Switch
Access
Switch
NAC
SIEM
DC Switch
AV
Server AV
HIPS
VM
NMS


Regional Office
UTM
Web Security GW
Web Server
App FW
DMZ
Email Antispam GW
ISP
Router
NGN FW
IPS
N-DLP
WAN/Extranet
& DR
Switch
Access
Switch
NAC
SIEM
DC Switch
AV
Server AV
HIPS
VM
NMS

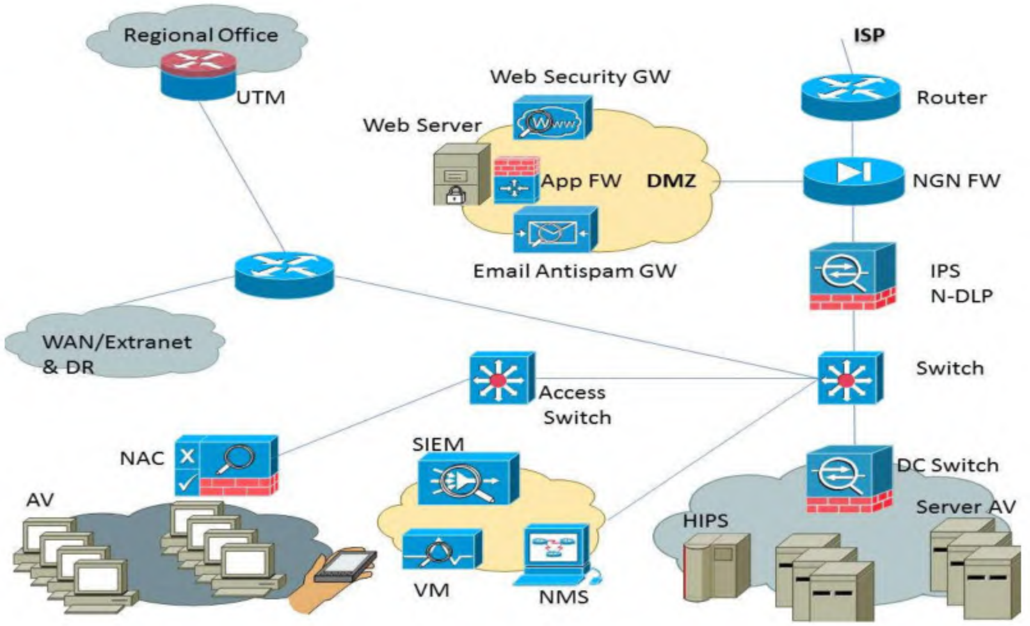




- Granular access list filtering and a well planned and tested security design are keys to success

Topic No 37: Security Overlay Of Enterprise (Part 3)

- General security design principles



1. Block unauthorized traffic at edge (direct public www traffic to DMZ web server)
2. Edge malware protection & DMZ
3. Web & email are important vectors to secure against malware and attacks
4. NGN-FW (may be found in a UTM as well)
5. Web security GW and email anti-spam GW solutions
6. Granular access list filtering in edge and data center FWs (source, destination, and traffic type/port)
7. A good AV solution, and keep virus definitions updated
8. Monthly VM scans

More Advanced Security:

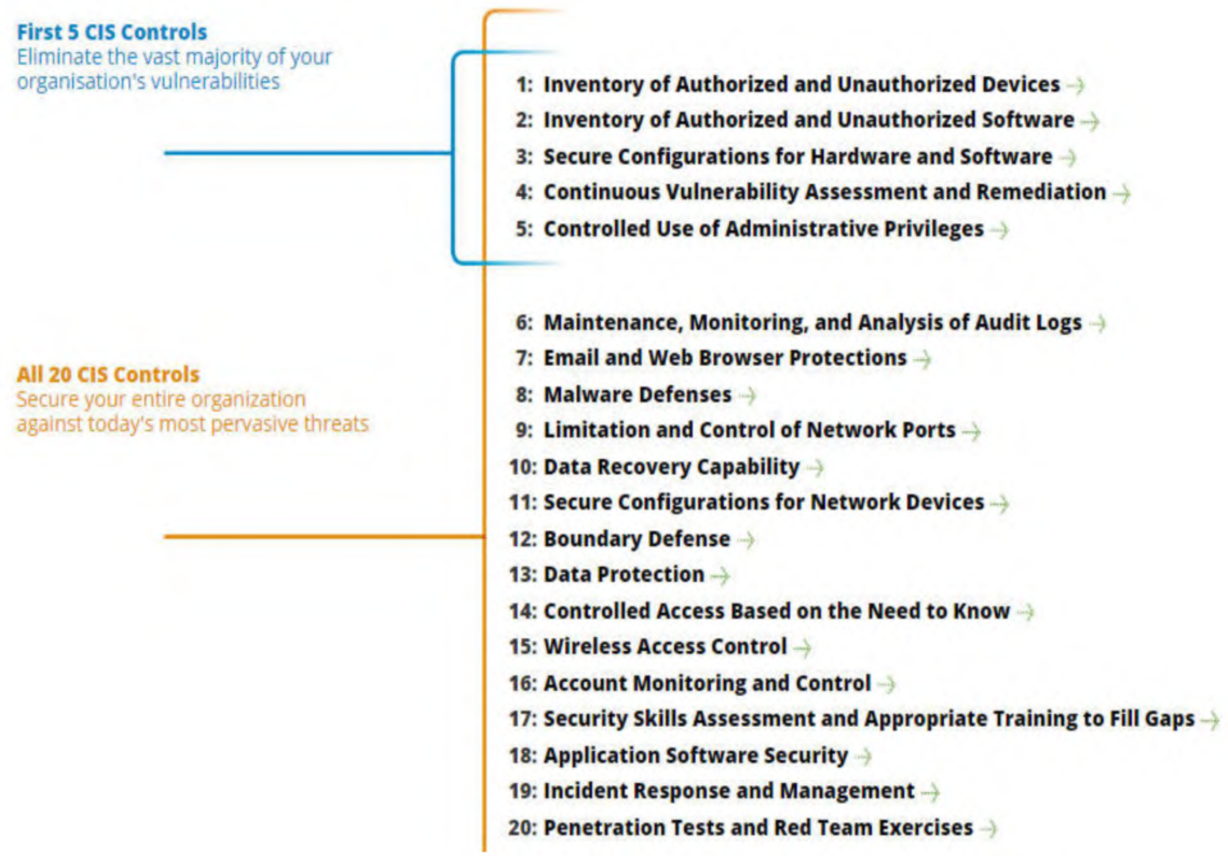
- APT & zero-day attack prevention
- SIEM solution
- Network DLP and system DLP
- Network admission control (NAC)
- Server HIPS
- Web application FW (WAF)

Even More Advanced Security:

- Network forensics
- Host-based APT / IoC solution
- Identity & access management (IAM)
- Privileged identity management (PIM)
- Database security solution

Further guidelines for strong security controls:

- CIS 20 critical security controls



First 5 CIS Controls
Eliminate the vast majority of your organisation's vulnerabilities

1: Inventory of Authorized and Unauthorized Devices
2: Inventory of Authorized and Unauthorized Software
3: Secure Configurations for Hardware and Software
4: Continuous Vulnerability Assessment and Remediation
5: Controlled Use of Administrative Privileges

All 20 CIS Controls
Secure your entire organization against today's most pervasive threats

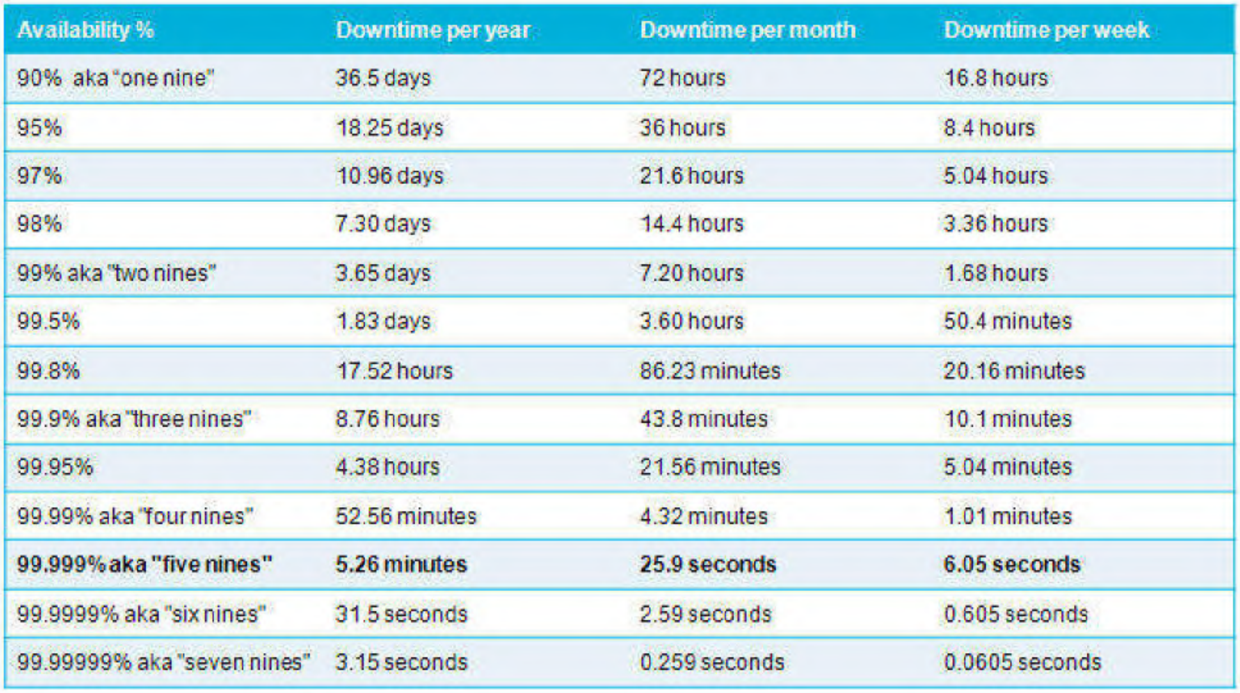
6: Maintenance, Monitoring, and Analysis of Audit Logs
7: Email and Web Browser Protections
8: Malware Defenses
9: Limitation and Control of Network Ports
10: Data Recovery Capability
11: Secure Configurations for Network Devices
12: Boundary Defense
13: Data Protection
14: Controlled Access Based on the Need to Know
15: Wireless Access Control
16: Account Monitoring and Control
17: Security Skills Assessment and Appropriate Training to Fill Gaps
18: Application Software Security
19: Incident Response and Management
20: Penetration Tests and Red Team Exercises

- Further guidelines for strong security controls:
  - CIS 20 critical security controls

Topic No 38: High Availability (HA)

- **What is high availability (HA) ?**
  - High availability of a system or component assures a high level of operational performance (uptime) for a given period of time

- High availability is a strategy
- Fault tolerance refers to a system designed in such a way that when one component fails, a backup component takes over operations immediately to avoid loss of service

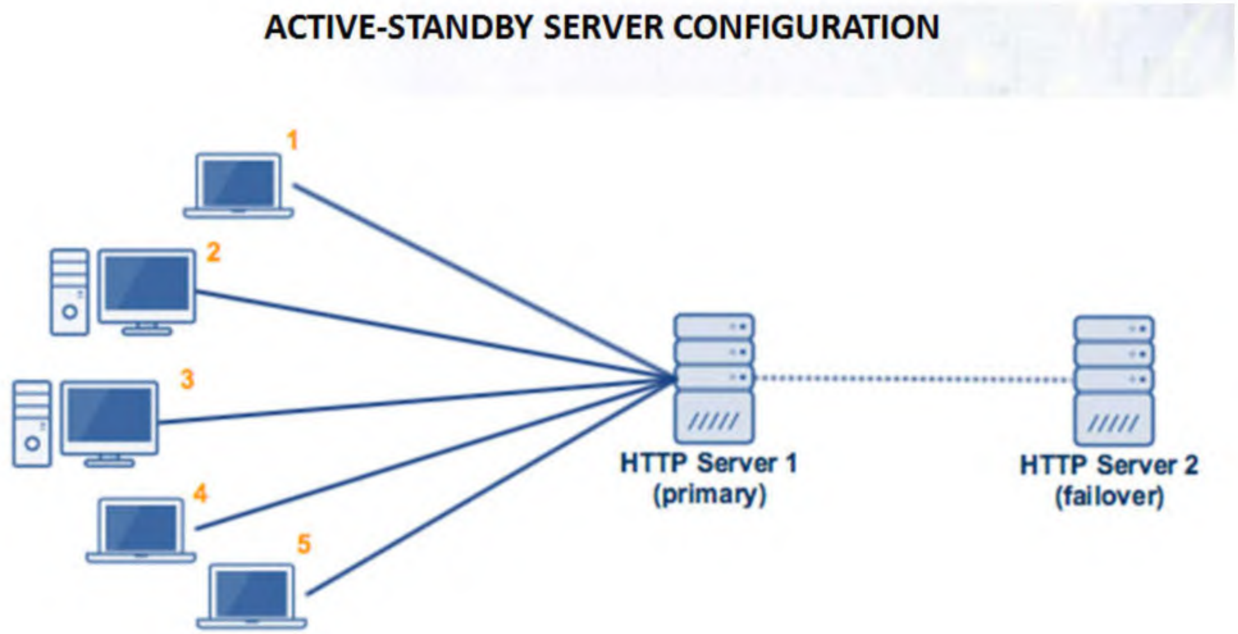


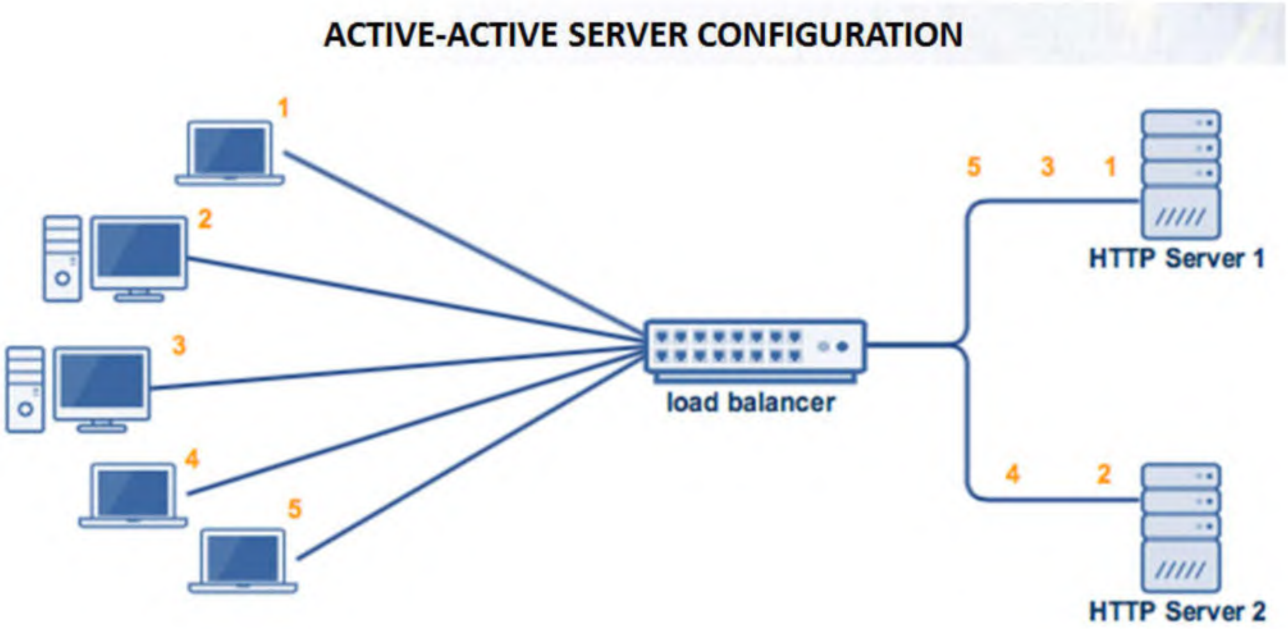
Availability %	Downtime per year	Downtime per month	Downtime per week
90% aka "one nine"	36.5 days	72 hours	16.8 hours
95%	18.25 days	36 hours	8.4 hours
97%	10.96 days	21.6 hours	5.04 hours
98%	7.30 days	14.4 hours	3.36 hours
99% aka "two nines"	3.65 days	7.20 hours	1.68 hours
99.5%	1.83 days	3.60 hours	50.4 minutes
99.8%	17.52 hours	86.23 minutes	20.16 minutes
99.9% aka "three nines"	8.76 hours	43.8 minutes	10.1 minutes
99.95%	4.38 hours	21.56 minutes	5.04 minutes
99.99% aka "four nines"	52.56 minutes	4.32 minutes	1.01 minutes
99.999% aka "five nines"	**5.26 minutes**	**25.9 seconds**	**6.05 seconds**
99.9999% aka "six nines"	31.5 seconds	2.59 seconds	0.605 seconds
99.99999% aka "seven nines"	3.15 seconds	0.259 seconds	0.0605 seconds

- High availability is designed in the following manner:
  - System level (data center or service)
  - Device level (within single device)
  - Device level (combination of multiple redundant devices)
  - Alternate site level
- High availability and fault tolerance:
  - Designed to minimize downtime with the help of redundant components
- Disaster Recovery:
  - A pre-planned approach for re-establishing IT functions at an alternate site

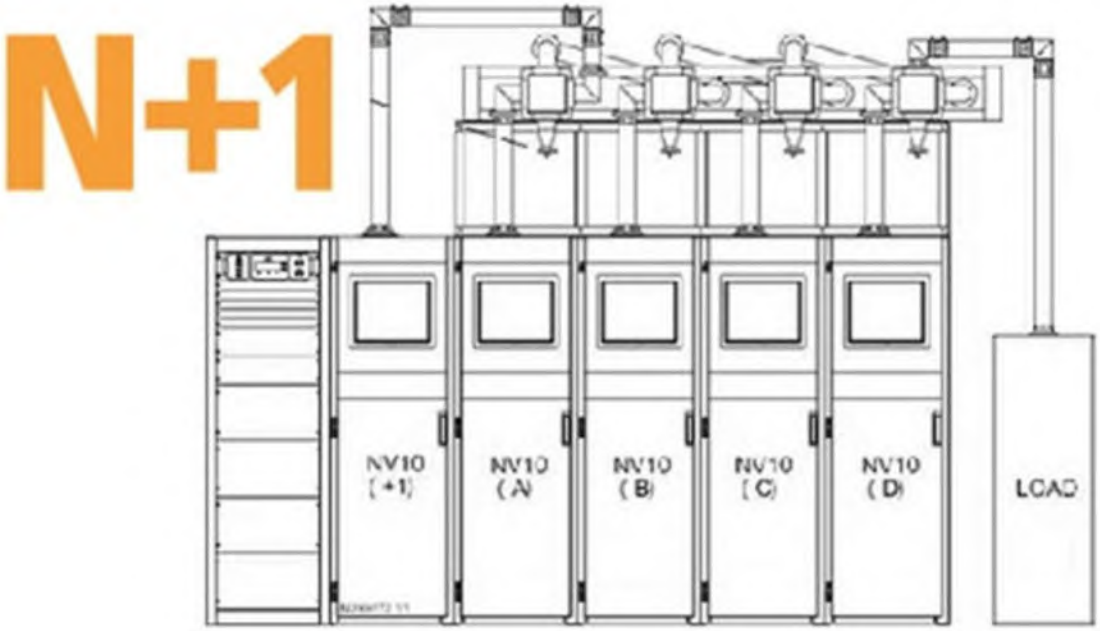
Topic No 39: High Availability Design

- Lets look at various HA designs

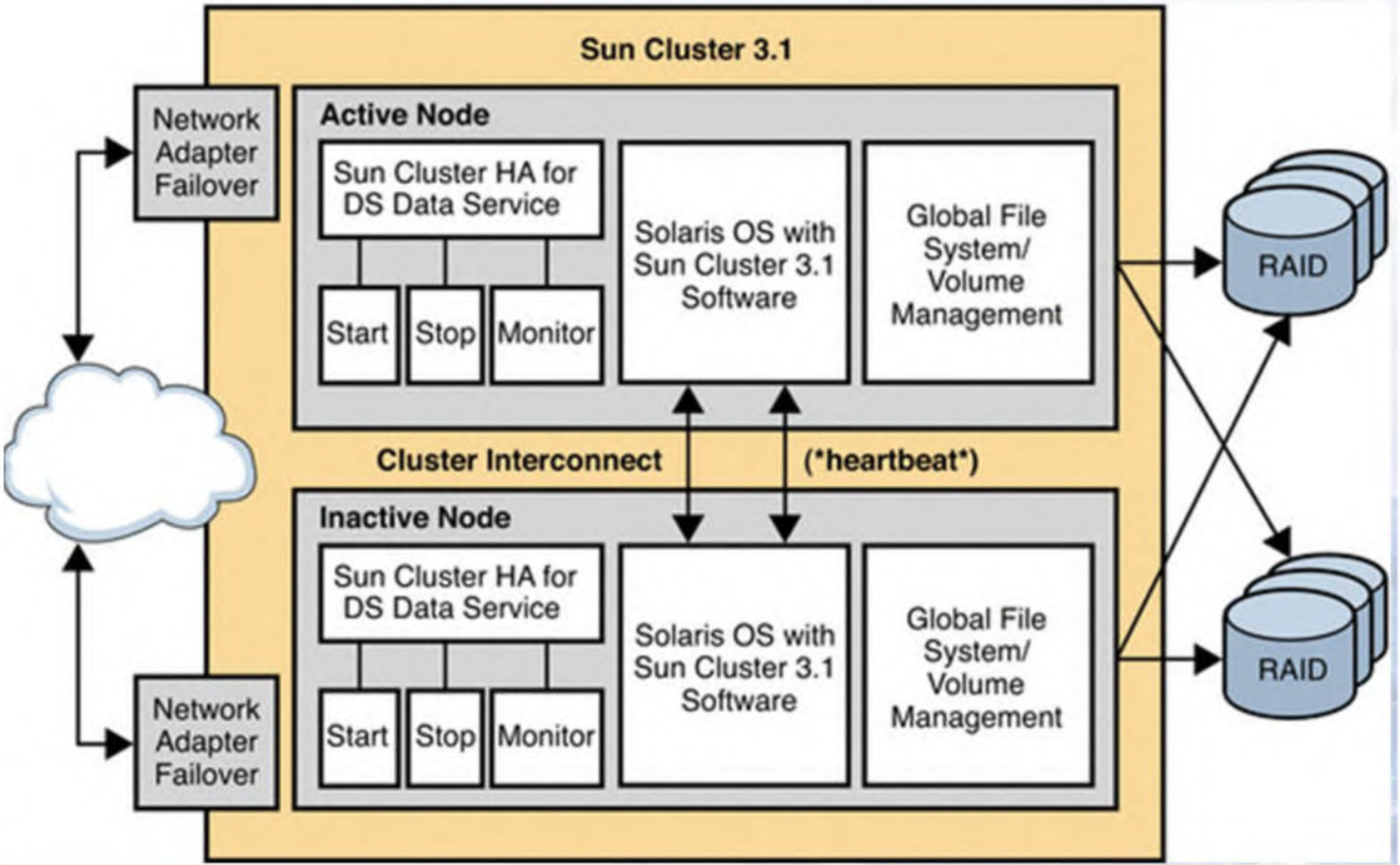




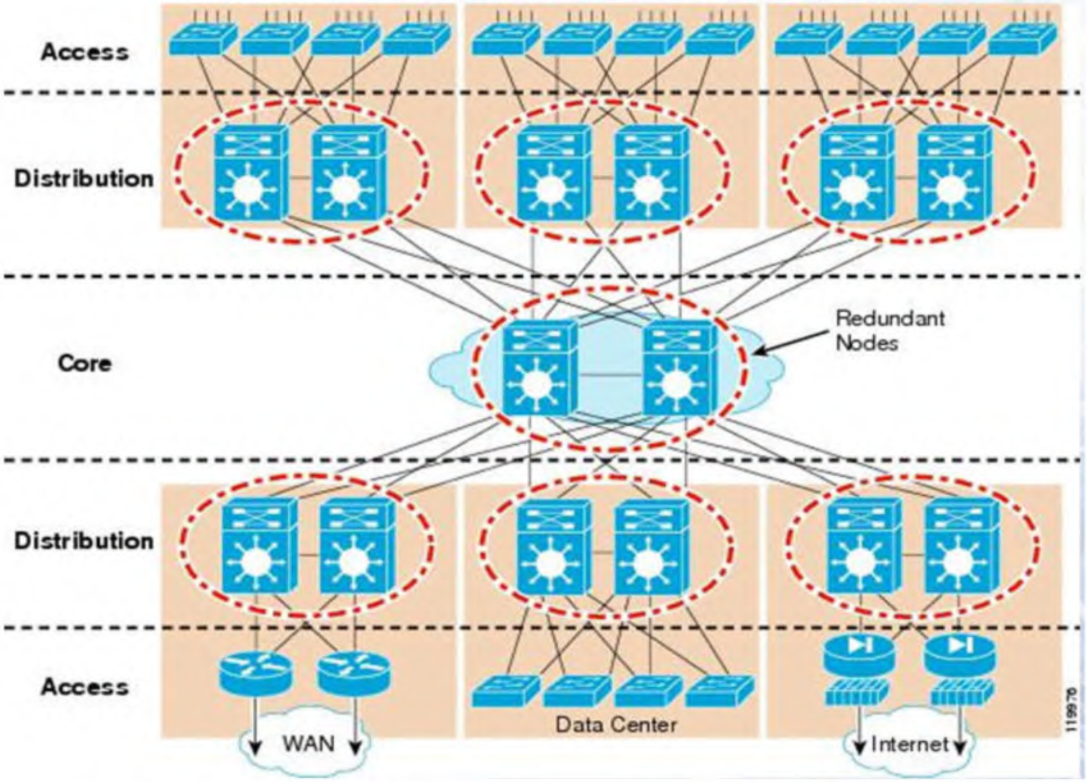
N+1 UPS REDUNDANT CONFIGURATION



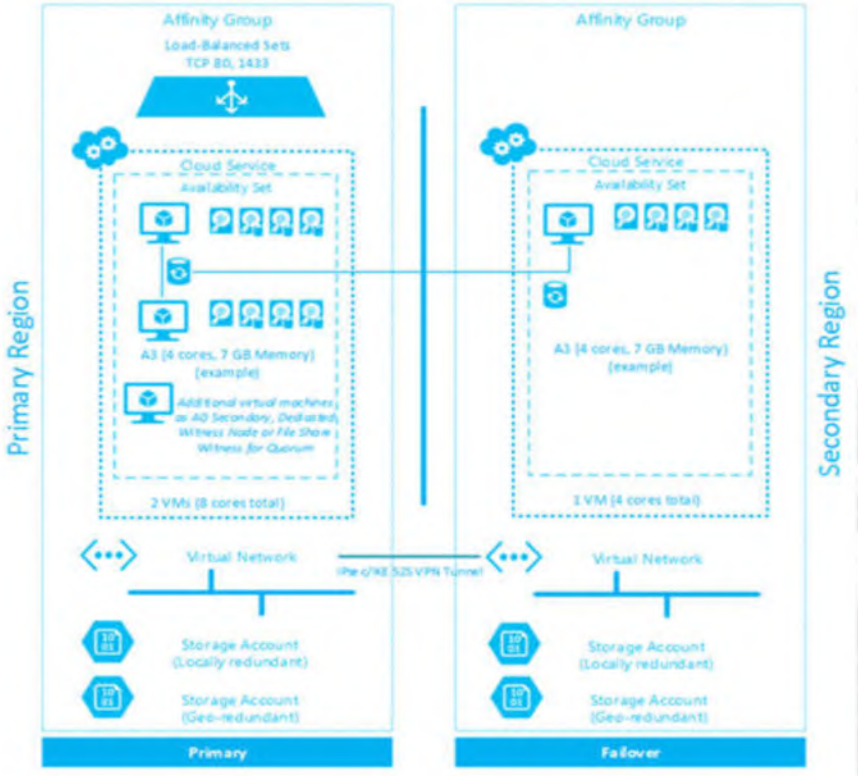
ACTIVE-STANDBY SUN SERVER CLUSTER


Sun Cluster 3.1
Network Adapter Failover
Active Node
Sun Cluster HA for DS Data Service
Start
Stop
Monitor
Solaris OS with Sun Cluster 3.1 Software
Global File System/ Volume Management
RAID
Cluster Interconnect
(*heartbeat*)
Inactive Node
Sun Cluster HA for DS Data Service
Start
Stop
Monitor
Solaris OS with Sun Cluster 3.1 Software
Global File System/ Volume Management
RAID
Network Adapter Failover

NETWORK REDUNDANT CONFIGURATION



DATA CENTER REDUNDANT CONFIGURATION

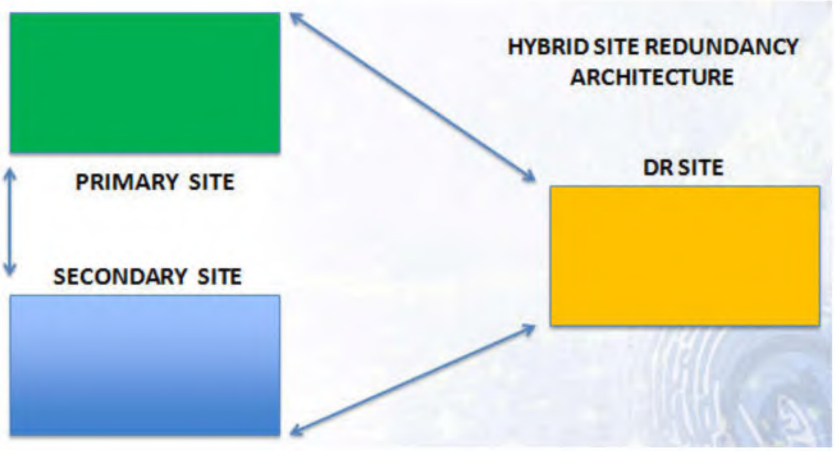


- Don’t forget to test the failover and fault tolerant capabilities of our network

Topic No 40: Site Redundancy

Three types of redundant site models:

- Hot site
- Cold site
- Warm site
- **Hot site (expensive):**
  - Mirror of primary data center
  - Populated with servers, cooling, power, and office space
  - Running concurrently with main/primary data center (synching)
  - Minimal impact
- **Cold site (cheapest):**
  - Office or data center space without any server related equipment installed
  - Power, cooling and office space
  - Servers/equipment migrated in event of primary site failure
- **Warm site (middle ground):**
  - Middle ground between hot site and cold site
  - Some pre-installed server hardware (ready for installation of production environments)
  - Requires engineering support to activate



- **RTO:**
  - Max amount of time, following a disaster, for an organization to recover files from backup storage and resume normal operations (max amount of downtime an organization can handle)
- **RPO:**
  - Max age of files that an organization must recover from backup storage for normal operations to resume after a disaster (minimum frequency of backups)
- **Example:**
  - If an organization has an RTO of two hours, it cannot be down for longer than that.
  - if an organization has an RPO of four hours, the system must back up at least every four hours.

Topic no 41: High Availability & Redundancy Case Study

- Mid-sized enterprise
- 3000 total staff
- 2000 IT users
- 30 IT team
- One DC, one secondary (regional) data center (warm site & backup site), and one DR site 99.9 % uptime designed.

IT setup:

- Oracle ERP system
- Share point portal for workflow automation
- Head office in Karachi
- Primary DC in Karachi (hosted with 3rd party)
- DR site in Lahore (hosted with 3rd party)
- Secondary DC in ISB

Primary DC:

- Fully redundant (HA) design for network, systems, and storage
- Cisco HA (active-standby)
- Oracle cluster technology for servers and DBs (active-active)

Secondary DC (ISB):

- All network, systems, and storage backups maintained here (also mirrored in DR)
- Regional servers (AD, file servers, etc)
- Test & staging environment here (segregated from main DC)
- Office working space

DR site

- Bare minimum HA (as DR site) for network, systems, and storage
- Mirror of all backups from secondary site maintained here
- Office working space
- Some additional computing capacity (minimum for unforeseen events)
- All critical systems and devices maintained in active mode (hot) for immediate DR failover
- Data maintained as per org RTO/RPO for immediate utility
- Monthly DR testing/drill

Backup strategy:

- Primary backup at secondary DR site
- Mirror at DR site
- For critical systems: monthly full backup, daily incremental backup
- For critical network devices: weekly full backup; backups based on change

Topic no 42: Backup Strategies

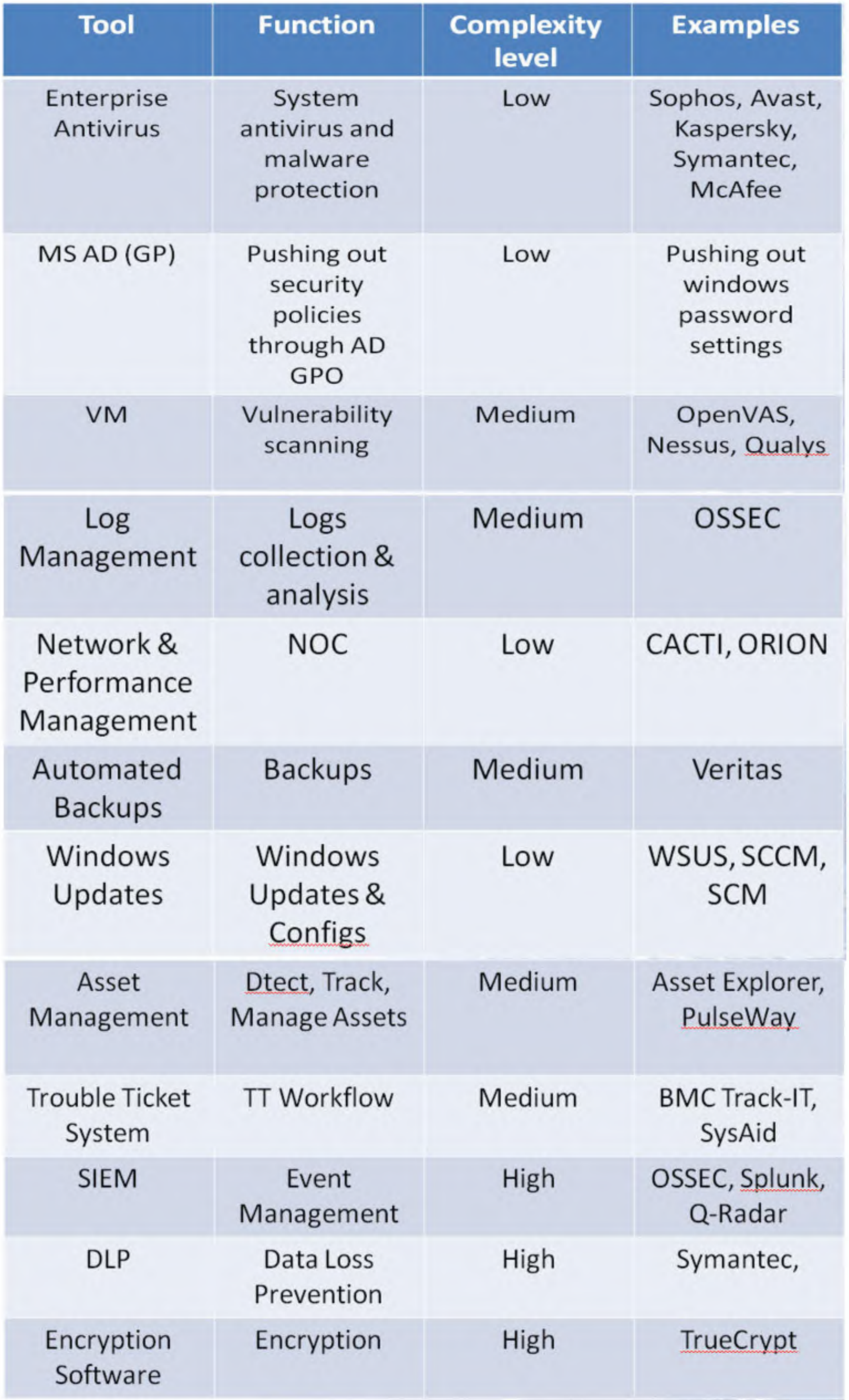
- **Backup considerations:**
  - What to backup?
  - Backup location?
  - Freq of backup?
  - Backup operator?
  - Backup checker (verification)?
  - Backup test & security methods?
  - Technology & tools used for backup?

- **What to backup?**
  - Network configuration files
  - OS backups
  - Database & application data
  - Other critical data
- **Backup location?**
  - Onsite for faster recovery
  - Offsite for DR purposes
  - Intermediate site (secondary site) as a middle-ground
- **Backup frequency?**
  - Depends entirely on criticality of data, nature of the information being backed up (how frequently does info change?), storage space available, and overall backup plan.
- **Backup operator and checker?**
  - Backups should ideally be automated
  - Operator should ensure that backups have taken place
  - Verifier should sign-off that check has been made
- **Backup testing & security considerations:**
  - Backup testing should be performed on a periodic basis and greater than the frequency of the DR drill (e.g. DR drill once a QTR, & testing once a month)
  - Encryption & compression
- **Backup tools and technology:**
  - Consider NAS, SAN, SCSI/IDE/SATA drives
  - Various tools and technology to perform full, differential, and incremental backups
  - Encryption
  - Access control
  - Alerts & reporting

Topic no 43: Security Tools Used In An Enterprise

- **Typical security tools used in an enterprise:**
  - Enterprise antivirus
  - MS Active Directory (AD)
  - Vulnerability manager
  - Logs management
  - Network & performance monitoring

    Automated backups
- **Typical security tools used in an enterprise:**
  - Microsoft Windows Server Update (WSUS) & SCM/SCCM
  - Asset management software
  - Trouble-ticket system
  - SIEM
  - DLP
  - Encryption software
  - 2FA



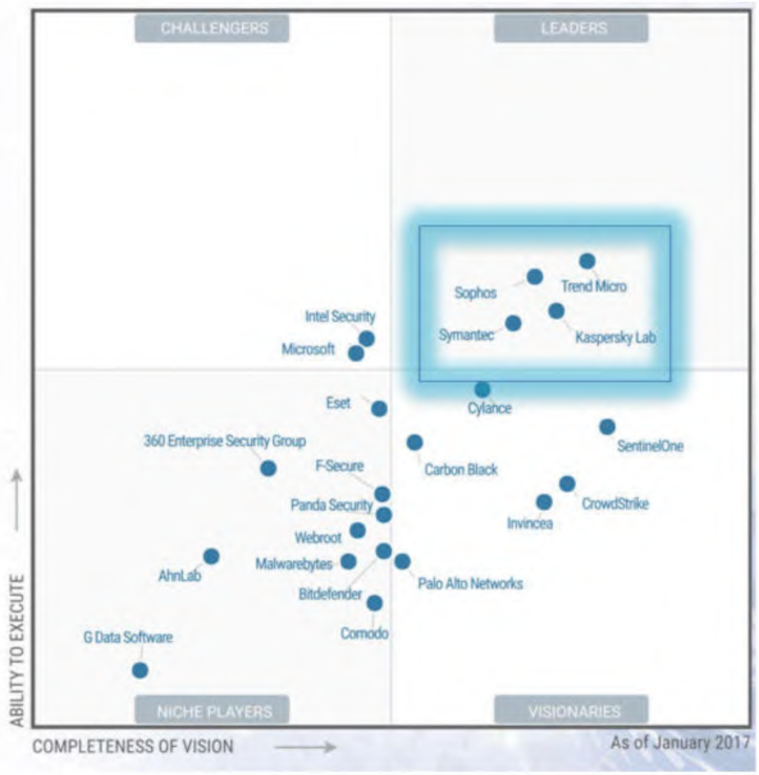
Tool	Function	Complexity level	Examples
Enterprise Antivirus	System antivirus and malware protection	Low	Sophos, Avast, Kaspersky, Symantec, McAfee
MS AD (GP)	Pushing out security policies through AD GPO	Low	Pushing out windows password settings
VM	Vulnerability scanning	Medium	OpenVAS, Nessus, Qualys
Log Management	Logs collection & analysis	Medium	OSSEC
Network & Performance Management	NOC	Low	CACTI, ORION
Automated Backups	Backups	Medium	Veritas
Windows Updates	Windows Updates & Configs	Low	WSUS, SCCM, SCM
Asset Management	Dtect, Track, Manage Assets	Medium	Asset Explorer, PulseWay
Trouble Ticket System	TT Workflow	Medium	BMC Track-IT, SysAid
SIEM	Event Management	High	OSSEC, Splunk, Q-Radar
DLP	Data Loss Prevention	High	Symantec,
Encryption Software	Encryption	High	TrueCrypt

Topic no 44: Security Tools – Typical Enterprise (Part 1)

- Gartner Magic Quadrant reports
- List of some other industry reports

Endpoint Protection
Jan, 2017
Gartner

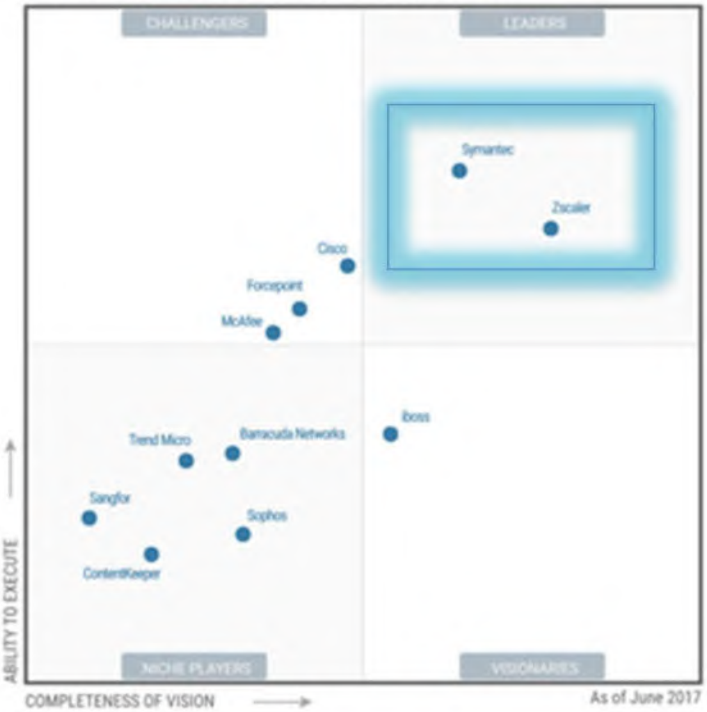
Trend Micro
Sophos
Kaspersky
Symantec



Gartner Secure Web Gateway Magic Quadrant

Secure Web
GW
June, 2017
Gartner

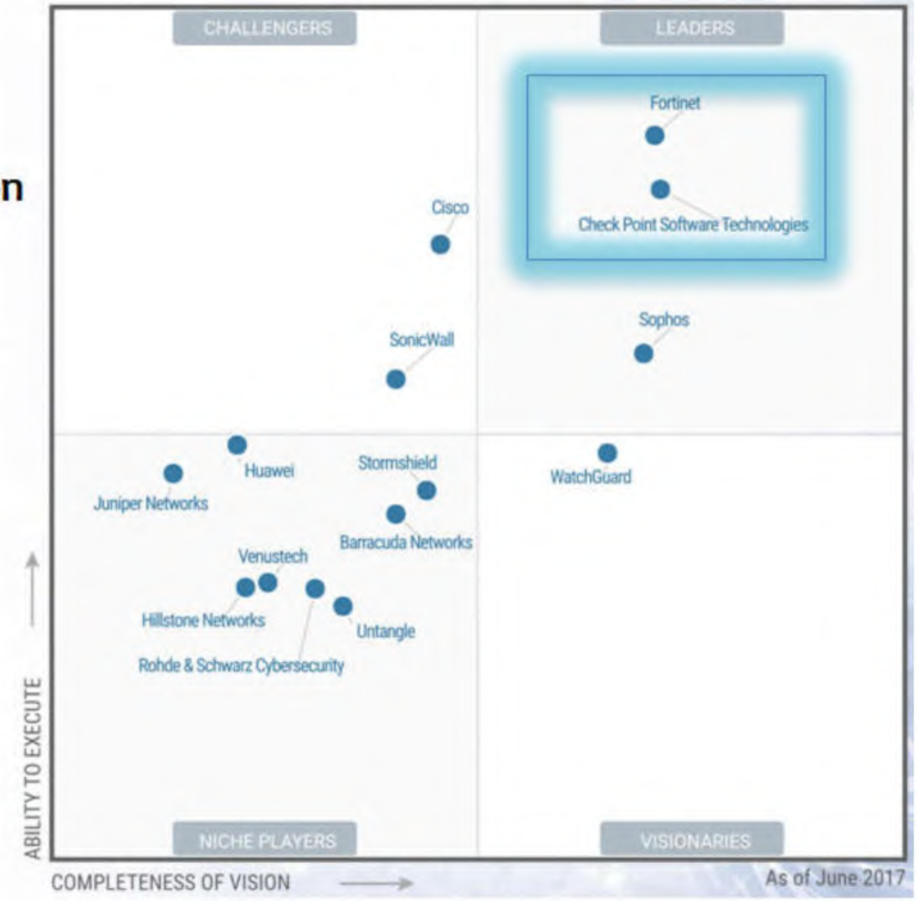
Symantec
Zscaler



Source: Gartner (June 2017)

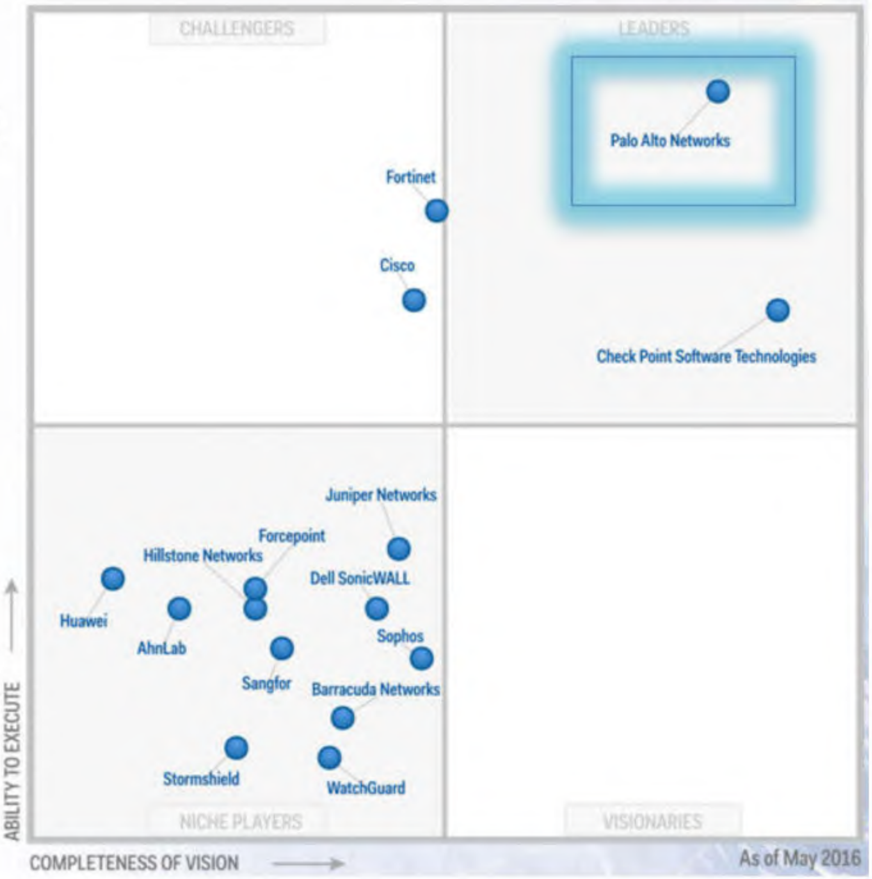
UTM
(SMB Multi-function
FW)
June, 2017
Gartner

Fortinet
Checkpoint

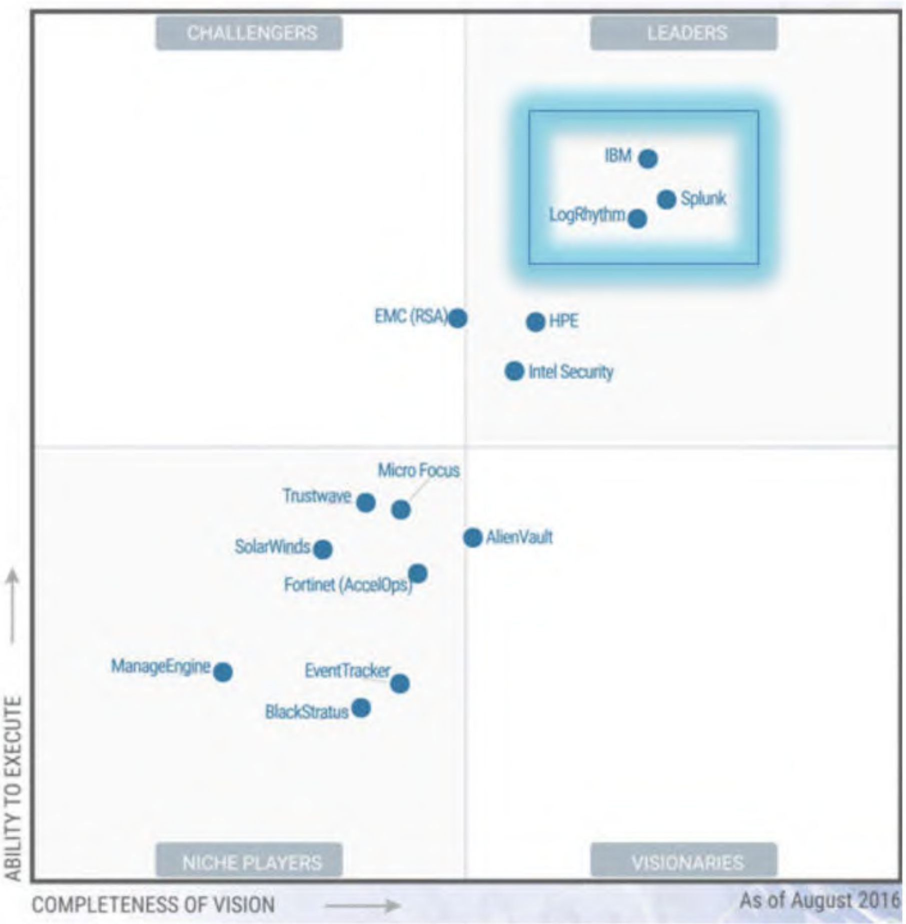


Enterprise
Network FWs
May 2016
Gartner

Palo Alto
Networks

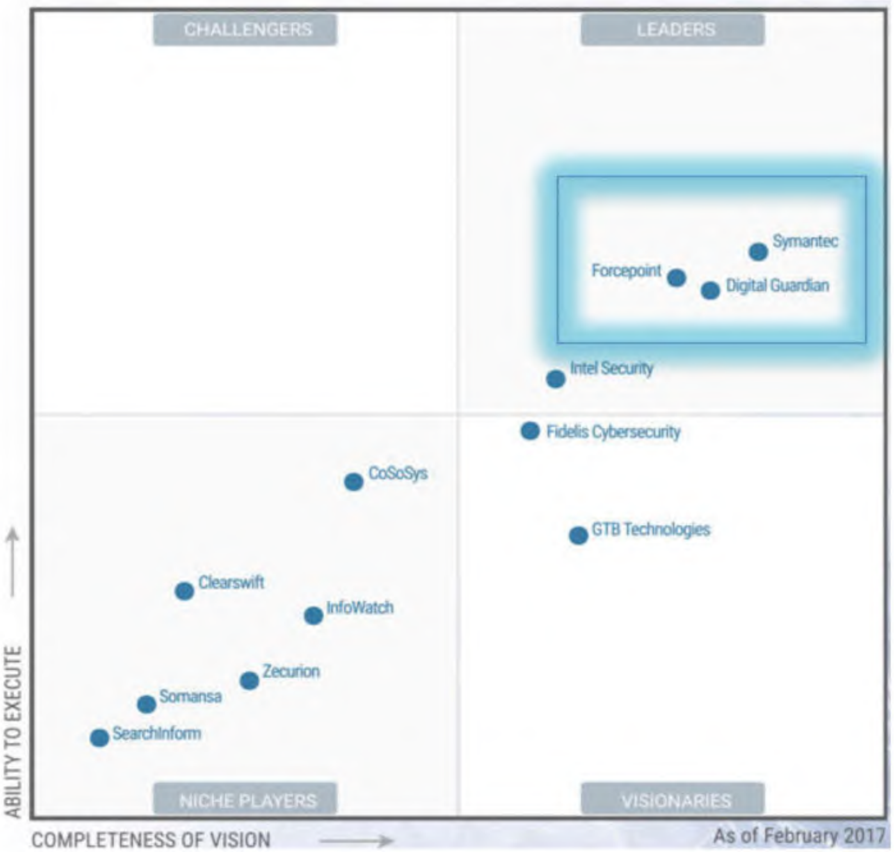


SIEM
AUGUST 2016
GARTNER



IBM
Splunk
LogRhythm

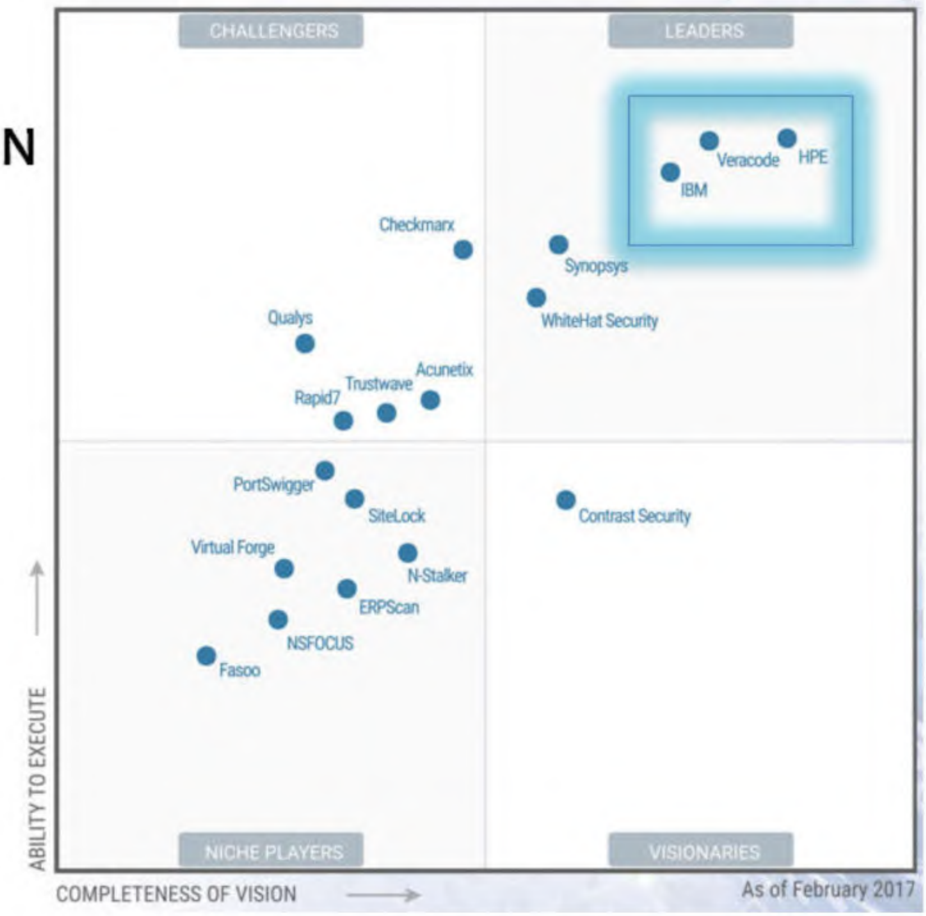
DLP
FEB 2017
GARTNER



-Symantec
-Digital
Guardian
-Forcepoint

APPLICATION SECURITY TESTING FEB 2017 GARTNER

HPE
Veracode
IBM



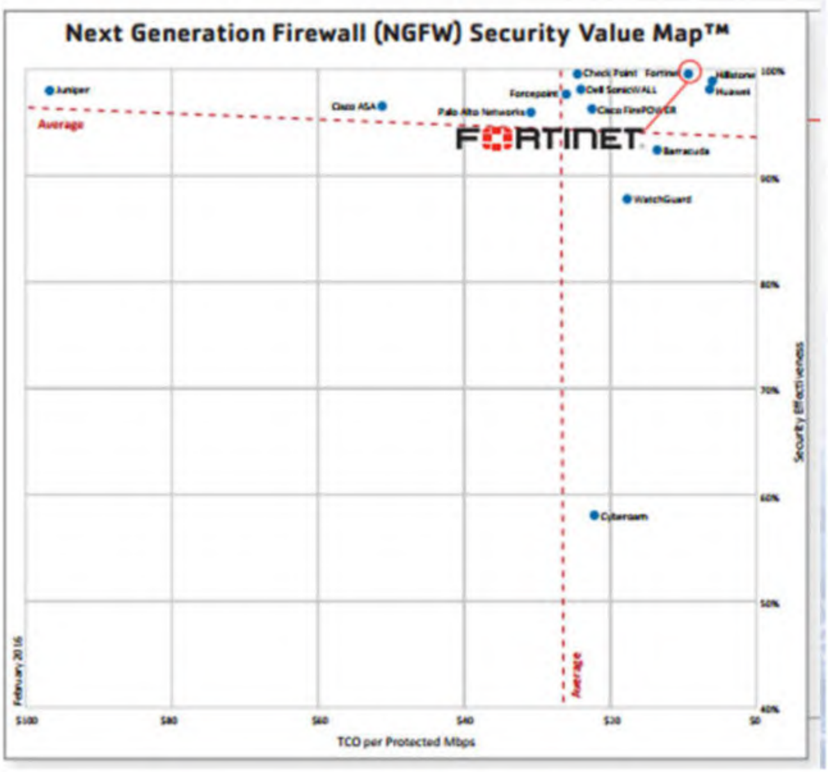
- View and read various industry reports for security tools comparisons:
  - Gartner
  - Forrestor
  - Security Awards
  - Lab reports: ICSA, NSS

Topic no 45: Security Tools – Typical Enterprise (Part 2)

- NSS Labs Security Value Map (SVM)
- Some additional Gartner Magic Quadrant reports

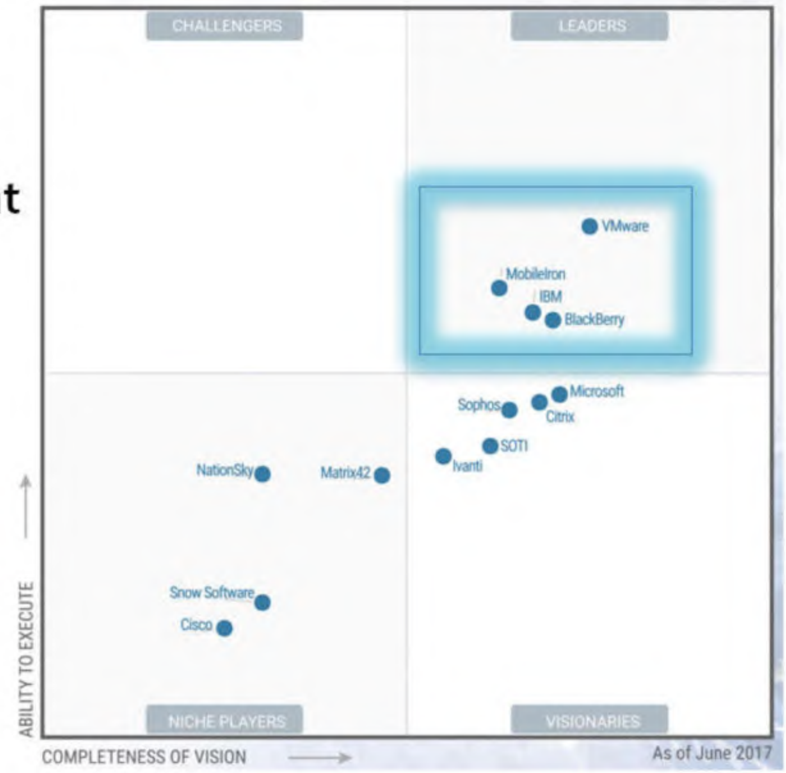
NGFW
NSS Labs
2016

Hillstone
Huawei
Fortinet



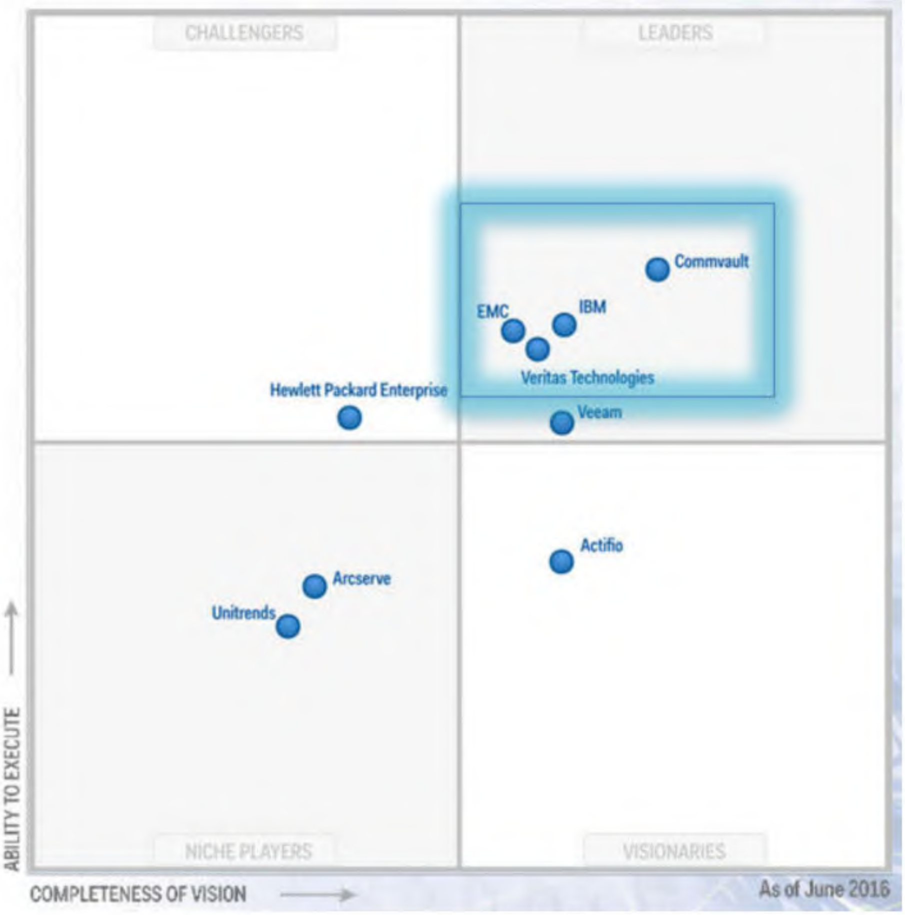
Enterprise
Mobility
Management
(EMM)
June 2017

VMWARE
MobileIron
IBM
Blackberry



DC Backup & Recovery June 2016

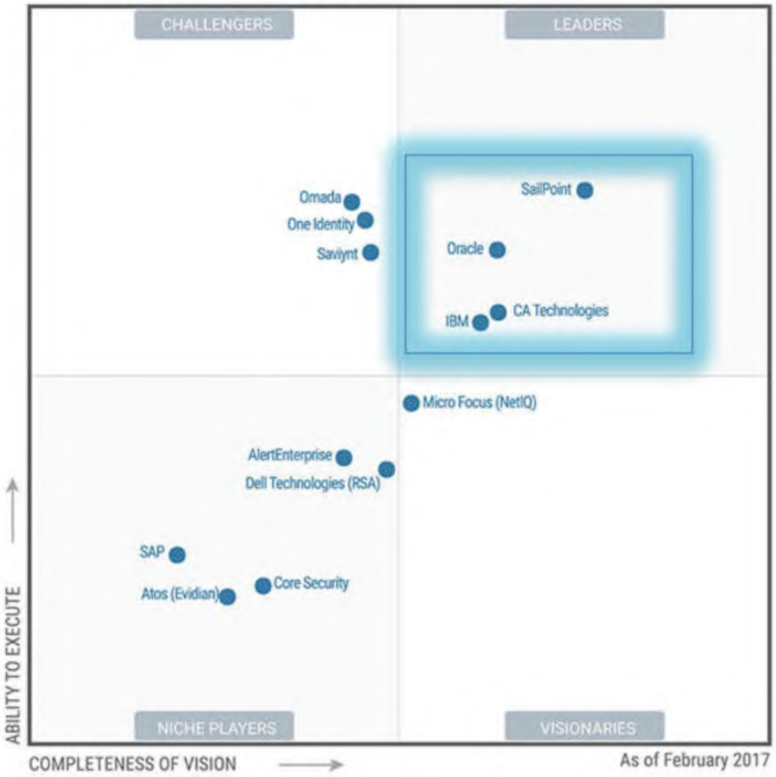
Commvault
IBM
EMC
Veritas



Identity, Governance Feb 2017

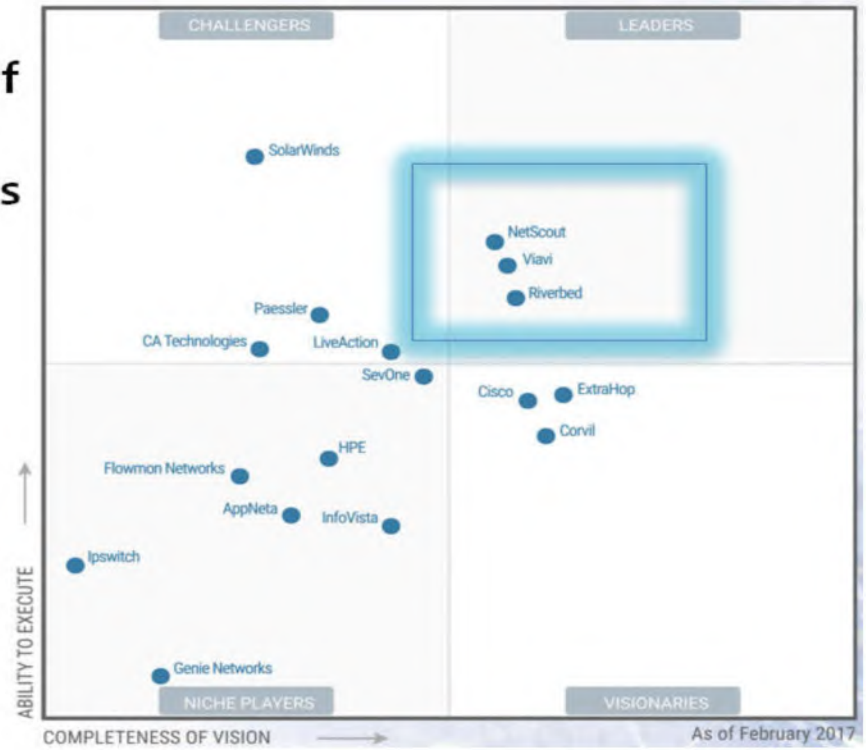
Sailpoint
Oracle
CA
IBM

Figure 1. Magic Quadrant for Identity Governance and Administration



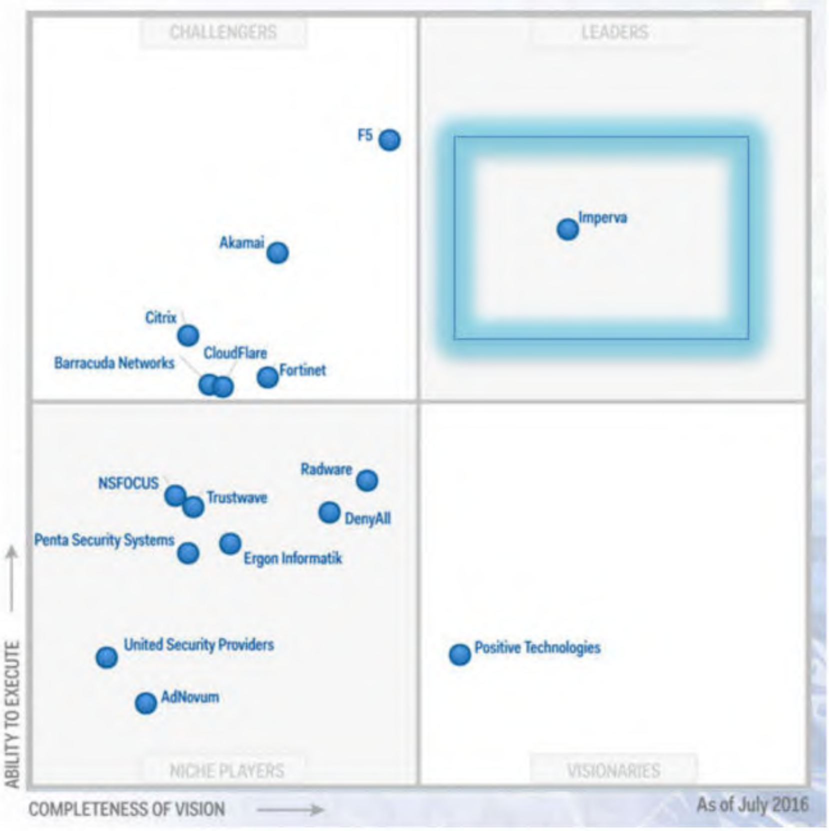
Source: Gartner (February 2017)

Network Perf Monitoring & Diagnostics Feb 2017



NetScout
Viavi
Riverbed

Web App FW July 2016



Imperva

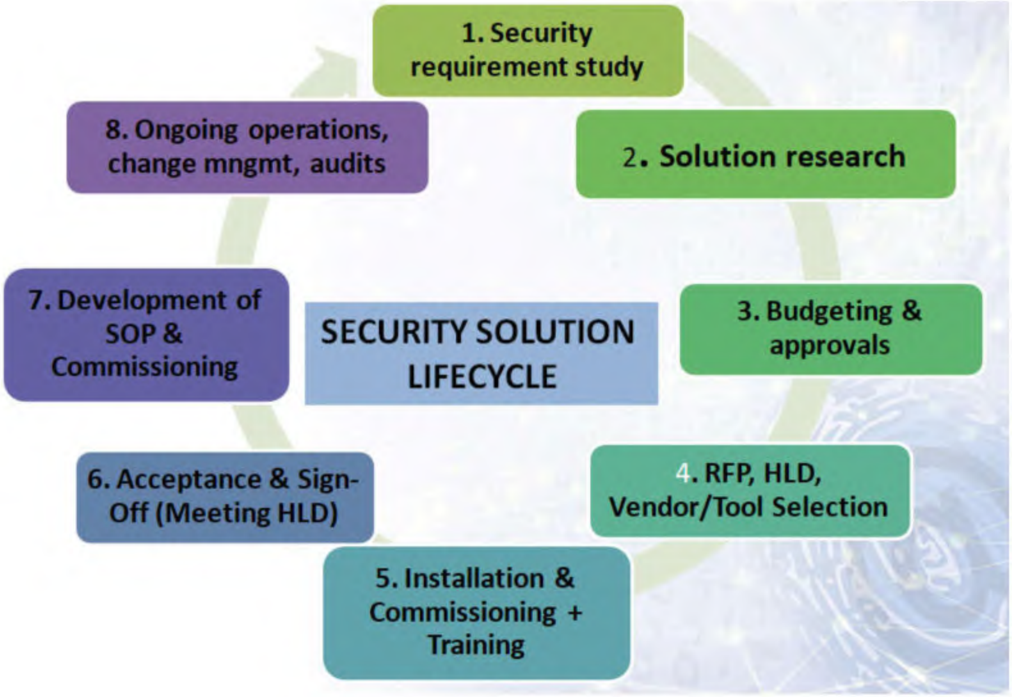
- **Gartner**
- **Forrestor**
- **NSS labs**
- **ICSA Labs**

Topic no 46: What Does "Box Security" Mean?

- "Box Security" refers to a prevalent approach in the industry, especially in larger organizations in which the solution for every security challenge is in the form of a "box" or device
- **Box for :**
  - Email security
  - Web security
  - FW
  - IPS
  - APT attack prevention
  - DDOS prevention
  - Network DLP
  - Network Forensics
  - Others
- Security is a combination of people, process, and technology
- Industry observation: most of the devices are not used to full capability or capacity after purchase
- Case in point: SIEM solution or DB security solution
- "Box security" is not the silver bullet
- Although many devices and boxes are required, they do not ensure a good security posture
- This approach is unfortunately promoted by many vendors who have equipment to sell
- Consider organizational maturity & readiness

Other challenges with "box security" approach:

- Shortage of staff (IT & security)
- Training and skill required to operate the sophisticated devices and features


1. Security requirement study
2. Solution research
3. Budgeting & approvals
4. RFP, HLD, Vendor/Tool Selection
5. Installation & Commissioning + Training
6. Acceptance & Sign-Off (Meeting HLD)
7. Development of SOP & Commissioning
8. Ongoing operations, change mngmt, audits
SECURITY SOLUTION LIFECYCLE

- Device objectives, and high-level-design (HLD) should be planned prior to commissioning
- Min operational baseline and configuration should be documented in SOP
- Device feature set and configuration audits should be conducted on a periodic basis (annual)

Topic no 47: Best Approach: IT Enterprise Security

- The 4-layer security transformation model is the only way to effectively and practically address security posture
- 4-layer security transformation model is tried & tested for geographies where the overall security awareness & posture is weak

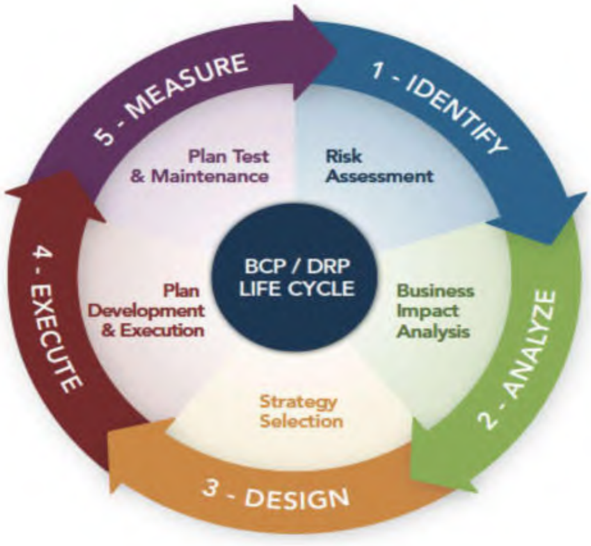
1. **Security hardening:** address security configuration of all IT assets which security "boxes" won't do for you
2. **Vulnerability management:** scanning to inspect patching of IT assets (essential)

- Security engineering
- Security governance

3. **Security engineering:** this is where more serious investments may be made once layers 1 & 2 have been completed satisfactorily (or are being addressed).
4. **Security governance**: ensure the proper utilization (as intended), ROI, and audits of purchased devices & solutions. Also ensure configs are as per design, and SOPs.

Topic no 48: What Is Disaster Recovery (DR)?

- **What is a disaster?**
  - Any significant event that causes disruption of information technology processing facilities, thus affecting the operations of the business
- **What is disaster recovery (DR)?**
  - DR is an area of security that allows an organization to maintain or quickly resume mission-critical (IT) functions following a disaster
- **What could cause the invocation of a DR fail over to DR site?**
  - Natural disasters such as flood, earthquake, lightning, storm
  - Disaster caused by human actions such as riot, fire, terrorist act, etc
- **What is the difference between DR and business continuity (BC)?**
  - DR is an IT function, whereas business continuity addresses keeping all essential aspects of a business functioning despite disruptive events (DR is a part of BC)



- **Three step process:**
  - Failover to the DR site (DR invocation)
  - Restoration of the services/facilities on primary site
  - Recovery (switchover back to primary site)
- **What is a DR plan?**
  - A documented, structured approach to dealing with unplanned incidents

- **DR plan checklist:**

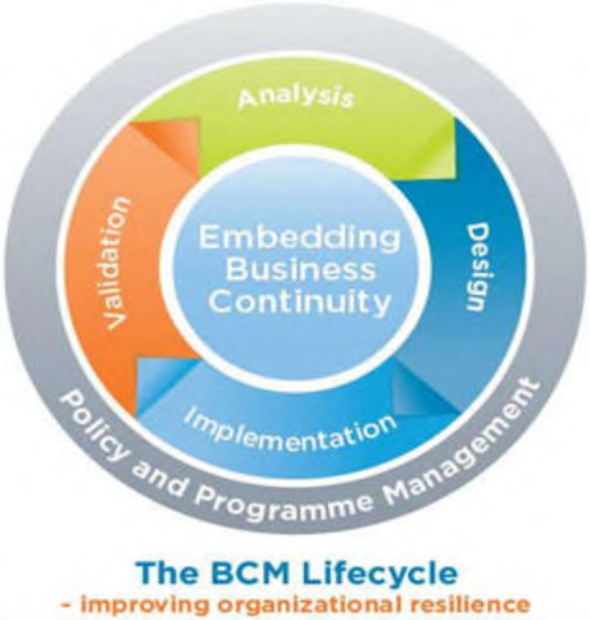
- Scope of the activity
- Gathering relevant network infrastructure documents
- Identifying the most serious threats and vulnerabilities, and the most critical assets
- Identifying current DR strategies
- Identifying emergency response team
- Management review & approval of DR plan
- Testing the plan (drill)
- Updating the plan
- Implementing a DR plan audit

Topic no 49: What is Business Continuity (BC)?

- **What is business continuity?**
  - Business Continuity (BC) is the capability of the org to continue delivery of products or services at acceptable predefined levels following a disruptive incident *(Source: ISO 22301:2012)*

- **What is business continuity management?**

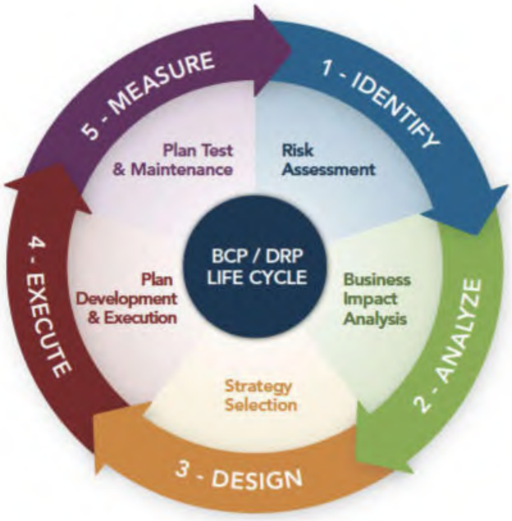
- Holistic management process that identifies potential threats to an organization and the impacts to business operations those threats, if realized, might cause, and which provides a framework for building org resilience with an effective response that safeguards interests of key stakeholders, reputation, brand and value-creating activities. *(Source: ISO 22301:2012)*


Analysis
Design
Implementation
Validation
Embedding Business Continuity
Policy and Programme Management
The BCM Lifecycle
- improving organizational resilience

- **What is a BC plan?**
  - A document that consists of critical information an organization needs to continue operating during an unplanned event
  - The BCP should state essential functions of the business, identify which systems and processes must be sustained, & detail how to maintain them.
  - It should take into account any possible business disruption

Topic no 50: DR In Enterprise Architecture – Part 1

- **DR considerations:**
  - DR plan
  - RTO & RPO
- **DR plan:**
  - A disaster recovery policy statement, plan overview and main goals of the plan
  - Key personnel and DR team contact information
  - Description of emergency response actions immediately following an incident.
  - A diagram of the entire network and recovery site.
  - Directions for how to reach the recovery site.
  - A list of software and systems that will be used in the recovery.
  - Sample templates for a variety of technology recoveries, including technical documentation from vendors.
  - Summary of insurance coverage.
  - Proposed actions for dealing with financial and legal issues.
  - Ready-to-use forms to help complete the plan.



- **RTO:**
  - Max amount of time, following a disaster, for an org to recover files from backup storage and resume normal operations; max amount of downtime an org can handle.
  - If an organization has an RTO of two hours, it cannot be down for longer than that
- **RPO:**
  - RPO is the max age of files that an organization must recover from backup storage for normal operations to resume after a disaster; determines the minimum frequency of backups.
  - For example, if an organization has an RPO of four hours, the system must back up at least every four hours

Topic no 51: DR In Enterprise Architecture – Part 2

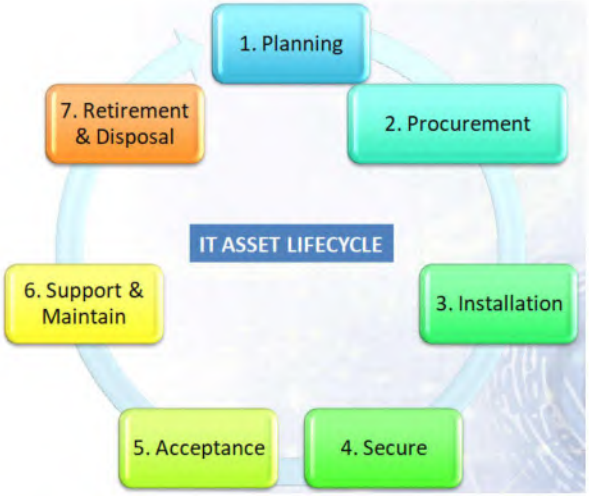
- DR considerations:
  - DR facility
  - DR drills & testing
  - DR testing checklist
  - BC plan alignment
- **DR facility:**
  - Location
  - Media circuits and backup circuits
  - Power and environment

- IT data center design
- Based on DR plan
- Operations & maintenance

- **DR drills & testing:**
  - Frequency and execution of DR drills as per IT policy of the org
  - Min twice a year and preferable quarterly for critical business reqmts
  - Backup testing
- **DR testing checklist:**
  - Secure management approval and funding for the test.
  - Provide detailed information about the test.
  - Make sure the entire test team is available on the planned test date.
  - Ensure your test does not conflict with other scheduled tests or activities.
  - Confirm test scripts are correct.
  - Verify that the test environment is ready.
  - Schedule a dry run of the test.
  - Be ready to halt the test if needed.
  - Have a scribe take notes.
  - Complete an after-action report about what worked and what failed.
  - Use the test results to update DR plan
- **BC plan alignment:**
  - DR is under IT ownership, whereas BC is under business operations ownership
  - DR is part of overall BC
  - Both plans must integrate and align seamlessly

Topic no 52: Role Of An IT Asset In Enterprise Security

- **What is an IT asset?**
  - An IT asset is any resource such as hardware, software, information, human resource, or facility owned or utilized by the organization for IT processing



1. PLANNING

- Requirements
- Owner & Risk Owner
- High Level Design
- Budget Approvals
- Project Planning

2. PROCUREMENT

- RFP
- Vendor Selection
- PO
- Contract & SLA
- Kick-Off Meeting

3. INSTALLATION

- Site Preparation
- Delivery
- Configuration
- Testing
- Commissioning

4. SECURE

- Security Controls
- Security Checklist
- Security SOP
- Security Testing

5. ACCEPTANCE

- Test Scripts
- UAT
- Security Accreditation
- Commissioning Sign-off
- Change Management

6. SUPPORT/MAINTAIN

- Vendor Support
- Maintenance/Repair
- Change Requests
- Renewals & Upgrades
- Regular Updates
- Monitoring & Audits

7. RETIRE/DISPOSE

- Decommission
- Dispose/Salvage
- Update Inventory

- Asset Owner: a person in the org responsible for managing an asset (e.g. for laptop)

- Risk owner: manages risks associated with the IT asset. Authorized to make decisions associated with managing risks, and in a management position
- **Acceptable Use (Of IT Assets):**
  - Laptops
  - Mobiles
  - Web browsing
  - Email usage
  - Servers
  - Company data

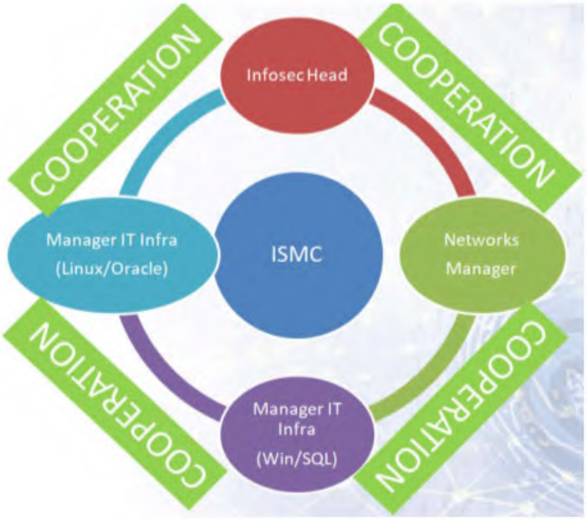
Topic no 53: How To Determine Security Posture?

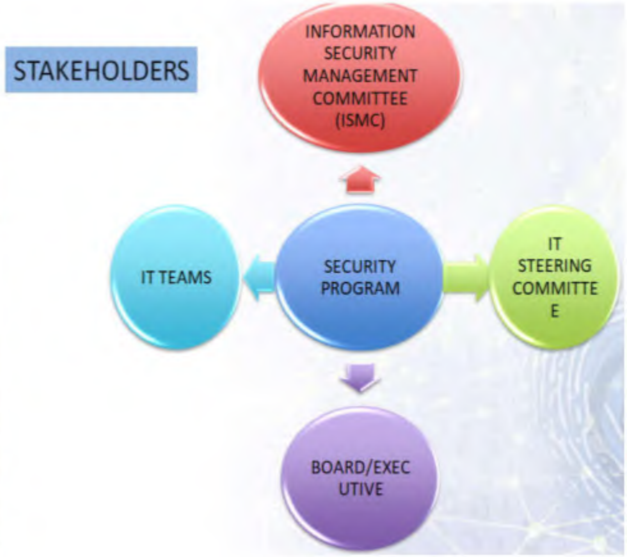
- Questions to ask:
  - Information security policy?
  - Organization security culture and tone at the top?
  - Clearly designated responsibility for security?
  - How many staff in security team [10%] and their roles?
  - Security hardening done on IT assets?
  - Which standard used for hardening?
  - Internal VM program?
  - Frequency of VM scanning?
  - Licensed software for OS/DB/Programs?
  - Last time penetration test was conducted by 3rd party?
  - Maturity of system security policies pushed through AD/GP
  - DR and/or backup site?
  - When was the last time a DR drill was performed?

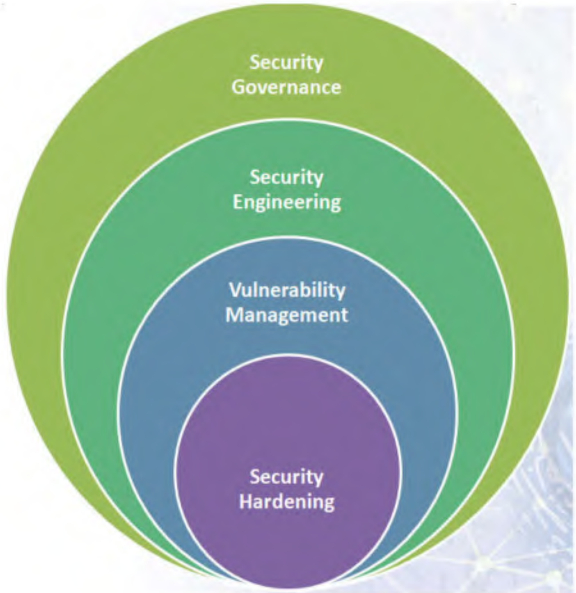
Topic no 54: Driving Successful Security Transformation

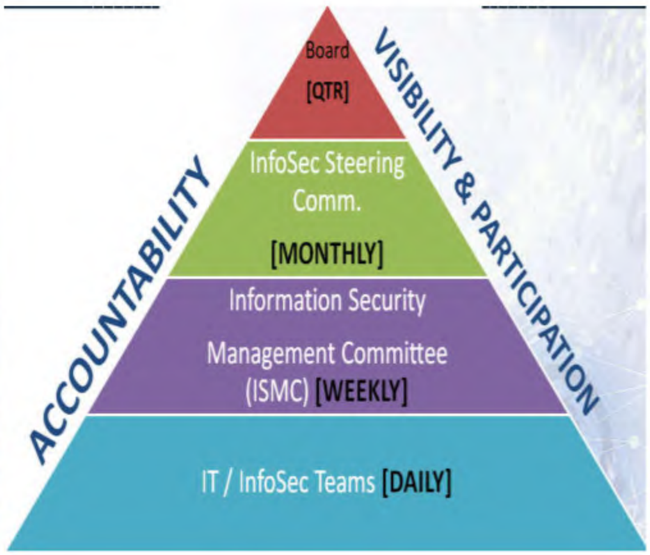
- Critical factors for successful security transformation projects:
  - Board-level buy-in and sponsorship
  - Regular Board or Executive management project reviews and decisions
  - Allocation of sufficient priority & resources

- Projects either fail or succeed before they begin!








Board [QTR]
InfoSec Steering Comm. [MONTHLY]
Information Security Management Committee (ISMC) [WEEKLY]
IT / InfoSec Teams [DAILY]
ACCOUNTABILITY
VISIBILITY & PARTICIPATION

- Successful security transformation projects can be made successful with correct sponsorship, structure, strategy, and strong project management

Chapter 3

Security Transformation Stage

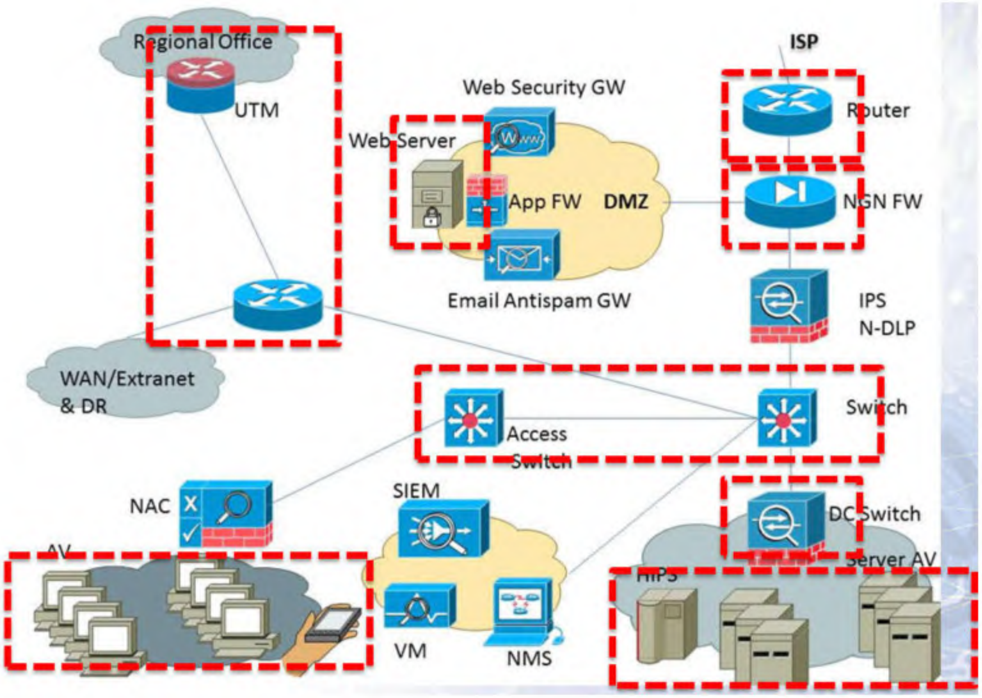
Topic no 55: Revisit Of Security Transformation Model

- **Security hardening:**
  - IT assets such as hardware and software come with default (insecure) configurations which become the basis for attacks
  - Typical case in point: username and password: “admin, admin”
  - System by reducing its surface of vulnerability, which is larger when a system performs more functions; in principle a single-function system is more secure than a multipurpose one.
- **Patching:**
- Fixing vulnerabilities (which may be exploited by malware or attackers) in software or firmware with vendor released patches (auto or manual updates)
- Patches are also called fixes
- **Patching considerations:**
  - Vendors release patch when they become aware of a vulnerability
  - Patches may be rolled up into a release
  - Off-the shelf software works well but testing reqd for customized instances
- **Hardening:** includes additional steps beyond patching to limit the ways a hacker or malware could gain entry.

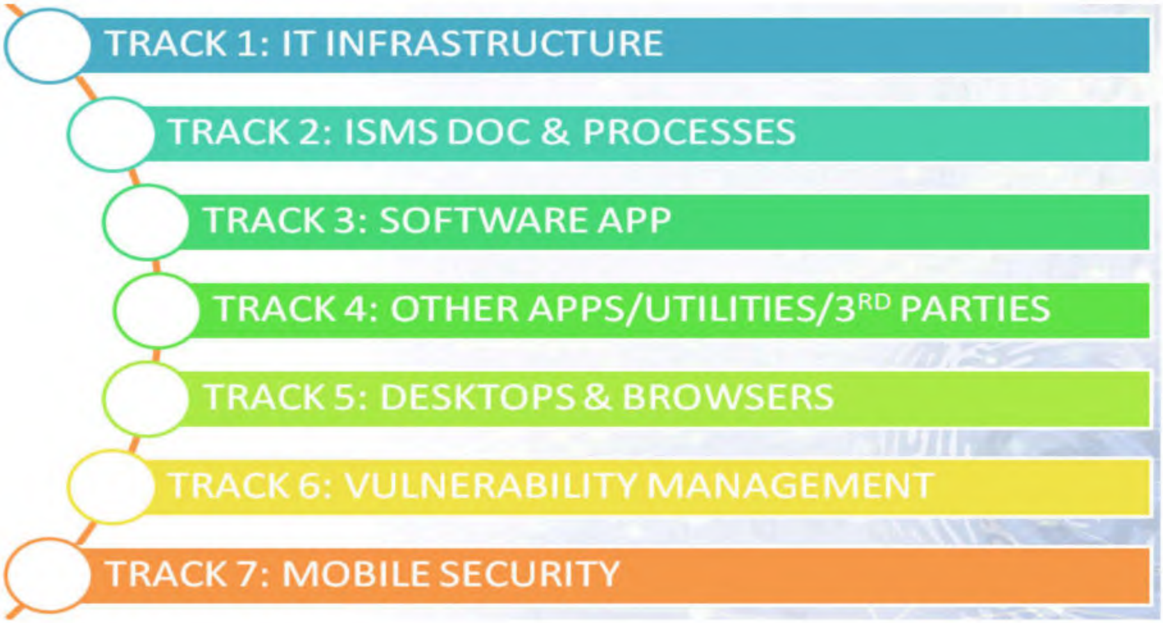
  Accomplished by turning on only the ports and services required, secure configuration of services & additional steps to limit system access
- **Note that both hardening & patching are required**
  - Hardening prevents existing and future vulnerabilities by tightening configuration
  - Patching is more of a vendor driven process but essential nonetheless

Topic no 56: Security Hardening Strategy

- Depending upon the size and type of the organization, there will be dozens, hundreds, or even thousands of IT assets to secure
- Priority is a key factor in all security undertakings
- Prioritize what is most important and needs to be done first
- Cascade as we go along



- Separate security engineering (Step 3) from security hardening (step 1)
- Security engineering requires more thorough working so will slow down the security implementation
- Do the low hanging fruit first (security hardening)
- Minimum security baseline (MSB) refers to the obvious assets which need to be secured and the threshold which is the minimum expectation from the security program



TRACK 1: IT INFRASTRUCTURE

TRACK 2: ISMS DOC & PROCESSES

TRACK 3: SOFTWARE APP

TRACK 4: OTHER APPS/UTILITIES/3^{RD} PARTIES

TRACK 5: DESKTOPS & BROWSERS

TRACK 6: VULNERABILITY MANAGEMENT

TRACK 7: MOBILE SECURITY

- For a successful security transformation project, good planning, organization, and effective project management is essential.

Topic no 57: Pre-requisites For Security Hardening

1. Security program approved
2. Consultant on board
3. Project kick-off meeting held
4. ISMC team identified and their loading for this project communicated
5. Appraisal linkage of core resources announced by CIO

1. Security program approved

- Project director
- Timeline
- General project sequence and strategy
- Understanding of main players and roles
- Understanding of project structure

2. Consultant on board

- Expert consultants in security transformation can facilitate the project success
- Third party & independent

- Bring a focus on delivering results
- Strong domain knowledge

3. **Project kick-off meeting held**
    - Project goals & mission
    - All key stakeholders made aware of their roles
    - Responsibilities & authority
    - Success criteria & reporting mechanism
4. **ISMC team identified and their loading for this project communicated**
    - ISMC plays a critical role
    - Cooperation & teamwork
    - Security leadership culture
    - Clarity on goals
5. **Appraisal linkage of core resources announced by CIO**
    - Broader team
    - Announcement by CIO
    - Clarity on evaluation mechanism

Topic no 58: Who Will Conduct The Security Hardening?

- **Involvement of various stakeholders for security hardening**
    - Operations teams
    - Security team
    - IT management
    - Consultant
    - Business

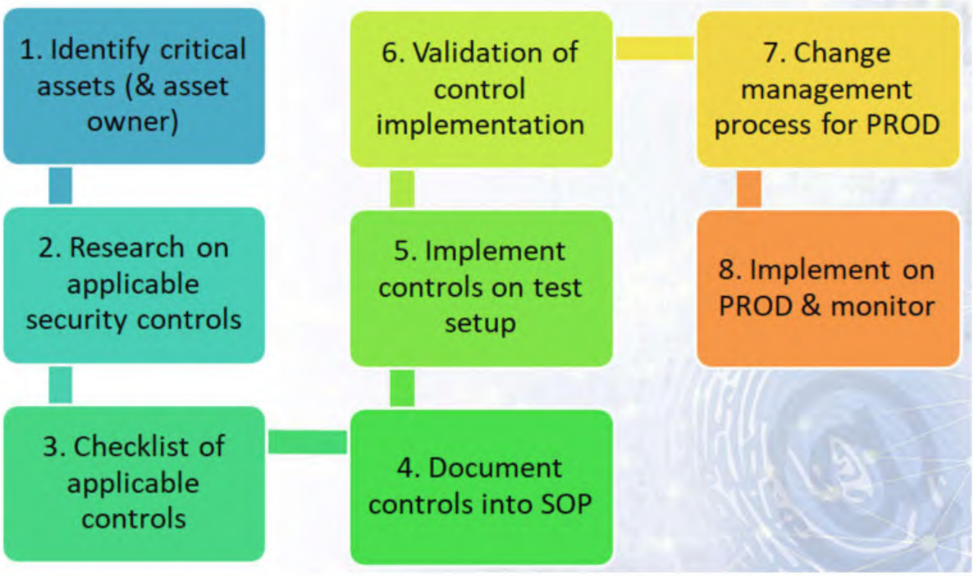
IT Ops teams
Security team
IT management
Consultant
Business

- **IT Operations teams:**
  - Study the security controls (CIS/DISA)
  - Apply the security controls in pilot/test environment
  - Report the completion of control implementation to ISMC
  - Assist InfoSec team with validation
- **InfoSec team:**
  - Conduct validation of security controls implementation
  - Acquire checklist of controls from relevant IT team
  - Document the status of controls in the form of a checklist
  - Forward validation report to ISMC
- **IT management:**
  - Ensure IT operations teams receive required guidance and support
  - Sign-off on change management requests
  - Assist with planning down-time and business related downtime
- **Consultant or project director:**
  - Drives the security program
  - Ensures that strategy is aligned with project objectives
  - Ensures process and activities are moving at good momentum as per timeline

- **Business stakeholders:**
  - Provide downtime approvals if required
  - Help to engage other vendors if applicable

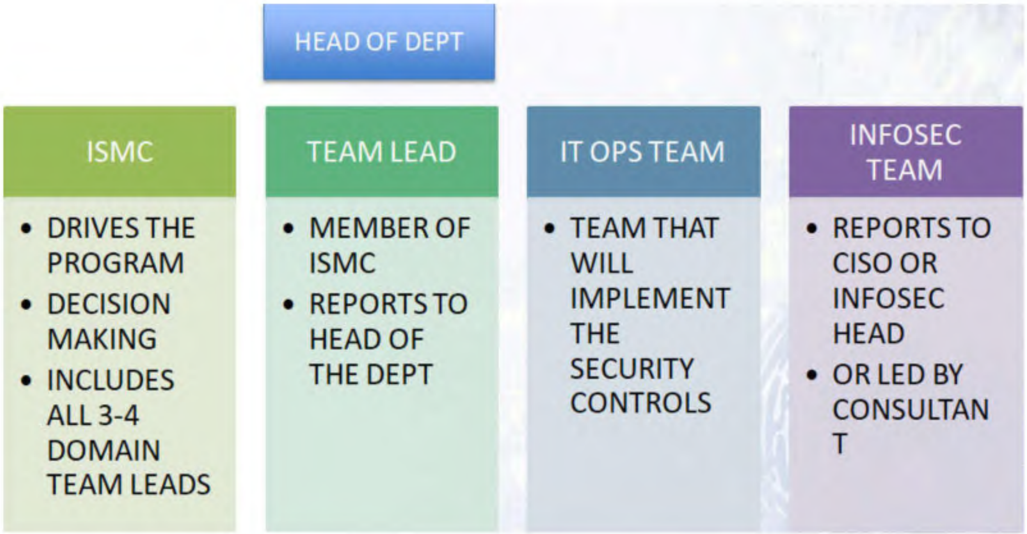
Topic no 59: 8 Step Methodology – Security Hardening (1)

- What is the 8 step security hardening methodology?


1. Identify critical assets (& asset owner)
2. Research on applicable security controls
3. Checklist of applicable controls
4. Document controls into SOP
5. Implement controls on test setup
6. Validation of control implementation
7. Change management process for PROD
8. Implement on PROD & monitor

- **Purpose:**
  - Many assets need to be hardened at various times, by various teams, for various requirements and projects
  - Standardize and follow a consistent approach
- **Benefits:**
  - Process for security hardening
  - Discipline to always follow the same steps
  - Helps avoid missing any steps in the process
  - Gives team clarity on what to do and what sequence to follow
- **If You Skip This Process:**
  - Will follow a new approach every time
  - Every resource has their own method

- Dependence on resource rather than the process
- Complicate rather than simplify
- Divergence in security activities



HEAD OF DEPT

ISMC

- DRIVES THE PROGRAM
- DECISION MAKING
- INCLUDES ALL 3-4 DOMAIN TEAM LEADS

TEAM LEAD

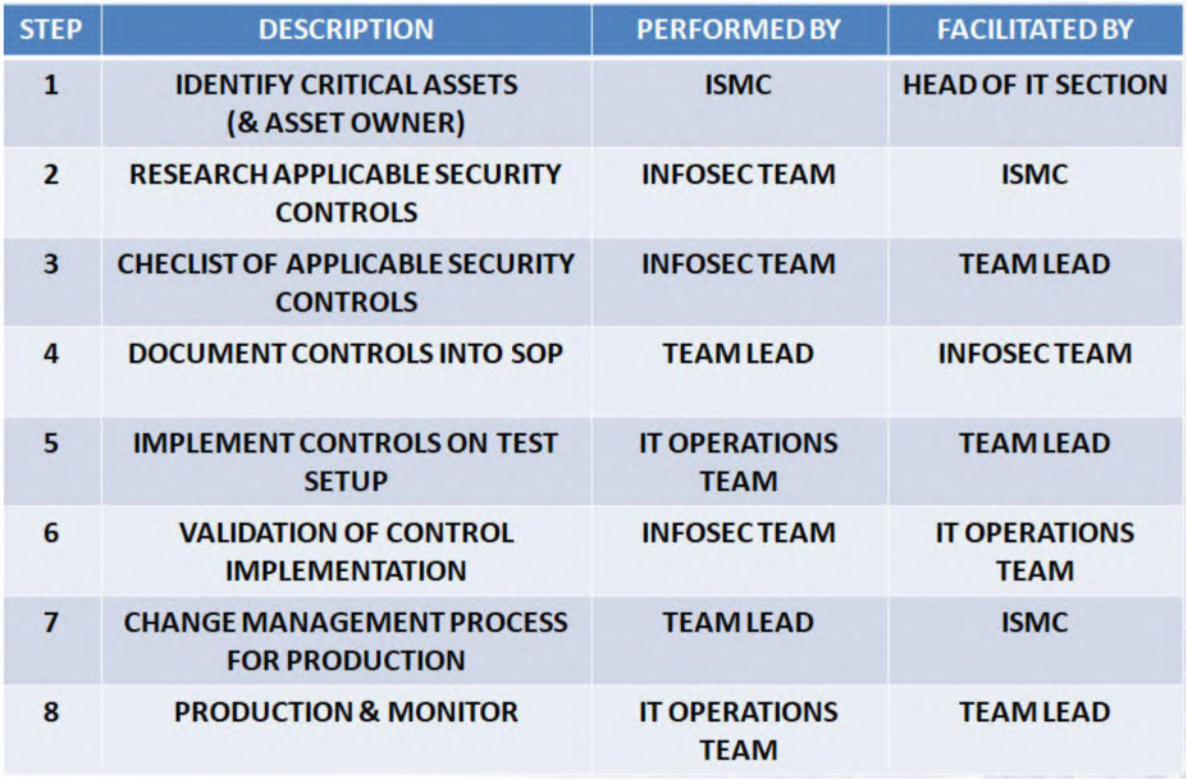
- MEMBER OF ISMC
- REPORTS TO HEAD OF THE DEPT

IT OPS TEAM

- TEAM THAT WILL IMPLEMENT THE SECURITY CONTROLS

INFOSEC TEAM

- REPORTS TO CISO OR INFOSEC HEAD
- OR LED BY CONSULTAN T



STEP	DESCRIPTION	PERFORMED BY	FACILITATED BY
1	IDENTIFY CRITICAL ASSETS (& ASSET OWNER)	ISMC	HEAD OF IT SECTION
2	RESEARCH APPLICABLE SECURITY CONTROLS	INFOSEC TEAM	ISMC
3	CHECLIST OF APPLICABLE SECURITY CONTROLS	INFOSEC TEAM	TEAM LEAD
4	DOCUMENT CONTROLS INTO SOP	TEAM LEAD	INFOSEC TEAM
5	IMPLEMENT CONTROLS ON TEST SETUP	IT OPERATIONS TEAM	TEAM LEAD
6	VALIDATION OF CONTROL IMPLEMENTATION	INFOSEC TEAM	IT OPERATIONS TEAM
7	CHANGE MANAGEMENT PROCESS FOR PRODUCTION	TEAM LEAD	ISMC
8	PRODUCTION & MONITOR	IT OPERATIONS TEAM	TEAM LEAD

Topic no 60: 8 Step Methodology – Security Hardening (2)

- **Step 1: Identify Critical Assets & Asset Owner:**
  - Asset inventory & infrastructure diagram
  - Examine risks
  - Analyze assets at a high level and prioritize
  - Minimum security baseline (MSB)
  - Break into phases
- **Step 2: Research on applicable security controls**
  - CIS, DISA
  - Search on google
  - Review standards/frameworks (ISO27001, PCI, etc)
  - Look at OWASP, CSA, NIST, CIS Top 20
  - Selection of controls
- **Step 3: Checklist of applicable security controls**
  - Checklist for progress tracking
  - Share with appropriate IT team
  - Forms record for controls trail
- **Step 4: Document controls into SOP**
  - Enter controls set into draft SOP
  - Who will do what when, (and briefly how)
  - Get Dept Head agreement and sign-off on checklist and SOP

Topic no 61: 8 Step Methodology – Security Hardening (3)

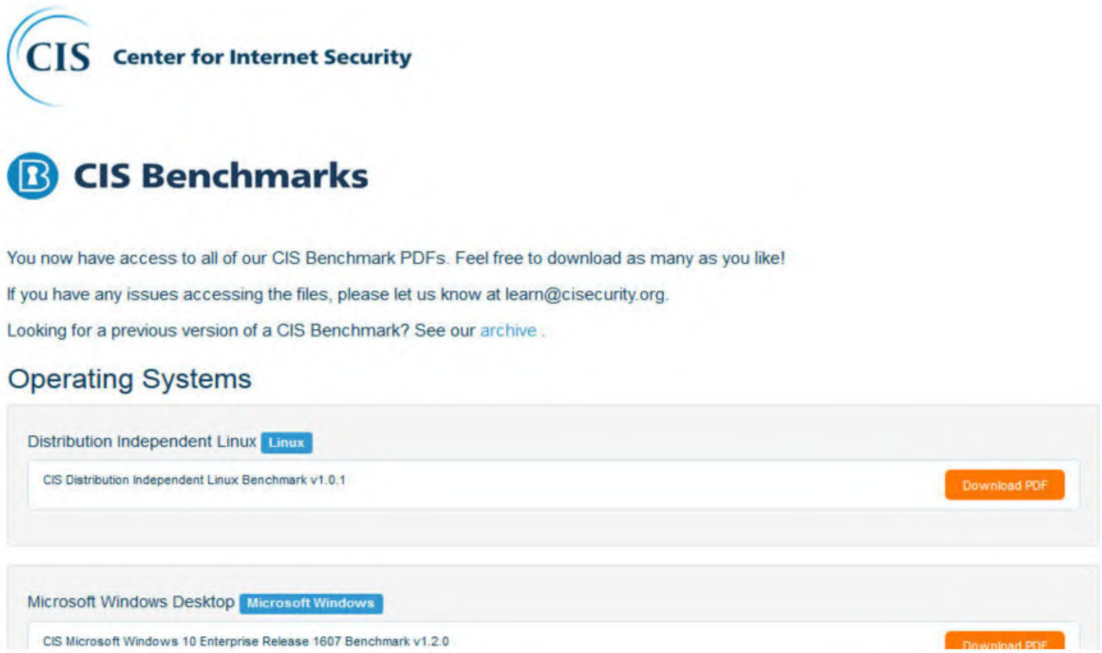
- **Step 5: Implement controls on test setup**
  - Relevant IT team to implement controls on test setup
  - Update checklist
  - Update SOP (if necessary)

  - Send checklist back to InfoSec team

- **Step 6: Validation of control implementation (by InfoSec team)**
  - InfoSec resource with relevant domain knowledge
  - Conduct preparation before actual validation (study controls)
  - Update checklist with status column
- **Step 7: Change management process for PRODUCTION:**
  - ISMC receives validation status from InfoSec team
  - Relevant dept head takes up change management process and prepares for shifting to PROD
  - Rollback, impact etc
- **Step 8: Implement on PROD & monitor:**
  - Monitor closely for 24-48 hours after moving to PROD
  - Rollback in case of unforeseen circumstances
  - IT team SOP finalized and now ops task

Topic no 62-65: A Look At CIS Security Benchmarks (1)

- Center for Internet Security (CIS)
  - https://www.cisecurity.org/cis-benchmarks/
  - Fill out your details and will receive an email with link



CIS Center for Internet Security

CIS Benchmarks

You now have access to all of our CIS Benchmark PDFs. Feel free to download as many as you like!

If you have any issues accessing the files, please let us know at learn@cisecurity.org.

Looking for a previous version of a CIS Benchmark? See our archive .

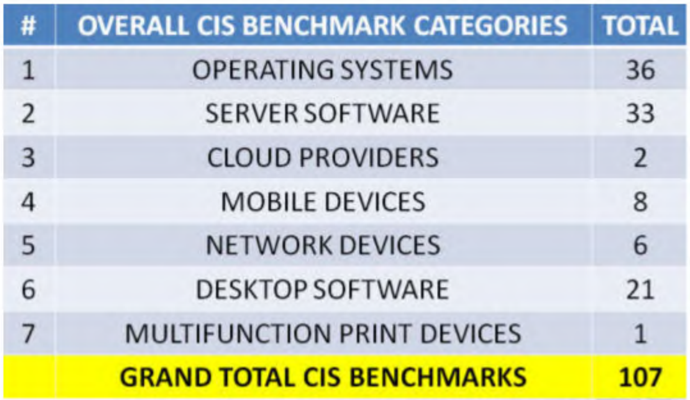
Operating Systems

Distribution Independent Linux Linux

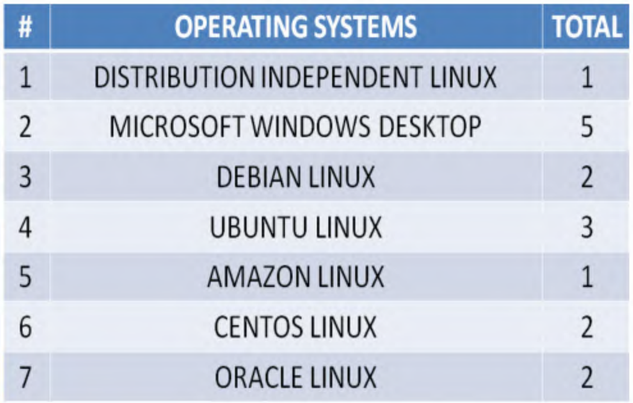
CIS Distribution Independent Linux Benchmark v1.0.1

Microsoft Windows Desktop Microsoft Windows

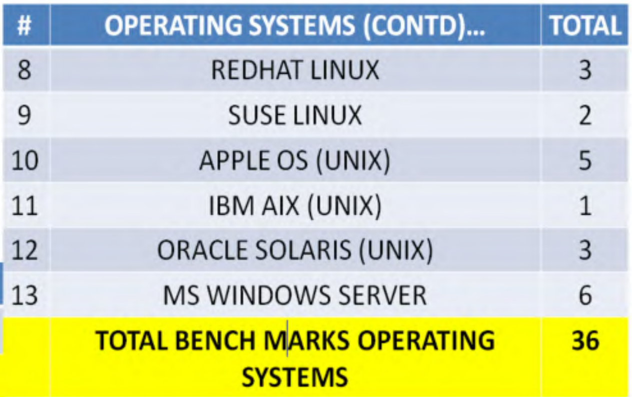
CIS Microsoft Windows 10 Enterprise Release 1607 Benchmark v1.2.0



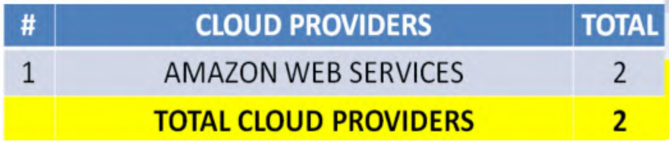
#	OVERALL CIS BENCHMARK CATEGORIES	TOTAL
1	OPERATING SYSTEMS	36
2	SERVER SOFTWARE	33
3	CLOUD PROVIDERS	2
4	MOBILE DEVICES	8
5	NETWORK DEVICES	6
6	DESKTOP SOFTWARE	21
7	MULTIFUNCTION PRINT DEVICES	1
	GRAND TOTAL CIS BENCHMARKS	**107**



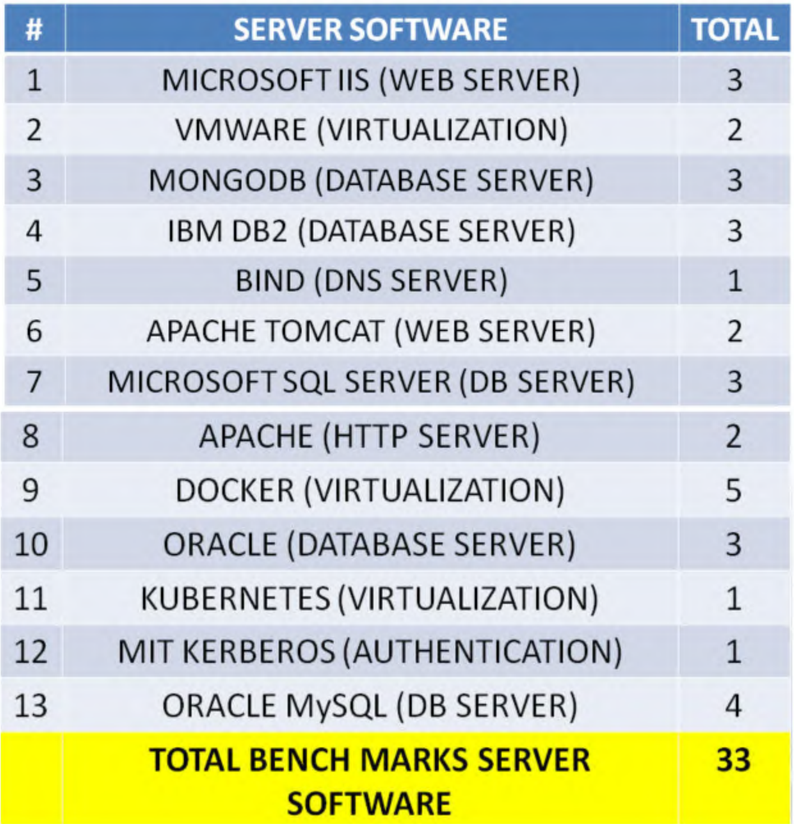
#	OPERATING SYSTEMS	TOTAL
1	DISTRIBUTION INDEPENDENT LINUX	1
2	MICROSOFT WINDOWS DESKTOP	5
3	DEBIAN LINUX	2
4	UBUNTU LINUX	3
5	AMAZON LINUX	1
6	CENTOS LINUX	2
7	ORACLE LINUX	2



#	OPERATING SYSTEMS (CONTD)...	TOTAL
8	REDHAT LINUX	3
9	SUSE LINUX	2
10	APPLE OS (UNIX)	5
11	IBM AIX (UNIX)	1
12	ORACLE SOLARIS (UNIX)	3
13	MS WINDOWS SERVER	6
	TOTAL BENCH MARKS OPERATING SYSTEMS	**36**

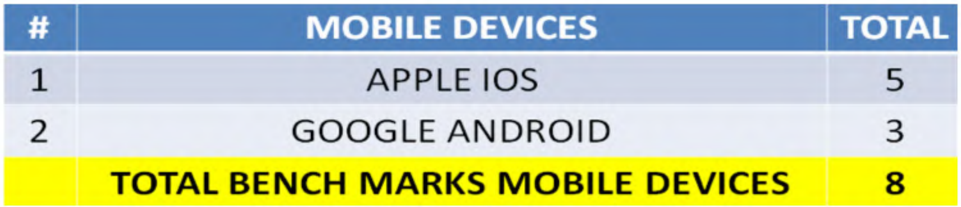


#	CLOUD PROVIDERS	TOTAL
1	AMAZON WEB SERVICES	2
	TOTAL CLOUD PROVIDERS	**2**

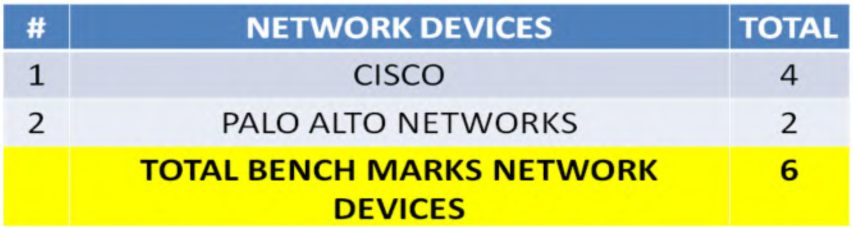


#	SERVER SOFTWARE	TOTAL
1	MICROSOFT IIS (WEB SERVER)	3
2	VMWARE (VIRTUALIZATION)	2
3	MONGODB (DATABASE SERVER)	3
4	IBM DB2 (DATABASE SERVER)	3
5	BIND (DNS SERVER)	1
6	APACHE TOMCAT (WEB SERVER)	2
7	MICROSOFT SQL SERVER (DB SERVER)	3
8	APACHE (HTTP SERVER)	2
9	DOCKER (VIRTUALIZATION)	5
10	ORACLE (DATABASE SERVER)	3
11	KUBERNETES (VIRTUALIZATION)	1
12	MIT KERBEROS (AUTHENTICATION)	1
13	ORACLE MySQL (DB SERVER)	4
	TOTAL BENCH MARKS SERVER SOFTWARE	**33**

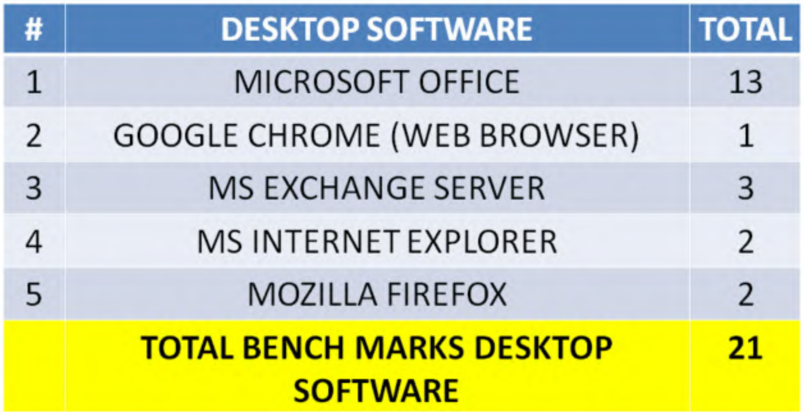
- Mobile devices, network devices, desktop software, multifunction print devices



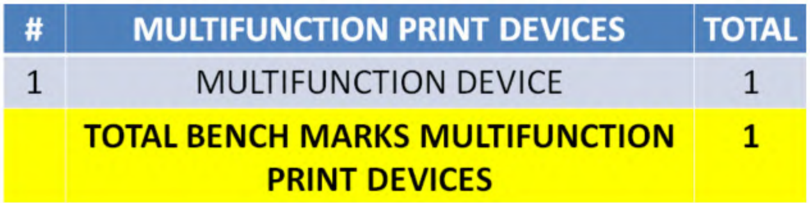
#	MOBILE DEVICES	TOTAL
1	APPLE IOS	5
2	GOOGLE ANDROID	3
	TOTAL BENCH MARKS MOBILE DEVICES	**8**



#	NETWORK DEVICES	TOTAL
1	CISCO	4
2	PALO ALTO NETWORKS	2
	TOTAL BENCH MARKS NETWORK DEVICES	**6**

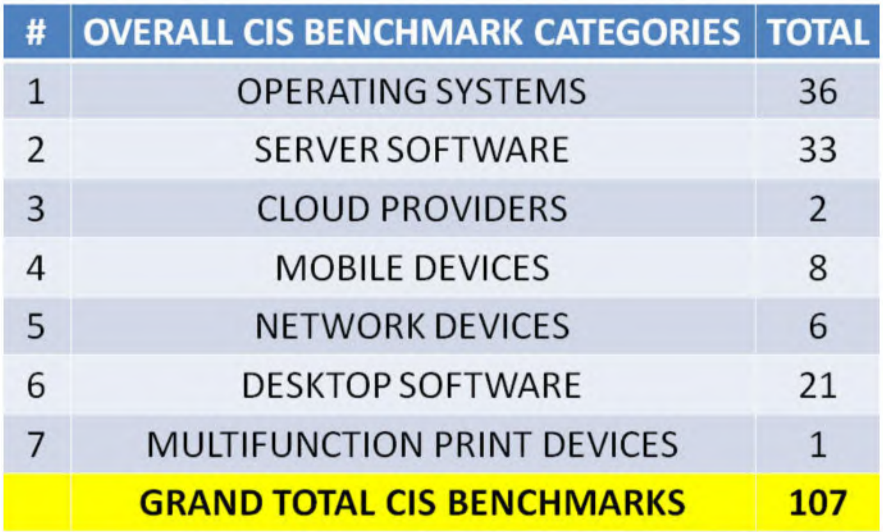


#	DESKTOP SOFTWARE	TOTAL
1	MICROSOFT OFFICE	13
2	GOOGLE CHROME (WEB BROWSER)	1
3	MS EXCHANGE SERVER	3
4	MS INTERNET EXPLORER	2
5	MOZILLA FIREFOX	2
	TOTAL BENCH MARKS DESKTOP SOFTWARE	**21**



#	MULTIFUNCTION PRINT DEVICES	TOTAL
1	MULTIFUNCTION DEVICE	1
	TOTAL BENCH MARKS MULTIFUNCTION PRINT DEVICES	**1**

- CIS Benchmarks example (Network Devices)



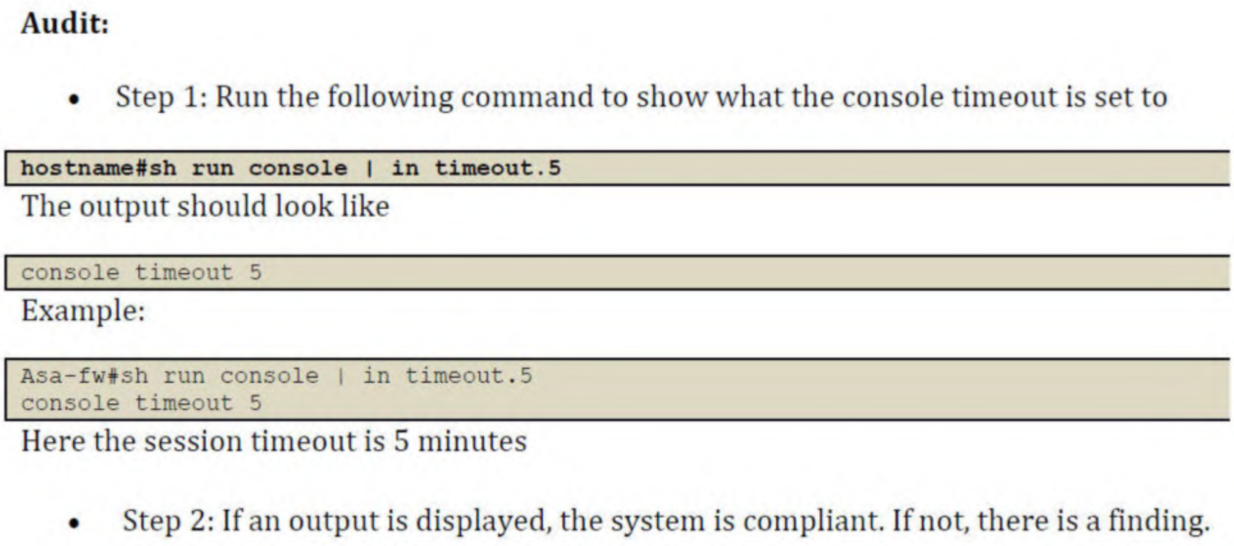
#	OVERALL CIS BENCHMARK CATEGORIES	TOTAL
1	OPERATING SYSTEMS	36
2	SERVER SOFTWARE	33
3	CLOUD PROVIDERS	2
4	MOBILE DEVICES	8
5	NETWORK DEVICES	6
6	DESKTOP SOFTWARE	21
7	MULTIFUNCTION PRINT DEVICES	1
	GRAND TOTAL CIS BENCHMARKS	**107**

CIS Cisco Firewall Benchmark

v4.0.0 - 06-29-2016

- June 29, 2016
- 174 pages PDF doc

- **Control content:**
  - Profile applicability (ASA 8.X, ASA 9.X)
  - Description
  - Rationale
  - Audit
  - Remediation
  - Default value
  - References
- **1.8 (page 88); Session Timeout**
  - Profile applicability: Level 1, Cisco ASA9.X
  - Description: Sets the idle timeout for a console session before the security appliance terminates it.
  - Rationale: Limiting session timeout prevents unauthorized users from using abandoned sessions to perform malicious activities.



Audit:

- Step 1: Run the following command to show what the console timeout is set to

```
hostname#sh run console | in timeout.5
```

The output should look like

```
console timeout 5
```

Example:

```
Asa-fw#sh run console | in timeout.5
console timeout 5
```

Here the session timeout is 5 minutes

- Step 2: If an output is displayed, the system is compliant. If not, there is a finding.

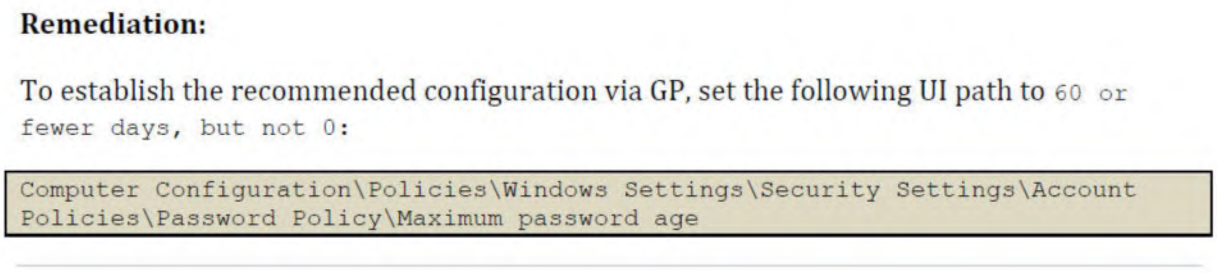
- CIS Benchmarks example (Operating Systems)
  - MS Windows Server 2012-R2

CIS Microsoft Windows Server 2012 R2 Benchmark

v2.2.1 - 01-31-2017

- January 31, 2017
- 760 pages PDF doc
- Profile applicability:
  - Level 1 domain controller
  - Level 1 member server
  - Level 2 domain controller
  - Level 2 member server
- **Level 1:** Items in this profile intend to:
  - be practical and prudent;
  - provide a clear security benefit; and
  - not inhibit the utility of the technology beyond acceptable means
- **Level 2:** extends the Level 1 - profile
  - intended for environments or use cases where security is paramount
  - acts as defense in depth measure
  - may negatively inhibit the utility or performance of the technology
- **Control content:**
  - Profile applicability (ASA 8.X, ASA 9.X)
  - Description
  - Rationale
  - Audit

  - Remediation
  - Impact
  - Default value
  - References
- **1.1.2 [L1]:** *Ensure 'Maximum password age' is set to '60 or fewer days, but not 0' (Scored)*
  - *Profile applicability: Level 1 Domain Controller, Level 1 Member Server*
- **1.1.2 [L1] Description:**
  - This policy setting defines how long a user can use their password before it expires.
  - Values for this policy setting range from 0 to 999 days. If you set the value to 0, the password will never expire.
- **1.1.2 [L1] Audit:**
  - Navigate to the UI Path articulated in the Remediation section and confirm it is set as prescribed.



Remediation:

To establish the recommended configuration via GP, set the following UI path to `60 or fewer days, but not 0`:

```
Computer Configuration\Policies\Windows Settings\Security Settings\Account
Policies\Password Policy\Maximum password age
```

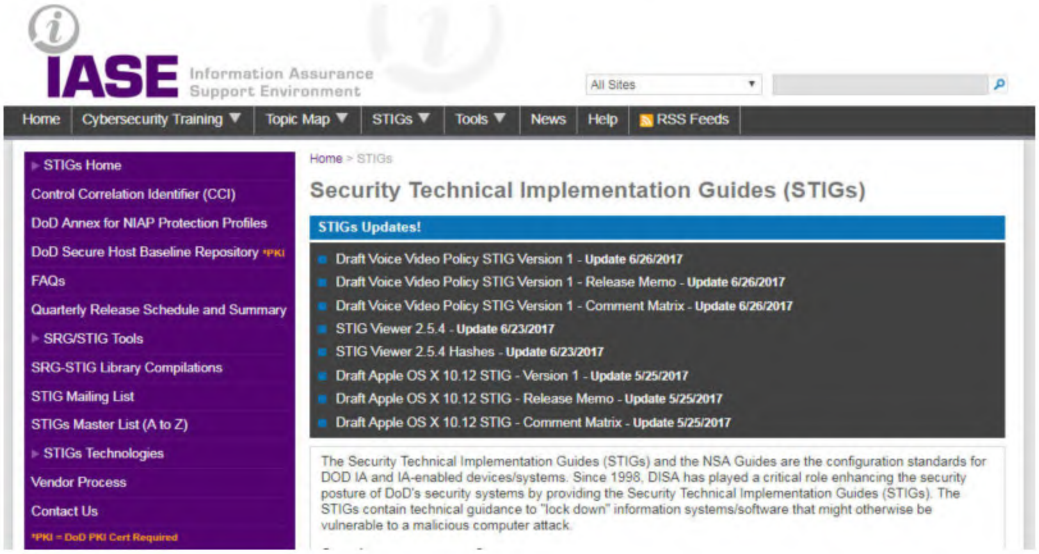
- 1.1.2 [L1] Default Value: 42 days
- 1.1.2 [L1] Reference: CCE-37167-4
  - Common Configuration Enumeration (Unique identifiers for common system config issues)

Topic no 66: A Look At DISA STIGs (1)

- USA DoD
- Security Technical Implementation Guides (STIGs)
- Most expansive security benchmarks available
- Most regularly updated
- Unclassified version

- http://iase.disa.mil/stigs/Pages/index.aspx
- 425 STIGs available
- STIGs master list (A-Z):
  - http://iase.disa.mil/stigs/Pages/a-z.aspx
- STIG viewer:
  - http://iase.disa.mil/stigs/Pages/stig-viewing-guidance.aspx

STIGs HOME


IASE
Information Assurance Support Environment
All Sites
Home
Cybersecurity Training ▼
Topic Map ▼
STIGs ▼
Tools ▼
News
Help
RSS Feeds
STIGs Home
Control Correlation Identifier (CCI)
DoD Annex for NIAP Protection Profiles
DoD Secure Host Baseline Repository *PKI
FAQs
Quarterly Release Schedule and Summary
SRG/STIG Tools
SRG-STIG Library Compilations
STIG Mailing List
STIGs Master List (A to Z)
STIGs Technologies
Vendor Process
Contact Us
*PKI = DoD PKI Cert Required
Home > STIGs

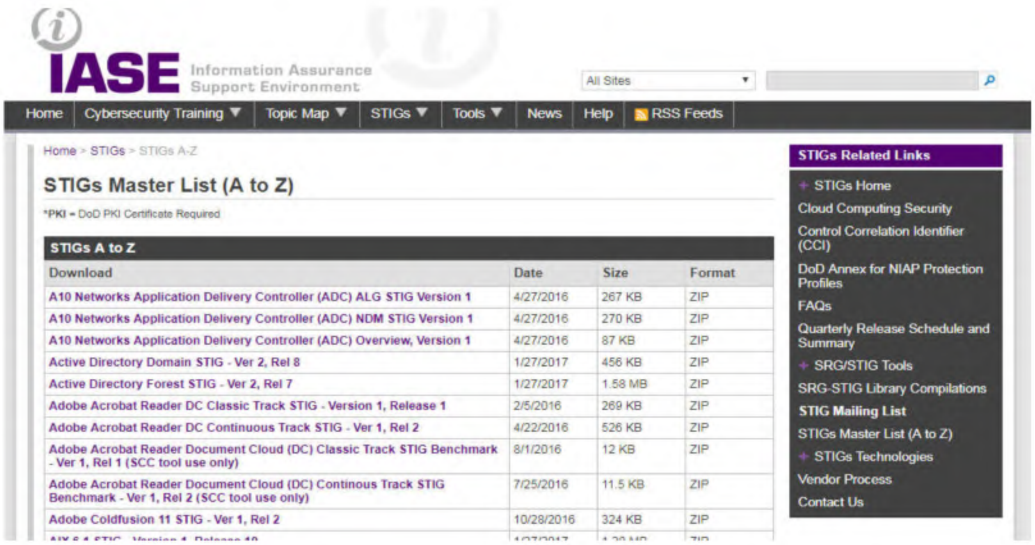
Security Technical Implementation Guides (STIGs)

STIGs Updates!

- Draft Voice Video Policy STIG Version 1 - **Update 6/26/2017**
- Draft Voice Video Policy STIG Version 1 - Release Memo - **Update 6/26/2017**
- Draft Voice Video Policy STIG Version 1 - Comment Matrix - **Update 6/26/2017**
- STIG Viewer 2.5.4 - **Update 6/23/2017**
- STIG Viewer 2.5.4 Hashes - **Update 6/23/2017**
- Draft Apple OS X 10.12 STIG - Version 1 - **Update 5/25/2017**
- Draft Apple OS X 10.12 STIG - Release Memo - **Update 5/25/2017**
- Draft Apple OS X 10.12 STIG - Comment Matrix - **Update 5/25/2017**

The Security Technical Implementation Guides (STIGs) and the NSA Guides are the configuration standards for DOD IA and IA-enabled devices/systems. Since 1998, DISA has played a critical role enhancing the security posture of DoD's security systems by providing the Security Technical Implementation Guides (STIGs). The STIGs contain technical guidance to "lock down" information systems/software that might otherwise be vulnerable to a malicious computer attack.

STIGs Master List



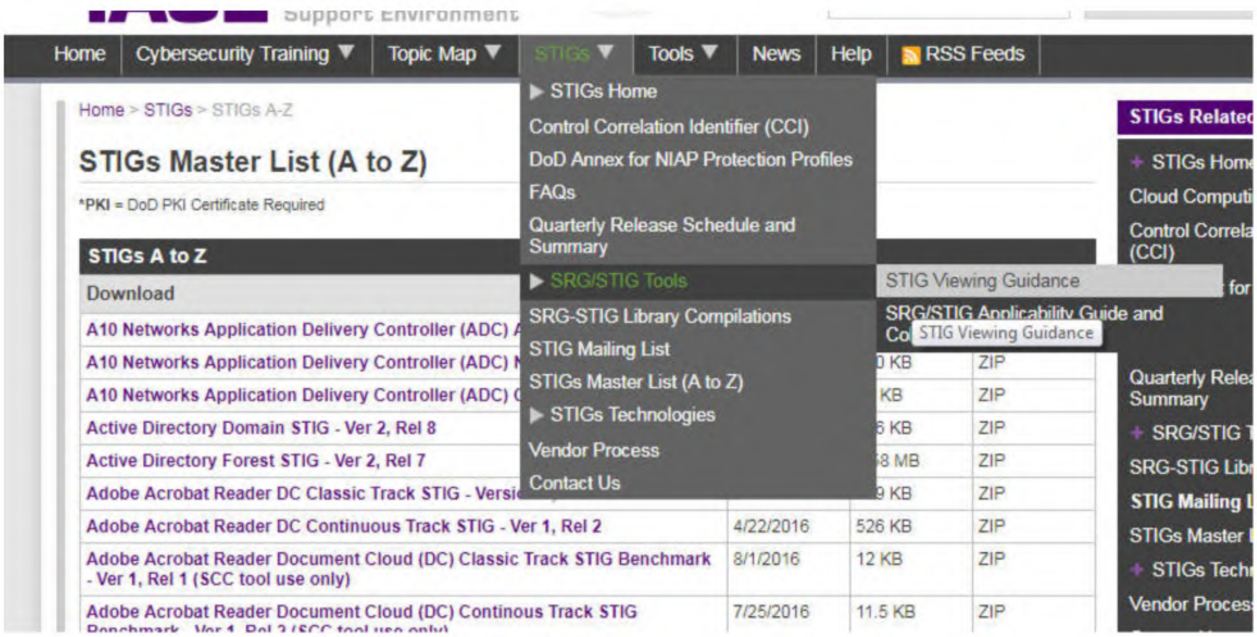
STIGs Master List (A to Z)

*PKI = DoD PKI Certificate Required

STIGs A to Z

Download	Date	Size	Format
A10 Networks Application Delivery Controller (ADC) ALG STIG Version 1	4/27/2016	267 KB	ZIP
A10 Networks Application Delivery Controller (ADC) NDM STIG Version 1	4/27/2016	270 KB	ZIP
A10 Networks Application Delivery Controller (ADC) Overview, Version 1	4/27/2016	87 KB	ZIP
Active Directory Domain STIG - Ver 2, Rel 8	1/27/2017	456 KB	ZIP
Active Directory Forest STIG - Ver 2, Rel 7	1/27/2017	1.58 MB	ZIP
Adobe Acrobat Reader DC Classic Track STIG - Version 1, Release 1	2/5/2016	269 KB	ZIP
Adobe Acrobat Reader DC Continuous Track STIG - Ver 1, Rel 2	4/22/2016	526 KB	ZIP
Adobe Acrobat Reader Document Cloud (DC) Classic Track STIG Benchmark - Ver 1, Rel 1 (SCC tool use only)	8/1/2016	12 KB	ZIP
Adobe Acrobat Reader Document Cloud (DC) Continous Track STIG Benchmark - Ver 1, Rel 2 (SCC tool use only)	7/25/2016	11.5 KB	ZIP
Adobe Coldfusion 11 STIG - Ver 1, Rel 2	10/28/2016	324 KB	ZIP
AIX 6.1 STIG - Version 1, Release 10	1/27/2017	1.30 MB	ZIP

STIGs Viewer



Home > STIGs > STIGs A-Z

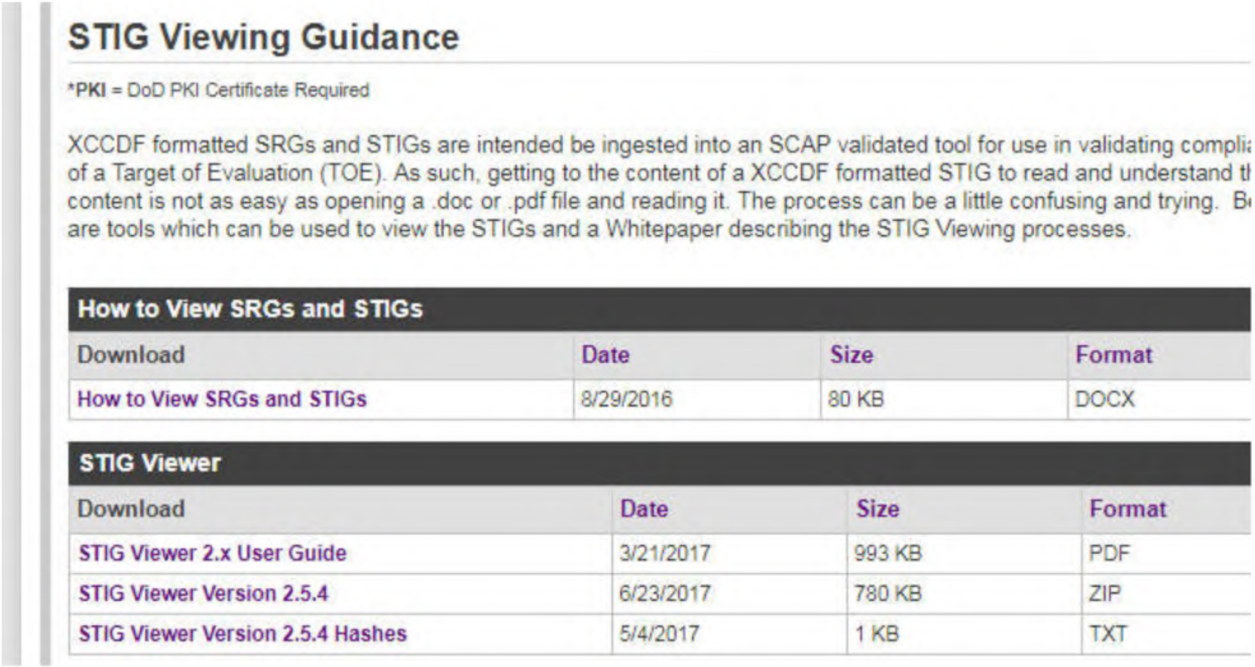
STIGs Master List (A to Z)

*PKI = DoD PKI Certificate Required

STIGs A to Z

Download			
A10 Networks Application Delivery Controller (ADC) A			
A10 Networks Application Delivery Controller (ADC) N		0 KB	ZIP
A10 Networks Application Delivery Controller (ADC) (		KB	ZIP
Active Directory Domain STIG - Ver 2, Rel 8		6 KB	ZIP
Active Directory Forest STIG - Ver 2, Rel 7		8 MB	ZIP
Adobe Acrobat Reader DC Classic Track STIG - Versi		9 KB	ZIP
Adobe Acrobat Reader DC Continuous Track STIG - Ver 1, Rel 2	4/22/2016	526 KB	ZIP
Adobe Acrobat Reader Document Cloud (DC) Classic Track STIG Benchmark - Ver 1, Rel 1 (SCC tool use only)	8/1/2016	12 KB	ZIP
Adobe Acrobat Reader Document Cloud (DC) Continous Track STIG Benchmark - Ver 1, Rel 2 (SCC tool use only)	7/25/2016	11.5 KB	ZIP

STIG Viewer Download



STIG Viewing Guidance

*PKI = DoD PKI Certificate Required

XCCDF formatted SRGs and STIGs are intended be ingested into an SCAP validated tool for use in validating complia of a Target of Evaluation (TOE). As such, getting to the content of a XCCDF formatted STIG to read and understand tl content is not as easy as opening a .doc or .pdf file and reading it. The process can be a little confusing and trying. B are tools which can be used to view the STIGs and a Whitepaper describing the STIG Viewing processes.

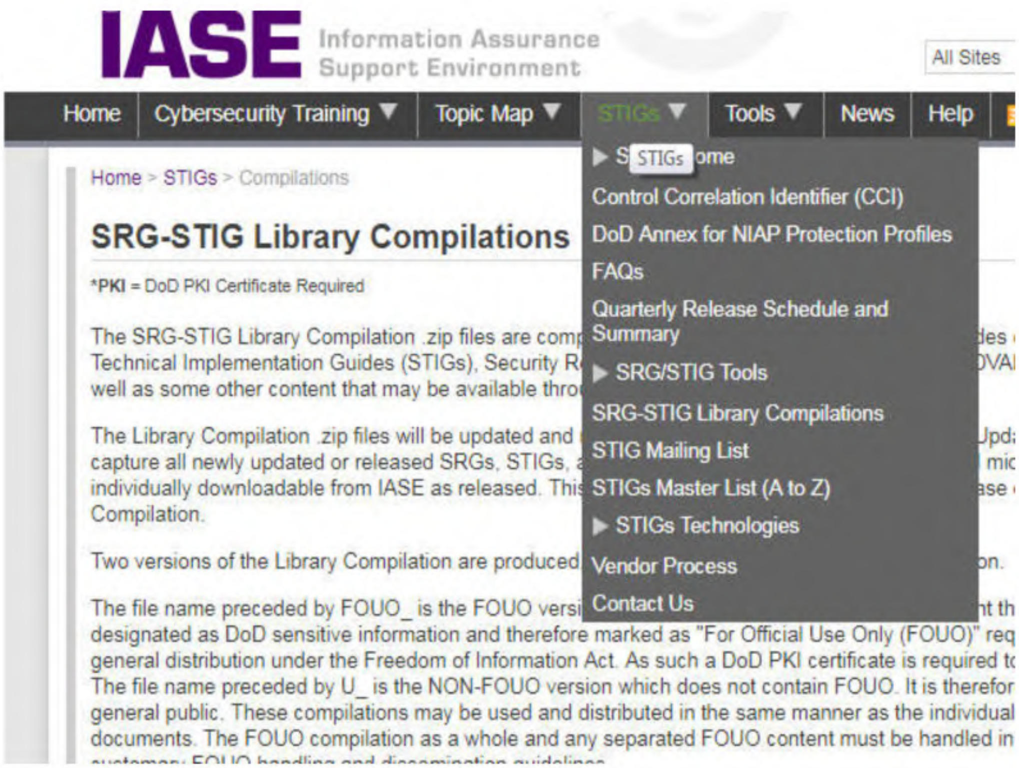
How to View SRGs and STIGs

Download	Date	Size	Format
How to View SRGs and STIGs	8/29/2016	80 KB	DOCX

STIG Viewer

Download	Date	Size	Format
STIG Viewer 2.x User Guide	3/21/2017	993 KB	PDF
STIG Viewer Version 2.5.4	6/23/2017	780 KB	ZIP
STIG Viewer Version 2.5.4 Hashes	5/4/2017	1 KB	TXT

STIG Library Compilation



Home > STIGs > Compilations

SRG-STIG Library Compilations

*PKI = DoD PKI Certificate Required

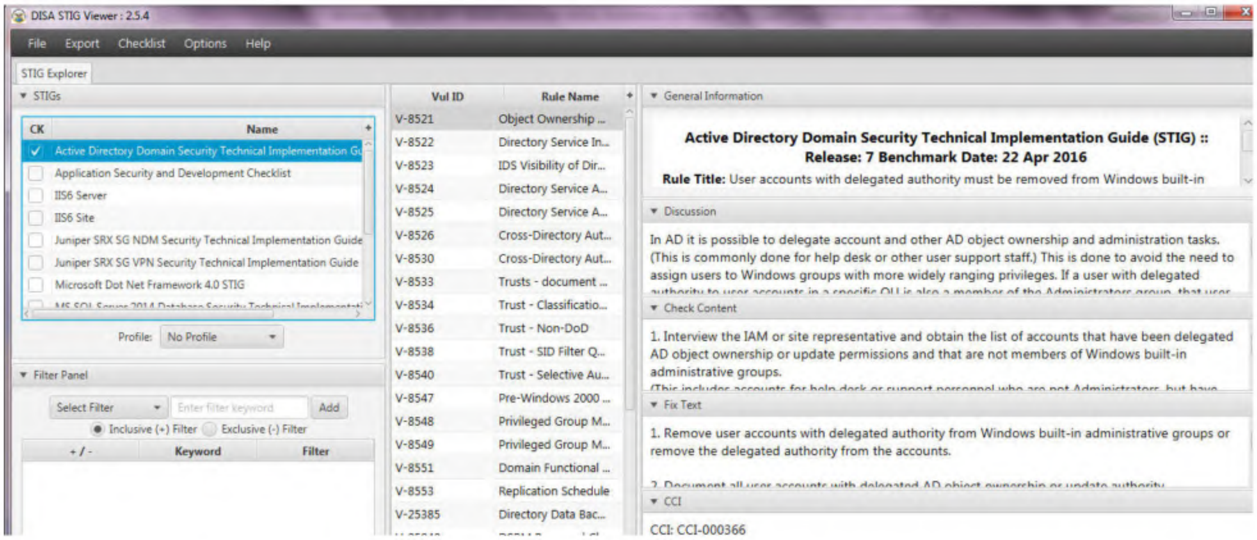
The SRG-STIG Library Compilation .zip files are comp des
Technical Implementation Guides (STIGs), Security R OVAL
well as some other content that may be available thro

The Library Compilation .zip files will be updated and Upd
capture all newly updated or released SRGs, STIGs, a mic
individually downloadable from IASE as released. This ase
Compilation.

Two versions of the Library Compilation are produced on.

The file name preceded by FOUO_ is the FOUO versi nt th
designated as DoD sensitive information and therefore marked as "For Official Use Only (FOUO)" req
general distribution under the Freedom of Information Act. As such a DoD PKI certificate is required to
The file name preceded by U_ is the NON-FOUO version which does not contain FOUO. It is therefor
general public. These compilations may be used and distributed in the same manner as the individual
documents. The FOUO compilation as a whole and any separated FOUO content must be handled in

STIG Viewer Window



CK	Name
☑	Active Directory Domain Security Technical Implementation Gu
□	Application Security and Development Checklist
□	IIS6 Server
□	IIS6 Site
□	Juniper SRX SG NDM Security Technical Implementation Guide
□	Juniper SRX SG VPN Security Technical Implementation Guide
□	Microsoft Dot Net Framework 4.0 STIG

+ / -	Keyword	Filter

Vul ID	Rule Name
V-8521	Object Ownership ...
V-8522	Directory Service In...
V-8523	IDS Visibility of Dir...
V-8524	Directory Service A...
V-8525	Directory Service A...
V-8526	Cross-Directory Aut...
V-8530	Cross-Directory Aut...
V-8533	Trusts - document ...
V-8534	Trust - Classificatio...
V-8536	Trust - Non-DoD
V-8538	Trust - SID Filter Q...
V-8540	Trust - Selective Au...
V-8547	Pre-Windows 2000 ...
V-8548	Privileged Group M...
V-8549	Privileged Group M...
V-8551	Domain Functional ...
V-8553	Replication Schedule
V-25385	Directory Data Bac...

Active Directory Domain Security Technical Implementation Guide (STIG) :: Release: 7 Benchmark Date: 22 Apr 2016

Rule Title: User accounts with delegated authority must be removed from Windows built-in

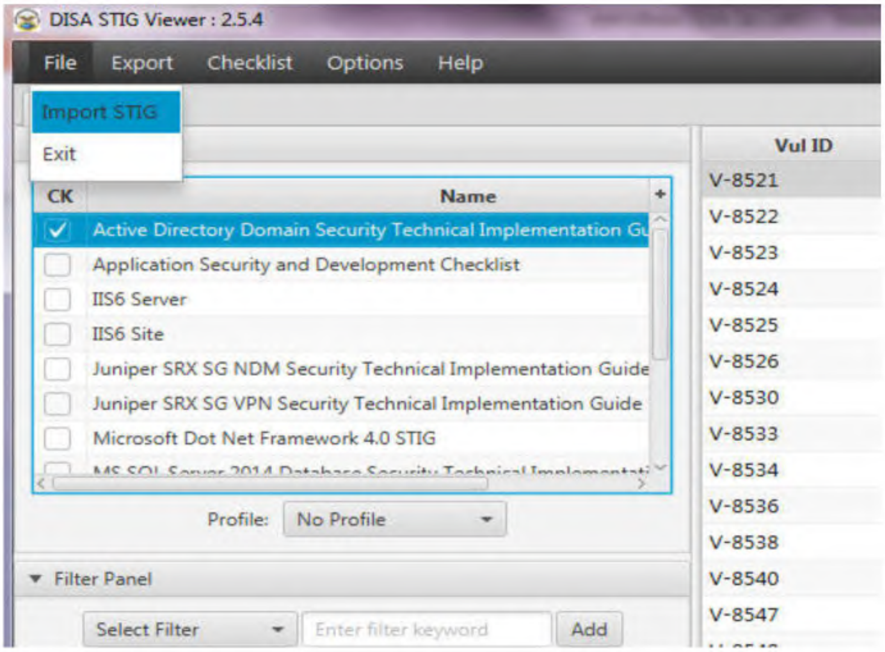
In AD it is possible to delegate account and other AD object ownership and administration tasks. (This is commonly done for help desk or other user support staff.) This is done to avoid the need to assign users to Windows groups with more widely ranging privileges. If a user with delegated

1. Interview the IAM or site representative and obtain the list of accounts that have been delegated AD object ownership or update permissions and that are not members of Windows built-in administrative groups.

1. Remove user accounts with delegated authority from Windows built-in administrative groups or remove the delegated authority from the accounts.

CCI: CCI-000366

Import STIG



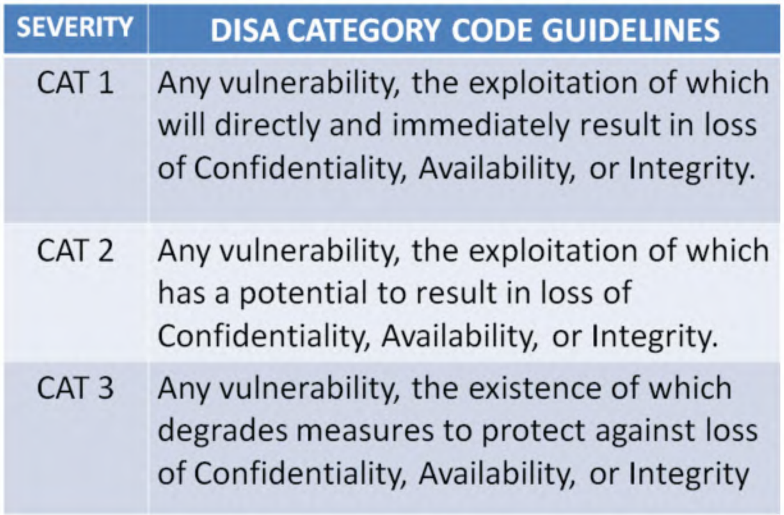
CK	Name
☑	Active Directory Domain Security Technical Implementation Gu
□	Application Security and Development Checklist
□	IIS6 Server
□	IIS6 Site
□	Juniper SRX SG NDM Security Technical Implementation Guide
□	Juniper SRX SG VPN Security Technical Implementation Guide
□	Microsoft Dot Net Framework 4.0 STIG
□	MS SQL Server 2014 Database Security Technical Implementati

Vul ID
V-8521
V-8522
V-8523
V-8524
V-8525
V-8526
V-8530
V-8533
V-8534
V-8536
V-8538
V-8540
V-8547

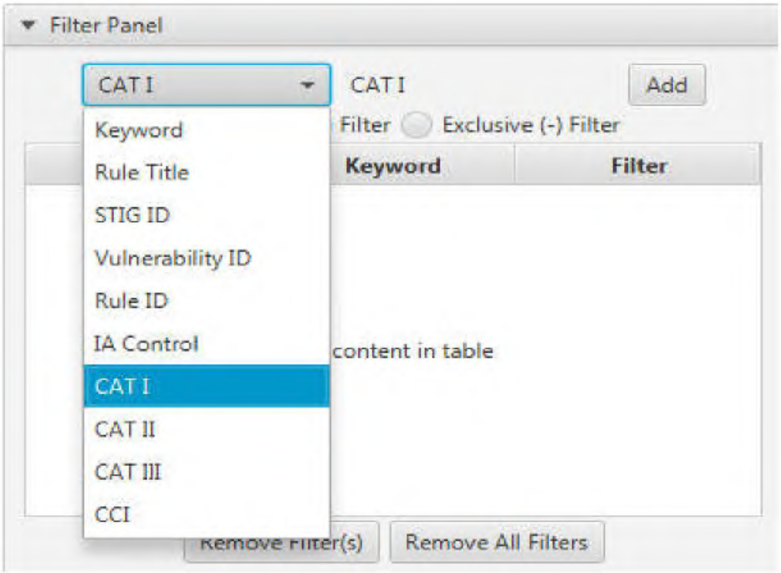
- Completely different mechanism for DISA STIGs

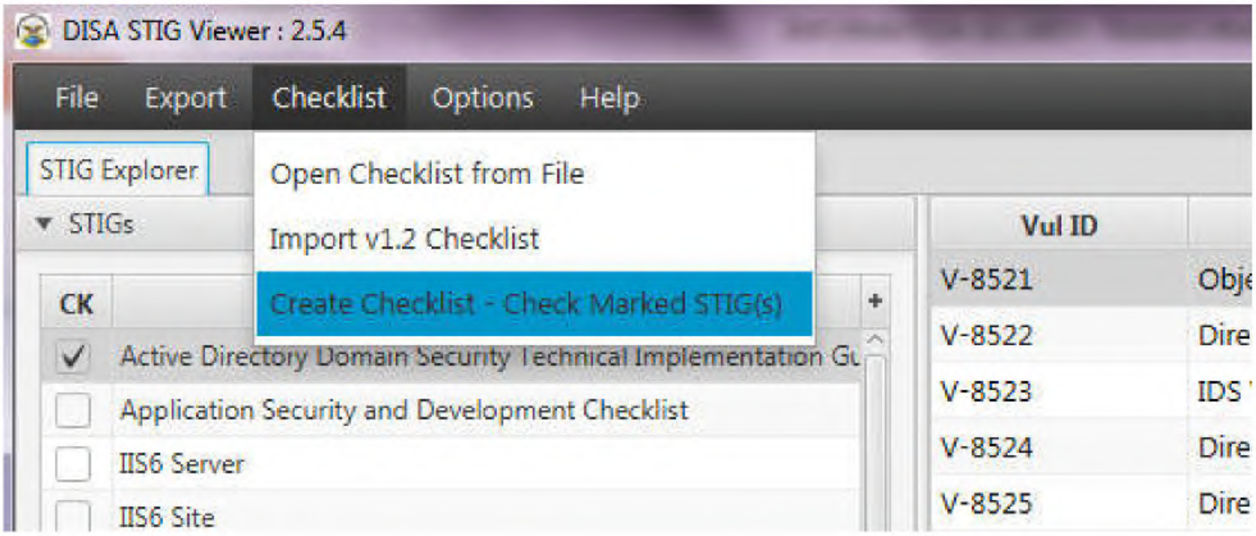
Topic no 67: A Look At DISA STIGs (2)

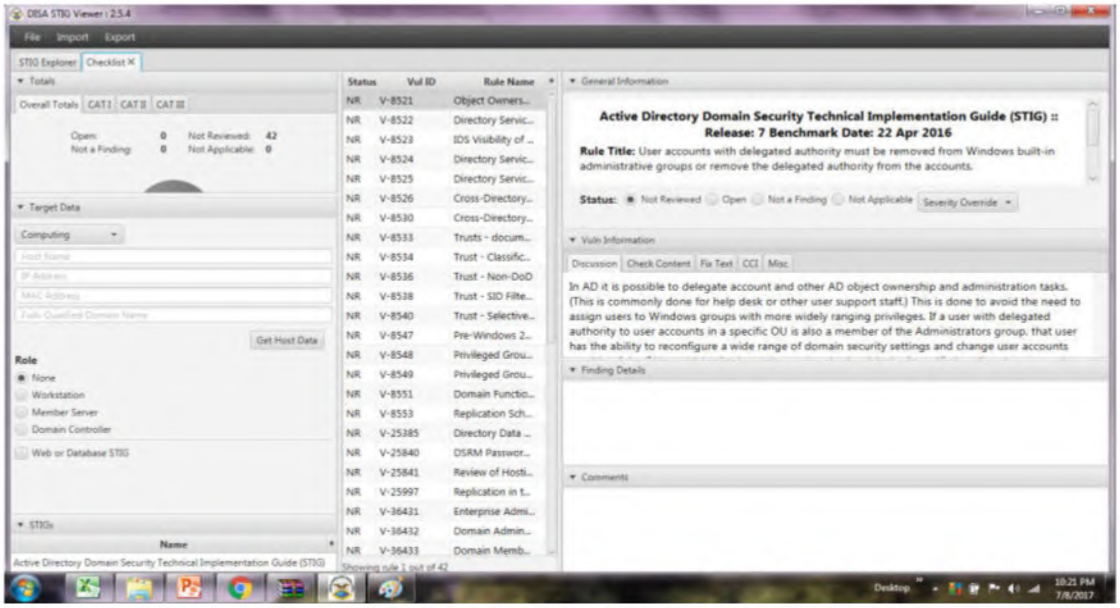
- **STIG content:**
  - General information (title)
  - Discussion
  - Check content
  - Fix text
  - CCI (References)



SEVERITY	DISA CATEGORY CODE GUIDELINES
CAT 1	Any vulnerability, the exploitation of which will directly and immediately result in loss of Confidentiality, Availability, or Integrity.
CAT 2	Any vulnerability, the exploitation of which has a potential to result in loss of Confidentiality, Availability, or Integrity.
CAT 3	Any vulnerability, the existence of which degrades measures to protect against loss of Confidentiality, Availability, or Integrity







Open:	0	Not Reviewed:	42
Not a Finding:	0	Not Applicable:	0

Role
● None
○ Workstation
○ Member Server
○ Domain Controller

□ Web or Database STIG

Active Directory Domain Security Technical Implementation Guide (STIG)

Status	Vul ID	Rule Name
NR	V-8521	Object Owners...
NR	V-8522	Directory Servic...
NR	V-8523	IDS Visibility of ...
NR	V-8524	Directory Servic...
NR	V-8525	Directory Servic...
NR	V-8526	Cross-Directory...
NR	V-8530	Cross-Directory...
NR	V-8533	Trusts - docum...
NR	V-8534	Trust - Classific...
NR	V-8536	Trust - Non-DoD
NR	V-8538	Trust - SID Filte...
NR	V-8540	Trust - Selective...
NR	V-8547	Pre-Windows 2...
NR	V-8548	Privileged Grou...
NR	V-8549	Privileged Grou...
NR	V-8551	Domain Functio...
NR	V-8553	Replication Sch...
NR	V-25385	Directory Data ...
NR	V-25840	DSRM Passwor...
NR	V-25841	Review of Hosti...
NR	V-25997	Replication in t...
NR	V-36431	Enterprise Admi...
NR	V-36432	Domain Admin...
NR	V-36433	Domain Memb...

Showing rule 1 out of 42

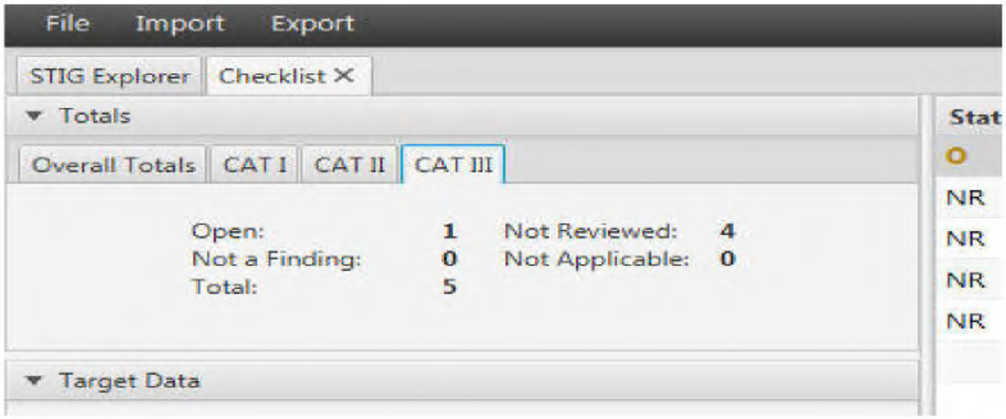
Active Directory Domain Security Technical Implementation Guide (STIG) ::
Release: 7 Benchmark Date: 22 Apr 2016

Rule Title: User accounts with delegated authority must be removed from Windows built-in administrative groups or remove the delegated authority from the accounts.

Status: ● Not Reviewed ○ Open ○ Not a Finding ○ Not Applicable Severity Override

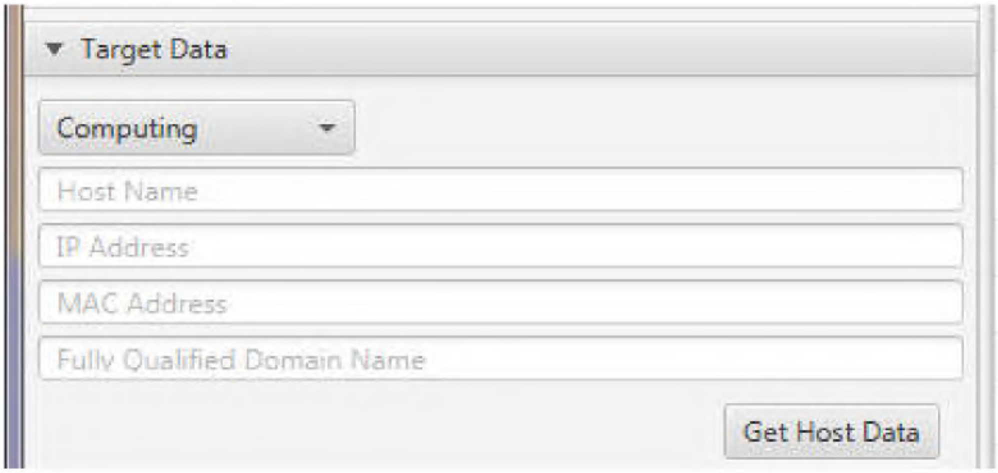
In AD it is possible to delegate account and other AD object ownership and administration tasks. (This is commonly done for help desk or other user support staff.) This is done to avoid the need to assign users to Windows groups with more widely ranging privileges. If a user with delegated authority to user accounts in a specific OU is also a member of the Administrators group. that user has the ability to reconfigure a wide range of domain security settings and change user accounts

- **Checklist screens:**
  - Overall totals
  - Target data
  - Role
  - Finding details
  - Comments
- **Checklist screens (STATUS):**
  - Not reviewed
  - Open
  - Not a finding
  - Not applicable

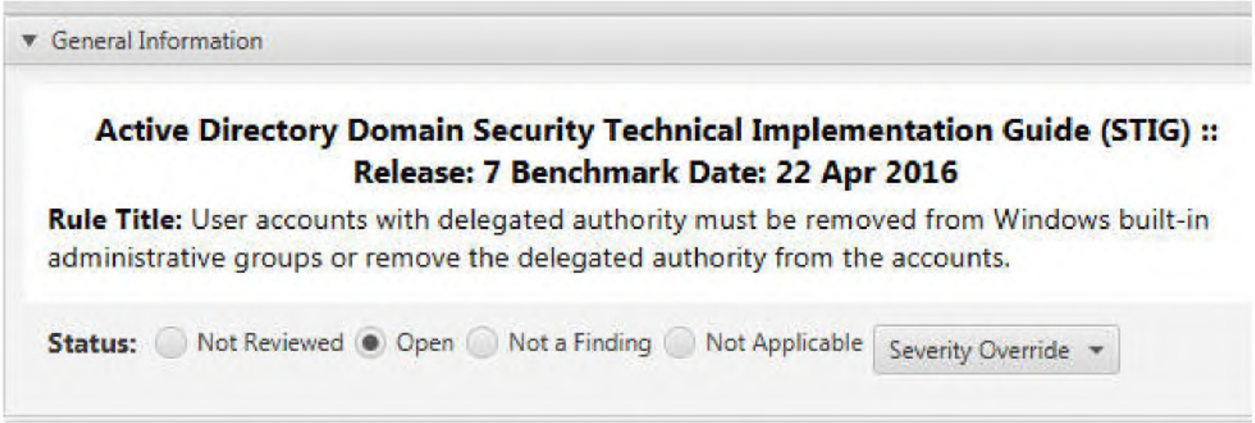


Open: 1 Not Reviewed: 4
Not a Finding: 0 Not Applicable: 0
Total: 5

O
NR
NR
NR
NR



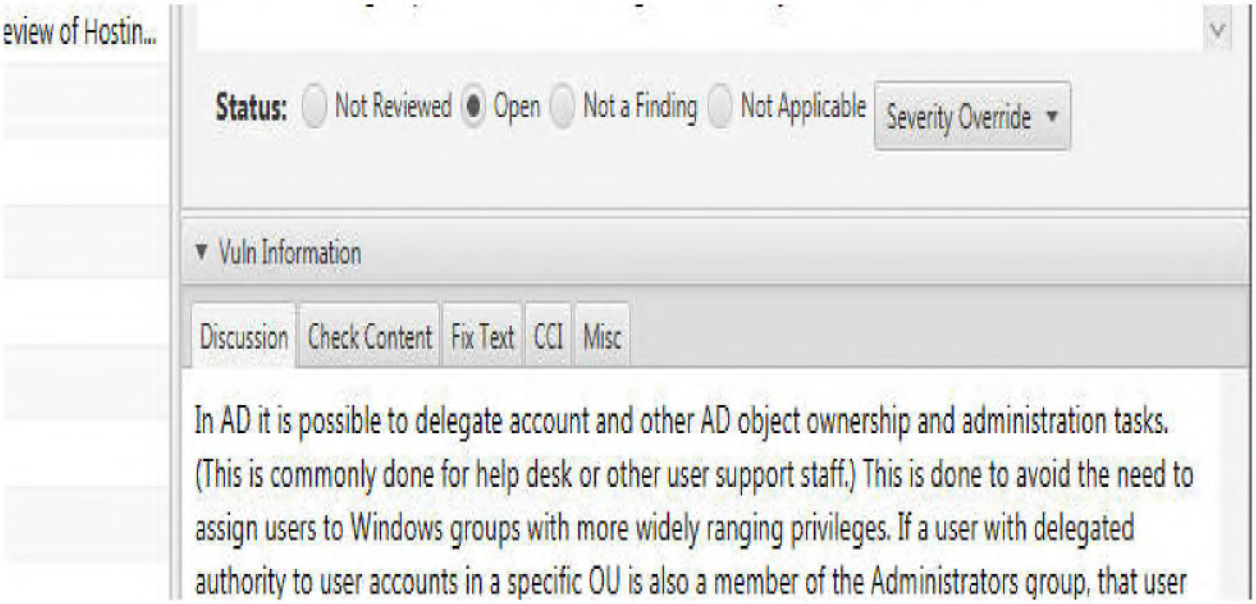
Computing



Active Directory Domain Security Technical Implementation Guide (STIG) :: Release: 7 Benchmark Date: 22 Apr 2016

Rule Title: User accounts with delegated authority must be removed from Windows built-in administrative groups or remove the delegated authority from the accounts.

Status: ○ Not Reviewed ● Open ○ Not a Finding ○ Not Applicable

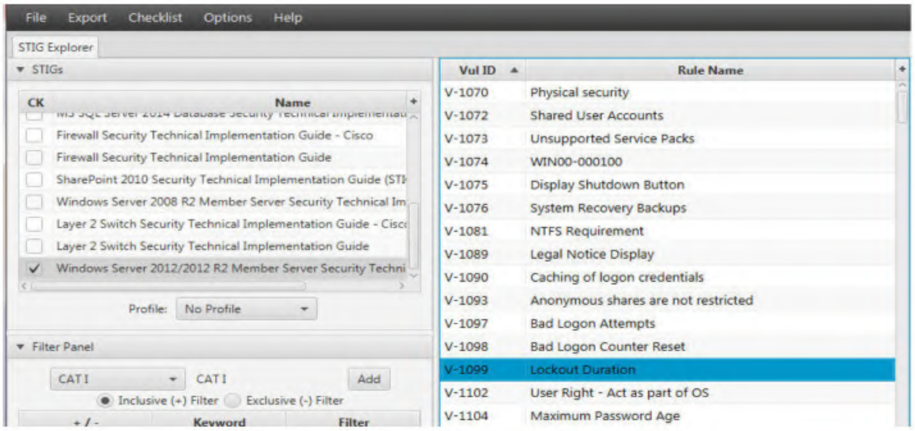


Status: ○ Not Reviewed ● Open ○ Not a Finding ○ Not Applicable

In AD it is possible to delegate account and other AD object ownership and administration tasks. (This is commonly done for help desk or other user support staff.) This is done to avoid the need to assign users to Windows groups with more widely ranging privileges. If a user with delegated authority to user accounts in a specific OU is also a member of the Administrators group, that user

Topic no 68: A Look At DISA STIGs (3)

- Windows Server 2012 R2 Member Server
  - Import STIG
  - V1099 (Lockout duration)



CK	Name
□	MS SQL Server 2014 Database Security Technical Implementati
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
□	SharePoint 2010 Security Technical Implementation Guide (STI
□	Windows Server 2008 R2 Member Server Security Technical Im
□	Layer 2 Switch Security Technical Implementation Guide - Cisc
□	Layer 2 Switch Security Technical Implementation Guide
☑	Windows Server 2012/2012 R2 Member Server Security Techni

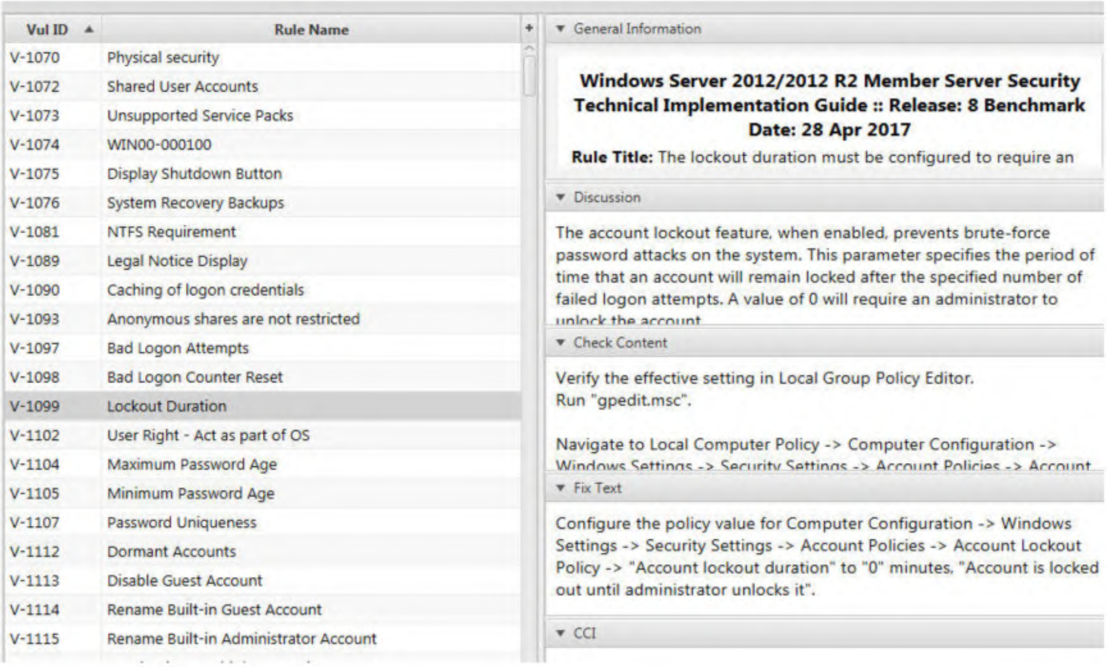
Profile: No Profile

CAT I ▾ CAT I

● Inclusive (+) Filter ○ Exclusive (-) Filter

+ / -	Keyword	Filter

Vul ID	Rule Name
V-1070	Physical security
V-1072	Shared User Accounts
V-1073	Unsupported Service Packs
V-1074	WIN00-000100
V-1075	Display Shutdown Button
V-1076	System Recovery Backups
V-1081	NTFS Requirement
V-1089	Legal Notice Display
V-1090	Caching of logon credentials
V-1093	Anonymous shares are not restricted
V-1097	Bad Logon Attempts
V-1098	Bad Logon Counter Reset
V-1099	Lockout Duration
V-1102	User Right - Act as part of OS
V-1104	Maximum Password Age



Vul ID	Rule Name
V-1070	Physical security
V-1072	Shared User Accounts
V-1073	Unsupported Service Packs
V-1074	WIN00-000100
V-1075	Display Shutdown Button
V-1076	System Recovery Backups
V-1081	NTFS Requirement
V-1089	Legal Notice Display
V-1090	Caching of logon credentials
V-1093	Anonymous shares are not restricted
V-1097	Bad Logon Attempts
V-1098	Bad Logon Counter Reset
V-1099	Lockout Duration
V-1102	User Right - Act as part of OS
V-1104	Maximum Password Age
V-1105	Minimum Password Age
V-1107	Password Uniqueness
V-1112	Dormant Accounts
V-1113	Disable Guest Account
V-1114	Rename Built-in Guest Account
V-1115	Rename Built-in Administrator Account

Windows Server 2012/2012 R2 Member Server Security Technical Implementation Guide :: Release: 8 Benchmark Date: 28 Apr 2017

Rule Title: The lockout duration must be configured to require an

The account lockout feature, when enabled, prevents brute-force password attacks on the system. This parameter specifies the period of time that an account will remain locked after the specified number of failed logon attempts. A value of 0 will require an administrator to unlock the account

Verify the effective setting in Local Group Policy Editor.
Run "gpedit.msc".

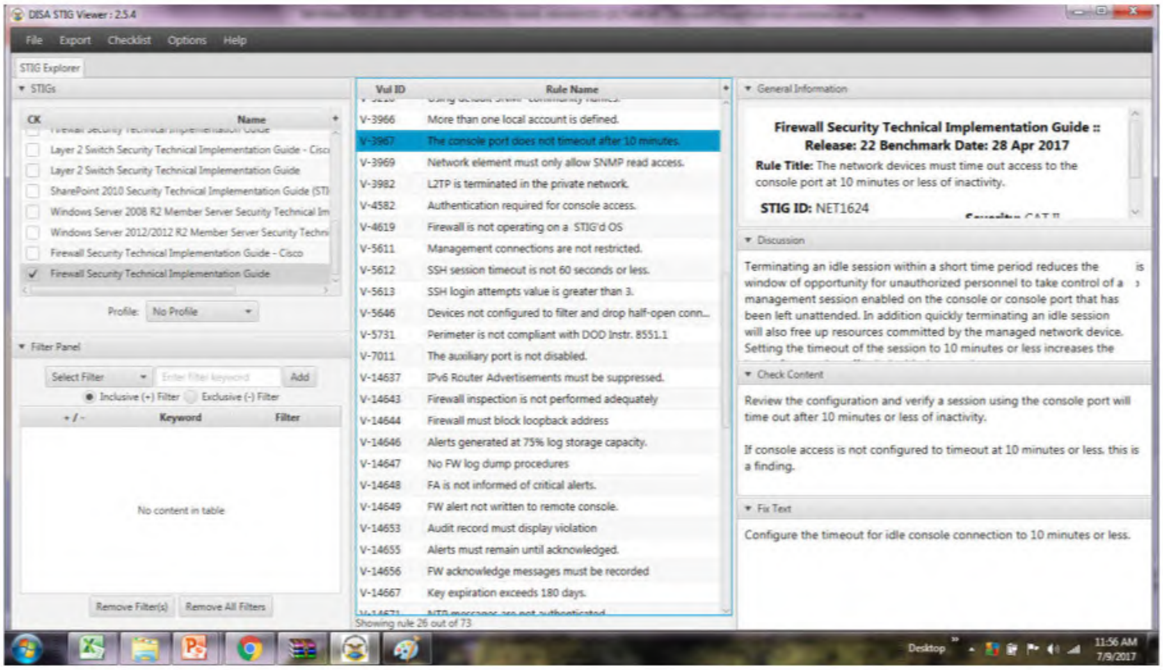
Navigate to Local Computer Policy -> Computer Configuration -> Windows Settings -> Security Settings -> Account Policies -> Account

Configure the policy value for Computer Configuration -> Windows Settings -> Security Settings -> Account Policies -> Account Lockout Policy -> "Account lockout duration" to "0" minutes, "Account is locked out until administrator unlocks it".

- **Rule Title:**
  - The lockout duration must be configured to require an administrator to unlock an account
  - Severity: CAT II
- **Discussion:**
  - The account lockout feature, when enabled, prevents brute-force password attacks on the system. This parameter specifies the period of time that an account will remain locked after the specified number of failed logon attempts. A value of 0 will require an administrator to unlock the account.
- **Check Content:**
  - Verify the effective setting in Local Group Policy Editor. Run "gpedit.msc".
  - Navigate to Local Computer Policy -> Computer Configuration -> Windows Settings -> Security Settings -> Account Policies -> Account Lockout Policy.
  - If the "Account lockout duration" is not set to "0", requiring an administrator to unlock the account, this is a finding.
- **Fix Text:**
  - Configure the policy value for Computer Configuration -> Windows Settings -> Security Settings -> Account Policies -> Account Lockout Policy -> "Account lockout duration" to "0" minutes
  - "Account is locked out until administrator unlocks it".
  - CCI: NIST SP 800-53 Revision 4 :: AC-7 b

Topic no 69: A Look At DISA STIGs (4)

- Firewall Security Technical Implementation Guide
- Vulnerability ID: V-3967
- Rule name: The console port does not timeout after 10 mins



CK	Name
□	Layer 2 Switch Security Technical Implementation Guide - Cisc
□	Layer 2 Switch Security Technical Implementation Guide
□	SharePoint 2010 Security Technical Implementation Guide (STI
□	Windows Server 2008 R2 Member Server Security Technical Im
□	Windows Server 2012/2012 R2 Member Server Security Techni
□	Firewall Security Technical Implementation Guide - Cisco
✓	Firewall Security Technical Implementation Guide

+/-	Keyword	Filter

Vul ID	Rule Name
V-3966	More than one local account is defined.
V-3967	The console port does not timeout after 10 minutes.
V-3969	Network element must only allow SNMP read access.
V-3982	L2TP is terminated in the private network.
V-4582	Authentication required for console access.
V-4619	Firewall is not operating on a STIG'd OS
V-5611	Management connections are not restricted.
V-5612	SSH session timeout is not 60 seconds or less.
V-5613	SSH login attempts value is greater than 3.
V-5646	Devices not configured to filter and drop half-open conn...
V-5731	Perimeter is not compliant with DOD Instr. 8551.1
V-7011	The auxiliary port is not disabled.
V-14637	IPv6 Router Advertisements must be suppressed.
V-14643	Firewall inspection is not performed adequately
V-14644	Firewall must block loopback address
V-14646	Alerts generated at 75% log storage capacity.
V-14647	No FW log dump procedures
V-14648	FA is not informed of critical alerts.
V-14649	FW alert not written to remote console.
V-14653	Audit record must display violation
V-14655	Alerts must remain until acknowledged.
V-14656	FW acknowledge messages must be recorded
V-14667	Key expiration exceeds 180 days.

Showing rule 26 out of 73

Firewall Security Technical Implementation Guide :: Release: 22 Benchmark Date: 28 Apr 2017

Rule Title: The network devices must time out access to the console port at 10 minutes or less of inactivity.

STIG ID: NET1624

Terminating an idle session within a short time period reduces the window of opportunity for unauthorized personnel to take control of a management session enabled on the console or console port that has been left unattended. In addition quickly terminating an idle session will also free up resources committed by the managed network device. Setting the timeout of the session to 10 minutes or less increases the

Review the configuration and verify a session using the console port will time out after 10 minutes or less of inactivity.

If console access is not configured to timeout at 10 minutes or less, this is a finding.

Configure the timeout for idle console connection to 10 minutes or less.

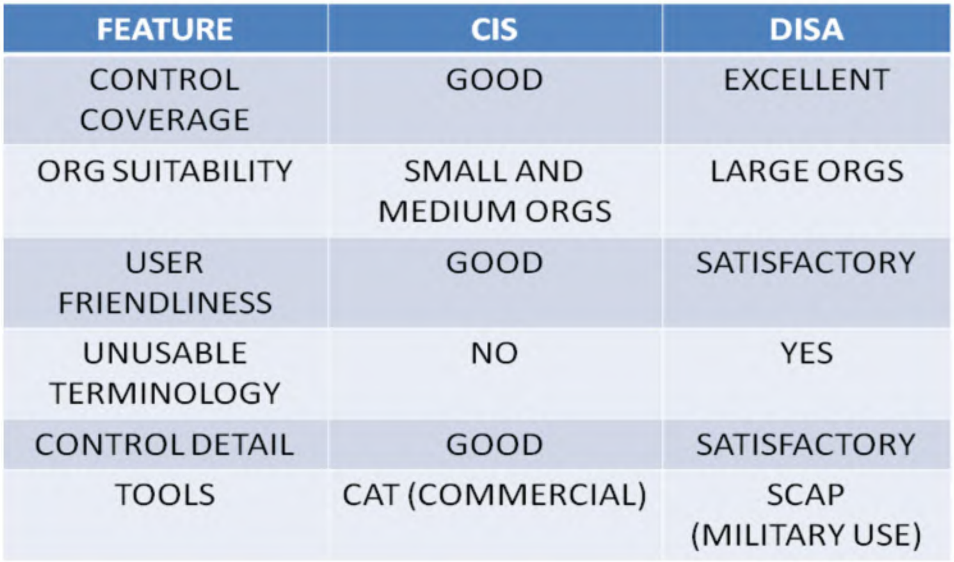
- **General Information:**
  - **Rule Title:** The network devices must time out access to the console port at 10 minutes or less of inactivity
  - **STIG ID**: NET1624
  - **Severity**: CAT II
- **Discussion:**
  - Terminating an idle session within a short time period reduces the window of opportunity for unauthorized personnel to take control of a management session enabled on the console or console port that has been left unattended. In addition quickly terminating an idle session will also free up resources committed by the managed network device. Setting the timeout of the session to 10 minutes or less increases the level of protection afforded critical network components
- **Check Content:**
  - Review the configuration and verify a session using the console port will time out after 10 mins or less of inactivity.

- If console access is not configured to timeout at 10 minutes or less, this is a finding.

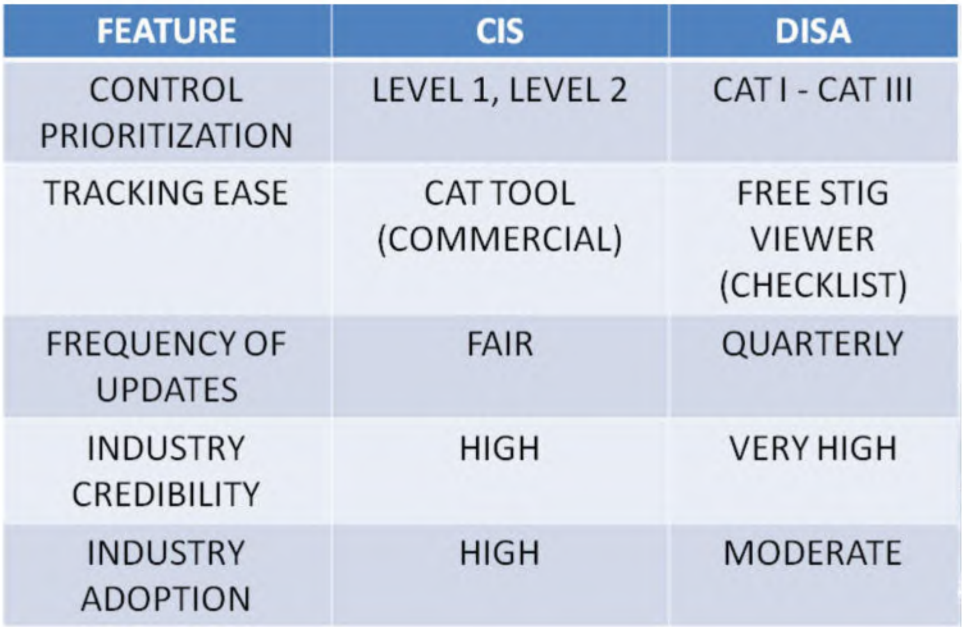
- **Fix Text:**
  - Configure the timeout for idle console connection to 10 minutes or less.

Topic no 70: Comparison of CIS Vs DISA

- Many controls are common
- Approaches are different
- Organization styles are different



FEATURE	CIS	DISA
CONTROL COVERAGE	GOOD	EXCELLENT
ORG SUITABILITY	SMALL AND MEDIUM ORGS	LARGE ORGS
USER FRIENDLINESS	GOOD	SATISFACTORY
UNUSABLE TERMINOLOGY	NO	YES
CONTROL DETAIL	GOOD	SATISFACTORY
TOOLS	CAT (COMMERCIAL)	SCAP (MILITARY USE)

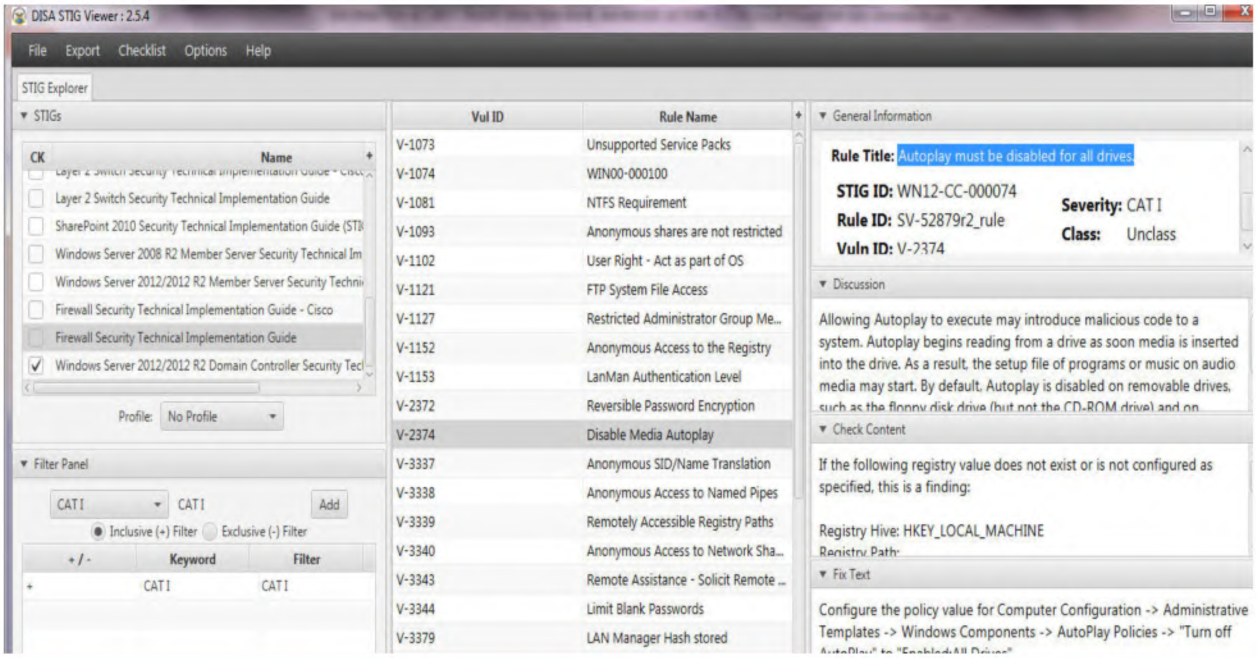


FEATURE	CIS	DISA
CONTROL PRIORITIZATION	LEVEL 1, LEVEL 2	CAT I - CAT III
TRACKING EASE	CAT TOOL (COMMERCIAL)	FREE STIG VIEWER (CHECKLIST)
FREQUENCY OF UPDATES	FAIR	QUARTERLY
INDUSTRY CREDIBILITY	HIGH	VERY HIGH
INDUSTRY ADOPTION	HIGH	MODERATE

- **How to select CIS/DISA:**
  - Size of organization
  - IT infrastructure extent
  - Nature of business
  - Security program goals
  - Maturity of IT & security staff
- **Rule of thumb:**
  - Smaller orgs use CIS
  - Larger orgs use DISA
  - CIS is part of Homeland Security, DISA is part of US Military
  - DISA more frequently updated and maintained with wider coverage

Topic no 71: Security Hardening – Windows Server 2012R2

- Windows Server 2012 – R2
- DISA, Release 8
  - 28 April 2017
- Domain Controller



CK	Name
□	Layer 2 Switch Security Technical Implementation Guide - Cisc
□	Layer 2 Switch Security Technical Implementation Guide
□	SharePoint 2010 Security Technical Implementation Guide (STI
□	Windows Server 2008 R2 Member Server Security Technical Im
□	Windows Server 2012/2012 R2 Member Server Security Techni
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
☑	Windows Server 2012/2012 R2 Domain Controller Security Tec

Profile: No Profile

CAT I CAT I Add

● Inclusive (+) Filter ○ Exclusive (-) Filter

+ / -	Keyword	Filter
+	CAT I	CAT I

Vul ID	Rule Name
V-1073	Unsupported Service Packs
V-1074	WIN00-000100
V-1081	NTFS Requirement
V-1093	Anonymous shares are not restricted
V-1102	User Right - Act as part of OS
V-1121	FTP System File Access
V-1127	Restricted Administrator Group Me...
V-1152	Anonymous Access to the Registry
V-1153	LanMan Authentication Level
V-2372	Reversible Password Encryption
V-2374	Disable Media Autoplay
V-3337	Anonymous SID/Name Translation
V-3338	Anonymous Access to Named Pipes
V-3339	Remotely Accessible Registry Paths
V-3340	Anonymous Access to Network Sha...
V-3343	Remote Assistance - Solicit Remote ...
V-3344	Limit Blank Passwords
V-3379	LAN Manager Hash stored

Rule Title: Autoplay must be disabled for all drives.

STIG ID: WN12-CC-000074
Rule ID: SV-52879r2_rule
Vuln ID: V-2374

Severity: CAT I
Class: Unclass

Allowing Autoplay to execute may introduce malicious code to a system. Autoplay begins reading from a drive as soon media is inserted into the drive. As a result, the setup file of programs or music on audio media may start. By default, Autoplay is disabled on removable drives, such as the floppy disk drive (but not the CD-ROM drive) and on

If the following registry value does not exist or is not configured as specified, this is a finding:

Registry Hive: HKEY_LOCAL_MACHINE
Registry Path:

Configure the policy value for Computer Configuration -> Administrative Templates -> Windows Components -> AutoPlay Policies -> "Turn off AutoPlay" to "Enabled:All Drives"

- General Information:
  - **Rule Title:** Autoplay must be disabled for all drives
  - **STIG ID**: WN12-CC-000074
  - **Severity**: CAT I
- **Discussion:**

  Allowing Autoplay to execute may introduce malicious code to a system.

  - Autoplay begins reading from a drive as soon media is inserted into the drive. As a result, the setup file of programs or music on audio media may start.
  - By default, Autoplay is disabled on removable drives, such as the floppy disk drive (but not the CD-ROM drive) and on network drives.
  - Enabling this policy disables Autoplay on all drives
- **Check Content:**
  - If the following registry value does not exist or is not configured as specified, this is a finding:
  - Registry Hive: HKEY_LOCAL_MACHINE
  - Registry Path: \SOFTWARE\Microsoft\Windows\CurrentVersion\policies\Explorer\
  - Value Name: NoDriveTypeAutoRun
  - Type: REG_DWORD Value: 0x000000ff (255)
- **Fix Text:**
  - Configure the policy value for Computer Configuration -> Administrative Templates -> Windows Components -> AutoPlay Policies -> "Turn off AutoPlay" to "Enabled: All Drives".
- **CCI (Control Correlation Identifier):**
  - CCI: CCI-001764 The information system prevents program execution in accordance with organization-defined policies regarding software program usage and restrictions and/or rules authorizing the terms and conditions of software program usage. NIST SP 800-53 Revision 4:: CM-7 (2)

Topic no 72: Case Study Security Hardening – Linux

- CIS Benchmarks case study (Red Hat Enterprise Linux 7)

CIS Red Hat Enterprise Linux 7 Benchmark

v2.1.1 - 01-31-2017

- January 31, 2017
- 347 pages PDF doc
- 5.2.2 (page 258); *Ensure SSH Protocol is set to 2 (Scored)*
- Profile applicability:
    - Level 1, Server
    - Level 1, Workstation
- 5.2.2 (page 258); *Ensure SSH Protocol is set to 2 (Scored)*
    - Description: SSH supports 2 different and incompatible protocols: SSH1 and SSH2. SSH1 was the original protocol & was subject to security issues. SSH2 is more advanced and secure.
    - Rationale: SSH v1 suffers from insecurities that do not affect SSH v2.
    - Audit: Run the following command and verify that output matches:

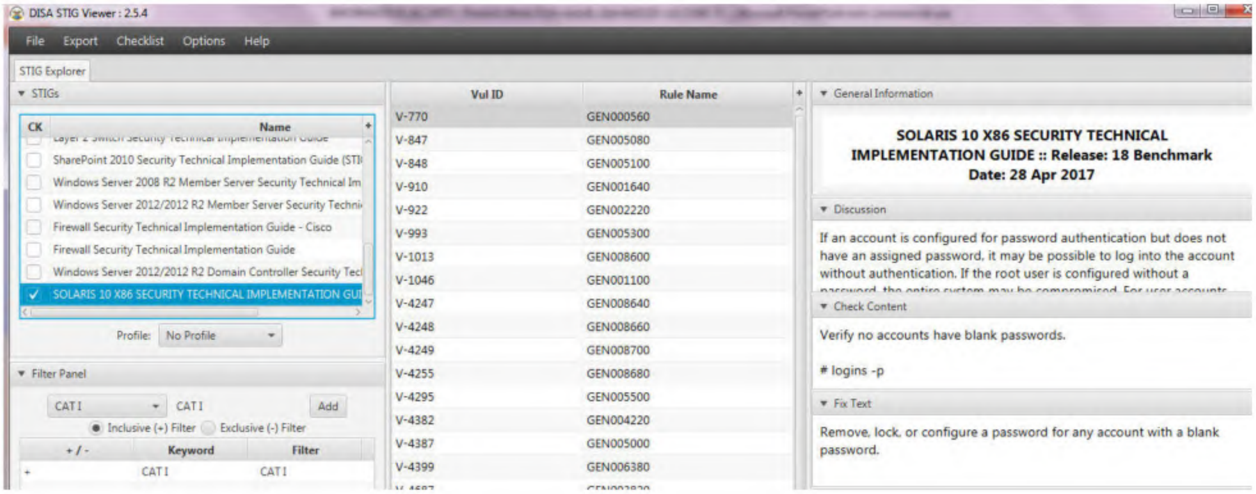
      # grep "^Protocol" /etc/ssh/sshd_config Protocol 2
    - Remediation: Edit the /etc/ssh/sshd_config file to set the parameter as follows:

      Protocol 2
    - **Critical Controls:** 3.4 Use Only Secure Channels For Remote System Administration
    - Critical Controls: 3.4 Perform all remote administration of servers, workstation, network devices, and similar equipment over secure channels.

- Protocols such as telnet, VNC, RDP, or others that do not actively support strong encryption should only be used if they are performed over a secondary encryption channel, such as SSL, TLS or IPSEC.

Topic no 73: Security Hardening – Case Study – Solaris

- Solaris 10 X86
- DISA, Release 18
  - 28 April 2017



CK	Name
□	Layer 2 Switch Security Technical Implementation Guide
□	SharePoint 2010 Security Technical Implementation Guide (STI
□	Windows Server 2008 R2 Member Server Security Technical Im
□	Windows Server 2012/2012 R2 Member Server Security Techni
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
□	Windows Server 2012/2012 R2 Domain Controller Security Tecl
✓	SOLARIS 10 X86 SECURITY TECHNICAL IMPLEMENTATION GUI

+ / -	Keyword	Filter
+	CAT I	CAT I

Vul ID	Rule Name
V-770	GEN000560
V-847	GEN005080
V-848	GEN005100
V-910	GEN001640
V-922	GEN002220
V-993	GEN005300
V-1013	GEN008600
V-1046	GEN001100
V-4247	GEN008640
V-4248	GEN008660
V-4249	GEN008700
V-4255	GEN008680
V-4295	GEN005500
V-4382	GEN004220
V-4387	GEN005000
V-4399	GEN006380

SOLARIS 10 X86 SECURITY TECHNICAL IMPLEMENTATION GUIDE :: Release: 18 Benchmark Date: 28 Apr 2017

Discussion: If an account is configured for password authentication but does not have an assigned password, it may be possible to log into the account without authentication. If the root user is configured without a

Check Content: Verify no accounts have blank passwords.

```
# logins -p
```

Fix Text: Remove, lock, or configure a password for any account with a blank password.

- **General Information:**
  - **Rule Title:** All shell files must have mode 0755 or less permissive
  - **STIG ID**: GEN002220
  - **Severity**: CAT I
- **Discussion:**
  - Shells with world/group-write permissions give the ability to maliciously modify the shell to obtain unauthorized access.
- **Check Content:**
  - If /etc/shells exists, check the group ownership of each shell referenced.
    # cat /etc/shells | xargs -n1 ls -lL
  - Otherwise, check any shells found on the system.

    # find / -name "*sh" | xargs -n1 ls -lL
  - If a shell has a mode more permissive than 0755, this is a finding
  -

- **Fix Text:**
  - Change the mode of the shell
  - **#chmod 0755 <shell>**
- **CCI (Control Correlation Identifier):**
  - CCI-000225
    The organization employs the concept of least privilege, allowing only authorized accesses for users (and processes acting on behalf of users) which are necessary to accomplish assigned tasks in accordance with organizational missions and business functions.
  - NIST SP 800-53 :: AC-6
  - NIST SP 800-53A :: AC-6.1
  - NIST SP 800-53 Revision 4 :: AC-6

Topic no 74: Case Study Security Hardening – Apache

- CIS Benchmarks case study (Apache Tomcat 7)

CIS Apache Tomcat 7 Benchmark

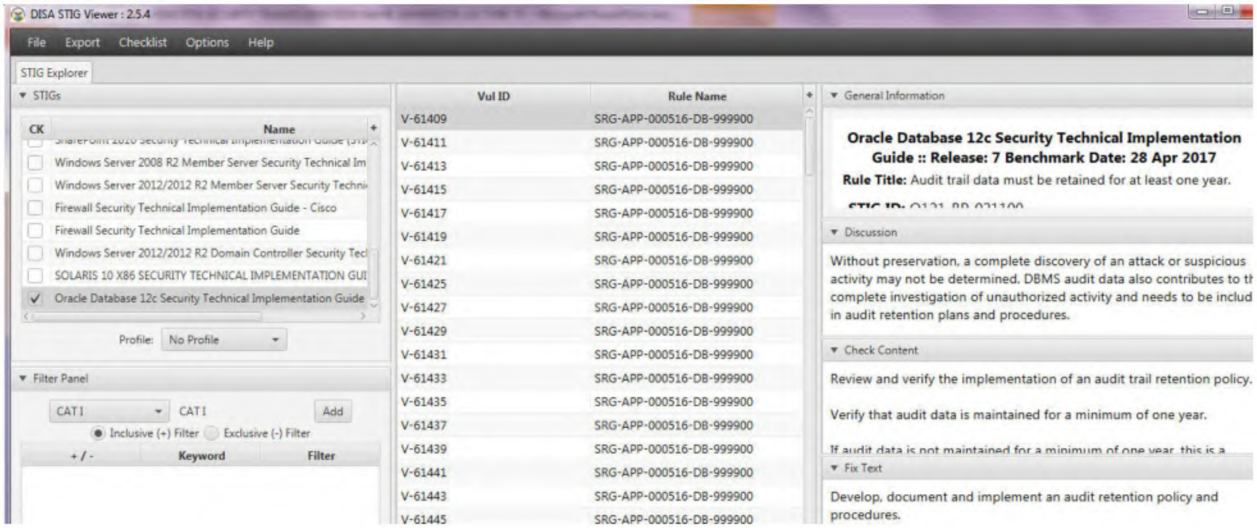
v1.1.0 - 04-26-2016

- April 26, 2016
- 94 pages PDF doc
- **7.7 (page 65);** ***Configure log file size limit (Scored)***
- **Profile applicability:**
  - Level 2
  - **Description:** By default, the logging. Properties file will have no defined limit for the log file size. This is a potential denial of service attack as it would be possible to fill a drive or partition containing the log files.
  - Rationale: Establishing a maximum log size that is smaller than the partition size will help mitigate the risk of an attacker maliciously exhausting disk space
  - **Audit:** Validate the max file limit is not greater than the size of the partition where the log files are stored.

- **Remediation:** Create the following entry in your logging.properties file. This field is specified in bytes:
  java.util.logging.FileHandler.limit=10000
- Default Value: No limit by default

Topic no 75: Security Hardening – Case Study – Oracle

- Oracle Database 12c
- DISA, Release 18
  - 28 April 2017



CK	Name
□	SharePoint 2010 Security Technical Implementation Guide (STI
□	Windows Server 2008 R2 Member Server Security Technical Im
□	Windows Server 2012/2012 R2 Member Server Security Techni
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
□	Windows Server 2012/2012 R2 Domain Controller Security Tec
□	SOLARIS 10 X86 SECURITY TECHNICAL IMPLEMENTATION GUI
✓	Oracle Database 12c Security Technical Implementation Guide

+ / -	Keyword	Filter

Vul ID	Rule Name
V-61409	SRG-APP-000516-DB-999900
V-61411	SRG-APP-000516-DB-999900
V-61413	SRG-APP-000516-DB-999900
V-61415	SRG-APP-000516-DB-999900
V-61417	SRG-APP-000516-DB-999900
V-61419	SRG-APP-000516-DB-999900
V-61421	SRG-APP-000516-DB-999900
V-61425	SRG-APP-000516-DB-999900
V-61427	SRG-APP-000516-DB-999900
V-61429	SRG-APP-000516-DB-999900
V-61431	SRG-APP-000516-DB-999900
V-61433	SRG-APP-000516-DB-999900
V-61435	SRG-APP-000516-DB-999900
V-61437	SRG-APP-000516-DB-999900
V-61439	SRG-APP-000516-DB-999900
V-61441	SRG-APP-000516-DB-999900
V-61443	SRG-APP-000516-DB-999900
V-61445	SRG-APP-000516-DB-999900

Oracle Database 12c Security Technical Implementation Guide :: Release: 7 Benchmark Date: 28 Apr 2017

Rule Title: Audit trail data must be retained for at least one year.

STIG ID: O121-BP-021100

Without preservation, a complete discovery of an attack or suspicious activity may not be determined. DBMS audit data also contributes to th complete investigation of unauthorized activity and needs to be includ in audit retention plans and procedures.

Review and verify the implementation of an audit trail retention policy.

Verify that audit data is maintained for a minimum of one year.

If audit data is not maintained for a minimum of one year, this is a

Develop, document and implement an audit retention policy and procedures.

- **General Information:**
  - **Rule Title:** The Oracle Listener must be configured to require administration authentication
  - **STIG ID**: O121-BP-022700
  - **Severity**: CAT I
- **Discussion:**
  - Oracle listener authentication helps prevent unauthorized administration of the Oracle listener. Unauthorized administration of the listener could lead to DoS exploits; loss of connection audit data, unauthorized reconfiguration or other unauthorized access.
  - This is a Category I finding because privileged access to the listener is not restricted to authorized users.
  - Unauthorized access can result in stopping of the listener (DoS) and overwriting of listener audit logs.

- **Check Content:**
  - If a listener is not running on the local database host server, this check is not a finding
  - For Windows hosts, view all Windows services with TNSListener embedded in the service name
  - The service name format is: **Oracle[ORACLE_HOME_NAME]TNSListener**
  - View the STIGVIEWER for Unix hosts
- **Fix Text:**
- By default, Oracle Net Listener permits only local administration for security reasons. As a policy, the listener can be administered only by the user who started it. This is enforced through local operating system authentication.
- **For example**, if user1 starts the listener, then only user1 can administer it. Any other user trying to administer the listener gets an error. The super user is the only exception.
- Remote administ. of the listener must not be permitted. If listener administ. from a remote system is required, granting secure remote access to the Oracle DBMS server and performing local administration is preferred.

- **CCI (Control Correlation Identifier):**
  - CCI: CCI-000366
    The organization implements the security configuration settings.
  - NIST SP 800-53 :: CM-6 b
  - NIST SP 800-53A :: CM-6.1 (iv)
  - NIST SP 800-53 Revision 4 :: CM-6 b

Topic no 76: Case Study Security Hardening – MS SQL

- CIS Benchmarks case study (MS SQL Server 2012)

CIS Microsoft SQL Server 2012 Benchmark

v1.3.0 - 09-30-2016

- September 30, 2016
- 73 pages PDF doc
- *2.14 Ensure 'sa' Login Account has been renamed (Scored)*

- **Profile applicability:**
  - Level 1 database engine
  - **Description:** The sa account is a widely known and often widely used SQL Server account with sysadmin privileges.
  - **Rationale:** It is more difficult to launch password-guessing and brute-force attacks against the sa account if the username is not known.
  - **Audit:** Use the following syntax to determine if the sa account is renamed:

    ```
    SELECT name FROM sys.server_principals WHERE sid = 0x01;
    ```

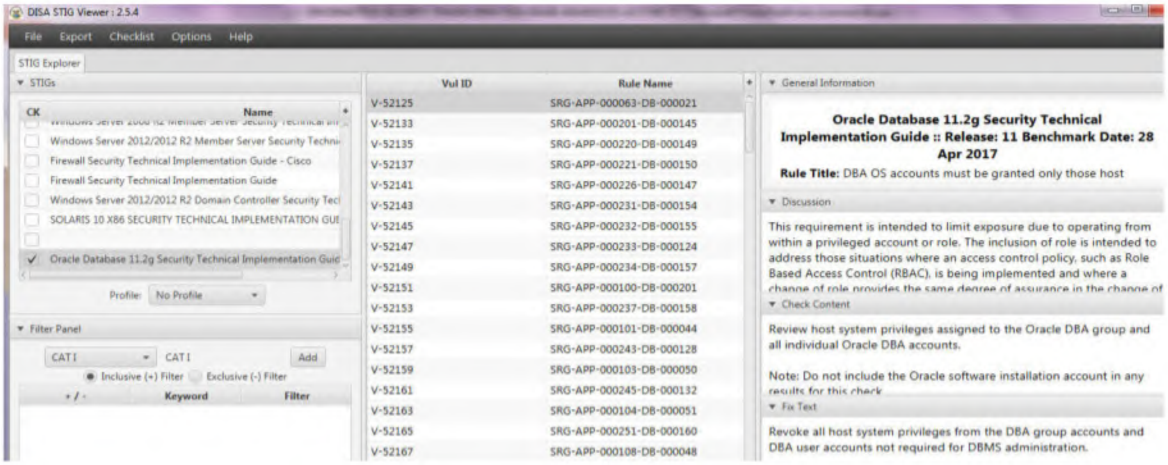
    A name of sa indicates the account has not been renamed
  - **Remediation:** Replace the different_user value within the below syntax and execute rename the sa login:

    ```
    ALTER LOGIN sa WITH NAME = <different_user>;
    ```

    - **Impact:** It is not a good security practice to code applications or scripts to use the sa account However, if this has been done renaming the sa account will prevent scripts and applications for authenticating to the database server and executing required tasks or functions.
    - **Default Value:** By default, the 'sa‘ account name is 'sa'

Topic no 77: Security Hardening – Case Study – Oracle

- Oracle database 11.2g
- DISA, Release 11
  - 28 April 2017



CK	Name
□	Windows Server 2008 R2 Member Server Security Technical Im
□	Windows Server 2012/2012 R2 Member Server Security Techni
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
□	Windows Server 2012/2012 R2 Domain Controller Security Tec
□	SOLARIS 10 X86 SECURITY TECHNICAL IMPLEMENTATION GUI
□	
✓	Oracle Database 11.2g Security Technical Implementation Guid

+ / -	Keyword	Filter

Vul ID	Rule Name
V-52125	SRG-APP-000063-DB-000021
V-52133	SRG-APP-000201-DB-000145
V-52135	SRG-APP-000220-DB-000149
V-52137	SRG-APP-000221-DB-000150
V-52141	SRG-APP-000226-DB-000147
V-52143	SRG-APP-000231-DB-000154
V-52145	SRG-APP-000232-DB-000155
V-52147	SRG-APP-000233-DB-000124
V-52149	SRG-APP-000234-DB-000157
V-52151	SRG-APP-000100-DB-000201
V-52153	SRG-APP-000237-DB-000158
V-52155	SRG-APP-000101-DB-000044
V-52157	SRG-APP-000243-DB-000128
V-52159	SRG-APP-000103-DB-000050
V-52161	SRG-APP-000245-DB-000132
V-52163	SRG-APP-000104-DB-000051
V-52165	SRG-APP-000251-DB-000160
V-52167	SRG-APP-000108-DB-000048

Oracle Database 11.2g Security Technical Implementation Guide :: Release: 11 Benchmark Date: 28 Apr 2017

Rule Title: DBA OS accounts must be granted only those host

Discussion

This requirement is intended to limit exposure due to operating from within a privileged account or role. The inclusion of role is intended to address those situations where an access control policy, such as Role Based Access Control (RBAC), is being implemented and where a change of role provides the same degree of assurance in the change of

Check Content

Review host system privileges assigned to the Oracle DBA group and all individual Oracle DBA accounts.

Note: Do not include the Oracle software installation account in any results for this check

Fix Text

Revoke all host system privileges from the DBA group accounts and DBA user accounts not required for DBMS administration.

- **General Information:**
  - **Rule Title:** The Oracle REMOTE_OS_ROLES parameter must be set to FALSE.
  - **STIG ID**: O112-BP-022000
  - **Severity**: CAT I
- **Discussion:**

- Setting REMOTE_OS_ROLES to TRUE allows operating system groups to control Oracle roles. The default value of FALSE causes roles to be identified and managed by the database.
- If REMOTE_OS_ROLES is set to TRUE, a remote user could impersonate another operating system user over a network connection.

  - **Check Content:**
    - From SQL*Plus: select value from v$parameter where **name = 'remote_os_roles';**
    - If the returned value is not FALSE or not documented in the System Security Plan as required, this is a Finding
  - **Fix Text:**
    - Document remote OS roles in the System Security Plan.
    - If not required, disable use of remote OS roles.
    - From SQL*Plus: **alter system set remote_os_roles = FALSE scope = spfile;**
    - The above SQL*Plus command will set the parameter to take effect at next system startup

- **CCI (Control Correlation Identifier):**

- CCI: CCI-000366 The org implements the security configuration settings.
- NIST SP 800-53 :: CM-6 b
- NIST SP 800-53A :: CM-6.1 (iv)
- NIST SP 800-53 Revision 4 :: CM-6 b

Topic no 78: Case Study Security Hardening – Windows 8

- CIS Benchmarks case study (Windows 8.1)

CIS Microsoft Windows 8.1 Workstation Benchmark

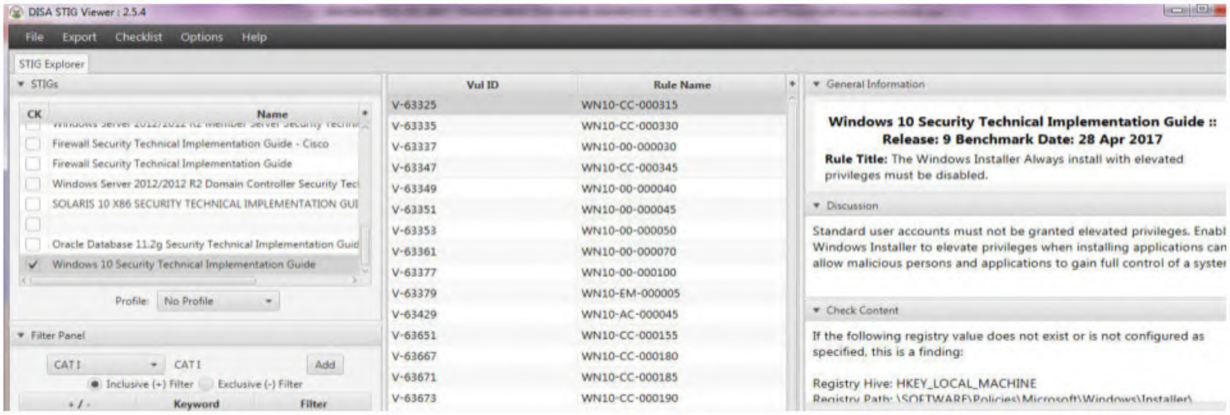
v2.2.1 - 01-31-2017

- January 31, 2017
- 891 pages PDF doc
- *18.9.70.3 Ensure 'Automatically send memory dumps for OS-generated error reports' is set to 'Disabled' (Scored)*
- Profile applicability:
  - Level 1
  - Level 1 + BitLocker
- *18.9.70.3 Ensure 'Automatically send memory dumps for OS-generated error reports' is set to 'Disabled' (Scored)*
- Description: This policy setting controls whether memory dumps in support of OS-generated error reports can be sent to Microsoft automatically. This policy does not apply to error reports generated by 3rd-party products, or additional data other than memory dumps.

- The recommended state for this setting is: Disabled.
- Rationale: Memory dumps may contain sensitive information and should not be automatically sent to anyone.
- Audit: Navigate to the UI Path articulated in the Remediation section and confirm it is set as prescribed. This group policy setting is backed by the following registry location:
  - **HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Windows\WindowsError Reporting:AutoApproveOSDumps**

Topic no 79: Case Study Security Hardening – Win 10

- Windows 10
- DISA, Release 9
  - 28 April 2017



CK	Name
□	Windows Server 2012/2012 R2 Member Server Security Techni
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
□	Windows Server 2012/2012 R2 Domain Controller Security Tec
□	SOLARIS 10 X86 SECURITY TECHNICAL IMPLEMENTATION GUI
□	
□	Oracle Database 11.2g Security Technical Implementation Guid
✓	Windows 10 Security Technical Implementation Guide

+/-	Keyword	Filter

Vul ID	Rule Name
V-63325	WN10-CC-000315
V-63335	WN10-CC-000330
V-63337	WN10-00-000030
V-63347	WN10-CC-000345
V-63349	WN10-00-000040
V-63351	WN10-00-000045
V-63353	WN10-00-000050
V-63361	WN10-00-000070
V-63377	WN10-00-000100
V-63379	WN10-EM-000005
V-63429	WN10-AC-000045
V-63651	WN10-CC-000155
V-63667	WN10-CC-000180
V-63671	WN10-CC-000185
V-63673	WN10-CC-000190

Windows 10 Security Technical Implementation Guide :: Release: 9 Benchmark Date: 28 Apr 2017

Rule Title: The Windows Installer Always install with elevated privileges must be disabled.

Standard user accounts must not be granted elevated privileges. Enabl Windows Installer to elevate privileges when installing applications can allow malicious persons and applications to gain full control of a syster

If the following registry value does not exist or is not configured as specified, this is a finding:

Registry Hive: HKEY_LOCAL_MACHINE
Registry Path: \SOFTWARE\Policies\Microsoft\Windows\Installer\

- **General Information:**
  - **Rule Title:** The antivirus program must be configured to update signature files on a daily basis.
  - **STIG ID**: WN10-00-000046
  - **Severity**: CAT I
- **Discussion:**

  Virus scan programs are a primary line of defense against the introduction of viruses and malicious code that can destroy data and even render a computer inoperable. Using a virus scan program provides the ability to detect malicious code before extensive damage occurs. Updated virus scan data files help protect a system, as constantly changing malware is identified by the antivirus software vendors
- **Check Content:**
  - This requirement is NA if McAfee VirusScan Enterprise (VSE) is used. It will be addressed with the corresponding McAfee VSE STIG.
  - Configurations will vary depending on the product.
- **Fix Text:**

- Configure the antivirus program to update signature files at least daily. Ensure the updates are occurring on timely basis and are not more than a week old.
- CCI (Control Correlation Identifier):

CCI: 000366 The org implements the security config settings.

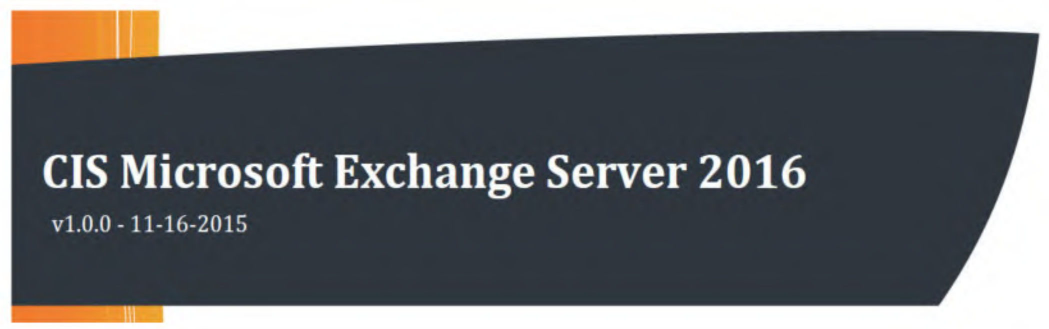
NIST SP 800-53 :: CM-6 b

NIST SP 800-53A :: CM-6.1 (iv)

NIST SP 800-53 Revision 4 :: CM-6

Topic no 80: Case Study Security Hardening – MS Exchange

- CIS Benchmarks case study (MS Exchange Server 2016)



CIS Microsoft Exchange Server 2016

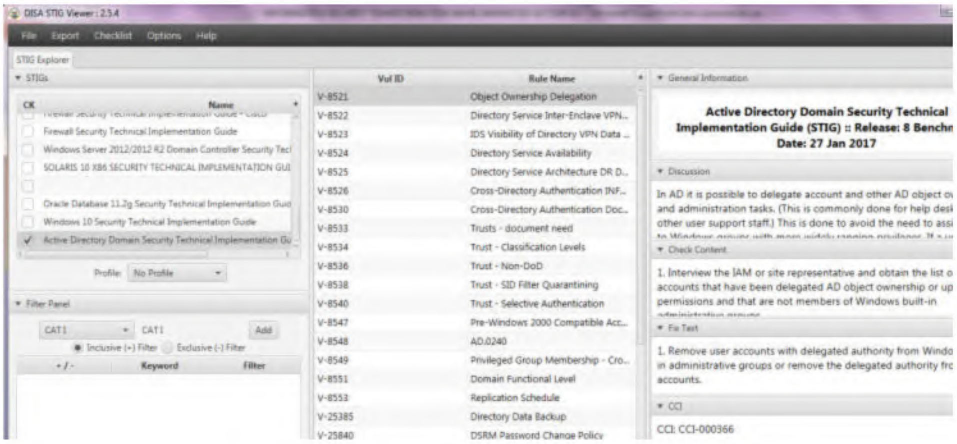
v1.0.0 - 11-16-2015

- November 16, 2015
- 66 pages PDF doc
- *2.5 Set 'Do not permanently delete items until the database has been backed up' to 'True' (Scored)*
- Profile applicability:
  - **Level 1** - Mailbox Services Security
  - **Description:** This setting allows you to ensure that items are not permanently deleted until the database has been backed up.
  - **Rationale:** To ensure that accidentally deleted items can be recovered, they should not be permanently deleted until the database is backed up.
  - **Audit:** Execute the following cmdlet and ensure **RetainDeletedItemsUntilBackup** is set to 'True': **Get-MailboxDatabase <Mailbox Database Name> | fl -property RetainDeletedItemsUntilBackup**
  - **Remediation:** To implement the recommended state, execute the following PowerShell cmdlet: **Set-MailboxDatabase <Mailbox Database Name> -RetainDeletedItemsUntilBackup $true**
  - **Impact:** The impact of enabling this setting should be minimal. More storage space will be required until any pending items are permanently deleted.
  - **Default Value:** False

Topic No 81: Security Hardening – Case Study – AD

- Active Directory Domain
- DISA, Release 8
    - 27 January, 2017

STIGVIEWER WINDOW



☐ Firewall Security Technical Implementation Guide - Cisco
☐ Firewall Security Technical Implementation Guide
☐ Windows Server 2012/2012 R2 Domain Controller Security Tecl
☐ SOLARIS 10 X86 SECURITY TECHNICAL IMPLEMENTATION GUI
☐
☐ Oracle Database 11.2g Security Technical Implementation Guid
☐ Windows 10 Security Technical Implementation Guide
☑ Active Directory Domain Security Technical Implementation Gu

Vul ID	Rule Name
V-8521	Object Ownership Delegation
V-8522	Directory Service Inter-Enclave VPN...
V-8523	IDS Visibility of Directory VPN Data ...
V-8524	Directory Service Availability
V-8525	Directory Service Architecture DR D...
V-8526	Cross-Directory Authentication INF...
V-8530	Cross-Directory Authentication Doc...
V-8533	Trusts - document need
V-8534	Trust - Classification Levels
V-8536	Trust - Non-DoD
V-8538	Trust - SID Filter Quarantining
V-8540	Trust - Selective Authentication
V-8547	Pre-Windows 2000 Compatible Acc...
V-8548	AD.0240
V-8549	Privileged Group Membership - Cro...
V-8551	Domain Functional Level
V-8553	Replication Schedule
V-25385	Directory Data Backup
V-25840	DSRM Password Change Policy

Active Directory Domain Security Technical Implementation Guide (STIG) :: Release: 8 Benchm Date: 27 Jan 2017

In AD it is possible to delegate account and other AD object o and administration tasks. (This is commonly done for help desk other user support staff.) This is done to avoid the need to assi to Windows groups with more widely ranging privileges. If a u

1. Interview the IAM or site representative and obtain the list o accounts that have been delegated AD object ownership or up permissions and that are not members of Windows built-in administrative groups

1. Remove user accounts with delegated authority from Windo in administrative groups or remove the delegated authority fro accounts.

CCI: CCI-000366

- **General Information:**
    - **Rule Title :** Membership to the Domain Admins group must be restricted to accounts used only to manage the Active Dir domain and domain controllers
    - **STIG ID**: AD.0002
    - **Severity**: CAT I
- **Discussion:**
    - The Domain Admins group is a highly privileged group. Personnel who are system administrators must log on to Active Directory systems only using accounts with the level of authority necessary.
  - Only system administrator accounts used exclusively to manage an Active Directory domain and domain controllers may be members of the Domain Admins group. A separation of administrator responsibilities helps mitigate the risk of privilege escalation resulting from credential theft attacks.
  - **Check Content:**
    - Review the Domain Admins group in Active Directory Users and Computers. Each Domain Administrator must have a separate unique account specifically for managing the Active Directory domain and domain controllers.
    - If any account listed in the Domain Admins group is a member of other administrator groups including the Enterprise Admins group, domain member server administrators groups, or domain workstation administrators groups, this is a finding.
  - **Fix Text:**

  - Create the necessary documentation that identifies the members of the Domain Admins group. Ensure that each member has a separate unique account that can only be used to manage the Active Directory
- **CCI (Control Correlation Identifier):**

  CCI-000366
  The organization implements the security configuration settings.
  NIST SP 800-53 :: CM-6 b
  NIST SP 800-53A :: CM-6.1 (iv)
  NIST SP 800-53 Revision 4 :: CM-6 b

Topic No 82: Case Study Security Hardening – IE Browser

- CIS Benchmarks case study (MS Internet Explorer 11)

CIS Microsoft Internet Explorer 11

v1.0.0 - 12-01-2014

- January 12, 2014
- 178 pages PDF doc
- *1.5 Configure 'Do not allow users to enable or disable add-ons' (Not Scored)*
- Profile applicability:
  - Level 1
- **Description:** This policy setting allows you to manage whether users have the ability to allow or deny add-ons through Add-On Manager.
- If you enable this policy setting, users cannot enable or disable add-ons through Add-On Manager. The only exception occurs if an add-on has been specifically entered into the 'Add-On List' policy setting in such a way as to allow users to continue to manage the add-on.
- In this case, the user can still manage the add-on through the Add-On Manager. If you disable or do not configure this policy setting, the appropriate controls in the Add-On Manager will be available to the user.

- Configure this setting in a manner that is consistent with security and operational requirements of your organization.

– **Rationale:** Users often choose to install add-ons that are not permitted by an organization's security policy. Such add-ons can pose a significant security and privacy risk to your network.

– **Audit:** HKEY_LOCAL_MACHINE\Software\Policies\Microsoft\InternetExplorer\Restrictions\NoExtensionManagement

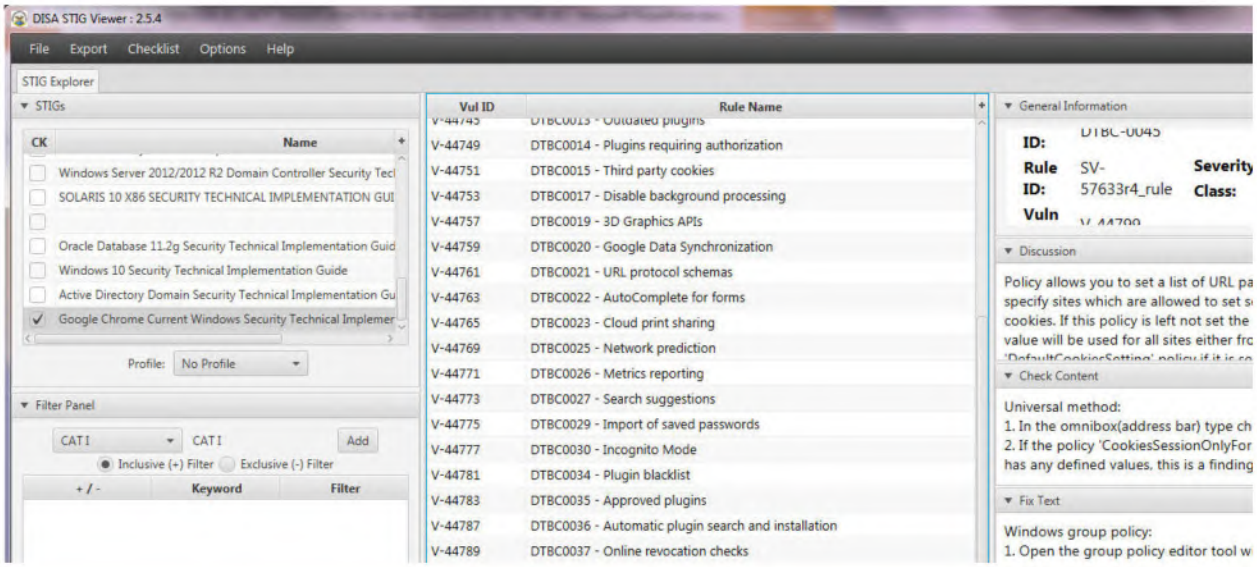
– **Remediation:** To establish the recommended configuration via Group Policy, set the following UI path to Not Configured.
Computer Configuration\Administrative Templates\Windows Components\Internet Explorer\Do not allow users to enable or disable add-ons

– **Impact:** When the Do not allow users to enable or disable add-ons setting is enabled, users will not be able to enable or disable their own Internet Explorer add-ons. If your organization uses add-ons, this configuration may affect their ability to work.

- ***1.5 Configure 'Do not allow users to enable or disable add-ons' (Not Scored)***
    - Default Value: Disabled

Topic No 83: Security Hardening – Case Study - Chrome

- Google Chrome
- DISA, Release 8
    - 27 April, 2017



CK	Name
□	Windows Server 2012/2012 R2 Domain Controller Security Tecl
□	SOLARIS 10 X86 SECURITY TECHNICAL IMPLEMENTATION GUI
□	
□	Oracle Database 11.2g Security Technical Implementation Guid
□	Windows 10 Security Technical Implementation Guide
□	Active Directory Domain Security Technical Implementation Gu
✓	Google Chrome Current Windows Security Technical Implemer

+ / -	Keyword	Filter

Vul ID	Rule Name
V-44745	DTBC0013 - Outdated plugins
V-44749	DTBC0014 - Plugins requiring authorization
V-44751	DTBC0015 - Third party cookies
V-44753	DTBC0017 - Disable background processing
V-44757	DTBC0019 - 3D Graphics APIs
V-44759	DTBC0020 - Google Data Synchronization
V-44761	DTBC0021 - URL protocol schemas
V-44763	DTBC0022 - AutoComplete for forms
V-44765	DTBC0023 - Cloud print sharing
V-44769	DTBC0025 - Network prediction
V-44771	DTBC0026 - Metrics reporting
V-44773	DTBC0027 - Search suggestions
V-44775	DTBC0029 - Import of saved passwords
V-44777	DTBC0030 - Incognito Mode
V-44781	DTBC0034 - Plugin blacklist
V-44783	DTBC0035 - Approved plugins
V-44787	DTBC0036 - Automatic plugin search and installation
V-44789	DTBC0037 - Online revocation checks

ID: DTBC-0045
Rule ID: SV-57633r4_rule
Severity Class:
Vuln V-44799

Policy allows you to set a list of URL pa
specify sites which are allowed to set s
cookies. If this policy is left not set the
value will be used for all sites either frc
'DefaultCookiesSetting' policy if it is co

Universal method:
1. In the omnibox(address bar) type ch
2. If the policy 'CookiesSessionOnlyFor
has any defined values, this is a finding

Windows group policy:
1. Open the group policy editor tool w

- **General Information:**
  - **Rule Title :** Session only based cookies must be disabled.
- General Information:
  - **Vuln ID:** V-44799
  - **STIG ID**: DTBC-0045
  - **Severity**: CAT I

- **Discussion:**

– Policy allows you to set a list of URL patterns that specify sites which are allowed to set session only cookies. If this policy is left not set the global default value will be used for all sites either from the 'DefaultCookiesSetting' policy if it is set, or the user's personal configuration otherwise. If the 'RestoreOnStartup' policy is set to restore URLs from previous sessions this policy will not be respected and cookies will be stored permanently for those sites

- **Check Content:**

– **Universal method:**

1. In the omnibox (address bar) type chrome://policy
2. If the policy 'CookiesSessionOnlyForUrls' exists, and has any defined values, this is a finding

– **Windows method:**

1. Start regedit
2. Navigate to HKLM\Software\Policies\Google\Google Chrome\Content Settings\CookiesSessionOnlyForUrls
3. If this key exists and has any defined values, this is a finding

- **Fix Text:**

Windows group policy:

1. Open the group policy editor tool with gpedit.msc
2. Navigate to Policy Path: Computer Configuration\Administrative Templates\Google\Google Chrome\Content Settings
   Policy Name: Allow session only cookies on these sites
   Policy State: Disabled Policy Value: N/A

- **CCI (Control Correlation Identifier):**
  - CCI-000166
    The information system protects against an individual (or process acting on behalf of an

individual) falsely denying having performed organization-defined actions to be covered by non-repudiation.

NIST SP 800-53 :: AU-10
NIST SP 800-53A :: AU-10.1
NIST SP 800-53 Revision 4 :: AU-10

Topic No 84: Case Study Security Hardening – Firefox

- CIS Benchmarks case study (Mozilla Firefox)

CIS Mozilla Firefox 38 ESR Benchmark

v1.0.0 - 12-31-2015

- December 31, 2015
- 72 pages PDF doc
- *3.5 (L2) Enable IDN Show Punycode (Scored)*
- Profile applicability:
  - Level 2
  - **Description:** This feature determines whether all Internationalized Domain Names (IDNs) displayed in the browser are displayed as Punycode or as Unicode.

  - **Rationale:** IDNs displayed in Punycode are easier to identify and therefore help mitigate the risk of accessing spoofed web pages.

  - **Audit:** Perform the following procedure:

1. Type about:config in the address bar
2. Type network.IDN_show_punycode in the filter
3. Ensure the preferences listed are set to the values specified below: **network.IDN_show_punycode=true**

- **Remediation:** Perform the following procedure:

1. Open the mozilla.cfg file in the installation directory with a text editor
2. Add the following lines to mozilla.cfg: **lockPref("network.IDN_show_punycode", true);**

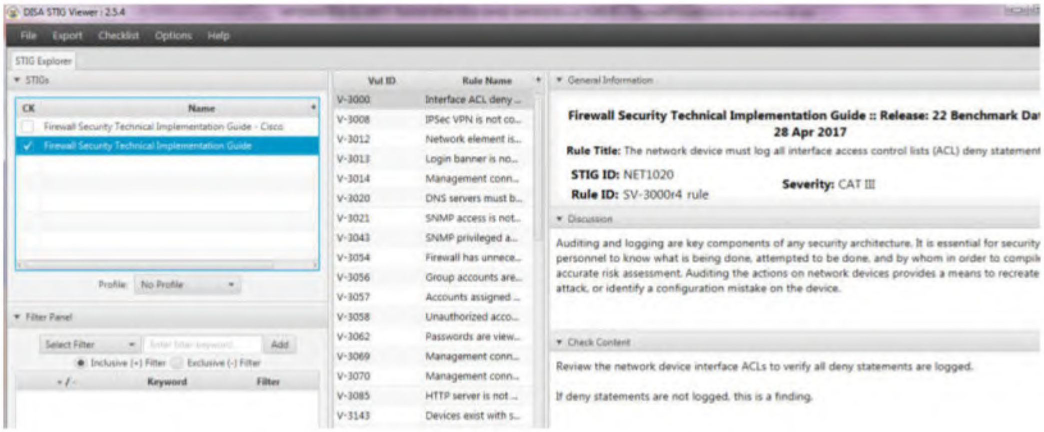
- **Default Value:** false

Topic No 85: Security Hardening – Case Study – FW

- Firewall STIG
- DISA, Release 22

  28 April, 2017

STIGVIEWER WINDOW



CK	Name
□	Firewall Security Technical Implementation Guide - Cisco
✓	Firewall Security Technical Implementation Guide

+/-	Keyword	Filter

Vul ID	Rule Name
V-3000	Interface ACL deny ...
V-3008	IPSec VPN is not co...
V-3012	Network element is...
V-3013	Login banner is no...
V-3014	Management conn...
V-3020	DNS servers must b...
V-3021	SNMP access is not...
V-3043	SNMP privileged a...
V-3054	Firewall has unnece...
V-3056	Group accounts are...
V-3057	Accounts assigned ...
V-3058	Unauthorized acco...
V-3062	Passwords are view...
V-3069	Management conn...
V-3070	Management conn...
V-3085	HTTP server is not ...
V-3143	Devices exist with s...

Firewall Security Technical Implementation Guide :: Release: 22 Benchmark Da
28 Apr 2017

Rule Title: The network device must log all interface access control lists (ACL) deny statement

STIG ID: NET1020

Rule ID: SV-3000r4 rule

Severity: CAT III

Auditing and logging are key components of any security architecture. It is essential for security personnel to know what is being done, attempted to be done, and by whom in order to compil accurate risk assessment. Auditing the actions on network devices provides a means to recreate attack, or identify a configuration mistake on the device.

Review the network device interface ACLs to verify all deny statements are logged.

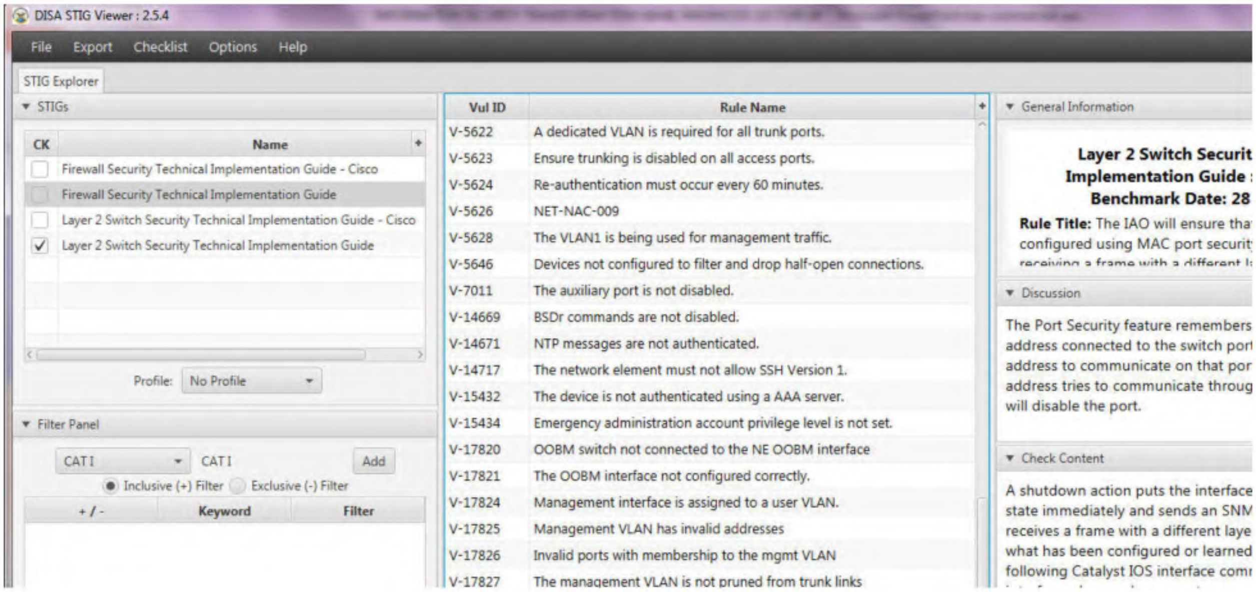
If deny statements are not logged, this is a finding.

- General Information:
  - **Rule Title :** The device must be configured to protect the network against denial of service attacks such as Ping of Death, TCP SYN floods, etc.
  - **Vuln ID:** V-3156
  - **STIG ID**: NET0375
  - **Severity**: CAT II
- **Discussion:**
  - A SYN-flood attack is a denial-of-service attack where the attacker sends a huge amount of please-start-a-connection packets and then nothing else. This causes the device being attacked to be overloaded with the open sessions and eventually crash.
  - A ping sweep (also known as an ICMP sweep) is a basic network scanning technique used to determine which of a range of IP addresses map to live hosts (computers)
- **Check Content:**
  - Review the device configurations to determine if denial of service attacks guarded against.
  - If the device is not configured to mitigate denial of service attacks, this is a finding.
- **Fix Text:**
  - If the firewall support SYN-flood or ping sweep protection then enable these features. If the firewall does not support these features, enable the security features on the router to protect the network from these attacks.
- **CCI (Control Correlation Identifier):**
  - (Misc info)

Topic No 86: Security Hardening – Case Study – Switch

- Layer 2 Switch STIG
- DISA, Release 20
  - 28 Oct, 2016

STIGVIEWER WINDOW



CK	Name
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
□	Layer 2 Switch Security Technical Implementation Guide - Cisco
☑	Layer 2 Switch Security Technical Implementation Guide

+ / -	Keyword	Filter

Vul ID	Rule Name
V-5622	A dedicated VLAN is required for all trunk ports.
V-5623	Ensure trunking is disabled on all access ports.
V-5624	Re-authentication must occur every 60 minutes.
V-5626	NET-NAC-009
V-5628	The VLAN1 is being used for management traffic.
V-5646	Devices not configured to filter and drop half-open connections.
V-7011	The auxiliary port is not disabled.
V-14669	BSDr commands are not disabled.
V-14671	NTP messages are not authenticated.
V-14717	The network element must not allow SSH Version 1.
V-15432	The device is not authenticated using a AAA server.
V-15434	Emergency administration account privilege level is not set.
V-17820	OOBM switch not connected to the NE OOBM interface
V-17821	The OOBM interface not configured correctly.
V-17824	Management interface is assigned to a user VLAN.
V-17825	Management VLAN has invalid addresses
V-17826	Invalid ports with membership to the mgmt VLAN
V-17827	The management VLAN is not pruned from trunk links

Layer 2 Switch Securit
Implementation Guide :
Benchmark Date: 28

Rule Title: The IAO will ensure tha
configured using MAC port securit
receiving a frame with a different l

The Port Security feature remembers
address connected to the switch port
address to communicate on that por
address tries to communicate throug
will disable the port.

A shutdown action puts the interface
state immediately and sends an SNM
receives a frame with a different laye
what has been configured or learned
following Catalyst IOS interface comr

- **General Information:**

  Rule Title : The IAO to that all switchports configured using MAC port security will shutdown upon receiving a frame with a different layer 2 source address than what has been configured or learned for port security

- **General Information:**
  - **Vuln ID:** V-18565
  - **STIG ID**: NET-NAC-032
  - **Severity**: CAT III

- **Discussion:**

– The Port Security feature remembers the Ethernet MAC address connected to the switch port and allows only that MAC address to communicate on that port If any other MAC address tries to communicate through the port, port security will disable the port.

- **Check Content:**

– A shutdown action puts the interface into the error-disabled state immediately and sends an SNMP trap notification if it receives a frame with a different layer 2 source address that what has been configured or learned for port security. The following Catalyst IOS interface command will shutdown the interface when such an event occurs: **switchport port-security violation shutdown**

- **Fix Text:**
  - Configure the port to shutdown when insecure hosts are connected to the wall jack.

Topic No 87: Case Study Security Hardening – Cisco IOS 15

- CIS Benchmarks case study (Cisco IOS 15)
- For Cisco routers running IOS 15M

CIS Cisco IOS 15 Benchmark

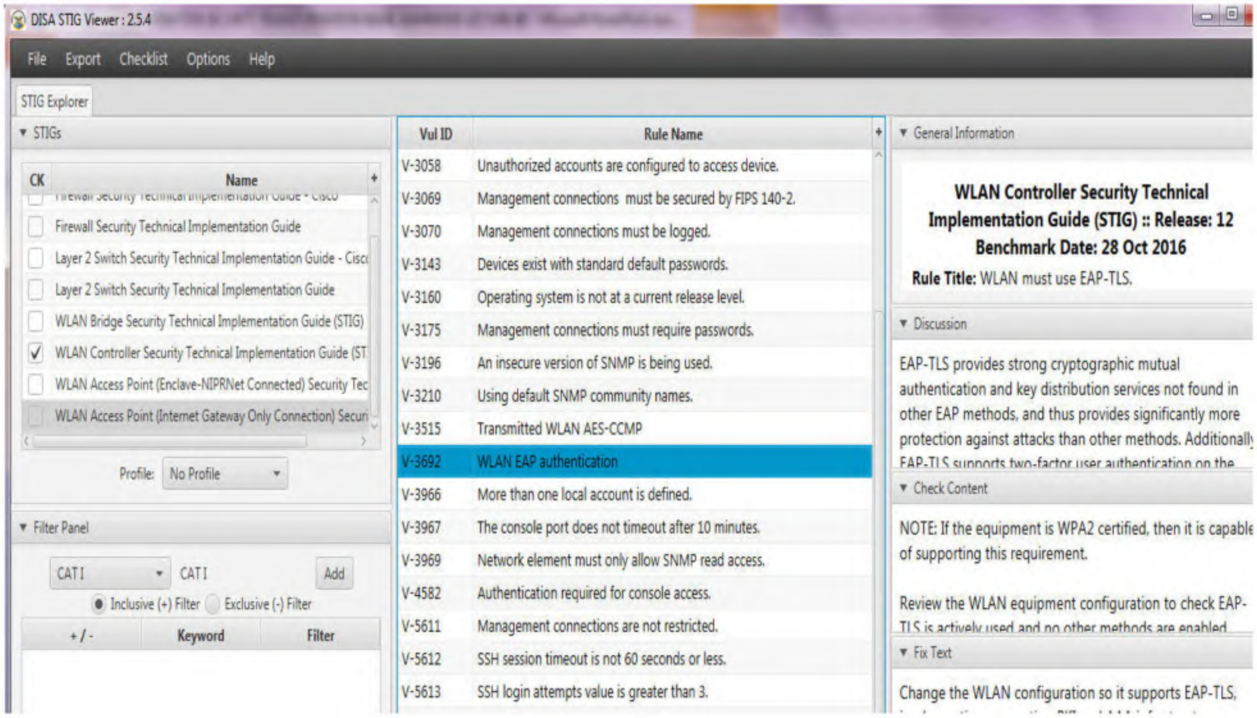
v4.0.0 - 06-30-2015

- June 30, 2015
- 151 pages PDF doc
- *3.3.2.2 Set 'ip ospf message-digest-key md5' (Scored)*
- Profile applicability:
  - Level 2
  - **Description:** Enable Open Shortest Path First (OSPF) Message Digest 5 (MD5) authentication.
  - **Rationale:** This is part of the OSPF authentication setup
  - **Audit:** Verify the appropriate md5 key is defined on the appropriate interface(s) **hostname#sh run int {*interface*}**
  - **Remediation: C**onfigure the appropriate interface(s) for Message Digest authentication **hostname(config)#interface {*interface_name*} hostname(config-if)#ip ospf message-digest-key {*ospf_md5_key-id*} md5 {*ospf_md5_key*}**
  - **Impact:** Organizations should plan and implement enterprise security policies that require rigorous authentication methods for routing protocols Configuring the proper interface(s) for 'ip ospf message-digest-key md5' enforces these policies by restricting exchanges between network devices.
  - **Default Value:** Not set

Topic No 88: Security Hardening – Case Study – WLAN

- WLAN Controller STIG
- DISA, Release 12
  - 28 Oct, 2016

STIGVIEWER WINDOW



CK	Name
□	Firewall Security Technical Implementation Guide - Cisco
□	Firewall Security Technical Implementation Guide
□	Layer 2 Switch Security Technical Implementation Guide - Cisc
□	Layer 2 Switch Security Technical Implementation Guide
□	WLAN Bridge Security Technical Implementation Guide (STIG)
☑	WLAN Controller Security Technical Implementation Guide (ST
□	WLAN Access Point (Enclave-NIPRNet Connected) Security Tec
□	WLAN Access Point (Internet Gateway Only Connection) Securi

Vul ID	Rule Name
V-3058	Unauthorized accounts are configured to access device.
V-3069	Management connections must be secured by FIPS 140-2.
V-3070	Management connections must be logged.
V-3143	Devices exist with standard default passwords.
V-3160	Operating system is not at a current release level.
V-3175	Management connections must require passwords.
V-3196	An insecure version of SNMP is being used.
V-3210	Using default SNMP community names.
V-3515	Transmitted WLAN AES-CCMP
V-3692	WLAN EAP authentication
V-3966	More than one local account is defined.
V-3967	The console port does not timeout after 10 minutes.
V-3969	Network element must only allow SNMP read access.
V-4582	Authentication required for console access.
V-5611	Management connections are not restricted.
V-5612	SSH session timeout is not 60 seconds or less.
V-5613	SSH login attempts value is greater than 3.

WLAN Controller Security Technical Implementation Guide (STIG) :: Release: 12 Benchmark Date: 28 Oct 2016

Rule Title: WLAN must use EAP-TLS.

EAP-TLS provides strong cryptographic mutual authentication and key distribution services not found in other EAP methods, and thus provides significantly more protection against attacks than other methods. Additionall EAP-TLS supports two-factor user authentication on the

NOTE: If the equipment is WPA2 certified, then it is capable of supporting this requirement.

Review the WLAN equipment configuration to check EAP-TLS is actively used and no other methods are enabled

Change the WLAN configuration so it supports EAP-TLS,

- General Information:
  - **Rule Title :** WLAN must use EAP-TLS
  - **Vuln ID:** V-3692
  - **STIG ID**: WIR0115-01
  - **Severity**: CAT II
- **Discussion:**
  - EAP-TLS provides strong cryptographic mutual authentication and key distribution services not found in other EAP methods, and thus provides significantly more protection against attacks than other methods.
  - Additionally, EAP-TLS supports two-factor user authentication on the WLAN client, which provides significantly more protection than methods that rely on a password or certificate alone.
  - EAP-TLS also can leverage DoD CAC in its authentication services, providing additional security and convenience.

- **Check Content:**
- NOTE: If the equipment is WPA2 certified, then it is capable of supporting this requirement.
- Review the WLAN equipment configuration to check EAP-TLS is actively used and no other methods are enabled.
- Mark as a finding if either EAP-TLS is not used or if the WLAN system allows users to connect with other methods.

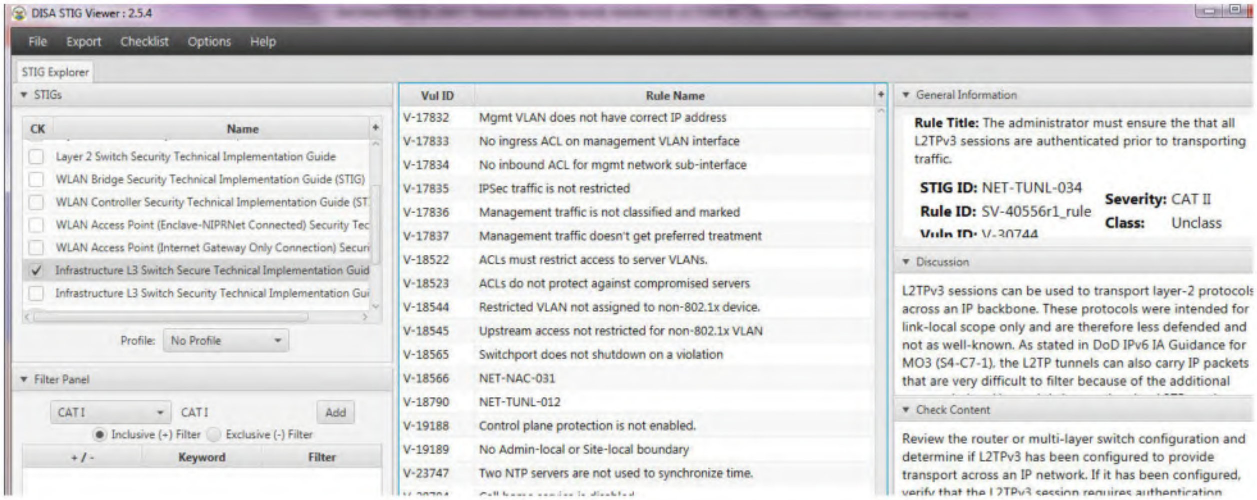
- **Fix Text:**

- Change the WLAN configuration so it supports EAP-TLS, implementing supporting PKI and AAA infrastructure as necessary.
- If the WLAN equipment is not capable of supporting EAP-TLS, procure new equipment capable of such support.

Topic No 89: Security Hardening – Case Study – L3 Switch

- Infrastructure Layer 3 Switch STIG
- DISA, Release 22
  - 28 April, 2017

STIGVIEWER WINDOW



CK	Name
□	Layer 2 Switch Security Technical Implementation Guide
□	WLAN Bridge Security Technical Implementation Guide (STIG)
□	WLAN Controller Security Technical Implementation Guide (ST
□	WLAN Access Point (Enclave-NIPRNet Connected) Security Tec
□	WLAN Access Point (Internet Gateway Only Connection) Securi
✓	Infrastructure L3 Switch Secure Technical Implementation Guid
□	Infrastructure L3 Switch Security Technical Implementation Gui

+/-	Keyword	Filter

Vul ID	Rule Name
V-17832	Mgmt VLAN does not have correct IP address
V-17833	No ingress ACL on management VLAN interface
V-17834	No inbound ACL for mgmt network sub-interface
V-17835	IPSec traffic is not restricted
V-17836	Management traffic is not classified and marked
V-17837	Management traffic doesn't get preferred treatment
V-18522	ACLs must restrict access to server VLANs.
V-18523	ACLs do not protect against compromised servers
V-18544	Restricted VLAN not assigned to non-802.1x device.
V-18545	Upstream access not restricted for non-802.1x VLAN
V-18565	Switchport does not shutdown on a violation
V-18566	NET-NAC-031
V-18790	NET-TUNL-012
V-19188	Control plane protection is not enabled.
V-19189	No Admin-local or Site-local boundary
V-23747	Two NTP servers are not used to synchronize time.

Rule Title: The administrator must ensure the that all L2TPv3 sessions are authenticated prior to transporting traffic.

STIG ID: NET-TUNL-034
Rule ID: SV-40556r1_rule
Vuln ID: V-30744
Severity: CAT II
Class: Unclass

L2TPv3 sessions can be used to transport layer-2 protocols across an IP backbone. These protocols were intended for link-local scope only and are therefore less defended and not as well-known. As stated in DoD IPv6 IA Guidance for MO3 (S4-C7-1), the L2TP tunnels can also carry IP packets that are very difficult to filter because of the additional

Review the router or multi-layer switch configuration and determine if L2TPv3 has been configured to provide transport across an IP network. If it has been configured, verify that the L2TPv3 session requires authentication

- **General Information:**
  - **Rule Title :** The administrator must ensure the that all L2TPv3 sessions are authenticated prior to transporting traffic.
  - **Vuln ID:** V-30744
  - **STIG ID**: NET-TUNL-034
  - **Severity**: CAT II
- **Discussion:**
  - L2TPv3 sessions can be used to transport layer-2 protocols across an IP backbone. These protocols were intended for link-local scope only and are therefore less defended and not as well-known.
  - As stated in DoD IPv6 IA Guidance for MO3 (S4-C7-1), the L2TP tunnels can also carry IP packets that are very difficult to filter because of the additional encapsulation.

- Hence, it is imperative that L2TP sessions are authenticated prior to transporting traffic

- **Check Content:**
  - Review the router or multi-layer switch configuration and determine if L2TPv3 has been configured to provide transport across an IP network. If it has been configured, verify that the L2TPv3 session requires authentication.

- **Fix Text:**
  - Configure L2TPv3 to use authentication for any peering sessions.

Topic No 90: Case Study Security Hardening – VMware

- CIS Benchmarks case study (Vmware ESXi 5.5)

CIS VMware ESXi 5.5 Benchmark

v1.2.0 - 12-16-2014

- December 16, 2014

- 132 pages PDF doc

- *5.1 Disable DCUI to prevent local administrative control (Scored)*

- Profile applicability:
  - Level 2
  - **Description:** The Direct Console User Interface (DCUI) can be disabled to prevent any local administration from the Host; Once the DCUI is disabled any administration of the ESXi host will be done through vCenter.

- **Rationale:**
  - The DCUI allows for low-level host configuration such as configuring IP address, hostname and root password as well as diagnostic capabilities such as enabling the ESXi shell, viewing log files, restarting agents, and resetting configurations. Actions performed from the DCUI are not tracked by vCenter Server. Even if Lockdown Mode is enabled, users who are members of the

DCUI.Access list can performed in vCenter Server where they can be centrally audited and monitored.

- **Audit:** Perform the following:

  1. From the vSphere web client select the host.
  2. Select "Manage" -> "Settings" -> "System" -> "Security Profile".
  3. Scroll down to "Services".
  4. Click "Edit...".
  5. Select "Direct Console UI".
  6. Verify the Startup Policy is set to "Start and Stop Manually“

  Additionally, the following PowerCLI command may be used:

  # List DCUI settings for all hosts Get-VMHost | Get-VMHostService | Where { $_.key -eq "DCUI" }

- **Remediation:** Perform the following:

  1. From the vSphere web client select the host.
  2. Select "Manage" -> "Settings" -> "System" -> "Security Profile".
  3. Scroll down to "Services".
  4. Click "Edit...".
  5. Select "Direct Console UI".
  6. Click "Stop".
  7. Change the Startup Policy "Start and Stop Manually".
  8. Click "OK".

- **Impact:**

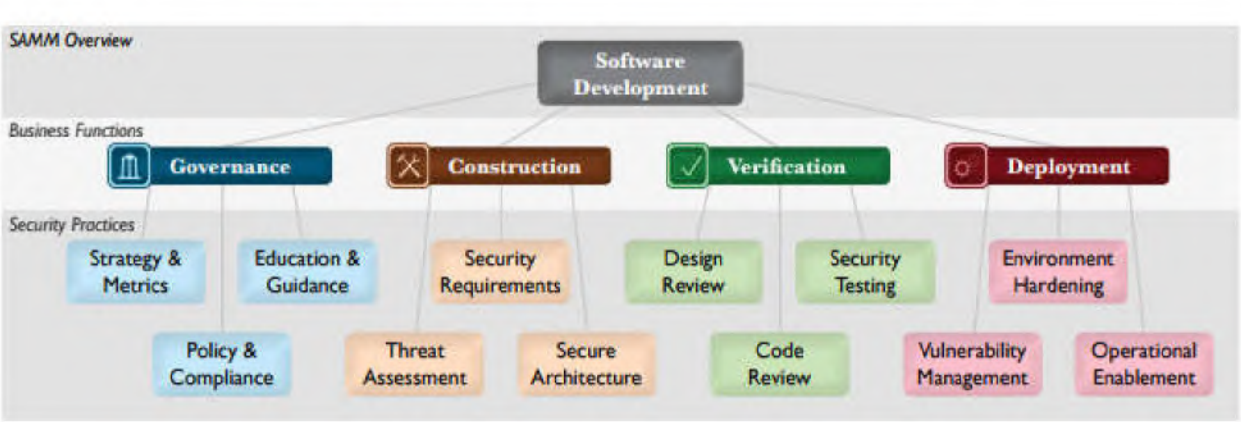
- Disabling the DCUI can create a potential "lock out" situation should the host become isolated from vCenter Server. Recovering from a "lock out" scenario requires re-installing ESXi. Consider leaving DCUI enabled and instead enable lockdown mode and limit the users allowed to access the DCUI using the DCUI.Access list.

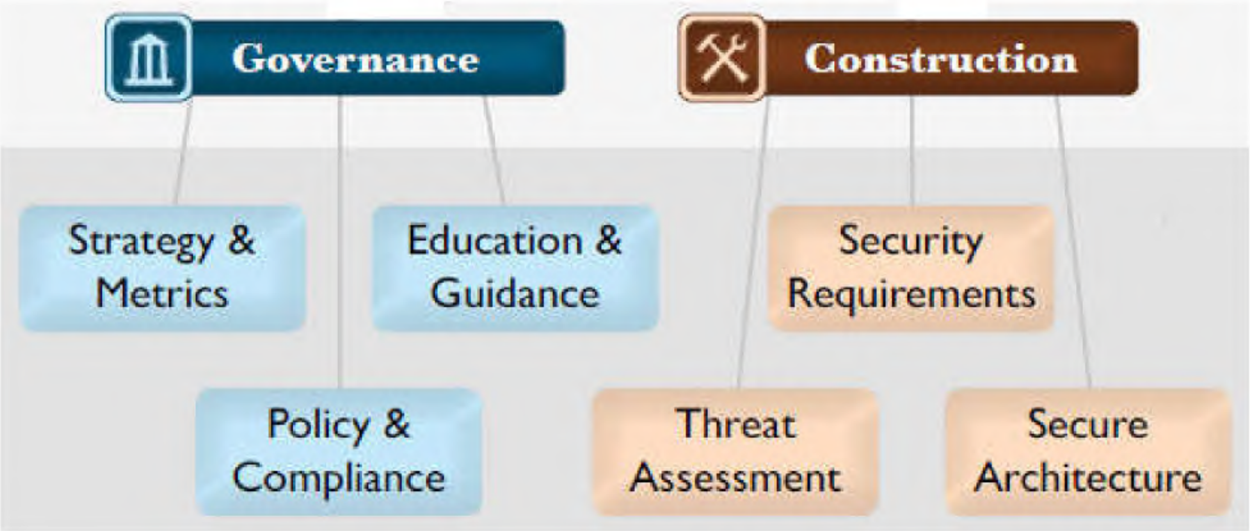
- **Default Value:**

  - The prescribed state is not the default state.

Topic no 91 & 92 : Software Security Fundamentals-SAMM & SAMM-2

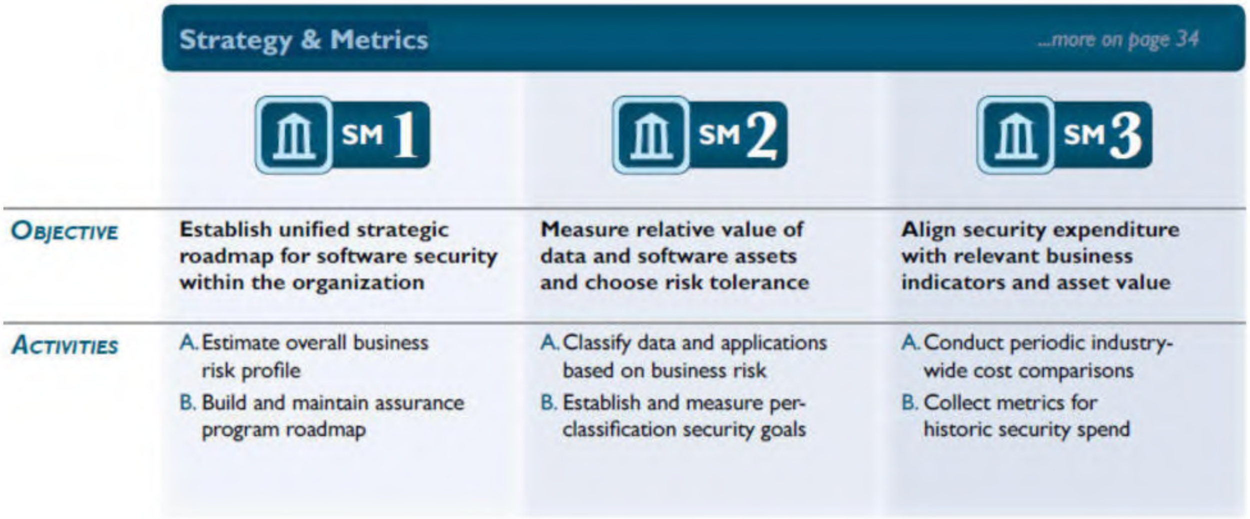
- Software Assurance Maturity Model (SAMM) developed by OWASP
  - A guide to building security into software development
  - 96 page PDF





- OWASP Software Assurance Maturity Model (SAMM) **Governance Phase:**
  - Strategy & Metrics
  - Education & Guidance
  - Policy & Compliance

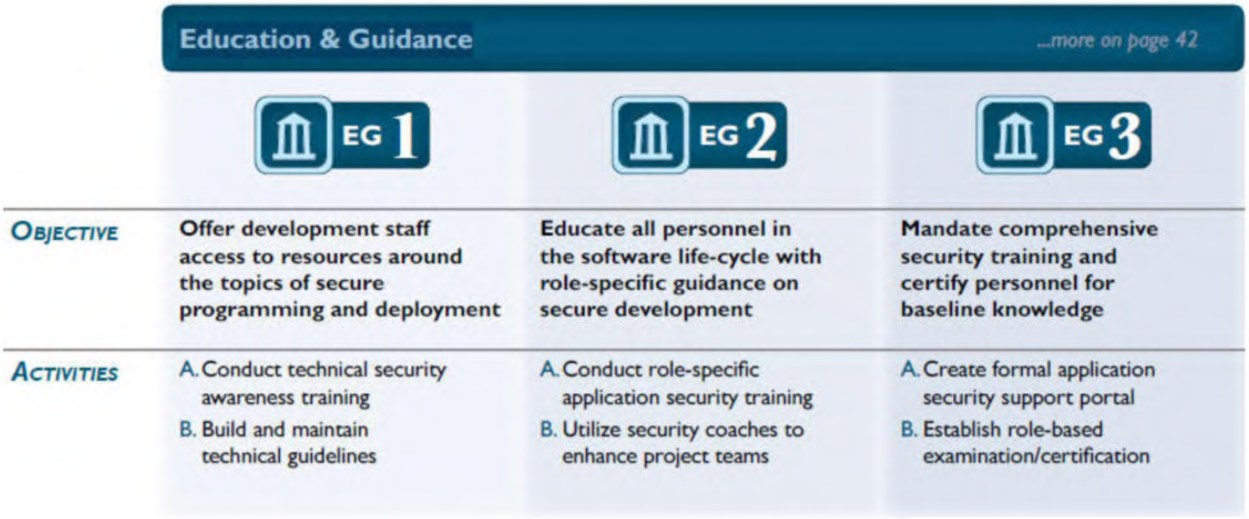
- **Strategy & Metrics:**
  - Focused on establishing the framework within an organization for a software security assurance program.
  - This is the most fundamental step in defining security goals in a way that’s both measurable and aligned with the organization’s real business risk.



Strategy & Metrics ...more on page 34

	SM 1	SM 2	SM 3
Objective	**Establish unified strategic roadmap for software security within the organization**	**Measure relative value of data and software assets and choose risk tolerance**	**Align security expenditure with relevant business indicators and asset value**
Activities	A. Estimate overall business risk profile B. Build and maintain assurance program roadmap	A. Classify data and applications based on business risk B. Establish and measure per-classification security goals	A. Conduct periodic industry-wide cost comparisons B. Collect metrics for historic security spend

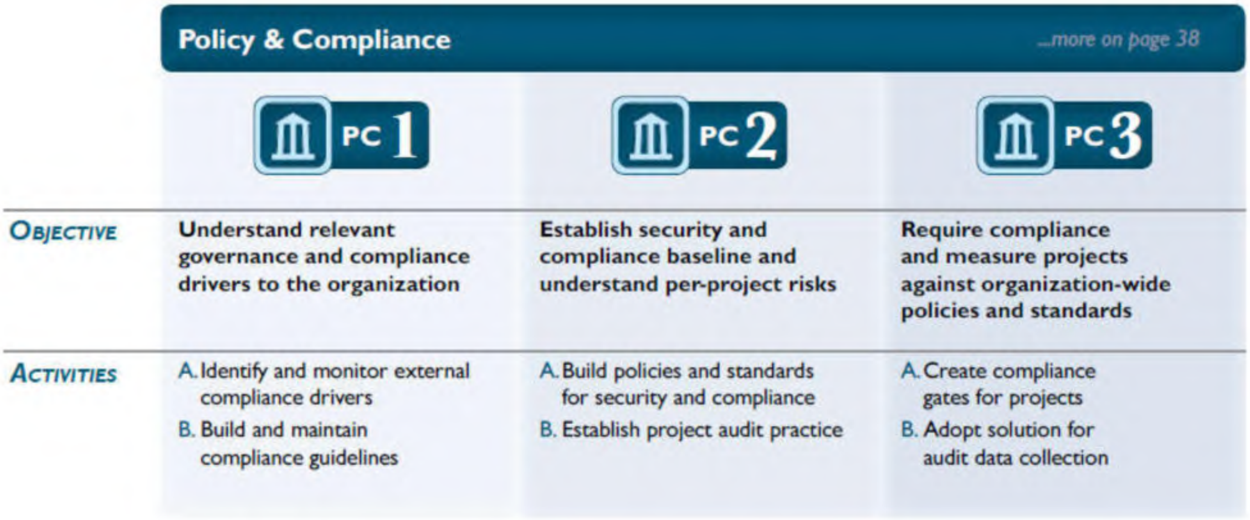
- **Education & Guidance:**
  - Focused on arming personnel involved in the software lifecycle with knowledge and resources to design, develop, and deploy secure software.
  - With improved access to information, project teams will be better able to proactively identify and mitigate the specific security risks that apply to their organization.



Education & Guidance ...more on page 42

	EG 1	EG 2	EG 3
Objective	**Offer development staff access to resources around the topics of secure programming and deployment**	**Educate all personnel in the software life-cycle with role-specific guidance on secure development**	**Mandate comprehensive security training and certify personnel for baseline knowledge**
Activities	A. Conduct technical security awareness training B. Build and maintain technical guidelines	A. Conduct role-specific application security training B. Utilize security coaches to enhance project teams	A. Create formal application security support portal B. Establish role-based examination/certification

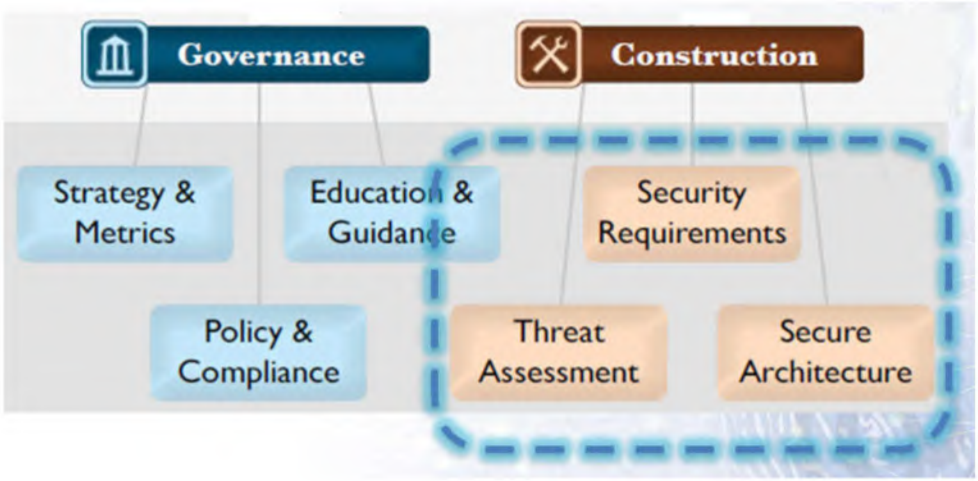
- **Policy & Compliance:**
  - Focused on understanding and meeting external legal and regulatory requirements while also driving internal security standards to ensure compliance in a way that's aligned with the business purpose of the org.
  - A driving theme for improvement within this Practice is focus on project-level audits that gather information about the organization's behavior in order to check that expectations are being met.



Policy & Compliance ...more on page 38

	PC 1	PC 2	PC 3
OBJECTIVE	Understand relevant governance and compliance drivers to the organization	Establish security and compliance baseline and understand per-project risks	Require compliance and measure projects against organization-wide policies and standards
ACTIVITIES	A. Identify and monitor external compliance drivers B. Build and maintain compliance guidelines	A. Build policies and standards for security and compliance B. Establish project audit practice	A. Create compliance gates for projects B. Adopt solution for audit data collection

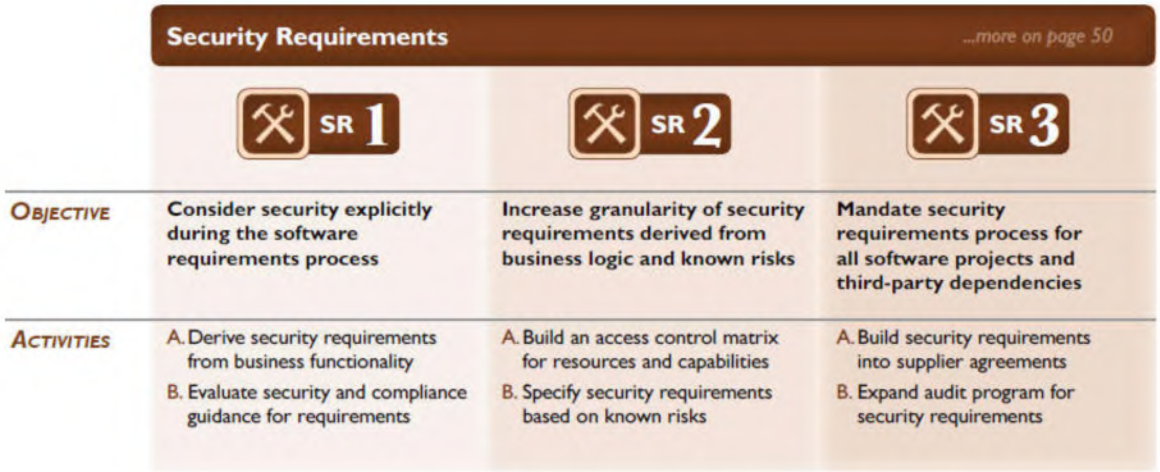
Topic no 93



- OWASP Software Assurance Maturity Model (SAMM) **Construction Phase:**
  - Security Requirements
  - Threat Assessment

- Secure Architecture

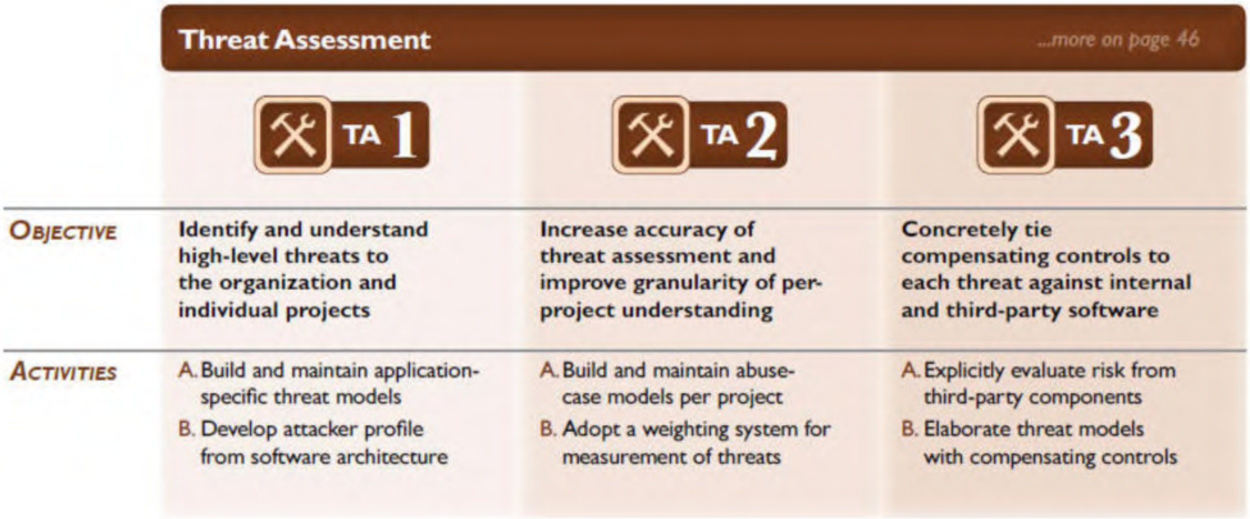
- **Security Requirements:**
  - Focused on proactively specifying the expected behavior of software with respect to security
  - Through addition of analysis activities at the project level, security requirements are initially gathered based on the high-level business purpose of the software



Security Requirements ...more on page 50

	SR 1	SR 2	SR 3
OBJECTIVE	Consider security explicitly during the software requirements process	Increase granularity of security requirements derived from business logic and known risks	Mandate security requirements process for all software projects and third-party dependencies
ACTIVITIES	A. Derive security requirements from business functionality B. Evaluate security and compliance guidance for requirements	A. Build an access control matrix for resources and capabilities B. Specify security requirements based on known risks	A. Build security requirements into supplier agreements B. Expand audit program for security requirements

- **Threat Assessment:**
  - Centered on identification and understanding the project-level risks based on the functionality of the software being developed and characteristics of the runtime environment
  - From details about threats and likely attacks against each project, the organization as a whole operates more effectively through better decisions about prioritization of initiatives for security

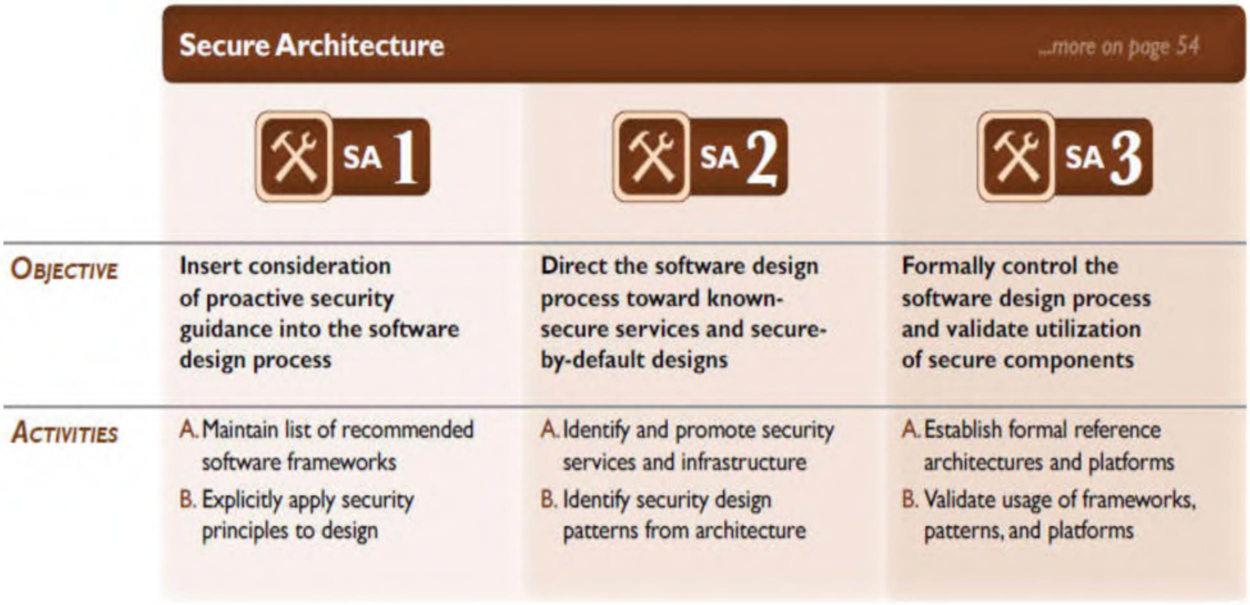


Threat Assessment ...more on page 46

	TA 1	TA 2	TA 3
OBJECTIVE	Identify and understand high-level threats to the organization and individual projects	Increase accuracy of threat assessment and improve granularity of per-project understanding	Concretely tie compensating controls to each threat against internal and third-party software
ACTIVITIES	A. Build and maintain application-specific threat models B. Develop attacker profile from software architecture	A. Build and maintain abuse-case models per project B. Adopt a weighting system for measurement of threats	A. Explicitly evaluate risk from third-party components B. Elaborate threat models with compensating controls

- **Secure Architecture:**
  - Focused on proactive steps for an organization to design and build secure software by default

- By enhancing the software design process with reusable services and components, the overall security risk from software development can be dramatically reduced.



Secure Architecture ...more on page 54

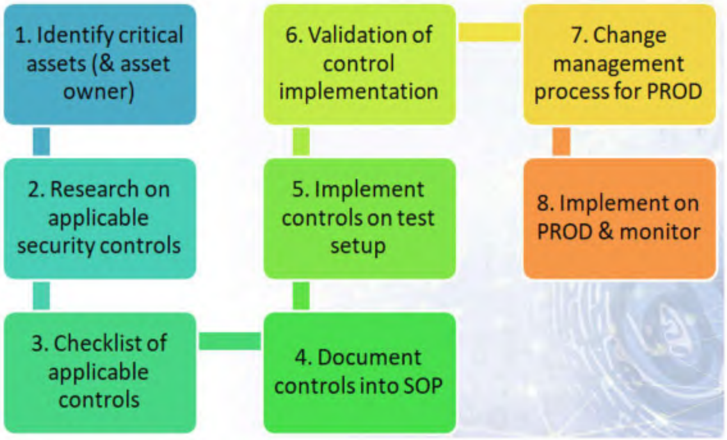
	SA 1	SA 2	SA 3
OBJECTIVE	Insert consideration of proactive security guidance into the software design process	Direct the software design process toward known-secure services and secure-by-default designs	Formally control the software design process and validate utilization of secure components
ACTIVITIES	A. Maintain list of recommended software frameworks B. Explicitly apply security principles to design	A. Identify and promote security services and infrastructure B. Identify security design patterns from architecture	A. Establish formal reference architectures and platforms B. Validate usage of frameworks, patterns, and platforms

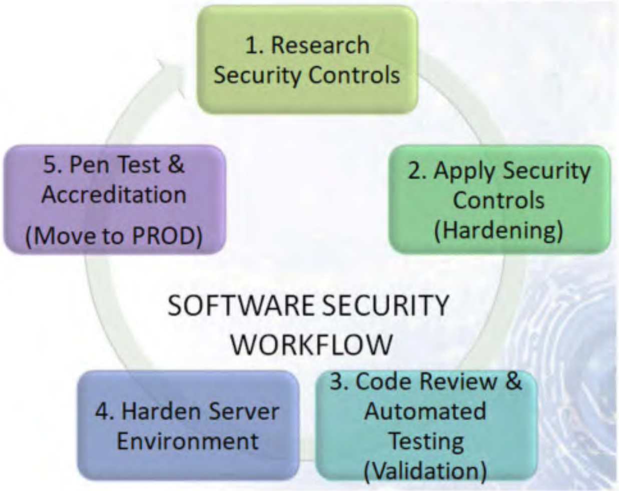
SAMM is an excellent model for software security and we look at the verification and deployment phases as part of testing and validation.

Topic no 94: SECURITY HARDENING – SOFTWARE APPLICATIONS

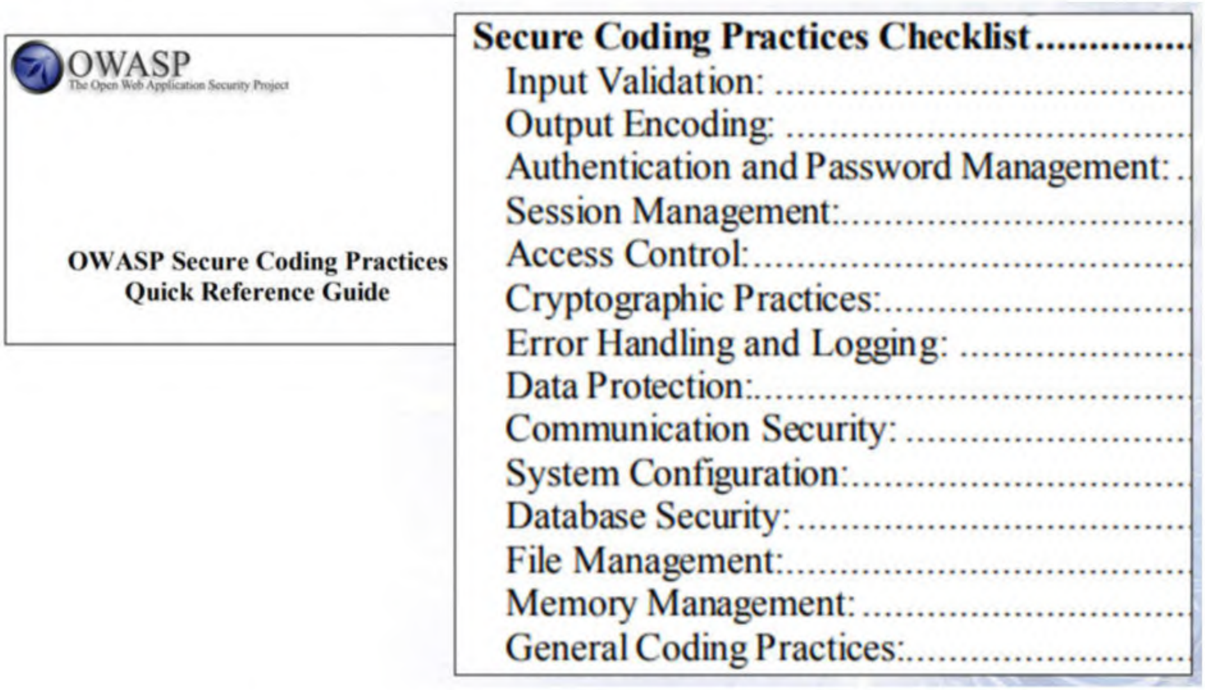
- **Two types of security hardening:**
  - IT assets (systems, network devices, databases, applications)
  - Software developed internally or by third party
- **Typical enterprise software:**
  - ERP (Oracle, SAP, IBM, etc)
  - **Internally or 3rd party developed software in ASP.NET, PHP, Android/IOS, or other platform**

8 STEP SECURITY HARDENING METHODOLOGY


1. Identify critical assets (& asset owner)
2. Research on applicable security controls
3. Checklist of applicable controls
4. Document controls into SOP
5. Implement controls on test setup
6. Validation of control implementation
7. Change management process for PROD
8. Implement on PROD & monitor


1. Research Security Controls
2. Apply Security Controls (Hardening)
3. Code Review & Automated Testing (Validation)
4. Harden Server Environment
5. Pen Test & Accreditation (Move to PROD)
SOFTWARE SECURITY WORKFLOW

- **Useful resources:**
  - www.OWASP.org
  - www.cloudsecurityalliance.org
  - MS Technet
  - OWASP Top 10
  - OWASP Secure Coding Practices Quick Reference Guide
  - SAMM

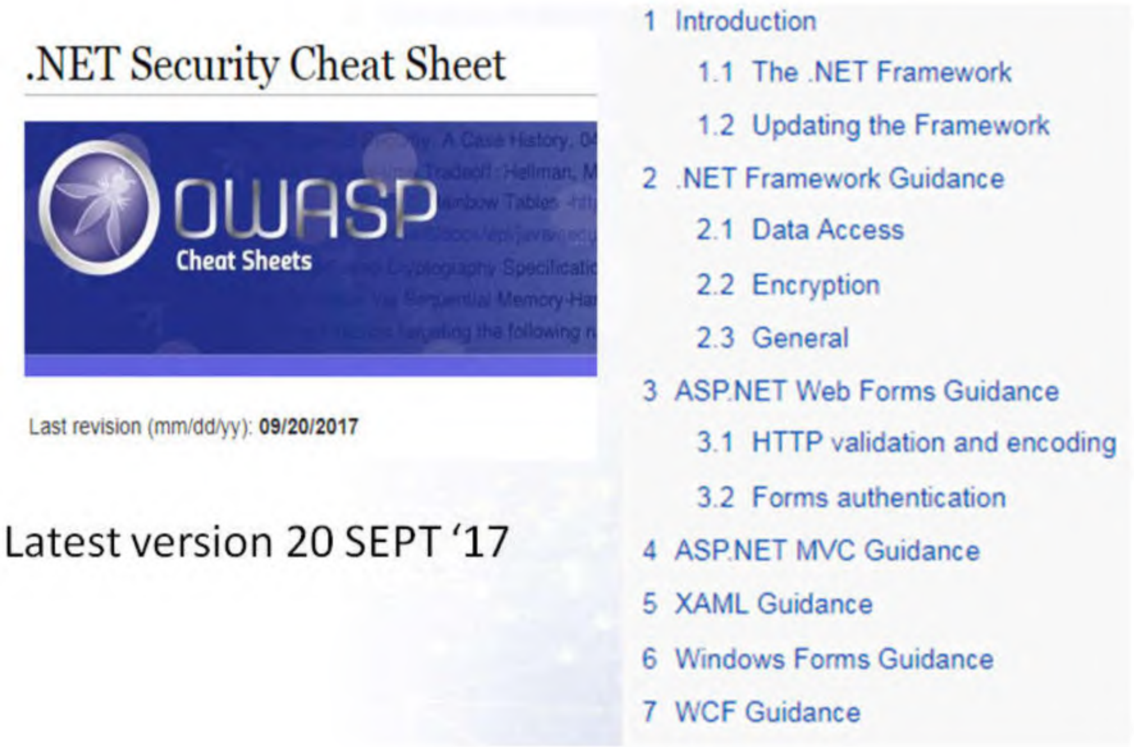


OWASP
The Open Web Application Security Project

OWASP Secure Coding Practices
Quick Reference Guide

Secure Coding Practices Checklist ....

Input Validation: ....
Output Encoding: ....
Authentication and Password Management: ..
Session Management:.......................................
Access Control:...
Cryptographic Practices:..................................
Error Handling and Logging: ....
Data Protection:..
Communication Security: ....
System Configuration:.....................................
Database Security: ....
File Management:...
Memory Management: ....
General Coding Practices:...............................



.NET Security Cheat Sheet

Last revision (mm/dd/yy): **09/20/2017**

Latest version 20 SEPT '17

1 Introduction
- 1.1 The .NET Framework
- 1.2 Updating the Framework

2 .NET Framework Guidance
- 2.1 Data Access
- 2.2 Encryption
- 2.3 General

3 ASP.NET Web Forms Guidance
- 3.1 HTTP validation and encoding
- 3.2 Forms authentication

4 ASP.NET MVC Guidance

5 XAML Guidance

6 Windows Forms Guidance

7 WCF Guidance

- **Conclusion**
  - Software security hardening is a challenging activity
  - Build software security program & integrate with QA
  - Domain specific knowledge required
  - Build capabilities and process following SAMM

Topic no 95: CASE STUDY – ASP.NET SECURITY HARDENING

- OWASP ASP.NET Cheat Sheet
- https://www.owasp.org/index.php/.NET_Security_Cheat_Sheet
- .NET Framework Guidance
- ASP.NET Web Forms Guidance
- ASP.NET MVC Framework Guidance
- **.NET Framework Guidance**
  - Data access
  - Encryption
  - General guidelines
- **NET FRAMEWORK, DATA ACCESS GUIDANCE:**

- Use Parameterized SQL commands for all data access, without exception.
- Do not use SqlCommand with a string parameter made up of a concatenated SQL String.
- Whitelist allowable values coming from the user. Use enums, TryParse or lookup values to assure that the data coming from the user is as expected.
- Apply the principle of least privilege when setting up the Database User in your database of choice. The database user should only be able to access items that make sense for the use case.
- Use of the Entity Framework is a very effective SQL injection prevention mechanism. When using SQL Server, prefer integrated authentication over SQL authentication.
- Use Always Encrypted where possible for sensitive data (SQL Server 2016 and SQL Azure)

- **.NET FRAMEWORK, GENERAL GUIDANCE:**

- Lock down the config file.
- Remove all aspects of configuration that are not in use.
- Encrypt sensitive parts of the web.config using aspnet_regiis -pe
- For Click Once applications the .Net Framework should be upgraded to use version 4.6.2 to ensure TLS 1.1/1.2 support.

- **ASP.NET Web Forms Guidance**

- HTTPS & some general configuration
- HTTP validation & encoding
- Forms authentication

- **ASP.NET MVC Guidance**
  - ASP.NET MVC (Model-View-Controller) is a contemporary web application framework that uses more standardized HTTP communication
  - Based on OWASP Top 10

Topic no 96: CASE STUDY – PHP SECURITY HARDENING

- PHP Security Guidelines
- https://docs.php.earth/security/intro/

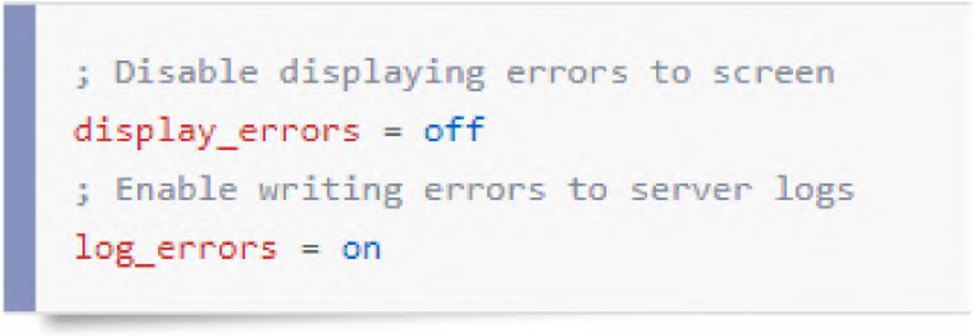
1. Cross site scripting (XSS)
2. Injections
   - SQL injection
   - Directory traversal (path injection)
   - Command injection
   - Code injection
3. Cross site request forgery (XSRF/CSRF)
4. Public files
5. Passwords
6. Uploading files
7. Session hijacking
8. Remote file inclusion
9. PHP configuration
   - Error reporting
   - Exposing PHP version
   - Remote files
   - Open_basedir
   - Session settings
10. Use HTTPS
11. Things not listed

9. PHP Configuration

Always keep the installed PHP version updated. You can use versionscan to check for possible vulnerabilities of your PHP version. Update open source libraries and applications, and keep your web server well maintained. Here are some of the important settings from php.ini that you should check out. You can also use iniscan to scan your php.ini files for best security practices.

- **Error Reporting**

In your production environment, you must always turn off displaying errors to the screen. If errors occur in your application and they are visible to the outside world, an attacker could get valuable data for attacking your application



```
; Disable displaying errors to screen
display_errors = off
; Enable writing errors to server logs
log_errors = on
```

Topic no 97: CASE STUDY – ASP.NET MVC SECURITY HARDENING

- ASP.NET MVC Security Guidelines
- https://www.owasp.org/index.php/.NET_Security_Cheat_Sheet#ASP.NET_MVC_Guidance
- ASP.NET MVC (Model-View-Controller) is a contemporary web application framework that uses more standardized HTTP communication than the Web Forms postback model
- The OWASP Top 10 lists the most prevalent and dangerous threats to web security in the world today and is reviewed every 3 years.
- After covering the top 10 it is generally advisable to assess for other threats or get a professional Penetration Test.
- Your approach to securing your web application should be to start at the top threat A1 below and work down, this will ensure that any time spent on security will be spent most effectively and cover the top threats first and lesser threats afterwards.

A.6 Sensitive data exposure

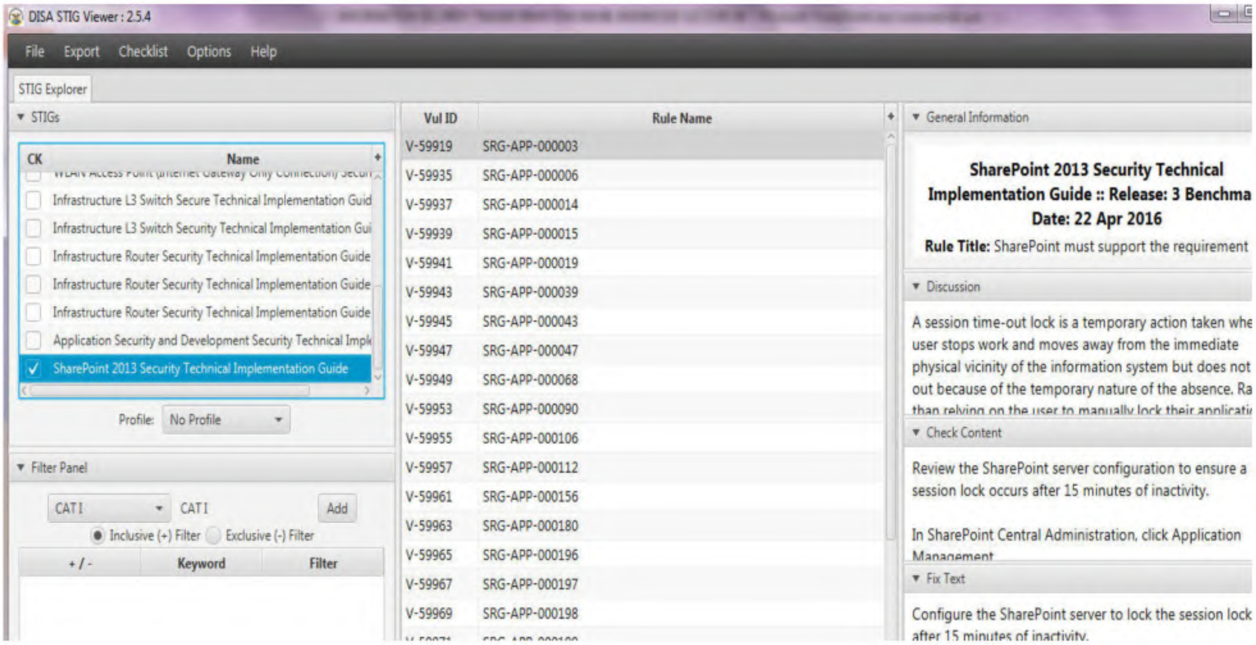
- DO NOT: Store encrypted passwords.
- DO: Use a strong hash to store password credentials. Use PBKDF2, BCrypt or SCrypt with at least 8000 iterations and a strong key.
- DO: Enforce passwords with a minimum complexity that will survive a dictionary attack i.e. longer passwords that use the full character set (numbers, symbols and letters) to increase the entropy.

- DO: Use a strong encryption routine such as AES-512 where personally identifiable data needs to be restored to it's original format. Do not encrypt passwords. Protect encryption keys more than any other asset.
- Apply the following test: Would you be happy leaving the data on a spreadsheet on a bus for everyone to read. Assume the attacker can get direct access to your database and protect it accordingly.
- DO: Use TLS 1.2 for your entire site. Get a free certificate from StartSSL.com or LetsEncrypt.org.
- DO NOT: Allow SSL, this is now obsolete
- DO: Have a strong TLS policy (see SSL Best Practises), use TLS 1.2 wherever possible. Then check the configuration using SSL Test
- DO: Ensure headers are not disclosing information about your application.
- See HttpHeaders.cs , Dionach StripHeaders or disable via web.config:

Topic no 98: Security Hardening – Case Study-SharePoint

- Sharepoint 2013 STIG
- DISA, Release 3
  - 22 April, 2016
- Sharepoint server side configurations

STIGVIEWER WINDOW



CK	Name
□	Infrastructure L3 Switch Secure Technical Implementation Guid
□	Infrastructure L3 Switch Security Technical Implementation Gui
□	Infrastructure Router Security Technical Implementation Guide
□	Infrastructure Router Security Technical Implementation Guide
□	Infrastructure Router Security Technical Implementation Guide
□	Application Security and Development Security Technical Impl
☑	SharePoint 2013 Security Technical Implementation Guide

+/-	Keyword	Filter

Vul ID	Rule Name
V-59919	SRG-APP-000003
V-59935	SRG-APP-000006
V-59937	SRG-APP-000014
V-59939	SRG-APP-000015
V-59941	SRG-APP-000019
V-59943	SRG-APP-000039
V-59945	SRG-APP-000043
V-59947	SRG-APP-000047
V-59949	SRG-APP-000068
V-59953	SRG-APP-000090
V-59955	SRG-APP-000106
V-59957	SRG-APP-000112
V-59961	SRG-APP-000156
V-59963	SRG-APP-000180
V-59965	SRG-APP-000196
V-59967	SRG-APP-000197
V-59969	SRG-APP-000198

SharePoint 2013 Security Technical Implementation Guide :: Release: 3 Benchma Date: 22 Apr 2016

Rule Title: SharePoint must support the requirement

A session time-out lock is a temporary action taken whe user stops work and moves away from the immediate physical vicinity of the information system but does not out because of the temporary nature of the absence. Ra than relying on the user to manually lock their applicati

Review the SharePoint server configuration to ensure a session lock occurs after 15 minutes of inactivity.

In SharePoint Central Administration, click Application Management

Configure the SharePoint server to lock the session lock after 15 minutes of inactivity.

- General Information:
  - **Rule Title :** For environments requiring an Internet-facing capability, the SharePoint application server upon which Central Administration is installed, must not be installed in the DMZ.
  - **Vuln ID:** V-59995

  - **STIG ID**: SP13-00-000155
  - **Severity**: CAT II

- **Discussion:**

- Information flow control regulates where information is allowed to travel within an information system and between information systems (as opposed to who is allowed to access the information) and without explicit regard to subsequent accesses to the information.
- SharePoint installed Central Administrator is a powerful management tool used to administer the farm. This server should be installed on a trusted network segment. This server should also be used to run services rather than user-oriented web applications.

- **Check Content:**

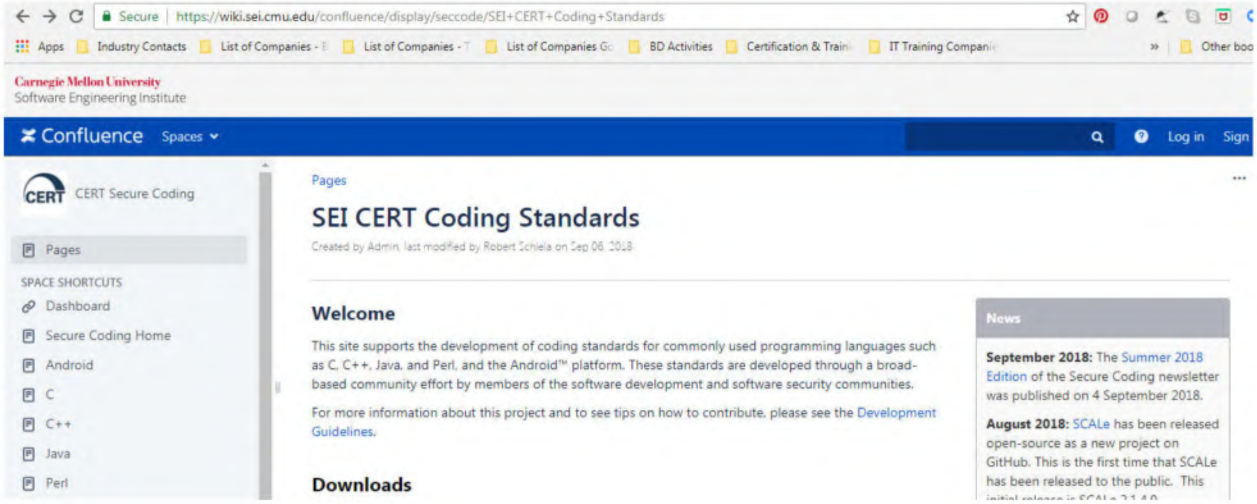
  - For environments requiring an Internet-facing capability, ensure the SharePoint Central Administration application server is not in the DMZ.
  - Inspect the logical location of the server farm web front end servers.
  - Verify the Central Administration site is not installed on a server located in a DMZ or other publicly accessible segment of the network.
  - If Central Administrator is installed on a publicly facing SharePoint server, this is a finding.

- **Fix Text:**

  - For environments requiring an Internet-facing capability, remove the SharePoint Central Administration application server upon which Central Administration is installed from the DMZ.

Topic no 99: CASE STUDY – C APPLICATIONS SECURITY HARDENING

- Carnegie Mellon Software Engineering Institute
- https://wiki.sei.cmu.edu/confluence/display/seccode/SEI+CERT+Coding+Standards
- https://wiki.sei.cmu.edu/confluence/display/c/SEI+CERT+C+Coding+Standard



SEI CERT Coding Standards

Created by Admin, last modified by Robert Schiela on Sep 06, 2018

Welcome

This site supports the development of coding standards for commonly used programming languages such as C, C++, Java, and Perl, and the Android™ platform. These standards are developed through a broad-based community effort by members of the software development and software security communities.

For more information about this project and to see tips on how to contribute, please see the Development Guidelines.

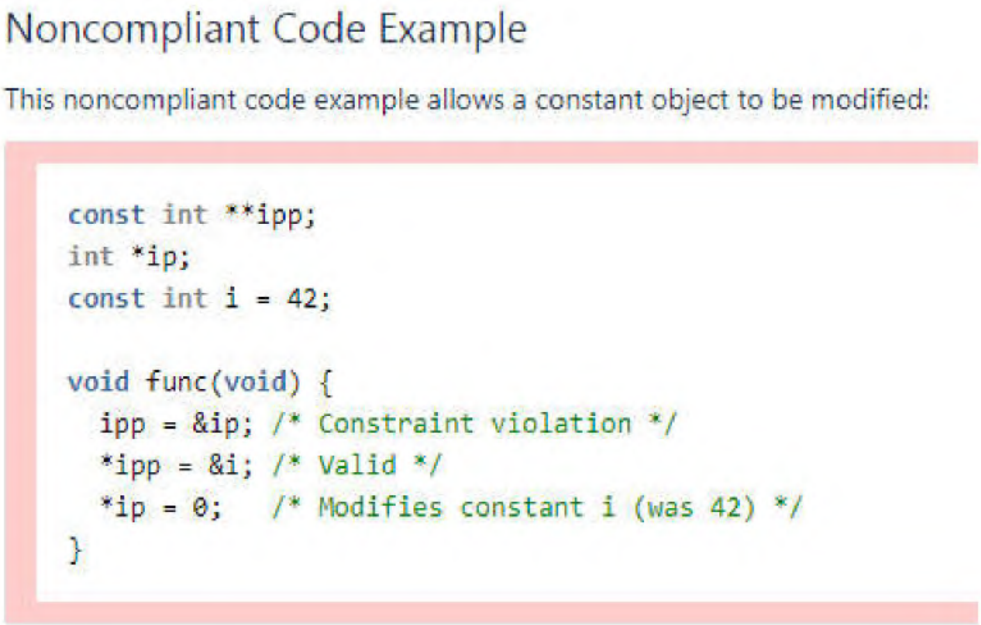
Downloads

September 2018: The Summer 2018 Edition of the Secure Coding newsletter was published on 4 September 2018.

August 2018: SCALe has been released open-source as a new project on GitHub. This is the first time that SCALe has been released to the public. This

https://wiki.sei.cmu.edu/confluence/display/seccode/SEI+CERT+Coding+Standards

- There are existing compiler implementations that allow const-qualified objects to be modified without generating a warning message.
- Avoid casting away const qualification because doing so makes it possible to modify const-qualified objects without issuing diagnostics.



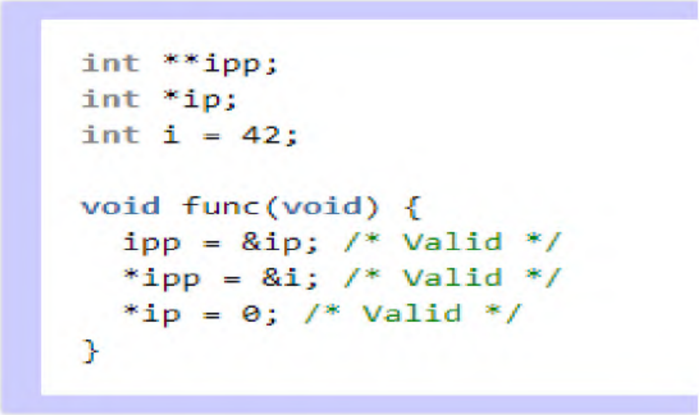
Noncompliant Code Example

This noncompliant code example allows a constant object to be modified:

```
const int **ipp;
int *ip;
const int i = 42;

void func(void) {
  ipp = &ip; /* Constraint violation */
  *ipp = &i; /* Valid */
  *ip = 0;   /* Modifies constant i (was 42) */
}
```

- The first assignment is unsafe because it allows the code that follows it to attempt to change the value of the const object i.



```
int **ipp;
int *ip;
int i = 42;

void func(void) {
  ipp = &ip; /* Valid */
  *ipp = &i; /* Valid */
  *ip = 0; /* Valid */
}
```

- The compliant solution depends on the intent of the programmer. If the intent is that the value of i is modifiable, then it should not be declared as a constant, as in this compliant solution:

– If the intent is that the value of i is not meant to change, then do not write noncompliant code that attempts to modify it.

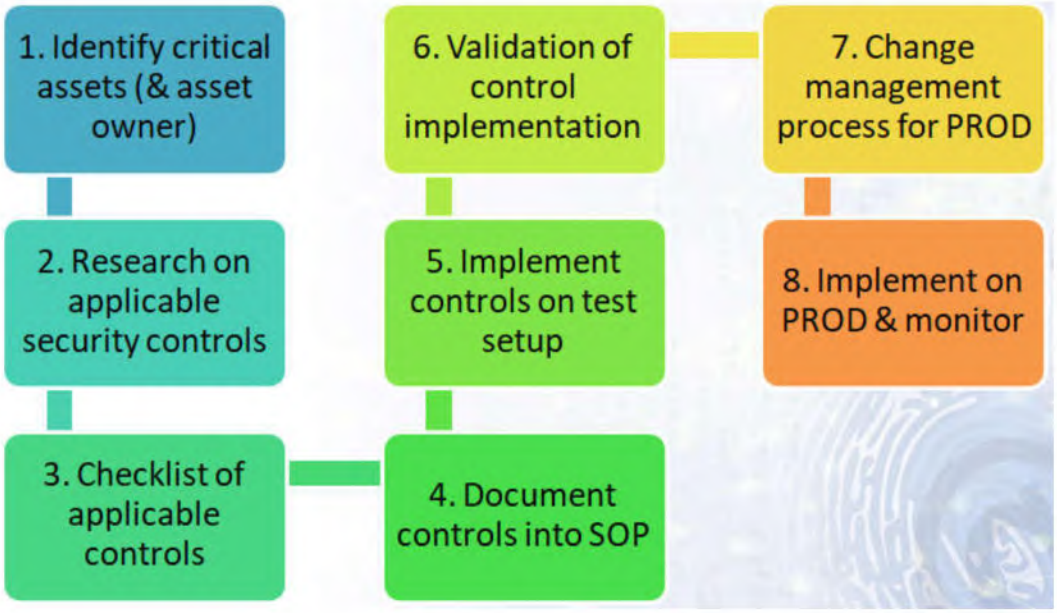
– Risk Assessment

– Automated detection

– Related vulnerabilities

Topic no 100: CASE STUDY – C++ APPLICATIONS SECURITY HARDENING

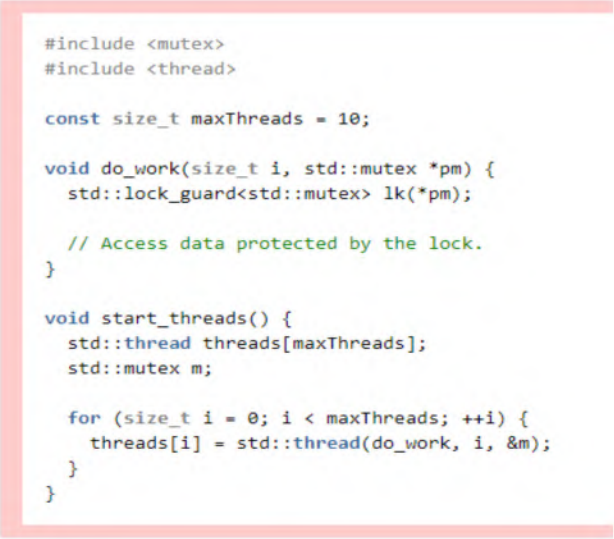
- Carnegie Mellon Software Engineering Institute
- https://wiki.sei.cmu.edu/confluence/pages/viewpage.action?pageId=88046682


1. Identify critical assets (& asset owner)
2. Research on applicable security controls
3. Checklist of applicable controls
4. Document controls into SOP
5. Implement controls on test setup
6. Validation of control implementation
7. Change management process for PROD
8. Implement on PROD & monitor

- Rule 01. Declarations and Initialization (DCL)
- Rule 02. Expressions (EXP)
- Rule 03. Integers (INT)
- Rule 04. Containers (CTR)
- Rule 05. Characters and Strings (STR)
- Rule 06. Memory Management (MEM)
- Rule 07. Input Output (FIO)
- Rule 08. Exceptions and Error Handling (ERR)Page:
- Rule 09. Object Oriented Programming (OOP)
- Rule 10. Concurrency (CON)
  - Rule 10. Concurrency (CON)
    - CON50-CPP. Do not destroy a mutex while it is locked
    - Mutex objects are used to protect shared data from being concurrently accessed. If a mutex object is destroyed while a thread is blocked waiting for the lock, critical sections and shared data are no longer protected.

- The C++ Standard, [thread.mutex.class], paragraph 5 [ISO/IEC 14882-2014], states the following:

- The behavior of a program is undefined if it destroys a mutex object owned by any thread or a thread terminates while owning a mutex object.



```
#include <mutex>
#include <thread>

const size_t maxThreads = 10;

void do_work(size_t i, std::mutex *pm) {
  std::lock_guard<std::mutex> lk(*pm);

  // Access data protected by the lock.
}

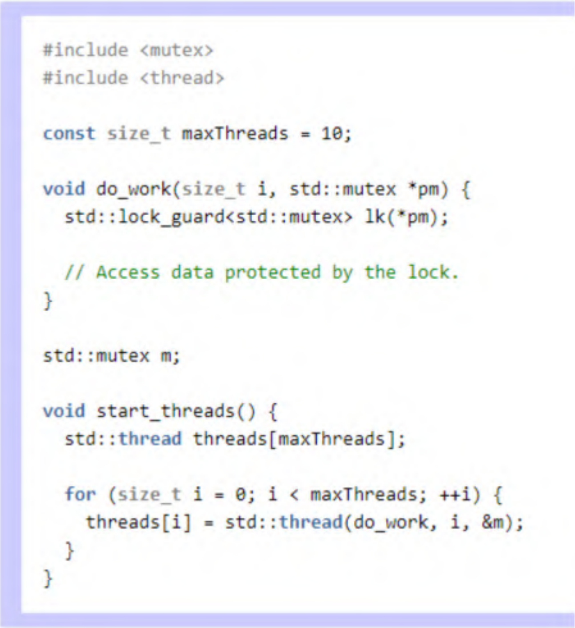
void start_threads() {
  std::thread threads[maxThreads];
  std::mutex m;

  for (size_t i = 0; i < maxThreads; ++i) {
    threads[i] = std::thread(do_work, i, &m);
  }
}
```

- **Non-Compliant Code Example:**

− This noncompliant code example creates several threads that each invoke the do_work() function, passing a unique number as an ID.

− Unfortunately, this code contains a race condition, allowing the mutex to be destroyed while it is still owned, because start_threads() may invoke the mutex's destructor before all of the threads have exited.



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#include <thread>

const size_t maxThreads = 10;

void do_work(size_t i, std::mutex *pm) {
  std::lock_guard<std::mutex> lk(*pm);

  // Access data protected by the lock.
}

std::mutex m;

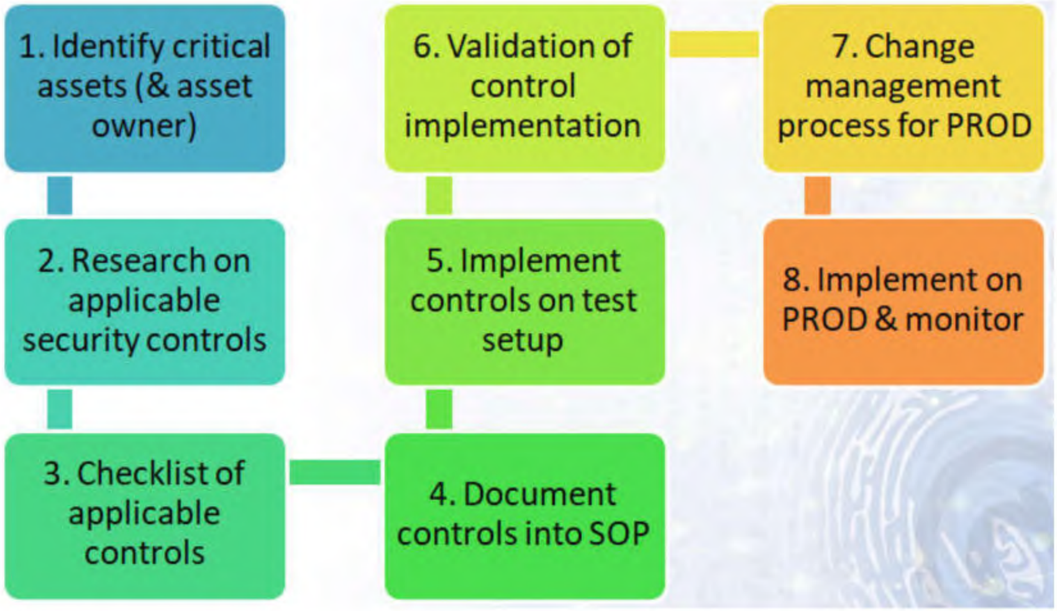
void start_threads() {
  std::thread threads[maxThreads];

  for (size_t i = 0; i < maxThreads; ++i) {
    threads[i] = std::thread(do_work, i, &m);
  }
}
```

- **Compliant Code Example:**
- This compliant solution eliminates the race condition by extending the lifetime of the mutex.

Topic no 101: CASE STUDY – JAVA APPLICATIONS SECURITY HARDENING

- Carnegie Mellon Software Engineering Institute
- https://wiki.sei.cmu.edu/confluence/display/java/SEI+CERT+Oracle+Coding+Standard+for+Java



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4. Document controls into SOP

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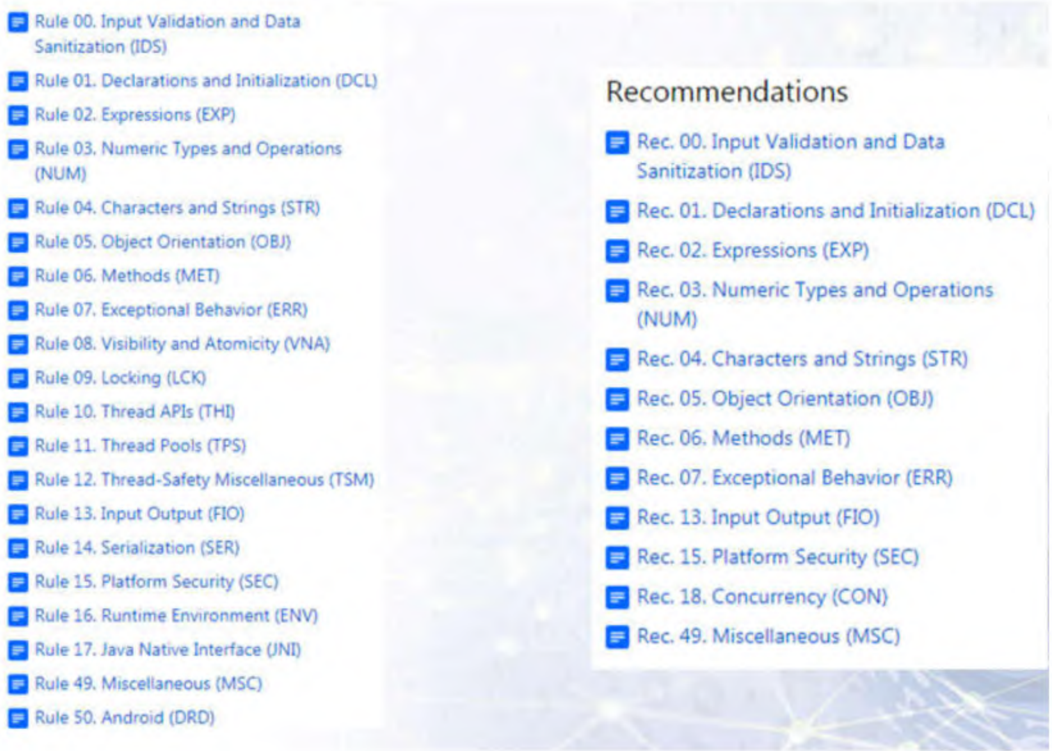


- Rule 00. Input Validation and Data Sanitization (IDS)
- Rule 01. Declarations and Initialization (DCL)
- Rule 02. Expressions (EXP)
- Rule 03. Numeric Types and Operations (NUM)
- Rule 04. Characters and Strings (STR)
- Rule 05. Object Orientation (OBJ)
- Rule 06. Methods (MET)
- Rule 07. Exceptional Behavior (ERR)
- Rule 08. Visibility and Atomicity (VNA)
- Rule 09. Locking (LCK)
- Rule 10. Thread APIs (THI)
- Rule 11. Thread Pools (TPS)
- Rule 12. Thread-Safety Miscellaneous (TSM)
- Rule 13. Input Output (FIO)
- Rule 14. Serialization (SER)
- Rule 15. Platform Security (SEC)
- Rule 16. Runtime Environment (ENV)
- Rule 17. Java Native Interface (JNI)
- Rule 49. Miscellaneous (MSC)
- Rule 50. Android (DRD)

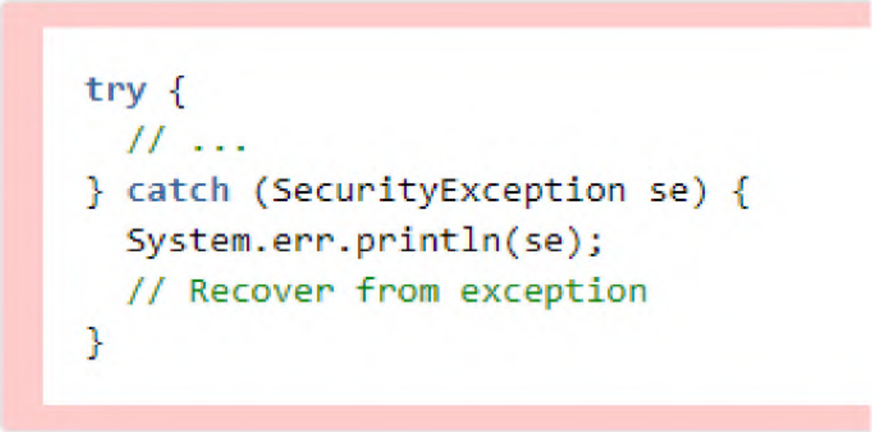
Recommendations

- Rec. 00. Input Validation and Data Sanitization (IDS)
- Rec. 01. Declarations and Initialization (DCL)
- Rec. 02. Expressions (EXP)
- Rec. 03. Numeric Types and Operations (NUM)
- Rec. 04. Characters and Strings (STR)
- Rec. 05. Object Orientation (OBJ)
- Rec. 06. Methods (MET)
- Rec. 07. Exceptional Behavior (ERR)
- Rec. 13. Input Output (FIO)
- Rec. 15. Platform Security (SEC)
- Rec. 18. Concurrency (CON)
- Rec. 49. Miscellaneous (MSC)

- **Rule 7**

– ERR02-J. Prevent exceptions while logging data

– Exceptions that are thrown while logging is in progress can prevent successful logging unless special care is taken. Failure to account for exceptions during the logging process can cause security vulnerabilities, such as allowing an attacker to conceal critical security exceptions by preventing them from being logged. Hence, programs must ensure that data logging continues to operate correctly even when exceptions are thrown during the logging process.

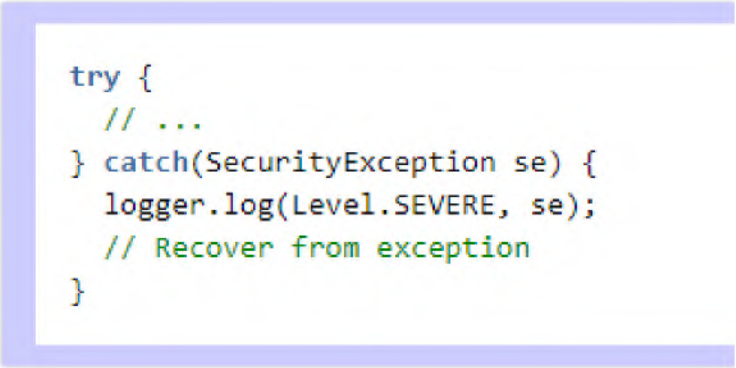


```
try {
  // ...
} catch (SecurityException se) {
  System.err.println(se);
  // Recover from exception
}
```

- **Non-compliant Code Example:**

– This noncompliant code example writes a critical security exception to the standard error stream:

– Writing such exceptions to the standard error stream is inadequate for logging purposes. First, the standard error stream may be exhausted or closed, preventing recording of subsequent exceptions. Second, the trust level of the standard error stream may be insufficient for recording certain security-critical exceptions or errors without leaking sensitive information. If an I/O error were to occur while writing the security exception, the catch block would throw an IOException and the critical security exception would be lost. Finally, an attacker may disguise the exception so that it occurs with several other innocuous exceptions.



```
try {
  // ...
} catch(SecurityException se) {
  logger.log(Level.SEVERE, se);
  // Recover from exception
}
```

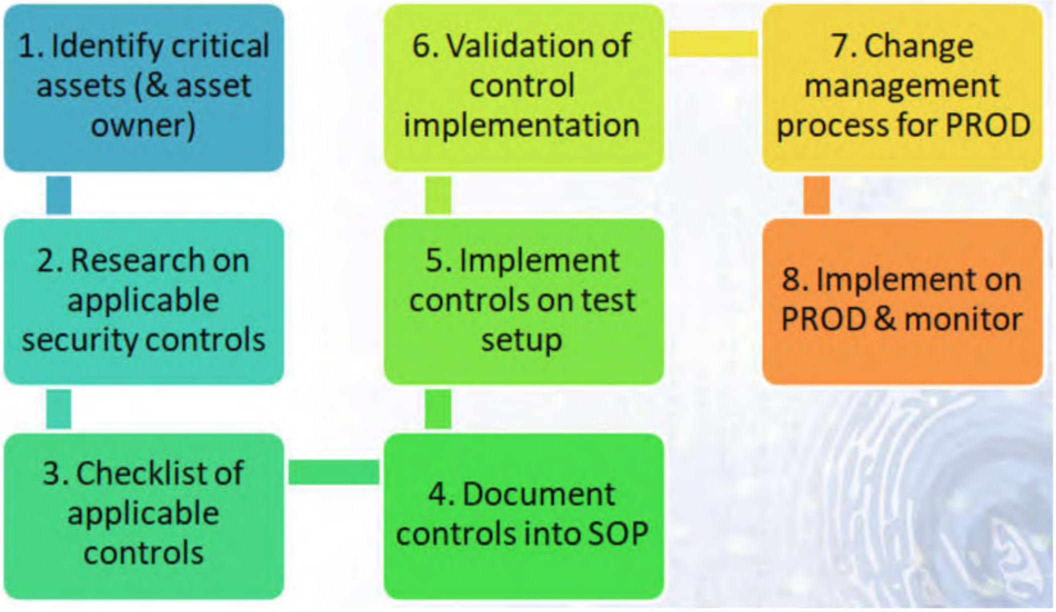
- **Compliant Solution:**

– This compliant solution uses java.util.logging.Logger, the default logging API provided by JDK 1.4 and later. Use of other compliant logging mechanisms, such as log4j, is also permitted.

– Typically, only one logger is required for the entire program.

Topic no 102: CASE STUDY – PERL APPLICATIONS SECURITY HARDENING

- Carnegie Mellon Software Engineering Institute
- https://wiki.sei.cmu.edu/confluence/display/perl/SEI+CERT+Perl+Coding+Standard



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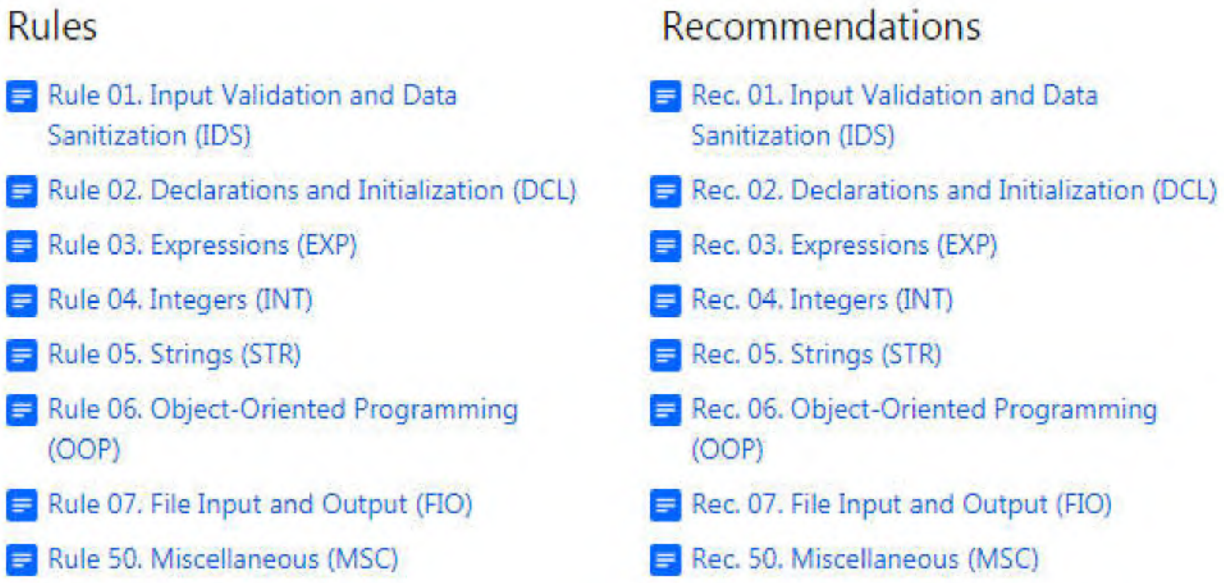


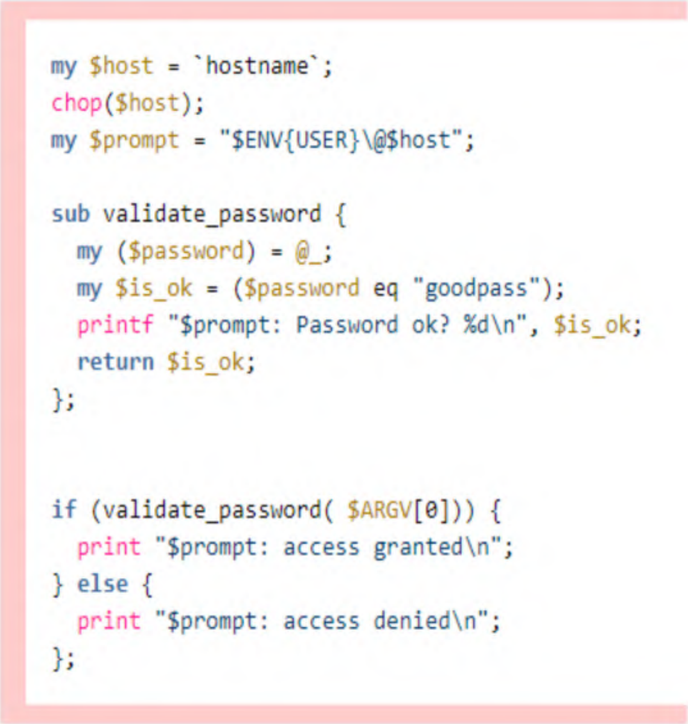
Rules

- Rule 01. Input Validation and Data Sanitization (IDS)
- Rule 02. Declarations and Initialization (DCL)
- Rule 03. Expressions (EXP)
- Rule 04. Integers (INT)
- Rule 05. Strings (STR)
- Rule 06. Object-Oriented Programming (OOP)
- Rule 07. File Input and Output (FIO)
- Rule 50. Miscellaneous (MSC)

Recommendations

- Rec. 01. Input Validation and Data Sanitization (IDS)
- Rec. 02. Declarations and Initialization (DCL)
- Rec. 03. Expressions (EXP)
- Rec. 04. Integers (INT)
- Rec. 05. Strings (STR)
- Rec. 06. Object-Oriented Programming (OOP)
- Rec. 07. File Input and Output (FIO)
- Rec. 50. Miscellaneous (MSC)

- **Rule 1**
- IDS30-PL. Exclude user input from format strings
- Never call any formatted I/O function with a format string containing user input.
- An attacker who can fully or partially control the contents of a format string can crash the Perl interpreter or cause a denial of service. She can also modify values, perhaps by using the %n|| conversion specifier, and use these values to divert control flow. Their capabilities are not as strong as in C [Seacord 2005]; nonetheless the danger is sufficiently great that the formatted output functions {{sprintf() and printf() should never be passed unsanitized format strings.

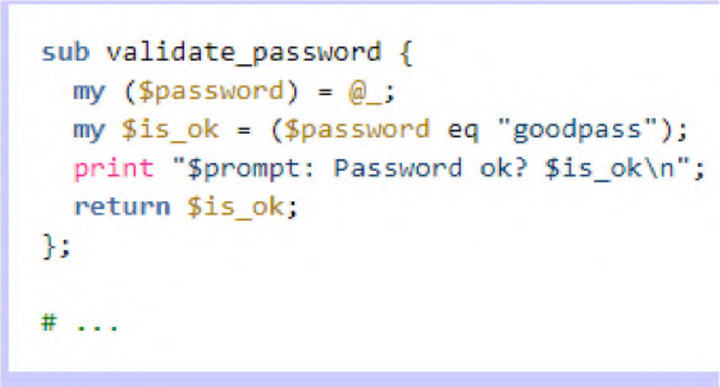


```
my $host = `hostname`;
chop($host);
my $prompt = "$ENV{USER}\@$host";

sub validate_password {
  my ($password) = @_;
  my $is_ok = ($password eq "goodpass");
  printf "$prompt: Password ok? %d\n", $is_ok;
  return $is_ok;
};


if (validate_password( $ARGV[0])) {
  print "$prompt: access granted\n";
} else {
  print "$prompt: access denied\n";
};
```

- This **noncompliant code example** tries to authenticate a user by having the user supply a password and granting access only if the password is correct.



```
sub validate_password {
  my ($password) = @_;
  my $is_ok = ($password eq "goodpass");
  print "$prompt: Password ok? $is_ok\n";
  return $is_ok;
};

# ...
```

- This **compliant code example** avoids the use of printf(), since print() provides sufficient functionality.

Topic no 103: Case Study Security Hardening – Android

- CIS Benchmarks case study (Google Android 7)

CIS Google Android 7 Benchmark

v1.0.0 - 01-24-2017

- January 24, 2017
- 87 pages PDF doc
- *1.15 Ensure Android Device Manager is set to Enabled (Not Scored)*
- Profile applicability:
  - Level 2
  - **Description:** Setup **Android Device Manager** as a Device Administrator.
- **Rationale:**
  - If you lose your Android device, you could use Android Device Manager to find your device and also ring, lock, or erase your device data remotely.
- **Audit:** Follow the below steps to verify that Android Device Manager is enabled:

  1. Tap the System Settings Gear Icon.
  2. Scroll to Personal.
  3. Tap Security.
  4. Scroll to Device administration;
  5. Tap Device administrators.
  6. Verify that Android Device Manager is enabled.

- **Remediation:** Follow the below steps to enable Android Device Manager:

  7. Tap the System Settings Gear Icon.
  8. Scroll to Personal.
  9. Tap Security.
  10. Scroll to Device administration;
  11. Tap Device administrators.

12. Tap Android Device Manager.
13. Tap Activate this device administrator.

- **Impact:**
  - Google may track your device location anytime.
- **Default Value:**
  - By default, Android Device Manager is not enabled.

Topic no 104: Case Study Security Hardening – Apple IOS 10

- CIS Benchmarks case study (Apple IOS 10)

CIS Apple iOS 10 Benchmark

v2.0.0 - 05-15-2017

- May 15, 2017
- 138 pages PDF doc
- *3.2.1.12 (L2) Ensure 'Allow modifying cellular data app settings' is set to 'Disabled' (Not Scored)*
- **Profile applicability:**
  - Level 2 - Institutionally Owned Devices
  - **Description:** This recommendation pertains to modifying the use of cellular data by apps.
- **Rationale:**
  - It is appropriate for an institution to have remote locating and erasure capability with their devices. Forcing cellular data to remain active is a means of supporting this goal.
- **Audit:**
  - From the Configuration Profile:

1. Open Apple Configurator
2. Open the Configuration Profile
3. In the left windowpane, click on the Restrictions tab.

4. In the right windowpane, verify that under the tab

Functionality, that the checkbox for Allow modifying cellular data app settings is unchecked. Or, from the device:

- Tap Settings.
- Tap General.
- Tap Profile.
- Tap <_Profile Name_>.
- Tap Restrictions.
- Confirm Changing app cellular data usage not allowed is displayed.

- **Remediation:**

- Open Apple Configurator.
- Open the Configuration Profile.
- In the left windowpane, click on the Restrictions tab;
- In the right windowpane, under the tab Functionality, uncheck the checkbox for **Allow modifying cellular data app settings.**
- Deploy the Configuration Profile.

- **CIS Controls:**

- 5.1 Minimize And Sparingly Use Administrative Privileges Minimize administrative privileges and only use administrative accounts when they are required;
- Implement focused auditing on the use of administrative privileged functions and monitor for anomalous behavior

Topic no 105: CASE STUDY – ASTERISK VOIP SECURITY HARDENING

1. Physically secure your IP PBX and network hardware

- The first step to security of your system

2. Never, Never, Never use the default passwords on any system. (Use Strong Passwords)

- This will stop most of the attacks as hackers use weak passwords to break in

3. Never use the same Username and password on your extensions

- “This is another VERY common issue, especially within the Asterisk community. Using password 101 for extension 101 is asking for big trouble. DON’T DO IT!”

4. Place your PBX behind a Firewall

- Use VPNs for remote access and limit to specific IP addresses
- Allow access on ports which are absolutely necessary
- Disable anonymous WAN requests (ICMP or PING) access to your IP PBX

5. Use the “permit=” and “deny=” lines in sip.conf

- “Use the “permit=” and “deny=” lines in sip.conf to only allow a small range of IP addresses access to extension/user in your sip.conf file. This is true even if you decide to allow inbound calls from “anywhere” (default), it won't let those users reach any authenticated elements!”

6. Keep inbound and outbound routing separate (asterisk)

- This is probably the biggest cause and source of toll fraud. By keeping your inbound call routing in a different context than your outbound routing, if an intruder does happen to make it into your system, he can’t get back out again.

Topic no 106: CASE STUDY – ASTERISK VOIP SECURITY HARDENING (2)

7. Limit registration by extensions to your local subnet.

- Restrict the IP addresses your extensions can register onto the local subnet. Asterisk PBXs can use the ACL (permit/deny) in SIP.conf to block IP addresses. This can fend off brute force registration attempts.

8. Disable channels and services that are not in use

- Disable channels that you aren’t using like skinny and MGCP. For Asterisk PBXs, you can “unload” these modules in the /etc/modules.conf file

9. Make it harder for sip scanners (Set “alwaysauthreject=yes”)

- Set “alwaysauthreject=yes” in your sip configuration file. What this does is prevent Asterisk from telling a sip scanner which extensions are valid by rejecting authentication requests on existing usernames with the same rejection details as with nonexistent usernames. If they can't find you they can't hack you!
- Another way to make it hard for SIP scanners is to install a SIP port firewall. This will block “scanning” of port 5060 and 5061 and can disable the attempting endpoint for a specific time when it detects a violation.

10. Limit and restrict routing and phone number dial plans

- Restrict calling to high-cost calling destination and don’t allow calling to 0900 + Premium numbers)

Topic no 106: CASE STUDY – ASTERISK VOIP SECURITY HARDENING (2)

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4. Limit and restrict routing and phone number dial plans

- Restrict calling to high-cost calling destination and don't allow calling to 0900 + Premium numbers)

5. Audit your system security regularly

Topic no 107: Version Control For IT Assets

- Benefits of version control
- Security implications

- ## Benefits of version control

  - http://its.unl.edu/bestpractices/version-management

  1. Organized, coordinated management of changes to software assets by one or many individuals, some of whom may be geographically dispersed
  2. Organized, coordinated management of changes to software assets for emergency hot-fixes, routine maintenance, upgrades …& new features with potentially overlapping dev timeframes (e.g., work on new features occurs simultaneously with work on routine maintenance and/or hot-

fixes)

3. An auditable change history (e.g., what changed, when, and by whom)
4. A reliable master copy of what assets are currently in production
5. A reliable master copy of assets from which to build and/or configure the production environment
6. Reliable copies of previous production versions of assets
7. Ability to see the specific differences between distinct versions of a given asset

- Security controls:
    - Access control measures
    - Privileged management
    - Backups

Topic no 108: Version Control Best Practices

- **Version control best practices**
    - https://intland.com/blog/sdlc/source-control-management-best-practices/

1. Starting with the basics, choose a source control system.
2. Keep your source code in source control (but not files generated / compiled from it).
3. Ensure the working file is from the latest version of the source file.
4. Only Check-out the file being worked upon.
5. Check in immediately after alterations are completed.
6. Review every change before committing, utilize the diff function!
7. Commit often, – every commit provides a rollback position.
8. Make extensive, – detailed notes in the check-in comments about why the changes were made.
9. Developers must commit their own changes (only).
10. Use the ignore button for files that should not be committed, consider adding pre-commit filters to prevent the wrong kinds of file (such as accidental check-in of personal user settings docs) from entering the source control
11. Ensure external dependencies are added to the source control, a common problem where everything works great on the contributing developers system but not elsewhere because they forgot to add

dependent files to the system.

Topic no 109: SECURITY HARDENING - SECURE SOFTWARE IMAGES

- CIS 20 CRITICAL SECURITY CONTROLS
- CONTROL 5, VERSION 7
- Secure Configuration for Hardware and Software on Mobile Devices, Laptops, Workstations and Servers

Establish Secure Configurations

- Maintain documented, standard security configuration standards for all authorized operating systems and software.

Maintain Secure Images

- Maintain secure images or templates for all systems in the enterprise based on the organization's approved configuration standards. Any new system deployment or existing system that becomes compromised should be imaged using one of those images or templates.

Securely Store Master Images

- Store the master images and templates on securely configured servers, validated with integrity monitoring tools, to ensure that only authorized changes to the images are possible.

Deploy System Configuration Management Tools

- Deploy system configuration management tools that will automatically enforce and redeploy configuration settings to systems at regularly scheduled intervals.

Implement Automated Configuration Monitoring Systems

- Utilize a Security Content Automation Protocol (SCAP) compliant configuration monitoring system to verify all security configuration elements, catalog approved exceptions, and alert when unauthorized changes occur.

Topic no 110: SECURITY HARDENING – MANUAL & AUTOMATED WORK

- Manual & Automated mechanisms for security hardening & validation
- **Step 1:** Scan an IT asset using Qualys compliance scan, NESSUS compliance scan, or CIS CAT PRO Tool
    - Acquire report of failed controls

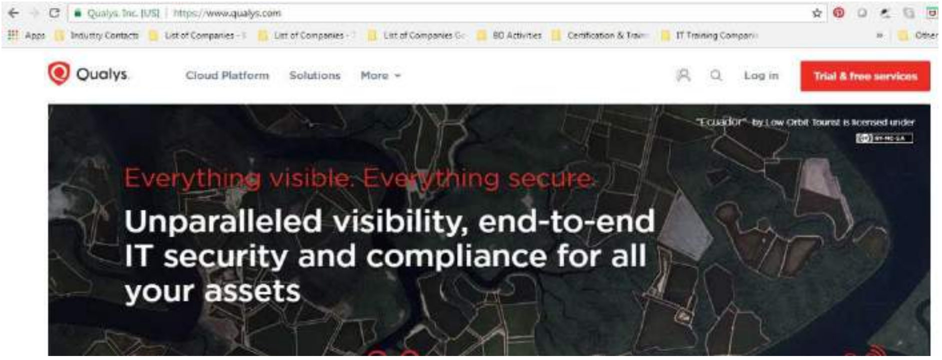
- **Step 2:** Apply the failed controls using AD (for Windows) or manually for other systems & devices

- **Step 3:** Use the automated feature of Qualys compliance scan, Nessus compliance scan or CIS CAT Pro Tool to verify that the applied controls are in place
  - Compare the ‘before’ and ‘after’ report
- **Step 4:** Manually verify if any discrepancy is found (control should be in place but not being validated by the tool)

- **Step 5:** For any system or device for which the Qualys compliance scan, Nessus compliance scan, or CIS CAT Pro Tool scan cannot be performed, conduct the validation of control implementation manually
  - Use sampling where necessary during manual validation work to reduce workload
  - For example, 15-20 % of assets may be checked at random
  - Or 15-20% of controls may be checked on an asset

Topic no 111 & 112 : QUALYS DEMO – SECURITY HARDENING

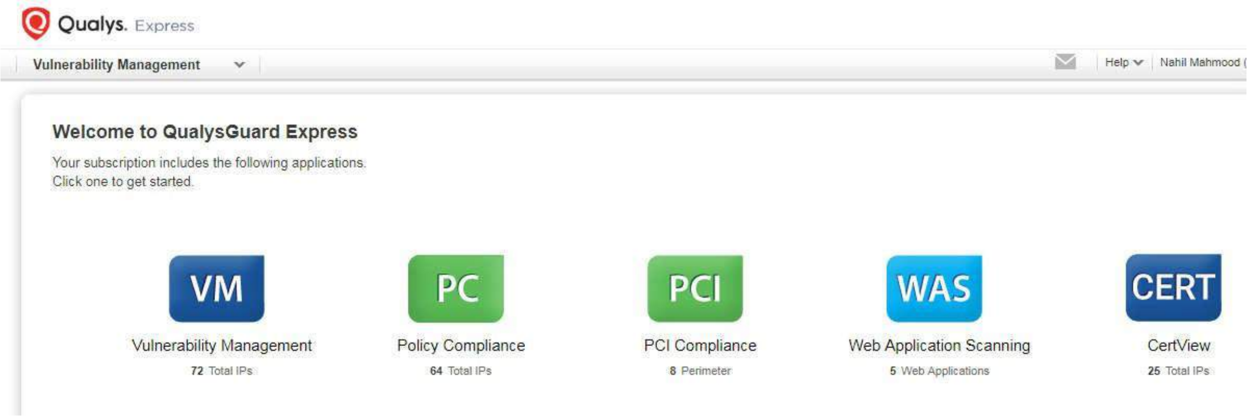
- Lets have a look at how Qualys can aid in the security hardening process



Everything visible. Everything secure.

Unparalleled visibility, end-to-end IT security and compliance for all your assets

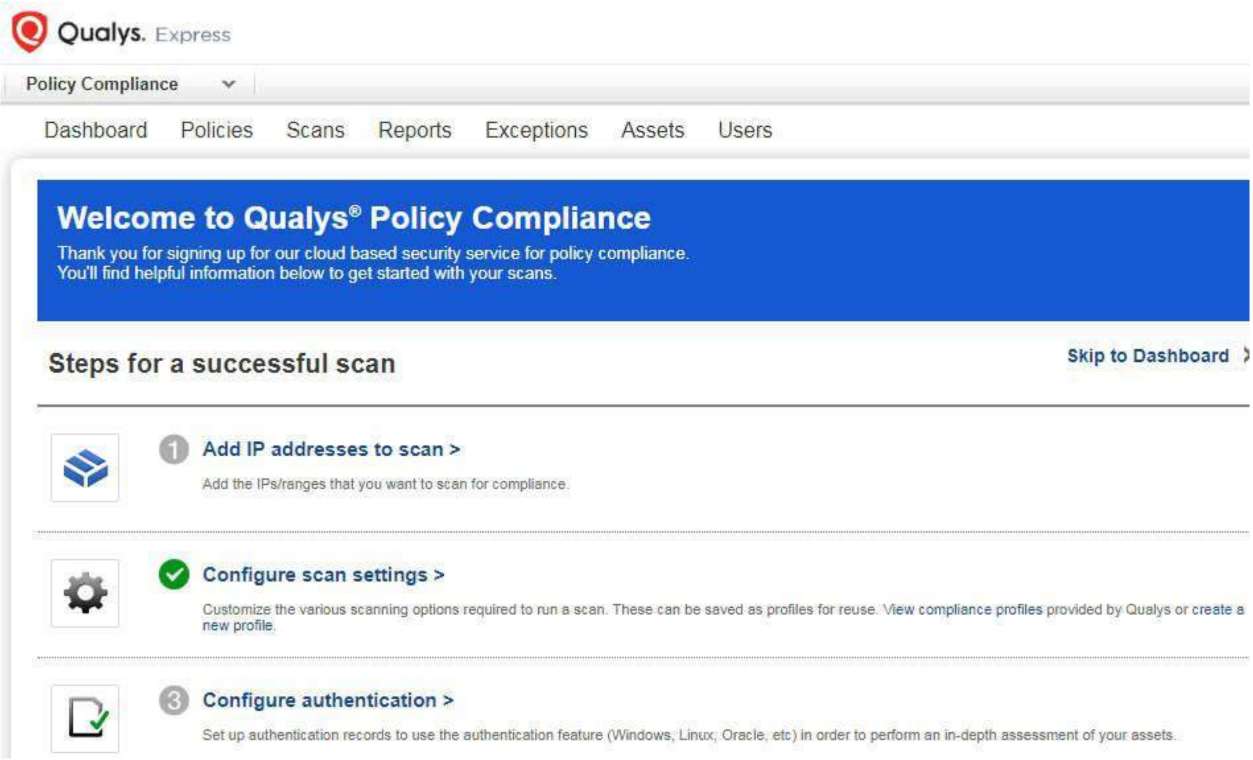
QUALYS WEBSITE – FREE TRIAL



Welcome to QualysGuard Express

Your subscription includes the following applications.
Click one to get started.

QUALYS GUARD – HOME SCREEN



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Steps for a successful scan

1 Add IP addresses to scan >

Add the IPs/ranges that you want to scan for compliance.

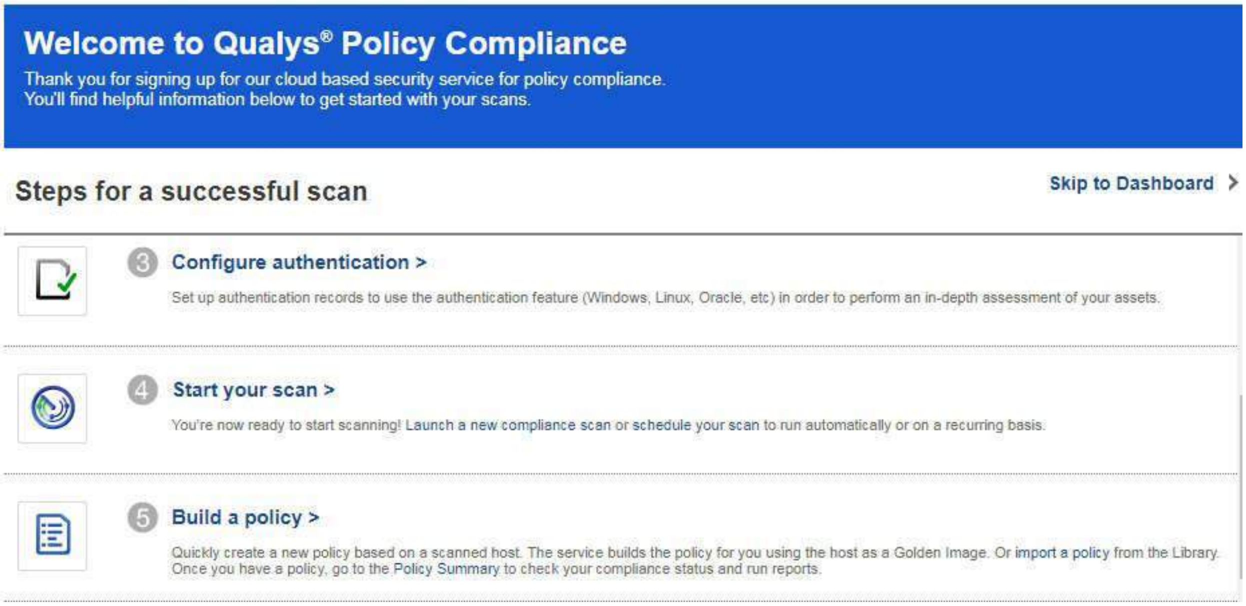
✓ Configure scan settings >

Customize the various scanning options required to run a scan. These can be saved as profiles for reuse. View compliance profiles provided by Qualys or create a new profile.

3 Configure authentication >

Set up authentication records to use the authentication feature (Windows, Linux, Oracle, etc) in order to perform an in-depth assessment of your assets.

POLICY COMPLIANCE – HOME SCREEN



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5 Build a policy >

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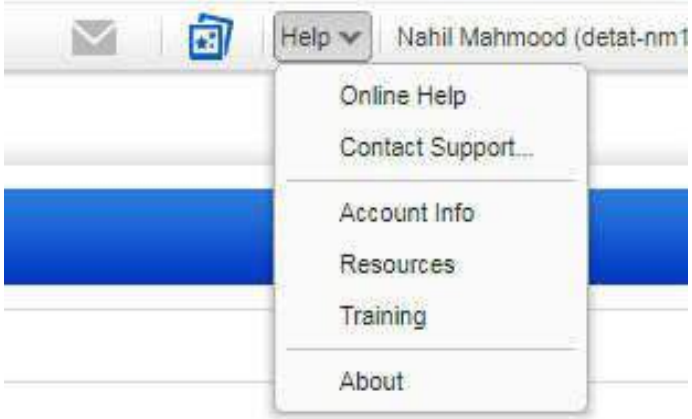
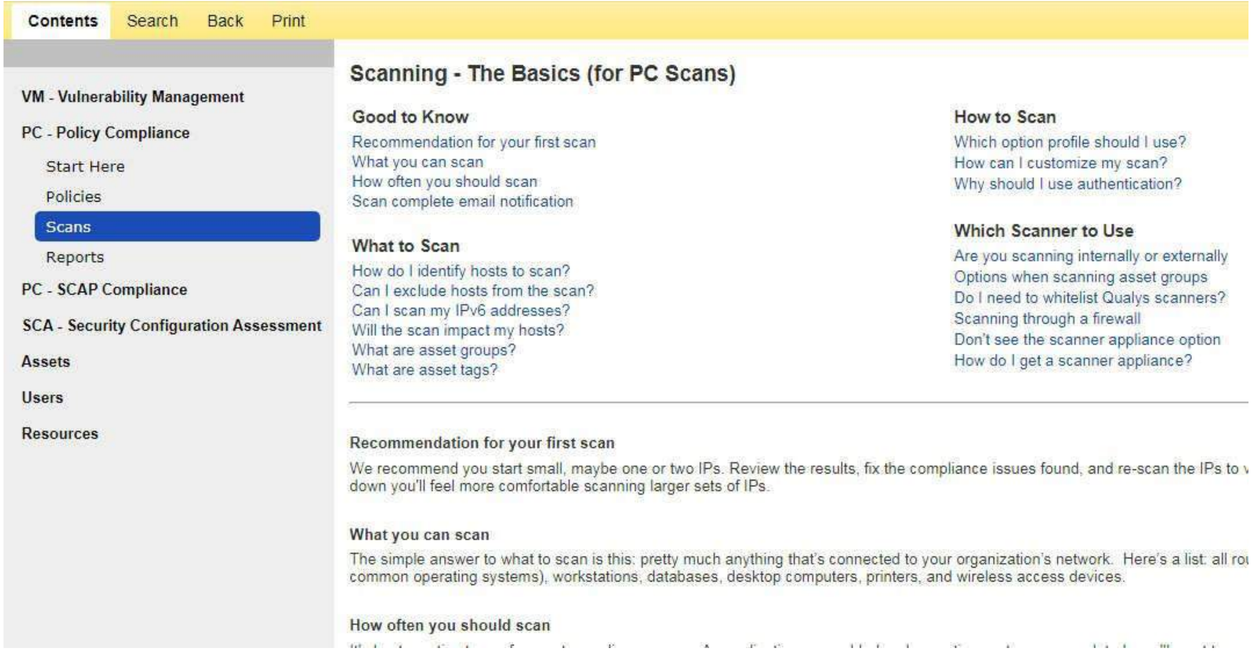
POLICY COMPLIANCE – 5 STEPS



HELP OPTIONS



Scanning - The Basics (for PC Scans)

Good to Know

Recommendation for your first scan
What you can scan
How often you should scan
Scan complete email notification

What to Scan

How do I identify hosts to scan?
Can I exclude hosts from the scan?
Can I scan my IPv6 addresses?
Will the scan impact my hosts?
What are asset groups?
What are asset tags?

How to Scan

Which option profile should I use?
How can I customize my scan?
Why should I use authentication?

Which Scanner to Use

Are you scanning internally or externally
Options when scanning asset groups
Do I need to whitelist Qualys scanners?
Scanning through a firewall
Don't see the scanner appliance option
How do I get a scanner appliance?

Recommendation for your first scan

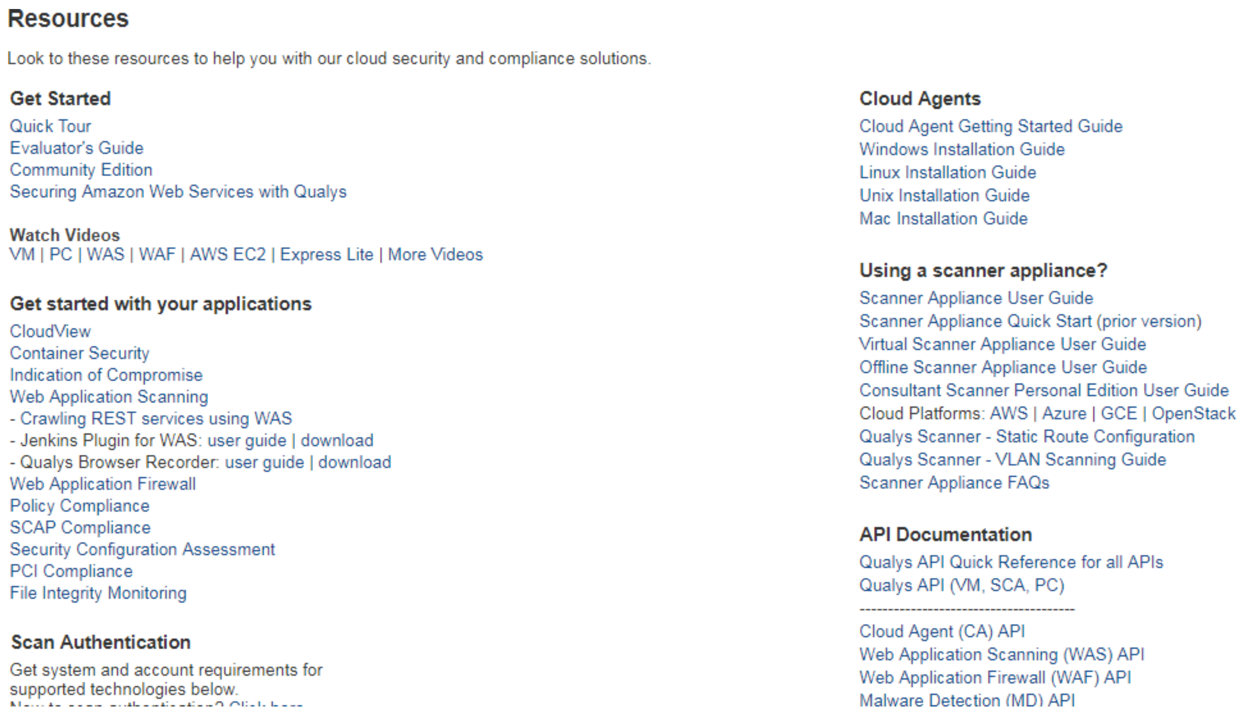
We recommend you start small, maybe one or two IPs. Review the results, fix the compliance issues found, and re-scan the IPs to down you'll feel more comfortable scanning larger sets of IPs.

What you can scan

The simple answer to what to scan is this: pretty much anything that's connected to your organization's network. Here's a list: all common operating systems), workstations, databases, desktop computers, printers, and wireless access devices.

How often you should scan

ONLINE HELP – POLICY COMPLIANCE



Resources

Look to these resources to help you with our cloud security and compliance solutions.

Get Started

Quick Tour
Evaluator's Guide
Community Edition
Securing Amazon Web Services with Qualys

Watch Videos

VM | PC | WAS | WAF | AWS EC2 | Express Lite | More Videos

Get started with your applications

CloudView
Container Security
Indication of Compromise
Web Application Scanning
- Crawling REST services using WAS
- Jenkins Plugin for WAS: user guide | download
- Qualys Browser Recorder: user guide | download
Web Application Firewall
Policy Compliance
SCAP Compliance
Security Configuration Assessment
PCI Compliance
File Integrity Monitoring

Scan Authentication

Get system and account requirements for supported technologies below.

Cloud Agents

Cloud Agent Getting Started Guide
Windows Installation Guide
Linux Installation Guide
Unix Installation Guide
Mac Installation Guide

Using a scanner appliance?

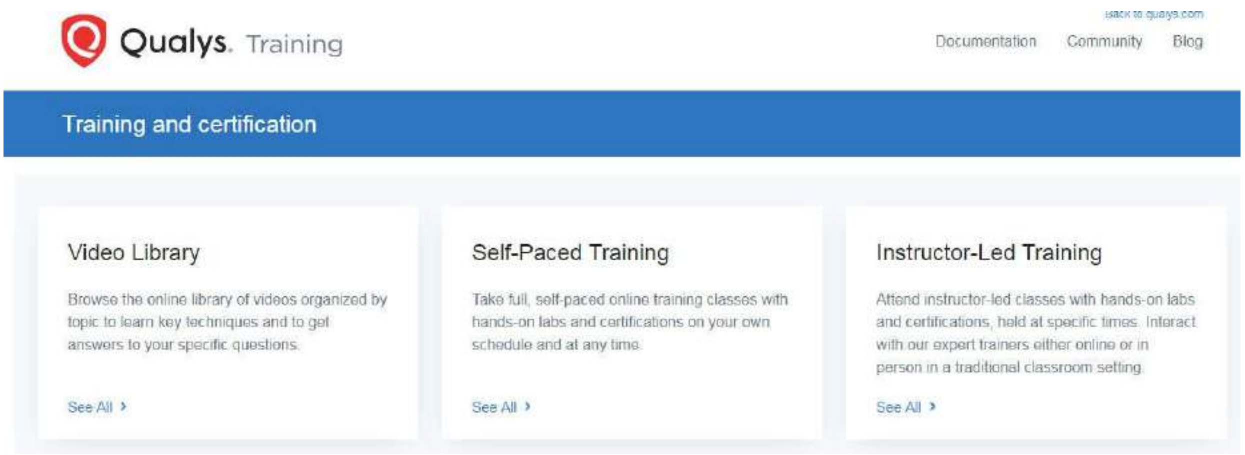
Scanner Appliance User Guide
Scanner Appliance Quick Start (prior version)
Virtual Scanner Appliance User Guide
Offline Scanner Appliance User Guide
Consultant Scanner Personal Edition User Guide
Cloud Platforms: AWS | Azure | GCE | OpenStack
Qualys Scanner - Static Route Configuration
Qualys Scanner - VLAN Scanning Guide
Scanner Appliance FAQs

API Documentation

Qualys API Quick Reference for all APIs
Qualys API (VM, SCA, PC)

Cloud Agent (CA) API
Web Application Scanning (WAS) API
Web Application Firewall (WAF) API
Malware Detection (MD) API

RESOURCES



Training and certification

Video Library

Browse the online library of videos organized by topic to learn key techniques and to get answers to your specific questions.

See All ›

Self-Paced Training

Take full, self-paced online training classes with hands-on labs and certifications on your own schedule and at any time.

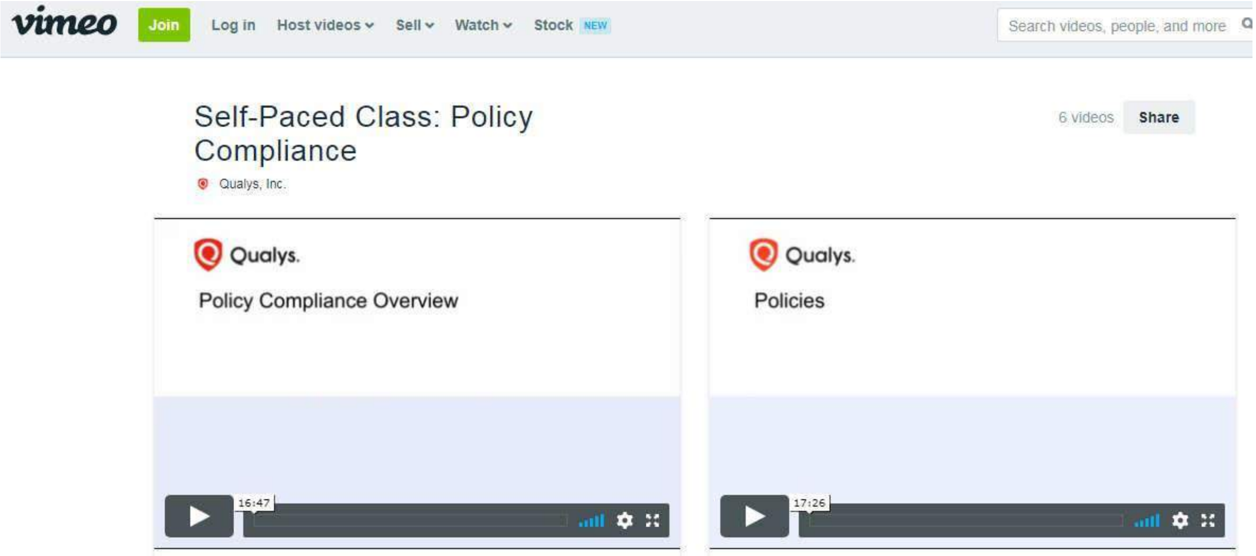
See All ›

Instructor-Led Training

Attend instructor-led classes with hands-on labs and certifications, held at specific times. Interact with our expert trainers either online or in person in a traditional classroom setting.

See All ›

QUALYS WEBSITE - TRAINING

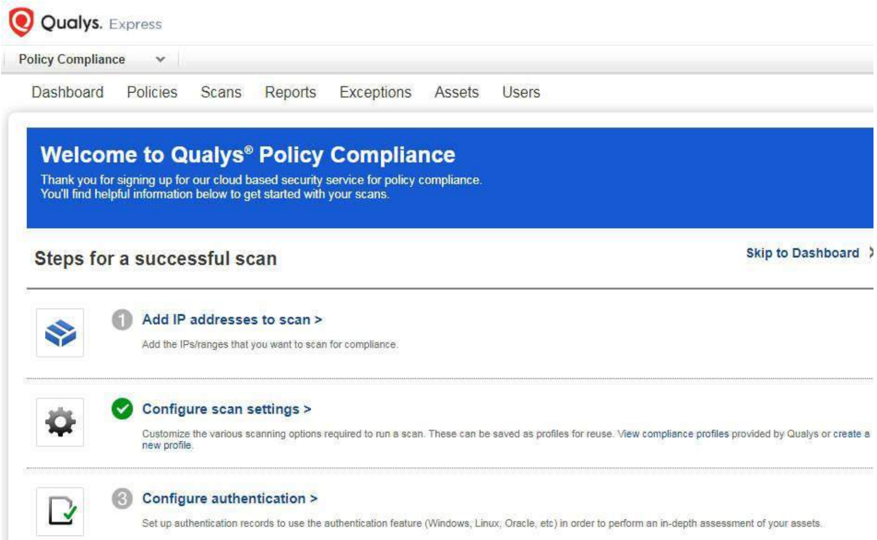


Self-Paced Class: Policy Compliance

Qualys, Inc.

TRAINING VIDEOS - VIMEO

- Qualys is an excellent tool with detailed online help, training, and resources to aid the new user



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Configure scan settings >

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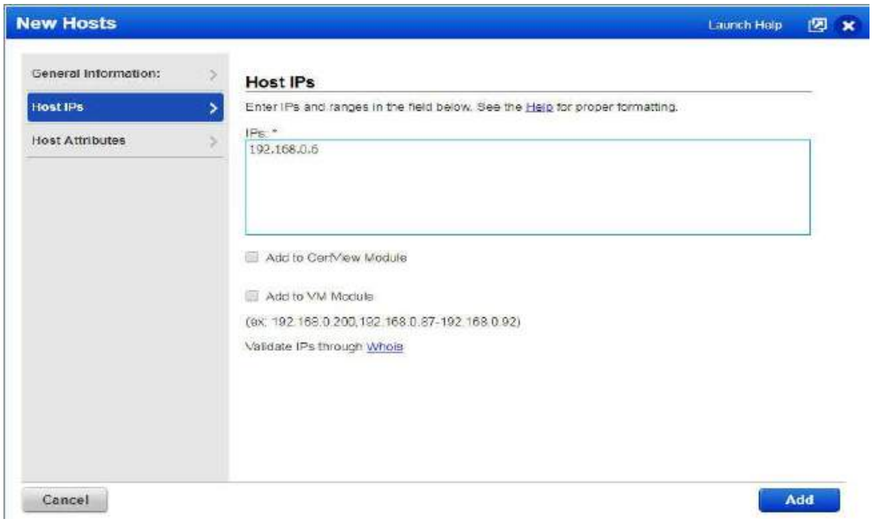
1. ADD IP ADDRESSES TO SCAN



Host IPs

Enter IPs and ranges in the field below. See the Help for proper formatting.

IPs: *

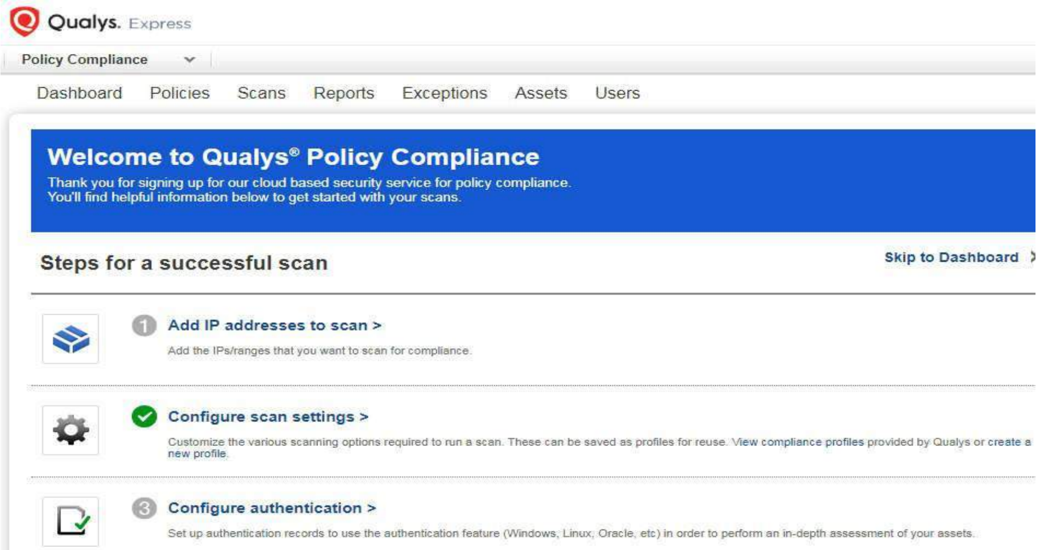
192.168.0.6

☐ Add to CertView Module

☐ Add to VM Module

(ex: 192.168.0.200,192.168.0.87-192.168.0.92)

Validate IPs through Whois



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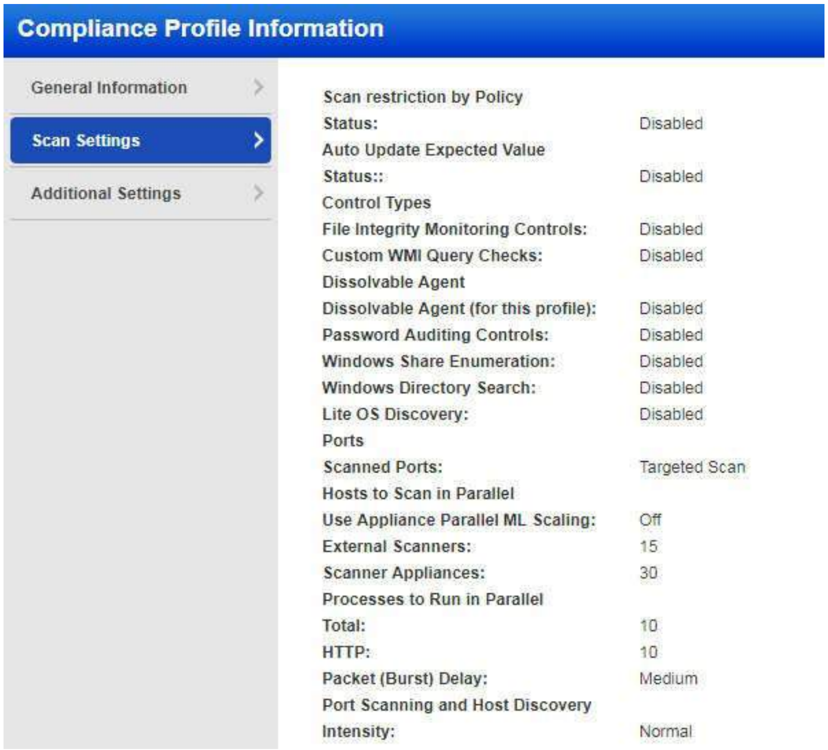
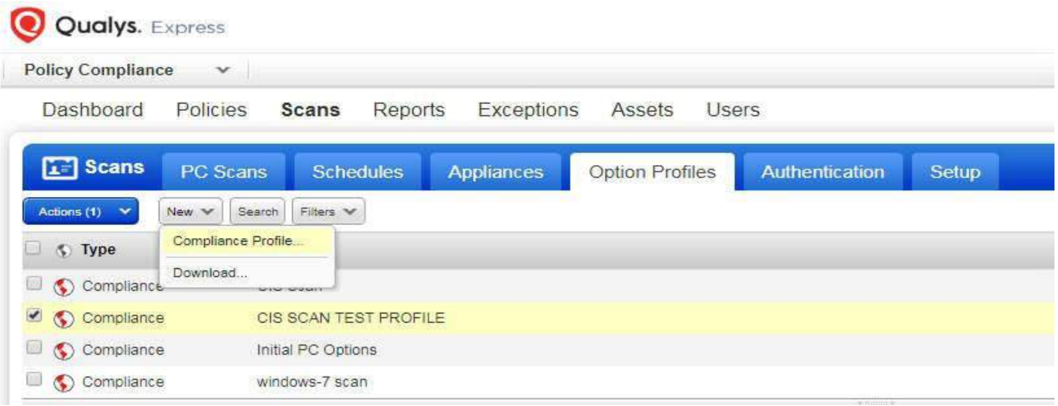
1. CONFIGURE SCAN SETTINGS



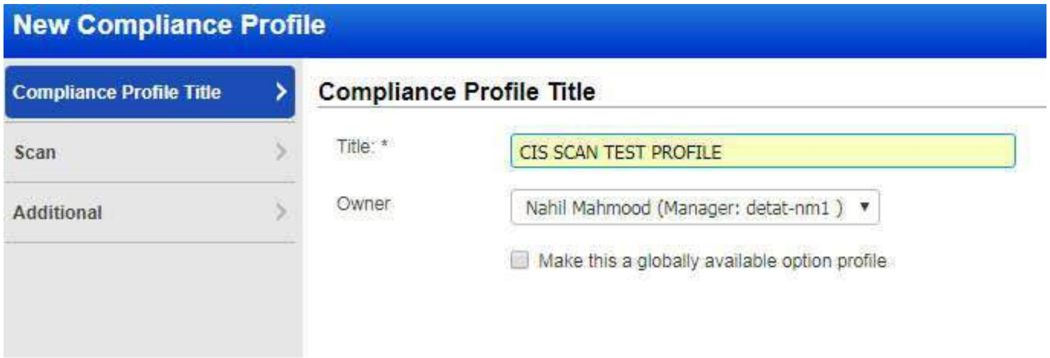
Compliance Profile Information

Scan restriction by Policy	
Status:	Disabled
Auto Update Expected Value	
Status::	Disabled
Control Types	
File Integrity Monitoring Controls:	Disabled
Custom WMI Query Checks:	Disabled
Dissolvable Agent	
Dissolvable Agent (for this profile):	Disabled
Password Auditing Controls:	Disabled
Windows Share Enumeration:	Disabled
Windows Directory Search:	Disabled
Lite OS Discovery:	Disabled
Ports	
Scanned Ports:	Targeted Scan
Hosts to Scan in Parallel	
Use Appliance Parallel ML Scaling:	Off
External Scanners:	15
Scanner Appliances:	30
Processes to Run in Parallel	
Total:	10
HTTP:	10
Packet (Burst) Delay:	Medium
Port Scanning and Host Discovery	
Intensity:	Normal



□	Type	
□	Compliance	CIS Scan
☑	Compliance	CIS SCAN TEST PROFILE
□	Compliance	Initial PC Options
□	Compliance	windows-7 scan

NEW COMPLIANCE PROFILE



New Compliance Profile

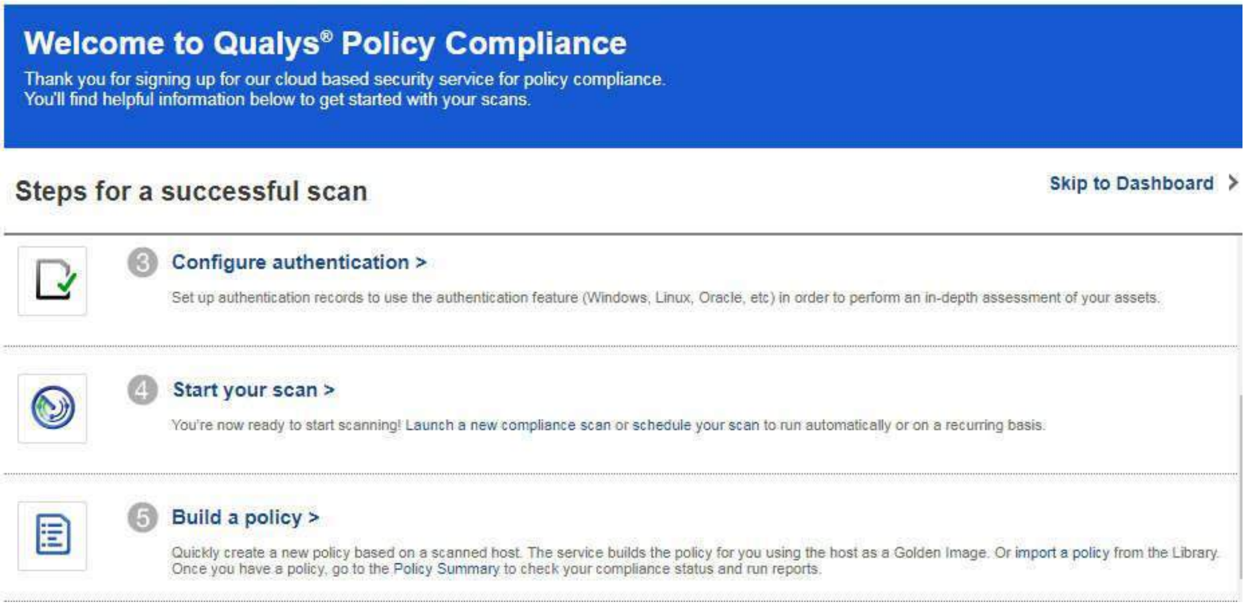
Compliance Profile Title

Title: * CIS SCAN TEST PROFILE

Owner Nahil Mahmood (Manager: detat-nm1) ▼

□ Make this a globally available option profile

‘CIS SCAN TEST PROFILE’ CREATED



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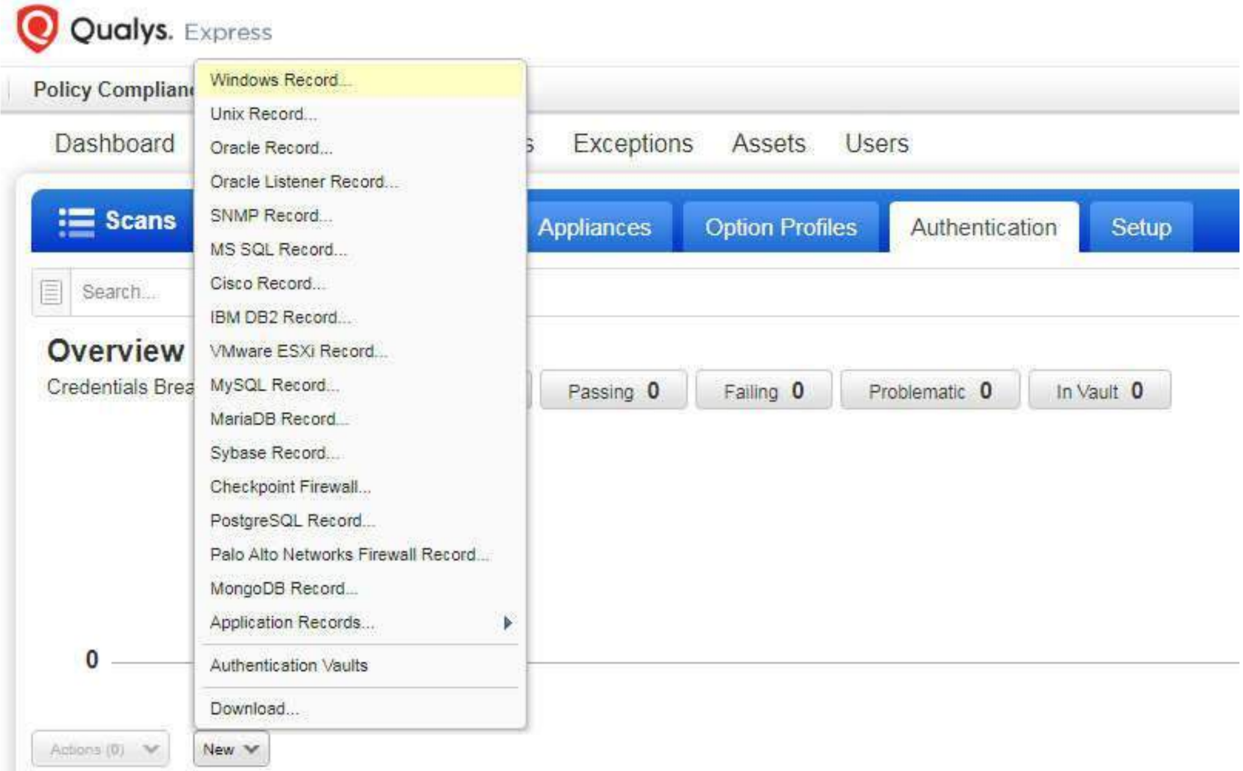
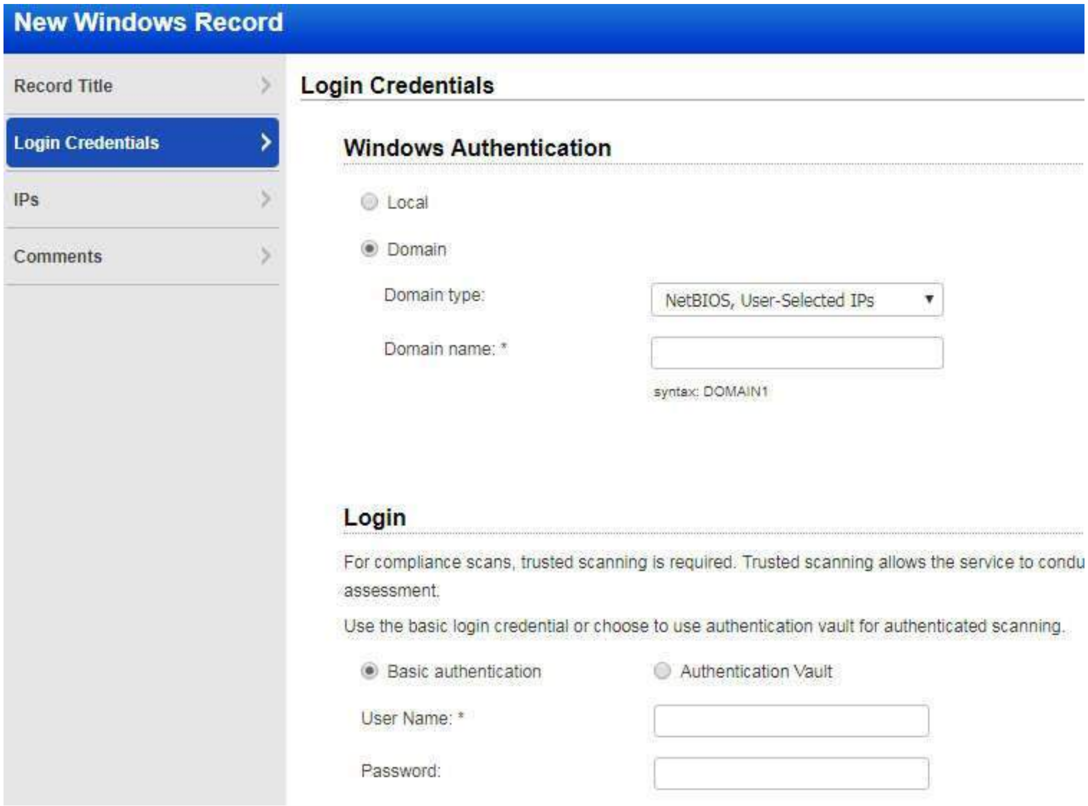
Once you have a policy, go to the Policy Summary to check your compliance status and run reports.

2. CONFIGURE AUTHENTICATION





New Windows Record

Login Credentials

Windows Authentication

○ Local

● Domain

Domain type: NetBIOS, User-Selected IPs ▾

Domain name: *

syntax: DOMAIN1

Login

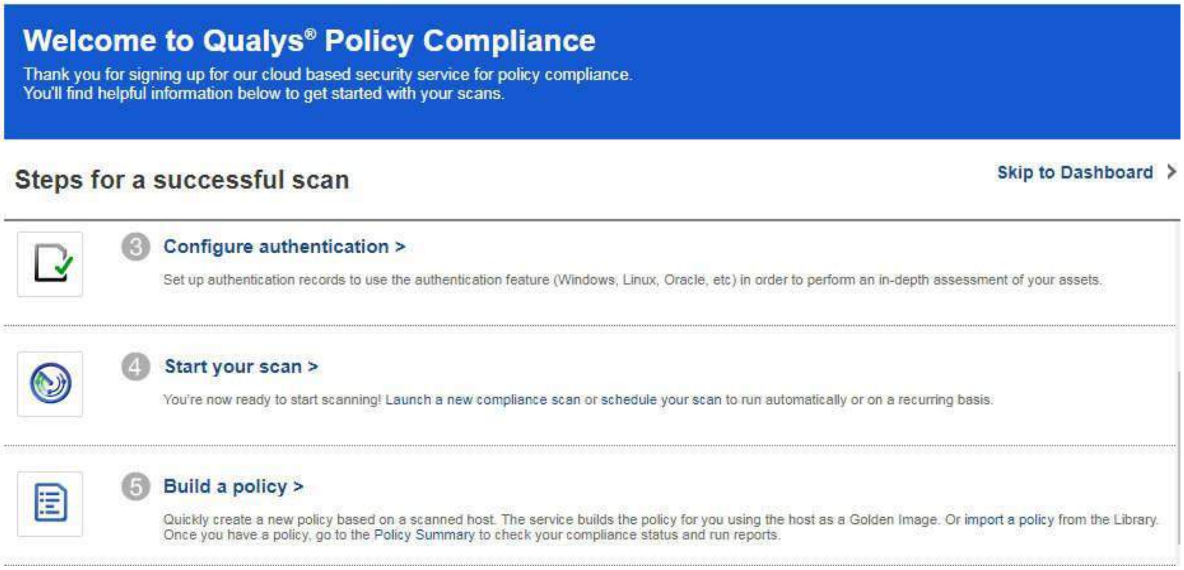
For compliance scans, trusted scanning is required. Trusted scanning allows the service to condu
assessment.

Use the basic login credential or choose to use authentication vault for authenticated scanning.

● Basic authentication ○ Authentication Vault

User Name: *

Password:



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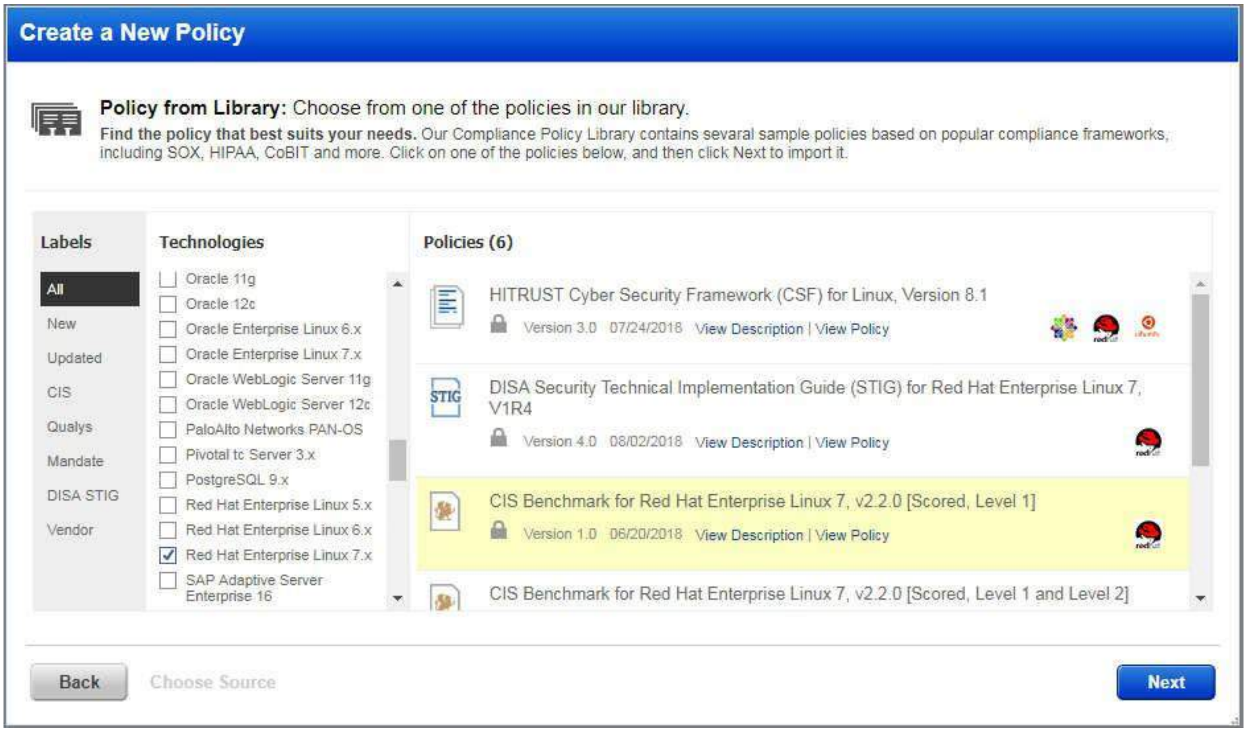


Create a New Policy

Policy from Library: Choose from one of the policies in our library.

Find the policy that best suits your needs. Our Compliance Policy Library contains sevaral sample policies based on popular compliance frameworks, including SOX, HIPAA, CoBIT and more. Click on one of the policies below, and then click Next to import it.

Technologies

- □ Oracle 11g
- □ Oracle 12c
- □ Oracle Enterprise Linux 6.x
- □ Oracle Enterprise Linux 7.x
- □ Oracle WebLogic Server 11g
- □ Oracle WebLogic Server 12c
- □ PaloAlto Networks PAN-OS
- □ Pivotal tc Server 3.x
- □ PostgreSQL 9.x
- □ Red Hat Enterprise Linux 5.x
- □ Red Hat Enterprise Linux 6.x
- ☑ Red Hat Enterprise Linux 7.x
- □ SAP Adaptive Server Enterprise 16

Policies (6)

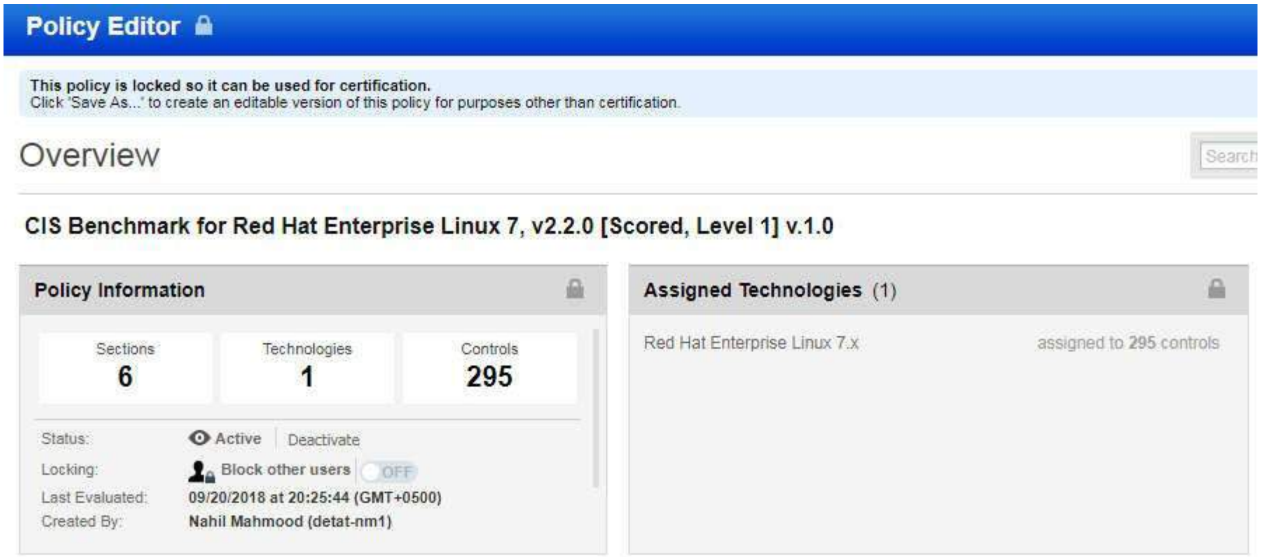
HITRUST Cyber Security Framework (CSF) for Linux, Version 8.1
Version 3.0 07/24/2018 View Description | View Policy

DISA Security Technical Implementation Guide (STIG) for Red Hat Enterprise Linux 7, V1R4
Version 4.0 08/02/2018 View Description | View Policy

CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1]
Version 1.0 06/20/2018 View Description | View Policy

CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1 and Level 2]

COMPLIANCE LIBRARY: CIS RED HAT ENT. LINUX 7



Policy Editor

This policy is locked so it can be used for certification.
Click 'Save As...' to create an editable version of this policy for purposes other than certification.

Overview

CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1] v.1.0

Policy Information

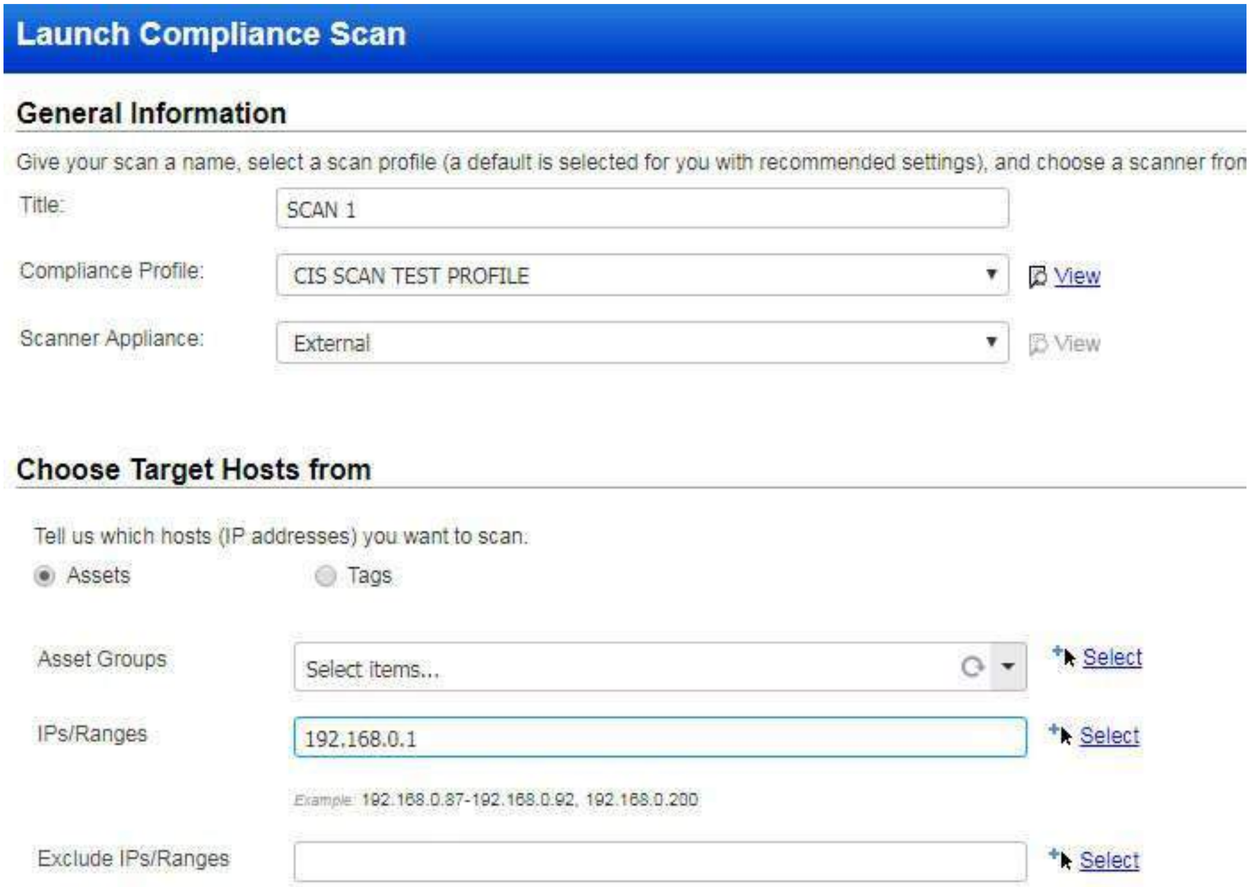
Sections	Technologies	Controls
6	1	295

Status: Active | Deactivate
Locking: Block other users OFF
Last Evaluated: 09/20/2018 at 20:25:44 (GMT+0500)
Created By: Nahil Mahmood (detat-nm1)

Assigned Technologies (1)

Red Hat Enterprise Linux 7.x assigned to 295 controls

POLICY EDITOR



Launch Compliance Scan

General Information

Give your scan a name, select a scan profile (a default is selected for you with recommended settings), and choose a scanner fron

Title: SCAN 1

Compliance Profile: CIS SCAN TEST PROFILE ▾ View

Scanner Appliance: External ▾ View

Choose Target Hosts from

Tell us which hosts (IP addresses) you want to scan.

● Assets ○ Tags

Asset Groups: Select items... Select

IPs/Ranges: 192.168.0.1 Select

Example: 192.168.0.87-192.168.0.92, 192.168.0.200

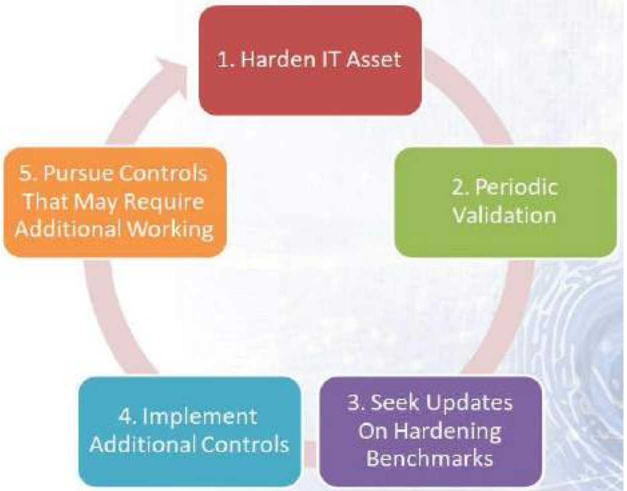
Exclude IPs/Ranges: Select

LAUNCH COMPLIANCE SCAN

- The scan features may also be adjusted from the main Qualys dashboard

Topic no 113: SECURITY HARDENING – LIFECYCLE

- Security Hardening Lifecycle: Maintaining An Integrated & Current Program


1. Harden IT Asset
2. Periodic Validation
3. Seek Updates On Hardening Benchmarks
4. Implement Additional Controls
5. Pursue Controls That May Require Additional Working

1: Harden IT Asset

Pursue the 8 step hardening methodology

2: Periodic Validation

Check periodically (every quarter) for changes to the established standard or baseline

3: Seek Updated On Hardening Benchmarks

- Benchmarks are periodically updated
- Subscribe to feeds from CIS, DISA, NIST NCP (National Checklist Program) Repository

4: Implement Additional Controls

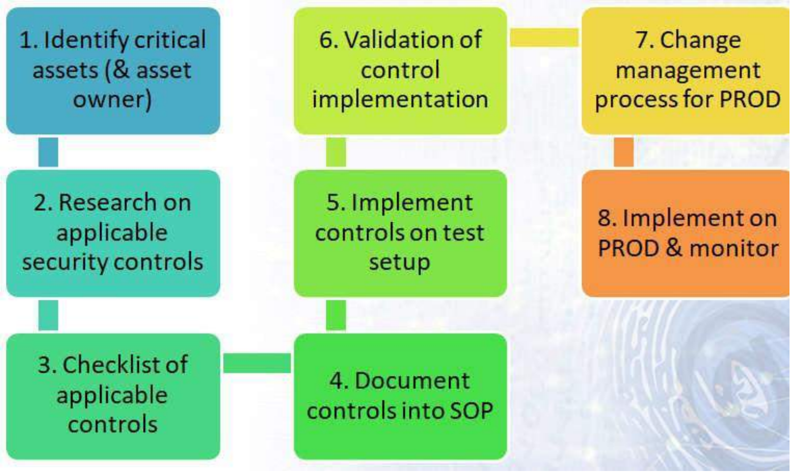
- Update the security controls by studying the changes

5: Pursue & Implement Controls That May Require Additional Working

- Some controls may have caused a crash or malfunction
- Some controls may have not been possible due to dependencies or missing utilities
- Enhance the % of implemented controls

Topic no 114: Hardening When CIS/DISA STIG Not Available

- What type of IT assets do not have a CIS/DISA STIG ?
  - Software applications (ASP.NET, PHP, Other)
  - Other applications such as asterisk deployments

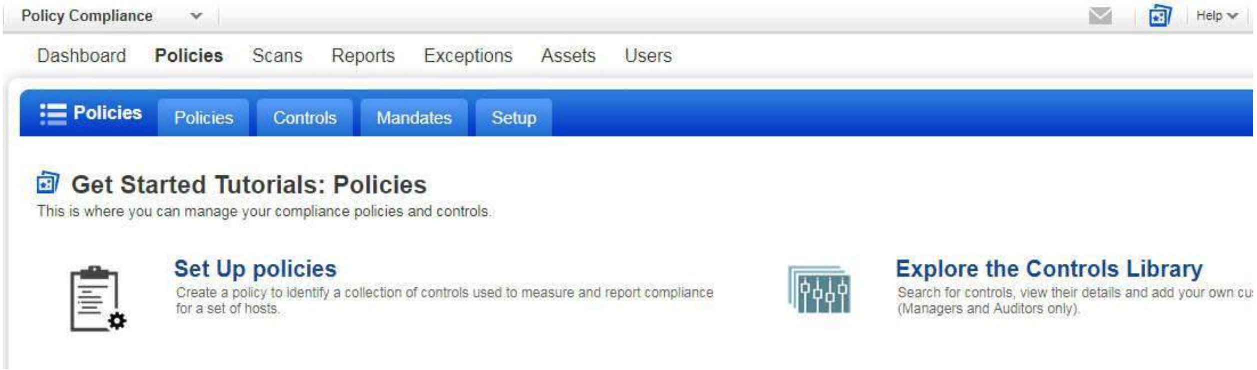

1. Identify critical assets (& asset owner)
2. Research on applicable security controls
3. Checklist of applicable controls
4. Document controls into SOP
5. Implement controls on test setup
6. Validation of control implementation
7. Change management process for PROD
8. Implement on PROD & monitor

- **Step 2: Research:**

  - Look up google
  - Look for case studies and whitepapers
- **Other considerations:**
  - Implement on test setup
  - Test the controls
  - Security testing tools
  - Perform third-party security testing (penetration testing)
  - Vendor best-practices for application security hardening
- With efforts and by following the 8-step methodology, all types of assets can be hardened

Topic no 115: QUALYS POLICY LIBRARIES

- Lets have a detailed look at Qualys built-in libraries for creating scanning policies
- CIS
- QUALYS
- MANDATE
- DISA
- VENDOR



Get Started Tutorials: Policies

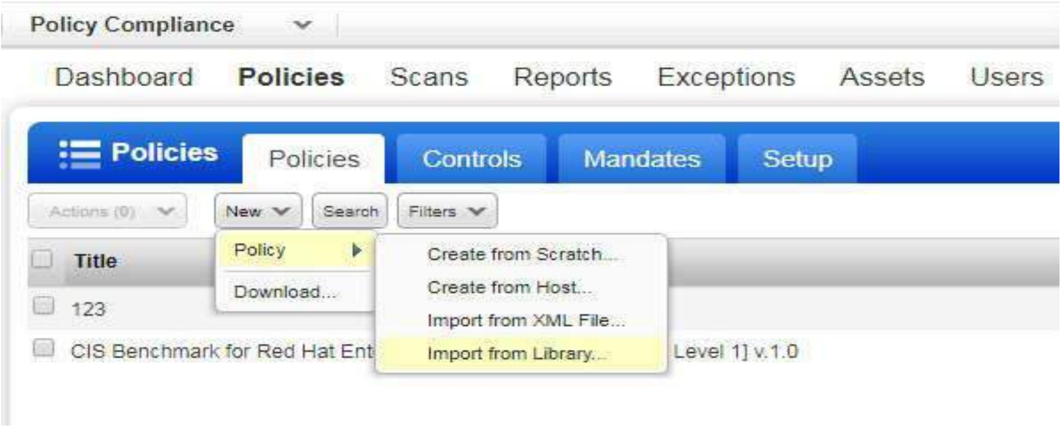
This is where you can manage your compliance policies and controls.

Set Up policies

Create a policy to identify a collection of controls used to measure and report compliance for a set of hosts.

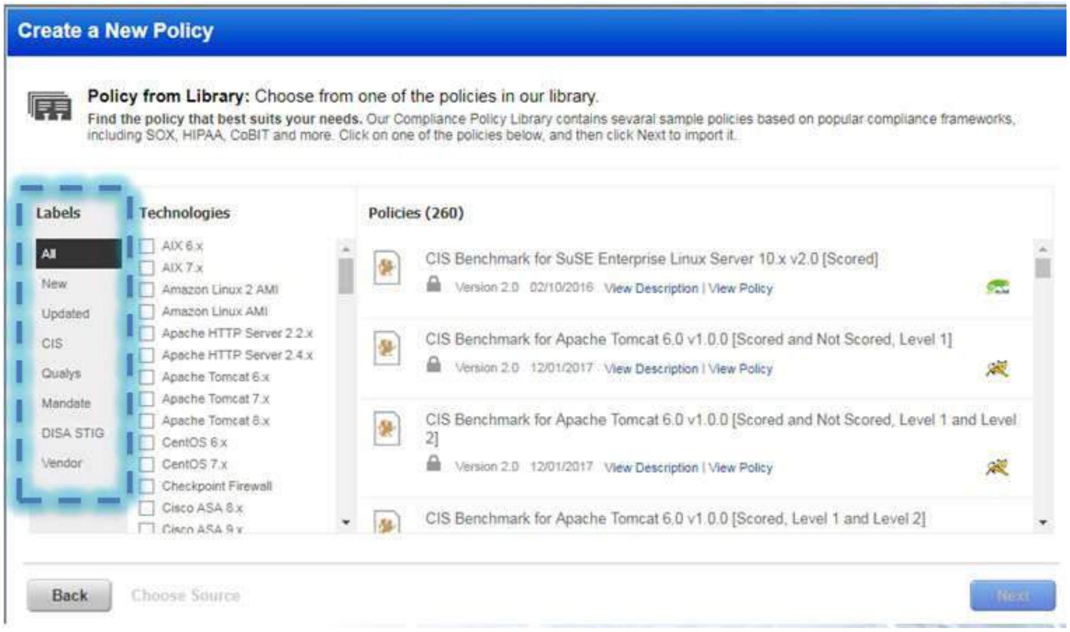
Explore the Controls Library

Search for controls, view their details and add your own cu (Managers and Auditors only).



Title
123
CIS Benchmark for Red Hat Ent … Level 1] v.1.0

CREATE NEW POLICY > IMPORT FROM LIBRARY



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Labels
All
New
Updated
CIS
Qualys
Mandate
DISA STIG
Vendor

Technologies
□ AIX 6.x
□ AIX 7.x
□ Amazon Linux 2 AMI
□ Amazon Linux AMI
□ Apache HTTP Server 2.2.x
□ Apache HTTP Server 2.4.x
□ Apache Tomcat 6.x
□ Apache Tomcat 7.x
□ Apache Tomcat 8.x
□ CentOS 6.x
□ CentOS 7.x
□ Checkpoint Firewall
□ Cisco ASA 8.x
□ Cisco ASA 9.x

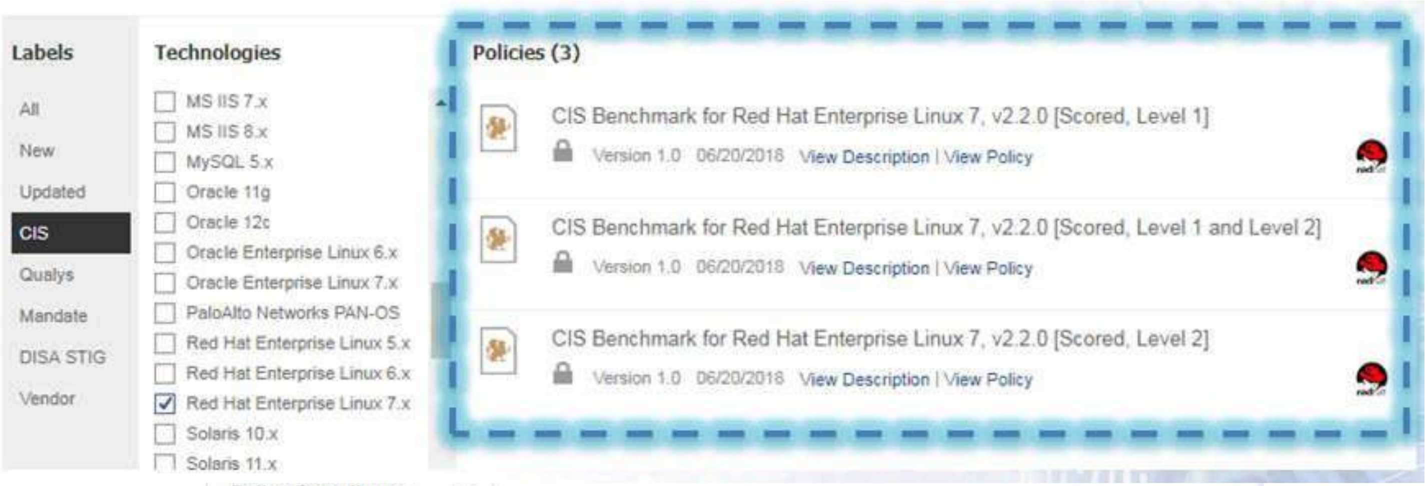
Policies (260)

CIS Benchmark for SuSE Enterprise Linux Server 10.x v2.0 [Scored]
Version 2.0 02/10/2016 View Description | View Policy

CIS Benchmark for Apache Tomcat 6.0 v1.0.0 [Scored and Not Scored, Level 1]
Version 2.0 12/01/2017 View Description | View Policy

CIS Benchmark for Apache Tomcat 6.0 v1.0.0 [Scored and Not Scored, Level 1 and Level 2]
Version 2.0 12/01/2017 View Description | View Policy

CIS Benchmark for Apache Tomcat 6.0 v1.0.0 [Scored, Level 1 and Level 2]



Labels
All
New
Updated
CIS
Qualys
Mandate
DISA STIG
Vendor

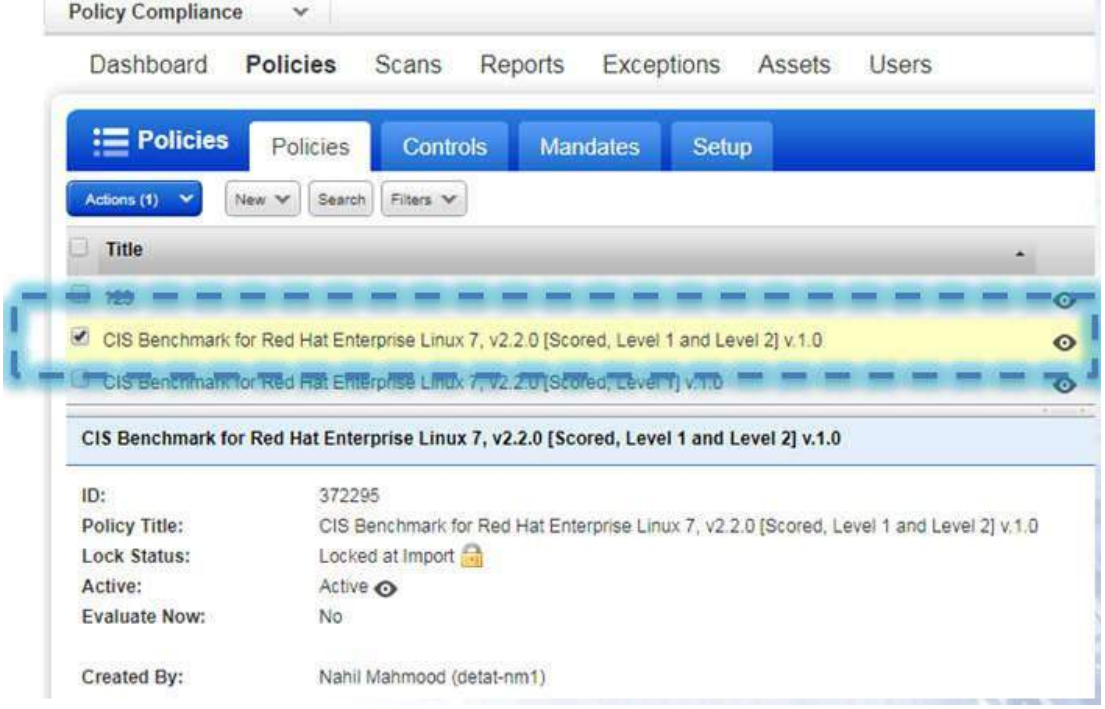
Technologies
□ MS IIS 7.x
□ MS IIS 8.x
□ MySQL 5.x
□ Oracle 11g
□ Oracle 12c
□ Oracle Enterprise Linux 6.x
□ Oracle Enterprise Linux 7.x
□ PaloAlto Networks PAN-OS
□ Red Hat Enterprise Linux 5.x
□ Red Hat Enterprise Linux 6.x
☑ Red Hat Enterprise Linux 7.x
□ Solaris 10.x
□ Solaris 11.x

Policies (3)

CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1]
Version 1.0 06/20/2018 View Description | View Policy

CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1 and Level 2]
Version 1.0 06/20/2018 View Description | View Policy

CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 2]
Version 1.0 06/20/2018 View Description | View Policy

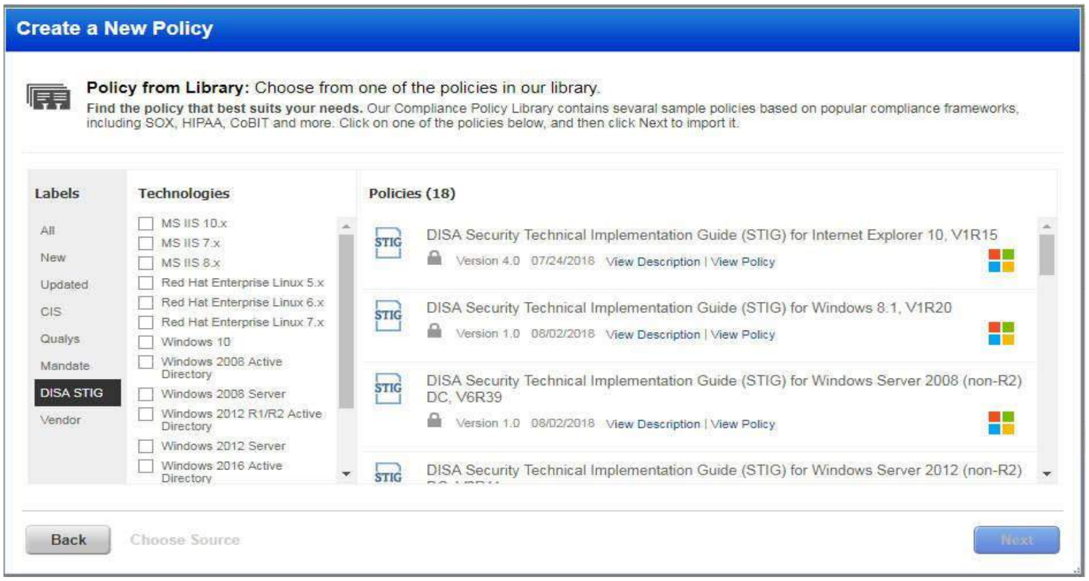


□ **Title**
□ 129
☑ CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1 and Level 2] v.1.0
□ CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1] v.1.0

CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1 and Level 2] v.1.0

ID:	372295
Policy Title:	CIS Benchmark for Red Hat Enterprise Linux 7, v2.2.0 [Scored, Level 1 and Level 2] v.1.0
Lock Status:	Locked at Import
Active:	Active
Evaluate Now:	No
Created By:	Nahil Mahmood (detat-nm1)

POLICIES DASHBOARD



Create a New Policy

Policy from Library: Choose from one of the policies in our library.

Find the policy that best suits your needs. Our Compliance Policy Library contains sevaral sample policies based on popular compliance frameworks, including SOX, HIPAA, CoBIT and more. Click on one of the policies below, and then click Next to import it.

Labels

- All
- New
- Updated
- CIS
- Qualys
- Mandate
- **DISA STIG**
- Vendor

Technologies

- □ MS IIS 10.x
- □ MS IIS 7.x
- □ MS IIS 8.x
- □ Red Hat Enterprise Linux 5.x
- □ Red Hat Enterprise Linux 6.x
- □ Red Hat Enterprise Linux 7.x
- □ Windows 10
- □ Windows 2008 Active Directory
- □ Windows 2008 Server
- □ Windows 2012 R1/R2 Active Directory
- □ Windows 2012 Server
- □ Windows 2016 Active Directory

Policies (18)

STIG DISA Security Technical Implementation Guide (STIG) for Internet Explorer 10, V1R15
Version 4.0 07/24/2018 View Description | View Policy

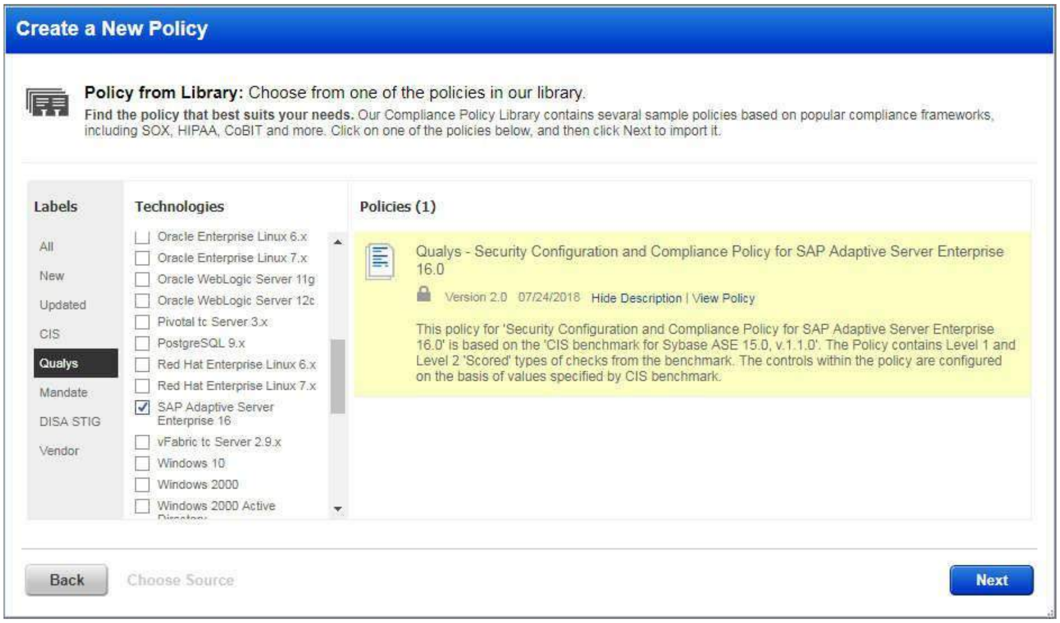
STIG DISA Security Technical Implementation Guide (STIG) for Windows 8.1, V1R20
Version 1.0 08/02/2018 View Description | View Policy

STIG DISA Security Technical Implementation Guide (STIG) for Windows Server 2008 (non-R2) DC, V6R39
Version 1.0 08/02/2018 View Description | View Policy

STIG DISA Security Technical Implementation Guide (STIG) for Windows Server 2012 (non-R2)

Back Choose Source Next

DISA STIG



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Labels

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- New
- Updated
- CIS
- **Qualys**
- Mandate
- DISA STIG
- Vendor

Technologies

- □ Oracle Enterprise Linux 6.x
- □ Oracle Enterprise Linux 7.x
- □ Oracle WebLogic Server 11g
- □ Oracle WebLogic Server 12c
- □ Pivotal tc Server 3.x
- □ PostgreSQL 9.x
- □ Red Hat Enterprise Linux 6.x
- □ Red Hat Enterprise Linux 7.x
- ☑ SAP Adaptive Server Enterprise 16
- □ vFabric tc Server 2.9.x
- □ Windows 10
- □ Windows 2000
- □ Windows 2000 Active Directory

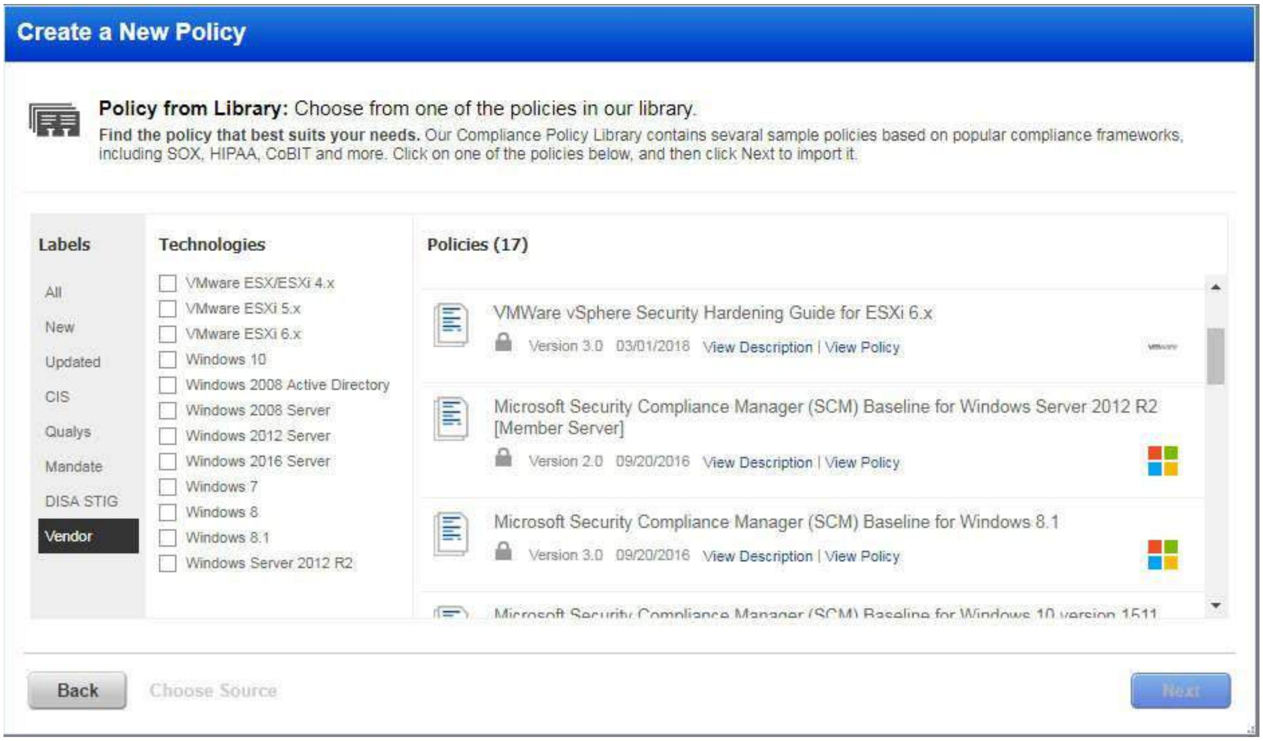
Policies (1)

Qualys - Security Configuration and Compliance Policy for SAP Adaptive Server Enterprise 16.0
Version 2.0 07/24/2018 Hide Description | View Policy

This policy for 'Security Configuration and Compliance Policy for SAP Adaptive Server Enterprise 16.0' is based on the 'CIS benchmark for Sybase ASE 15.0, v.1.1.0'. The Policy contains Level 1 and Level 2 'Scored' types of checks from the benchmark. The controls within the policy are configured on the basis of values specified by CIS benchmark.

Back Choose Source Next

QUALYS SAP ADAPTIVE SERVER ENT 16



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Labels

- All
- New
- Updated
- CIS
- Qualys
- Mandate
- DISA STIG
- Vendor

Technologies

- □ VMware ESX/ESXi 4.x
- □ VMware ESXi 5.x
- □ VMware ESXi 6.x
- □ Windows 10
- □ Windows 2008 Active Directory
- □ Windows 2008 Server
- □ Windows 2012 Server
- □ Windows 2016 Server
- □ Windows 7
- □ Windows 8
- □ Windows 8.1
- □ Windows Server 2012 R2

Policies (17)

VMWare vSphere Security Hardening Guide for ESXi 6.x
Version 3.0 03/01/2016 View Description | View Policy

Microsoft Security Compliance Manager (SCM) Baseline for Windows Server 2012 R2 [Member Server]
Version 2.0 09/20/2016 View Description | View Policy

Microsoft Security Compliance Manager (SCM) Baseline for Windows 8.1
Version 3.0 09/20/2016 View Description | View Policy

Microsoft Security Compliance Manager (SCM) Baseline for Windows 10 version 1511

Back Choose Source Next

VENDOR POLICIES

- Qualys has a vast number of options for Compliance Scans, and these should be fully explored through the Qualys trial

Topic no 116: Security Hardening For Outsourced IT Assets

- IT Outsourcing
- Mechanism to harden outsourced IT assets
- Important considerations
- **IT Outsourcing examples:**
  - Call centers
  - Hosted servers
  - Software development
  - Workstation helpdesk functions
  - Network services
  - Any other arrangement
- **Mechanism:**
  - Information Security Policy
  - Vendor contract (right-to-audit clause)
  - Set up security project with security project manager
  - Periodic reviews
  - Penalties for non-compliance
- **Important considerations:**
  - Enter security requirements into RFP
  - Part of vendor evaluation
  - Proceed with contract including InfoSec clauses
  - Awareness training
- **Security evaluations:**
  - Include outsourced scope in periodic internal audit

- Ask for third-party security review
- Vulnerability assessment and penetration test (if applicable)
- Spot security checks

Topic no 117: What is Vulnerability Management?

- **What is vulnerability?**
  - Vulnerability is a cyber-security term that refers to a flaw in a system that can leave it open to attack. Vulnerability may also refer to any type of weakness in a computer system itself, in a set of procedures or in anything that leaves information security exposed to a threat.

- **How do you fix vulnerabilities?**
  - Computer users and network personnel can protect computer systems from vulnerabilities by keeping software security patches up to date. These patches can remedy flaws or security holes that were found in the initial release. Computer and network personnel should also stay informed about current vulnerabilities in the software they use and seek out ways to protect against them.

- **What is vulnerability management?**
  - Vulnerability management is the "cyclical practice of identifying, classifying, remediating, and mitigating vulnerabilities"

- **What is vulnerability assessment (VA)?**
  - A process that defines, identifies, and classifies the security holes (vulnerabilities) in a computer, network, or communications infrastructure.

- **What are some of the common vulnerability scanners?**
  - OpenVAS
  - Nessus
  - Qualys
  - Rapid7

Topic no 118: What Are The Steps In VM Lifecycle?

VM Steps:

1. Analyze assets
2. Prepare scanner
3. Run vulnerability scan
4. Assess results
5. Patch systems
6. Verify (re-scan)

1. **Analyze Assets:**

    - Examine assets to scan
    - Gather details on IP subnet
    - Look at potential issues with network traffic
    - Inform asset owners and relevant department heads

2. **Prepare Scanner:**
    - Set scanner parameters
    - Select type of scan
    - Look at credentials-based scan
    - Explore and research plug-ins
    - Do a test run
    - Coordinate with asset owner

3. **Run Vulnerability Scanner:**
    - Run the automated scan
    - Monitor network performance degradation issues
    - Generate report

4. **Assess Results:**
    - Evaluate results
    - Prioritize according to the risk level
    - Collate results for asset owners
    - Communicate the results and remediation timelines

5. **Patch Systems:**
    - Research vulnerabilities
    - Evaluate fixes and remediation method
    - Test the patches and fixes
    - Apply patches/fixes
    - Monitor results

6. **Verify (Re-scan)**
    - Re-scan to confirm that the vulnerability scanner gives a positive report
    - Collate results of vulnerability scan
    - Report findings

Topic no 119: Why Is Software Insecure?

- Software is everywhere in IT
- Software is being developed in a manner which leaves many defects which may be exploited by attackers
- Race to meet software deadlines with little emphasis on security
- **Result:** insecure software
- Gary McGraw, "trinity of trouble" for software security:
  - **Connectivity;** ever-increasing computer connectivity & to the internet enhances exposure to attacks

- **Extensibility: "**Second, an extensible system is one that supports updates and extensions and thereby allows functionality to evolve incrementally. Web browsers, for example, support plug-ins that enable users to install extensions for new document types. Extensibility is attractive for purposes of increasing functionality, but also makes it difficult to keep the constantly-adapting system free of software vulnerabilities."

- **Complexity:** Software systems are growing exponentially in size and complexity, which makes vulnerabilities unavoidable.

- Carnegie Mellon University's CyLab Sustainable Computing Consortium estimates that commercial software contains 20 to 30 bugs for every 1,000 lines of code and Windows XP contains at least 40 million lines of code That's 1 million bugs in Windows XP

- **Monoculture: Dan Greer:** "The security situation is deteriorating, and that deterioration compounds when nearly all computers in the hands of end users rely on a single operating system subject to the same vulnerabilities the world over."

Topic no 120: Why Is A VM Program Required?

- **What is a patch?**
  - "A **patch** is a piece of software designed to update a computer program or its supporting data, to fix or improve it. This includes fixing **security** vulnerabilities and other bugs"

- **What is patch management?**

  - Patch management is an area of systems management that involves acquiring, testing, and installing multiple patches (code changes) to an administered computer system.

- **Patch management tasks :**

  - Maintaining current knowledge of available patches, deciding what patches are appropriate for particular systems, ensuring that patches are installed properly, testing systems after installation, and documenting all associated procedures, such as specific configs required.

- **Risk of not patching:**
  - By not applying a patch you might be leaving the door open for a malware attack

- Malware exploits flaws in a system in order to do its work. In addition, the timeframe between an exploit and when a patch is released is getting shorter

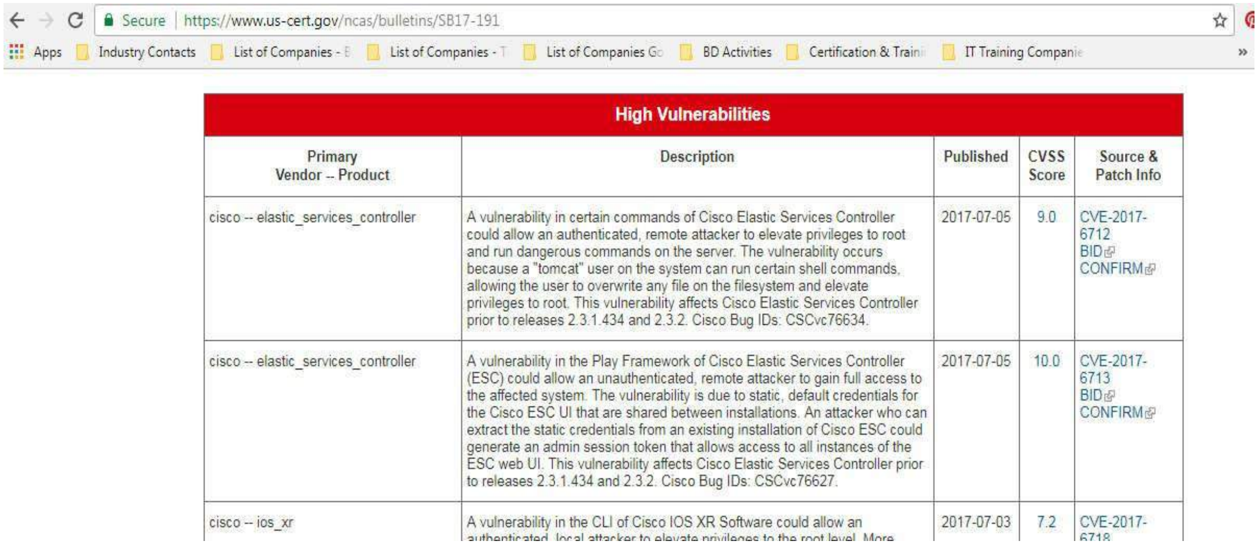
- Defects in clients like web browsers, email programs, image viewers, instant messaging software, and media players may allow malicious websites, etc. to infect or compromise your computer with no action on your part other than viewing or listening to the website, message, or media

A VM program addresses timely management of patching to ensure that vulnerabilities are not present for hackers to exploit

Topic no 121: What Is CVE & Vulnerability Database?

- **What is CVE?**
  - CVE is a list of information security vulnerabilities and exposures that aims to provide common names for publicly known cyber security issues. The goal of CVE is to make it easier to share data across separate vulnerability capabilities (tools, repositories, and services) with this "common enumeration."

SNAPSHOT OF US-CERT VULNERABILITY BULLETINS

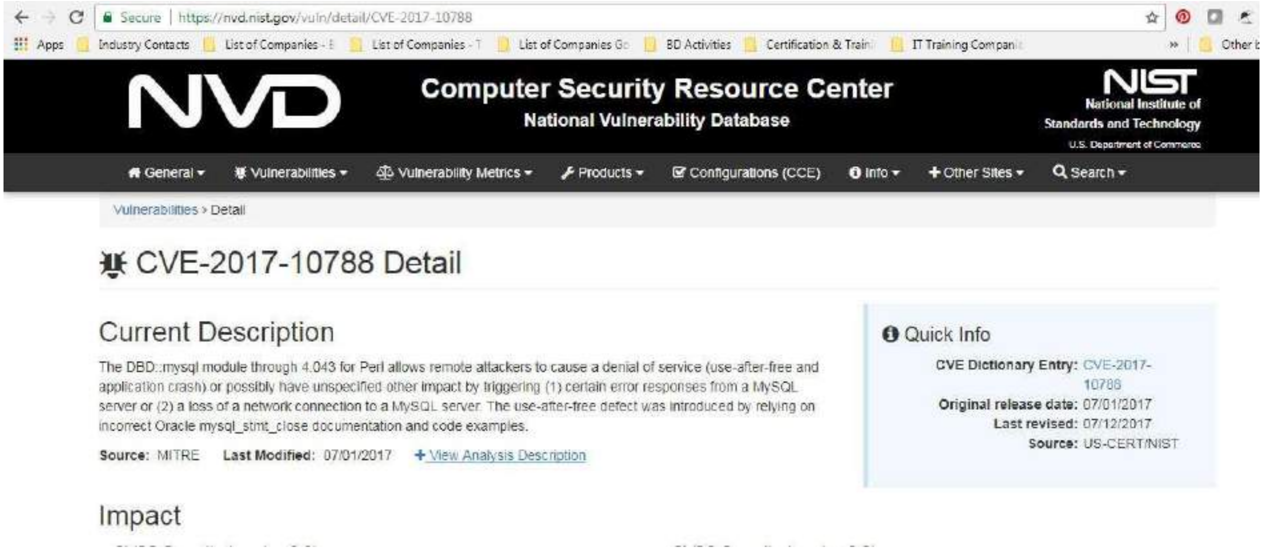


High Vulnerabilities

Primary Vendor -- Product	Description	Published	CVSS Score	Source & Patch Info
cisco -- elastic_services_controller	A vulnerability in certain commands of Cisco Elastic Services Controller could allow an authenticated, remote attacker to elevate privileges to root and run dangerous commands on the server. The vulnerability occurs because a "tomcat" user on the system can run certain shell commands, allowing the user to overwrite any file on the filesystem and elevate privileges to root. This vulnerability affects Cisco Elastic Services Controller prior to releases 2.3.1.434 and 2.3.2. Cisco Bug IDs: CSCvc76634.	2017-07-05	9.0	CVE-2017-6712 BID CONFIRM
cisco -- elastic_services_controller	A vulnerability in the Play Framework of Cisco Elastic Services Controller (ESC) could allow an unauthenticated, remote attacker to gain full access to the affected system. The vulnerability is due to static, default credentials for the Cisco ESC UI that are shared between installations. An attacker who can extract the static credentials from an existing installation of Cisco ESC could generate an admin session token that allows access to all instances of the ESC web UI. This vulnerability affects Cisco Elastic Services Controller prior to releases 2.3.1.434 and 2.3.2. Cisco Bug IDs: CSCvc76627.	2017-07-05	10.0	CVE-2017-6713 BID CONFIRM
cisco -- ios_xr	A vulnerability in the CLI of Cisco IOS XR Software could allow an authenticated, local attacker to elevate privileges to the root level. More	2017-07-03	7.2	CVE-2017-6718

- **What is NVD?**
  - The NVD is the CVE dictionary augmented with additional analysis, a database, and a fine- grained search engine. The NVD is a superset of CVE. The NVD is synchronized with CVE such that any updates to CVE appear immediately on the NVD.

SNAPSHOT OF NATIONAL VULNERABILITY DATABASE - NVD



CVE-2017-10788 Detail

Current Description

The DBD::mysql module through 4.043 for Perl allows remote attackers to cause a denial of service (use-after-free and application crash) or possibly have unspecified other impact by triggering (1) certain error responses from a MySQL server or (2) a loss of a network connection to a MySQL server. The use-after-free defect was introduced by relying on incorrect Oracle mysql_stmt_close documentation and code examples.

Source: MITRE **Last Modified:** 07/01/2017 + View Analysis Description

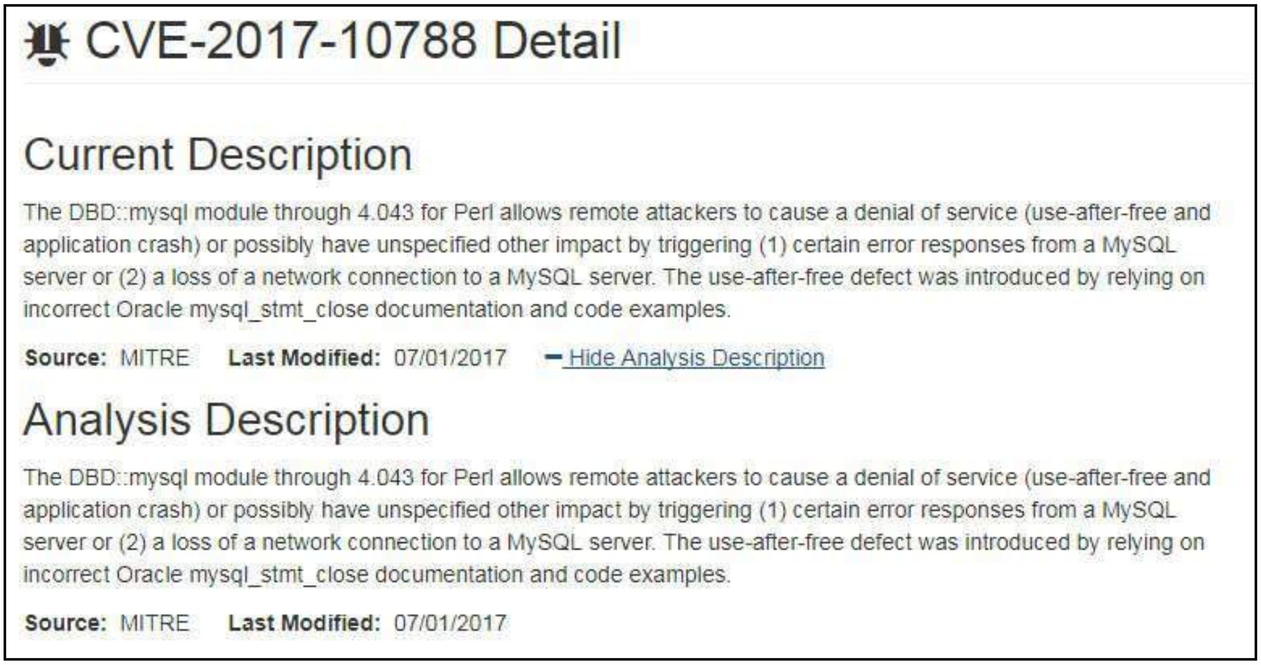
Quick Info

CVE Dictionary Entry: CVE-2017-10788
Original release date: 07/01/2017
Last revised: 07/12/2017
Source: US-CERT/NIST

Impact

- **What is the NVD severity score?**
  - The NVD uses the Common Vulnerability Scoring System [(CVSS) Version 2](), which is is an open standard for assigning vulnerability impacts that is used by a variety of organizations
  - [NISTIR 7946 - CVSS Implementation Guidance]() describes methodologies developed by the NVD for using CVSS, and along with Appendix B describes the NVD's entire vulnerability assessment process.

SNAPSHOT OF CVE-2017-10788



CVE-2017-10788 Detail

Current Description

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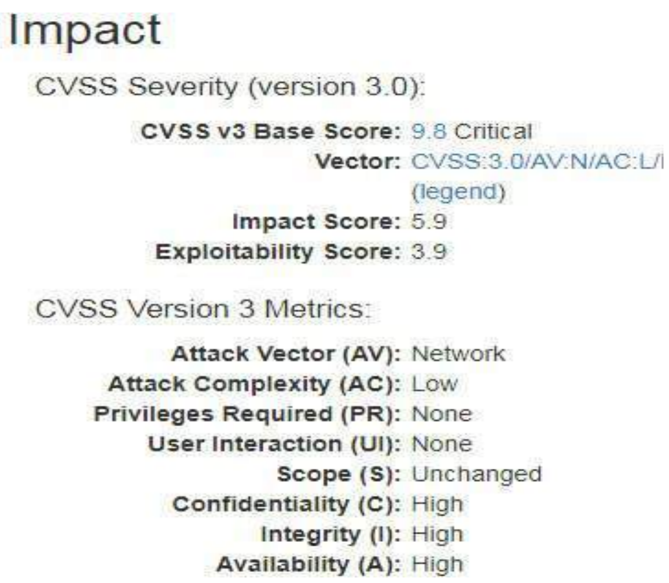
Source: MITRE **Last Modified:** 07/01/2017 − Hide Analysis Description

Analysis Description

The DBD::mysql module through 4.043 for Perl allows remote attackers to cause a denial of service (use-after-free and application crash) or possibly have unspecified other impact by triggering (1) certain error responses from a MySQL server or (2) a loss of a network connection to a MySQL server. The use-after-free defect was introduced by relying on incorrect Oracle mysql_stmt_close documentation and code examples.

Source: MITRE **Last Modified:** 07/01/2017



Impact

CVSS Severity (version 3.0):

CVSS v3 Base Score: 9.8 Critical

Vector: CVSS:3.0/AV:N/AC:L/ (legend)

Impact Score: 5.9

Exploitability Score: 3.9

CVSS Version 3 Metrics:

Attack Vector (AV): Network

Attack Complexity (AC): Low

Privileges Required (PR): None

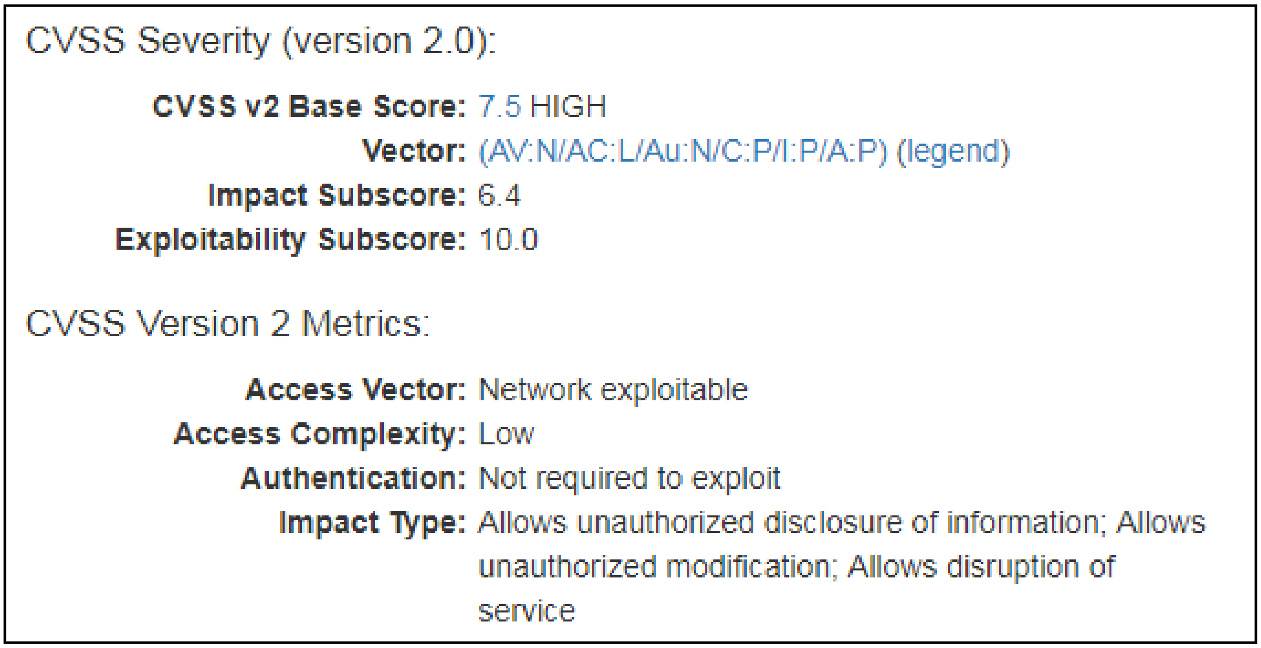
User Interaction (UI): None

Scope (S): Unchanged

Confidentiality (C): High

Integrity (I): High

Availability (A): High



CVSS Severity (version 2.0):

CVSS v2 Base Score: 7.5 HIGH

Vector: (AV:N/AC:L/Au:N/C:P/I:P/A:P) (legend)

Impact Subscore: 6.4

Exploitability Subscore: 10.0

CVSS Version 2 Metrics:

Access Vector: Network exploitable

Access Complexity: Low

Authentication: Not required to exploit

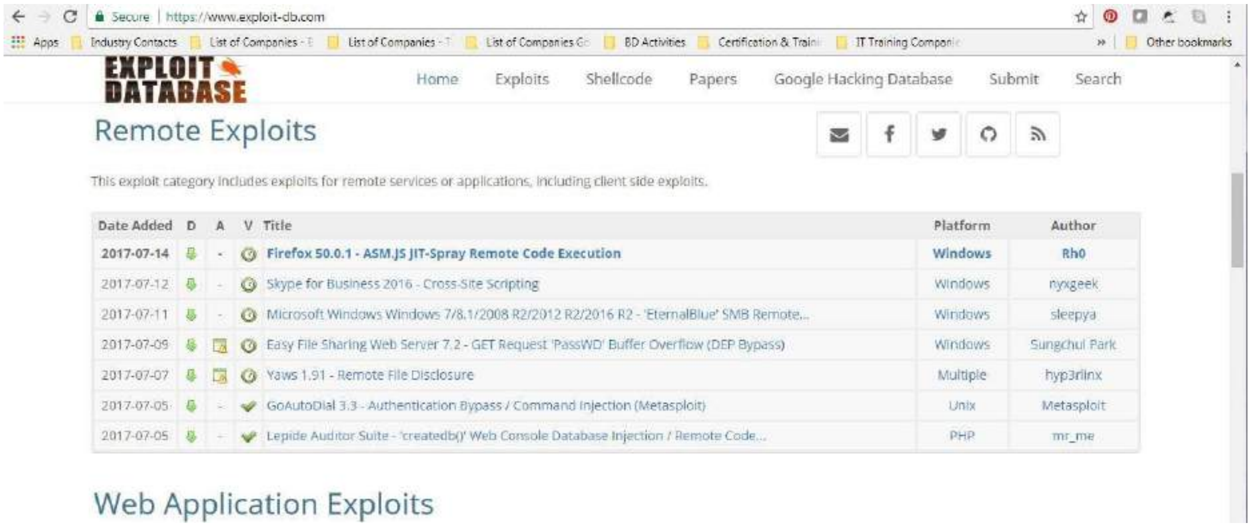
Impact Type: Allows unauthorized disclosure of information; Allows unauthorized modification; Allows disruption of service

- Note that all the major vendors publish their security vulnerabilities online
  - Microsoft
  - Oracle
  - Cisco
  - Etc

Topic no 122: What Is An Exploit?

- **What is an exploit?**
  - Program or some code that takes advantage of a security hole (i.e. a vulnerability) in an application or system, so that an attacker can use it for their benefit.

- **Remote exploit:**
  - A *remote exploit* works over a network and exploits the security vulnerability without any prior access to the vulnerable system.
- **Local exploit:**
  - A *local exploit* requires prior access to the vulnerable system and usually increases the privileges of the person running the exploit past those granted by the system administrator.
- **Exploit database:**
  - The Exploit Database is a CVE compliant archive of public exploits and corresponding vulnerable software, developed for use by penetration testers and vulnerability researchers. Our aim is to serve the most comprehensive collection of exploits gathered through direct submissions, mailing lists, as well as other public sources, and present them in a freely-available and easy-to-navigate database.
  - The Exploit Database is a repository for *exploits and proof-of-concepts rather than advisories*, making it a valuable resource for those who need actionable data right away.



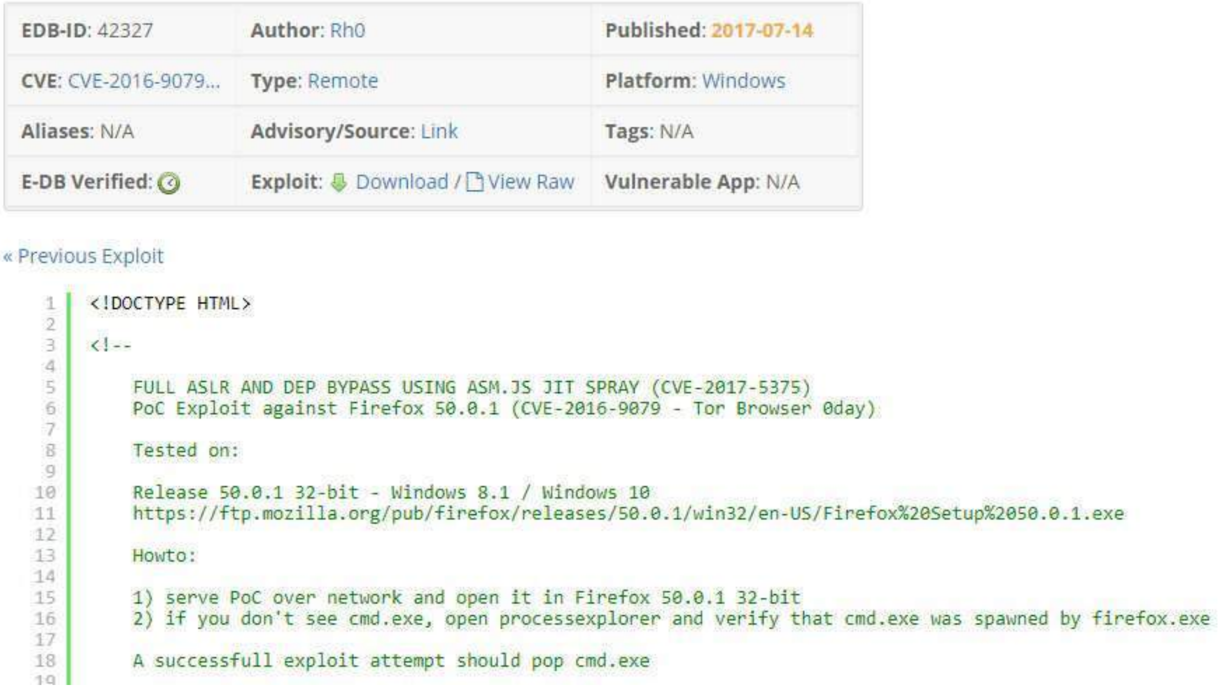
Remote Exploits

This exploit category includes exploits for remote services or applications, including client side exploits.

Date Added	D	A	V	Title	Platform	Author
2017-07-14	⬇	-	○	Firefox 50.0.1 - ASM.JS JIT-Spray Remote Code Execution	Windows	Rh0
2017-07-12	⬇	-	○	Skype for Business 2016 - Cross-Site Scripting	Windows	nyxgeek
2017-07-11	⬇	-	○	Microsoft Windows Windows 7/8.1/2008 R2/2012 R2/2016 R2 - 'EternalBlue' SMB Remote...	Windows	sleepya
2017-07-09	⬇	▨	○	Easy File Sharing Web Server 7.2 - GET Request 'PassWD' Buffer Overflow (DEP Bypass)	Windows	Sungchul Park
2017-07-07	⬇	▨	○	Yaws 1.91 - Remote File Disclosure	Multiple	hyp3rlinx
2017-07-05	⬇	-	✓	GoAutoDial 3.3 - Authentication Bypass / Command Injection (Metasploit)	Unix	Metasploit
2017-07-05	⬇	-	✓	Lepide Auditor Suite - 'createdb()' Web Console Database Injection / Remote Code...	PHP	mr_me

Web Application Exploits

SNAPSHOT OF EXPLOIT CODE



EDB-ID: 42327	**Author:** Rh0	**Published:** 2017-07-14
CVE: CVE-2016-9079...	**Type:** Remote	**Platform:** Windows
Aliases: N/A	**Advisory/Source:** Link	**Tags:** N/A
E-DB Verified:	**Exploit:** Download / View Raw	**Vulnerable App:** N/A

« Previous Exploit

```
<!DOCTYPE HTML>

<!--

    FULL ASLR AND DEP BYPASS USING ASM.JS JIT SPRAY (CVE-2017-5375)
    PoC Exploit against Firefox 50.0.1 (CVE-2016-9079 - Tor Browser 0day)

    Tested on:

    Release 50.0.1 32-bit - Windows 8.1 / Windows 10
    https://ftp.mozilla.org/pub/firefox/releases/50.0.1/win32/en-US/Firefox%20Setup%2050.0.1.exe

    Howto:

    1) serve PoC over network and open it in Firefox 50.0.1 32-bit
    2) if you don't see cmd.exe, open processexplorer and verify that cmd.exe was spawned by firefox.exe

    A successfull exploit attempt should pop cmd.exe
```

- **Zero-day exploit:**
  - A zero day vulnerability refers to a hole in software that is unknown to the vendor. This security hole is then exploited by hackers before the vendor becomes aware and hurries to fix it this **exploit** is called a zero day attack.

Topic no 123: Effective Vulnerability Management: Stage 2

Another look at the security transformation model

- Stage 1: Security hardening
  - Taking stock of your assets
  - Prioritizing the assets
  - Establishing an MSB
  - Implement security controls with CIS/DISA/Other benchmarks
  - Basic/broader security hardening
- Note that Stage 1 (Hardening) and Stage 2 (Patching) are shown sequentially to show priority
- In practical terms, the two efforts may be done slightly staggered depending upon resources available
- Establish one program and then the other
- Stage 1 (Hardening) is equivalent to tightening all the screws on machinery and will reduce impact of an attack (like a shield)

- Stage 2 (Patching) will seal all the entry points for an attacker to gain access or to penetrate a system
- Note that both Stage 1 and Stage 2 are equally important and necessary and assist in enhancing the security posture in their unique manner

Topic no 124: Security Breach Case Study 1: Home Dept 2014

- 56 million payment cards compromised
- Early September 2014
- Sequence of events:
  - The attackers were able to gain access to one of Home Depot's vendor environments by using a third-party vendor's logon credentials
  - Then they exploited a zero-day vulnerability in Windows, which allowed them to pivot from the vendor-specific environment to the Home Depot corporate environment.
  - Once they were in the Home Depot network, they were able install memory scraping malware on over 7,500 self-checkout POS terminals (Smith, 2014).
  - This malware was able to grab 56 million credit and debit cards. The malware was also able to capture 53 million email addresses (Winter, 2014).
  - The stolen payment cards were used to put up for sale and bought by carders. The stolen email addresses were helpful in putting together large phishing campaigns.
- Home Depot didn't have secure configuration of the software or hardware on the POS terminals.
- There was no proof of regularly scheduled vulnerability scanning of the POS environment.
- They didn't have proper network segregation between the Home Depot corporate network and the POS network.
- Overall: several controls missing, vendor management of IDs and access management missing, and monitoring of the network was missing

Topic no 125: Security Breach Case Study 2: Anthem

- Health Insurer Anthem
- Affected 78.8 million individuals

- **Sequence of events:**
  - Data breach began on Feb. 18, 2014, when a user within one of Anthem's subsidiaries opened a phishing email containing malicious content

- Opening the email launched the download of malicious files to the user's computer and allowed hackers to gain remote access to that computer and dozens of other systems within the Anthem enterprise, including Anthem's data warehouse
- Starting with the initial remote access, the attacker was able to move laterally across Anthem systems and escalate privileges, gaining increasingly greater ability to access information and make changes in the environment
- The attacker utilized at least 50 accounts and compromised at least 90 systems within the Anthem enterprise environment including, eventually, the company's enterprise data warehouse a system that stores a large amount of consumer personally identifiable information
- Queries to that data warehouse resulted in access to an ex filtration of approximately 78.8 m unique user records

- **Vulnerabilities:**
  - Exploitable vulnerabilities were found in anthem network
  - User security awareness training conducted to prevent phishing and social engineering

- **Remediation measures:**
  - Implemented two-factor authentication on all remote access tools, deployed a privileged account management solution and added enhanced logging resources to its security event and incident management solutions
  - Further, the company conducted a complete reset of passwords for all privileged users, suspended all remote access pending implementation of two-factor authentication and created new Network Admin IDs

Topic no 126: Best Practices For Applying Security Patches

- "The risk of implementing the service pack, hotfix and security patch should ALWAYS be LESS than the risk of not implementing it."
- “You should never be worse off by implementing a service pack, hotfix and security patch. If you are unsure, then take steps to ensure that there is no doubt when moving them to production systems.”

1. Use a change control process

- A good change control procedure has an identified owner, a path for customer input, an audit trail for any changes, a clear announcement and review period, testing procedures, and a well- understood back-out plan.

- Change control will manage the process from start to finish

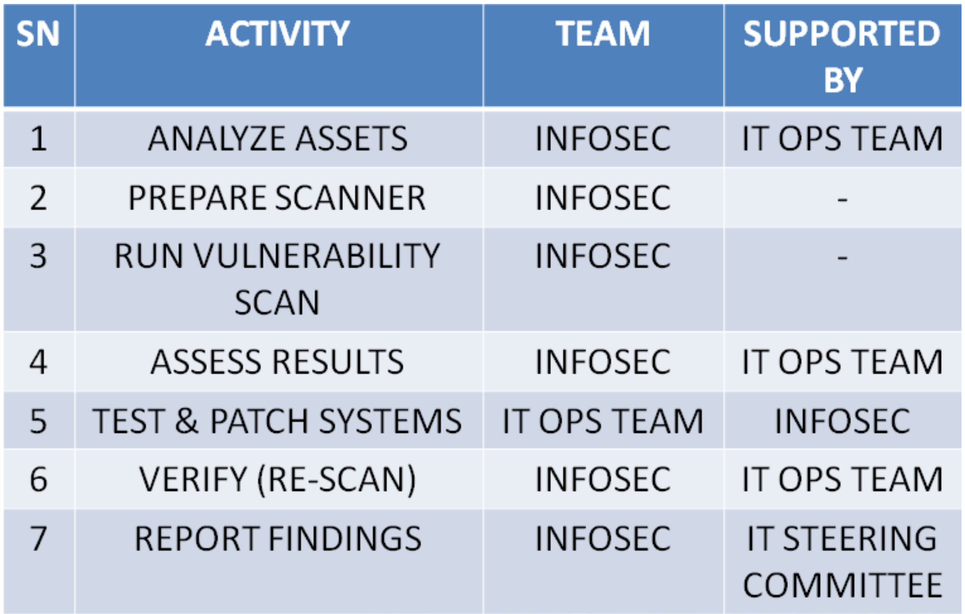
2. Read all related documentation:

- Before applying any service pack, hotfix or security patch, all relevant documentation should be read and peer reviewed. The peer review process is critical as it mitigates the risk of a single person missing critical and relevant points when evaluating the update
- Ensure the update is relevant, and will resolve an existing issue
- Ensure adoption won't cause other issues resulting in a compromise of the production system
- There are dependencies relating to the update, (i.e. certain features being enabled or disabled for the update to be effective.)
- Potential issues will arise from the sequencing of the update, as specific instructions may state or recommend a sequence of events or updates to occur before the service pack, hotfix or security patch is applied

3. Apply updates on a need-only basis
4. Testing
5. Plan to uninstall
6. Working backup and production downtime
7. Always have roll-back plan
8. Don’t get more than 2 service packs behind

Topic no 127: Who Conducts Vulnerability Management

- A number of teams and resources may be involved in the VM lifecycle

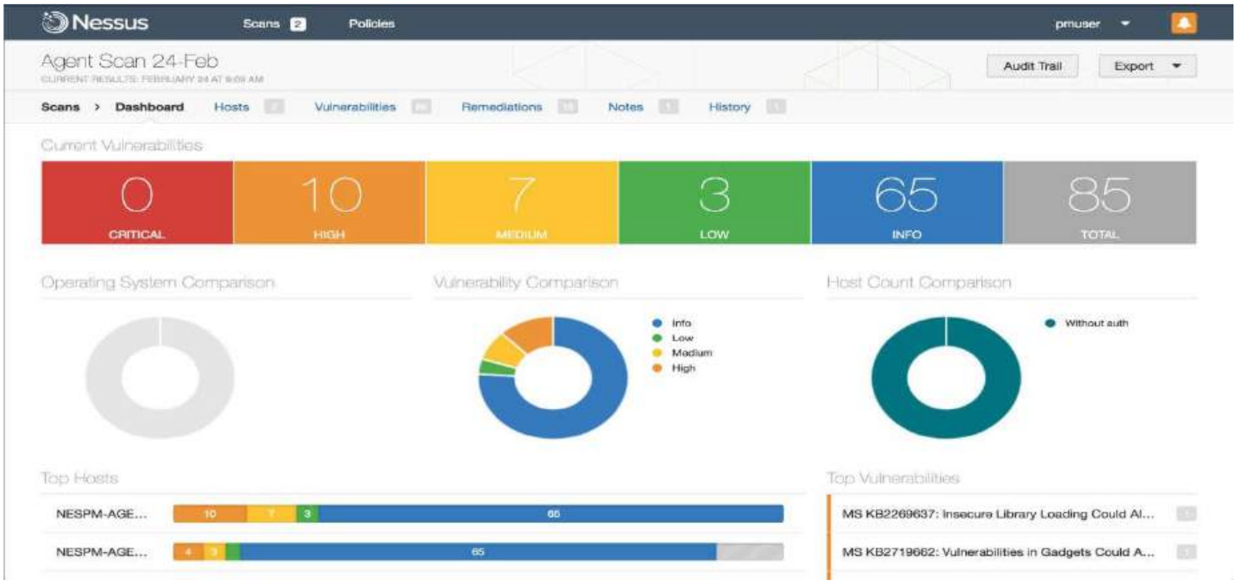


SN	ACTIVITY	TEAM	SUPPORTED BY
1	ANALYZE ASSETS	INFOSEC	IT OPS TEAM
2	PREPARE SCANNER	INFOSEC	-
3	RUN VULNERABILITY SCAN	INFOSEC	-
4	ASSESS RESULTS	INFOSEC	IT OPS TEAM
5	TEST & PATCH SYSTEMS	IT OPS TEAM	INFOSEC
6	VERIFY (RE-SCAN)	INFOSEC	IT OPS TEAM
7	REPORT FINDINGS	INFOSEC	IT STEERING COMMITTEE

- **Role of Infosec team:**
  - Takes the primary ownership of the vulnerability management process
  - Runs scanning after coordinating with the relevant IT Ops team
  - Shares scanning reports with IT teams and management
  - Tracks remediation timelines
  - Understands criticality issues and helps to prioritize
  - Studies the security patch details as a backup resource
  - Assists with change management process
- **Role of IT Ops team:**
  - Owner of the IT asset
  - Receives the vulnerability scan report from Infosec team
  - Studies the vulnerability
  - Understands criticality, impact, & dependencies
  - Helps Infosec team develop a project plan (if required) and timelines for the patching
  - Tests the patches in test environment
  - Takes backups, develops roll-back plan
  - Takes downtime and takes ownership of the change management process
  - Implements the patches
  - Monitors the systems after patch implementation
  - Rolls-back if necessary
  - Creates the necessary documentation

Topic no 128: Nessus Features

- Lets take a look at Nessus features
- Nessus (Reports):
  - Customize reports to sort by vulnerability or host
  - Create an executive summary or compare scan results
  - Targeted email notifications of scan results
- Nessus (Scan Types):
  - Asset discovery
  - Un-credentialed vulnerability discovery
  - Credentialed scanning for system hardening & missing patches
- Nessus (Compliance & Config Scans):
  - Compliance auditing: FFIEC, FISMA, CyberScope, GLBA, HIPAA/ HITECH, NERC, PCI, SCAP, SOX
  - Configuration auditing: CERT, CIS, COBIT/ITIL, DISA STIGs, FDCC, ISO, NIST, NSA
- Nessus (Risk scores):
  - Vulnerability ranking based on CVE, five severity levels (Critical, High, Medium, Low, Info), customizable severity levels for recasting of risk
- Nessus is a cost-effective scanner that gets most of the job done for vulnerability scanning
- It has CIS and DISA compliance templates
- Has some flaws and bugs but overall useful tool

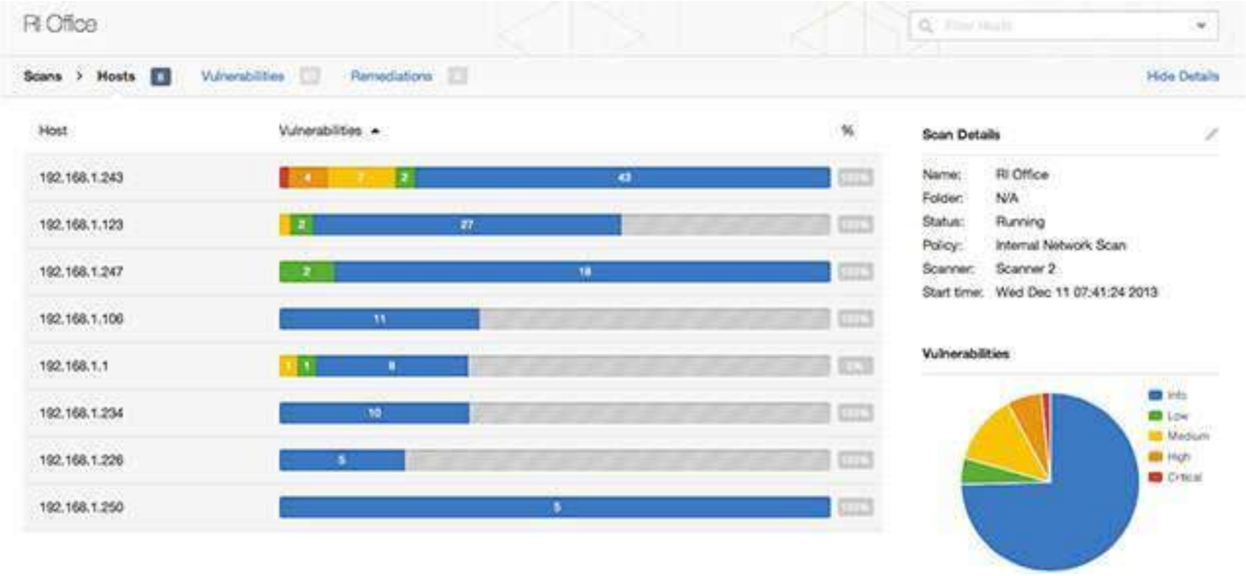


Agent Scan 24-Feb

CURRENT RESULTS: FEBRUARY 24 AT 9:09 AM

MS KB2269637: Insecure Library Loading Could Al...

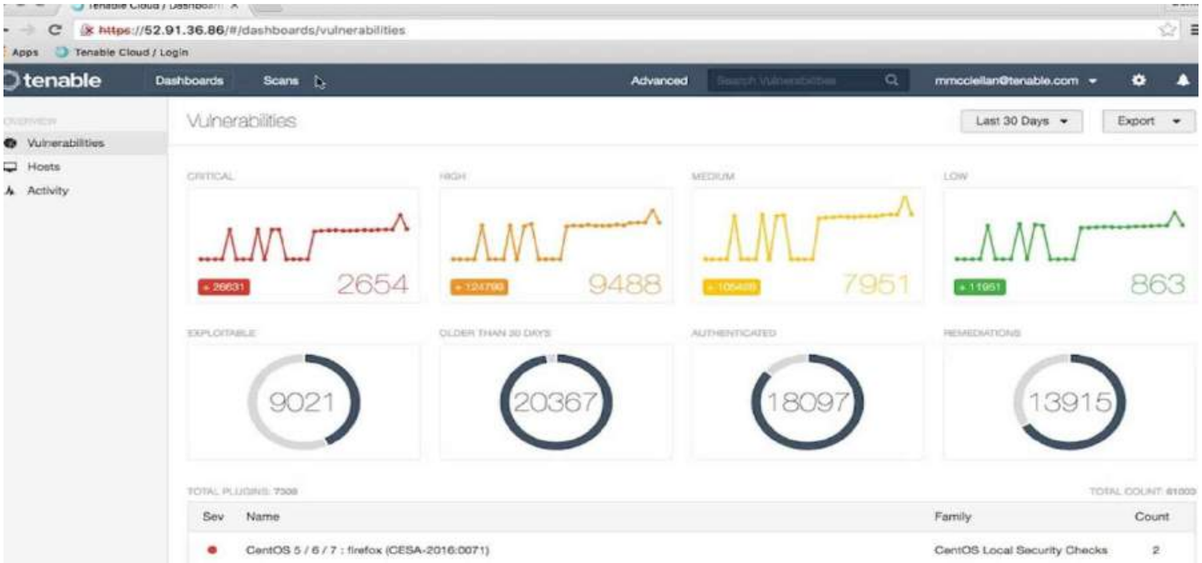
MS KB2719662: Vulnerabilities in Gadgets Could A...



Host	Vulnerabilities ▲
192.168.1.243	4 7 2 43
192.168.1.123	2 27
192.168.1.247	2 18
192.168.1.106	11
192.168.1.1	1 1 8
192.168.1.234	10
192.168.1.226	5
192.168.1.250	5

Scan Details

Name: RI Office
Folder: N/A
Status: Running
Policy: Internal Network Scan
Scanner: Scanner 2
Start time: Wed Dec 11 07:41:24 2013



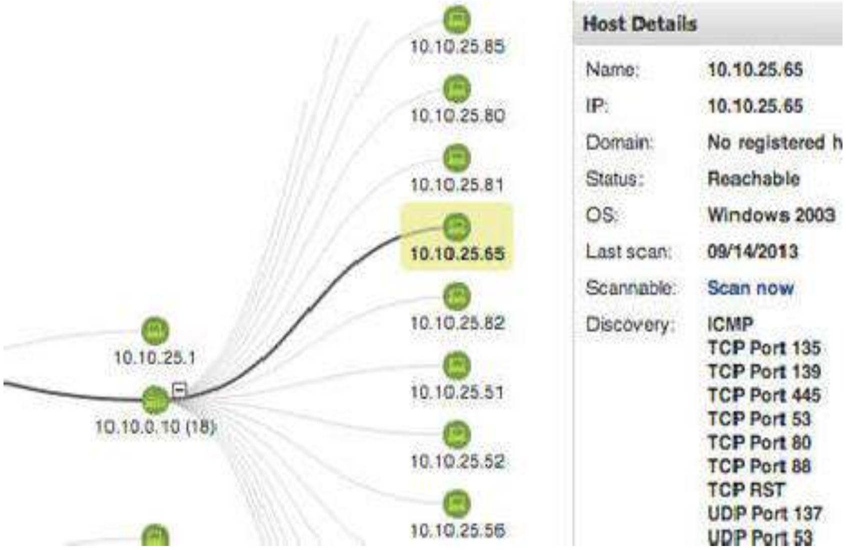
https://52.91.36.86/#/dashboards/vulnerabilities

TOTAL PLUGINS: 7308 TOTAL COUNT: 61003

Sev	Name	Family	Count
●	CentOS 5 / 6 / 7 : firefox (CESA-2016:0071)	CentOS Local Security Checks	2

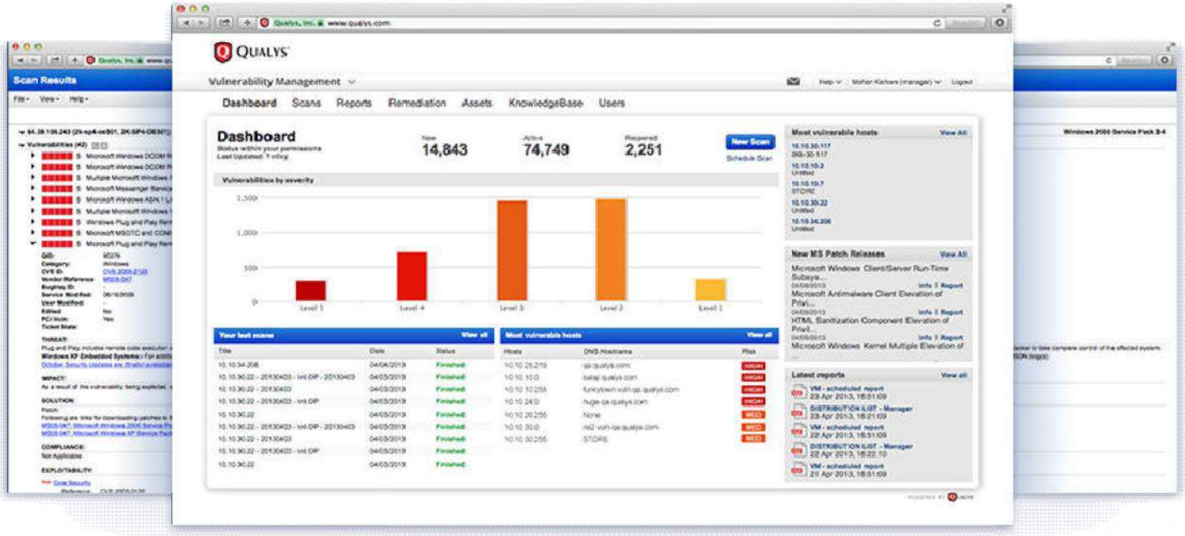
Topic no 129: Qualys Features

- Qualys:
  - Cloud-based service
  - On-premise device
  - Complete suite
  - Scalable and immediate deployment
  - Asset discovery; find and organize hosts
  - Prioritize & manage remediation tickets
  - Continuous monitoring service
  - Policy compliance scanning
  - Qualys Secure Seal for websites



Host Details

Name:	10.10.25.65
IP:	10.10.25.65
Domain:	No registered h
Status:	Reachable
OS:	Windows 2003
Last scan:	09/14/2013
Scannable:	Scan now
Discovery:	ICMP TCP Port 135 TCP Port 139 TCP Port 445 TCP Port 53 TCP Port 80 TCP Port 88 TCP RST UDP Port 137 UDP Port 53



Dashboard
Status within your permissions

New	Active	Reopened
14,843	74,749	2,251

Your last scans

Title	Date	Status
10.10.34.208	04/04/2013	Finished
10.10.30.22 - 20130403 - Int DIP - 20130403	04/03/2013	Finished
10.10.30.22 - 20130403	04/03/2013	Finished
10.10.30.22 - 20130403 - Int DIP	04/03/2013	Finished
10.10.30.22	04/03/2013	Finished
10.10.30.22 - 20130403 - Int DIP - 20130403	04/03/2013	Finished
10.10.30.22 - 20130403	04/03/2013	Finished
10.10.30.22 - 20130403 - Int DIP	04/03/2013	Finished
10.10.30.22	04/03/2013	Finished

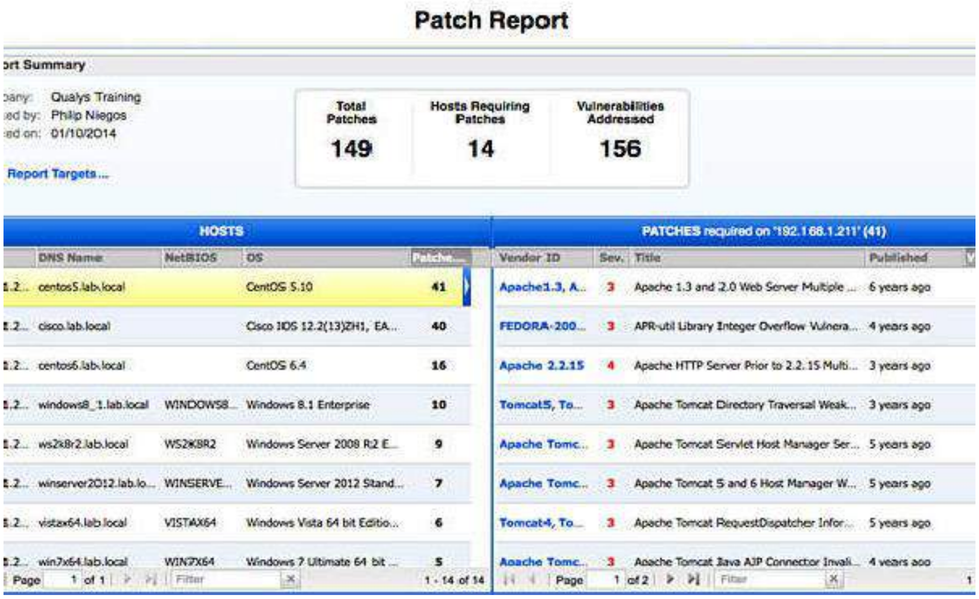
Most vulnerable hosts

Hosts	DNS Hostname	Risk
10.10.25.219	qa.qualys.com	HIGH
10.10.10.0	balaji.qualys.com	HIGH
10.10.10.255	funkytown.vuln.qa.qualys.com	HIGH
10.10.24.0	huge.qa.qualys.com	HIGH
10.10.20.255	None	MED
10.10.30.0	re2.vuln.qa.qualys.com	MED
10.10.30.255	STORE	MED

Most vulnerable hosts
10.10.30.117
10.10.10.3
Untitled
10.10.10.7
STORE
10.10.30.22
Untitled
10.10.34.206
Untitled

New MS Patch Releases
Microsoft Windows Client/Server Run-Time Subsys...
Info | Report
Microsoft Antimalware Client Elevation of Privi...
Info | Report
HTML Sanitization Component Elevation of Privil...
Info | Report
Microsoft Windows Kernel Multiple Elevation of

Latest reports
VM - scheduled report
23 Apr 2013, 18:51:09
DISTRIBUTION LIST - Manager
23 Apr 2013, 18:21:09
VM - scheduled report
22 Apr 2013, 18:51:09
DISTRIBUTION LIST - Manager
22 Apr 2013, 18:22:10
VM - scheduled report
21 Apr 2013, 18:51:09



Patch Report

ort Summary

pany: Qualys Training
ed by: Philip Niegos
ed on: 01/10/2014

Report Targets...

Total Patches	Hosts Requiring Patches	Vulnerabilities Addressed
149	14	156

HOSTS

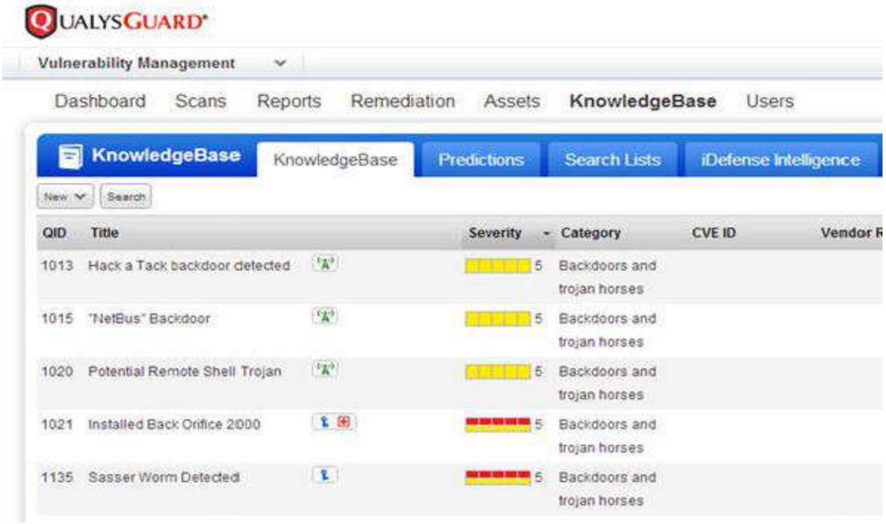
	DNS Name	NetBIOS	OS	Patche...
1.2...	centos5.lab.local		CentOS 5.10	41
1.2...	cisco.lab.local		Cisco IOS 12.2(13)ZH1, EA...	40
1.2...	centos6.lab.local		CentOS 6.4	16
1.2...	windows8_1.lab.local	WINDOWS8...	Windows 8.1 Enterprise	10
1.2...	ws2k8r2.lab.local	WS2K8R2	Windows Server 2008 R2 E...	9
1.2...	winserver2012.lab.lo...	WINSERVE...	Windows Server 2012 Stand...	7
1.2...	vistax64.lab.local	VISTAX64	Windows Vista 64 bit Editio...	6
1.2...	win7x64.lab.local	WIN7X64	Windows 7 Ultimate 64 bit ...	5

Page 1 of 1 Filter 1 - 14 of 14

PATCHES required on '192.168.1.211' (41)

Vendor ID	Sev.	Title	Published
Apache1.3, A...	3	Apache 1.3 and 2.0 Web Server Multiple ...	6 years ago
FEDORA-200...	3	APR-util Library Integer Overflow Vulnera...	4 years ago
Apache 2.2.15	4	Apache HTTP Server Prior to 2.2.15 Multi...	3 years ago
Tomcat5, To...	3	Apache Tomcat Directory Traversal Weak...	3 years ago
Apache Tomc...	3	Apache Tomcat Servlet Host Manager Ser...	5 years ago
Apache Tomc...	3	Apache Tomcat 5 and 6 Host Manager W...	5 years ago
Tomcat4, To...	3	Apache Tomcat RequestDispatcher Infor...	5 years ago
Apache Tomc...	3	Apache Tomcat Java AJP Connector Invali...	4 years ago

Page 1 of 2 Filter 1



QUALYSGUARD®

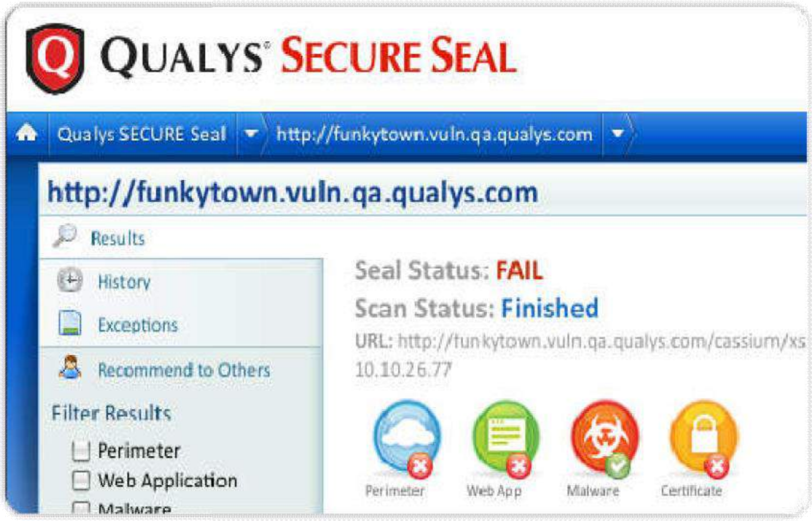
Vulnerability Management

Dashboard Scans Reports Remediation Assets **KnowledgeBase** Users

KnowledgeBase KnowledgeBase Predictions Search Lists iDefense Intelligence

New Search

QID	Title	Severity	Category	CVE ID	Vendor R
1013	Hack a Tack backdoor detected	5	Backdoors and trojan horses		
1015	"NetBus" Backdoor	5	Backdoors and trojan horses		
1020	Potential Remote Shell Trojan	5	Backdoors and trojan horses		
1021	Installed Back Orifice 2000	5	Backdoors and trojan horses		
1135	Sasser Worm Detected	5	Backdoors and trojan horses		



QUALYS® SECURE SEAL

Qualys SECURE Seal http://funkytown.vuln.qa.qualys.com

http://funkytown.vuln.qa.qualys.com

Seal Status: FAIL

Scan Status: Finished

URL: http://funkytown.vuln.qa.qualys.com/cassium/xs

10.10.26.77

- Qualys:
  - Website scanning

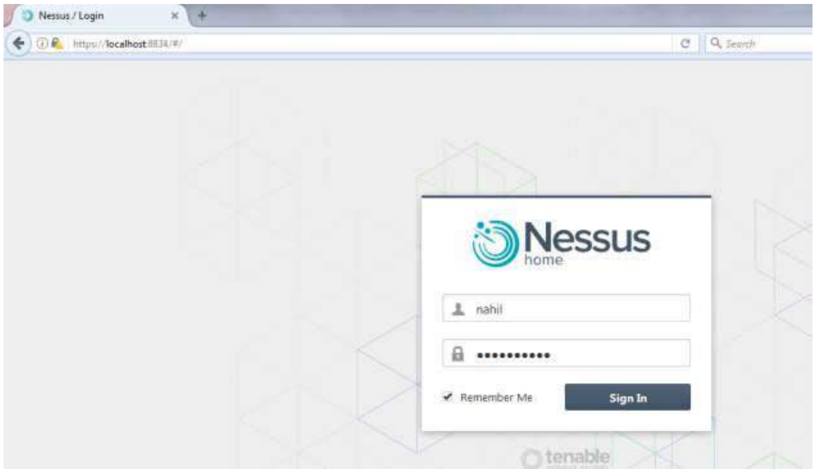
  - compliance
  - Annual subscription service model

- Qualys is a convenient and scalable VM tool that comes with several modules
- Subscription-based pricing model which can be expensive
- Several advantages due to cloud-based service

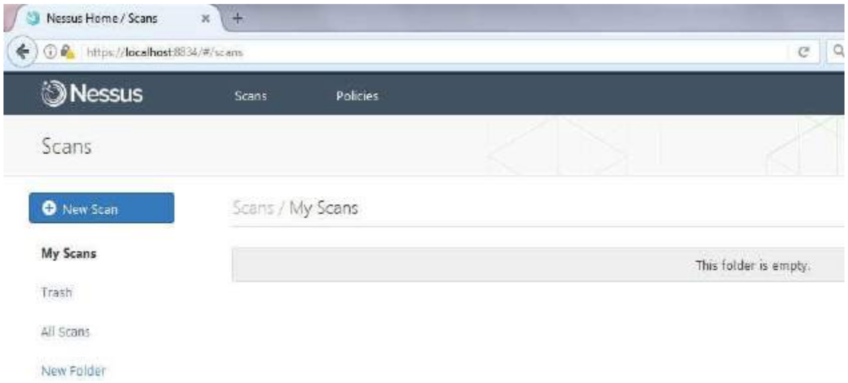
Topic no 130: Nessus Demo – 1

- Lets take a look at Nessus Demo
- https://www.tenable.com/products/nessus/nessus-professional/evaluate
- Download free 7 day trial
- Get activation key from website

LOGIN SCREEN

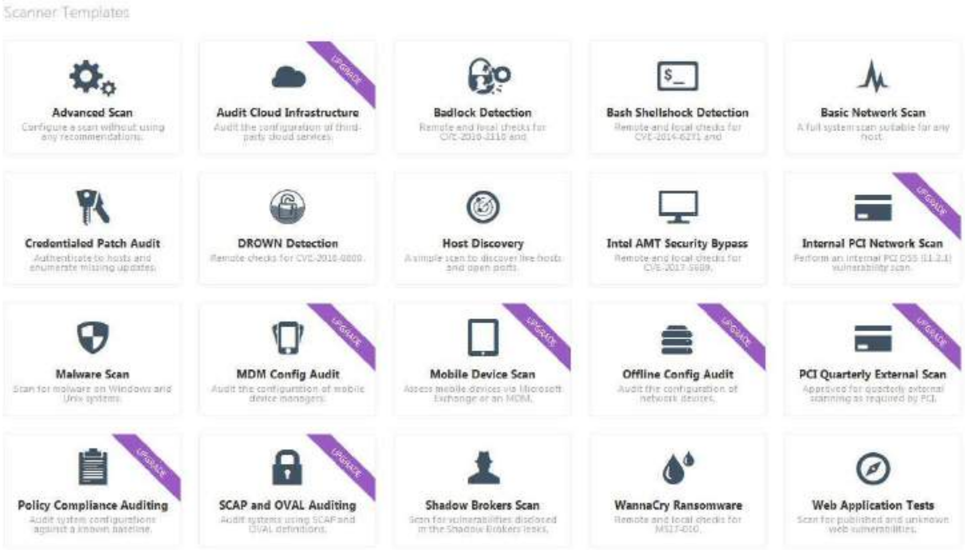


DASHBOARD



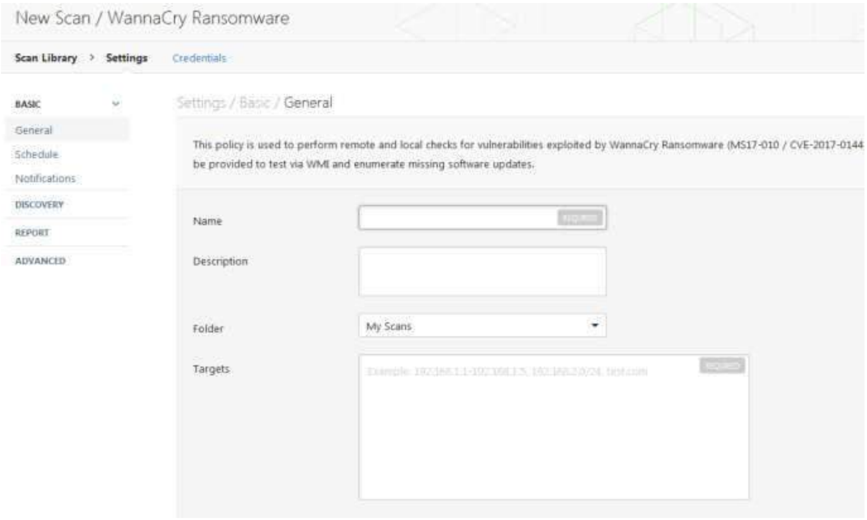
This folder is empty.

NEW SCAN


Scanner Templates
Advanced Scan
Configure a scan without using any recommendations.
UPGRADE
Audit Cloud Infrastructure
Audit the configuration of third-party cloud services.
Badlock Detection
Remote and local checks for CVE-2016-2118 and
Bash Shellshock Detection
Remote and local checks for CVE-2014-6271 and
Basic Network Scan
A full system scan suitable for any host.
Credentialed Patch Audit
Authenticate to hosts and enumerate missing updates.
DROWN Detection
Remote checks for CVE-2016-0800.
Host Discovery
A simple scan to discover live hosts and open ports.
Intel AMT Security Bypass
Remote and local checks for CVE-2017-5689.
UPGRADE
Internal PCI Network Scan
Perform an internal PCI DSS (11.2.1) vulnerability scan.
Malware Scan
Scan for malware on Windows and Unix systems.
UPGRADE
MDM Config Audit
Audit the configuration of mobile device managers.
UPGRADE
Mobile Device Scan
Assess mobile devices via Microsoft Exchange or an MDM.
UPGRADE
Offline Config Audit
Audit the configuration of network devices.
UPGRADE
PCI Quarterly External Scan
Approved for quarterly external scanning as required by PCI.
UPGRADE
Policy Compliance Auditing
Audit system configurations against a known baseline.
UPGRADE
SCAP and OVAL Auditing
Audit systems using SCAP and OVAL definitions.
Shadow Brokers Scan
Scan for vulnerabilities disclosed in the Shadow Brokers leaks.
WannaCry Ransomware
Remote and local checks for MS17-010.
Web Application Tests
Scan for published and unknown web vulnerabilities.

WANNACRY RANSOMWARE SCAN

NEW SCAN WINDOW



This policy is used to perform remote and local checks for vulnerabilities exploited by WannaCry Ransomware (MS17-010 / CVE-2017-0144

be provided to test via WMI and enumerate missing software updates.

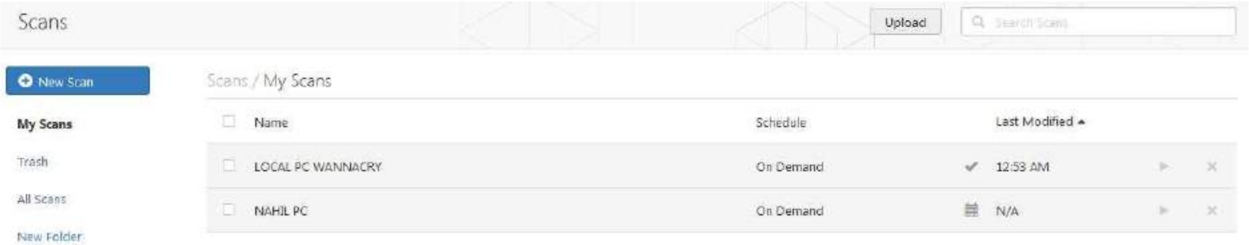
Name

Description

Folder: My Scans

Targets: Example: 192.168.1.1-192.168.1.5, 192.168.2.0/24, test.com

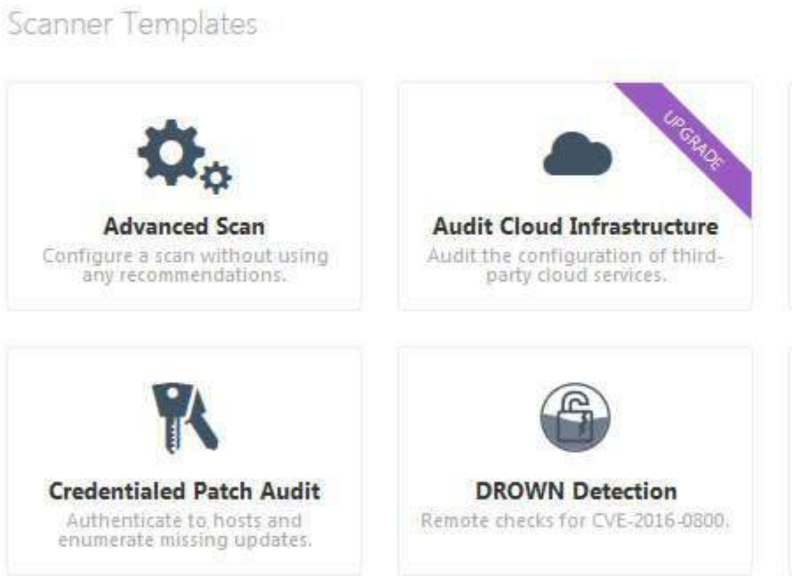
DASHBOARD VIEW WITH SCANS



Scans / My Scans

□	Name	Schedule		Last Modified ▲		
□	LOCAL PC WANNACRY	On Demand	✓	12:53 AM	▶	×
□	NAHIL PC	On Demand	▦	N/A	▶	×

NEW SCAN…


Scanner Templates

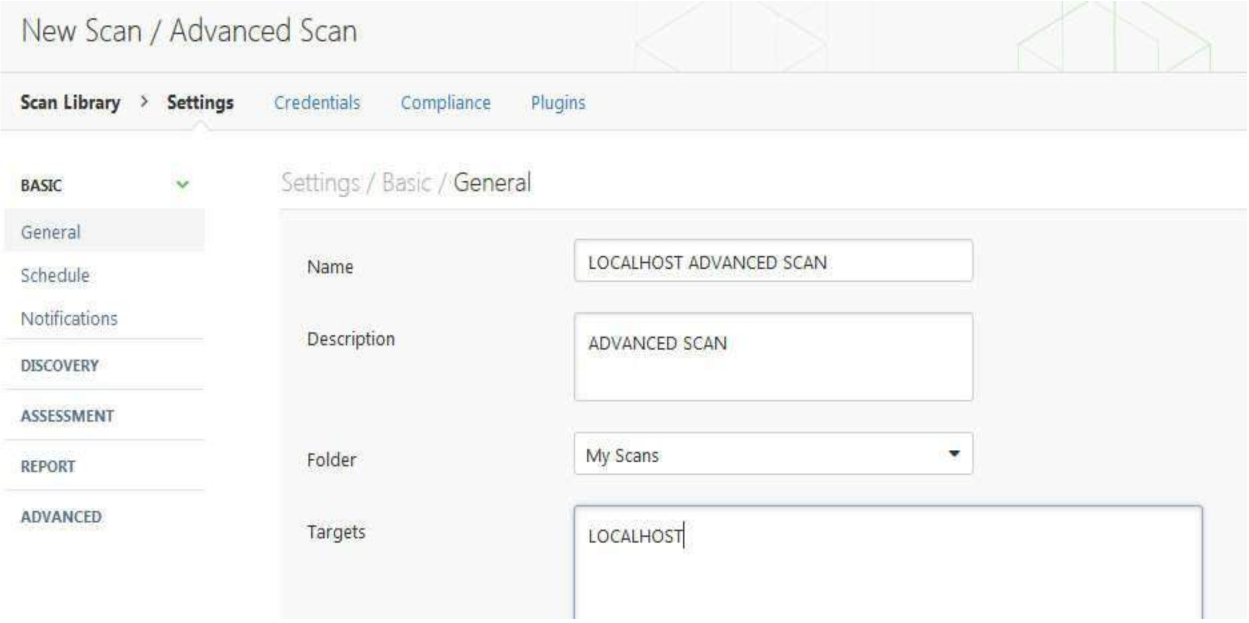
Advanced Scan
Configure a scan without using any recommendations.

Audit Cloud Infrastructure
Audit the configuration of third-party cloud services.

Credentialed Patch Audit
Authenticate to hosts and enumerate missing updates.

DROWN Detection
Remote checks for CVE-2016-0800.

ENTER SCAN DETAILS


New Scan / Advanced Scan

Settings / Basic / General

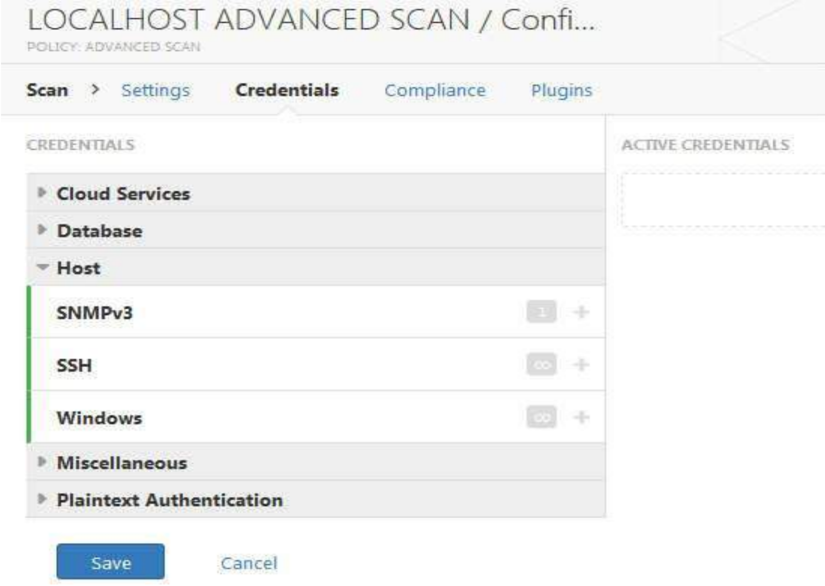
Name: LOCALHOST ADVANCED SCAN

Description: ADVANCED SCAN

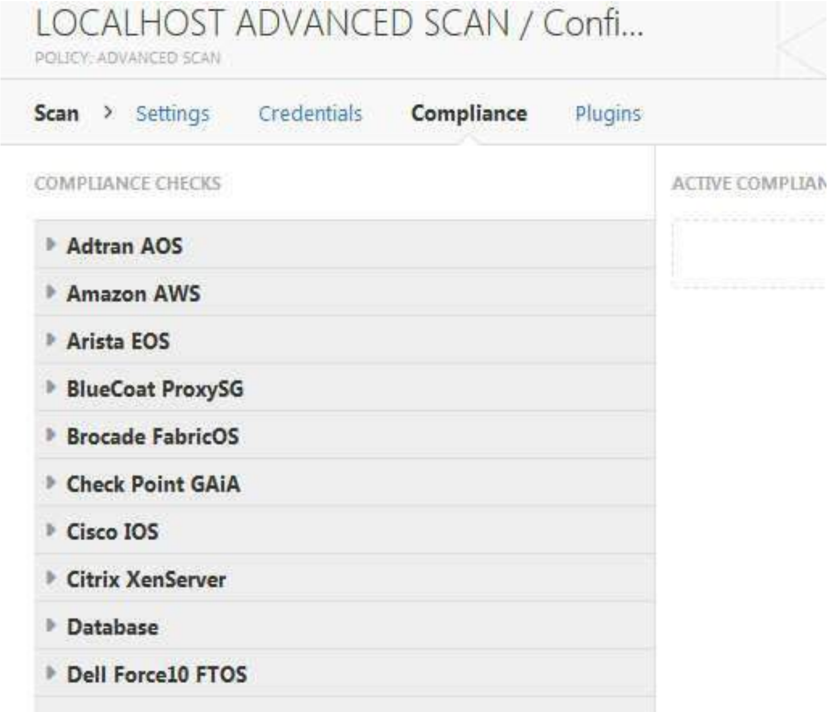
Folder: My Scans

Targets: LOCALHOST

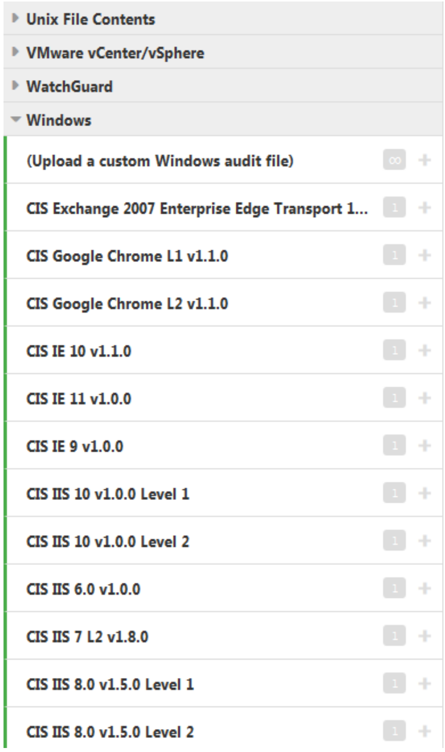
CREDENTIAL SCAN



COMPLIANCE SCAN

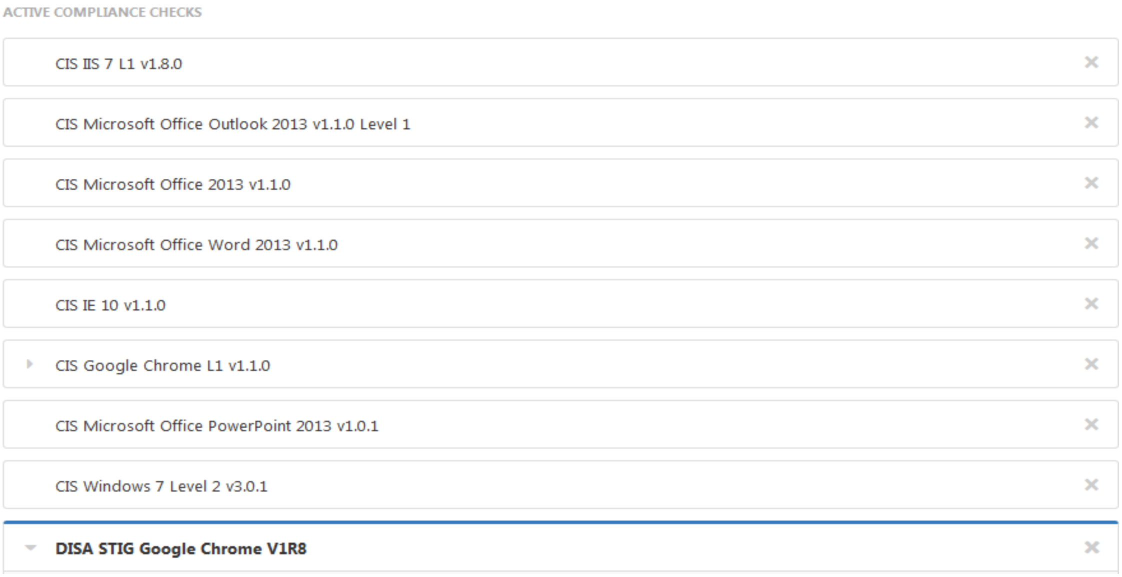


WINDOWS COMPLIANCE MENU (CIS)



- Unix File Contents
- VMware vCenter/vSphere
- WatchGuard
- Windows
  - (Upload a custom Windows audit file) ∞ +
  - CIS Exchange 2007 Enterprise Edge Transport 1... 1 +
  - CIS Google Chrome L1 v1.1.0 1 +
  - CIS Google Chrome L2 v1.1.0 1 +
  - CIS IE 10 v1.1.0 1 +
  - CIS IE 11 v1.0.0 1 +
  - CIS IE 9 v1.0.0 1 +
  - CIS IIS 10 v1.0.0 Level 1 1 +
  - CIS IIS 10 v1.0.0 Level 2 1 +
  - CIS IIS 6.0 v1.0.0 1 +
  - CIS IIS 7 L2 v1.8.0 1 +
  - CIS IIS 8.0 v1.5.0 Level 1 1 +
  - CIS IIS 8.0 v1.5.0 Level 2 1 +

WINDOWS COMPLIANCE MENU (CIS)…



ACTIVE COMPLIANCE CHECKS

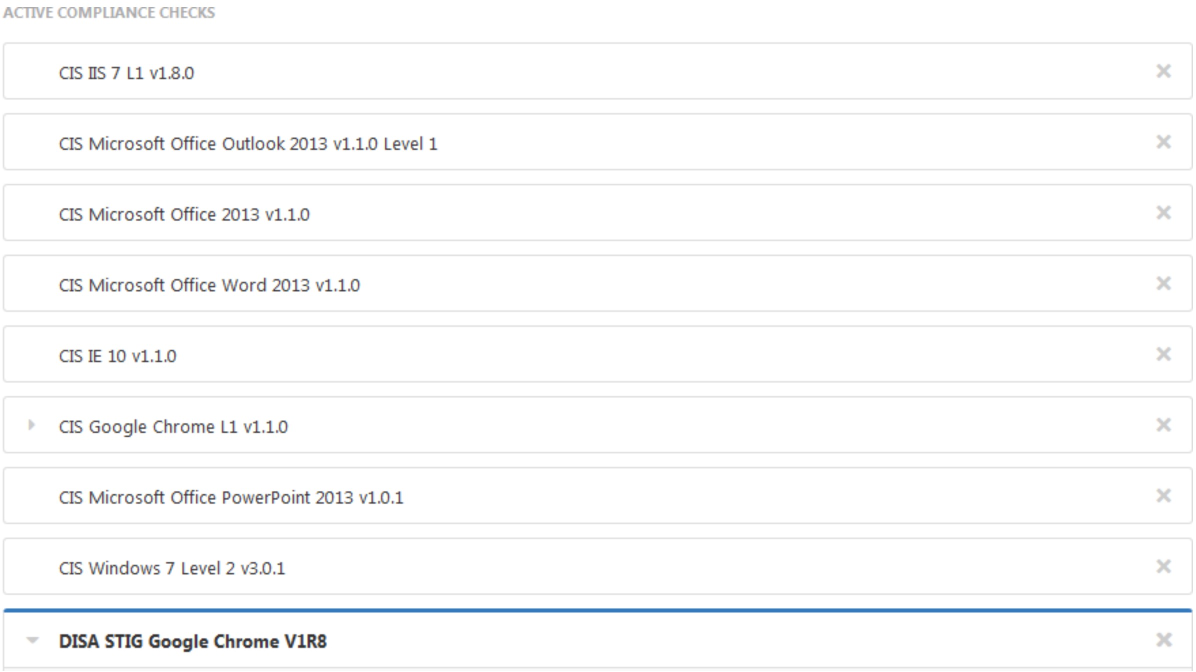
- CIS IIS 7 L1 v1.8.0 ×
- CIS Microsoft Office Outlook 2013 v1.1.0 Level 1 ×
- CIS Microsoft Office 2013 v1.1.0 ×
- CIS Microsoft Office Word 2013 v1.1.0 ×
- CIS IE 10 v1.1.0 ×
- CIS Google Chrome L1 v1.1.0 ×
- CIS Microsoft Office PowerPoint 2013 v1.0.1 ×
- CIS Windows 7 Level 2 v3.0.1 ×
- **DISA STIG Google Chrome V1R8** ×

- Lets take a look at Nessus Demo
- https://www.tenable.com/products/nessus/nessus-professional/evaluate
- Download free 7 day trial
- Get activation key from website

Topic no 131: Nessus Demo – 2

- Lets take a look at Nessus Demo
- https://www.tenable.com/products/nessus/nessus-professional/evaluate
- Download free 7 day trial
- Get activation key from website

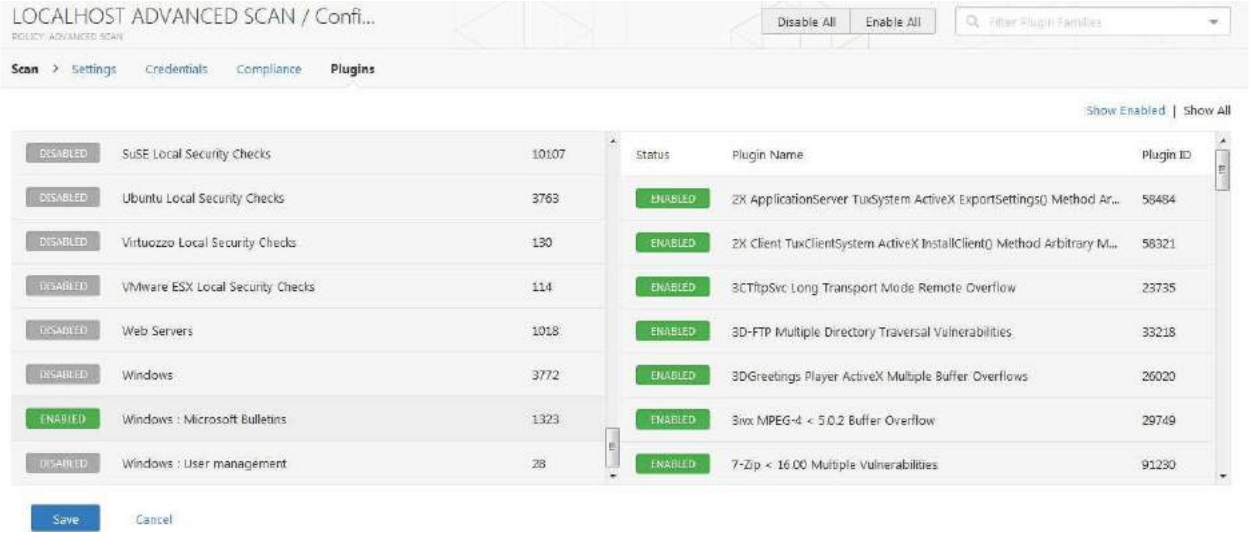
- **ADVANCED SCAN / COMPLIANCE**



ACTIVE COMPLIANCE CHECKS

- CIS IIS 7 L1 v1.8.0 ×
- CIS Microsoft Office Outlook 2013 v1.1.0 Level 1 ×
- CIS Microsoft Office 2013 v1.1.0 ×
- CIS Microsoft Office Word 2013 v1.1.0 ×
- CIS IE 10 v1.1.0 ×
- CIS Google Chrome L1 v1.1.0 ×
- CIS Microsoft Office PowerPoint 2013 v1.0.1 ×
- CIS Windows 7 Level 2 v3.0.1 ×
- **DISA STIG Google Chrome V1R8** ×

ADVANCED SCAN / PLUG-INS



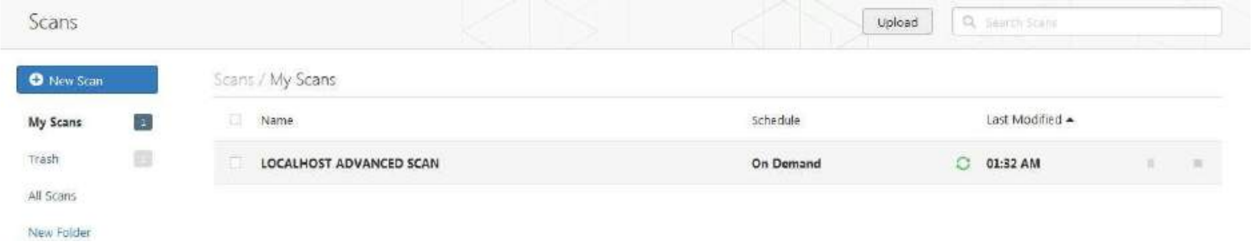
LOCALHOST ADVANCED SCAN / Confi...

POLICY: ADVANCED SCAN

DISABLED	SuSE Local Security Checks	10107
DISABLED	Ubuntu Local Security Checks	3763
DISABLED	Virtuozzo Local Security Checks	130
DISABLED	VMware ESX Local Security Checks	114
DISABLED	Web Servers	1018
DISABLED	Windows	3772
ENABLED	Windows : Microsoft Bulletins	1323
DISABLED	Windows : User management	28

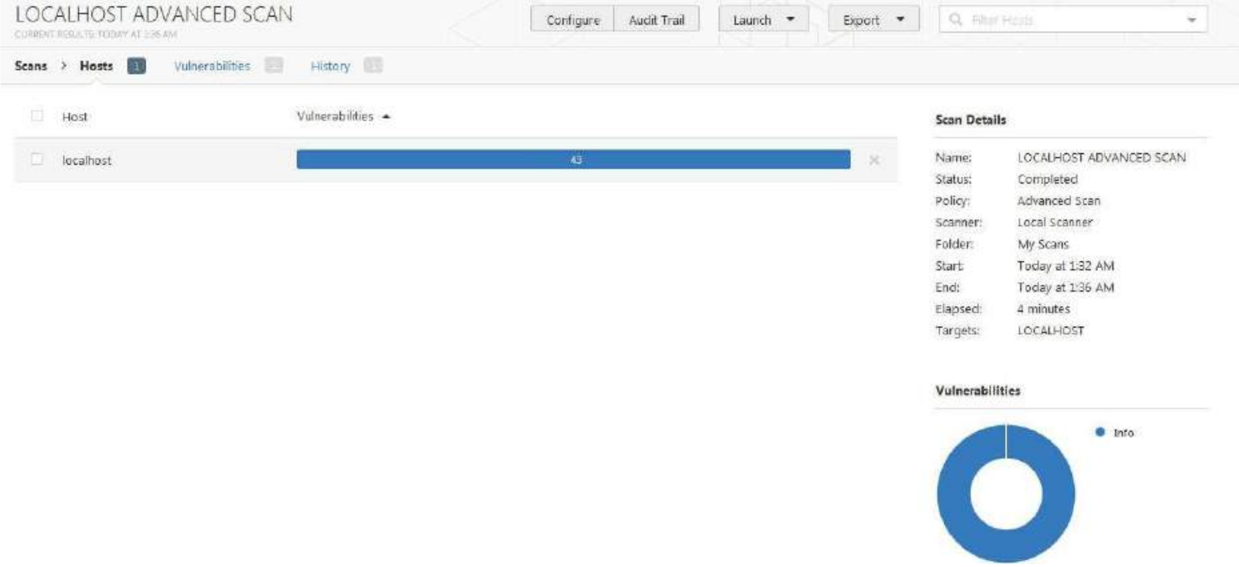
Status	Plugin Name	Plugin ID
ENABLED	2X ApplicationServer TuxSystem ActiveX ExportSettings() Method Ar...	58484
ENABLED	2X Client TuxClientSystem ActiveX InstallClient() Method Arbitrary M...	58321
ENABLED	3CTftpSvc Long Transport Mode Remote Overflow	23735
ENABLED	3D-FTP Multiple Directory Traversal Vulnerabilities	33218
ENABLED	3DGreetings Player ActiveX Multiple Buffer Overflows	26020
ENABLED	3ivx MPEG-4 < 5.0.2 Buffer Overflow	29749
ENABLED	7-Zip < 16.00 Multiple Vulnerabilities	91230

SCAN…IN PROGRESS



□	Name	Schedule	Last Modified ▲
□	LOCALHOST ADVANCED SCAN	On Demand	01:32 AM

SCAN REPORT [43 INFO]

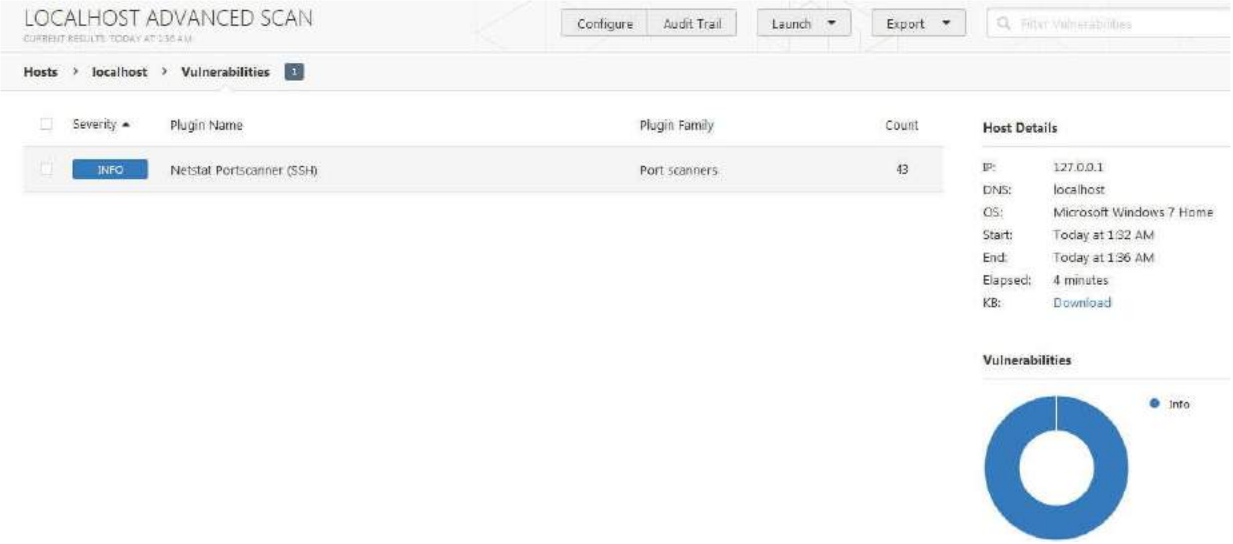


□	Host	Vulnerabilities ▲
□	localhost	43

Scan Details

Name:	LOCALHOST ADVANCED SCAN
Status:	Completed
Policy:	Advanced Scan
Scanner:	Local Scanner
Folder:	My Scans
Start:	Today at 1:32 AM
End:	Today at 1:36 AM
Elapsed:	4 minutes
Targets:	LOCALHOST

SCAN REPORT [DETAILS]



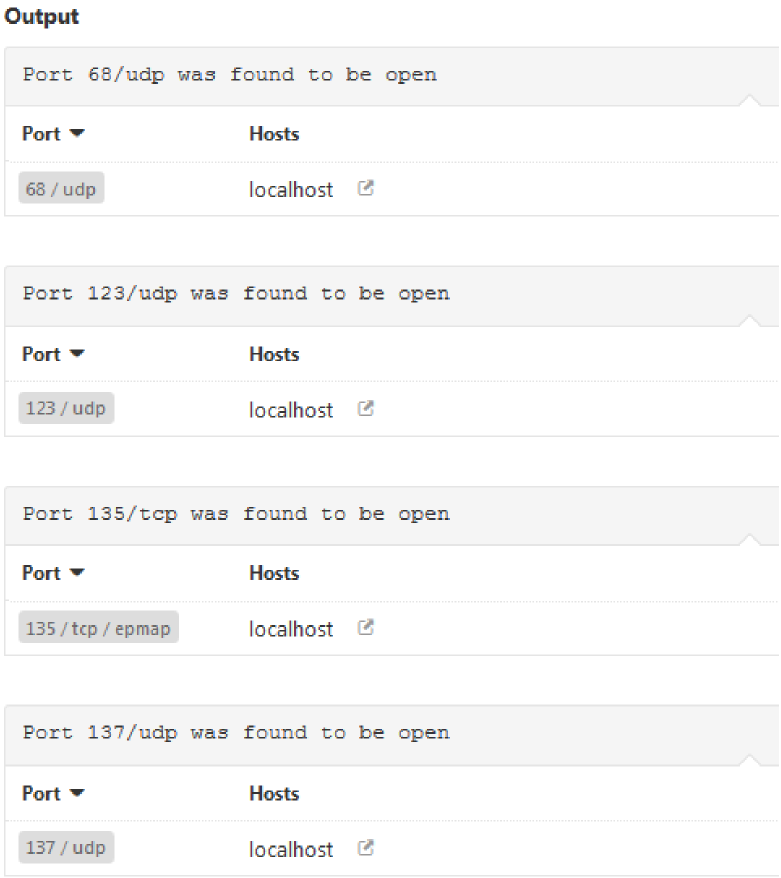
□	Severity ▲	Plugin Name	Plugin Family	Count
□	INFO	Netstat Portscanner (SSH)	Port scanners	43

Host Details

IP:	127.0.0.1
DNS:	localhost
OS:	Microsoft Windows 7 Home
Start:	Today at 1:32 AM
End:	Today at 1:36 AM
Elapsed:	4 minutes
KB:	Download

SCAN REPORT [DETAILS…]

https://en.wikipedia.org/wiki/Netstat



Output

```
Port 68/udp was found to be open
```

Port ▾	Hosts
68 / udp	localhost

```
Port 123/udp was found to be open
```

Port ▾	Hosts
123 / udp	localhost

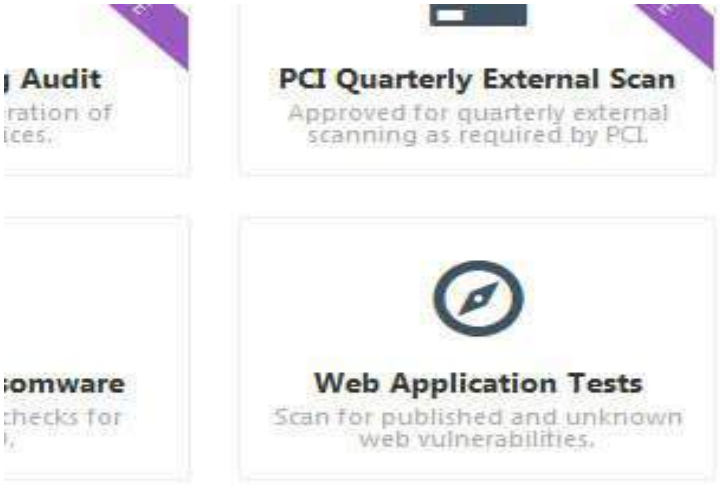
```
Port 135/tcp was found to be open
```

Port ▾	Hosts
135 / tcp / epmap	localhost

```
Port 137/udp was found to be open
```

Port ▾	Hosts
137 / udp	localhost

WEB APPLICATION TEST



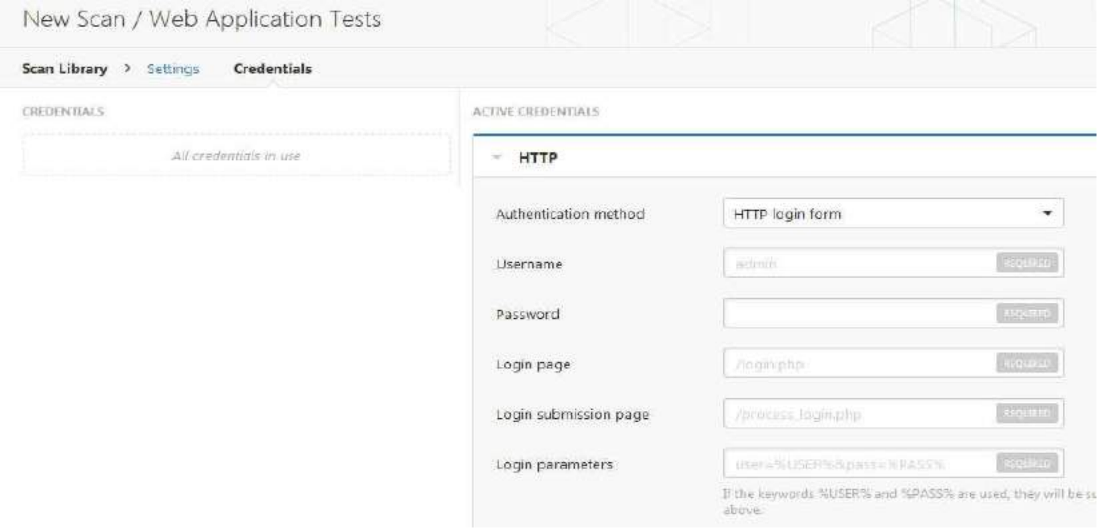
Audit
ration of
ices.

PCI Quarterly External Scan
Approved for quarterly external scanning as required by PCI.

omware
hecks for

Web Application Tests
Scan for published and unknown web vulnerabilities.

WEB APPLICATION TEST - CREDENTIALS



New Scan / Web Application Tests

Scan Library > Settings Credentials

CREDENTIALS

All credentials in use

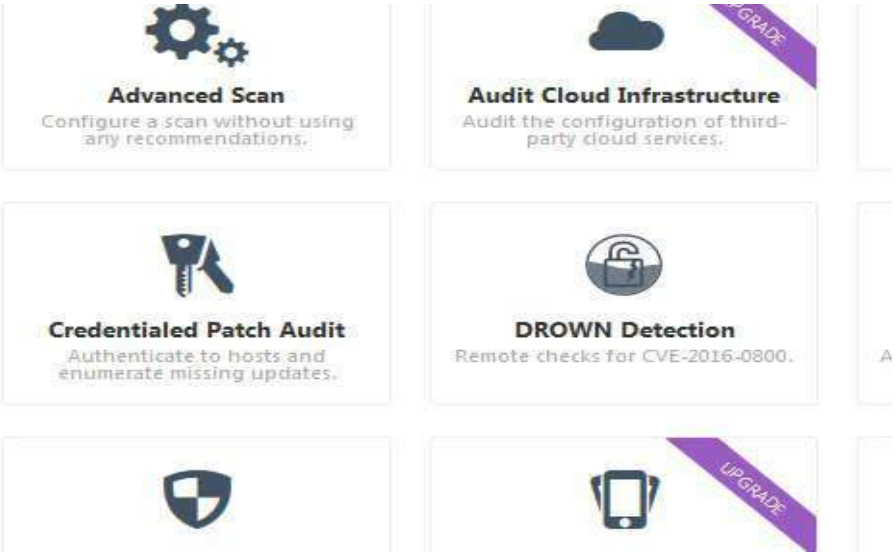
ACTIVE CREDENTIALS

HTTP

Authentication method	HTTP login form
Username	admin REQUIRED
Password	REQUIRED
Login page	/login.php REQUIRED
Login submission page	/process_login.php REQUIRED
Login parameters	user=%USER%&pass=%PASS% REQUIRED

If the keywords %USER% and %PASS% are used, they will be s
above.

CREDENTIALED PATCH AUDIT



Advanced Scan

Configure a scan without using any recommendations.

Audit Cloud Infrastructure

Audit the configuration of third-party cloud services.

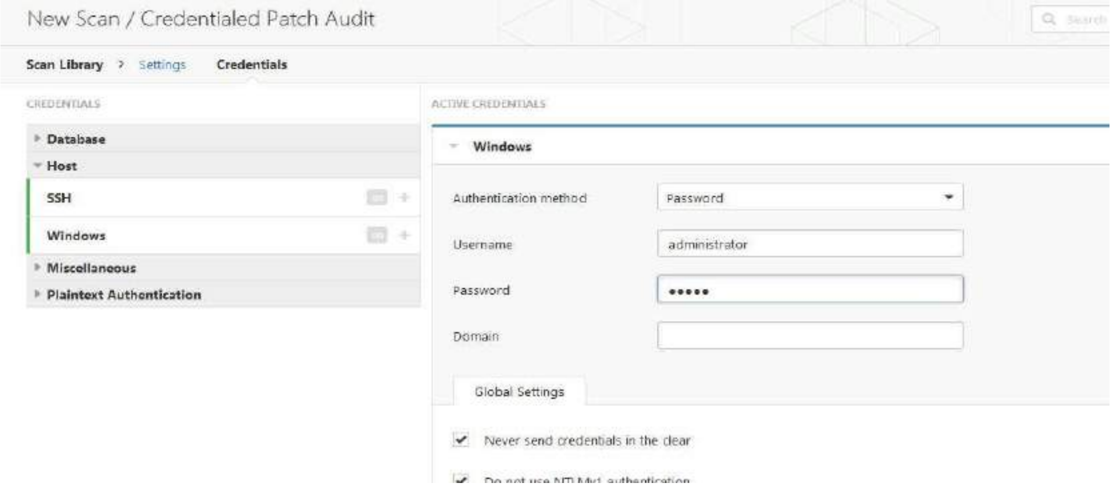
Credentialed Patch Audit

Authenticate to hosts and enumerate missing updates.

DROWN Detection

Remote checks for CVE-2016-0800.

CREDENTIALED PATCH AUDIT



New Scan / Credentialed Patch Audit

Scan Library > Settings Credentials

CREDENTIALS

- Database
- Host
  - SSH
  - Windows
- Miscellaneous
- Plaintext Authentication

ACTIVE CREDENTIALS

Windows

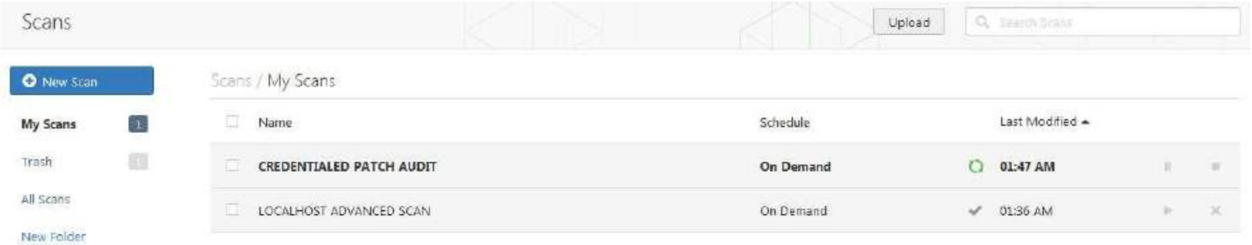
Authentication method	Password
Username	administrator
Password	•••••
Domain	

Global Settings

☑ Never send credentials in the clear

☑ Do not use NTLMv1 authentication

SCANS DASHBOARD



Scans

Upload

New Scan

My Scans 1

Trash

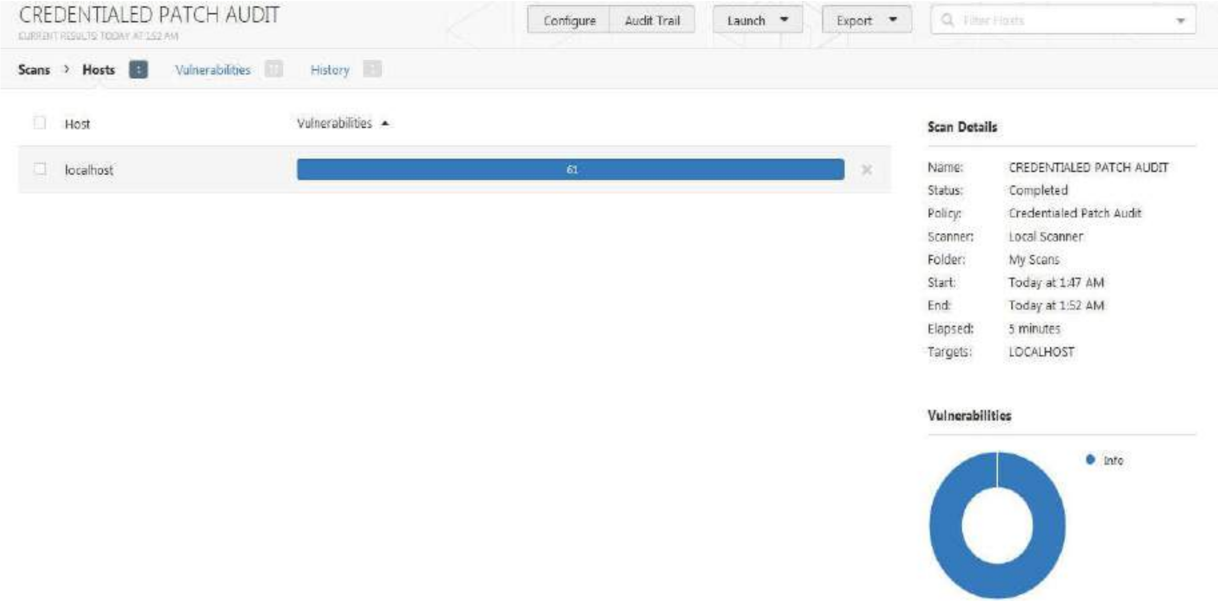
All Scans

New Folder

Scans / My Scans

□	Name	Schedule		Last Modified ▲
□	CREDENTIALED PATCH AUDIT	On Demand	○	01:47 AM
□	LOCALHOST ADVANCED SCAN	On Demand	✓	01:36 AM

- **CREDENTIALED AUDIT SCAN RESULTS [61 INFO]**



CREDENTIALED PATCH AUDIT

CURRENT RESULTS: TODAY AT 1:52 AM

Configure | Audit Trail | Launch ▾ | Export ▾

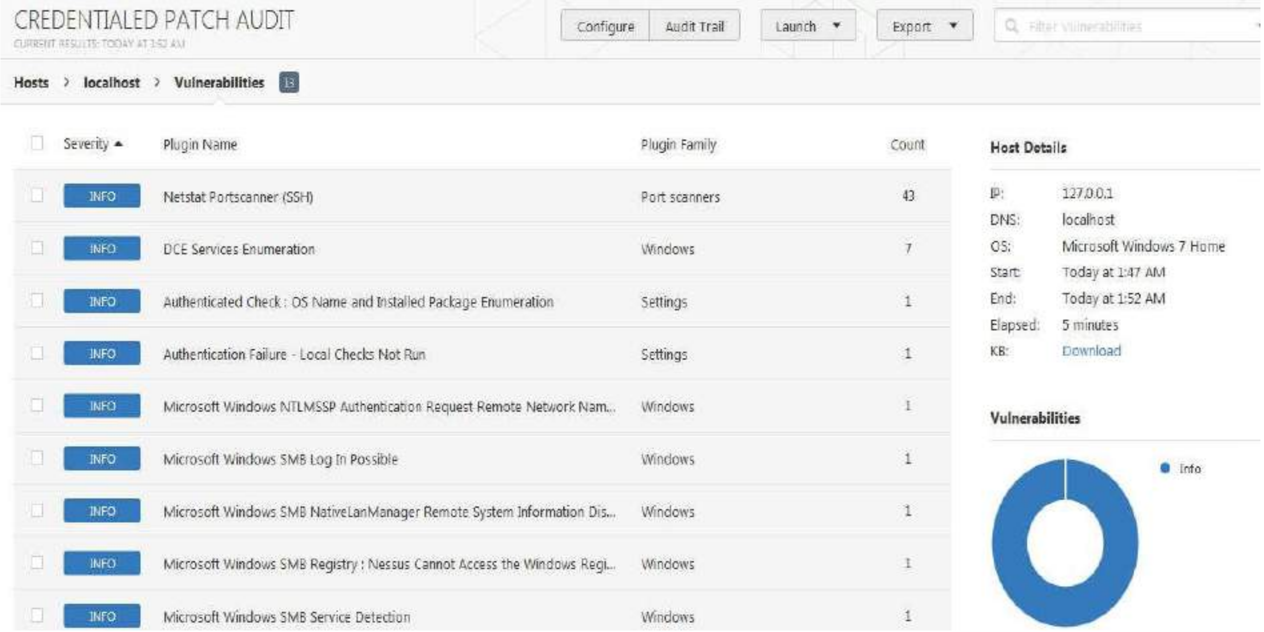
Scans › Hosts 1 Vulnerabilities History

□	Host	Vulnerabilities ▲
□	localhost	61

Scan Details

Name:	CREDENTIALED PATCH AUDIT
Status:	Completed
Policy:	Credentialed Patch Audit
Scanner:	Local Scanner
Folder:	My Scans
Start:	Today at 1:47 AM
End:	Today at 1:52 AM
Elapsed:	5 minutes
Targets:	LOCALHOST

Vulnerabilities



CREDENTIALED PATCH AUDIT

CURRENT RESULTS: TODAY AT 1:52 AM

Configure | Audit Trail | Launch ▾ | Export ▾

Hosts › localhost › Vulnerabilities 13

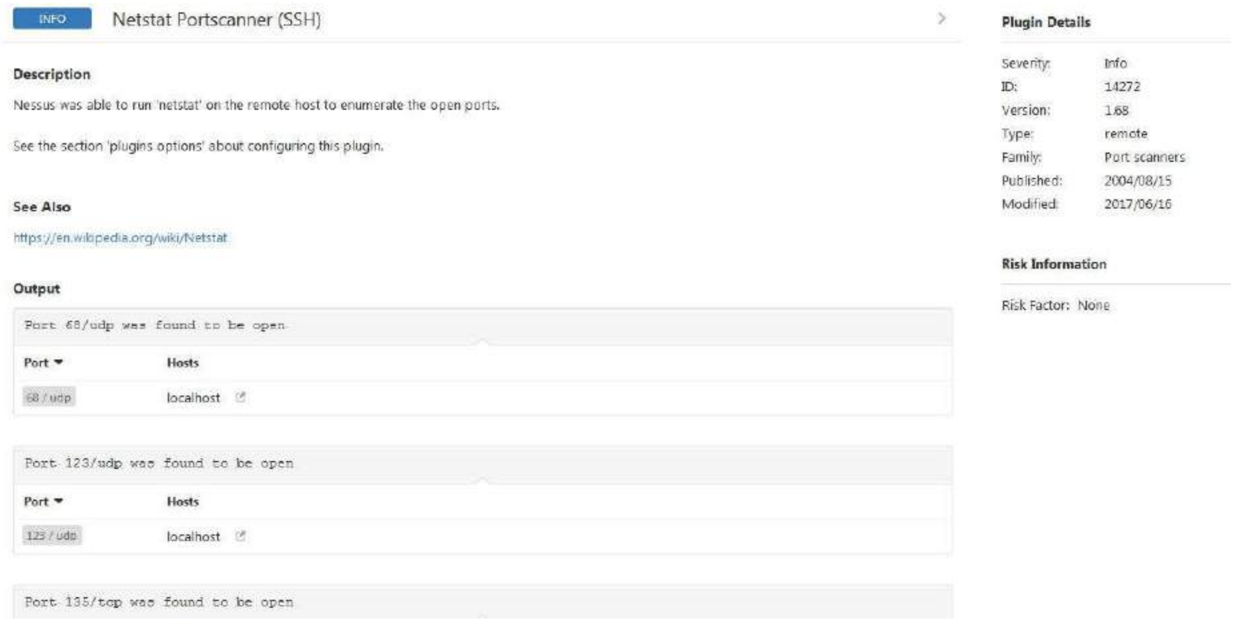
□	Severity ▲	Plugin Name	Plugin Family	Count
□	INFO	Netstat Portscanner (SSH)	Port scanners	43
□	INFO	DCE Services Enumeration	Windows	7
□	INFO	Authenticated Check : OS Name and Installed Package Enumeration	Settings	1
□	INFO	Authentication Failure - Local Checks Not Run	Settings	1
□	INFO	Microsoft Windows NTLMSSP Authentication Request Remote Network Nam...	Windows	1
□	INFO	Microsoft Windows SMB Log In Possible	Windows	1
□	INFO	Microsoft Windows SMB NativeLanManager Remote System Information Dis...	Windows	1
□	INFO	Microsoft Windows SMB Registry : Nessus Cannot Access the Windows Regi...	Windows	1
□	INFO	Microsoft Windows SMB Service Detection	Windows	1

Host Details

IP:	127.0.0.1
DNS:	localhost
OS:	Microsoft Windows 7 Home
Start:	Today at 1:47 AM
End:	Today at 1:52 AM
Elapsed:	5 minutes
KB:	Download

Vulnerabilities

CREDENTIALED AUDIT SCAN RESULTS [DETAILS]



Netstat Portscanner (SSH)

Description

Nessus was able to run 'netstat' on the remote host to enumerate the open ports.

See the section 'plugins options' about configuring this plugin.

See Also

https://en.wikipedia.org/wiki/Netstat

Output

```
Port 68/udp was found to be open
```

Port	Hosts
68 / udp	localhost

```
Port 123/udp was found to be open
```

Port	Hosts
123 / udp	localhost

```
Port 135/tcp was found to be open
```

Plugin Details

Severity:	Info
ID:	14272
Version:	1.68
Type:	remote
Family:	Port scanners
Published:	2004/08/15
Modified:	2017/06/16

Risk Information

Risk Factor: None

Topic no 136: How Do VM Scanners Work?

- Lets take a look at Qualys scanning technique:
- QualysGuard scanning methodology mainly focuses on the different steps that an attacker might follow in order to perform an attack.
- It tries to use exactly the same discovery and information gathering techniques that will be used by an attacker.
  - **Checking if the remote host is alive**
  - The first step is to check if the host to be scanned is up and running in order to avoid wasting time on scanning a dead or unreachable host
  - This detection is done by probing some well-known TCP and UDP ports. If the scanner receives at least one reply from the remote host, it continues the scan
  - **Firewall detection**
  - The second test is to check if the host is behind any firewalling/filtering device. This test enables the scanner to gather more information about the network infrastructure and will help during the scan of TCP and UDP ports.
  - **TCP / UDP Port scanning**
  - The third step is to detect all open TCP and UDP ports to determine which services are running on this host. The number of ports is configurable, but the default scan

is approximately 1900 TCP ports and 180 UDP ports.

- **OS Detection**
- Once the TCP port scanning has been performed, the scanner tries to identify the operating system running on the host.
- This detection is based on sending specific TCP packets to open and closed ports.

- **TCP / UDP Service Discovery**
- Once TCP/UDP ports have been found open, the scanner tries to identify which service runs on each open port by using active discovery tests

- **Vulnerability assessment based on the services detected**
- Once the scanner has identified the specific services running on each open TCP and UDP port, it performs the actual vulnerability assessment.
- The scanner first tries to check the version of the service in order to detect only vulnerabilities applicable to this specific service version. Every vulnerability detection is non-intrusive, meaning that the scanner never exploits vulnerability if it could negatively affect the host in any way.

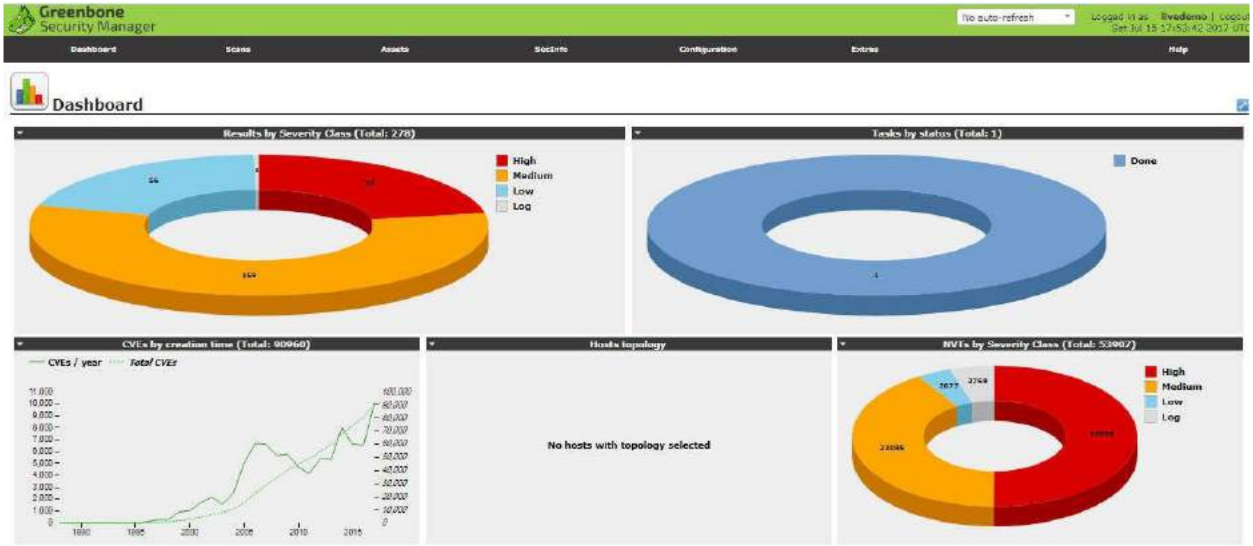
- **Limitations:**

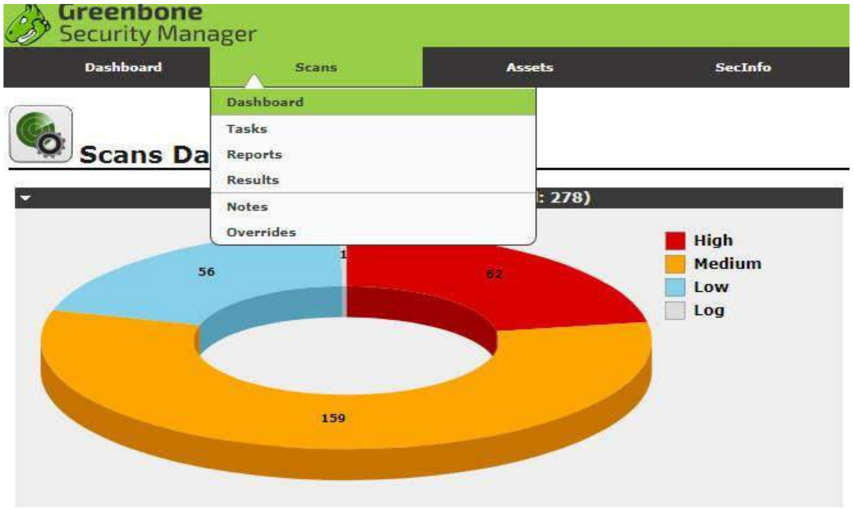
a. Vulnerability scanners work in the same manner as antivirus programs do by using databases that store descriptions of different types of vulnerabilities

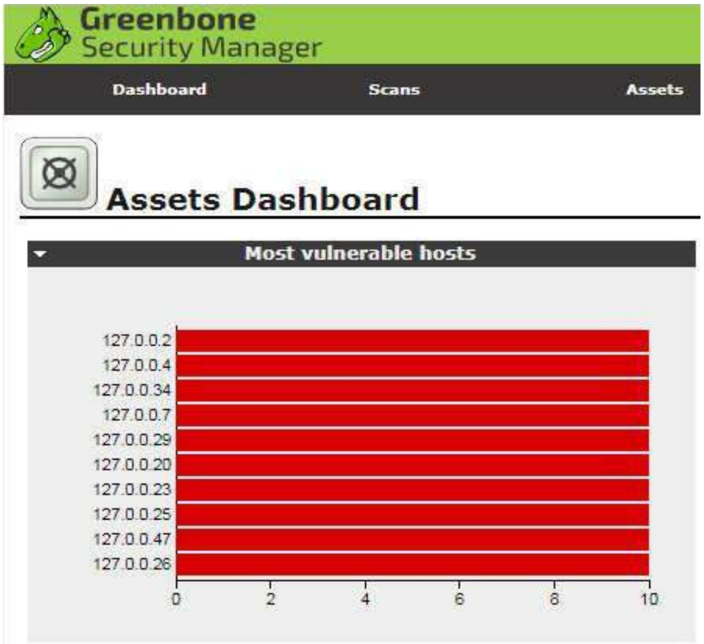
b. False positive or false negative rate

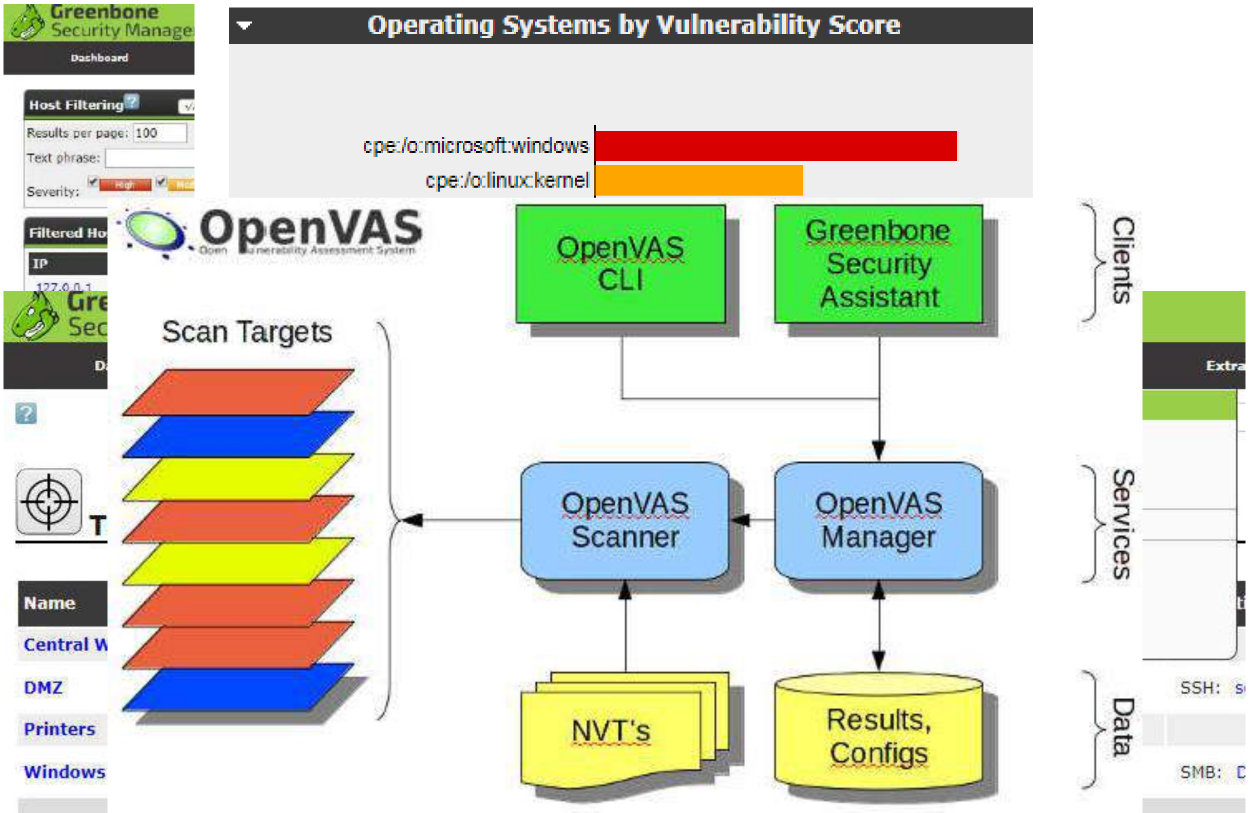
Topic no 139: Open Source Vulnerability Scanners

- Lets take a look at OpenVAS
- http://www.openvas.org/livedemo.html
- Login and password: livedemo




Greenbone
Security Manager
Dashboard
Scans
Assets
SecInfo
Dashboard
Tasks
Reports
Results
Notes
Overrides
Scans Da
: 278)
High
Medium
Low
Log
1
62
56
159


Greenbone
Security Manager
Dashboard
Scans
Assets
Assets Dashboard
Most vulnerable hosts
127.0.0.2
127.0.0.4
127.0.0.34
127.0.0.7
127.0.0.29
127.0.0.20
127.0.0.23
127.0.0.25
127.0.0.47
127.0.0.26
0
2
4
6
8
10


Greenbone
Security Manage
Dashboard
Host Filtering
Results per page: 100
Text phrase:
Severity:
Filtered Ho
IP
127.0.0.1
Operating Systems by Vulnerability Score
cpe:/o:microsoft:windows
cpe:/o:linux:kernel
OpenVAS
Open Vulnerability Assessment System
Scan Targets
OpenVAS CLI
Greenbone Security Assistant
Clients
OpenVAS Scanner
OpenVAS Manager
Services
NVT's
Results, Configs
Data
Name
Central W
DMZ
Printers
Windows
Extra
SSH:
SMB:

Topic no 140: Suggested Frequency For VM Scanning

APPROXIMATELY 50k NETWORK VULNERABILITY TESTS

- OpenVAS is a simple, free (opensource) VA scanner
- It has source code documentation, virtual images for download, and mailing lists on its website

- **Pre-requisites**
  - Information security team
  - Vulnerability management policy
  - Inhouse scanner or openvas tool
  - Trained staff
- **At the start:**
  - Organizations scanning once a year or not at all
  - Vulnerabilities identified by internal scanning or external VA report
  - Not remediated

  - Lack of discipline and management support

- **As organizations get more mature in scanning discipline:**
  - Quarterly scan
  - Quarterly remediation by IT teams
  - Quarterly report to IT Steering Committee
- **Mature organizations:**
  - Monthly scan
  - Monthly remediation
  - Quarterly or bi-annual external VA/PT
  - Monthly reports to IT Steering Committee
- **Most mature organizations:**
  - Fortnightly scan
  - Fortnightly remediation
  - Monthly reporting

Topic no 141: VM Challenges & Pitfalls

- **Challenges:**
  - Internal expertise on VM tool
  - Not enough support from IT teams
  - Vulnerability patching causing application failure
  - Management support

- **Internal expertise on VM tool**
  - Not too much expertise required
  - Create testbed
  - Monitor traffic pattern
  - Train staff if possible
  - Patch small portions of the network first
- **Not enough support from IT teams:**
  - Create reports and share among IT management
  - Highlight and educate risks to IT management and board
  - Create departmental competition and relationship-building
- **Patching causing application failure:**
  - In test environment create work around or compensating controls
  - Test the compensating controls
  - Document the compensating controls
- **Not enough management support:**
  - Share reports with management highlighting recent incidents
  - Share industry-specific or geographically relevant breach reports
  - Create awareness

Topic no 142: IT Asset Management Challenges

- The typical enterprise has hundreds or thousands of IT assets with a fast-paced business environment
- Tough challenge to keep all IT assets tracked and updated with all the right software patches and updates
- **Challenges:**
  - Asset discovery & tracking
  - Antivirus status
  - Windows & OS updates
  - Patch management
  - Change management
- **Asset discovery & tracking**

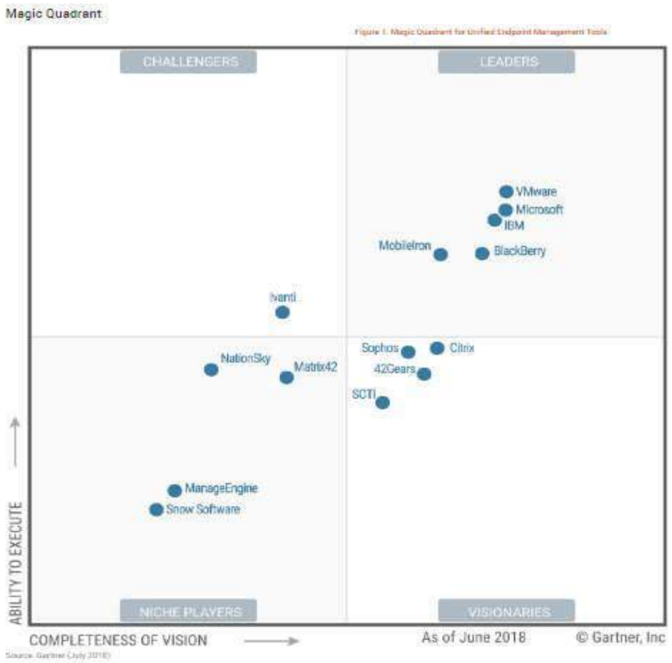
  - New assets added & old assets removed
  - Temporary or replacement machines
  - Travelling staff
  - Test beds
  - Vendor environments
- **Antivirus status:**
  - Working and updated antivirus critical to a security managed network
  - Geographically dispersed network
  - Some stations not responding or updating
- **Windows & OS updates:**
  - Windows, Linux, Unix, AIX and database systems
  - Vendor patches from multiple sources
  - Testing the patches
  - Acquiring downtime windows
  - Monitoring the performance
- **Patch management:**
  - Scanning for vulnerabilities
  - Passing on reports to IT teams
  - Tracking the remediation
  - Re-scanning for verification
  - Reporting to management
- **Change management:**
  - Change management inherent to all change processes
  - Change management requires reviews and approvals
  - Configuration management database or repository

Topic No 144: ASSET MANAGEMENT TOOLS FOR SECURITY FUNCTIONS

- Asset management helps with the following security functions:

1. Patch management
2. Software whitelisting
3. Software assets discovery and management
4. Enterprise tracking and reporting

- Gartner refers to this area as Unified endpoint management (UEM):



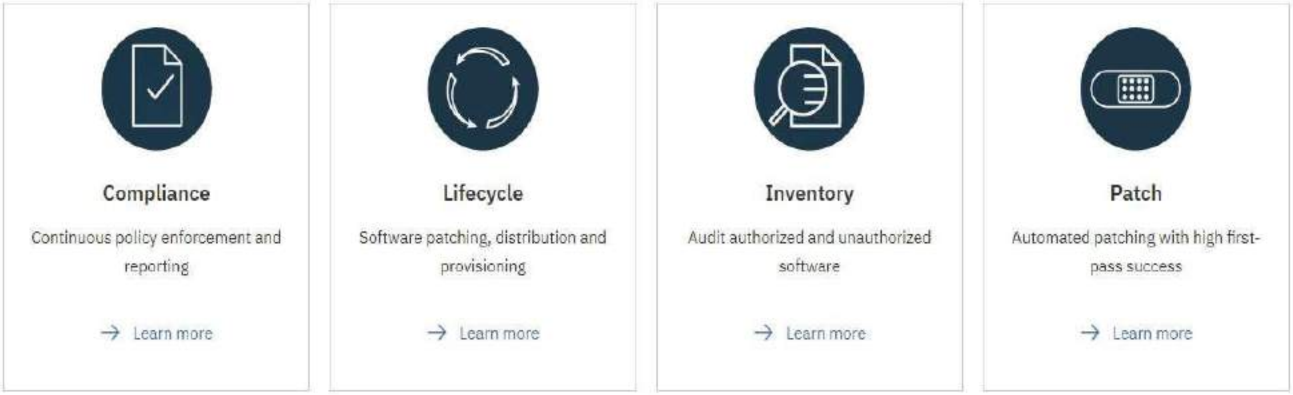
GARTNER MAGIC QUADRANT FOR

UNIFIED ENDPOINT MANAGEMENT 2018

- Unified endpoint management (UEM) tools combine the management of multiple endpoint types in a single console. [illegible]:

GARTNER UEM 2018 REPORT

1. Configure, manage and monitor iOS, Android, Windows 10 and macOS, and manage some Internet of Things (IoT) and wearable endpoints.
2. Unify the application of configurations, management profiles, device compliance and data protection.
3. Provide a single view of multi device users, enhancing efficacy of end-user support and gathering detailed workplace analytics.
4. Act as a coordination point to orchestrate the activities of related endpoint technologies such as identity services and security infrastructure.



Compliance

Continuous policy enforcement and reporting

→ Learn more

Lifecycle

Software patching, distribution and provisioning

→ Learn more

Inventory

Audit authorized and unauthorized software

→ Learn more

Patch

Automated patching with high first-pass success

→ Learn more

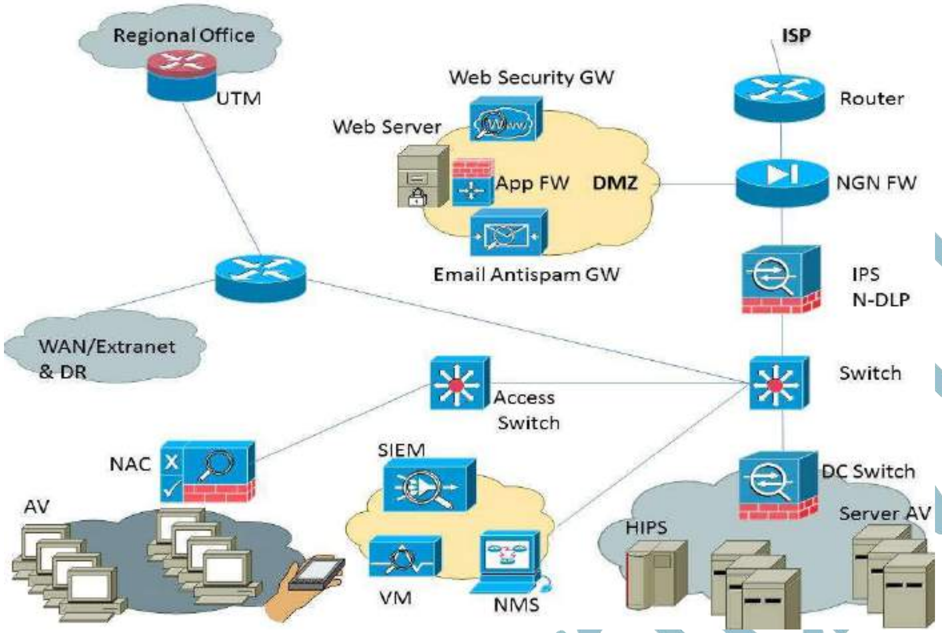
MICROSOFT SOFTWARE RESTRICTION POLICIES (SRP) FOR WHITELISTING

- Software Restriction Policies (SRP) is Group Policy-based feature that identifies software programs [illegible]
- Software restriction policies are part of the Microsoft security and management strategy to assist enterprises in increasing the reliability, integrity, and manageability of their computers.
- You can also use software restriction policies to create a highly restricted configuration for computers, in which you allow only specifically identified applications to run. Software restriction policies are integrated with Microsoft Active Directory and Group Policy.
- You can also create software restriction policies on stand-alone computers. Software restriction policies are trust policies, which are regulations set by an administrator to restrict scripts and other code that is not fully trusted from running.

Topic No 145: WHAT IS SECURITY ENGINEERING?

- Security Engineering is the third layer of the Security Transformation Model
- Consists of more in-depth and complicated security activities which take more time and effort
- Many times related to security architecture
- **Types of activities for security engineering:**
    - FW granular access lists
    - Building an effective DMZ architecture
    - Segregating the network with VLANs
    - Adding a security tool such as SIEM, FW, DLP, NAC, etc
    - App-DB encryption
- **DMZ Architecture Case Study:**
    - DMZ is an important zone in the overall security architecture
    - Devices which need to communicate to outside world placed in DMZ

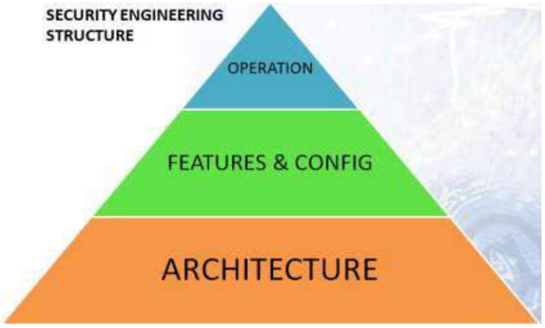
- Web servers, email gateways, web gateways



- **FW Access List Case Study:**
  - Most of the industry has not worked on building granular access lists
  - Most FWs have "allow all" for traffic
  - Granular access lists need to be built based on servers, or traffic flows
- **Why at Layer 3 of Security Transformation Model?**
  - These take time, effort, and often budget approval

Topic No 146: WHAT IS THE OBJECTIVE OF SECURITY ENGINEERING?

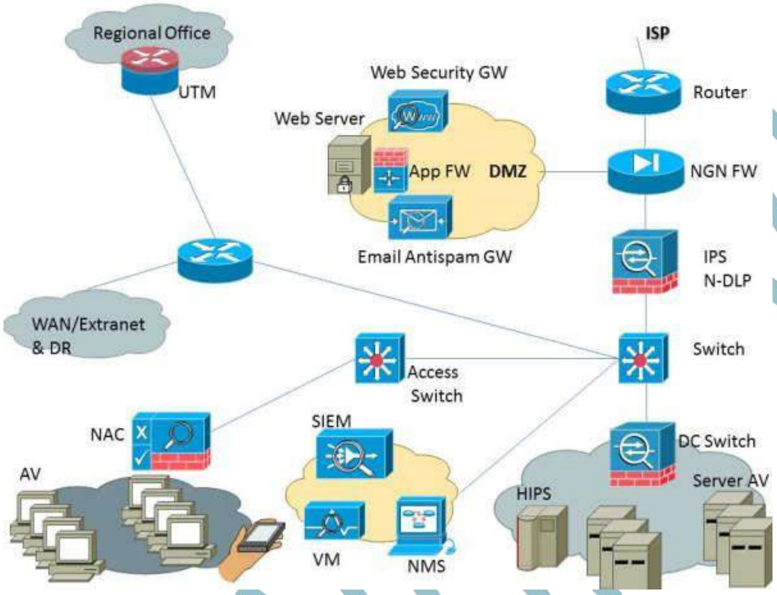
- Security architecture as per best-practices
- The right security devices in the right places
- Effective security configuration of security devices (features)
- Optimum operation of security devices
- Aggregate controls



Examples:

- FW first and then IPS

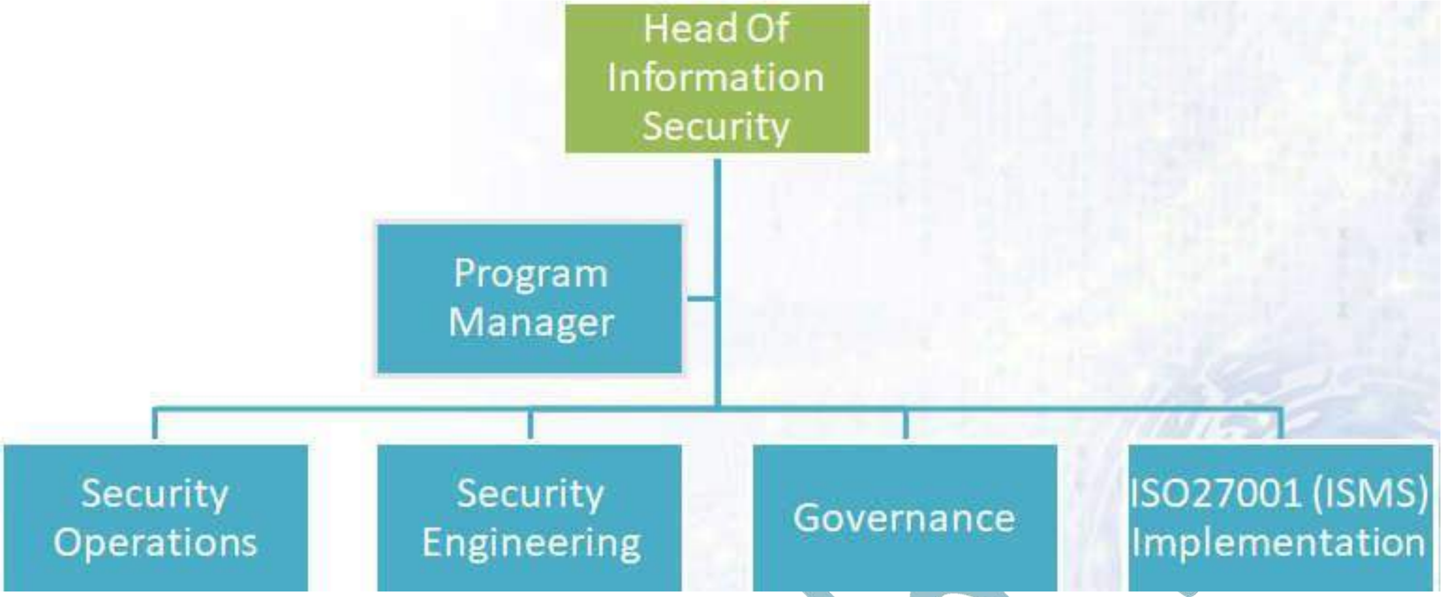
- Edge FW, data center FW
- Malware protection at the network edge
- VPN termination on remote access VPN device
- VPN tunnels for extranet connectivity

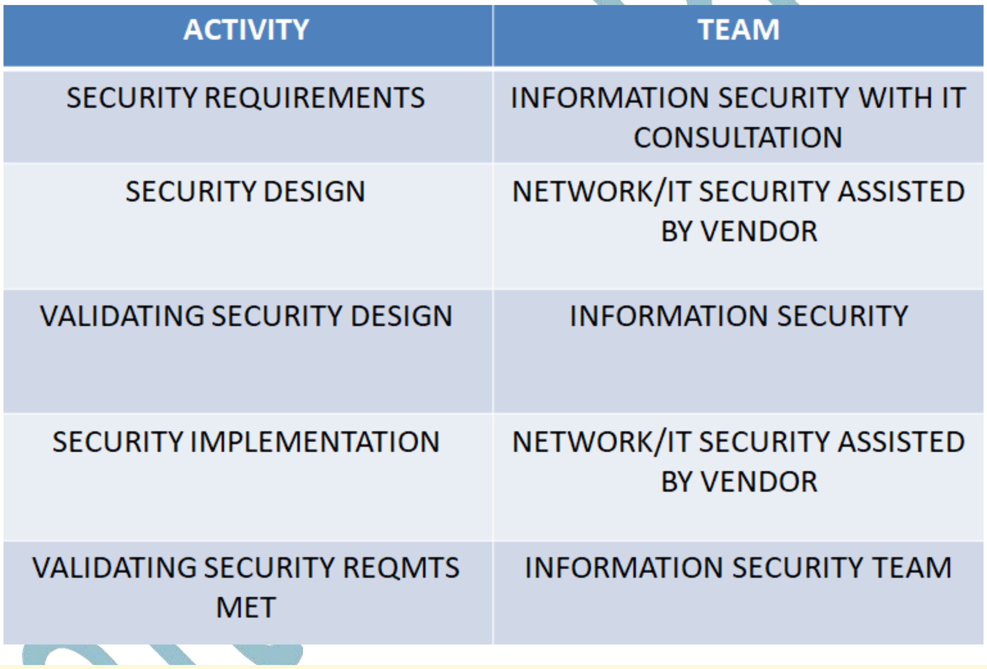


implemented

Topic No 147: WHOSE RESPONSIBILITY IS SECURITY ENGINEERING?

TYPICAL STRUCTURE OF AN INFORMATION SECURITY TEAM



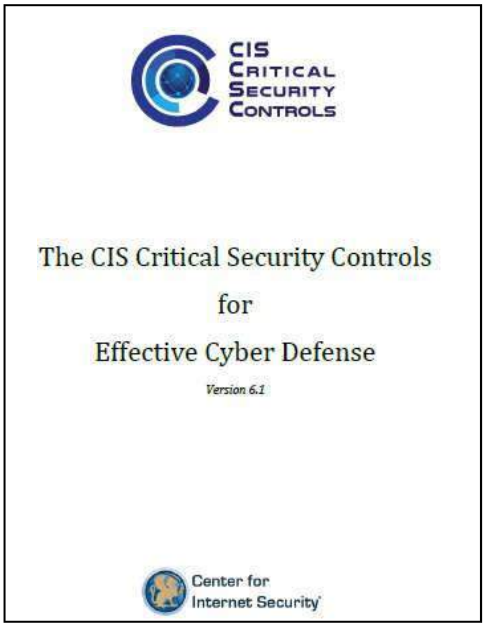


ACTIVITY	TEAM
SECURITY REQUIREMENTS	INFORMATION SECURITY WITH IT CONSULTATION
SECURITY DESIGN	NETWORK/IT SECURITY ASSISTED BY VENDOR
VALIDATING SECURITY DESIGN	INFORMATION SECURITY
SECURITY IMPLEMENTATION	NETWORK/IT SECURITY ASSISTED BY VENDOR
VALIDATING SECURITY REQMTS MET	INFORMATION SECURITY TEAM

- As Security Engineering involves in-depth knowledge of IT & Security, the necessary resources, knowledge, skills, and people need to be pooled to achieve the objectives effectively

Topic No 148: CIS 20 CRITICAL SECURITY CONTROLS

- What are the CIS 20 Critical Security Controls?


CIS Critical Security Controls

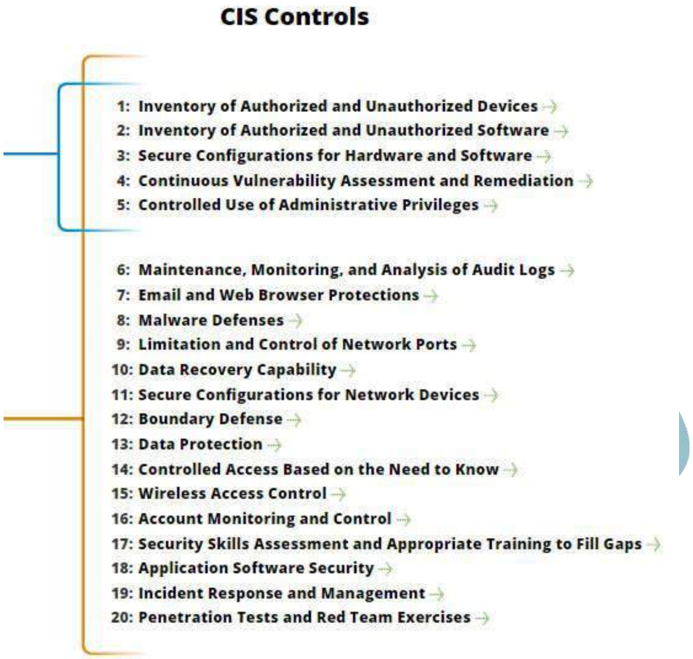
The CIS Critical Security Controls

for

Effective Cyber Defense

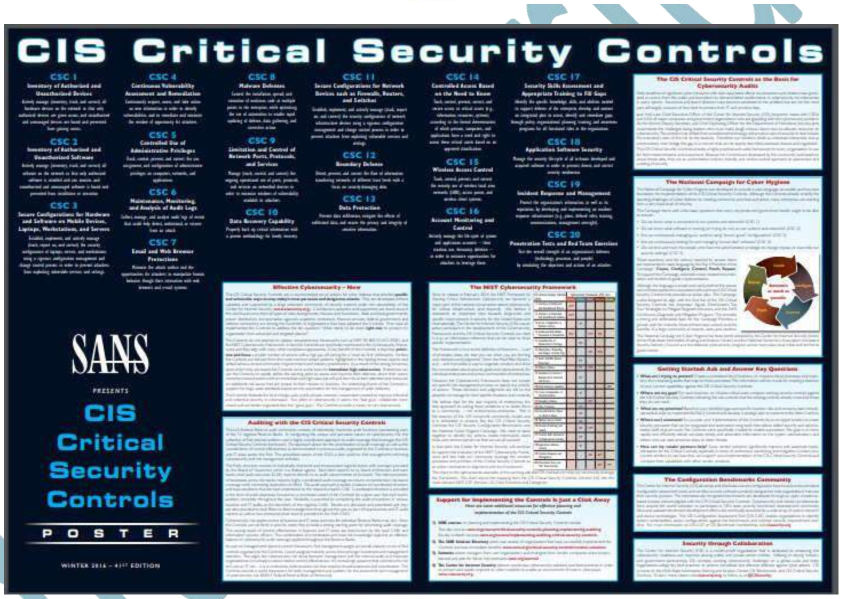
Version 6.1

Center for Internet Security


CIS Controls

1: Inventory of Authorized and Unauthorized Devices →
2: Inventory of Authorized and Unauthorized Software →
3: Secure Configurations for Hardware and Software →
4: Continuous Vulnerability Assessment and Remediation →
5: Controlled Use of Administrative Privileges →

6: Maintenance, Monitoring, and Analysis of Audit Logs →
7: Email and Web Browser Protections →
8: Malware Defenses →
9: Limitation and Control of Network Ports →
10: Data Recovery Capability →
11: Secure Configurations for Network Devices →
12: Boundary Defense →
13: Data Protection →
14: Controlled Access Based on the Need to Know →
15: Wireless Access Control →
16: Account Monitoring and Control →
17: Security Skills Assessment and Appropriate Training to Fill Gaps →
18: Application Software Security →
19: Incident Response and Management →
20: Penetration Tests and Red Team Exercises →


CIS Critical Security Controls
SANS
PRESENTS
CIS Critical Security Controls
POSTER
WINTER 2016 – 41ST EDITION

- CSC 1: Inventory of Authorized and Unauthorized Devices
- CSC 2: Inventory of Authorized and Unauthorized Software
- CSC 3: Secure Configurations for Hardware and Software on Mobile Devices, Laptops, Workstations, and Servers
- CSC 4: Continuous Vulnerability Assessment and Remediation
- CSC 5: Controlled Use of Administrative Privileges
- CSC 6: Maintenance, Monitoring, and Analysis of Audit Logs
- CSC 8: Malware Defenses
- CSC 9: Limitation and Control of Network Ports, Protocols, and Services

- CSC 10: Data Recovery Capability
- CSC 11: Secure Configurations for Network Devices such as Firewalls, Routers, and Switches
- CSC 12: Boundary Defense
- CSC 13: Data Protection
- CSC 14: Controlled Access Based on the Need to Know
- CSC 15: Wireless Access Control
- CSC 16: Account Monitoring and Control
- CSC 17: Security Skills Assessment and Appropriate Training to Fill Gaps
- CSC 18: Application Software Security
- CSC 19: Incident Response and Management
- CSC 20: Penetration Tests and Red Team Exercises

s

: Deploy an automated asset inventory discovery tool and use it to build a preliminary inventory of systemsconnected to an organization’s public and private network(s). Both active tools that scan through IPv4 or IPv6

employed.

: If

configuration protocol (DHCP) server logging, and use this information to improve the asset inventory and help detect unknown systems.

: Ensure that all equipment acquisitions automatically update the inventory system as new, approved devices

.

: Maintain an asset inventory of all systems connected to the network and the network devices themselves,recording at least the network addresses, machine name(s), purpose of each system, an asset owner responsible

– The inventory should include every system that has an Internet protocol (IP) address on the network, including but not limited to desktops, laptops, servers network equipment (routers, switches, firewalls, etc.), printers, storage area networks, Voice Over-IP telephones, multi-homed addresses, virtual addresses, etc.

– The asset inventory created must also include data on whether the device is a portable and/or personal device.

– Devices such as mobile phones, tablets, laptops, and other portable electronic devices that store or process data must be identified, regardless of whether they are attached to the organization’s network.

1

network. The 802.1x must be tied into the inventory data to determine authorized versus unauthorized systems.

1.6: Use client certificates to validate and authenticate systems prior to connecting to the private network.

Topic No 150: CSC2: Inventory Of Authorized & Unauthorized Software

: Devise a list of authorized software and version that is required in the enterprise for each type of system, including servers, workstations, and laptops of various kinds and uses. This list should be monitored by file integrity checking tools to validate that the authorized software has not been modified.

: Deploy application whitelisting technology that allows systems to run software only if it is included on the

- The whitelist may be very extensive (as is available from commercial whitelist vendors), so that users are not inconvenienced when using common software.
- Or, for some special-purpose systems (which require only a small number of programs to achieve their needed business functionality), the whitelist may be quite narrow.

: Deploy software inventory tools throughout the organization covering each of the operating system types in

- The software inventory system should track the version of the underlying operating system as well as the applications installed on it.
- The software inventory systems must be tied into the hardware asset inventory so all devices and associated software are tracked from a single location.

: Virtual machines and/or air-gapped systems should be used to isolate and run applications that are requiredfor business operations but based on higher risk should not be installed within a networked environment.

Topic No 151: CSC3-I: Secure Configurations For HW & SW

Establish standard secure configurations of your operating systems and software applications.

- Standardized images should represent hardened versions of the underlying operating system and the applications installed on the system.
- These images should be validated and refreshed on a regular basis to update their security configuration in light of recent vulnerabilities and attack vectors.

: Follow strict configuration management, building a secure image that is used to build all new systems thatare deployed in the enterprise.

- Any existing system that becomes compromised should be re-imaged with the secure build.
- Regular updates or exceptions to this image should be integrated into the organization’s change management processes.
- Images should be created for workstations, servers, and other system types used by the organization.

: Store the master images on securely configured servers, validated with integrity checking tools capable of continuous inspection, and change management to ensure that only authorized changes to the images are possible.

- Alternatively, these master images can be stored in offline machines, air-gapped from the production network, with images copied via secure media to move them between the image storage servers and the production network.

: Perform all remote administration of servers, workstation, network devices, and similar equipment over secure channels.

- Protocols such as telnet, VNC, RDP, or others that do not actively support strong encryption should only be used if they are performed over a secondary encryption channel, such as SSL, TLS or IPSEC.

Topic No 152: CSC3-II: Secure Configurations For HW & SW

: Use file integrity checking tools to ensure that critical system files (including sensitive system and

- The reporting system should have the ability to account for routine and expected changes; highlight and alert on unusual or unexpected alterations; show the history of configuration changes over time and identify who made the change (including the original logged-in account in the event of a user ID switch, such as with the su or sudo command).
- These integrity checks should identify suspicious system alterations such as: owner and permissions changes to files or directories; the use of alternate data streams which could be used to hide malicious activities; and the introduction of extra files into key system areas (which could indicate malicious payloads left by attackers or additional files inappropriately added during batch distribution processes).

: Implement and test an automated configuration monitoring system that verifies all remotely testable secure configuration elements, and alerts when unauthorized changes occur.

- This includes detecting new listening ports, new administrative users, changes to group and local policy objects (where applicable), and new services running on a system.
- Whenever possible use tools compliant with the Security Content Automation Protocol (SCAP) in order to streamline reporting and integration.

: Deploy system configuration management tools, such as **Active Directory Group Policy Objects** for Microsoft Windows systems or **Puppet for UNIX systems** that will automatically enforce and redeploy configuration settings to systems at regularly scheduled intervals.

- They should be capable of triggering redeployment of configuration settings on a scheduled, manual, or event-driven basis.

Topic No 153 & 154: CSC4-I: Continuous Vuln. Assessment & Remediation

: Run automated vulnerability scanning tools against all systems on the network on a weekly or morefrequent basis and deliver prioritized lists of the most critical vulnerabilities to each responsible system administrator along with risk scores that compare the effectiveness of system administrators and departments in reducing risk.

- Use a SCAP-validated vulnerability scanner that looks for both code-based vulnerabilities (such as those described by Common
- Vulnerabilities and Exposures entries) and configuration-based vulnerabilities (as enumerated by the Common Configuration Enumeration Project).

: Correlate event logs with information from vulnerability scans to fulfill two goals.

- First, personnel should verify that the activity of the regular vulnerability scanning tools is itself logged.
- Second, personnel should be able to correlate attack detection events with prior vulnerability scanning results to determine whether the given exploit was used against a target known to be vulnerable.

: Perform vulnerability scanning in authenticated mode either with agents running locally on each end system to analyze the security configuration or with remote scanners that are given administrative rights on the system being tested.

- Use a dedicated account for authenticated vulnerability scans, which should not be used for any other administrative activities and should be tied to specific machines at specific IP addresses.
- Ensure that only authorized employees have access to the vulnerability management user interface and that roles are applied to each user

: Subscribe to vulnerability intelligence services in order to stay aware of emerging exposures, and use the information gained from this subscription to update the organization's vulnerability scanning

activities on at

- Alternatively, ensure that the vulnerability scanning tools you use are regularly updated with all relevant important security vulnerabilities.

: Deploy automated patch management tools and software update tools for operating system andsoftware/applications on all systems for which such tools are available and safe.

- Patches should be applied to all systems, even systems that are properly air gapped.

: Monitor logs associated with any scanning activity and associated administrator accounts to ensure that thisactivity is limited to the timeframes of legitimate scans

: Compare the results from back-to-back vulnerability scans to verify that vulnerabilities were addressed either by patching, implementing a compensating control, or documenting and accepting a reasonable businessrisk.

- Such acceptance of business risks for existing vulnerabilities should be periodically reviewed to determine if newer compensating controls or subsequent patches can address vulnerabilities that were previously accepted, or if conditions have changed, increasing the risk.

: Establish a process to risk-rate vulnerabilities based on the exploitability and potential impact of the vulnerability, and segmented by appropriate groups of assets (example, DMZ servers, internal network servers,desktops, laptops).

- Apply patches for the riskiest vulnerabilities first.
- A phased rollout can be used to minimize the impact to the organization.
- Establish expected patching timelines based on the risk rating level.

Topic No 155 & 156: CSC5-I: Controlled Use of Administrative Privileges

: Minimize administrative privileges and only use administrative accounts when they are

monitor for anomalous behavior.

: Use automated tools to inventory all administrative accounts and validate that each person with administrative privileges on desktops, laptops, and servers is authorized by a senior executive.

: Before deploying any new devices in a networked environment, change all default passwords for applications, operating systems, routers, firewalls, wireless access points, and other systems to have values consistent with administration-level accounts.

: Configure systems to issue a log entry and alert when an account is added to or removed from a domain administrators' group, or when a new local administrator account is added on a system

: Configure systems to issue a log entry and alert on any unsuccessful login to an administrative account

: Use multifactor authentication for all administrative access, including domain administrative access Multi-factor authentication can include a variety of techniques, to include the use of smart cards, certificates, One Time Password (OTP) tokens, biometrics, or other similar authentication methods.

: Where multi-factor authentication is not supported, user accounts shall be required to use

: Administrators should be required to access a system using a fully logged and non-administrative account Then, once logged on to the machine without administrative privileges, the administrator should transition to administrative privileges using tools such as Sudo on Linux/UNIX, RunAs on Windows, and other similar facilities for other types of systems.

: Administrators shall use a dedicated machine for all administrative tasks or tasks requiring elevated access This machine shall be isolated from the organization's primary network and not be allowed Internet access. This machine shall not be used for reading e-mail, composing documents, or surfing the Internet.

Topic No 157 & 158: CSC6-I: MAINTENANCE, MONITORING, ANALYSIS OF AUDIT LOGS

: **Utilize Three Synchronized Time Sources:** Use at least three synchronized time sources from which all servers and network devices retrieve time information on a regular basis so that timestamps in logs are consistent

: **Activate audit logging:** Ensure that local logging has been enabled on all systems and networking devices.

: **Enable detailed logging:** Enable system logging to include detailed information such as an event source, date, user, timestamp, source addresses, destination addresses, and other useful elements.

: **Ensure adequate storage for logs:** Ensure that all systems that store logs haveadequate storage space for the logs generated.

: **Central Log Management:** Ensure that appropriate logs are being aggregated to a central log management system for analysis and review.

: **Deploy SIEM or Log Analytic Tool:** Deploy Security Information and Event Management (SIEM) or log analytic tool for log correlation and analysis.

: **Regularly Review Logs:** On a regular basis, review logs to identify anomalies or abnormal events.

: **Regularly Tune SIEM:** On a regular basis, tune your SIEM system to better identify actionable events and decrease event noise.

Topic No 159 & 160: CSC7-I: EMAIL AND WEB BROWSER PROTECTIONS

: Ensure Use of Only Fully Supported Browser & Email Clients: Ensure that only fully supported web browsers & email clients are allowed to execute in the org, ideally only using thelatest version of the browsers & email clients provided by the vendor.

: Disable Unnecessary or Unauthorized Browser or Email Client Plugins: Uninstall or disable any unauthorized browser or email client plugins or add-on applications.

: Limit Use of Scripting Languages in Web Browsers and Email Clients: Ensure that only authorized scripting languages are able to run in all web browsers and email clients.

: Maintain and enforce Network based URL Filters: Enforce network based URL filters that limit a systems ability to connect to websites not approved by the org. This filtering shall beenforced for each of the orgs systems (whether at org facility or not).

: Subscribe to URL-categorization service: Subscribe to URL categorization services to ensure that they are up-to-date with the most recent website category definitions available. Uncategorized websites shall be blocked by default.

: Log all URL requests: Log all URL requests from each of the organization's systems, whether onsite or a mobile device, in order to identify potentially malicious activity and assist incident handlers with identifying potentially compromised systems.

: Use of DNS Filtering Services: Use DNS filtering services to help block access to known malicious domains.

: Implement DMARC and Enable Receiver-Side Verification: To lower the chance of spoofed or modified emails from valid domains, implement Domain-based Message Authentication, Reporting and Conformance (DMARC) policy and verification starting by implementing the Sender Policy Framework (SPF) and the Domain Keys Identified Mail(DKIM) standards.

7.1o: Sandbox All Email Attachments: Use sandboxing to analyze and block inbound email attachments with malicious behavior.

Topic No 161 & 162: CSC8-I: MALWARE DEFENSES

8.1: Utilize Centrally Managed Anti-malware Software: Utilize centrally managed anti-malware software to continuously monitor and defend each of the organization's workstations and servers.

: Ensure Anti-Malware Software and Signatures are Updated Ensure that the organization's anti-malware software updates its scanning engine and signature database on a regular basis.

: Enable Operating System Anti-Exploitation Features/ Deploy Anti-Exploit Technologies Enable anti-exploitation features such as Data Execution Prevention (DEP) or Address Space Layout Randomization (ASLR) that are available In an operating system or deploy appropriate toolkits that can be configured to apply protection to a broader set of applications and executables.

: Configure Anti-Malware Scanning of Removable Devices: Configure devices so that they automatically conduct an anti-maiware scan of removable media when inserted or connected.

: Configure Devices Not To Auto-run Content: Configure devices to not auto-run content from removable media.

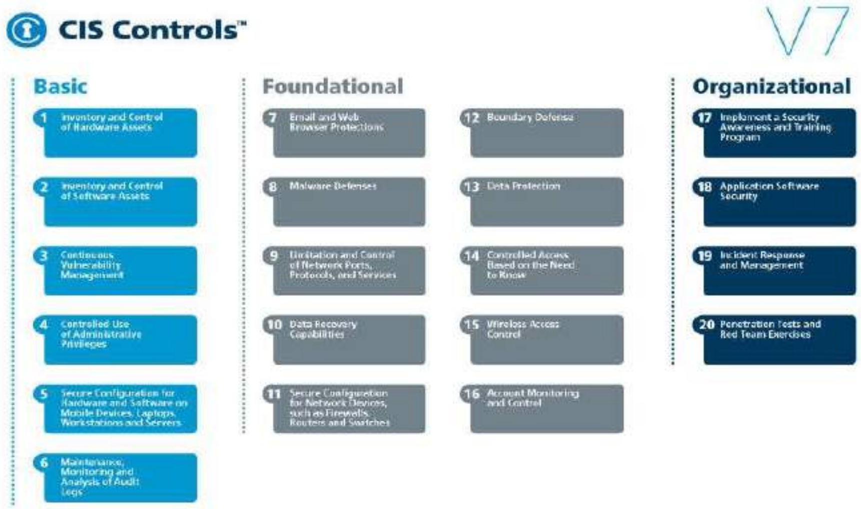
: Centralize Anti-malware Logging: Send all malware detection events to enterprise anti- malware administration tools and event log servers for analysis and alerting.

: Enable DNS Query Logging: Enable Domain Name System (DNS) query logging to detect hostname lookups for known malicious domains.

: Enable Command-line Audit Logging: Enable command-line audit logging for commandshells, such as Microsoft Power shell and Bash.

Topic No 163: CIS CONTROL 9: LIMITATION & CONTROL OF NETWORK

CIS 20 Critical Security Controls



CIS Controls™ V7

Basic

1 Inventory and Control of Hardware Assets

2 Inventory and Control of Software Assets

3 Continuous Vulnerability Management

4 Controlled Use of Administrative Privileges

5 Secure Configuration for Hardware and Software on Mobile Devices, Laptops, Workstations and Servers

6 Maintenance, Monitoring and Analysis of Audit Logs

Foundational

7 Email and Web Browser Protections

8 Malware Defenses

9 Limitation and Control of Network Ports, Protocols, and Services

10 Data Recovery Capabilities

11 Secure Configuration for Network Devices, such as Firewalls, Routers and Switches

12 Boundary Defense

13 Data Protection

14 Controlled Access Based on the Need to Know

15 Wireless Access Control

16 Account Monitoring and Control

Organizational

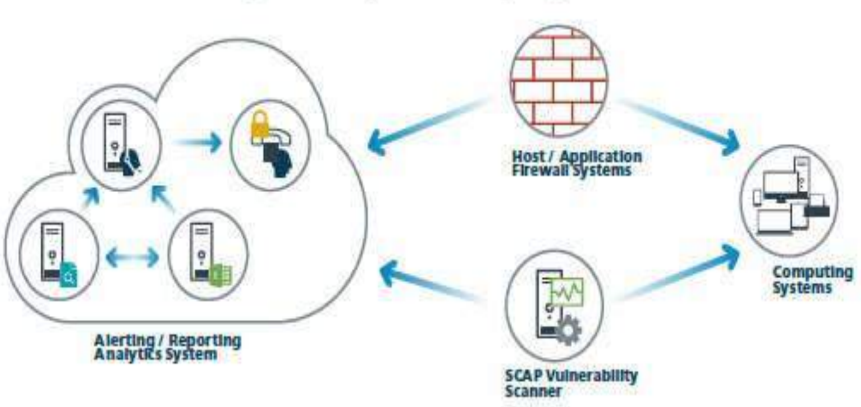
17 Implement a Security Awareness and Training Program

18 Application Software Security

19 Incident Response and Management

20 Penetration Tests and Red Team Exercises

CIS Control 9: System Entity Relationship Diagram


Host / Application Firewall Systems
Computing Systems
Alerting / Reporting Analytics System
SCAP Vulnerability Scanner

: Associate Active Ports, Services and Protocols to Asset Inventory

- Associate active ports, services and protocols to the hardware assets in the asset inventory.

: Ensure Only Approved Ports, Protocols and Services Are Running

- Ensure that only network ports, protocols, and services listening on a system with validated business needs, are running on each system.

: Perform Regular Automated Port Scans

- Perform automated port scans on a regular basis against all systems and alert if unauthorized ports are detected on a system.

: Apply Host-based Firewalls or Port Filtering

- Apply host-based firewalls or port filtering tools on end systems, with a default-deny rule that drops all traffic except those services and ports that are explicitly allowed.

: Implement Application Firewalls

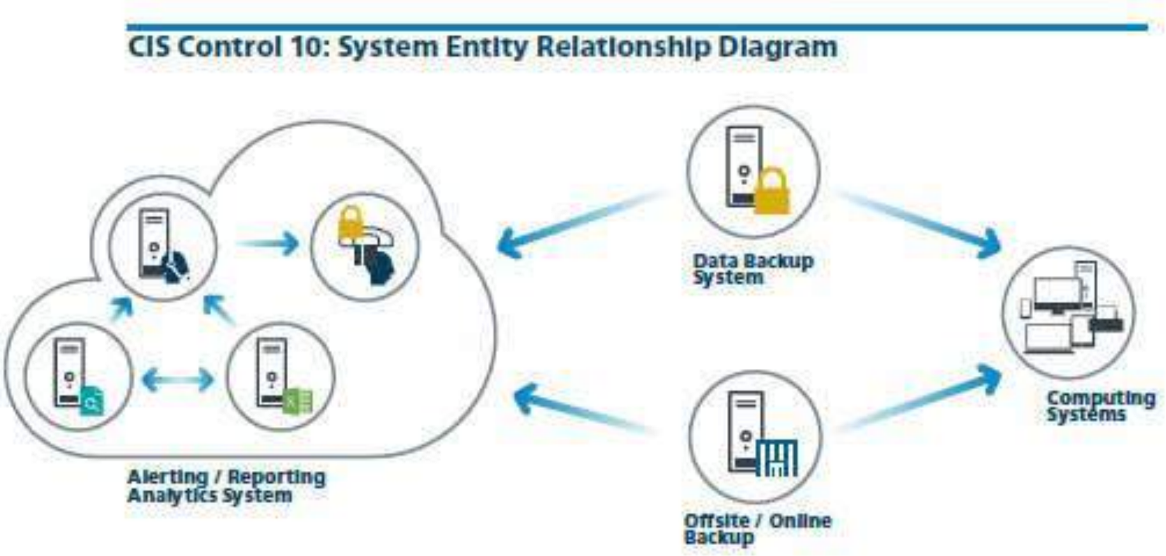
- Place application firewalls in front of any critical servers to verify and validate the traffic going to the server. Any unauthorized traffic should be blocked and logged.

PROCEDURES & TOOLS:

- Port scanning tools are used to determine which services are listening on the network for a range of target systems. In addition to determining which ports are open, effective port scanners can be configured to identify the version of the protocol and service listening on each discovered port. This list of services and their versions are compared against an inventory of services required by the organization for each server and workstation in an asset management system.
- Recently added features in these port scanners are being used to determine the changes in services offered by scanned machines on the network since the previous scan, helping security personnel identify differences over time.

Topic No 164: CIS CONTROL 10: DATA RECOVERY CAPABILITIES

CIS 20 Critical Security Controls


CIS Control 10: System Entity Relationship Diagram
Data Backup System
Computing Systems
Offsite / Online Backup
Alerting / Reporting Analytics System

: Ensure Regular Automated Back Ups

- Ensure that all system data is automatically backed up on regular basis.

: Perform Complete System Backups

- Ensure that each of the organization's key systems are backed up as a complete system, through processes such as imaging, to enable the quick recovery of an entire system.

: Test Data on Backup Media

- Test data integrity on backup media on a regular basis by performing a data restoration process to ensure that the backup is properly working.

: Ensure Protection of Backups

- Ensure that backups are properly protected via physical security or encryption when they are stored, as well as when they are moved across the network. This includes remote backups and cloud services.

: Ensure Backups Have At least One Non-Continuously Addressable Destination

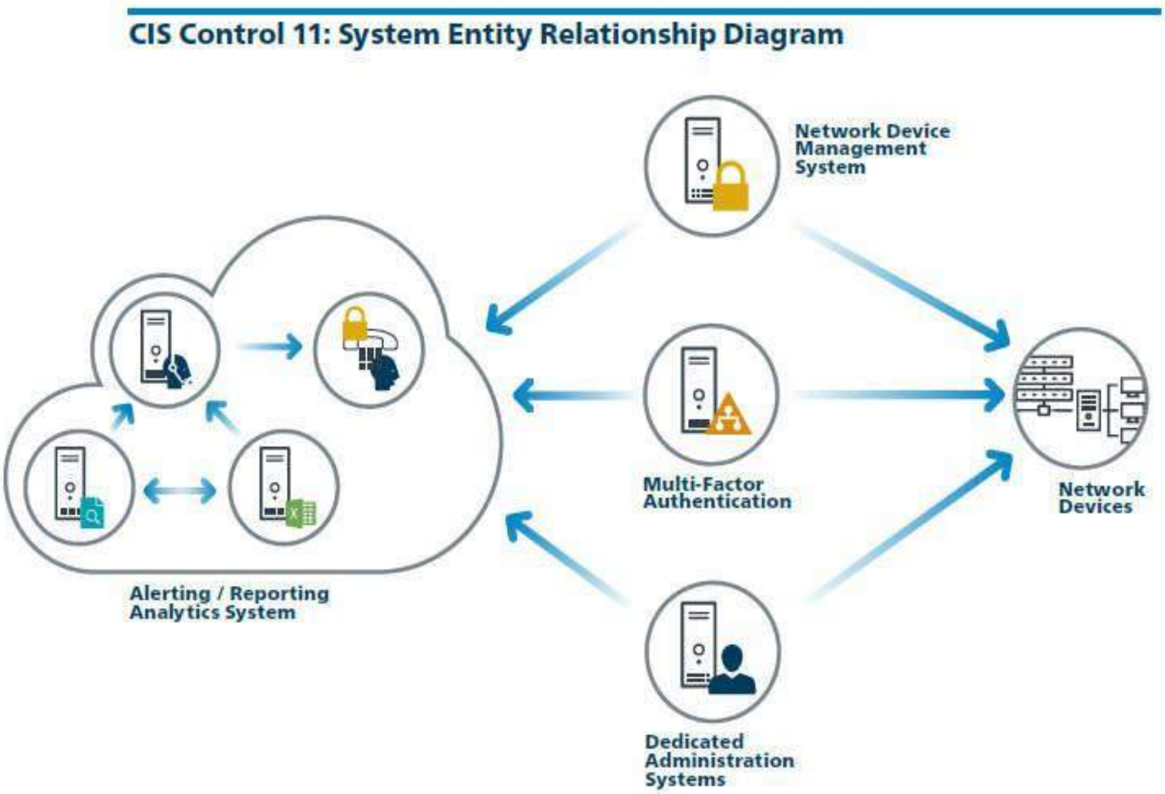
- Ensure that all backups have at least one backup destination that is not continuously addressable through operating system calls.

Procedures & Tools:

- Once per quarter (or whenever new backup equipment is purchased), a testing team should evaluate a random sample of system backups by attempting to restore them on a test bed environment. The restored systems should be verified to ensure that the operating system, application, and data from the backup are all intact and functional.
- In the event of malware infection, restoration procedures should use a version of the backup that is believed to predate the original infection.

Topic No165 & 166: CIS CONTROL 11: SECURE CONFIG FOR NETWORK DEVICES

- Secure Configuration For Network Devices Such As Firewalls, Routers, And Switches


CIS Control 11: System Entity Relationship Diagram
Network Device Management System
Multi-Factor Authentication
Network Devices
Alerting / Reporting Analytics System
Dedicated Administration Systems

: Maintain Standard Security Configurations for Network Devices

- Maintain standard, documented security configuration standards for all authorized network devices.

: Document Traffic Configuration Rules

- All configuration rules that allow traffic to flow through network devices should be documented in a configuration management system with a specific business reason for each rule, a specific individual's name responsible for that business need, and an expected duration of the need.

: Use Automated Tools to Verify Standard Device Configurations and Detect Changes

- Compare all network device configuration against approved security configurations defined for each network device in use and alert when any deviation is discovered

: Install the Latest Stable Version of Any Security-related Updates on All Network Devices

- Install the latest stable version of any security-related updates on all network devices.

: Manage Network Devices Using Multi-Factor Authentication and Encrypted Sessions

- Manage all network devices using multi-factor authentication and encrypted sessions.

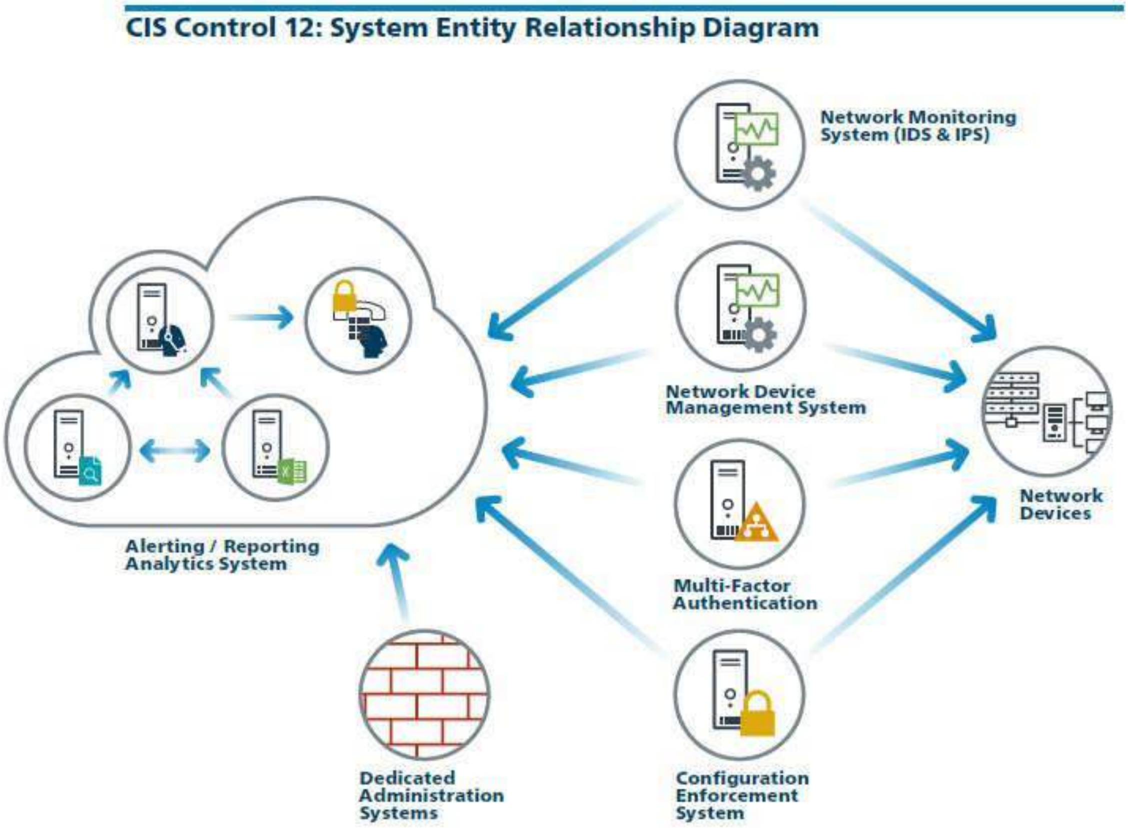
: Use Dedicated Machines For All Network Administrative Tasks

- Ensure network engineers use a dedicated machine for all administrative tasks or tasks requiring elevated access. This machine shall be segmented from the organization's primary network and not be allowed Internet access. This machine shall not be used for reading e-mail, composing documents, or surfing the Internet.

: Manage Network Infrastructure Through a Dedicated Network

- Manage the network infrastructure across network connections that are separated from the business use of that network, relying on separate VLANs or, preferably, on entirely different physical connectivity for management sessions for network devices.

Topic No 167, 168 & 169: CIS CONTROL 12: BOUNDARY DEFENSE – I


CIS Control 12: System Entity Relationship Diagram
Network Monitoring System (IDS & IPS)
Network Device Management System
Multi-Factor Authentication
Configuration Enforcement System
Network Devices
Alerting / Reporting Analytics System
Dedicated Administration Systems

BOUNDARY DEFENSE

: Maintain an Inventory of Network Boundaries

- Maintain an up-to-date inventory of all of the organization's network boundaries.

: Scan for Unauthorized Connections across Trusted Network Boundaries

- Perform regular scans from outside each trusted network boundary to detect any unauthorized connections which are accessible across the boundary.

: Deny Communications with Known Malicious IP Addresses

- Deny communications with known malicious or unused Internet IP addresses and limit access only to trusted and necessary IP address ranges at each of the organization's network boundaries.

: Deny Communication over Unauthorized Ports

- Deny communication over unauthorized TCP or UDP ports or application traffic to ensure that only authorized protocols are allowed to cross the network boundary in or out of the network at each of the organization's network boundaries.

: Configure Monitoring Systems to Record Network Packets

- Configure monitoring systems to record network packets passing through the boundary at each of the organization's network boundaries.

: Deploy Network-based IDS Sensor

- Deploy network-based Intrusion Detection Systems (IDS) sensors to look for unusual attack mechanisms and detect compromise of these systems at each of the organization's network boundaries.

: Deploy Network-Based Intrusion Prevention Systems

- Deploy network-based Intrusion Prevention Systems (IPS) to block malicious network traffic at each of the organization's network boundaries.

: Deploy NetFlow Collection on Networking Boundary Devices

- Enable the collection of NetFlow and logging data on all network boundary devices.

: Deploy Application Layer Filtering Proxy Server

- Ensure that all network traffic to or from the Internet passes through an authenticated application layer proxy that is configured to filter unauthorized connections.

: Decrypt Network Traffic at Proxy

- Decrypt all encrypted network traffic at the boundary proxy prior to analyzing the content. However, the organization may use whitelists of allowed sites that can be accessed through the proxy without decrypting the traffic.

: Require All Remote Login to Use Multi-factor Authentication

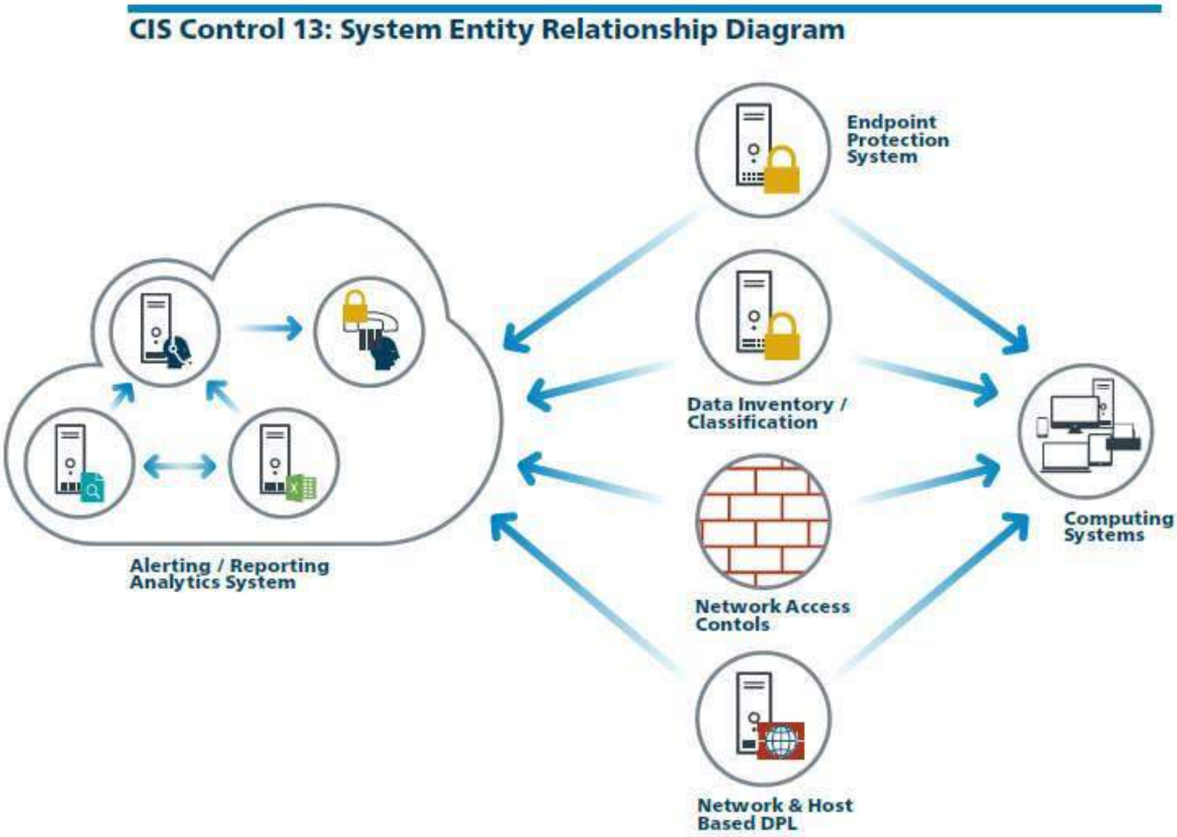
- Require all remote login access to the organization's network to encrypt data in transit and use multi-factor authentication

: Manage All Devices Remotely Logging into Internal Network

- Scan all enterprise devices remotely logging into the organization's network prior to accessing the network to ensure that each of the organization's security policies has been enforced in the same manner as local network devices.

Topic No 170, 171 & 172: CIS CONTROL 13: DATA PROTECTION-I

Data Protection


CIS Control 13: System Entity Relationship Diagram
Endpoint Protection System
Data Inventory / Classification
Network Access Contols
Network & Host Based DPL
Computing Systems
Alerting / Reporting Analytics System

: Maintain an Inventory of Sensitive Information

- Maintain an inventory of all sensitive information stored, processed, or transmitted by the organization's technology systems, including those located onsite or at a remote service provider.

: Remove Sensitive Data or Systems Not Regularly Accessed by Organization

- Remove sensitive data or systems not regularly accessed by the organization from the network. These systems shall only be used as stand alone systems (disconnected from the network) by the business unit needing to occasionally use the system or completely virtualized and powered off until needed.

: Monitor and Block Unauthorized Network Traffic

- Deploy an automated tool on network perimeters that monitors for unauthorized transfer of sensitive information and blocks such transfers while alerting information security professionals.

: Only Allow Access to Authorized Cloud Storage or Email Providers

- Only allow access to authorized cloud storage or email providers.

: Monitor and Detect Any Unauthorized Use of Encryption

- Monitor all traffic leaving the organization and detect any unauthorized use of encryption.

: Encrypt the Hard Drive of All Mobile Devices.

- Utilize approved whole disk encryption software to encrypt the hard drive of all mobile devices.

: Manage USB Devices

- If USB storage devices are required, enterprise software should be used that can configure systems to allow the use of specific devices. An inventory of such devices should be maintained.

: Manage System's External Removable Media's Read/write Configurations

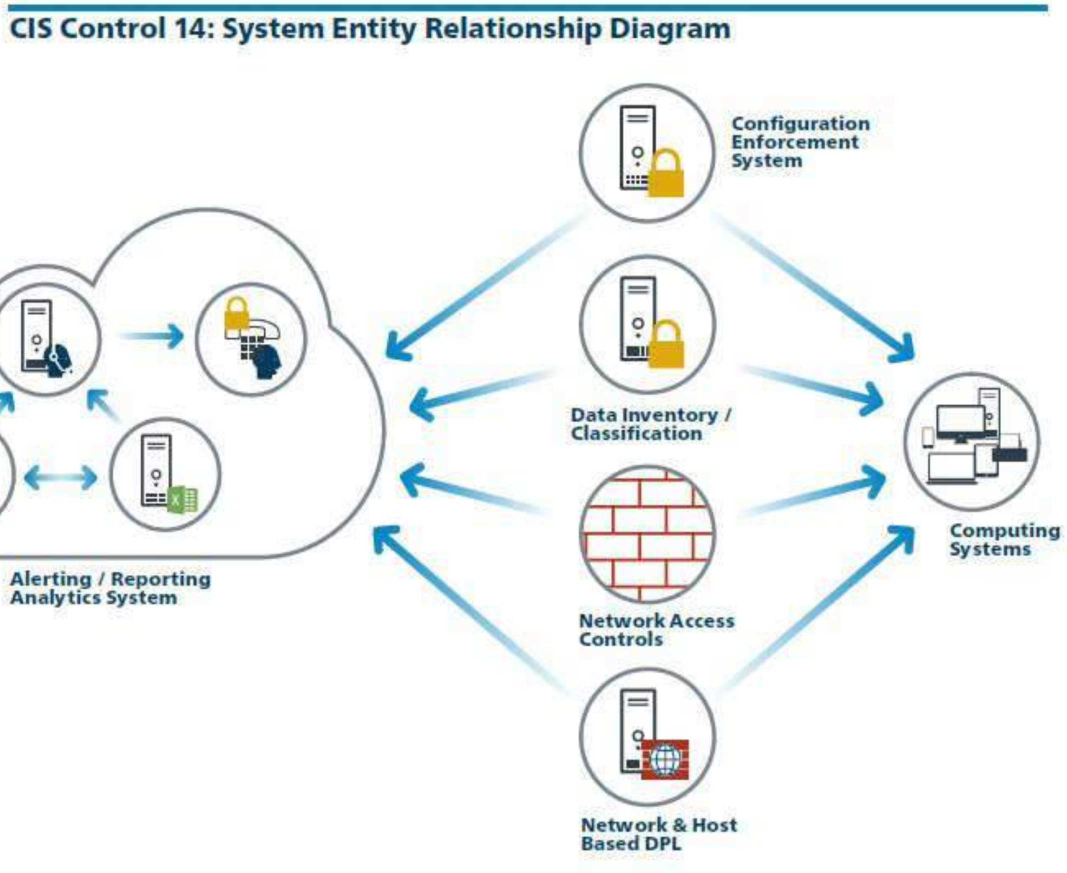
- Configure systems not to write data to external removable media, if there is no business need for supporting such devices.

: Encrypt Data on USB Storage Devices

- If USB storage devices are required, all data stored on such devices must be encrypted while at rest.

Topic No 173 & 174: CIS CONTROL 14: CONTROLLED ACCESS-NEED TO KNOW-I

Controlled Access Based On The Need To Know


CIS Control 14: System Entity Relationship Diagram
Configuration Enforcement System
Data Inventory / Classification
Network Access Controls
Network & Host Based DPL
Computing Systems
Alerting / Reporting Analytics System

: Segment the Network Based on Sensitivity

- Segment the network based on the label or classification level of the information stored on the servers, locate all sensitive information on separated Virtual Local Area Networks (VLANs).

: Enable Firewall Filtering Between VLANs

- Enable firewall filtering between VLANs to ensure that only authorized systems are able to communicate with other systems necessary to fulfill their specific responsibilities.

: Disable Workstation to Workstation Communication

- Disable all workstation to workstation communication to limit an attacker's ability to move laterally and compromise neighboring systems, through technologies such as Private VLANs or micro segmentation.

: Encrypt All Sensitive Information in Transit

- Encrypt all sensitive information in transit.

: Utilize an Active Discovery Tool to Identify Sensitive Data

- Utilize an active discovery tool to identify all sensitive information stored, processed, or transmitted by the organization's technology systems, including those located onsite or at a remote service provider and update the organization's sensitive information inventory.

: Protect Information through Access Control Lists

- Protect all information stored on systems with file system, network share, claims, application, or database specific access control lists. These controls will enforce the principle that only authorized individuals should have access to the information based on their need to access the information as a part of their responsibilities.

: Enforce Access Control to Data through Automated Tools

- Use an automated tool, such as host-based Data Loss Prevention, to enforce access controls to data even when data is copied off a system.

: Encrypt Sensitive Information at Rest

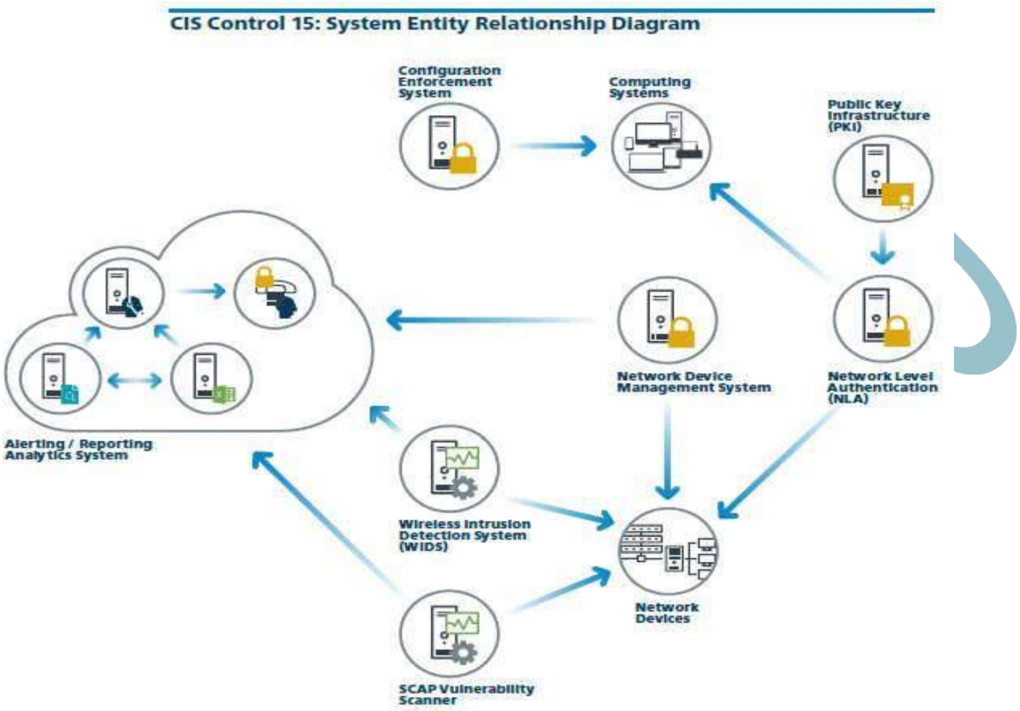
- Encrypt all sensitive information at rest using a tool that requires a secondary authentication mechanism not integrated into the operating system, in order to access the information.

: Enforce Detail Logging for Access or Changes to Sensitive Data

- Enforce detailed audit logging for access to sensitive data or changes to sensitive data (utilizing tools such as File Integrity Monitoring or Security Information and Event Monitoring).

Topic No 175,176 & 177: CIS CONTROL 15: WIRELESS ACCESS CONTROL-I

Wireless Access Control


CIS Control 15: System Entity Relationship Diagram
Configuration Enforcement System
Computing Systems
Public Key Infrastructure (PKI)
Network Device Management System
Network Level Authentication (NLA)
Alerting / Reporting Analytics System
Wireless Intrusion Detection System (WIDS)
Network Devices
SCAP Vulnerability Scanner

: Maintain an Inventory of Authorized Wireless Access Points

- Maintain an inventory of authorized wireless access points connected to the wired network.

: Detect Wireless Access Points Connected to the Wired Network

- Configure network vulnerability scanning tools to detect and alert on unauthorized wireless access points connected to the wired network.

: Use a Wireless Intrusion Detection System

- Use a wireless intrusion detection system (WIDS) to detect and alert on unauthorized wireless access points connected to the network.

: Disable Wireless Access on Devices if Not Required

- Disable wireless access on devices that do not have a business purpose for wireless access.

: Limit Wireless Access on Client Devices

- Configure wireless access on client machines that do have an essential wireless business purpose, to allow access only to authorized wireless networks and to restrict access to other wireless networks.

: Disable Peer-to-peer Wireless Network Capabilities on Wireless Clients

- Disable peer-to-peer (adhoc) wireless network capabilities on wireless clients.

: Leverage the Advanced Encryption Standard (AES) to Encrypt Wireless Data

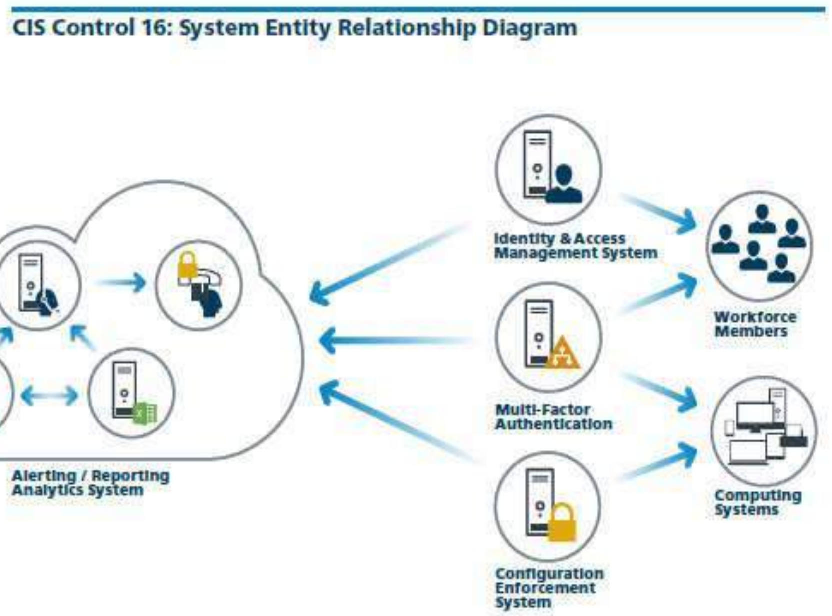
- Leverage the Advanced Encryption Standard (AES) to encrypt wireless data in transit.

: Use Wireless Authentication Protocols that Require Mutual, Multi-Factor Authentication

- Ensure that wireless networks use authentication protocols such as Extensible Authentication Protocol-Transport Layer Security (EAP/TLS), that requires mutual, multi-factor authentication.

Topic No 178, 179 & 180: CIS CONTROL 16: ACCOUNT MONITORING & CONTROL-I

Account Monitoring & Control


CIS Control 16: System Entity Relationship Diagram
Identity & Access Management System
Workforce Members
Multi-Factor Authentication
Computing Systems
Configuration Enforcement System
Alerting / Reporting Analytics System

: Maintain an Inventory of Authentication Systems

- Maintain an inventory of each of the organization's authentication systems, including those located onsite or at a remote service provider.

: Configure Centralized Point of Authentication

- Configure access for all accounts through as few centralized points of authentication as possible, including network, security, and cloud systems.

: Require Multi-factor Authentication

- Require multi-factor authentication for all user accounts, on all systems, whether managed onsite or by a third-party provider.

: Encrypt or Hash all Authentication Credentials

- Encrypt or hash with a salt all authentication credentials when stored.

: Encrypt Transmittal of Username and Authentication Credentials

- Ensure that all account usernames and authentication credentials are transmitted across networks using encrypted channels.

: Maintain an Inventory of Accounts

- Maintain an inventory of all accounts organized by authentication system.

: Establish Process for Revoking Access

- Establish and follow an automated process for revoking system access by disabling accounts immediately upon termination or change of responsibilities of an employee or contractor . Disabling these accounts, instead of deleting accounts, allows preservation of audit trails.

: Disable Any Unassociated Accounts

- Disable any account that cannot be associated with a business process or business owner.

: Disable Dormant Accounts

- Automatically disable dormant accounts after a set period of inactivity.

: Ensure All Accounts Have An Expiration Date

- Ensure that all accounts have an expiration date that is monitored and enforced.

: Lock Workstation Sessions After Inactivity

- Automatically lock workstation sessions after a standard period of inactivity.

: Monitor Attempts to Access Deactivated Accounts

- Monitor attempts to access deactivated accounts through audit logging.

: Alert on Account Login Behavior Deviation

- Alert when users deviate from normal login behavior, such as time-of-day, workstation location and duration.

: Encrypt Transmittal of Username and Authentication Credentials

- Ensure that all account usernames and authentication credentials are transmitted across networks using encrypted channels.

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- Automatically lock workstation sessions after a standard period of inactivity.

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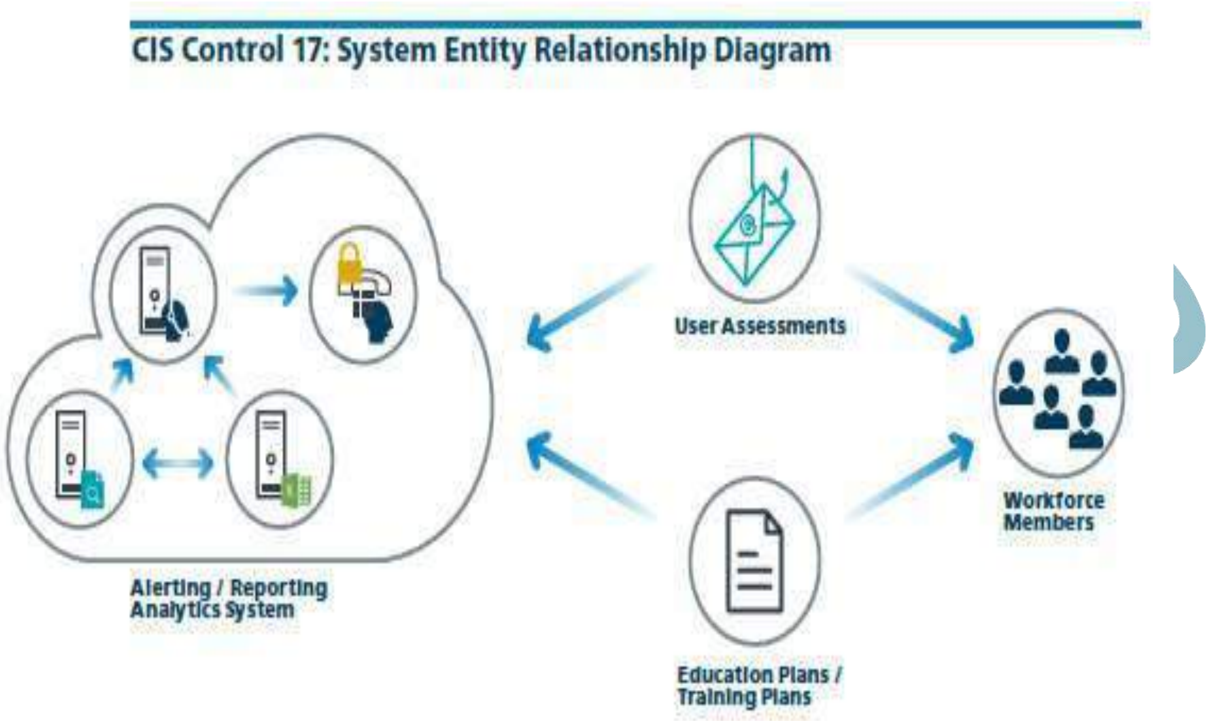
- Monitor attempts to access deactivated accounts through audit logging.

: Alert on Account Login Behavior Deviation

- Alert when users deviate from normal login behavior, such as time-of-day, workstation location and duration.

Topic No 181, 182: CIS CONTROL 17: SECURITY AWARENESS & TRAINING-I

- IMPLEMENT A SECURITY AWARENESS & TRAINING PROGRAM


CIS Control 17: System Entity Relationship Diagram
User Assessments
Workforce Members
Alerting / Reporting Analytics System
Education Plans / Training Plans

: Perform a Skills Gap Analysis

- Perform a skills gap analysis to understand the skills and behaviors workforce members are not adhering to, using this information to build a baseline education roadmap.

: Deliver Training to Fill the Skills Gap

- Deliver training to address the skills gap identified to positively impact workforce members' security behavior.

: Implement a Security Awareness Program

- Create a security awareness program for all workforce members to complete on a regular basis to ensure they understand and exhibit the necessary behaviors and skills to help ensure the security of the organization. The organization's security awareness program should be communicated in a continuous and engaging manner

: Update Awareness Content Frequently

- Ensure that the organization's security awareness program is updated frequently (at least annually) to address new technologies, threats, standards and business requirements.

: Train Workforce on Secure Authentication

- Train workforce members on the importance of enabling and utilizing secure authentication.

: Train Workforce on Identifying Social Engineering Attacks

- Train the workforce on how to identify different forms of social engineering attacks, such as phishing, phone scams and impersonation calls.

: Train Workforce on Sensitive Data Handling

- Train workforce on how to identify and properly store, transfer, archive and destroy [illegible].

: Train Workforce on Causes of Unintentional Data Exposure

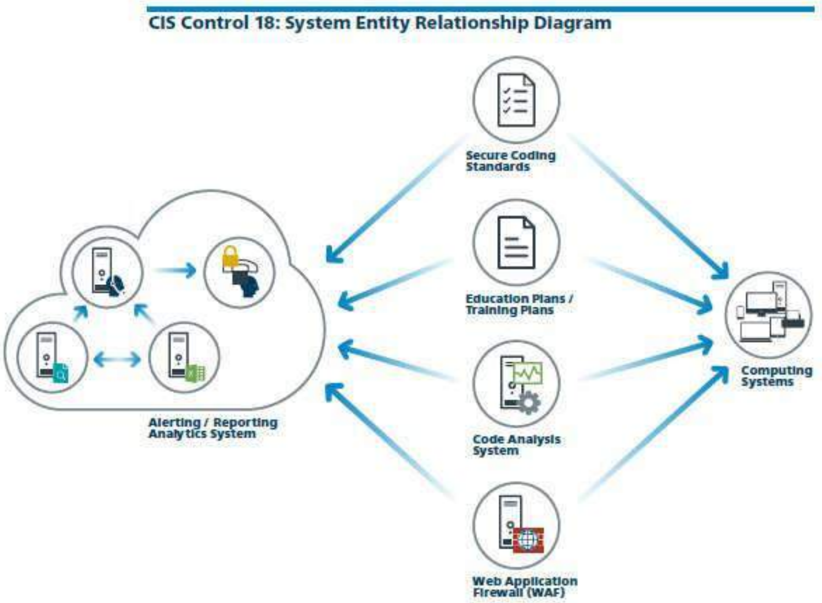
- Train workforce members to be aware of causes for unintentional data exposures, such as losing their mobile devices or emailing the wrong person due to autocomplete in email.

: Train Workforce Members on Identifying and Reporting Incidents

- Train employees to be able to identify the most common indicators of an incident and be able to report such an incident.

Topic No 183,184,185: CIS CONTROL 18: APPLICATION SOFTWARE SECURITY-I

Application Software Security


CIS Control 18: System Entity Relationship Diagram
Secure Coding Standards
Education Plans / Training Plans
Code Analysis System
Web Application Firewall (WAF)
Computing Systems
Alerting / Reporting Analytics System

: Establish Secure Coding Practices

- Establish secure coding practices appropriate to the programming language and development environment being used.

: Ensure Explicit Error Checking is Performed for All In-house Developed Software

- For in-house developed software, ensure that explicit error checking is performed and documented for all input, including for size, data type, & acceptable ranges or formats.

: Verify That Acquired Software is Still Supported

- Verify that the version of all software acquired from outside your organization is still supported by the developer or appropriately hardened based on developer security .

: Only Use Up-to-date And Trusted Third-Party Components

- Only use up-to-date and trusted third-party components for the software developed by the organization.

: Use Only Standardized and Extensively Reviewed Encryption Algorithms

- Use only standardized and extensively reviewed encryption algorithms.

: Ensure Software Development Personnel are Trained in Secure Coding

- Ensure that all software development personnel receive training in writing secure code for their specific development environment and responsibilities.

: Apply Static and Dynamic Code Analysis Tools

- Apply static and dynamic analysis tools to verify that secure coding practices are being adhered to for internally developed software.

: Establish a Process to Accept and Address Reports of Software Vulnerabilities

- Establish a process to accept and address reports of software vulnerabilities, including providing a means for external entities to contact your security group.

: Separate Production and Non-Production Systems

- Maintain separate environments for production and nonproduction systems. Developers should not have unmonitored access to production environments.

: Deploy Web Application Firewalls (WAFs)

- Protect web applications by deploying web application firewalls (WAFs) that inspect all traffic flowing to the web application for common web application attacks.

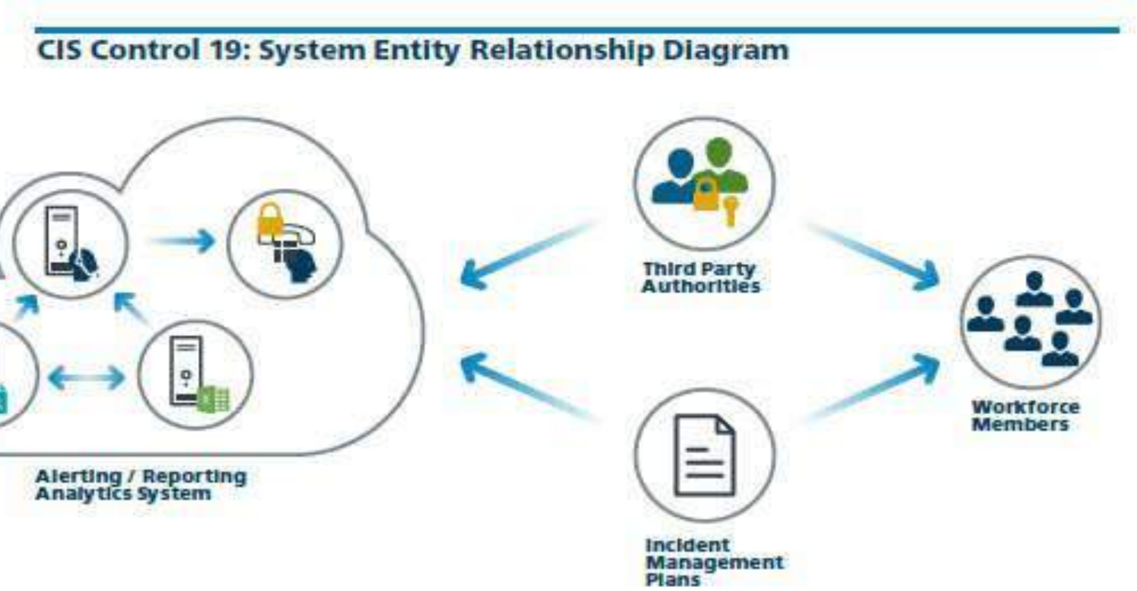
- For applications that are not web-based, specific application firewalls should be deployed if such tools are available for the given application type. If the traffic is encrypted, the device should either sit behind the encryption or be capable of decrypting the traffic prior to analysis. If neither option is appropriate, a host-based web application firewall should be deployed.

: Use Standard Hardening Configuration Templates for Databases

- For applications that rely on a database, use standard hardening configuration templates. All systems that are part of critical business processes should also be tested.

Topic No 186, 187: CIS CONTROL 19: INCIDENT RESPONSE & MANAGEMENT-I

- Incident Response & Management


CIS Control 19: System Entity Relationship Diagram
Third Party Authorities
Workforce Members
Alerting / Reporting Analytics System
Incident Management Plans

: Document Incident Response Procedures

- Ensure that there are written incident response plans that defines roles of personnel as well as phases of incident handling/management.

: Assign Job Titles and Duties for Incident Response

- Assign job titles and duties for handling computer and network incidents to specific individuals and ensure tracking and documentation throughout the incident through resolution.

: Designate Management Personnel to Support Incident Handling

- Designate management personnel, as well as backups, who will support the incident handling process by acting in key decision-making roles.

: Devise Organization-wide Standards for Reporting Incidents

- Devise organization-wide standards for the time required for system administrators and other workforce members to report anomalous events to the incident handling team, the mechanisms for such reporting, and the kind of information that should be included in the [illegible].

: Maintain Contact Information For Reporting Security Incidents

- Assemble & maintain information on third-party contact information to be used to report a security incident, such as Law Enforcement, relevant govt departments, vendors, etc

: Publish Information Regarding Reporting Computer Anomalies and Incidents

- Publish information for all workforce members, regarding reporting computer anomalies and incidents to the incident handling team. Such information should be included in routine employee awareness activities.

: Conduct Periodic Incident Scenario Sessions for Personnel

- Plan and conduct routine incident response exercises and scenarios for the workforce involved in the incident response to maintain awareness and comfort in responding to real world threats.

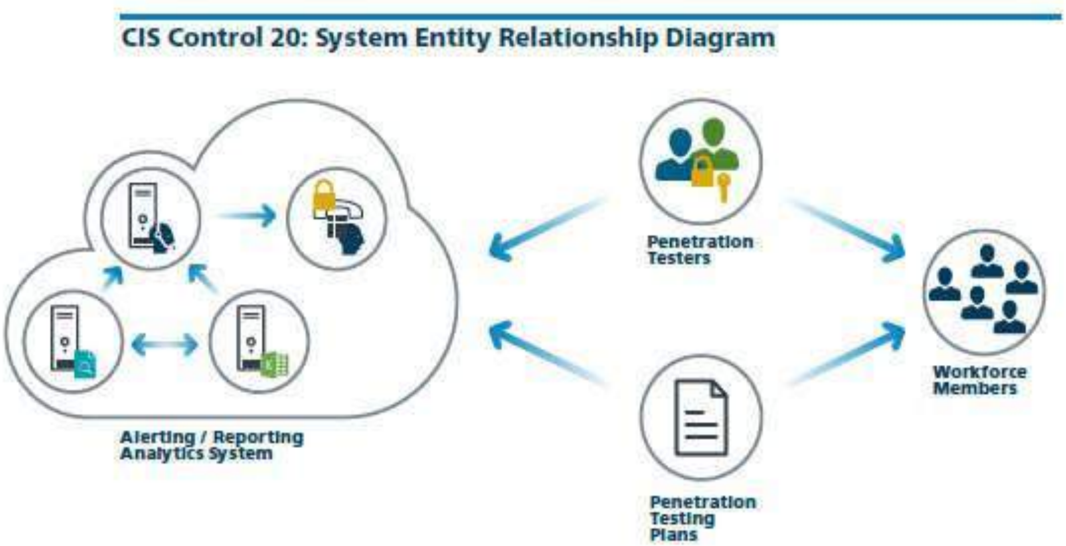
- Exercises should test communication channels, decision making, and incident responders technical capabilities using tools and data available to them.

: Create Incident Scoring and Prioritization Schema

- Create incident scoring and prioritization schema based on known or potential impact to your organization. Utilize score to define frequency of status updates and escalation procedures.

Topic No 188, 189: CIS CONTROL 20: PEN TESTS & RED TEAM EXERCISES-I

Penetration Tests & Red Team Exercises


CIS Control 20: System Entity Relationship Diagram
Alerting / Reporting Analytics System
Penetration Testers
Workforce Members
Penetration Testing Plans

: Establish a Penetration Testing Program

- Establish a program for penetration tests that includes a full scope of blended attacks, such as wireless, client-based, and web application attacks.

: Conduct Regular External and Internal Penetration Tests

- Conduct regular external and internal penetration tests to identify vulnerabilities and attack vectors that can be used to exploit enterprise systems successfully.

: Perform Periodic Red Team Exercises

- Perform periodic Red Team exercises to test organizational readiness to identify and stop attacks or to respond quickly and effectively.

: Include Tests for Presence of Unprotected System Information and Artifacts

- Include tests for the presence of unprotected system information and artifacts that would be useful to attackers, including network diagrams, configuration files, older penetration test reports, e-mails or documents containing passwords or other information critical to system operation.

: Create Test Bed for Elements Not Typically Tested in Production

- Create a test bed that mimics a production environment for specific penetration tests and Red Team attacks against elements that are not typically tested in production, such as attacks against supervisory control and data acquisition and other control systems.

: Use Vulnerability Scanning and Penetration Testing Tools in Concert

- Use vulnerability scanning & penetration testing tools in concert. The results of vulnerability scanning assessments should be used as a starting point to guide & focus pen testing efforts.

: Ensure Results from Penetration Test are Documented Using Open, Machine- readable Standards

- Wherever possible, ensure that Red Teams results are documented using open, machine-readable standards (e.g., SCAP). Devise a scoring method for determining the results of Red Team exercises so that results can be compared over time.

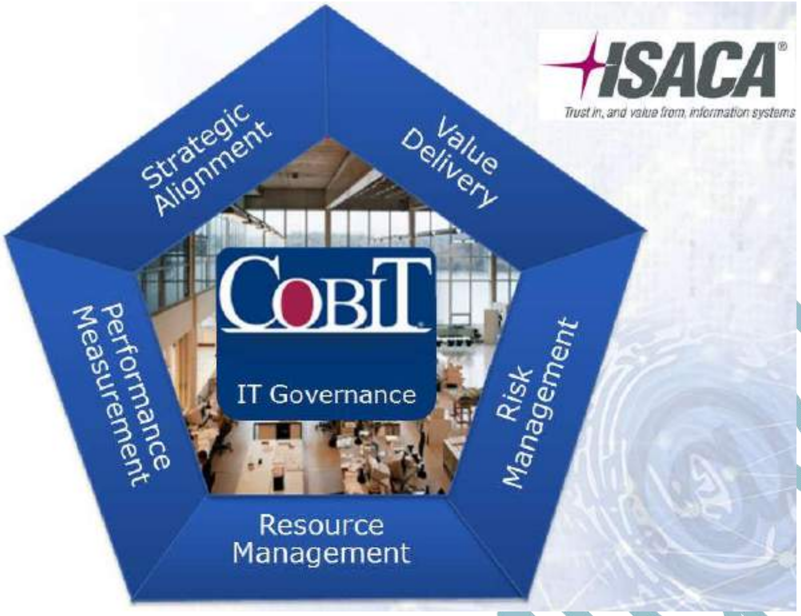
: Control and Monitor Accounts Associated with Penetration Testing

- Any user or system accounts used to perform penetration testing should be controlled and monitored to make sure they are only being used for and are removed or restored to normal function after testing is over.

Topic No 190: What Is IT Governance?

- **What is IT Governance?**
  - The primary goals of IT Governance are to assure that the investments in IT generate business value, and to mitigate the risks that are associated with IT
  - Simply put, it's putting structure around how organizations align IT strategy with business strategy, ensuring that companies stay on track to achieve their strategies and goals, and implementing good ways to measure IT's performance.
  - It makes sure that all stakeholders' interests are taken into account and that processes provide measurable results.
  - An IT governance framework should answer key questions such as how the IT dept is functioning overall, what key metrics management needs and what return IT is giving back to the business from investments
- Frameworks which cover IT Governance:
  - ISO27001: 2013 (Information Security Management System - ISMS)
  - ITIL (IT Infrastructure Library)

- COBIT (Control Objectives for Information & Related Technology)

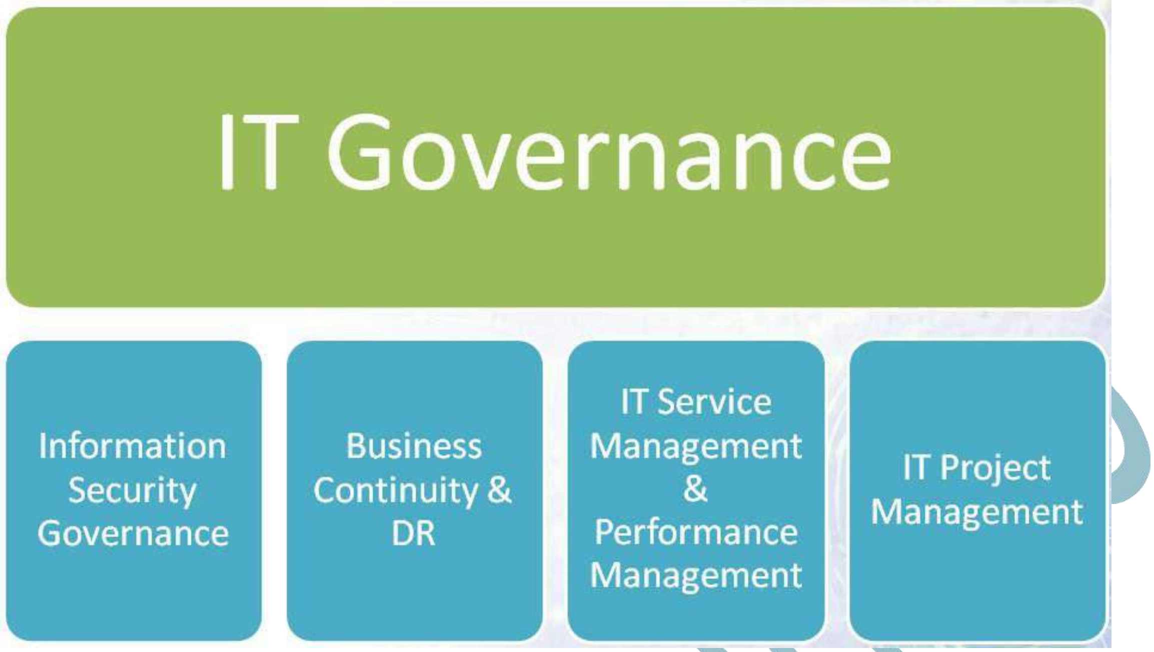


- **What is COBIT?**
  - Simply stated, COBIT 5 helps enterprises to create optimal value from IT by maintaining a balance between realising benefits and optimising risk levels and [illegible].

ISACA
Trust in, and value from, information systems

Topic No 191: What Is Information Security Governance?

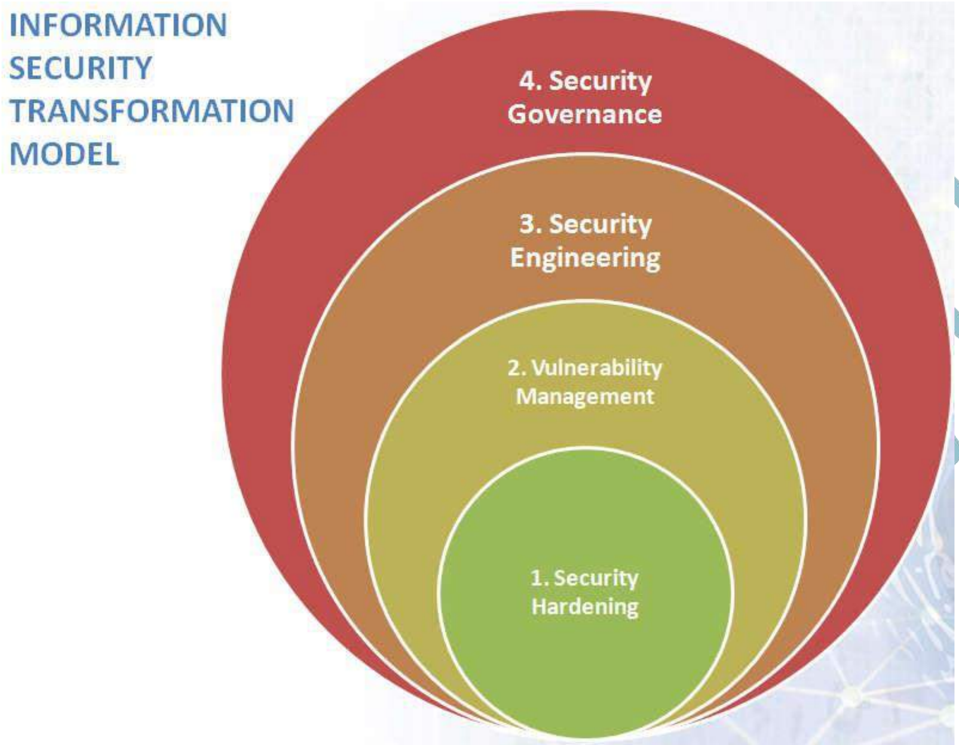
- **What is Information Security governance ?**
  - *"Security governance is the set of responsibilities and practices exercised by the board and executive management with the goal of providing strategic direction, ensuring that objectives are achieved, ascertaining that risks are managed appropriately and verifying that the enterprise's resources are used responsibly."*
- Information Security governance is the mechanism how the information security function is managed by the organization


IT Governance
Information Security Governance
Business Continuity & DR
IT Service Management & Performance Management
IT Project Management

- The leading framework for Information Security governance is ISO27001:2013 (ISMS)
  - Considered gold standard
  - Most widely deployed Information Security governance framework
- "Provides a model for establishing, implementing, operating, monitoring, reviewing, maintaining and improving an information security management system."
- Clauses 4 to 10 of ISO27001:2013
  - 4: Organization & context, scope
  - 5: Leadership & commitment, policy, organizational roles & responsibilities
  - 6: Planning; Infosec objectives and planning to achieve them
  - 7: Support; resources, competence, awareness
  - 8: Operations; risk assessment and risk management
  - 9: Performance evaluation; monitoring, measurement & analysis; internal audit
  - 10: Non-conformities & corrective actions, continual improvement

Topic No 192: Why Is InfoSec Governance At Stage 4?

- Lets have a look at the Security Transformation Model


INFORMATION SECURITY TRANSFORMATION MODEL
4. Security Governance
3. Security Engineering
2. Vulnerability Management
1. Security Hardening

- **Why is security governance at stage 4?**
  - First build a building and then manage it
  - First 2 stages build up the essential foundation
  - 3rd stage implements advanced security measures
  - Then (4th stage) it is time to manage
- **Limited organizational bandwidth?**
  -
  - May get lost in governance if implement at the wrong time
  - Spend limited resources where they count most (in security hardening)
- **Pakistan's InfoSec paradigm**
  - Governance overkill
  - Reactive
  - Superficial
  - Complete absence of underlying security controls

  - that is why security transformation is required
- Once the basic foundations of security hardening, vulnerability management, and security engineering are in place it is time to manage the “system”
- If we try to establish governance first, our entire energies will be consumed in managing a system that has not yet been built.
- Organizational security maturity…when does governance make sense?
- Governance is important but only after security hardening & controls (stage 1, 2, and 3) are in place

Topic No 193: Can InfoSec Governance Be Before Stage 4?

- Lets have a look at the Security Transformation Model
- Implications of implementing Stage 4 before first 3 stages:
  - Expending project energy, resources, and time in governance whereas they should have been spent on building fundamental security foundation (which later requires management)
  - Getting caught up in intangible “governance” activity
  - Getting caught up in policy & management without essential and fundamental underlying security controls
  - Setting unrealistic expectations
  - Note that governance consists of documentation and process which tends to bog [illegible]

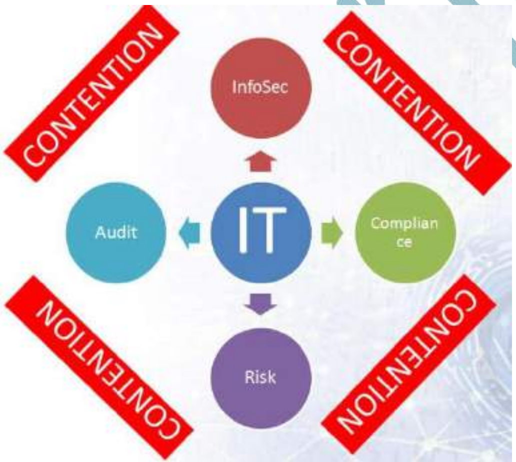
Security controls (Stage 1-3) once they are implemented by following security hardening & vulnerability management international best-practices can be better documented and regulated through governance (policy, SOP)

- **Why?**
  - We know what works and is implementable in terms of security controls
  - Controls are implemented incrementally (practical)
  - Minimal policy in place at initial stages as a starting point

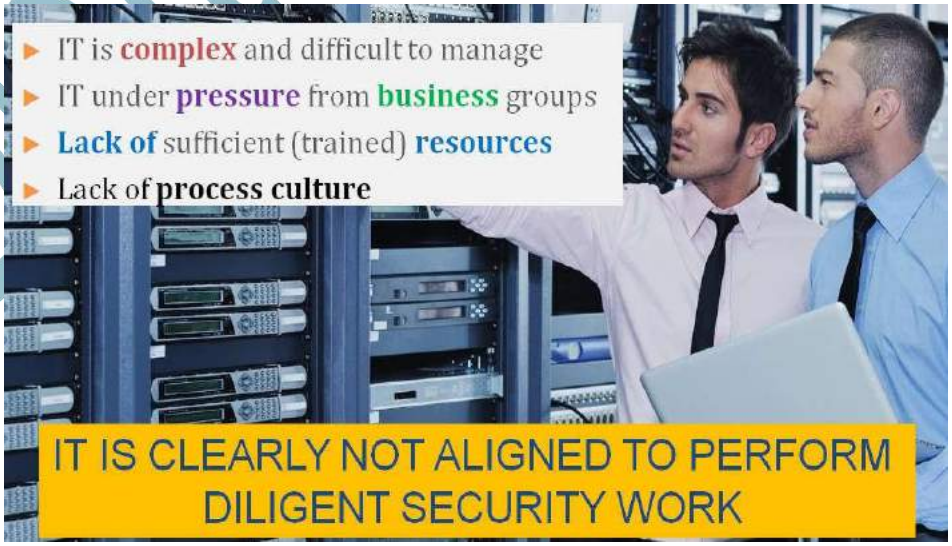
- However:
  - Certain projects may have governance stipulations by the regulator/customers
  - Deadline to achieve certain governance or security milestones
  - In such cases tailor security transformation project
- The sequence of the security transformation model (stages 1 through 4) should be followed wherever possible as it is a tried and tested model
- The security transformation model may be tailored as per your unique requirements

Topic No 194: Pakistan's InfoSecurity Posture & Challenges

- Lets have a look at the typical IT & Information Security challenges



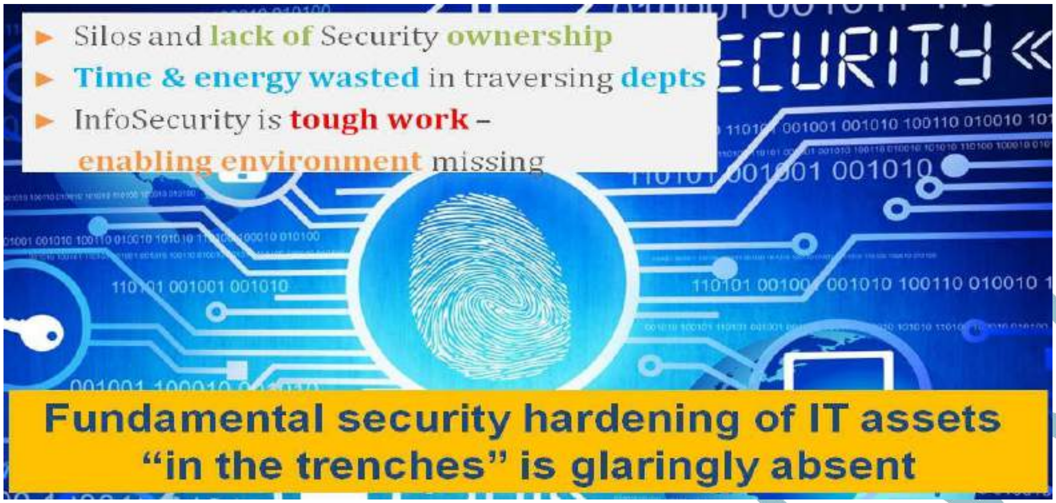
IT CHALLENGES SUMMARY



- IT is complex and difficult to manage
- IT under pressure from business groups
- Lack of sufficient (trained) resources
- Lack of process culture

IT IS CLEARLY NOT ALIGNED TO PERFORM DILIGENT SECURITY WORK

INFORMATION SECURITY CHALLENGES



- Silos and lack of Security ownership
- Time & energy wasted in traversing depts
- InfoSecurity is tough work – enabling environment missing

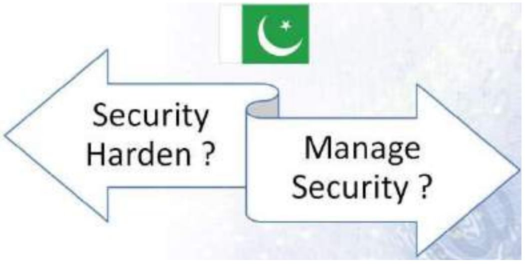
Fundamental security hardening of IT assets "in the trenches" is glaringly absent

PAKISTAN INDUSTRY CHARACTERISTICS

- Wavering management commitment
- "Superficial dressing" security
- Reactive to regulator/audit/compliance
- Security hardening largely "untouched"

Industry (has been) in denial

PAKISTAN INDUSTRY CHARACTERISTICS



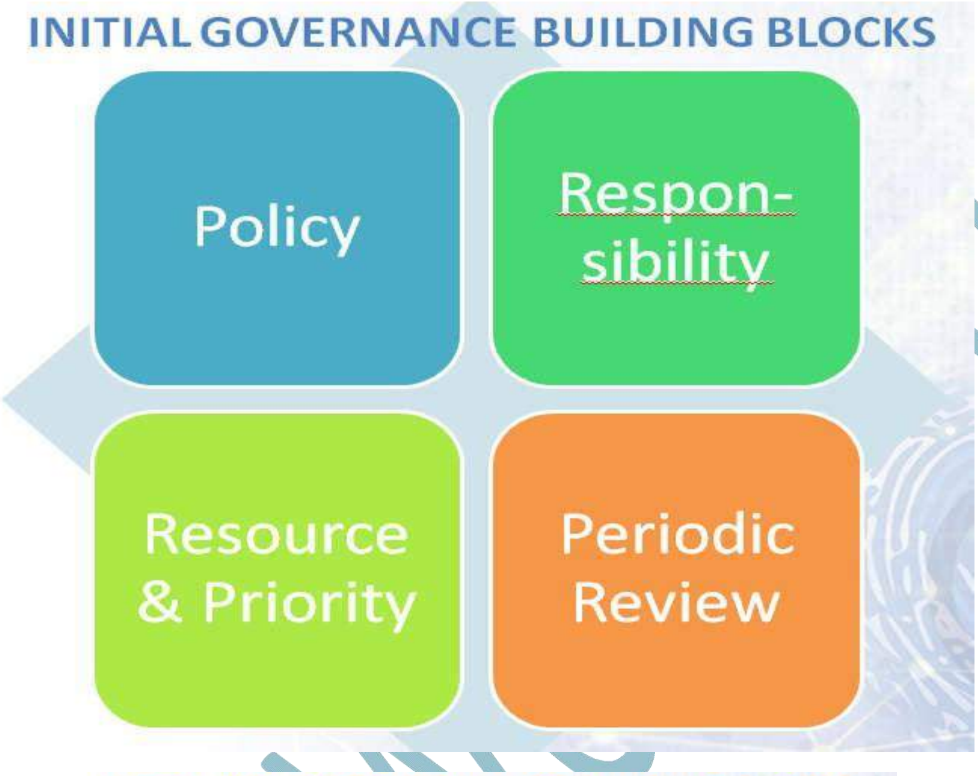
Security Harden ?

Manage Security ?

- Pakistan is now almost one entire technology generation behind in Information Security
- IT progressed during the last 10-12 years but InfoSec was ignored
- Information Security Transformation Model is the only way to catch up

Topic No 195: InfoSec Governance Building Blocks

- Lets have a look at the Information Security governance building blocks



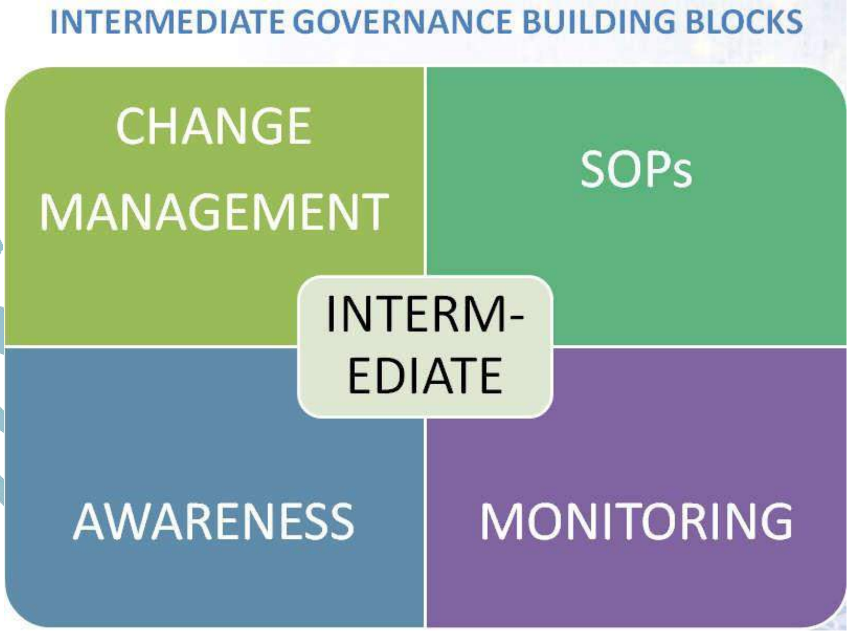
INITIAL GOVERNANCE BUILDING BLOCKS

Policy

Respon-sibility

Resource & Priority

Periodic Review



INTERMEDIATE GOVERNANCE BUILDING BLOCKS

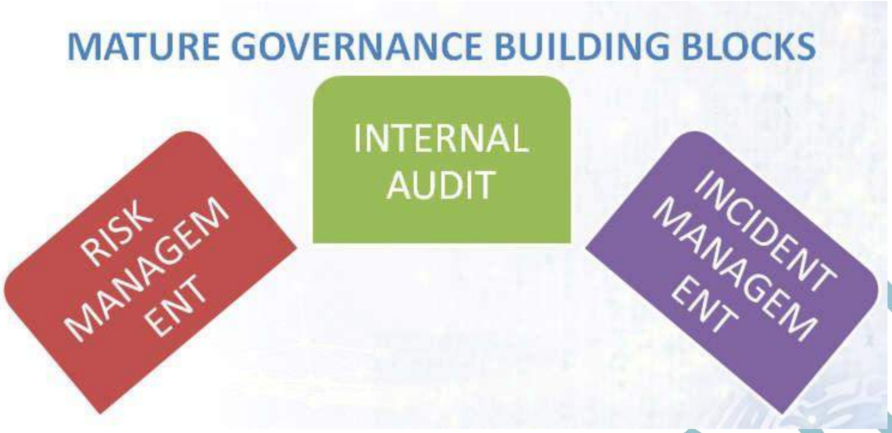
CHANGE MANAGEMENT

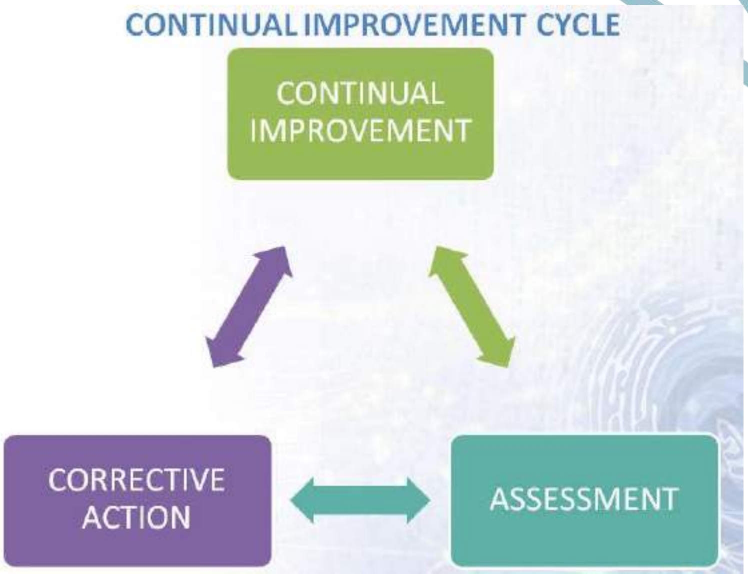
SOPs

INTERM-EDIATE

AWARENESS

MONITORING

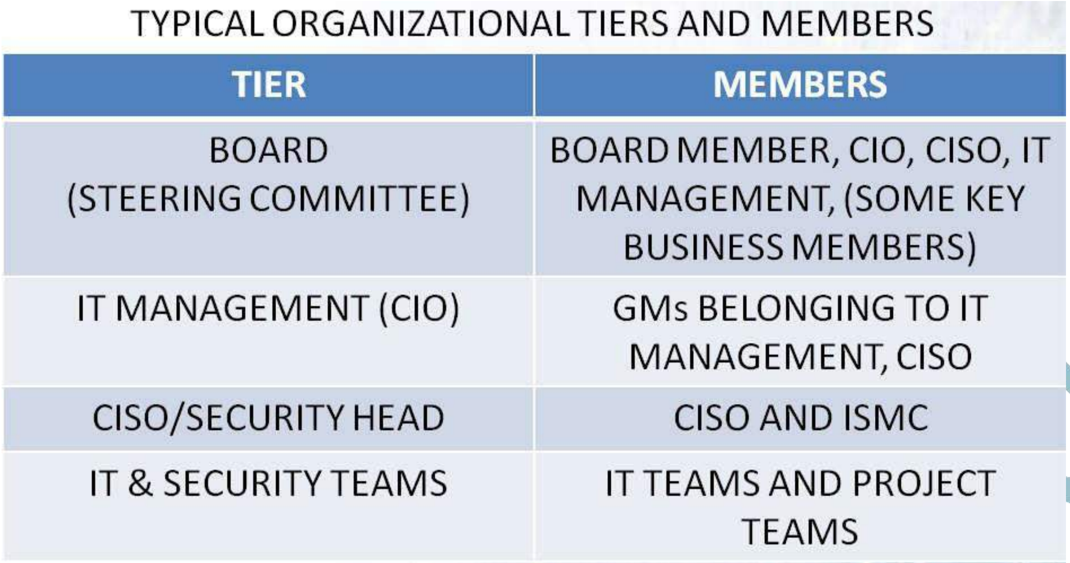

MATURE GOVERNANCE BUILDING BLOCKS


CONTINUAL IMPROVEMENT CYCLE

- **Governance implementation should be broken up into phases**
  - Essential (initial) activities first
  - Gradually progress with activities that match organizational readiness & maturity

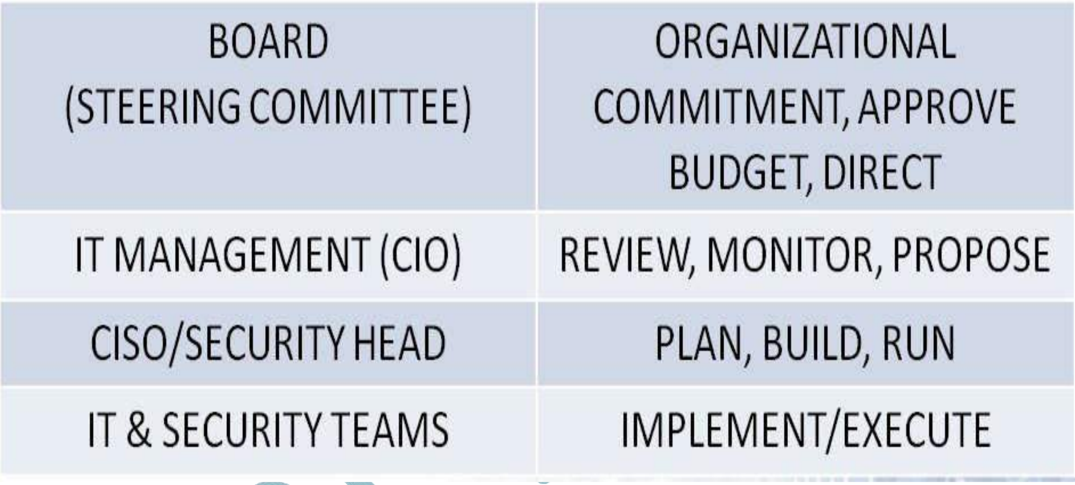
Topic No 196: Whose Responsibility Is InfoSec Governance?

- Information security governance has responsibilities at different layers of the organization
- In Pakistan, the governance functions are slightly different than practice in more mature markets



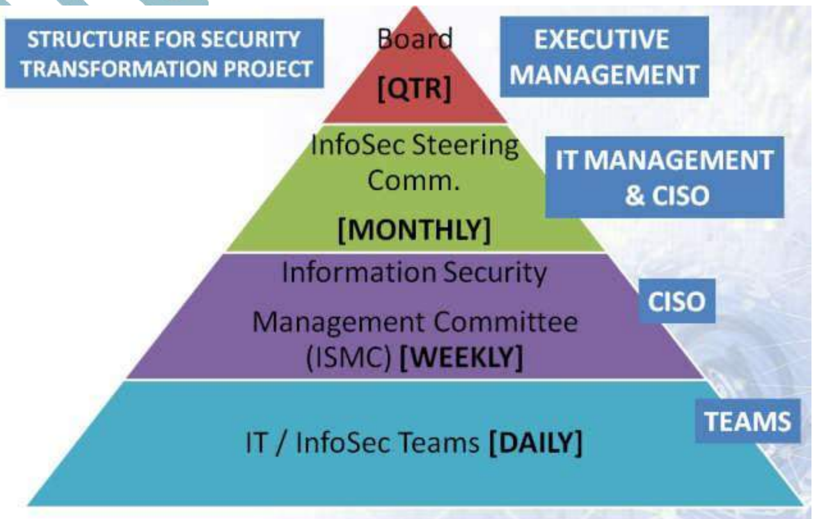
TYPICAL ORGANIZATIONAL TIERS AND MEMBERS

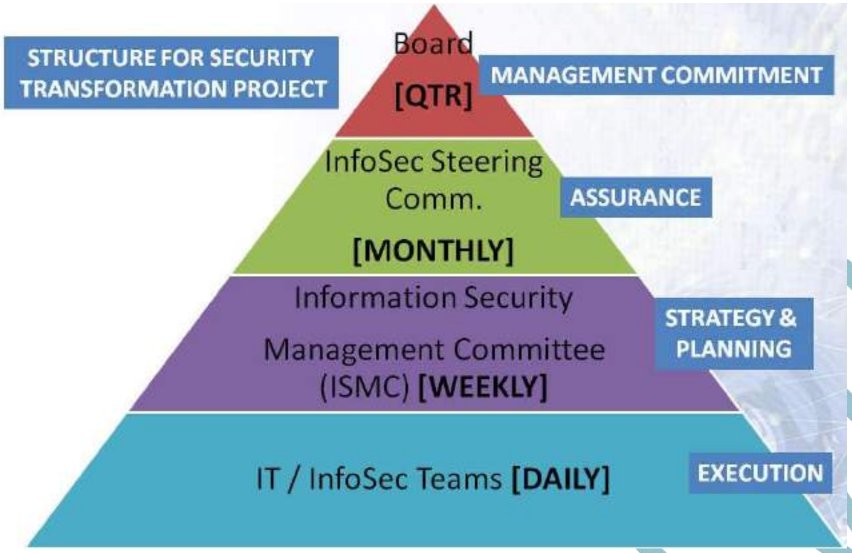
TIER	MEMBERS
BOARD (STEERING COMMITTEE)	BOARD MEMBER, CIO, CISO, IT MANAGEMENT, (SOME KEY BUSINESS MEMBERS)
IT MANAGEMENT (CIO)	GMs BELONGING TO IT MANAGEMENT, CISO
CISO/SECURITY HEAD	CISO AND ISMC
IT & SECURITY TEAMS	IT TEAMS AND PROJECT TEAMS

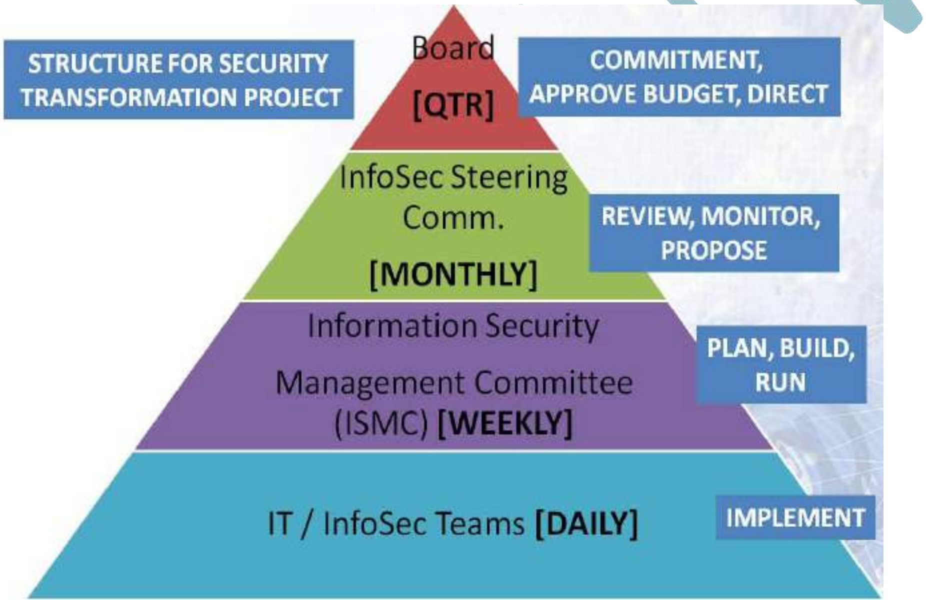


BOARD (STEERING COMMITTEE)	ORGANIZATIONAL COMMITMENT, APPROVE BUDGET, DIRECT
IT MANAGEMENT (CIO)	REVIEW, MONITOR, PROPOSE
CISO/SECURITY HEAD	PLAN, BUILD, RUN
IT & SECURITY TEAMS	IMPLEMENT/EXECUTE

- Based on experience with real Information Security Transformation projects in the Pakistan industry, we have set a more practical structure as shown in the following slides
- Well-suited to drive the Security Transformation project successfully


STRUCTURE FOR SECURITY TRANSFORMATION PROJECT
Board [QTR]
EXECUTIVE MANAGEMENT
InfoSec Steering Comm. [MONTHLY]
IT MANAGEMENT & CISO
Information Security Management Committee (ISMC) [WEEKLY]
CISO
IT / InfoSec Teams [DAILY]
TEAMS

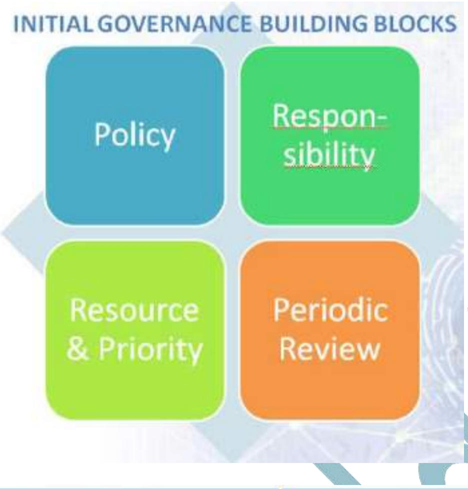

STRUCTURE FOR SECURITY TRANSFORMATION PROJECT
Board [QTR]
MANAGEMENT COMMITMENT
InfoSec Steering Comm. [MONTHLY]
ASSURANCE
Information Security Management Committee (ISMC) [WEEKLY]
STRATEGY & PLANNING
IT / InfoSec Teams [DAILY]
EXECUTION

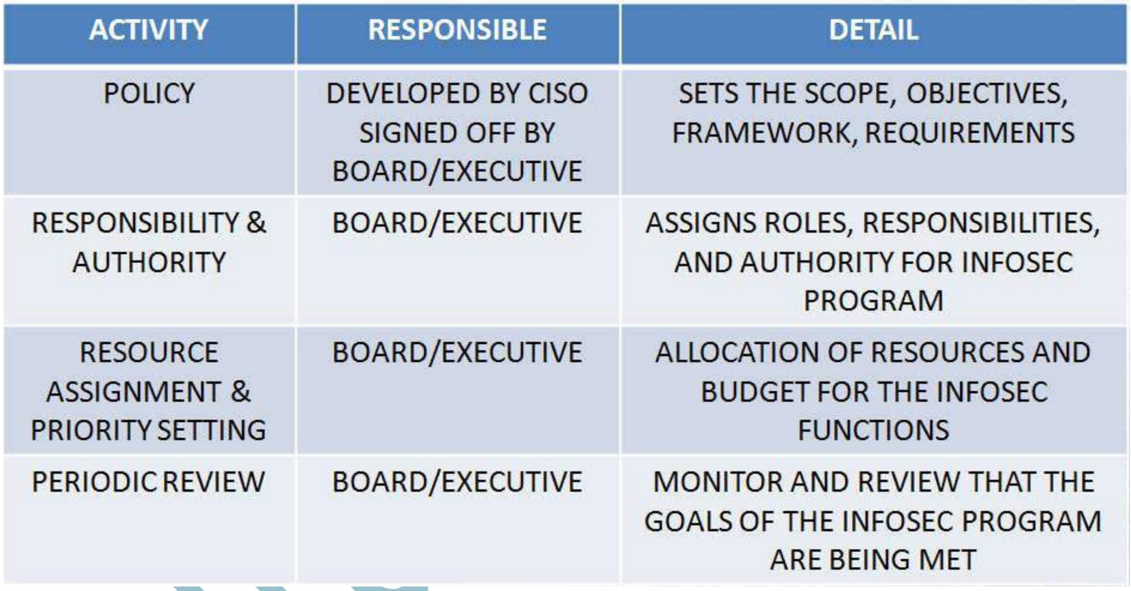

STRUCTURE FOR SECURITY TRANSFORMATION PROJECT
Board [QTR]
COMMITMENT, APPROVE BUDGET, DIRECT
InfoSec Steering Comm. [MONTHLY]
REVIEW, MONITOR, PROPOSE
Information Security Management Committee (ISMC) [WEEKLY]
PLAN, BUILD, RUN
IT / InfoSec Teams [DAILY]
IMPLEMENT

- When working in the practical industry in a market where the security posture is sub-par, we should be open to adopt structures and strategies relevant for such a level of market
- ISACA and other frameworks propose mechanisms that do not always make sense in an unprepared market

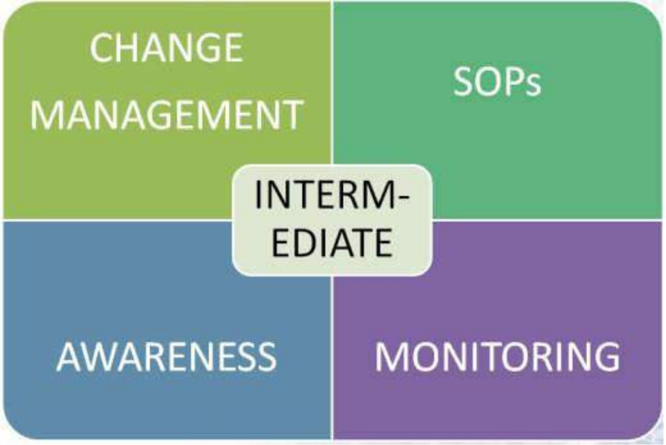
Topic No 197: How Is InfoSec Governance Implemented?

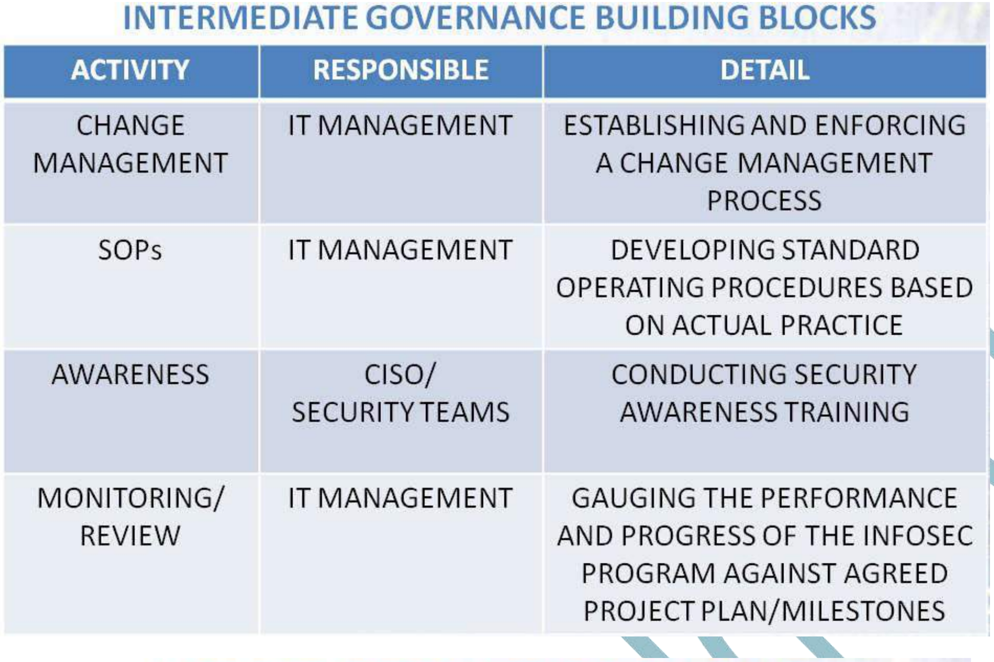
- Lets have a look at the Information Security governance building blocks





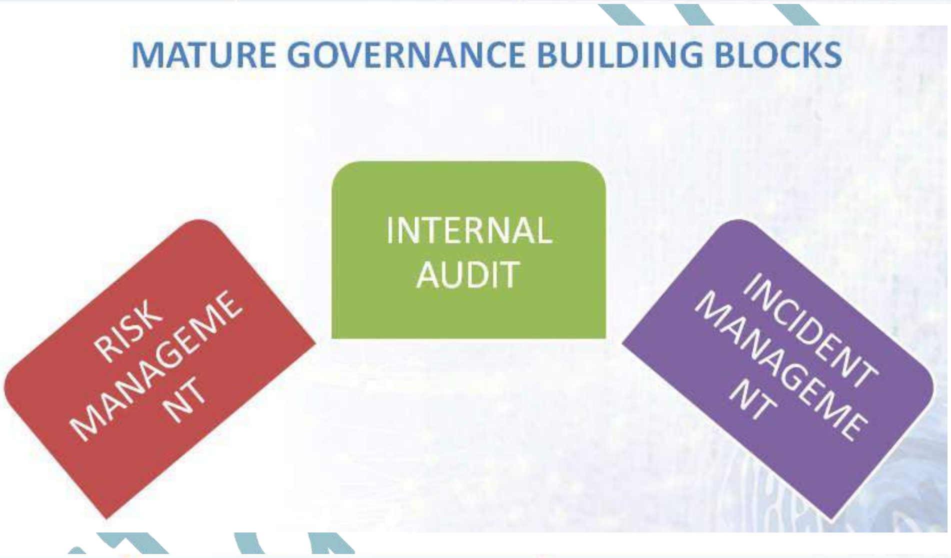
ACTIVITY	RESPONSIBLE	DETAIL
POLICY	DEVELOPED BY CISO SIGNED OFF BY BOARD/EXECUTIVE	SETS THE SCOPE, OBJECTIVES, FRAMEWORK, REQUIREMENTS
RESPONSIBILITY & AUTHORITY	BOARD/EXECUTIVE	ASSIGNS ROLES, RESPONSIBILITIES, AND AUTHORITY FOR INFOSEC PROGRAM
RESOURCE ASSIGNMENT & PRIORITY SETTING	BOARD/EXECUTIVE	ALLOCATION OF RESOURCES AND BUDGET FOR THE INFOSEC FUNCTIONS
PERIODIC REVIEW	BOARD/EXECUTIVE	MONITOR AND REVIEW THAT THE GOALS OF THE INFOSEC PROGRAM ARE BEING MET



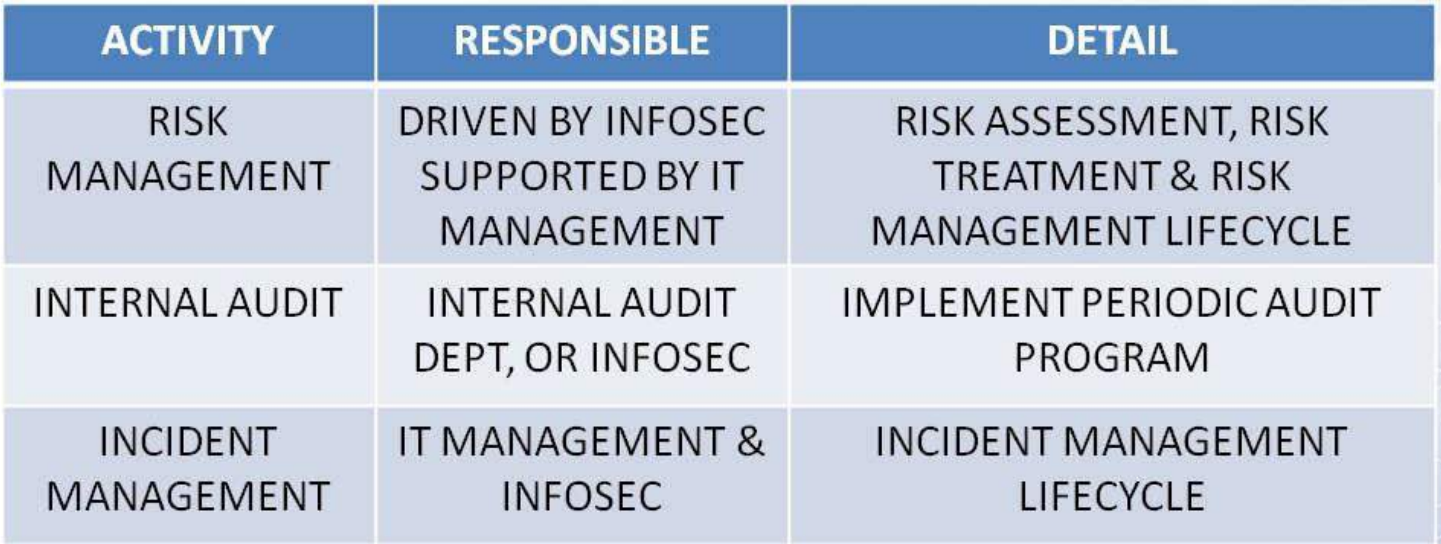


INTERMEDIATE GOVERNANCE BUILDING BLOCKS

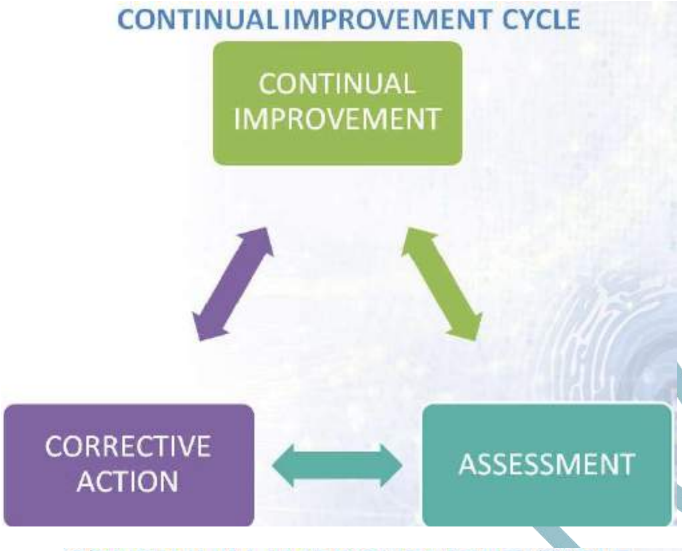
ACTIVITY	RESPONSIBLE	DETAIL
CHANGE MANAGEMENT	IT MANAGEMENT	ESTABLISHING AND ENFORCING A CHANGE MANAGEMENT PROCESS
SOPs	IT MANAGEMENT	DEVELOPING STANDARD OPERATING PROCEDURES BASED ON ACTUAL PRACTICE
AWARENESS	CISO/ SECURITY TEAMS	CONDUCTING SECURITY AWARENESS TRAINING
MONITORING/ REVIEW	IT MANAGEMENT	GAUGING THE PERFORMANCE AND PROGRESS OF THE INFOSEC PROGRAM AGAINST AGREED PROJECT PLAN/MILESTONES

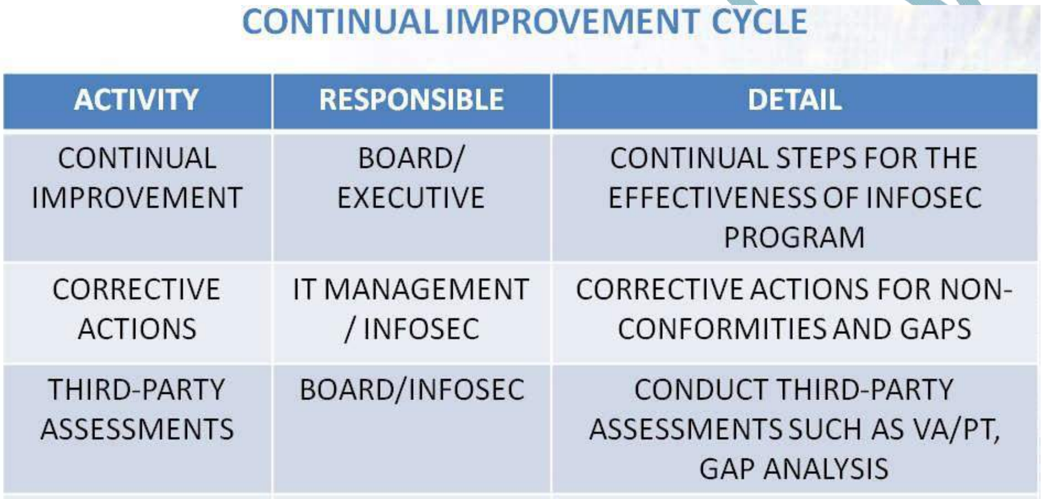


MATURE GOVERNANCE BUILDING BLOCKS



ACTIVITY	RESPONSIBLE	DETAIL
RISK MANAGEMENT	DRIVEN BY INFOSEC SUPPORTED BY IT MANAGEMENT	RISK ASSESSMENT, RISK TREATMENT & RISK MANAGEMENT LIFECYCLE
INTERNAL AUDIT	INTERNAL AUDIT DEPT, OR INFOSEC	IMPLEMENT PERIODIC AUDIT PROGRAM
INCIDENT MANAGEMENT	IT MANAGEMENT & INFOSEC	INCIDENT MANAGEMENT LIFECYCLE





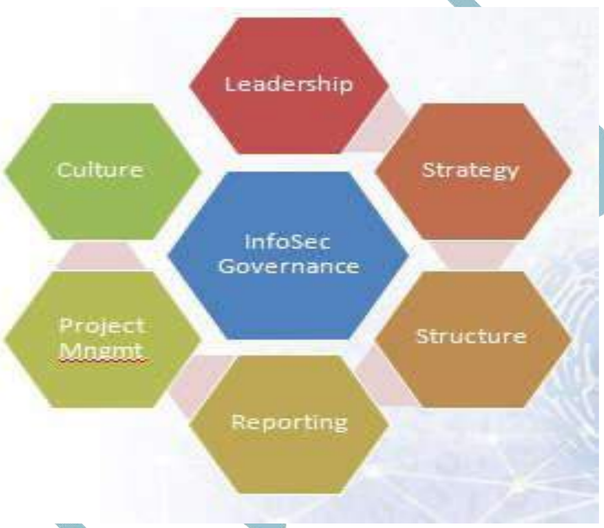
CONTINUAL IMPROVEMENT CYCLE

ACTIVITY	RESPONSIBLE	DETAIL
CONTINUAL IMPROVEMENT	BOARD/ EXECUTIVE	CONTINUAL STEPS FOR THE EFFECTIVENESS OF INFOSEC PROGRAM
CORRECTIVE ACTIONS	IT MANAGEMENT / INFOSEC	CORRECTIVE ACTIONS FOR NON-CONFORMITIES AND GAPS
THIRD-PARTY ASSESSMENTS	BOARD/INFOSEC	CONDUCT THIRD-PARTY ASSESSMENTS SUCH AS VA/PT, GAP ANALYSIS

- Information Security governance can quickly become a challenge as governance is considered an intangible
  - How do you achieve governance ?
  - When do you know you have achieved it ?
  - How you drive process and documentation in IT ?
- The key is to align Information Security governance as closely as possible with ISO27001:2013 (ISMS), and to go for crisp clear actions which are always measurable
- Certify against ISO27001:2013 (ISMS) for best-practices implementation

Topic No 198: How To Build Effective InfoSec Governance?

- Key success factors:
  - Leadership
  - Strategy
  - Reporting
  - Project management
  - Culture



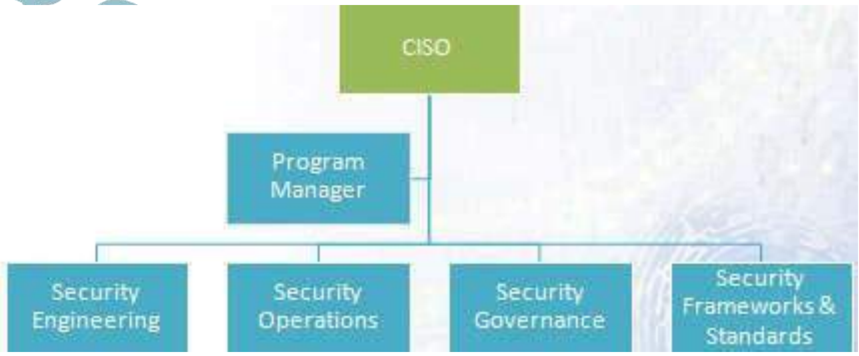
- **Leadership:**
  - Executive management role
  - Tone at the top
  - Drive pressing priority
  - Approves budgets and resources
  - Periodic review of progress
- **Strategy:**
  - How the objectives will be practically achieved while achieving the technical, governance, and performance goals
  - How the organization will gear up and focus for the security transformation
- **Structure:**

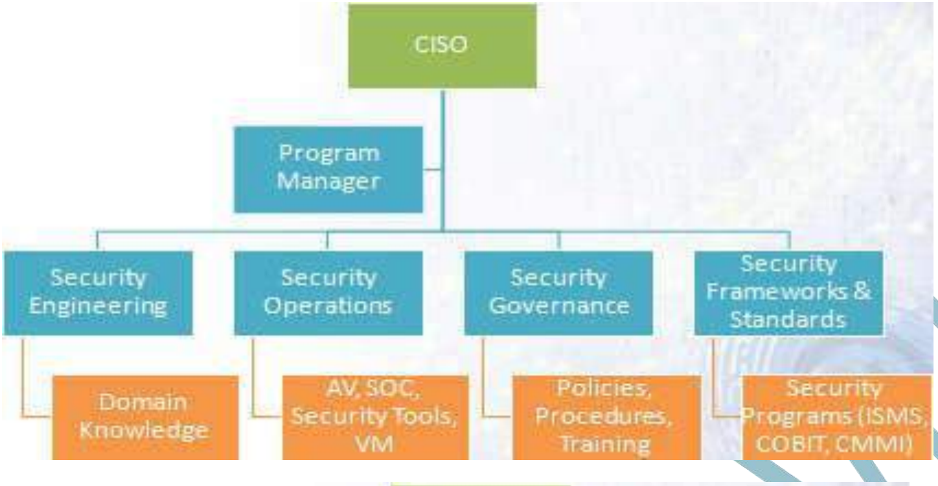
  - What hierarchies, team structures, reporting lines, and resources will come together
- How will different teams work together to achieve the common goals?

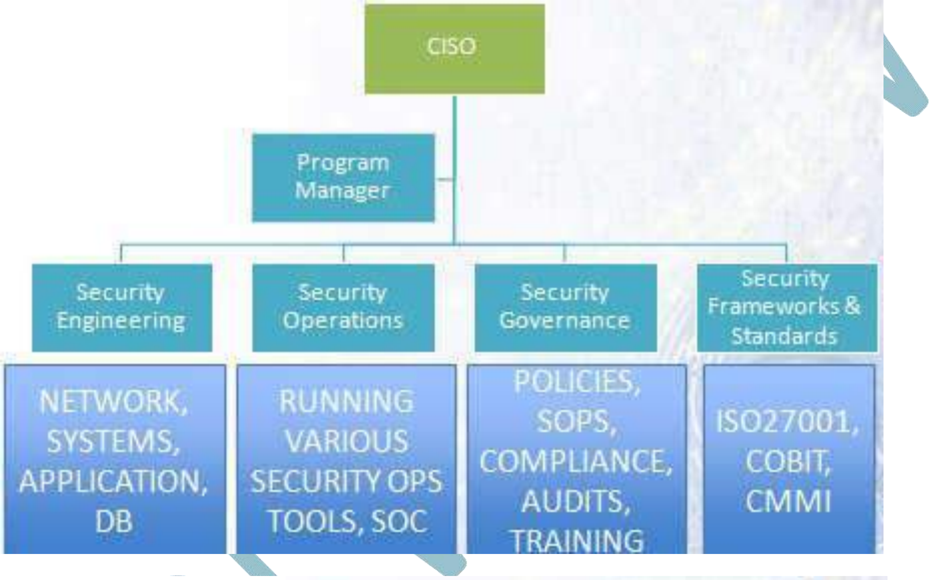
- **Reporting:**
  - What will be reported?
  - What will be the frequency of reports?
  - Who will perform review and assurance?
  - Who will monitor and track progress?
- **Project Management:**
  - How will an exceptional execution discipline be built?
  - How will milestones and performance be tracked?
  - How will project management best-practices be utilized?
- **Culture:**
  - How will an open, cooperative, authentic, and committed culture be built?
  - How will [illegible]?
  - How will a performance driven culture be promoted?
- Building effective information security governance or an effective information security transformation project are based on good management, execution and project management skills

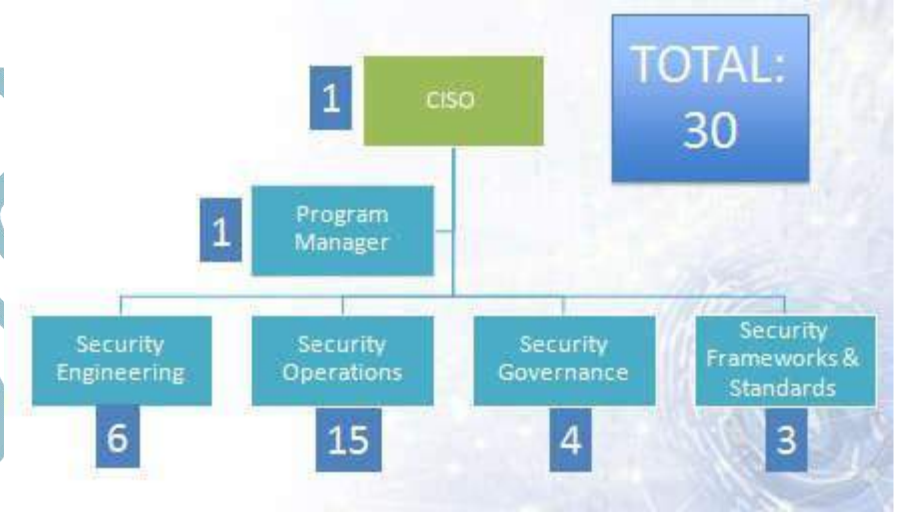
Topic No 199: InfoSec Dept Structure (Large-Sized Org)

- Lets look at the recommended structure for a large organization




CISO
Program Manager
Security Engineering
Security Operations
Security Governance
Security Frameworks & Standards
Domain Knowledge
AV, SOC, Security Tools, VM
Policies, Procedures, Training
Security Programs (ISMS, COBIT, CMMI)

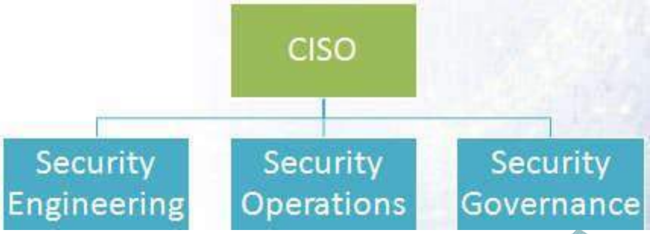

CISO
Program Manager
Security Engineering
Security Operations
Security Governance
Security Frameworks & Standards
NETWORK, SYSTEMS, APPLICATION, DB
RUNNING VARIOUS SECURITY OPS TOOLS, SOC
POLICIES, SOPS, COMPLIANCE, AUDITS, TRAINING
ISO27001, COBIT, CMMI

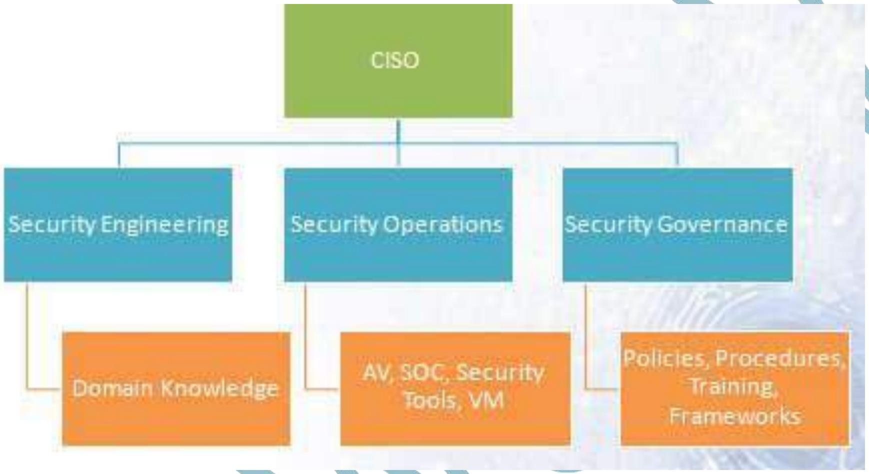


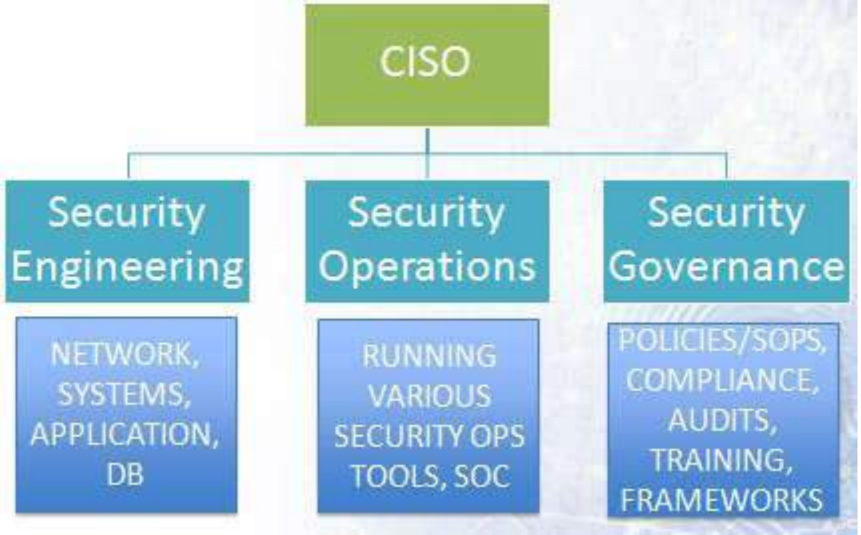
- A large organization can have an Infosec team ranging between 25-30 staff
- 10% of IT (250 to 300 IT staff)

Topic No 200: InfoSec Dept Structure (Mid-Sized Org)

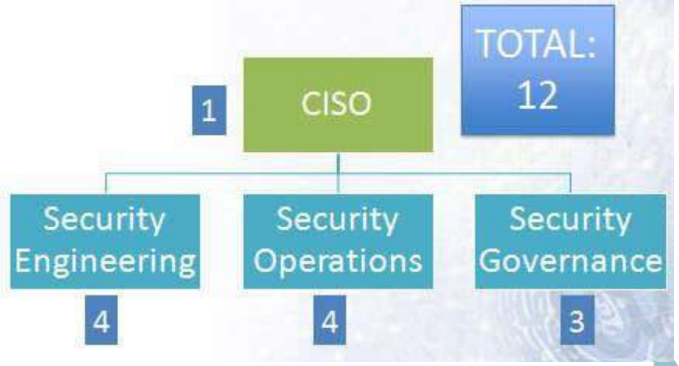
- Lets look at the recommended structure for a mid-sized organization







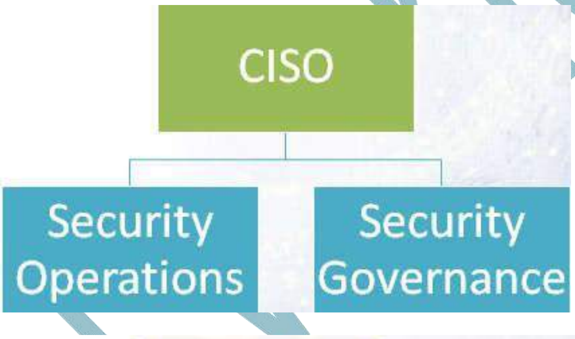
CISO
Security Engineering
Security Operations
Security Governance
NETWORK, SYSTEMS, APPLICATION, DB
RUNNING VARIOUS SECURITY OPS TOOLS, SOC
POLICIES/SOPS, COMPLIANCE, AUDITS, TRAINING, FRAMEWORKS

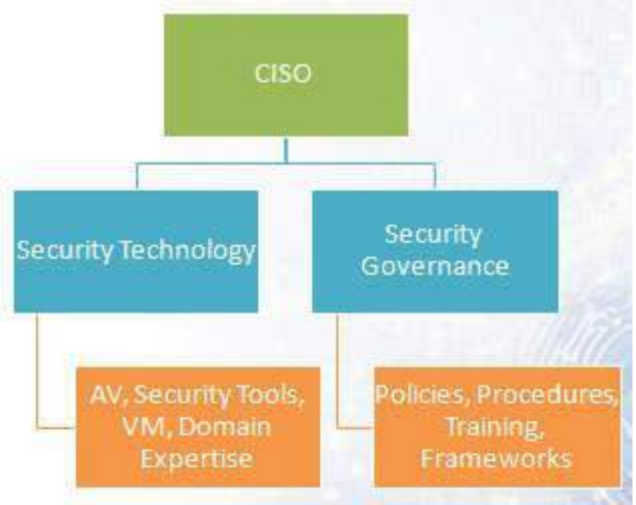


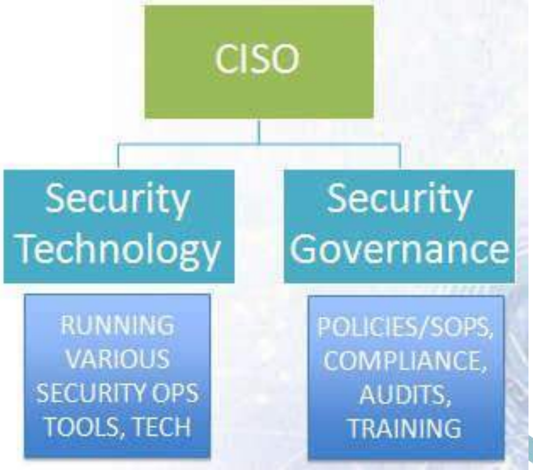
- A mid-sized organization can have an Infosec team ranging between 10-15 staff
- 10% of IT (100 to 150 IT staff)

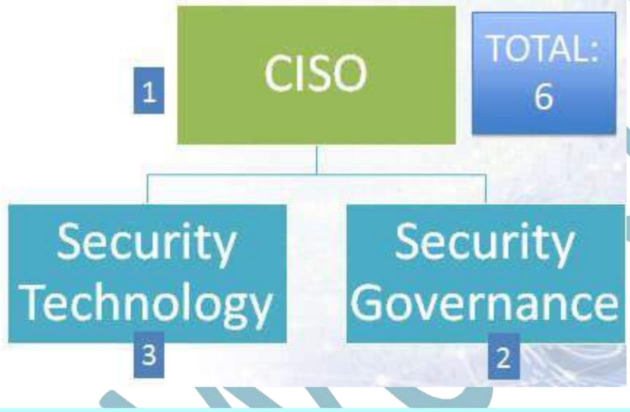
Topic No 201: InfoSec Dept Structure (Small Org)

- Lets look at the recommended structure for a small organization




CISO
Security Technology
Security Governance
AV, Security Tools, VM, Domain Expertise
Policies, Procedures, Training, Frameworks

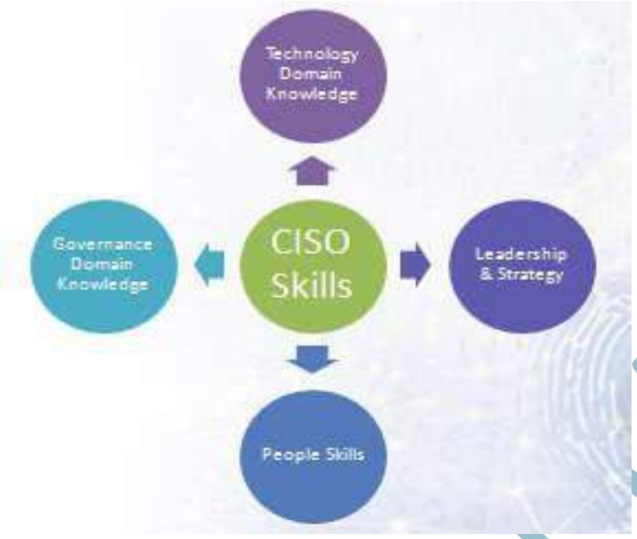

CISO
Security Technology
Security Governance
RUNNING VARIOUS SECURITY OPS TOOLS, TECH
POLICIES/SOPS, COMPLIANCE, AUDITS, TRAINING



- A small-sized organization can have an Infosec team ranging between 2-4 staff
- 10% of IT (15 to 50 IT staff)

Topic No 202: Role Of CISO In Driving Infosec Program

- The CISO plays a crucial role in successfully driving the Information Security program
-
    -
    - Placement in organizational hierarchy



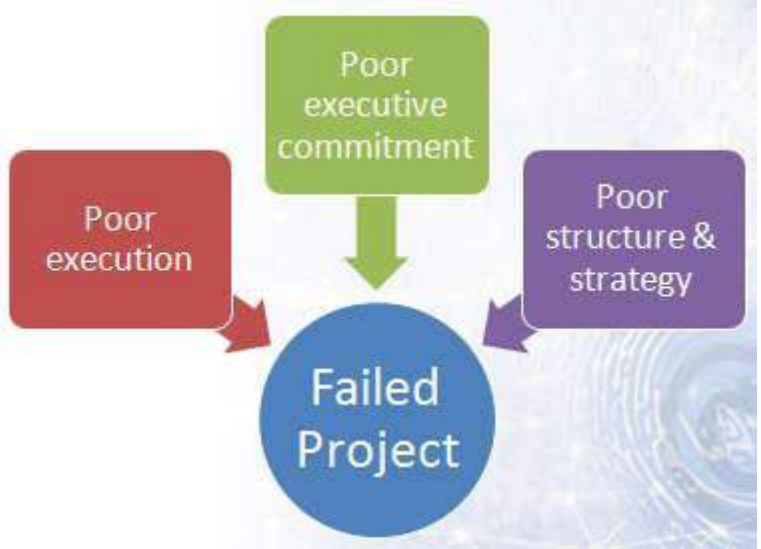
- **Leadership & strategy:**
  - Good understanding of IT & Information security challenges
  - Experience of driving critical projects in organizations
  - Ability to build program strategy, structure, reporting mechanism , and execution discipline to achieve results
  - Ability to work with Board and senior executive management to drive program
  - Ability to motivate and communicate security vision to team
  - Ability to infuse credibility & authenticity in IT environment
  - Ability to build team work & cooperation culture
- **Technology Domain Knowledge:**
  - CISOs or security heads usually have 5-10 years experience in IT followed by 3-5 years in Information Security
  - CISOs are typically strong in 2-3 domain areas such as networking + infrastructure OR software + databases OR software QA & process engineering
  - A good CISO is able to build a good team to cover all major domain areas and all functional reqmts
  - Having a solid technical base, good CISOs are able to easily build a security competence layer on top of it
- **Governance domain knowledge:**
  - Working with regulators & compliance

- Policies & SOPs
- Frameworks & standards
- A passion for training & awareness
- A process oriented mindset to successfully build a strong InfoSec program
- Ability to balance people, process, and technology

- **Good people skills:**
  - A CISO requires good people management skills as the security transformation project is all about motivating, directing, and organizing people to achieve a focused goal
  - Personal discipline & commitment
- **Placement:**
  - Within
  - Within risk
  - Reporting to board committee

Topic No 203: Key Inhibitors For Security Program Failure

- There may be several inhibitors to achieving a successful security transformation project



- **Executive management:**
  - Allocates budget and approves resources

- Sets organizational priority & "tone at the top"
- Even if you start a program without executive management support, it may not last long
- Periodic reviews by executive management drive the execution in the IT organization
- Organizational priorities may change quickly if executive management does not sustain its commitment

- **Strategy & structure:**
  - A good or poor strategy & structure will make or break any project, in any discipline, in any organization
  - Addressing the needs and inter-linkages to make the entire machinery work in a streamlined manner

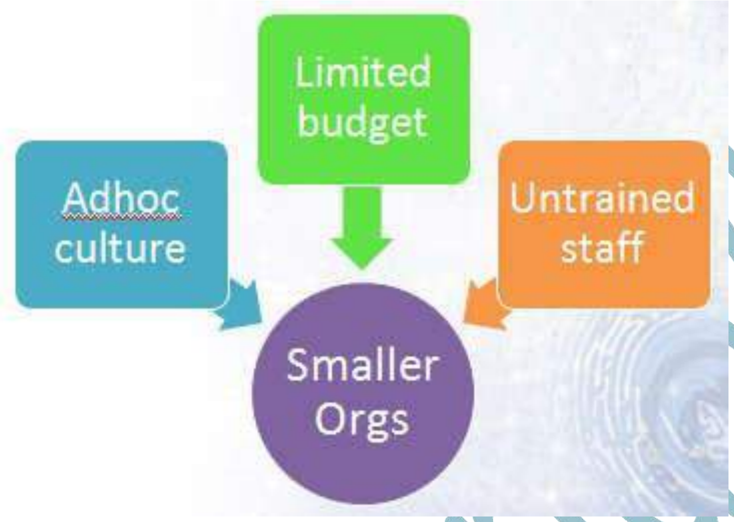
- Understanding roles of various stakeholders and taking them all along
  - Having sufficient experience to work at various levels of the organization

- **Execution:**
  - All information security projects boil down to strong execution & project management once leadership commitment and strategy/structure issues are addressed
  - Allocating tasks to run different phases in parallel & sequentially
  - Prioritizing tasks
  - Tracking progress
  - Reporting dashboards
  - Team/Steering Committee/Board presentations

- Failure of the Information Security program will be imminent if any one of these three elements (leadership, strategy/structure, execution) is not adequately addressed

Topic No 204: InfoSec Strategy For Smaller Organizations

- Smaller & newer organizations face unique challenges which may require a creative approach to implement a successful security transformation program



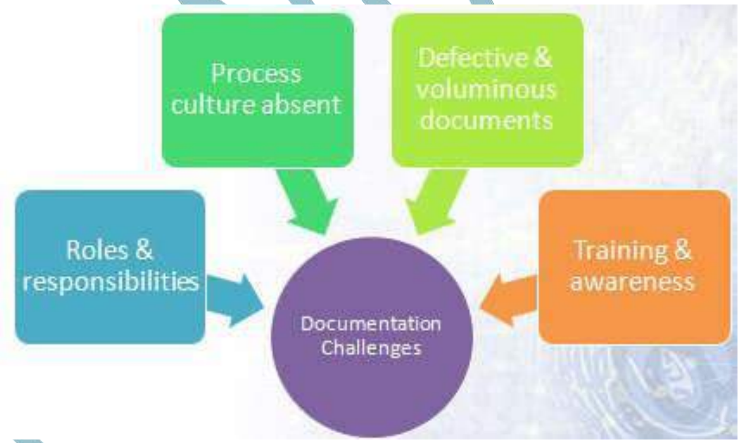
- **Limited budget:**
  - Limited priority with limited resources
  - Break up project into phases matching resource allocation & organizational bandwidth available
  - Limit scope to 1 location, department, team, or even to 1 application
  - Consider hiring one competent security or IT member in the team
  - Provide management support and periodic review
  - 12 to 15 months for security transformation

- **Untrained staff:**
  - Consider hiring a consultant
  - Train, incentivize, and motivate team
  - Give time to the team to adopt the security culture & processes
  - Periodic management reviews & corrective actions
- **Adhoc culture:**
  - Smaller & newer organizations may have a chaotic and adhoc culture
  - Lack of process approach

  - Resources not disciplined for consistent delivery
  - Rapidly changing focus and attention span
  - May be resolved with a good project leader or competent consultant
  - Training & setting organizational vision
- The leaders of small organizations are usually aware of their organizational capacity and limitations with experience
- Work with the organziational leadership to deploy competent project lead and team members

Topic No 205: Common Challenges: Security Documentation

- Common challenges with security governance documentation
- As we have seen in the previous modules, **policies, SOPs, checklists, guidelines, and records** are all important parts of the Information Security Management System (ISMS) and are based on documentation usually with an associated process



- **Process culture absent:**
  - Adhoc culture

    a corporate culture based on the ability to adapt quickly to changing conditions.
  - Rapidly changing priorities
  - Inhibits time & concentration required for documentation
  - Requires executive support to build process oriented culture
  - Requires business transformation as well as security transformation as the style in which the organization works needs to be addressed
  - New focus on quality, process, and assurance for results

long and detailed

- **Defective & voluminous documentation:**
  - Effective writing & documentation is a rare skill
  - No one likes to read long, winding, poorly structured documentation
  - No one likes to read
  -
  - Gradually build organizational appetite for documentation with extremely concise documents
  - Documentation has a close relationship with process culture and quality – is your organizational going after the right goals with balance?
- **Training & awareness:**
  - There may be a fear for documentation, and staff may be unaware or not possessing the skills or experience of documentation
  - Train and raise awareness in a friendly environment
  - Incentivize
  - Create working templates which are easily accessible on organizational portal
  - Create how-to videos & FAQs, etc
  - Invest in raising competence & skills of staff
- **Roles & responsibilities:**
  - Is right person working at the right place?
  - Do key people tasked with security governance & documentation has the right skills and experience to build documentation?
  - Are staffs aware of their responsibilities related to security governance documentation …policies, SOPs, checklists, etc?
  - Is documentation and process approach part of staff JDs & appraisal?

Topic No 206: Security Documentation: Policies

- **Policies**
- Standards
- Procedures

- Guidelines

Policies:

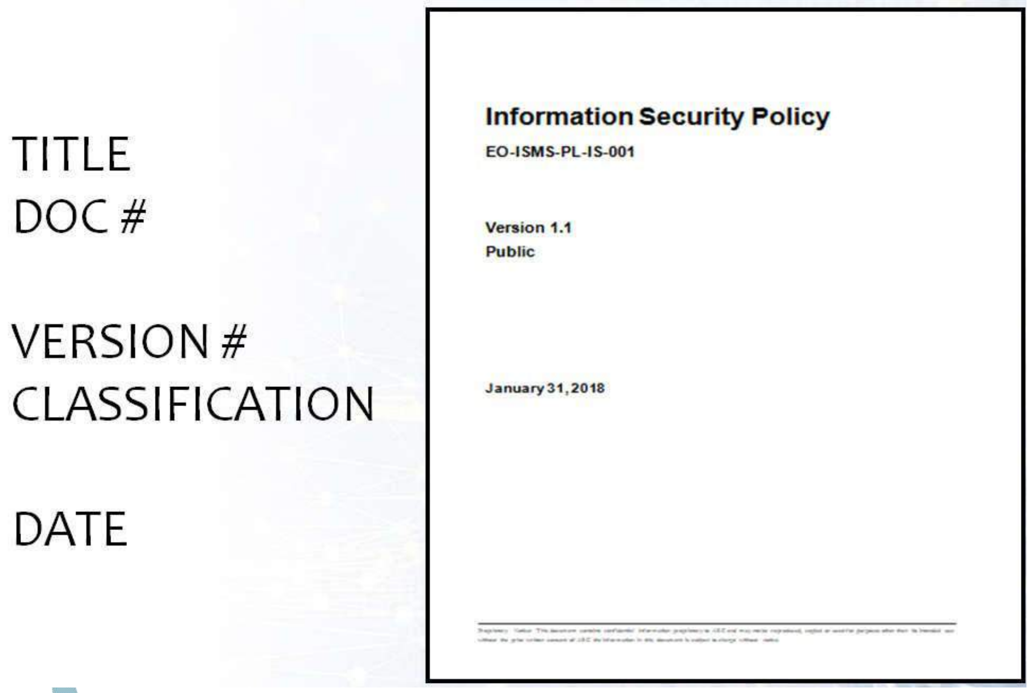
Policies are **formal statements produced and supported by senior management**. They can be organization-wide, issue-specific or system specific. Your organization's policies should reflect your objectives for your information security program.

Your policies should be like a building foundation; **built to last and resistant to change or** .

1. **Driven by business objectives** and convey the amount of risk senior management is willing

2. Easily accessible and understood by the intended reader

3. Created with the intent to be **in place for several years and regularly reviewed with approved changes** made as needed.


TITLE
DOC #
VERSION #
CLASSIFICATION
DATE

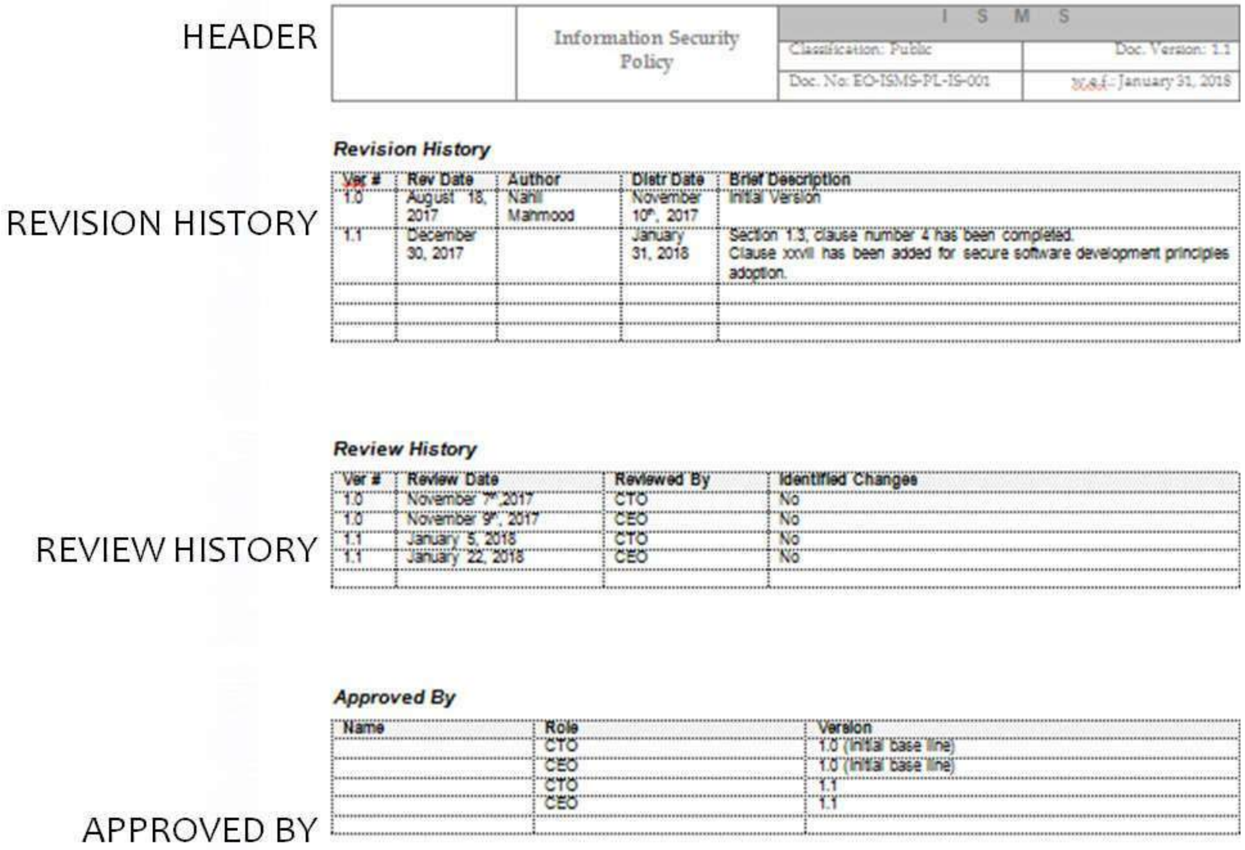
Information Security Policy

EO-ISMS-PL-IS-001

Version 1.1

Public

January 31, 2018


HEADER
REVISION HISTORY
REVIEW HISTORY
APPROVED BY

	Information Security Policy	I S M S	
		Classification: Public	Doc. Version: 1.1
		Doc. No: EO-ISMS-PL-IS-001	w.e.f.: January 31, 2018

Revision History

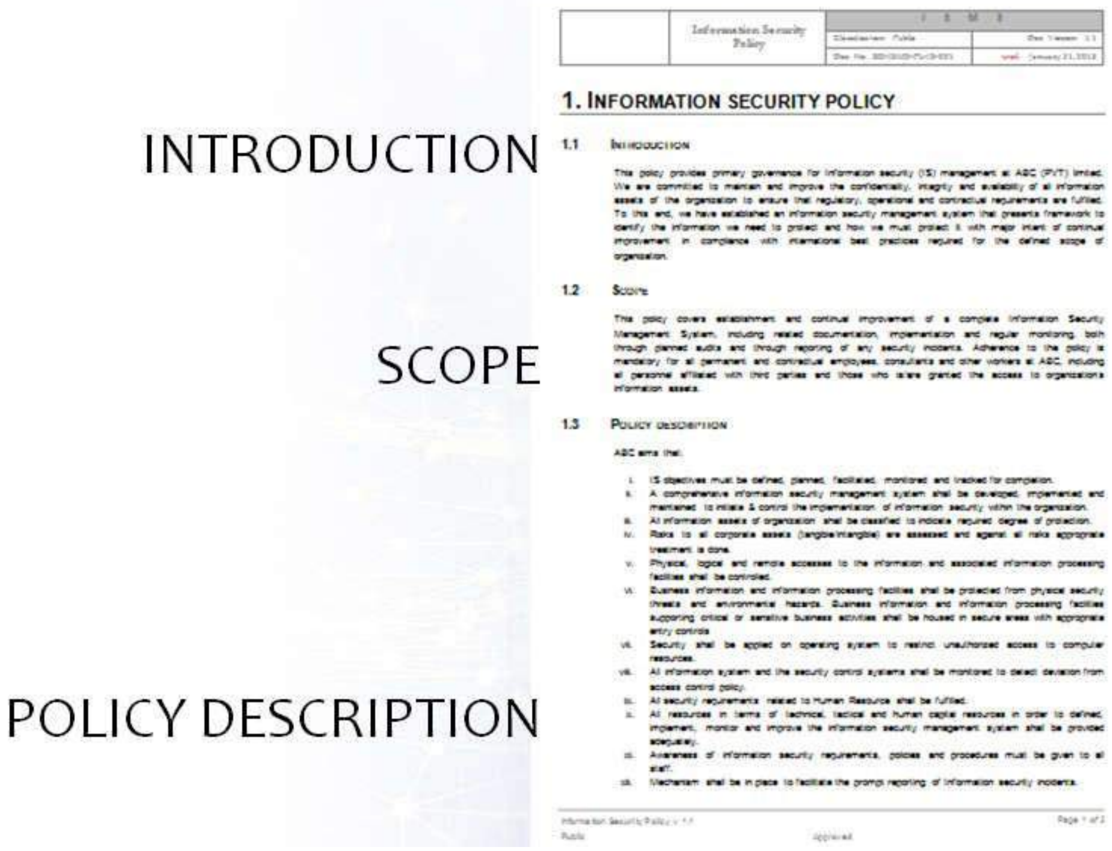
Ver #	Rev Date	Author	Distr Date	Brief Description
1.0	August 18, 2017	Nahil Mahmood	November 10th, 2017	Initial Version
1.1	December 30, 2017		January 31, 2018	Section 1.3, clause number 4 has been completed. Clause xxvii has been added for secure software development principles adoption.

Review History

Ver #	Review Date	Reviewed By	Identified Changes
1.0	November 7th 2017	CTO	No
1.0	November 9th, 2017	CEO	No
1.1	January 5, 2018	CTO	No
1.1	January 22, 2018	CEO	No

Approved By

Name	Role	Version
	CTO	1.0 (Initial base line)
	CEO	1.0 (Initial base line)
	CTO	1.1
	CEO	1.1



	Information Security Policy	I S M S	
		Classification: Public	Doc. Version: 1.1
		Doc. No: EO-ISMS-PL-IS-001	w.e.f.: January 31, 2018

1. INFORMATION SECURITY POLICY

1.1 INTRODUCTION

This policy provides primary governance for information security (IS) management at ABC (PVT) limited. We are committed to maintain and improve the confidentiality, integrity and availability of all information assets of the organization to ensure that regulatory, operational and contractual requirements are fulfilled. To this end, we have established an information security management system that presents framework to identify the information we need to protect and how we must protect it with major intent of continual improvement in compliance with international best practices required for the defined scope of organization.

1.2 SCOPE

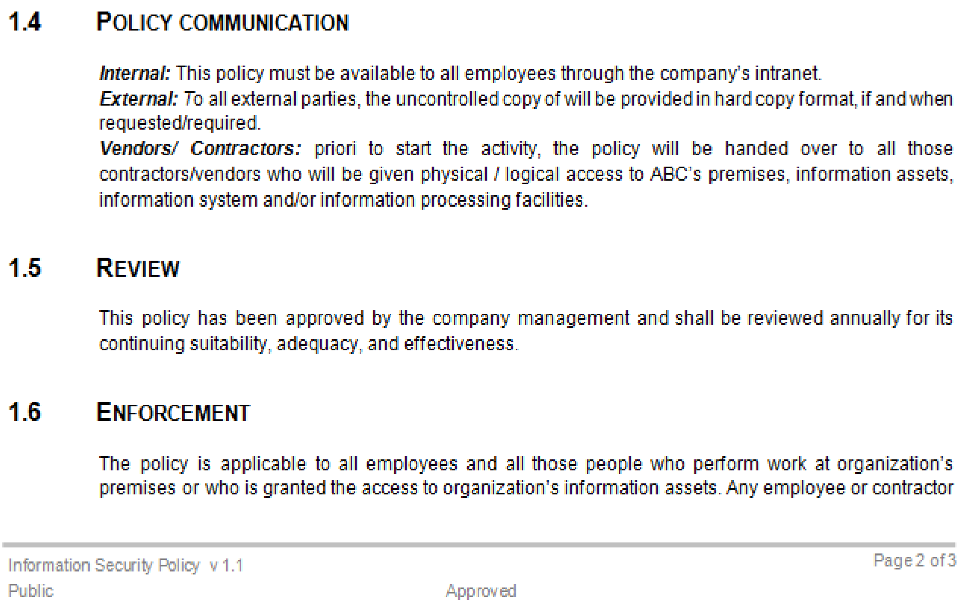
This policy covers establishment and continual improvement of a complete Information Security Management System, including related documentation, implementation and regular monitoring, both through planned audits and through reporting of any security incidents. Adherence to the policy is mandatory for all permanent and contractual employees, consultants and other workers at ABC, including all personnel affiliated with third parties and those who is/are granted the access to organization's information assets.

1.3 POLICY DESCRIPTION

ABC aims that:

i. IS objectives must be defined, planned, facilitated, monitored and tracked for completion.
ii. A comprehensive information security management system shall be developed, implemented and maintained to initiate & control the implementation of information security within the organization.
iii. All information assets of organization shall be classified to indicate required degree of protection.
iv. Risks to all corporate assets (tangible/intangible) are assessed and against all risks appropriate treatment is done.
v. Physical, logical and remote accesses to the information and associated information processing facilities shall be controlled.
vi. Business information and information processing facilities shall be protected from physical security threats and environmental hazards. Business information and information processing facilities supporting critical or sensitive business activities shall be housed in secure areas with appropriate entry controls.
vii. Security shall be applied on operating system to restrict unauthorized access to computer resources.
viii. All information system and the security control systems shall be monitored to detect deviation from access control policy.
ix. All security requirements related to Human Resource shall be fulfilled.
x. All resources in terms of technical, tactical and human capital resources in order to defined, implement, monitor and improve the information security management system shall be provided adequately.
xi. Awareness of information security requirements, policies and procedures must be given to all staff.
xii. Mechanism shall be in place to facilitate the prompt reporting of information security incidents.

Information Security Policy v 1.1 Page 1 of 2
Public Approved



1.4 POLICY COMMUNICATION

Internal: This policy must be available to all employees through the company's intranet.
External: To all external parties, the uncontrolled copy of will be provided in hard copy format, if and when requested/required.
Vendors/ Contractors: priori to start the activity, the policy will be handed over to all those contractors/vendors who will be given physical / logical access to ABC's premises, information assets, information system and/or information processing facilities.

1.5 REVIEW

This policy has been approved by the company management and shall be reviewed annually for its continuing suitability, adequacy, and effectiveness.

1.6 ENFORCEMENT

The policy is applicable to all employees and all those people who perform work at organization's premises or who is granted the access to organization's information assets. Any employee or contractor

Information Security Policy v 1.1 Page 2 of 3
Public Approved

Topic No 207: Security Documentation: Standards

- Policies
- **Standards**
- Procedures
- Guidelines

Standards

Standards are **mandatory actions or rules** that give formal policies support and direction. One of the more difficult parts of writing standards for an information security program is getting a company-wide consensus on what standards need to be in place.

This can be a time-consuming process but is vital to the success of your information security program.

1. Used to indicate expected user behavior. For example, a consistent company email signature.
2. Might specify what hardware and software solutions are available and supported.
3. Compulsory and must be enforced to be effective. (This also applies to policies!)

Topic No 208: Security Documentation: Procedures

- Policies
- Standards
- Procedures
- Guidelines

Procedures

Procedures are detailed step by step instructions to achieve a given goal or mandate. They are typically intended for internal departments and should adhere to strict change control processes.

Procedures can be developed as you go. If this is the route your organization chooses to take it’s necessary to have comprehensive and consistent documentation of the procedures that you are developing.

collection of, instructions, and information

1. Often act as the “cookbook” for staff to consult to accomplish a repeatable process.
2. Detailed enough and yet not too difficult that only a small group (or a single person) will understand.
3. Installing operating systems, performing a system backup, granting access rights to a system and setting up new user accounts are all example of procedures.

Topic No 209: Security Documentation: Guidelines

- Policies
- Standards
- Procedures
- **Guidelines**

Guidelines

Guidelines are recommendations to users when specific standards do not apply. Guidelines are designed to streamline certain processes according to what the best practices are.

Guidelines, by nature, should be open to interpretation and do not need to be followed to the letter.

1. Are more general vs. specific rules.
2. Provide flexibility for unforeseen circumstances.
3. Should NOT be confused with formal policy statements.

Topic No 210: How to Develop Effective Security Policies

6 Steps To Security Policy Excellence

Purpose Of Policies & Procedures

- Policies and procedures establish **guidelines to behavior and business processes** in accordance with an organization's strategic objectives. While typically developed in response to legal and regulatory requirements, their primary purpose should be to convey accumulated wisdom on how best to get things done in a **risk-free, efficient and compliant way.**

Policy Pitfalls an unexpected negative outcome

1. Poorly worded policies
2. Badly structured policies
3. Out-of-date policies
4. Inadequately communicated policies
5. Unenforced policies
6. Lack of management scrutiny

Six Steps:

1. **Create & Review**

Documents must be written using language that is appropriate for the target audience and should spell out the consequences of non-compliance. Smaller, more manageable documents are easier for an organization to review and update, while also being more palatable for the intended recipients.

2. Distribute

Organizations need to effectively distribute policies, both new and updated, in a timely and efficient manner. These need to be consistently enforced across an organization.

3. Achieve Consent

A process needs to be implemented that monitors users' response to policies. Policy distribution should be prioritized, ensuring that higher risk policies are signed off earlier by users than other lower risk documents.

For example, an organization may want to ensure that a user signs up to their Information Governance policy on the first day that they start employment, whilst having up to two weeks to sign up to the Travel & Expense Policy.

Systems need to in place to grant a user two weeks to process a particular document, after which the system should automatically force the user to process it.

4. Understanding

Any areas that show weaknesses can be identified and corrected accordingly. Additional training or guidance may be necessary or, if it's the policy that is causing confusion, it can be reworded or simplified.

5. Auditability

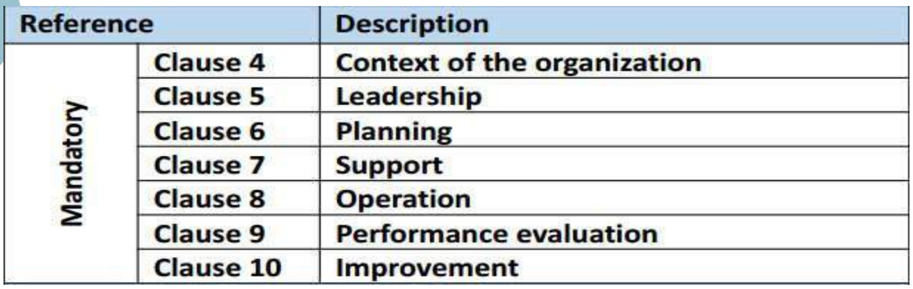
The full revision history of all documents needs to be maintained as well as who has read what, when & if possible, how long it took; who declined a policy and why. This record should be stored for future reference & may be stored in conjunction with test results.

6. Reporting

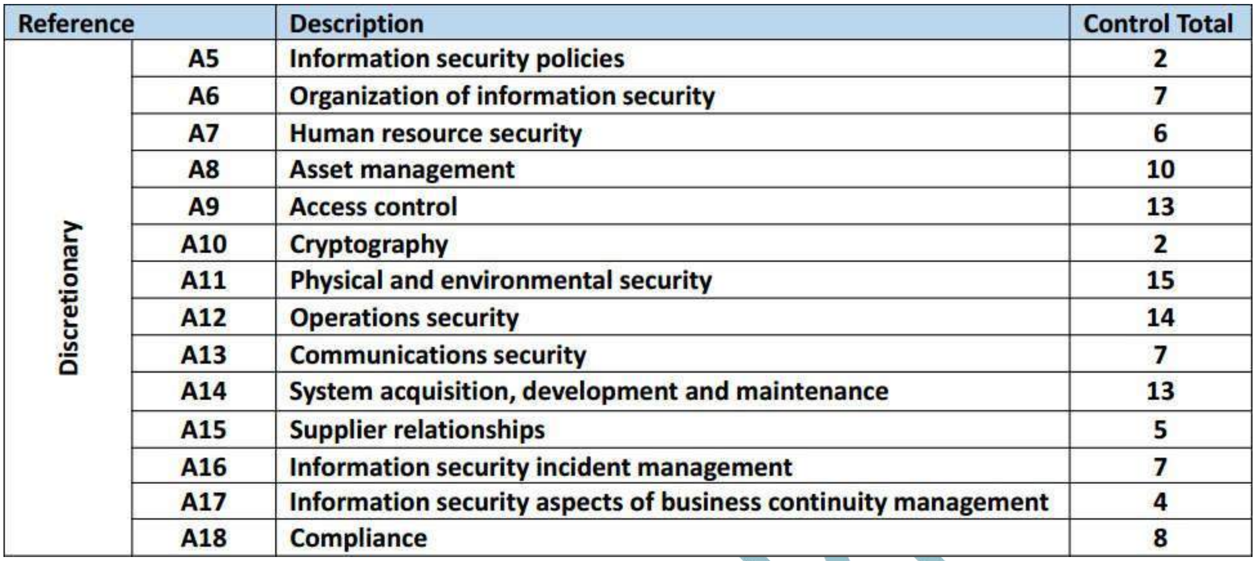
To affect change and improve compliance it helps if key performance indicators relating to policy uptake are clearly visible across all levels of an enterprise. Dashboard visibility of policy uptake compliance by geographical or functional business units helps to consolidate information and highlights exceptions.

Topic No 211: ISMS: Leading InfoSec Governance Framework

- ISO27001:2013 (ISMS)
  - Specifies the requirements for establishing, implementing, maintaining and continually improving an information security management system
  -
  - Long annex



Reference		Description
Mandatory	Clause 4	Context of the organization
	Clause 5	Leadership
	Clause 6	Planning
	Clause 7	Support
	Clause 8	Operation
	Clause 9	Performance evaluation
	Clause 10	Improvement



Reference		Description	Control Total
Discretionary	A5	Information security policies	2
	A6	Organization of information security	7
	A7	Human resource security	6
	A8	Asset management	10
	A9	Access control	13
	A10	Cryptography	2
	A11	Physical and environmental security	15
	A12	Operations security	14
	A13	Communications security	7
	A14	System acquisition, development and maintenance	13
	A15	Supplier relationships	5
	A16	Information security incident management	7
	A17	Information security aspects of business continuity management	4
	A18	Compliance	8

Merits of ISO27001:2013 (ISMS):

- Exceptional framework with comprehensive coverage of mandatory requirements (clauses 4-10) and discretionary controls (annex)
- Highly beneficial as a framework for security program
-
- Provides a structure and organized sequence for security controls
- Complements security transformation model as serves as a reference and guideline for activities and controls
- Very broad
- Generic framework – leaves it to organization how to implement the measures and
- Not suited for orgs that are new to security program

How to best use advantages of ISO27001:2013 (ISMS):

- Implement security transformational model
- Cap off security transformation project with ISO27001:2013 (ISMS) certification
- ISMS as a complementary reference and checklist rather than main framework

Topic No 212: Clauses 4-6 Of ISO27001:2013 (ISMS)

- **4: Context:**
  - Understanding org and its context; internal and external issues relevant to its purpose and that affect its ability to achieve intended outcomes of ISMS
  - Needs and expectations of interested parties (e.g. legal and regulatory reqmts and contractual obligations)
  - Scope (boundaries); interfaces and dependencies
- **5: Leadership & Commitment**
  - Policy & objectives are established and are compatible with strategic direction of
  - Integrating ISMS into org processes
  - Resources for ISMS available
  - Communicating importance
  - Ensuring ISMS achieves intended outcomes
  - Directing & supporting persons
  - Promoting continual improvement
  - Assign and communicate roles, responsibilities & authorities
- **6: Planning**
  - Address org risks & opportunities & prevent or reduce undesired effects
  -
  - Identify, analyze, evaluate risks
  - Ensure
  - Ensure information security objectives are measurable, communicated
  - For objectives determine what will be done, what resources reqd, who will be responsible, when completed, how to evaluate results

Topic No 213: Clauses 7-10 Of ISO27001:2013 (ISMS)

Lets have a look at clauses 7-10

- **7: Support**
  - Org shall provide the resources necessary for the establishment, implementation, maintenance and continual improvement of the ISMS
  - Ensure competence of staff for the ISMS
  - Awareness related to the policy and ISMS will be ensured among staff
  - Communication mechanisms related to ISMS internal and external to the org
  - Documentation with appropriate identification, description, format, review & approval mechanism
  - Documentation change control, protection, distribution, retention, & disposal
- **8: Operations**
  - Plan, implement, and control processes
  - Control planned changes
  - Outsourced processes controlled
  - and
- **9: Performance Evaluation**
  - Monitoring, measurement, analysis, and evaluation
  - What needs to be monitored, methods, who will monitor, when to monitor, who shall analyze and evaluate results?
  - Internal audit implemented at planned intervals
  - Define audit criteria and scope for each audit
  - Reporting of auditing results
  - Retain auditing docs

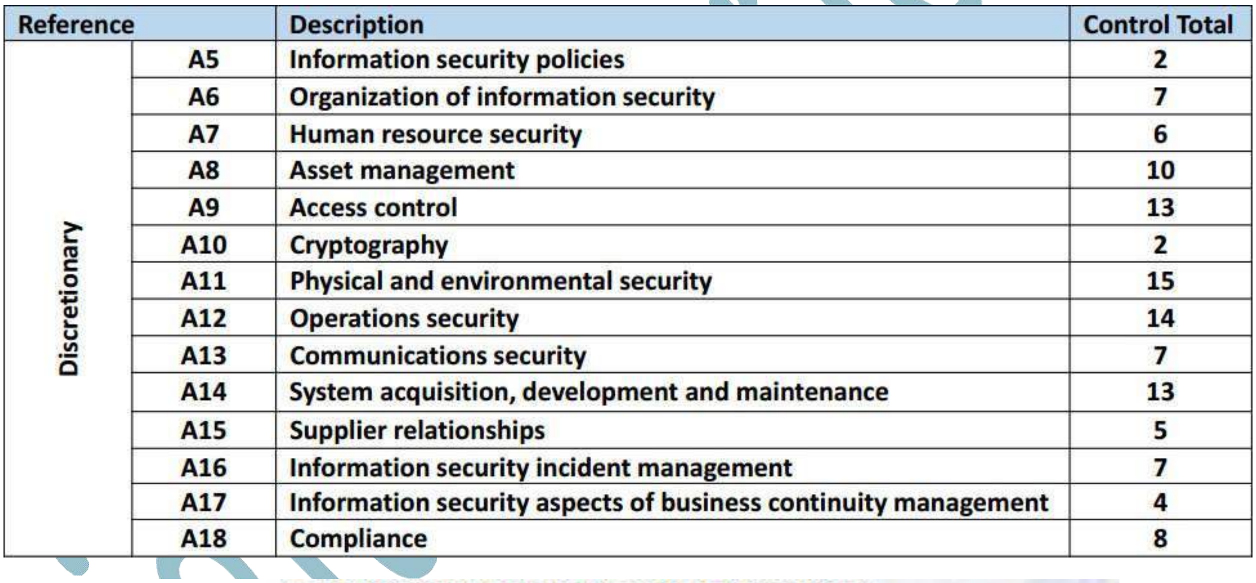
  - Internal audit implemented at planned intervals
  - Define audit criteria and scope for each audit
  - Reporting of auditing results
  - Retain auditing docs

- Planned intervals
- Status of actions
- Changes in external and internal environment
- Review non-conformities and corrective actions, monitoring & measurement results, audit reports, other

- **10: Improvement**
  - Non-conformities and corrective actions
  - Continual improvement

Topic No 214: ISO27001:2013 Controls Appendix; Part 1

- Lets have a look at the ISO27001:2013 (ISMS) controls (appendix) in more detail



Reference		Description	Control Total
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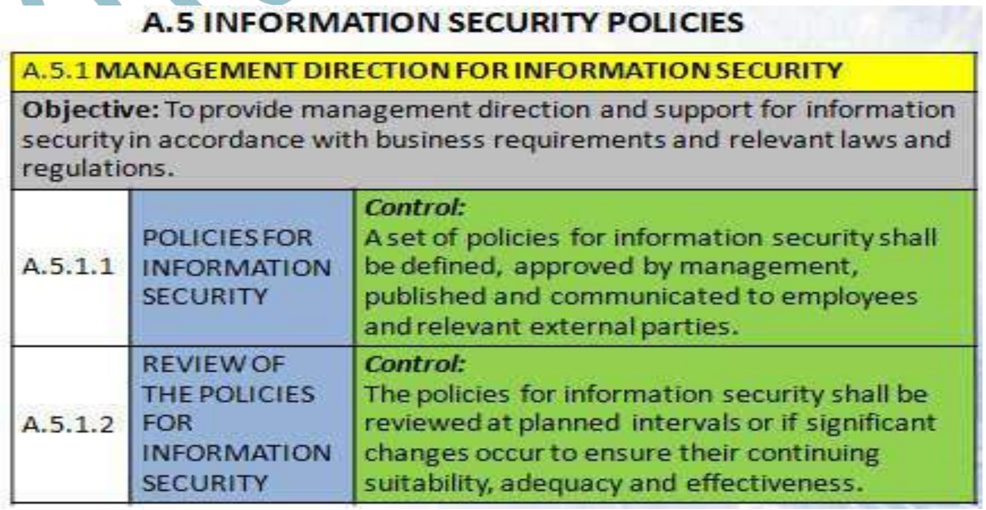
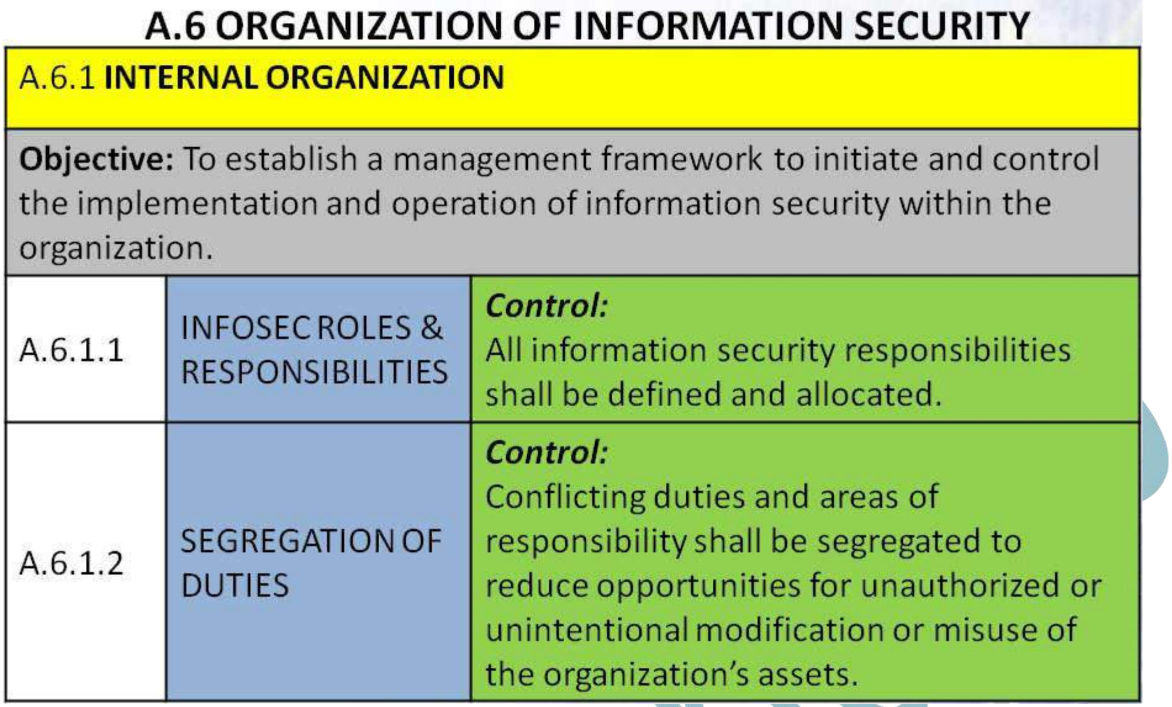


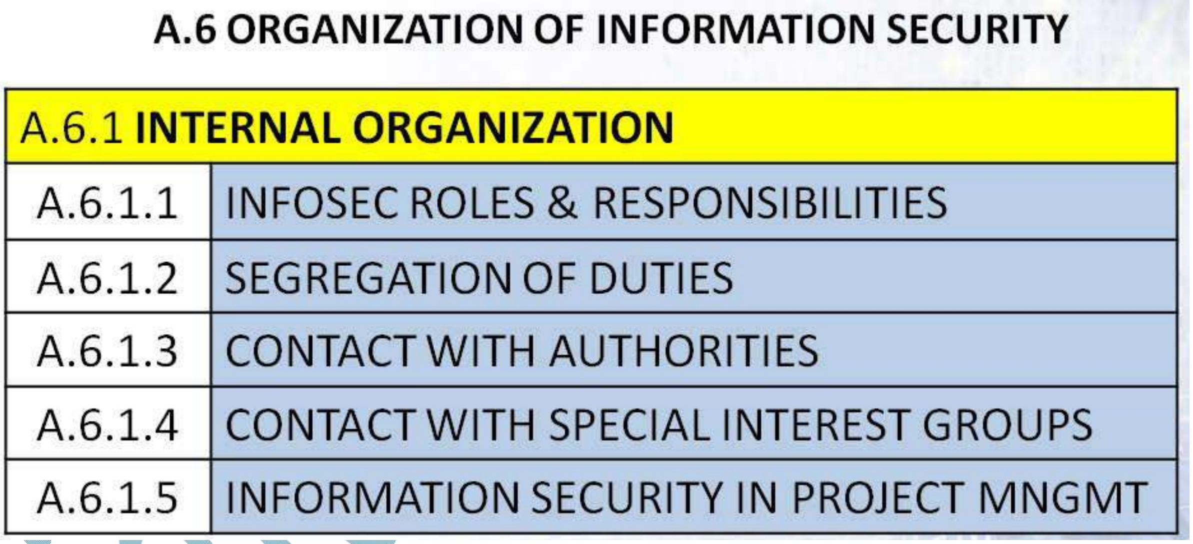
A.5 INFORMATION SECURITY POLICIES

A.5.1 MANAGEMENT DIRECTION FOR INFORMATION SECURITY		
Objective: To provide management direction and support for information security in accordance with business requirements and relevant laws and regulations.		
A.5.1.1	POLICIES FOR INFORMATION SECURITY	***Control:*** A set of policies for information security shall be defined, approved by management, published and communicated to employees and relevant external parties.
A.5.1.2	REVIEW OF THE POLICIES FOR INFORMATION SECURITY	***Control:*** The policies for information security shall be reviewed at planned intervals or if significant changes occur to ensure their continuing suitability, adequacy and effectiveness.



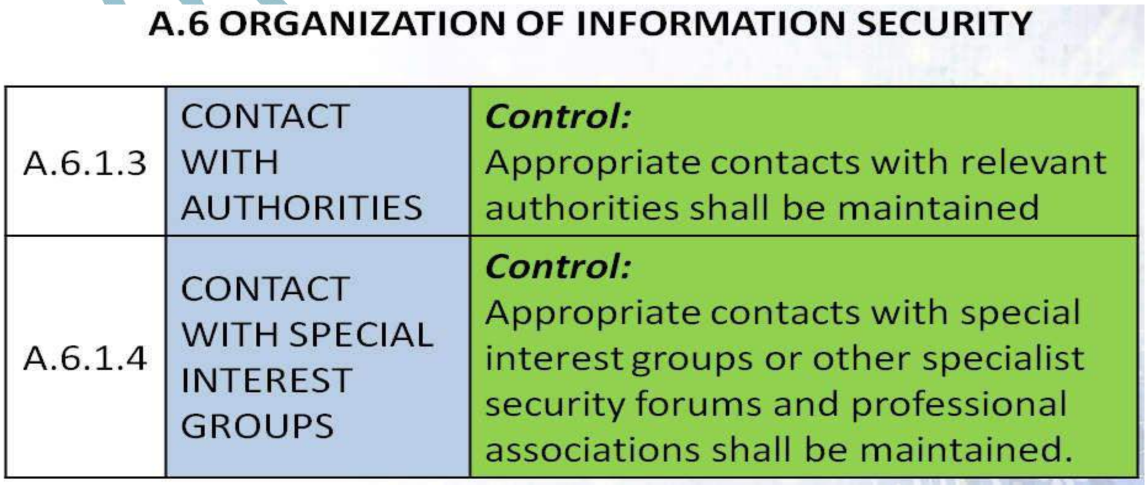
A.6 ORGANIZATION OF INFORMATION SECURITY

A.6.1 **INTERNAL ORGANIZATION**		
Objective: To establish a management framework to initiate and control the implementation and operation of information security within the organization.		
A.6.1.1	INFOSEC ROLES & RESPONSIBILITIES	***Control:*** All information security responsibilities shall be defined and allocated.
A.6.1.2	SEGREGATION OF DUTIES	***Control:*** Conflicting duties and areas of responsibility shall be segregated to reduce opportunities for unauthorized or unintentional modification or misuse of the organization's assets.



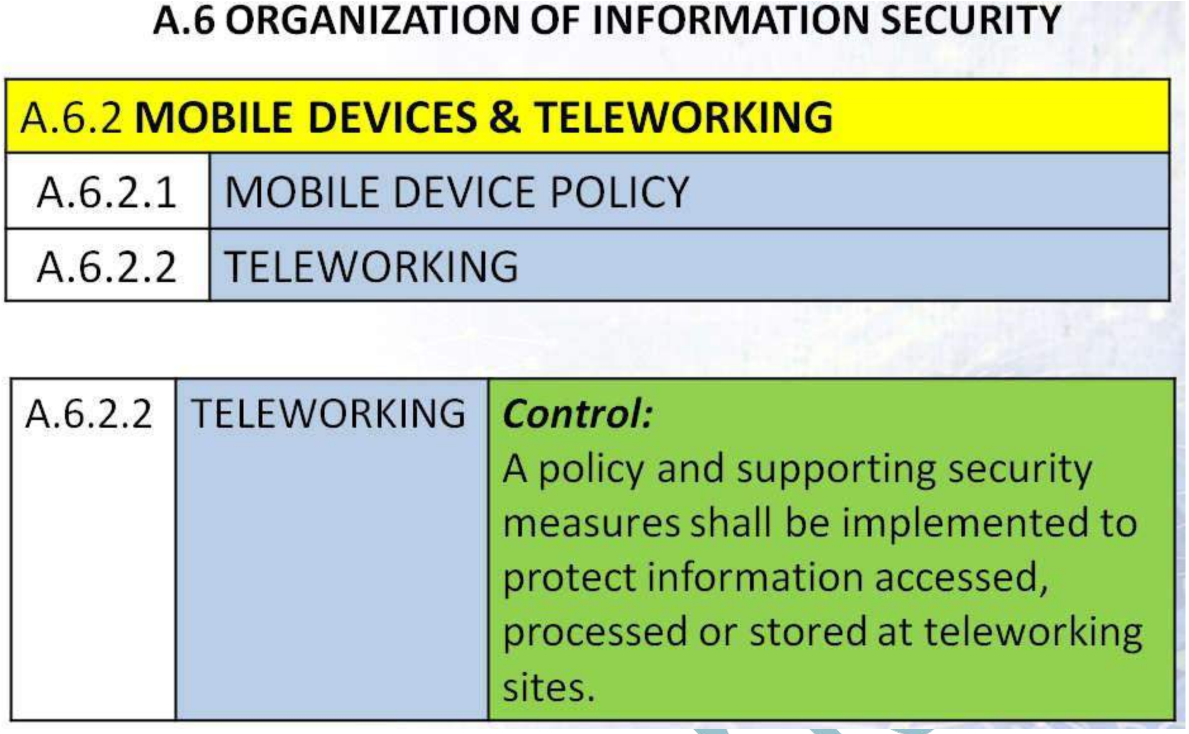
A.6 ORGANIZATION OF INFORMATION SECURITY

A.6.1 **INTERNAL ORGANIZATION**	
A.6.1.1	INFOSEC ROLES & RESPONSIBILITIES
A.6.1.2	SEGREGATION OF DUTIES
A.6.1.3	CONTACT WITH AUTHORITIES
A.6.1.4	CONTACT WITH SPECIAL INTEREST GROUPS
A.6.1.5	INFORMATION SECURITY IN PROJECT MNGMT



A.6 ORGANIZATION OF INFORMATION SECURITY

A.6.1.3	CONTACT WITH AUTHORITIES	***Control:*** Appropriate contacts with relevant authorities shall be maintained
A.6.1.4	CONTACT WITH SPECIAL INTEREST GROUPS	***Control:*** Appropriate contacts with special interest groups or other specialist security forums and professional associations shall be maintained.

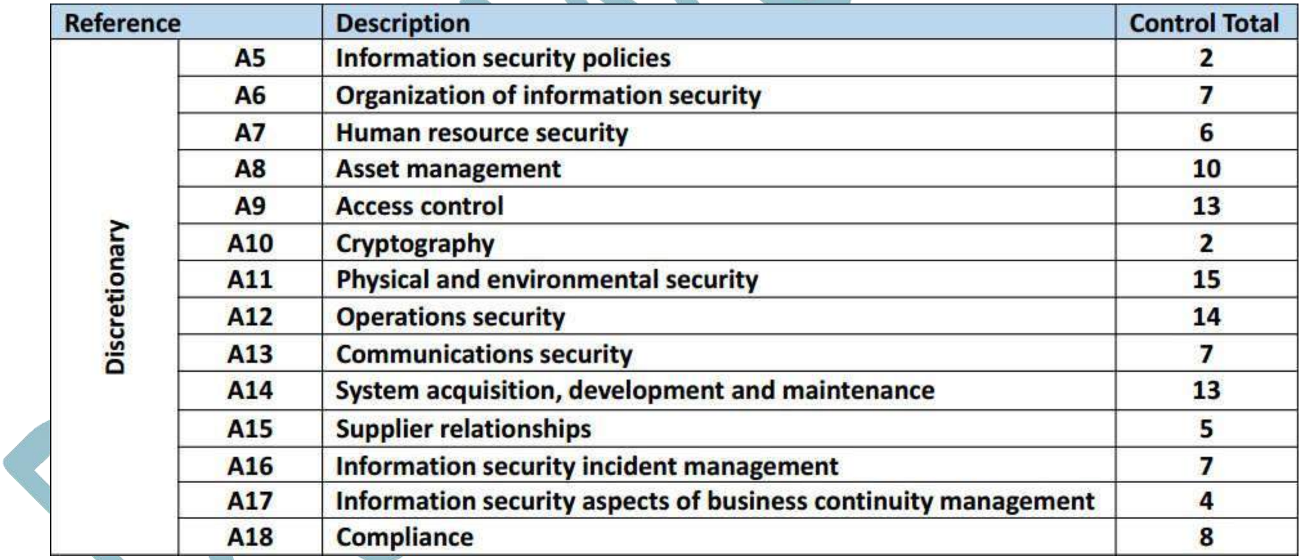


A.6 ORGANIZATION OF INFORMATION SECURITY

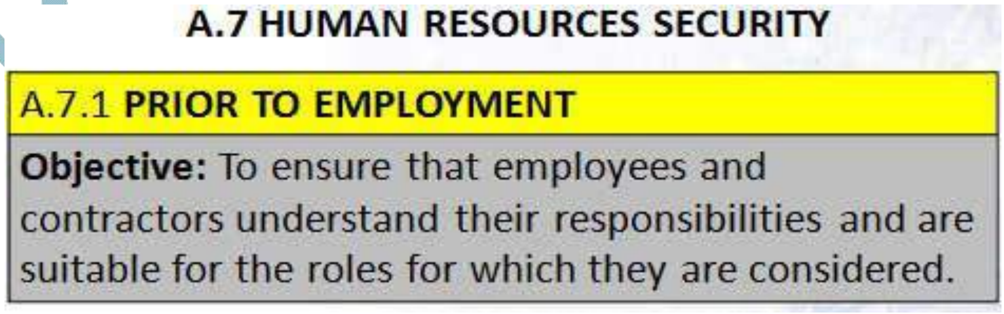
A.6.2 MOBILE DEVICES & TELEWORKING	
A.6.2.1	MOBILE DEVICE POLICY
A.6.2.2	TELEWORKING

A.6.2.2	TELEWORKING	***Control:*** A policy and supporting security measures shall be implemented to protect information accessed, processed or stored at teleworking sites.

Topic No 215: ISO27001:2013 Controls Appendix; Part 2



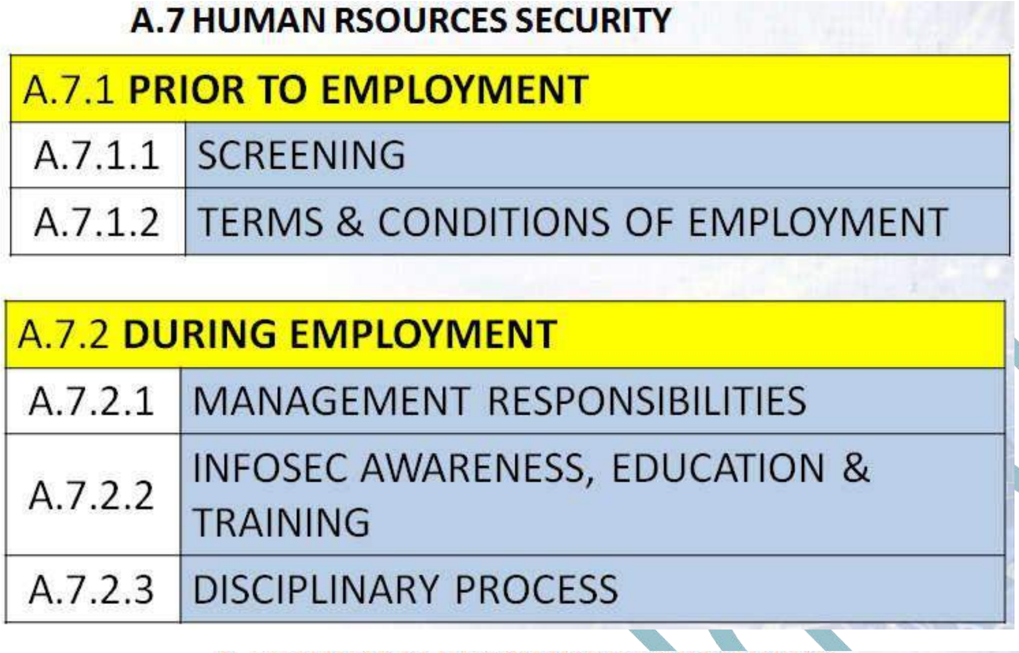
Reference		Description	Control Total
Discretionary	A5	Information security policies	2
	A6	Organization of information security	7
	A7	Human resource security	6
	A8	Asset management	10
	A9	Access control	13
	A10	Cryptography	2
	A11	Physical and environmental security	15
	A12	Operations security	14
	A13	Communications security	7
	A14	System acquisition, development and maintenance	13
	A15	Supplier relationships	5
	A16	Information security incident management	7
	A17	Information security aspects of business continuity management	4
	A18	Compliance	8



A.7 HUMAN RESOURCES SECURITY

A.7.1 **PRIOR TO EMPLOYMENT**

Objective: To ensure that employees and contractors understand their responsibilities and are suitable for the roles for which they are considered.



A.7 HUMAN RSOURCES SECURITY

A.7.1 PRIOR TO EMPLOYMENT	
A.7.1.1	SCREENING
A.7.1.2	TERMS & CONDITIONS OF EMPLOYMENT

A.7.2 DURING EMPLOYMENT	
A.7.2.1	MANAGEMENT RESPONSIBILITIES
A.7.2.2	INFOSEC AWARENESS, EDUCATION & TRAINING
A.7.2.3	DISCIPLINARY PROCESS

A.7 HUMAN RESOURCES SECURITY

A.7.1.1	**SCREENING**	***Control:*** Background verification checks on all candidates for employment shall be carried out in accordance with relevant laws, regulations & ethics and shall be proportional to the business requirements, the classification of the information to be accessed and the perceived risks.
A.7.1.2	**TERMS & CONDITIONS OF EMPLOYMENT**	***Control:*** The contractual agreements with employees and contractors shall state their and the organization's responsibilities for information security.

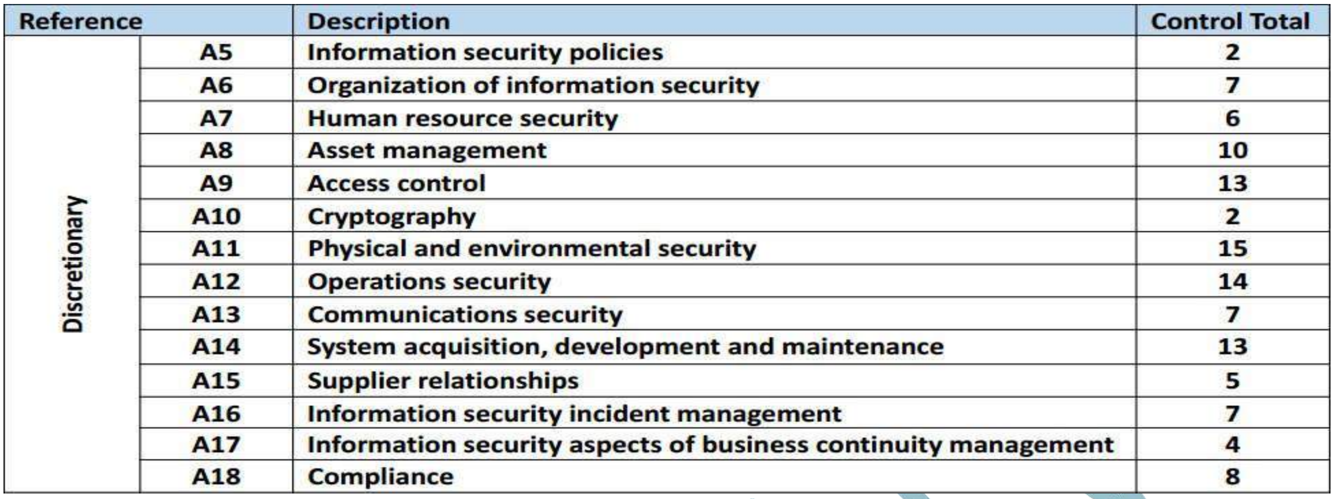
A.7.2 **DURING EMPLOYMENT**	
A.7.2.1	MANAGEMENT RESPONSIBILITIES
A.7.2.2	INFOSEC AWARENESS, EDUCATION & TRAINING
A.7.2.3	DISCIPLINARY PROCESS

A.7.2.1	**MANAGEMENT RESPONSIBILITIES**	**Control:** Management shall require all employees and contractors to apply information security in accordance with the established policies and procedures of the organization.
A.7.1.2	**TERMS & CONDITIONS OF EMPLOYMENT**	***Control:*** The contractual agreements with employees and contractors shall state their and the organization's responsibilities for information security.

A.7.3 **TERMINATION & CHANGE OF EMPLOYMENT**	
A.7.3.1	TERMINATION OR CHANGE OF EMPLOYMENT RESONSIBILITIES

A.7.3.1	**TERMINATION OR CHANGE OF EMPLOYMENT RESONSIBILITIES**	***Control:*** Information security responsibilities and duties that [illegible] or change of employment shall be defined, communicated to the employee or contractor and enforced

Topic No 216: ISO27001:2013 Controls Appendix; Part 3



Reference		Description	Control Total
Discretionary	A5	Information security policies	2
	A6	Organization of information security	7
	A7	Human resource security	6
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	A12	Operations security	14
	A13	Communications security	7
	A14	System acquisition, development and maintenance	13
	A15	Supplier relationships	5
	A16	Information security incident management	7
	A17	Information security aspects of business continuity management	4
	A18	Compliance	8

A.8.1 **RESPONSIBILITY FOR ASSETS**	
A.8.1.1	INVENTORY OF ASSETS
A.8.1.2	OWNERSHIP OF ASSETS
A.8.1.3	ACCEPTABLE USE OF ASSETS
A.8.1.4	RETURN OF ASSETS

A.8.1.1	**INVENTORY OF ASSETS**	***Control:*** associated with information and information processing facilities shall be identified and an inventory of these assets shall be drawn up and maintained.
A.8.1.3	**ACCEPTABLE USE OF ASSETS**	***Control:*** Rules for the acceptable use of information and of assets associated with information and information processing facilities shall be identified, documented and implemented.

A.8.2 **INFORMATION CLASSIFICATION**	
A.8.2.1	CLASSIFICATION OF INFORMATION
A.8.2.2	LABELLING OF INFORMATION

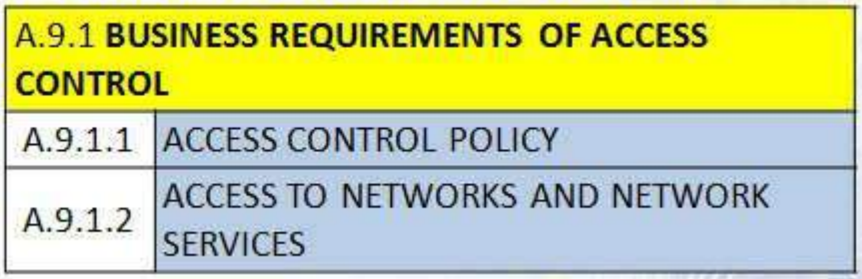
A.8.2.3	HANDLING OF ASSETS

A.8.2.1	**CLASSIFICATION OF INFORMATION**	***Control:*** Information shall be [illegible] legal requirements, value, criticality and sensitivity to unauthorized disclosure or [illegible]
A.8.2.3	**HANDLING OF ASSETS**	***Control:*** Procedures for handling assets shall be developed and implemented in accordance with the [illegible] classification scheme adopted by the organization.

A.8.3 **MEDIA HANDLING**	
A.8.3.1	MANAGEMENT OF REMOVABLE MEDIA
A.8.3.2	DISPOSAL OF MEDIA
A.8.3.3	PHYSICAL MEDIA TRANSFER

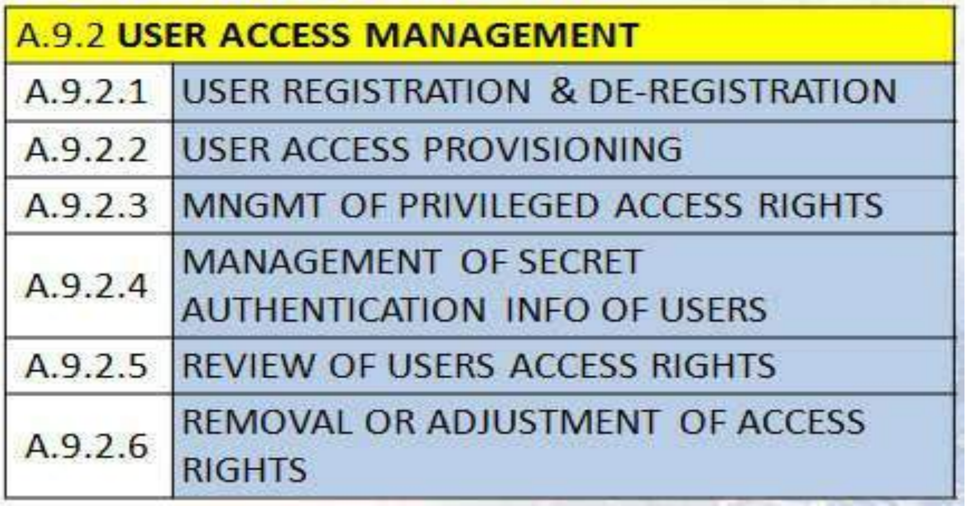
A.8.3.1	**MANAGEMENT OF REMOVABLE MEDIA**	***Control:*** Procedures shall be implemented for the management of removable Media in accordance with the classification scheme adopted by the Organization.
A.8.3.3	**PHYSICAL MEDIA TRANSFER**	***Control:*** Media containing information shall be protected against unauthorized access, misuse or corruption during transportation

Topic No 217: ISO27001:2013 Controls Appendix; Part 4



A.9.1 BUSINESS REQUIREMENTS OF ACCESS CONTROL	
A.9.1.1	ACCESS CONTROL POLICY
A.9.1.2	ACCESS TO NETWORKS AND NETWORK SERVICES

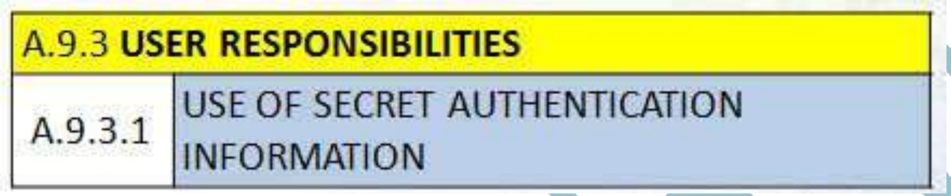
A.9.1.2	**ACCESS TO NETWORKS & NETWORK SERVICES**	***Control:*** Users shall only be provided with access to the network and network services that they have been specifically authorized to use.



A.9.2 USER ACCESS MANAGEMENT	
A.9.2.1	USER REGISTRATION & DE-REGISTRATION
A.9.2.2	USER ACCESS PROVISIONING
A.9.2.3	MNGMT OF PRIVILEGED ACCESS RIGHTS
A.9.2.4	MANAGEMENT OF SECRET AUTHENTICATION INFO OF USERS
A.9.2.5	REVIEW OF USERS ACCESS RIGHTS
A.9.2.6	REMOVAL OR ADJUSTMENT OF ACCESS RIGHTS

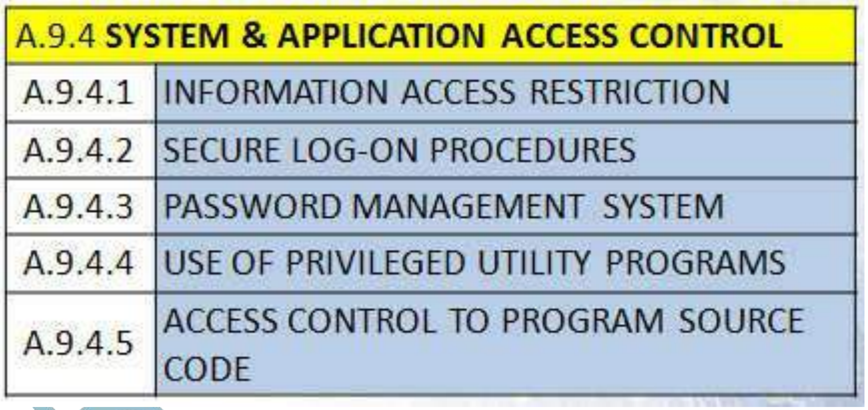
A.9.2.3	**MANAGEMENT OF PRIVILEGED ACCESS RIGHTS**	***Control:*** The allocation and use of privileged access rights shall be restricted and controlled.
A.9.2.5	**REVIEW OF USER ACCESS RIGHTS**	***Control:*** Asset owners shall review users' access rights at regular intervals.

A.9.2.6	**REMOVAL OR ADJUSTMENT OF ACCESS RIGHTS**	***Control:*** Access rights of all employees and external party users to info & info processing facilities shall be removed upon termination of their employment, contract or agreement, or adjusted upon change.



A.9.3 **USER RESPONSIBILITIES**	
A.9.3.1	USE OF SECRET AUTHENTICATION INFORMATION

A.9.3.1	**USE OF SECRET AUTHENTICATION INFORMATION**	***Control:*** Users shall be required to follow the organization's practices in the use of secret authentication information.

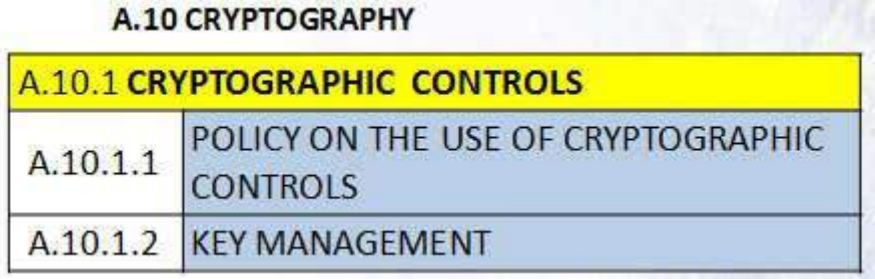


A.9.4 **SYSTEM & APPLICATION ACCESS CONTROL**	
A.9.4.1	INFORMATION ACCESS RESTRICTION
A.9.4.2	SECURE LOG-ON PROCEDURES
A.9.4.3	PASSWORD MANAGEMENT SYSTEM
A.9.4.4	USE OF PRIVILEGED UTILITY PROGRAMS
A.9.4.5	ACCESS CONTROL TO PROGRAM SOURCE CODE

A.9.4.3	**PASSWORD MANAGEMENT SYSTEM**	***Control:*** Password management systems shall be interactive and shall ensure quality passwords.
A.9.4.5	**ACCESS CONTROL TO PROGRAM SOURCE CODE**	***Control:*** Access to program source code shall be restricted.

Topic No 218: ISO27001:2013 Controls Appendix; Part 5

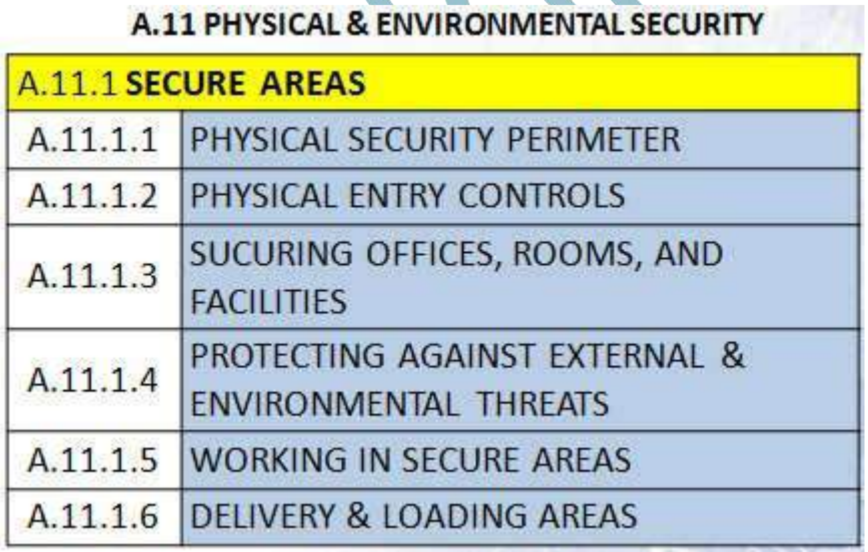
In this module lets look at ISO27001:2013 (ISMS) related to cryptography, and physical & environmental security.



A.10 CRYPTOGRAPHY

A.10.1	CRYPTOGRAPHIC CONTROLS
A.10.1.1	POLICY ON THE USE OF CRYPTOGRAPHIC CONTROLS
A.10.1.2	KEY MANAGEMENT

A.10.1.2	**KEY MANAGEMENT**	***Control:*** A policy on the use, protection and lifetime of cryptographic keys shall be developed and implemented through their whole lifecycle.

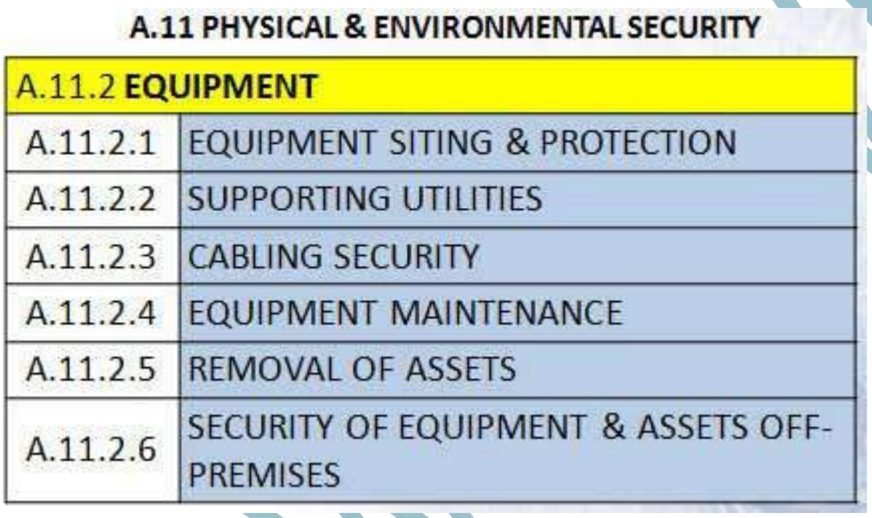


A.11 PHYSICAL & ENVIRONMENTAL SECURITY

A.11.1	SECURE AREAS
A.11.1.1	PHYSICAL SECURITY PERIMETER
A.11.1.2	PHYSICAL ENTRY CONTROLS
A.11.1.3	SUCURING OFFICES, ROOMS, AND FACILITIES
A.11.1.4	PROTECTING AGAINST EXTERNAL & ENVIRONMENTAL THREATS
A.11.1.5	WORKING IN SECURE AREAS
A.11.1.6	DELIVERY & LOADING AREAS

A.11.1.1	**PHYSICAL SECURITY PERIMETER**	***Control:*** Security perimeters shall be defined and used to protect areas that contain either sensitive or critical info & information processing facilities.
A.11.1.2	**PHYSICAL ENTRY CONTROLS**	***Control:*** Secure areas shall be protected by appropriate entry controls to Ensure that

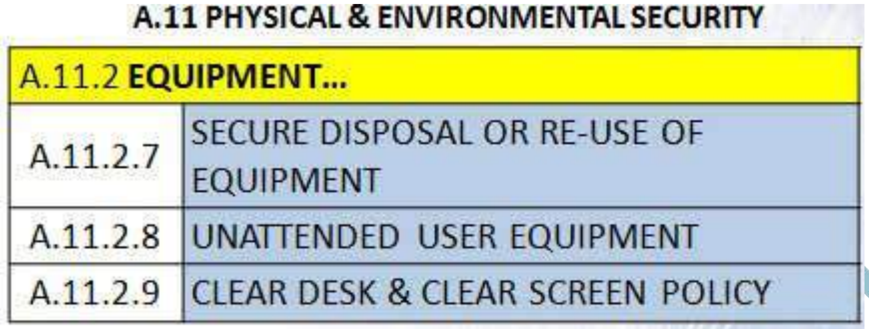
		only authorized personnel are allowed access.
A.11.1.5	**WORKING IN SECURE AREAS**	***Control:*** Procedures for working in secure areas shall be designed and applied.



A.11 PHYSICAL & ENVIRONMENTAL SECURITY

A.11.2 **EQUIPMENT**	
A.11.2.1	EQUIPMENT SITING & PROTECTION
A.11.2.2	SUPPORTING UTILITIES
A.11.2.3	CABLING SECURITY
A.11.2.4	EQUIPMENT MAINTENANCE
A.11.2.5	REMOVAL OF ASSETS
A.11.2.6	SECURITY OF EQUIPMENT & ASSETS OFF-PREMISES

A.11.2.2	**SUPPORTING UTILITIES**	***Control:*** Equipment shall be protected from power failures and other disruptions caused by failures in supporting utilities.
A.11.2.4	**EQUIPMENT MAINTENANCE**	***Control:*** Equipment shall be correctly maintained to ensure its continued availability and integrity.

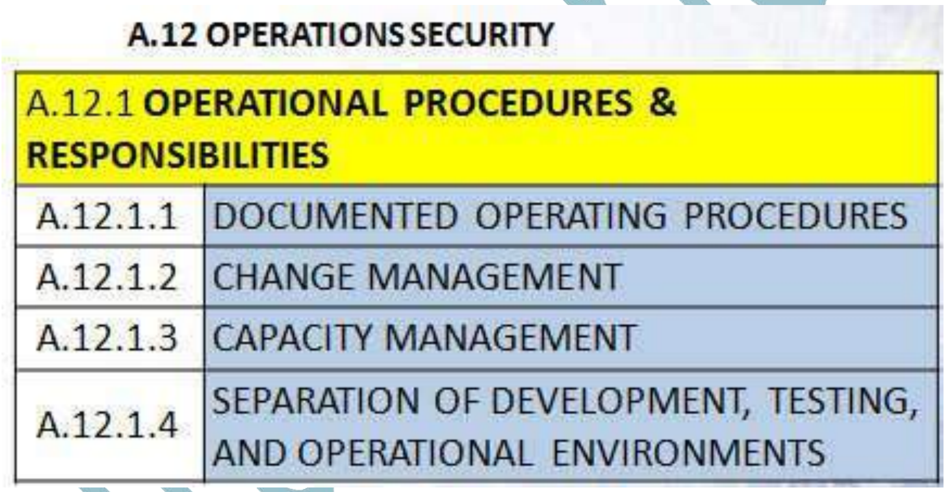


A.11 PHYSICAL & ENVIRONMENTAL SECURITY

A.11.2 EQUIPMENT...	
A.11.2.7	SECURE DISPOSAL OR RE-USE OF EQUIPMENT
A.11.2.8	UNATTENDED USER EQUIPMENT
A.11.2.9	CLEAR DESK & CLEAR SCREEN POLICY

A.11.2.9	**CLEAR DESK & CLEAR SCREEN POLICY**	***Control:*** A clear desk policy for papers and removable storage media and a clear screen policy for information processing facilities shall be adopted.

Topic No 219 & 220: ISO27001:2013 Controls Appendix; Part 6 & 7



A.12 OPERATIONS SECURITY

A.12.1 OPERATIONAL PROCEDURES & RESPONSIBILITIES	
A.12.1.1	DOCUMENTED OPERATING PROCEDURES
A.12.1.2	CHANGE MANAGEMENT
A.12.1.3	CAPACITY MANAGEMENT
A.12.1.4	SEPARATION OF DEVELOPMENT, TESTING, AND OPERATIONAL ENVIRONMENTS

A.12.1.1	**DOCUMENTED OPERATING PROCEDURES**	***Control:*** Operating procedures shall be documented and made available to all users who need them.
A.12.1.2	**CHANGE MANAGEMENT**	***Control:*** Changes to the organization, business processes, information processing facilities and systems that affect information security shall be controlled.

A.12.1.3	**CAPACITY MANAGEMENT**	***Control:*** The use of resources shall be monitored, tuned and projections made of future capacity requirements to ensure the required system performance.
A.12.1.4	**SEPARATION OF DEVELOPMENT, TESTING, AND OPERATIONAL ENVIRONMENTS**	***Control:*** Development, testing, and operational environments shall be separated to reduce the risks of unauthorized access or changes to the operational environment.

A.12.2 **PROTECTION FROM MALWARE**	
A.12.2.1	CONTROLS AGAINST MALWARE

A.12.2.1	**CONTROLS AGAINST MALWARE**	***Control:*** Detection, prevention and recovery controls to protect against malware shall be implemented, combined with appropriate user awareness.

A.12.3 **BACKUP**	
A.12.3.1	INFORMATION BACKUP

A.12.3.1	**INFORMATION BACKUP**	***Control:*** Backup copies of information, software and system images shall be taken and tested regularly in accordance with an

		agreed backup policy.

A.12.4 **LOGGING & MONITORING**	
A.12.4.1	EVENT LOGGING
A.12.4.2	PROTECTION OF LOG INFORMATION
A.12.4.3	ADMINISTRATOR & OPERATOR LOGS
A.12.4.4	CLOCK SYNCHRONISATION

A.12.4.1	EVENT LOGGING	***Control:*** Event logs recording user activities, exceptions, faults and information Security events shall be produced, kept and regularly reviewed.
A.12.4.3	ADMINISTRATOR & OPERATOR LOGS	***Control:*** System administrator and system operator activities shall be logged and the logs protected and regularly reviewed.

A.12.5 **CONTROL OF OPERATIONAL SOFTWARE**	
A.12.5.1	INSTALLATION OF SOFTWARE ON OPERATIONAL

	SYSTEMS

A.12.5.1	INSTALLATION OF SOFTWARE ON OPERATIONAL SYSTEMS	***Control:*** Procedures shall be implemented to control the installation of software on operational systems.

A.12.6 **TECHNICAL VULNERABILITY MANAGEMENT**	
A.12.6.1	MANAGEMENT OF TECHNICAL VULNERABILITIES
A.12.6.2	RESTRICTIONS ON SOFTWARE INSTALLATION

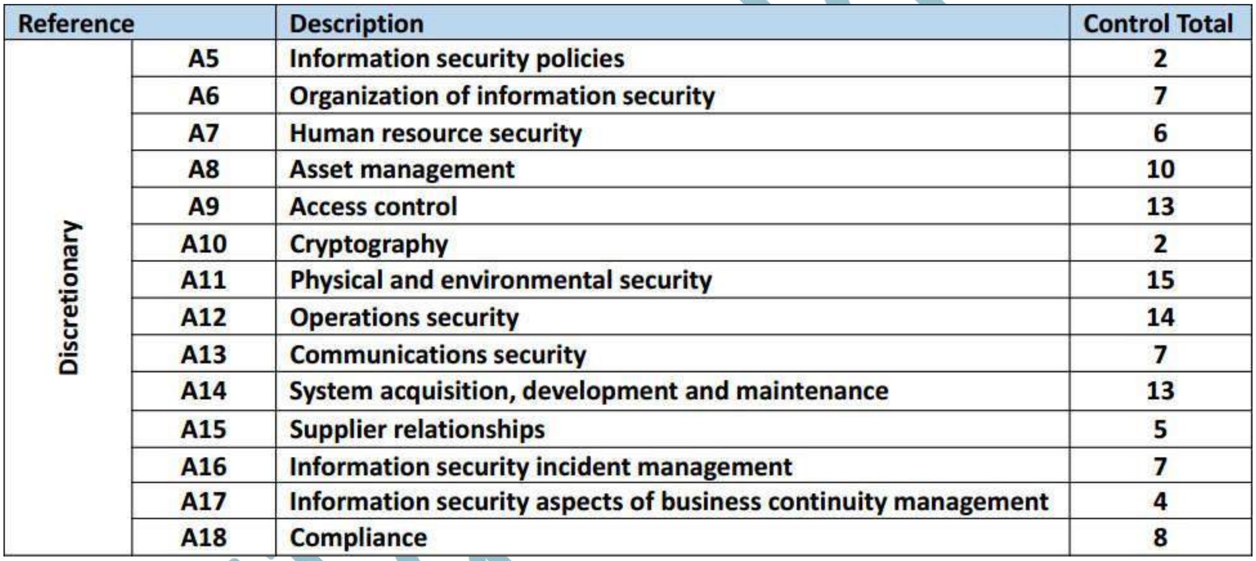
A.12.6.1	MANAGEMENT OF TECHNICAL VULNERABILITIES	***Control:*** Information about technical vulnerabilities of information systems being used shall be obtained in a timely fashion, the organization's exposure to such vulnerabilities evaluated and appropriate measures taken to address the associated risk.
A.12.6.2	RESTRICTIONS ON SOFTWARE INSTALLATION	***Control:*** Rules governing the installation of software by users shall be established and implemented.

A.12.7 **INFORMATION SYSTEMS AUDIT CONSIDERATIONS**

A.12.7.1	INFORMATION SYSTEMS AUDIT CONTROLS

A.12.7.1	INFORMATION SYSTEMS AUDIT CONTROLS	***Control:*** Audit requirements and activities involving verification of operational systems shall be carefully planned and agreed to minimise disruptions to business processes.

Topic No 221: ISO27001:2013 Controls Appendix; Part 8



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	A15	Supplier relationships	5
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	A18	Compliance	8

A.13 COMMUNICATIONS SECURITY

A.13.1 COMMUNICATIONS SECURITY	
A.13.1.1	**NETWORK CONTROLS**
A.13.1.2	**SECURITY OF NETWORK SERVICES**
A.13.1.3	**SEGREGATION IN NETWORKS**

A.13.1.1	NETWORK CONTROLS	***Control:*** Networks shall be managed and controlled to protect information in systems and applications.
A.13.1.2	SECURITY OF NETWORK SERVICES	***Control:*** Security mechanisms, service levels and management requirements of all network services shall be identified and included in network services agreements, whether these services are provided in-house or outsourced.
A.13.1.3	SEGREGATION IN NETWORKS	***Control:*** Groups of information services, users and information systems shall be segregated on networks.

A.13.2 **INFORMATION TRANSFER**	
A.13.2.1	INFORMATION TRANSFER POLICIES & PROCEDURES
A.13.2.2	AGREEMENTS ON INFORMATION TRANSFER
A.13.2.3	ELECTRONIC MESSAGING
A.13.2.4	CONFIDENTIALITY OR NON-DISCLOSURE AGREEMENTS

A.13.2.1	INFORMATION TRANSFER POLICIES & PROCEDURES	***Control:*** Formal transfer policies, procedures and controls shall be in place to protect the

		transfer of information through the use of all types of communication facilities.
A.13.2.2	AGREEMENTS ON INFORMATION TRANSFER	***Control:*** Agreements shall address the secure transfer of business information between the organization and external parties.

Topic No 222: ISO27001:2013 Controls Appendix; Part 9

SYSTEM ACQUISITION, DEVELOPMENT, & MAINTENANCE

A.14.1 **SECURITY REQMTS OF INFORMATION SYSTEMS**	
A.14.1.1	INFORMATION SECURITY REQMTS ANALYSIS & SPECIFICATION
A.14.1.2	SECURING APPLICATION SERVICES ON PUBLIC NETWORKS
A.14.1.3	PROTECTING APPLICATION SERVICES TRANSACTIONS

A.14.1.1	INFORMATION SECURITY REQMTS ANALYSIS & SPECIFICATION	***Control:*** The information security related requirements shall be included in the requirements for new information systems or enhancements to existing information systems.

A.14.2 **SECURITY IN DEV. & SUPPORT PROCESSES**	
A.14.2.1	SECURE DEVELOPMENT POLICY
A.14.2.2	SYSTEM CHANGE CONTROL PROCEDURES
A.14.2.3	TECHNICAL REVIEW OF APPLICATIONS AFTER OPERATING PLATFORM CHANGES
A.14.2.4	RESTRICTIONS ON CHANGES TO SOFTWARE PACKAGES
A.14.2.5	SECURE SYSTEM ENGINEERING PRINCIPLES
A.14.2.6	SECURE DEVELOPMENT ENVIRONMENT
A.14.2.7	OUTSOURCED DEVELOPMENT
A.14.2.8	SYSTEM SECURITY TESTING
A.14.2.9	SYSTEM ACCEPTANCE TESTING

A.14.2.3	TECHNICAL REVIEW OF APPLICATIONS AFTER OPERATING PLATFORM CHANGES	***Control:*** When operating platforms are changed, business critical applications shall be reviewed and tested to ensure there is no adverse impact on organizational operations or security.
A.14.2.4	RESTRICTIONS ON CHANGES TO SOFTWARE PACKAGES	***Control:*** Modifications to software packages shall be discouraged, limited to

		necessary changes and all changes shall be strictly controlled.
A.14.2.5	SECURE SYSTEM ENGINEERING PRINCIPLES	***Control:*** Principles for engineering secure systems shall be established, documented, maintained and applied to any information system Implementation efforts.
A.14.2.8	SYSTEM SECURITY TESTING	***Control:*** Testing of security functionality shall be carried out during development.

A.14.3 **TEST DATA**	
A.14.3.1	PROTECTION OF TEST DATA

A.14.3.1	PROTECTION OF TEST DATA	***Control:*** Test data shall be selected carefully, protected and controlled.

Topic No 223: ISO27001:2013 Controls Appendix; Part 10

SUPPLIER RELATIONSHIPS

A.15.1 INFORMATION SECURITY IN SUPPLIER RELATIONSHIPS	
A.15.1.1	INFORMATION SECURITY POLICY FOR SUPPLIER RELATIONSHIPS

A.15.1.2	ADDRESSING SECURITY WITHIN SUPPLIER AGREEMENTS
A.15.1.3	INFORMATION & COMMUNICATION TECHNOLOGY SUPPLY CHAIN

A.15.1.1	**INFORMATION SECURITY POLICY FOR SUPPLIER RELATIONSHIPS**	***Control:*** Information security requirements for mitigating the risks associated with supplier's access to the organization's assets shall be agreed with the supplier and documented.

A.15.2 SUPPLIER SERVICE DELIVERY MANAGEMENT	
A.15.2.1	MONITORING & REVIEW OF SUPPLIER SERVICES
A.15.2.2	MANAGING CHANGES TO SUPPLIER SERVICES

A.15.2.1	**MONITORING & REVIEW OF SUPPLIER SERVICES**	***Control:*** Organizations shall regularly monitor, review and audit supplier service delivery**.**
A.15.2.2	**MANAGING CHANGES TO SUPPLIER SERVICES**	***Control:*** Changes to the provision of services by suppliers, including maintaining & improving existing information security policies, procedures & controls, shall be managed, taking account of the criticality of business information, systems and processes involved and re-assessment of risks.

Topic No 224: ISO27001:2013 Controls Appendix; Part 11

INFORMATION SECURITY INCIDENT MANAGEMENT

A.16.1 MNGMT OF INFOSEC INCIDENTS & IMPROVEMENTS	
A.16.1.1	**RESPONSIBILITIES & PROCEDURES**
A.16.1.2	**REPORTING INFOSEC SECURITY EVENTS**
A.16.1.3	**REPORTING INFOSEC WEAKNESSES**
A.16.1.4	**ASSESSMENT OF & DECISION ON INFOSEC EVENTS**
A.16.1.5	**RESPONSE TO INFOSEC INCIDENTS**
A.16.1.6	**LEARNING FROM INFOSEC INCIDENTS**
A.16.1.7	**COLLECTION OF EVIDENCE**

A.16.1.2	**REPORTING INFORMATION SECURITY EVENTS**	***Control:*** Information security events shall be reported through appropriate management channels as quickly as possible.
A.16.1.2	**REPORTING INFORMATION SECURITY EVENTS**	***Control:*** *Information security events shall be reported through appropriate management channels as quickly as possible.*
A.16.1.3	**REPORTING INFORMATION SECURITY**	***Control:*** *Employees and contractors using the organization's information*

	WEAKNESSES	*systems and services shall be required to note and report any observed or suspected information security weaknesses in systems or services.*
A.16.1.5	**RESPONSE TO INFORMATION SECURITY INCIDENTS**	*Control:* ***Information security incidents shall be responded to in accordance with the documented procedures.***
A.16.1.6	**LEARNING FROM INFORMATION SECURITY INCIDENTS**	*Control:* *Knowledge gained from analysing and resolving information security incidents shall be used to reduce the likelihood or impact of future incidents.*

Topic No 225: ISO27001:2013 Controls Appendix; Part 12

INFOSEC ASPECTS OF BUSINESS CONTINUITY MNGMT

A.17.1 INFORMATION SECURITY CONTINUITY	
A.17.1.1	**PLANNING INFOSEC CONTINUITY**
A.17.1.2	**IMPLEMENTING INFOSEC CONTINUITY**
A.17.1.3	**VERIFY, REVIEW, & EVALUATE INFOSEC CONTINUITY**

A.17.1.1	**PLANNING INFOSEC CONTINUITY**	***Control:*** The organization shall determine its requirements for information security and the continuity of information security management in adverse situations, e.g. during a crisis or disaster.
A.17.1.2	**IMPLEMENTING INFOSEC CONTINUITY**	***Control:*** The organization shall establish, document, implement and maintain processes, procedures and controls to ensure the required level of continuity for information security during an adverse situation.
A.17.1.3	**VERIFY, REVIEW, & EVALUATE INFOSEC CONTINUITY**	***Control:*** The organization shall verify the established and implemented info security continuity controls at regular intervals in order to ensure that they are valid and effective during adverse situations.

A.17.2 REDUNDANCIES	
A.17.2.1	**AVAILABILITY OF INFORMATION PROCESSING FACILITIES**

A.17.2.1	**AVAILABILITY OF INFORMATION PROCESSING FACILITIES**	***Control:*** Information processing facilities shall be implemented with redundancy sufficient to meet availability requirements.

Topic No 226: ISO27001:2013 Controls Appendix; Part 13

COMPLIANCE

A.18.1 COMPLIANCE WITH LEGAL & CONTRACTUAL REQUIREMENTS	
A.18.1.1	IDENTIFICATION OF APPLICABLE LEGISLATION & CONTRACTUAL REQMTS
A.18.1.2	INTELLECTUAL PROPERTY RIGHTS
A.18.1.3	PROTECTION OF RECORDS
A.18.1.4	PRIVACY & PROTECTION OF PERSONALLY IDENTIFIABLE INFORMATION
A.18.1.4	REGULATION OF CRYPTOGRAPHIC CONTROLS

A.18.1.1	**IDENTIFICATION OF APPLICABLE LEGISLATION & CONTRACTUAL REQMTS**	***Control:*** All relevant legislative statutory, regulatory, contractual requirements and the organization's approach to meet these requirements shall be explicitly identified, documented and kept up to date for each information system and the organiz.
A.18.1.2	**INTELLECTUAL PROPERTY RIGHTS**	***Control:*** Appropriate procedures shall be implemented to ensure compliance with legislative, regulatory and contractual requirements related to intellectual property rights and use of proprietary software products.

A.18.2 INFORMATION SECURITY REVIEWS	
A.18.2.1	**INDEPENDENT REVIEW OF INFORMATION SECURITY**
A.18.2.2	**COMPLIANCE WITH SECURITY POLICY & STANDARDS**
A.18.2.3	**TECHNICAL COMPLIANCE REVIEW**

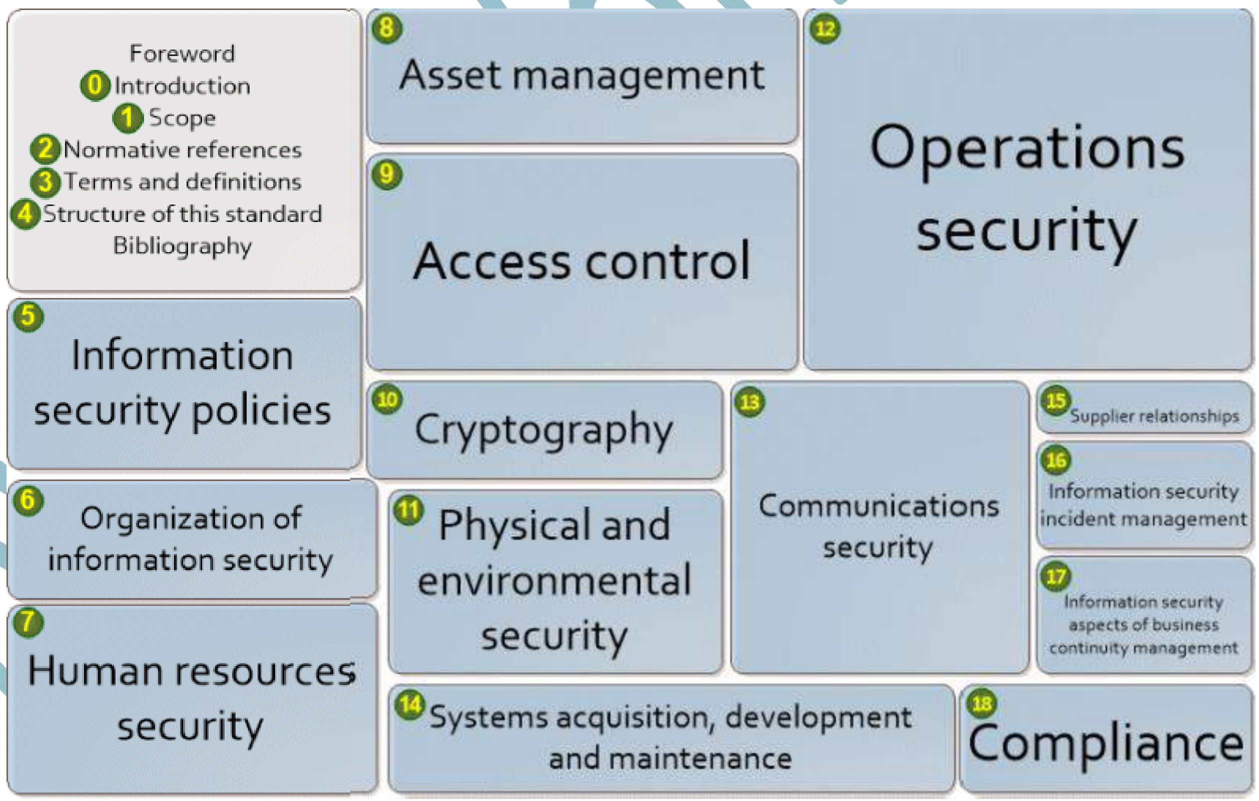
A.18.2.1	**INDEPENDENT REVIEW OF INFORMATION SECURITY**	***Control:*** The organization's approach to managing information security & its implementation (i.e. control objectives, controls, policies, processes & procedures for info security) shall be reviewed independently at planned

		intervals or when significant changes occur.
A.18.2.2	**COMPLIANCE WITH SECURITY POLICY & STANDARDS**	***Control:*** Managers shall regularly review the compliance of information processing and procedures within their area of responsibility with the appropriate security policies, standards and any other security requirements.
A.18.2.3	**TECHNICAL COMPLIANCE REVIEW**	***Control:*** Information systems shall be regularly reviewed for compliance with the organization's information security policies and standards.

Topic No 227: How to Use ISO27002:2013

- **What is ISO27002:2013?**
  - Information technology -- Security techniques -- Code of practice for information security controls
  - Renamed from ISO 17799
- **0.1 Background & Context**
  - This Int’l Standard is designed for orgs to use as a reference for selecting controls within the process of implementing an Information Security Management System (ISMS) based on ISO/IEC 27001; or as a **guidance document** for organizations implementing commonly accepted information security controls.

STRUCTURE OF ISO27002:2013



Foreword
0 Introduction
1 Scope
2 Normative references
3 Terms and definitions
4 Structure of this standard
Bibliography

5 Information security policies

6 Organization of information security

7 Human resources security

8 Asset management

9 Access control

10 Cryptography

11 Physical and environmental security

12 Operations security

13 Communications security

14 Systems acquisition, development and maintenance

15 Supplier relationships

16 Information security incident management

17 Information security aspects of business continuity management

18 Compliance

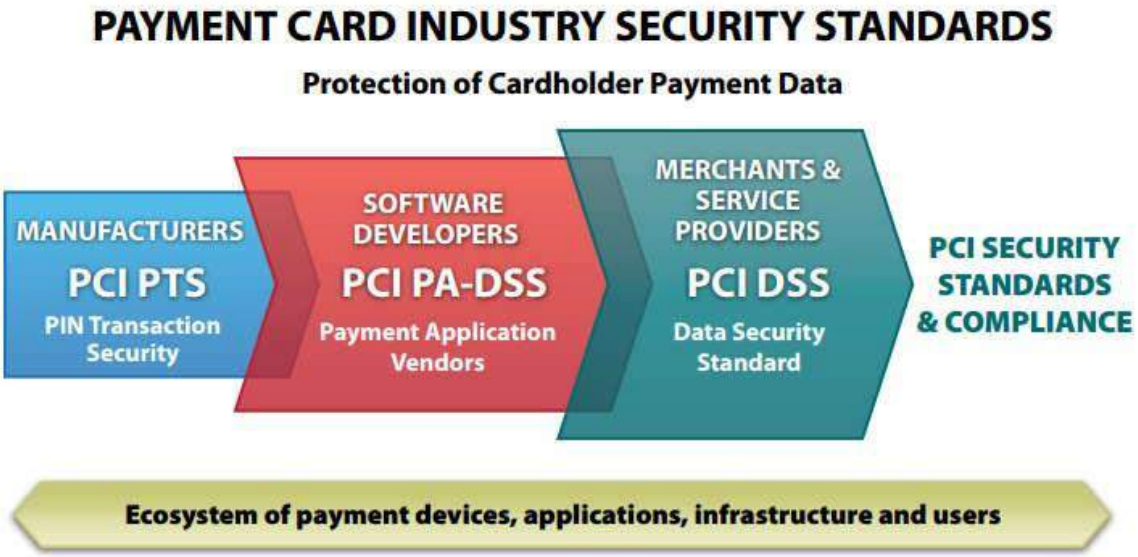
- Lets have a look at control A.5.1.2 (**Review Of The Policies Of Information Security**)

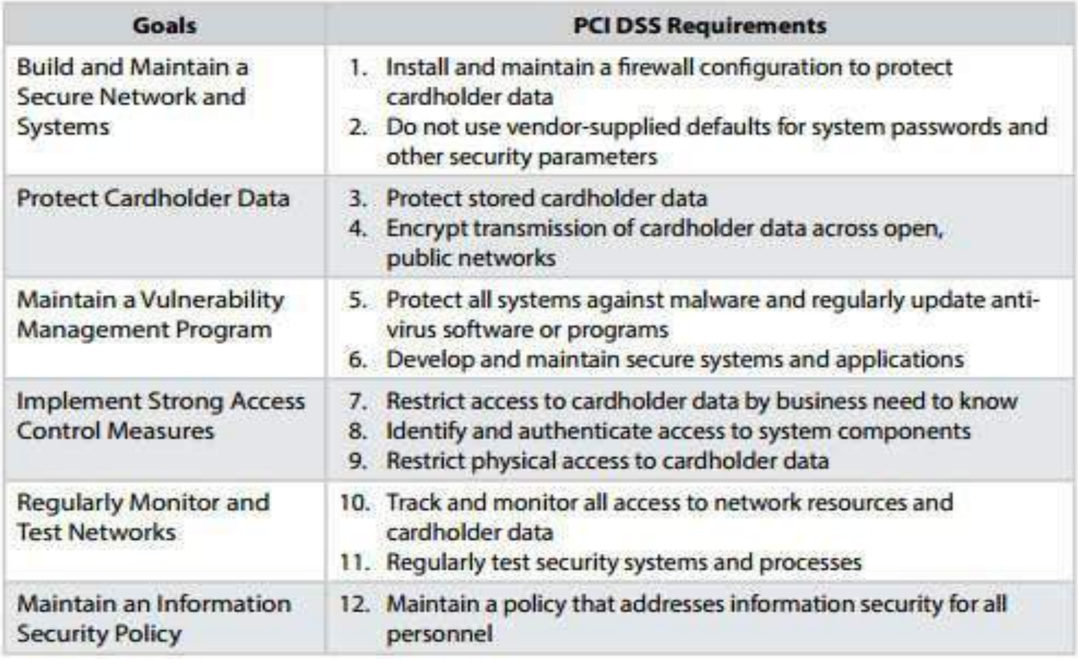
ISO27001:2013

A.5.1.2	REVIEW OF THE POLICIES FOR INFORMATION SECURITY	**Control:** The policies for information security shall be reviewed at planned intervals or if significant changes occur to ensure their continuing suitability, adequacy and effectiveness.
		27002: Implementation Guidance: Each policy should have an owner who has approved management responsibility for the development, review and evaluation of the policies. The review should include assessing opportunities for improvement of the org's policies and approach to managing Infosec in response to changes to the org environment, business circumstances, legal conditions or tech environment.

Topic No 228: PCI DSS V3

- **PCI Data Security Standard (DSS):**
  - Designed to ensure that ALL companies that accept, process, store or transmit credit card info maintain a secure environment
  - Managed by Security Standards Council
  - SSC is an independent body that was created by the major payment card brands (Visa, MasterCard, American Express, Discover and JCB
  - 6 Broad goals and 12 requirements


PAYMENT CARD INDUSTRY SECURITY STANDARDS
Protection of Cardholder Payment Data
MANUFACTURERS
PCI PTS
PIN Transaction Security
SOFTWARE DEVELOPERS
PCI PA-DSS
Payment Application Vendors
MERCHANTS & SERVICE PROVIDERS
PCI DSS
Data Security Standard
PCI SECURITY STANDARDS & COMPLIANCE
Ecosystem of payment devices, applications, infrastructure and users



Goals	PCI DSS Requirements
Build and Maintain a Secure Network and Systems	1. Install and maintain a firewall configuration to protect cardholder data 2. Do not use vendor-supplied defaults for system passwords and other security parameters
Protect Cardholder Data	3. Protect stored cardholder data 4. Encrypt transmission of cardholder data across open, public networks
Maintain a Vulnerability Management Program	5. Protect all systems against malware and regularly update anti-virus software or programs 6. Develop and maintain secure systems and applications
Implement Strong Access Control Measures	7. Restrict access to cardholder data by business need to know 8. Identify and authenticate access to system components 9. Restrict physical access to cardholder data
Regularly Monitor and Test Networks	10. Track and monitor all access to network resources and cardholder data 11. Regularly test security systems and processes
Maintain an Information Security Policy	12. Maintain a policy that addresses information security for all personnel

REQMT	TEST PROCEDURES	GUIDANCE
7.1.4 Require documented approval by authorized parties specifying required privileges.	7.1.4 Select a sample of user IDs & compare with documented approvals to verify that: -Documented approval exists for the assigned privileges -The approval was by authorized parties -That specified privileges match the roles assigned to the individual.	Documented approval (for example, in writing or electronically) assures that those with [illegible] privileges are known and authorized by management, and that their [illegible] necessary for their job [illegible]
8.1.4 Remove/ disable inactive user accounts within 90 days.	8.1.4 Observe user accounts to verify that any inactive accounts over 90 days [illegible].	Accounts that are [illegible] regularly are often targets of attack since it is less likely that any changes (such as a changed password) will be noticed. As such, these accounts may be more easily exploited and used to access [illegible]

- PCI is specific to the card environment to protect cardholder data
- PCI controls are very specific and in-depth compared to generic and high-level controls of ISO27001

Topic No 229: SANS/CIS CRITICAL SECURITY CONTROLS

- A very useful collection of controls for improving security posture

SN	CONTROL
1	**Inventory** of Authorized and Unauthorized **Devices**
2	**Inventory** of Authorized and Unauthorized **Software**
3	**Secure Configurations** for Hardware and Software
4	Continuous **Vulnerability Assessment** and Remediation
5	Controlled Use of **Administrative Privileges**
SN	CONTROL
6	Maintenance, Monitoring, and Analysis of Audit Logs
7	Email and Web Browser Protections
8	Malware Defenses
9	Limitation and Control of Network Ports
10	Data Recovery Capability
SN	CONTROL
11	Secure Configurations for Network Devices
12	Boundary Defense
13	Data Protection
14	Controlled Access Based on the Need to Know

15	Wireless Access Control
SN	CONTROL
16	Account Monitoring an Control
17	Security Skills Assessment and Appropriate Training to Fill Gaps
18	Application Software Security
19	Incident Response and Management
20	Penetration Tests and Red Team Exercises

CONTROL 1.1: INVENTORY OF AUTH & UNAUTH DEVICES

Deploy an **automated asset inventory discovery tool** and use it to build a preliminary inventory of systems connected to an organization's public and private network(s). Both active tools that scan through IPv4 or IPv6 network address ranges and passive tools that identify hosts based on analyzing their traffic should be employed.

CONTROL 2.1: INVENTORY OF AUTH & UNAUTH SW

Devise a that is required in the enterprise **for each type of system**, including servers, workstations, and laptops of various This list should be **monitored by file integrity checking tools** to v.

CONTROL 3.1: SECURE CONFIGS FOR HW & SW

Establish **standard secure configurations of your operating systems and software applications.** Standardized **images** s**hould represent hardened versions** of the underlying **operating system and the applications** installed on the system. These images should be **validated and refreshed on a regular basis** to update their security configuration in light of recent vulnerabilities and attack vectors.

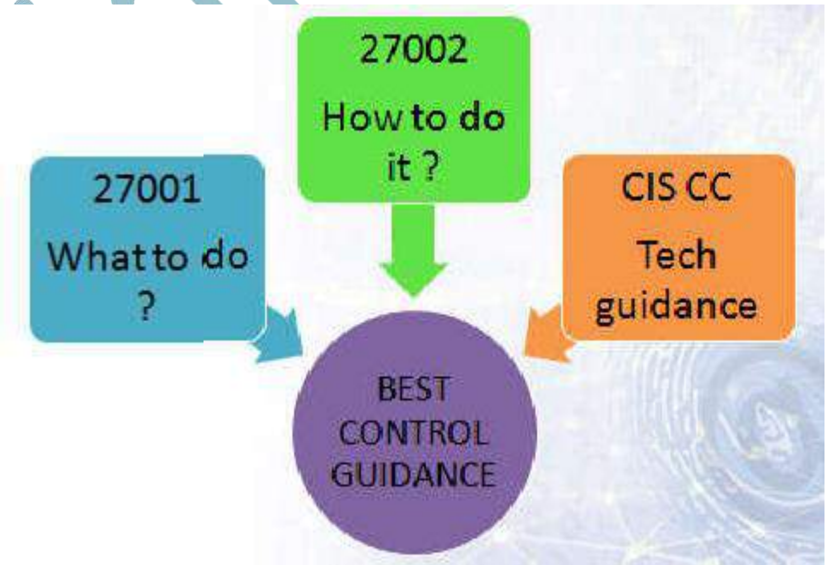
CONTROL 4.1: CONTINUOUS VULNERABILITY ASSESSMENT & REMEDIATION

Run **automated vulnerability scanning tools** against all systems on the network on a **weekly or more frequent basis** and deliver prioritized lists of the most critical vulnerabilities to each responsible system administrator **along with risk scores that compare the effectiveness of system administrators and departments in reducing risk.**

Use a y scanner that looks for both code vulnerabilities (such as those described by Common Vulnerabilities and Exposures entries) and configuration-based vulnerabilities (as enumerated by the Common Configuration Enumeration Project).

CONTROL 5.1 CONTROLLED USE OF ADMIN PRIVILEGES

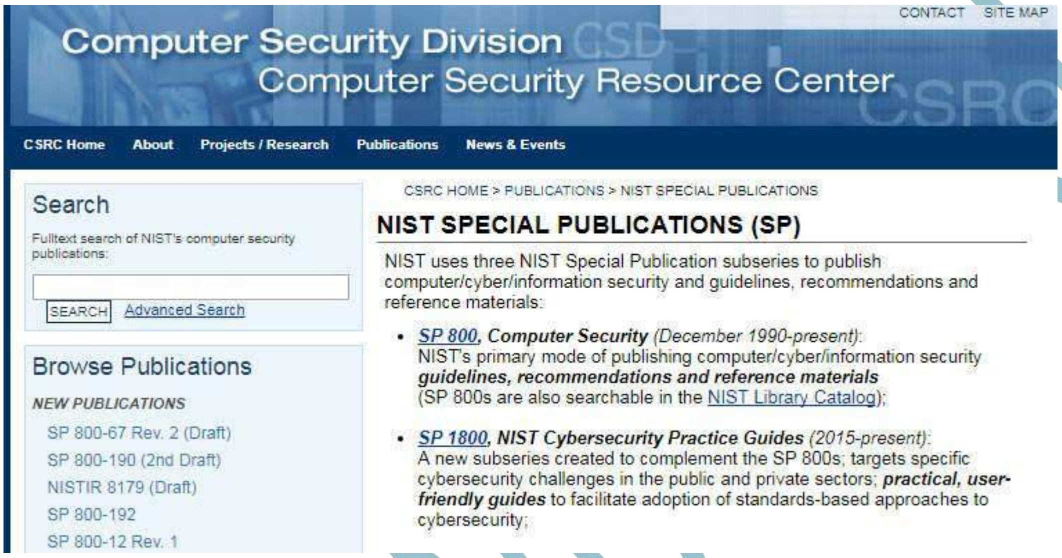
Minimize administrative privileges and only use administrative accounts when they are required. Implement focused auditing on the use of administrative privileged .



- An ideal framework for more detailed and specific guidance on deeper and more stringent security controls

Topic No 230: NIST FRAMEWORK

- The Computer Security Resource Center (CSRC) website guides users to NIST resources on **computer, cyber, and information security and privacy.**
- Its content includes **publications, projects, research, news and events** from the NIST Information Technology Laboratory's (ITL) two security divisions



CONTACT SITE MAP

Computer Security Division CSD

Computer Security Resource Center CSRC

CSRC Home | About | Projects / Research | Publications | News & Events

Search

Fulltext search of NIST's computer security publications:

SEARCH Advanced Search

Browse Publications

NEW PUBLICATIONS

SP 800-67 Rev. 2 (Draft)

SP 800-190 (2nd Draft)

NISTIR 8179 (Draft)

SP 800-192

SP 800-12 Rev. 1

CSRC HOME > PUBLICATIONS > NIST SPECIAL PUBLICATIONS

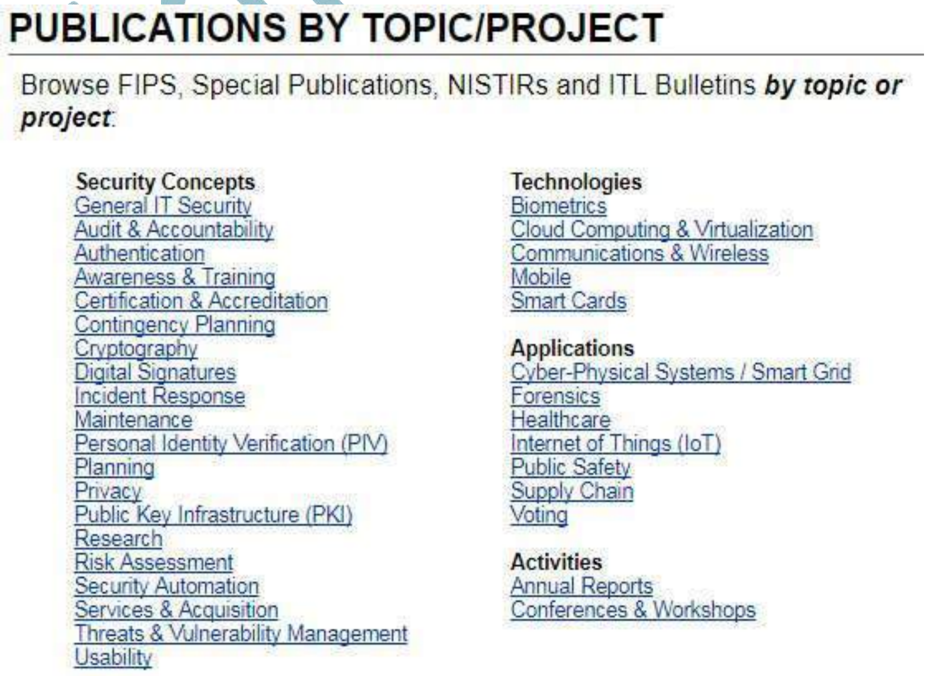
NIST SPECIAL PUBLICATIONS (SP)

NIST uses three NIST Special Publication subseries to publish computer/cyber/information security and guidelines, recommendations and reference materials:

- SP 800, **Computer Security** *(December 1990-present)*: NIST's primary mode of publishing computer/cyber/information security ***guidelines, recommendations and reference materials*** (SP 800s are also searchable in the NIST Library Catalog);
- *SP 1800*, ***NIST Cybersecurity Practice Guides*** *(2015-present)*: A new subseries created to complement the SP 800s; targets specific cybersecurity challenges in the public and private sectors; ***practical, user-friendly guides*** to facilitate adoption of standards-based approaches to cybersecurity;

- ***SP 800*, *Computer Security*** *(December 1990-present)*:

  NIST's primary mode of publishing computer/cyber/information security ***guidelines, recommendations and reference materials*** (SP 800s are also searchable in the NIST Library Catalog);



PUBLICATIONS BY TOPIC/PROJECT

Browse FIPS, Special Publications, NISTIRs and ITL Bulletins ***by topic or project***:

Security Concepts

General IT Security

Audit & Accountability

Authentication

Awareness & Training

Certification & Accreditation

Contingency Planning

Cryptography

Digital Signatures

Incident Response

Maintenance

Personal Identity Verification (PIV)

Planning

Privacy

Public Key Infrastructure (PKI)

Research

Risk Assessment

Security Automation

Services & Acquisition

Threats & Vulnerability Management

Usability

Technologies

Biometrics

Cloud Computing & Virtualization

Communications & Wireless

Mobile

Smart Cards

Applications

Cyber-Physical Systems / Smart Grid

Forensics

Healthcare

Internet of Things (IoT)

Public Safety

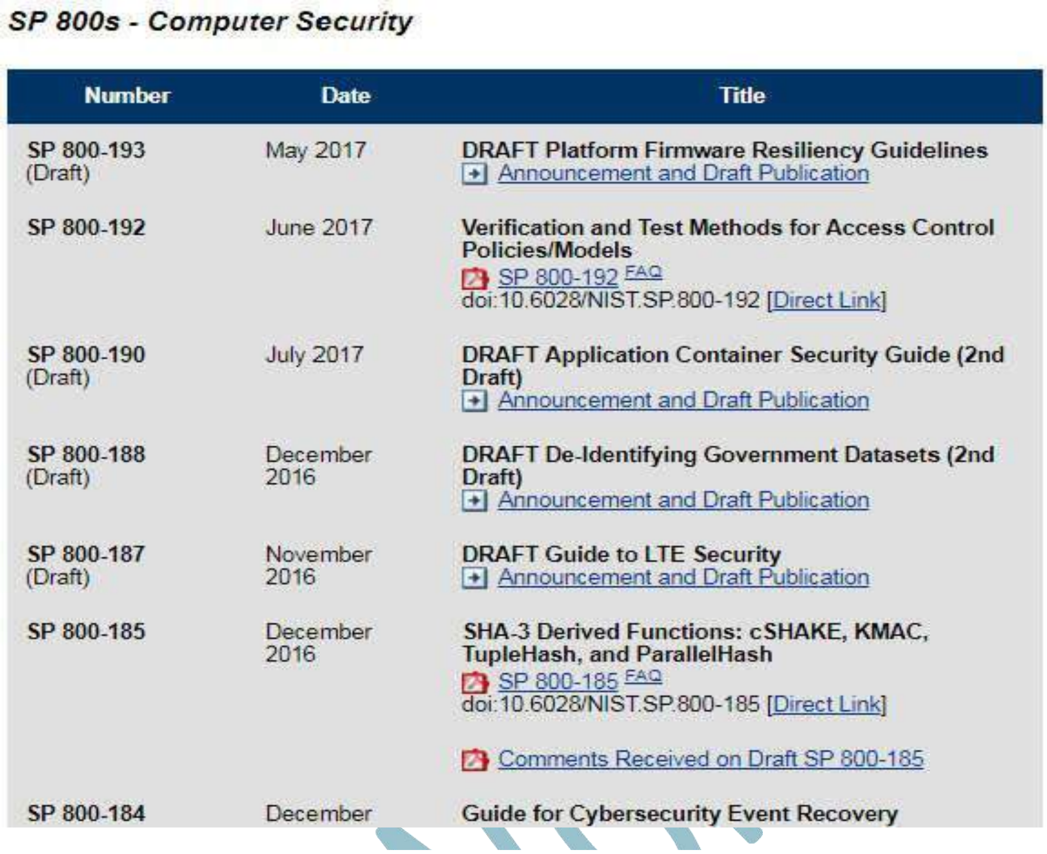
Supply Chain

Voting

Activities

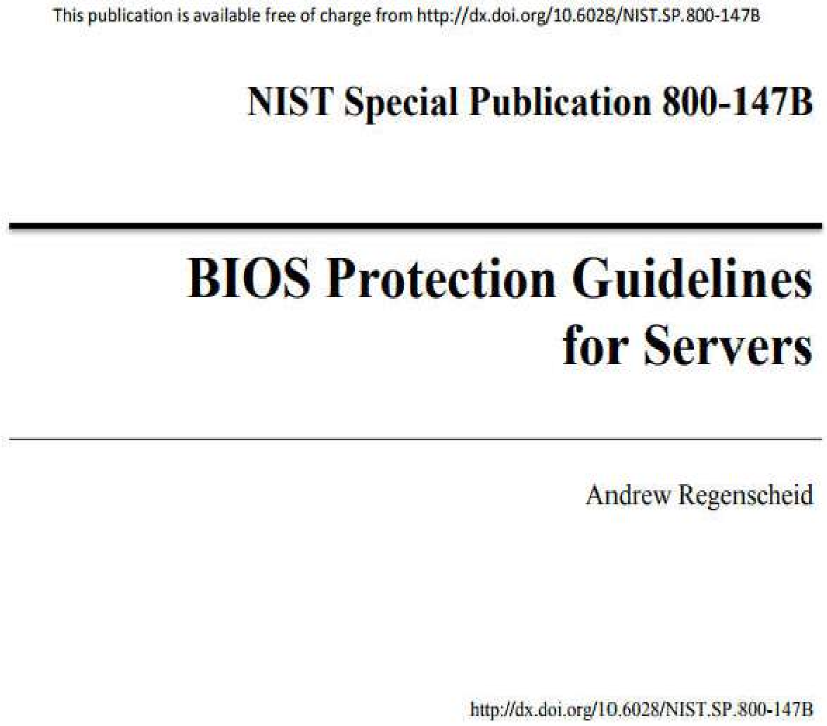
Annual Reports

Conferences & Workshops



SP 800s - Computer Security

Number	Date	Title
SP 800-193 (Draft)	May 2017	DRAFT Platform Firmware Resiliency Guidelines Announcement and Draft Publication
SP 800-192	June 2017	Verification and Test Methods for Access Control Policies/Models SP 800-192 FAQ doi:10.6028/NIST.SP.800-192 [Direct Link]
SP 800-190 (Draft)	July 2017	DRAFT Application Container Security Guide (2nd Draft) Announcement and Draft Publication
SP 800-188 (Draft)	December 2016	DRAFT De-Identifying Government Datasets (2nd Draft) Announcement and Draft Publication
SP 800-187 (Draft)	November 2016	DRAFT Guide to LTE Security Announcement and Draft Publication
SP 800-185	December 2016	SHA-3 Derived Functions: cSHAKE, KMAC, TupleHash, and ParallelHash SP 800-185 FAQ doi:10.6028/NIST.SP.800-185 [Direct Link] Comments Received on Draft SP 800-185
SP 800-184	December	Guide for Cybersecurity Event Recovery



This publication is available free of charge from http://dx.doi.org/10.6028/NIST.SP.800-147B

NIST Special Publication 800-147B

BIOS Protection Guidelines for Servers

Andrew Regenscheid

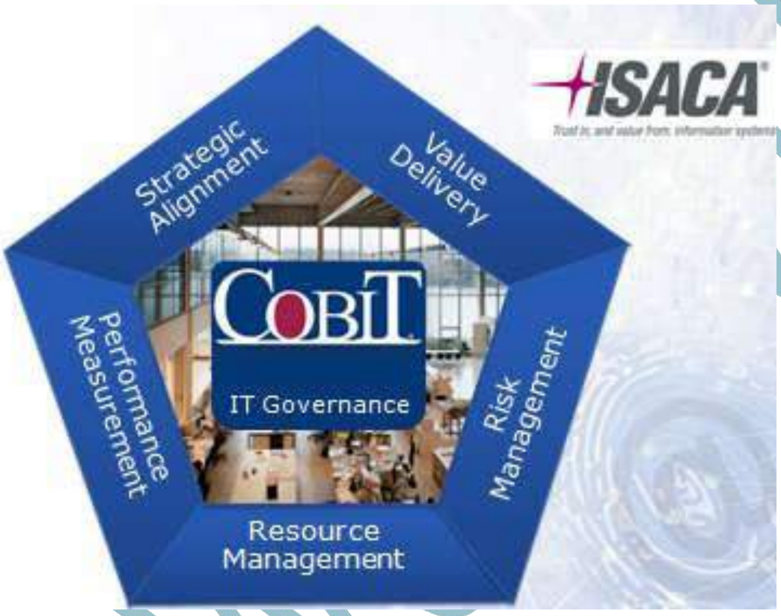
http://dx.doi.org/10.6028/NIST.SP.800-147B

AUGUST 2014
32 PAGES DOC

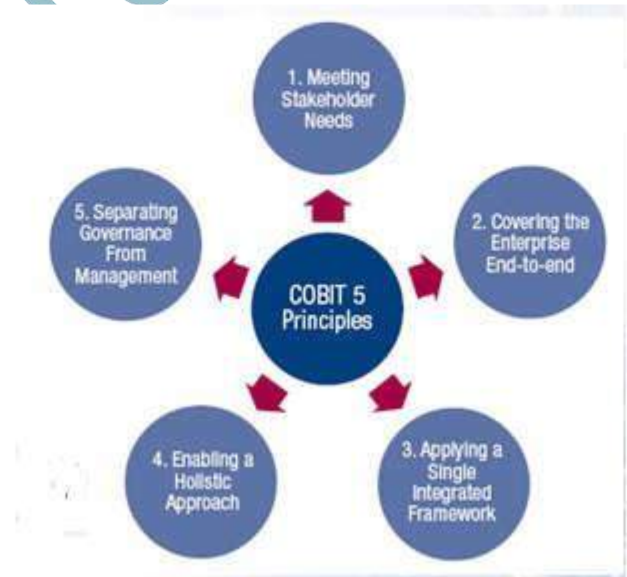
- NIST has a tremendous library of free documentation on a diverse range of topics
- **Relevance is often average, however, depth and detail of material is extra-ordinary**

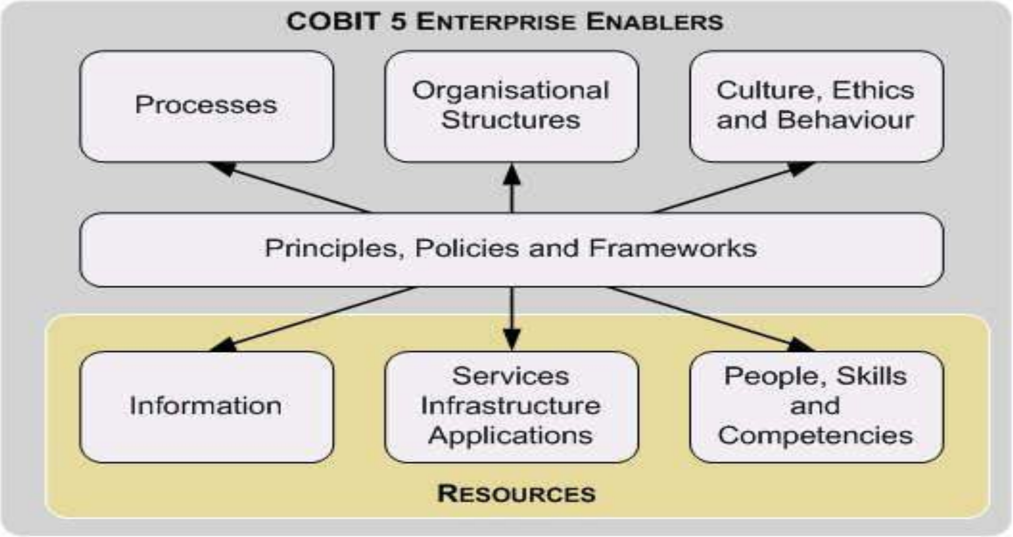
Topic No 231: COBIT

- COBIT:
  - ISACA framework for IT Governance
  - COBIT 5 helps enterprises to create optimal value from IT by maintaining a balance between realising benefits and optimising risk levels and resource use (ISACA)



- COBIT 5 brings together **five principles** that allow the enterprise to build an effective governance and management framework (ISACA)
- Based on a holistic set of **seven enablers** that optimises IT investment and use for the benefit of stakeholders (ISACA)

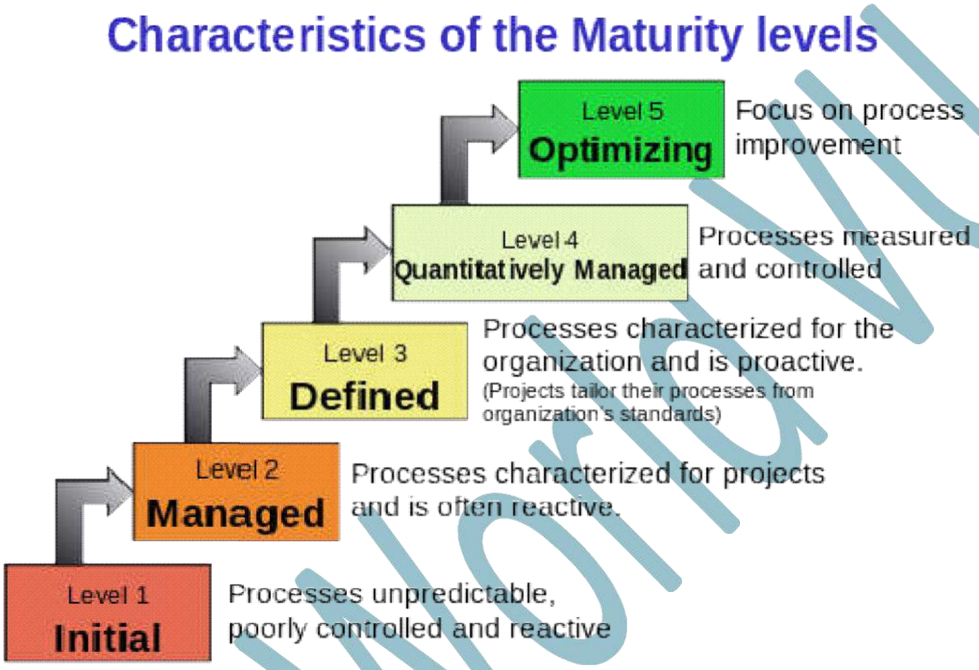

1. Meeting Stakeholder Needs
2. Covering the Enterprise End-to-end
3. Applying a Single Integrated Framework
4. Enabling a Holistic Approach
5. Separating Governance From Management
COBIT 5 Principles


COBIT 5 ENTERPRISE ENABLERS
Processes
Organisational Structures
Culture, Ethics and Behaviour
Principles, Policies and Frameworks
Information
Services Infrastructure Applications
People, Skills and Competencies
RESOURCES

- **Governance** ensures that enterprise objectives are achieved by **evaluating** stakeholder needs, conditions & options; setting **direction** through prioritisation & decision making; & **monitoring** performance, compliance and progress against agreed direction and objectives **(EDM)**
- **Management plans, builds, runs** and **monitors** activities in alignment with the direction set by the governance body to achieve the enterprise objectives **(PBRM)**
- COBIT 5 is a detailed framework for IT governance developed by ISACA which has principles, enablers, and processes
- These tools assist implementers and customer organizations to successfully deploy the framework
- Certifiable framework

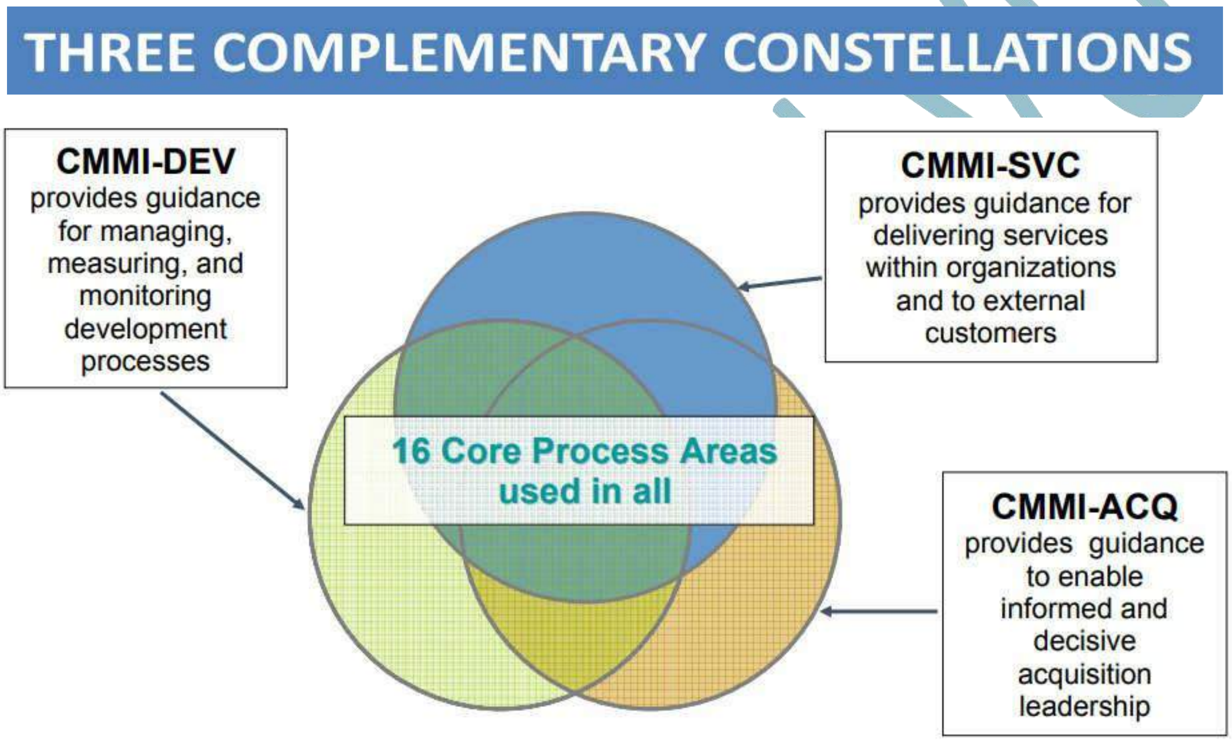
Topic No 232: CMMI

- **The Capability Maturity Model** (CMM) is a methodology used to **develop & refine an org's software dev process**. The model describes a **five-level evolutionary path** of increasingly organized & systematically more mature processes.


Characteristics of the Maturity levels
Level 5
Optimizing
Focus on process improvement
Level 4
Quantitatively Managed
Processes measured and controlled
Level 3
Defined
Processes characterized for the organization and is proactive.
(Projects tailor their processes from organization's standards)
Level 2
Managed
Processes characterized for projects and is often reactive.
Level 1
Initial
Processes unpredictable, poorly controlled and reactive

- CMM was developed and is promoted by the Software Engineering Institute (SEI), a research and development center sponsored by the U.S. Department of Defense (DoD)
- **Now CMMI Institute (ISACA)**
- **The Capability Maturity Model Integration (CMMI®)** is a performance improvement model for competitive organizations that want to achieve **high-performance operations.**
- Building upon an org's business performance objectives, **CMMI provides a set of practices for improving processes,** resulting in a performance improvement system that paves the way for **better operations and performance.**
- More than any other approach, CMMI **doesn't just help to improve org processes.** CMMI also has **built-in practices** that help to improve the way you use any performance improvement approach, setting you up to achieve a **positive return on your investment**

- CMMI does not provide a single process. Rather, the CMMI provides **guidance on what to do to improve your processes, not define your processes.** CMMI is designed to **compare an organization's existing processes to proven best practice** developed by members of industry, govt, & academia; reveal possible areas for improvement; & provide ways to measure progress.
- CMMI helps you to build & manage performance improvement systems that fit your unique environment.



THREE COMPLEMENTARY CONSTELLATIONS

CMMI-DEV
provides guidance for managing, measuring, and monitoring development processes

CMMI-SVC
provides guidance for delivering services within organizations and to external customers

CMMI-ACQ
provides guidance to enable informed and decisive acquisition leadership

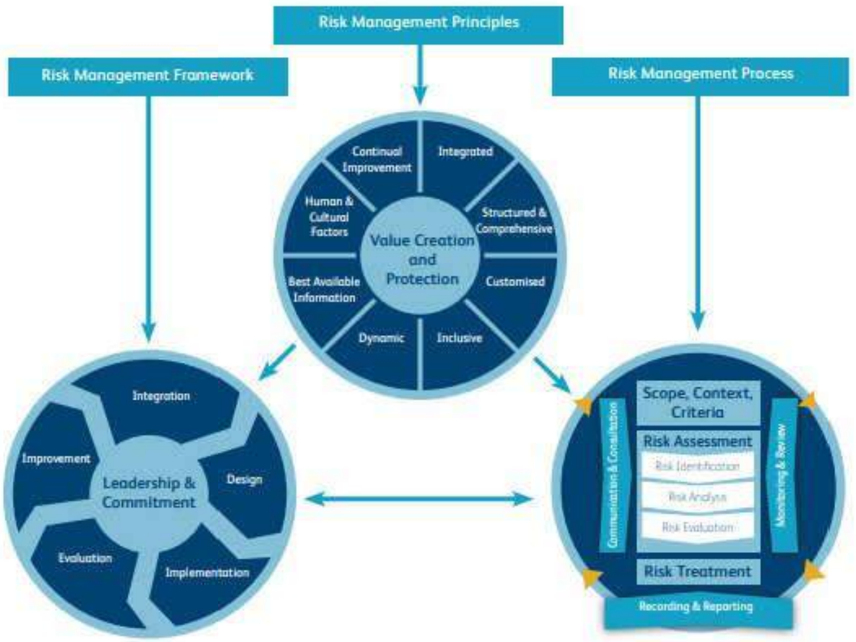
16 Core Process Areas used in all

- CMMI is a very well regarded framework especially in the software industry
- Very useful for demonstrating process & quality capabilities to **customers, partners, and investors.**

Topic No 233: ISO31000:2018 – RISK MANAGEMENT – AN INTRO

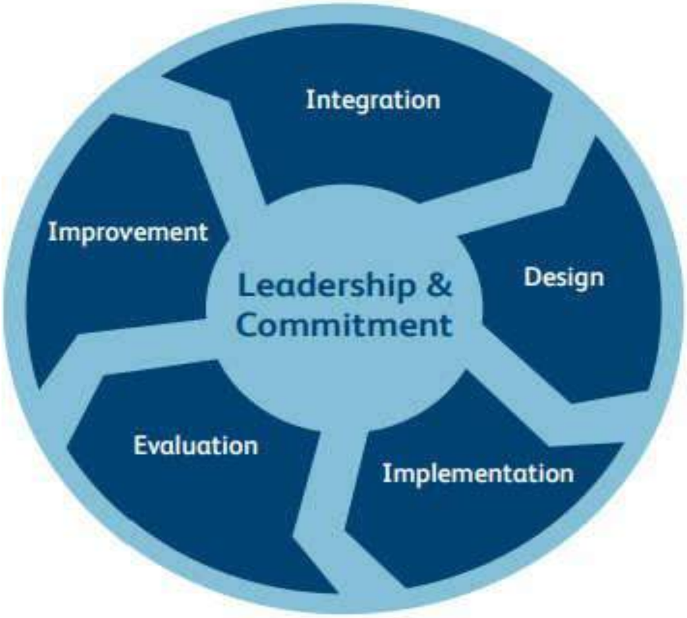
A Risk Practitioners Guide To ISO31000:2018

Figure 3: Principles, framework and risk management process from ISO 31000

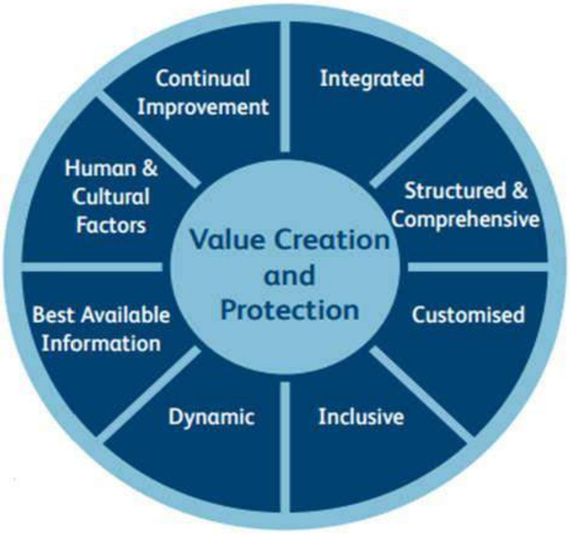


Framework

5 components



8 PRINCIPLES


Continual Improvement
Integrated
Human & Cultural Factors
Structured & Comprehensive
Value Creation and Protection
Best Available Information
Customised
Dynamic
Inclusive

ISO31000 objectives:

- ISO 31000 states that the guidelines should be used by people who create and protect value in organisations by managing risks, making decisions, setting and achieving objectives and improving performance.
- ISO 31000 states that the guidelines should be used by people who create and protect value in organisations by managing risks, making decisions, setting and achieving objectives and improving performance.

ISO31000 purpose:

- ISO 31000 states that the purpose of risk management is the creation and protection of value.

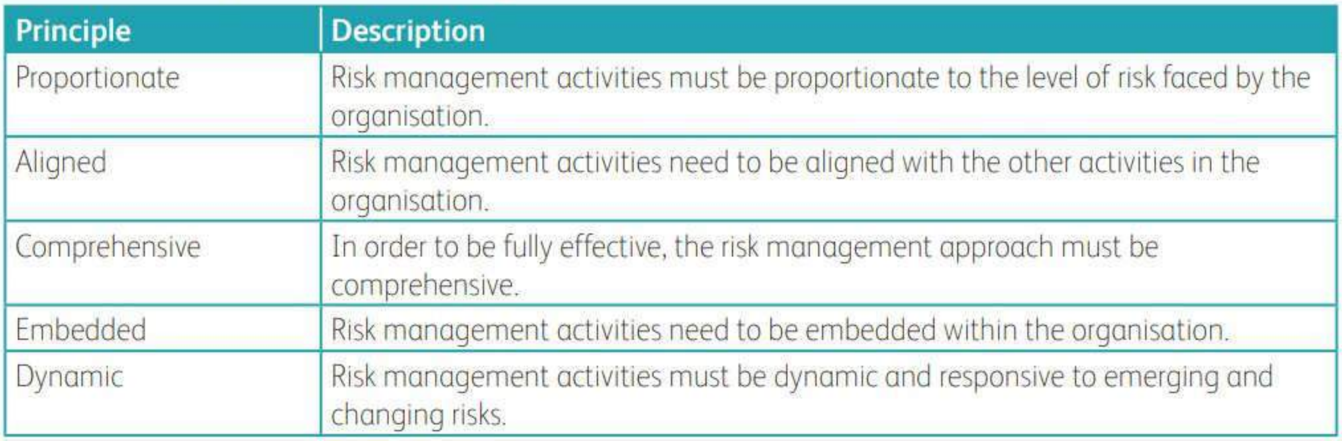
Topic No 234: ISO31000:2018 – RISK MANAGEMENT – 8 PRINCIPLES

PRINCIPLES:

1. Framework and processes should be customized and proportionate.
2. Appropriate and timely involvement of stakeholders is necessary.
3. Structured and comprehensive approach is required.
4. Risk management is an integral part of all organizational activities.
5. Risk management anticipates, detects, acknowledges and responds to changes.
6. Risk management explicitly considers any limitations of available information.
7. Human and cultural factors influence all aspects of risk management.
8. Risk management is continually improved through learning and experience.

- The first five principles provide guidance on how a risk management initiative should be designed, and principles six, seven and eight relate to the operation of the risk management initiative.
- The latter principles confirm that the best information available should be used; human and cultural factors should be considered; and the risk management arrangements should ensure continual improvement.
- The first five principles are concerned with the design and planning of the risk management initiative and these principles are often summarized as proportionate, aligned, comprehensive, embedded and dynamic (PACED), as shown in Table 1.

Table 1: Principles of risk management



Principle	Description
Proportionate	Risk management activities must be proportionate to the level of risk faced by the organisation.
Aligned	Risk management activities need to be aligned with the other activities in the organisation.
Comprehensive	In order to be fully effective, the risk management approach must be comprehensive.
Embedded	Risk management activities need to be embedded within the organisation.
Dynamic	Risk management activities must be dynamic and responsive to emerging and changing risks.

Topic No 235: ISO31000:2018 – RISK MANAGEMENT – FRAMEWORK

- The principles of risk management and the **framework** are closely related.
- For example, one of the principles is that risk management should be integrated and one of the components of the framework is **integration**.
- The principle outlines what must be achieved, and the framework provides information on how to achieve the required **integration**.
- The ISO 31000 guidelines are centered on leadership and commitment.
- The effectiveness of risk management will depend on its **integration** into all aspects of the organization, including decision-making.
- The remaining components of the framework are **design, implementation, evaluation and improvement**. This approach is often represented in management literature as plan-do-check-act.
- ISO 31000 provides narrative description of how the framework should support risk management activities in an organization.
- This is often referred to as the **risk architecture, strategy and protocols** of the organization, as set out in Table 2.

RISK MANAGEMENT FRAMEWORK

- ARCHITECTURE
- STRATEGY
- PROTOCOLS

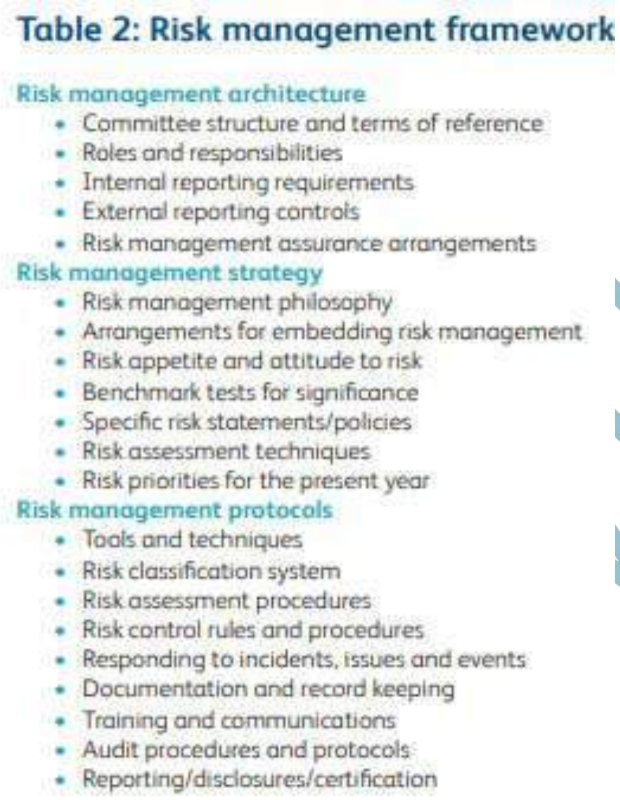


Table 2: Risk management framework

Risk management architecture

- Committee structure and terms of reference
- Roles and responsibilities
- Internal reporting requirements
- External reporting controls
- Risk management assurance arrangements

Risk management strategy

- Risk management philosophy
- Arrangements for embedding risk management
- Risk appetite and attitude to risk
- Benchmark tests for significance
- Specific risk statements/policies
- Risk assessment techniques
- Risk priorities for the present year

Risk management protocols

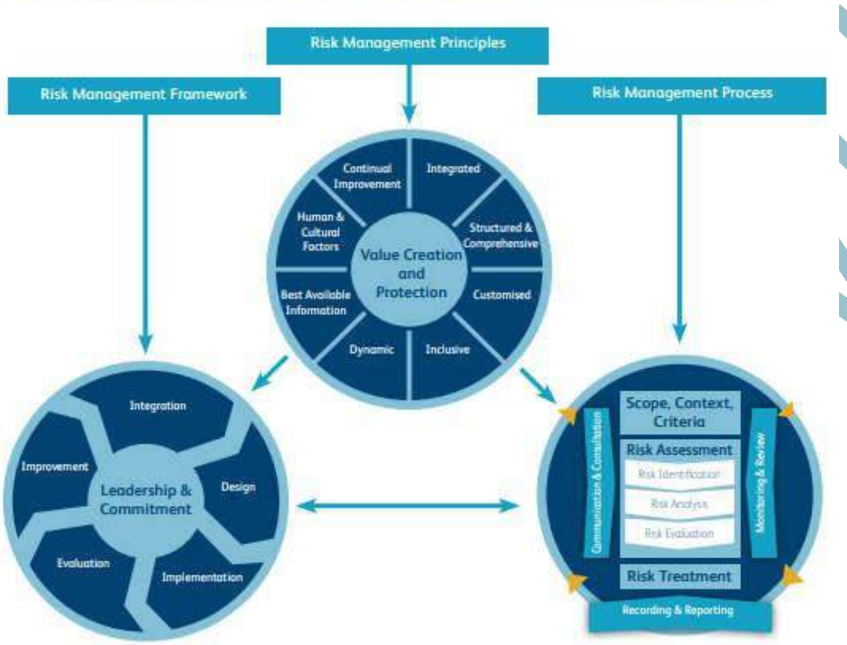
- Tools and techniques
- Risk classification system
- Risk assessment procedures
- Risk control rules and procedures
- Responding to incidents, issues and events
- Documentation and record keeping
- Training and communications
- Audit procedures and protocols
- Reporting/disclosures/certification

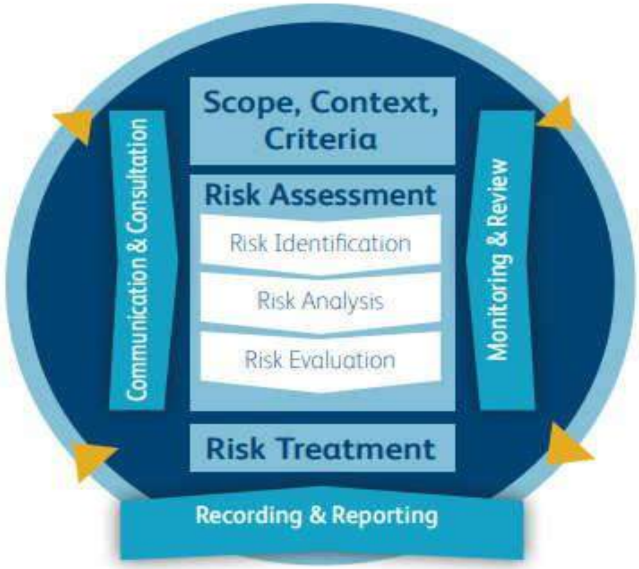
Topic No 236: ISO31000:2018 – RISK MANAGEMENT – PROCESS

A Risk Practitioners Guide To ISO31000:2018

https://www.theirm.org/media/3513119/IRM-Report-ISO-31000-2018-v3.pdf

Figure 3: Principles, framework and risk management process from ISO 31000





At the center of the risk management process are the activities of **risk assessment and risk treatment**.

Risk assessment is described as having the three stages of **risk identification, risk analysis and risk evaluation**.

- Each of the three stages is described in detail in ISO 31000 and it provides valuable insight into how risks can be **identified**, how they can be **analyzed** in terms of likelihood and consequences and finally, how they can be **evaluated** in relation to the **established risk criteria (risk appetite)** to determine whether additional action is required.

- Risk **treatment** is also a vitally important part of the risk management process and ISO 31000 provides information on the selection of **risk treatment options**, the preparation and implementation of **risk treatment plans**.
- ISO 31000 states that the selection of **risk treatment options** involves balancing the potential benefits of introducing further risk treatment (controls) against the associated cost, effort or disadvantages.
- The **risk treatment plan** should clearly identify the timescale and responsibilities for implementing the selected **risk treatments**.

Topic No 237: ISO31000:2018 – RISK MANAGEMENT – HOW TO IMPLEMENT

A Risk Practitioners Guide To ISO31000:2018

https://www.theirm.org/media/3513119/IRM-Report-ISO-31000-2018-v3.pdf

Successful implementation of a risk management initiative is an ongoing process that involves working through 10 activities below on a continuous basis. These activities relate to:

(1) Plan;

(2) Implement;

(3) Measure; and

(4) Learn.

Plan:

1. Identify intended benefits of the RM initiative and gain board support

2. Plan the scope of the RM initiative and develop common language of risk

3. Establish the RM strategy, framework and the roles and responsibilities

Implement:

4. Adopt suitable risk assessment tools and an agreed risk classification system

5. Establish risk benchmarks (risk criteria) & undertake risk assessments

6. Determine risk appetite and risk tolerance levels and evaluate the existing controls

Measure:

7. Evaluate effectiveness of existing controls and introduce improvements

8. Embed risk-aware culture and align RM with other activities in the organization

Learn

9. Monitor and review risk performance indicators to measure RM contribution

10. Report risk performance in line with obligations and monitor improvement

Although ISO 31000 covers the full scope of requirements for a management system, it is for the organization to convert those requirements into a checklist and action plan.

Topic No 238 & 239: INCIDENT MANAGEMENT- I & II

Information Security Incident Management

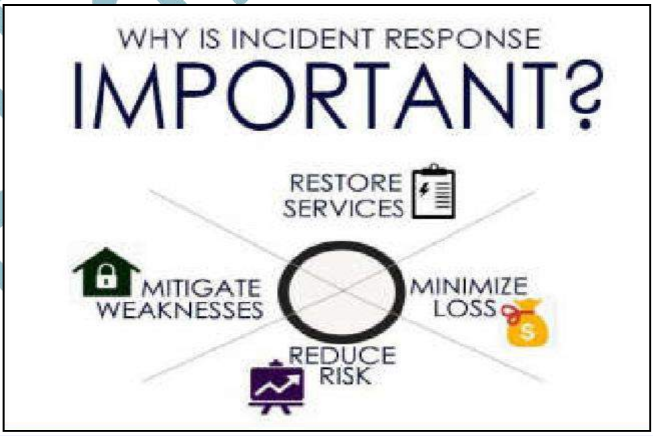
- Have a look at ISO27002: 2013 (Page 67+) for best practices guidance

Objective:

- "To ensure a consistent and effective approach to the management of information security incidents, including communication on security events and weaknesses."

Top 10 Considerations For Incident Response

https://www.owasp.org/images/9/92/Top10ConsiderationsForIncidentResponse.pdf



1. Audit & Due Diligence

Performing an audit will let you know how well prepared the organization is for Incident Responsein terms of:

- People
- Process
- Equipment

2. Create Response Team

- An Incident Response team should consist of people with sufficient technical skills. It is important that the team members consist of SME's (Subject Matter Experts) or Knowledge Engineers from different domains across the organization.
- Team lead
- Triage officer
- Incident handler

3. Create Documented IR Plan

- An organization should have a well-documented IR plan that would guide the IR Team during an incident.
- A comprehensive plan at minimum, should cover Roles & Responsibilities, Investigation, Triage and Mitigation, Recovery, and Documentation process.

4. Identify Indicators & Triggers

- What would be categorized as an incident at your organization?
- How important or weighty are the factors that would trigger an incident?
- Clearly define what can trigger an incident

5. Investigate the Problem

- Establishing , clearly what has occurred
- Identify what systems, people or processes have been compromised or affected based on incident
- Determine what happened & what was compromised
- Determine the point of origin of the incident where possible. This infers that you establish the source of the threat or attack vector
- Specify your investigation objectives, triage and resolution methodology

6. Triage & Mitigation

Investigation leads to the triage and resolution process. As the team identifies potential exposure, they should plan and execute effective mitigation accordingly:

- Classification of Incident
- Incident Prioritization
- Assigning specific tasks to specific people

7. Recovery

- Once a thorough investigation has been carried out, recovery is a significant step for restoring services or materials that might have been affected during an incident. This could be the task of the technical team (transition from active incident to standard monitoring)

8. Documentation & Reporting

- A comprehensive incident report is required in keeping with best practices and with the Incident Response plan. The type of reports that might be required might vary but should help in managing and reviewing incidents satisfactorily.

9. Process Review

Make intelligent decisions about important factors:

- Should I increase or decrease the number of Incident Handlers?
- What risks did we identify during the incident that needs to be followed up for action and monitored closely?

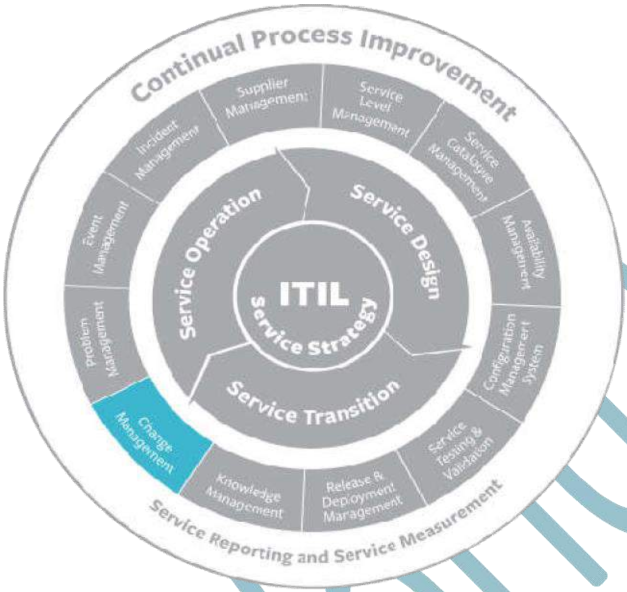
10. Practice, Practice, Practice

- Do not wait until an incident occurs before you put your team to work. Once the organization has a workable plan in place, it is advisable to run through part or all of it as a tabletop exercise, and run through various scenarios and drills.

Topic No 240: CHANGE MANAGEMENT-I

Until Change Management Best Practices

http://www.bmc.com/guides/itil-change-management.html



ITIL change management is a process designed to understand and minimize risks while making IT changes. Businesses have two main expectations of the services provided by IT:

1. The services should be stable, reliable, and predictable.
2. The services should be able to change rapidly to meet evolving business requirements.
3. These expectations are in conflict. The objective of change management is to enable IT service management to meet both expectations—to enable rapid change while minimizing the possibility of disruption to services.

Types of Changes

Standard changes are changes to a service or to the IT infrastructure where the implementation process and the risks are known upfront.

- These changes are managed according to policies that are the IT organization already has in place.
- Since these changes are subject to established policies and procedures, they are the easiest to prioritize and implement, and often don't require approval from a risk management perspective.

Normal Changes

- Those that must go through the change process before being approved and implemented. If they are determined to be high-risk, a change advisory board must decide whether they will be implemented.

Emergency Changes

- Arise when an unexpected error or threat occurs, such as when a flaw in the infrastructure related to services needs to be addressed immediately. A security threat is another example of an emergency situation that requires changes to be made immediately.

Topic No 241: CHANGE MANAGEMENT-II

Mission

The mission of the IT change management process is to implement changes in the most efficient manner, while minimizing the negative impact on customers when changes are implemented. KPIs for tracking success of the IT change management process are:

i. Successful changes: The number of changes that have been completed successfully compared to the total number of completed changes. The higher the percentage of successful changes, the better.

ii. Backlog of changes: The number of changes that are not yet completed. While this absolute number depends on the size of the organization, it should not grow over time.

iii. Emergency changes: The number of completed "emergency" changes. This absolute number depends on the size of the organization and should not increase over time.

Scope

The scope of the IT change management process is limited to change implementations that will cause:

i. A service to become unavailable or degraded during service hours

ii. The functionality of a service to become different

iii. The CMDB to require an update

iv. Other IT changes don't usually require formal change management. Instead, they can be tracked as standard IT activities.

IT Change Management Procedures

a. Request for change review: Change coordinators use this procedure when they are dealing with requests for change.

b. Change planning: Change coordinators and specialists employ this process to prepare the implementation plans for changes.

c. Change approval: The change manager and approvers (e.g., customer representatives and service owners) follow this procedure to approve planned changes.

d. Change implementation: Specialists use this process to implement infrastructure changes.

e. change closure: Specialists follow this procedure when they perform production tests after changes have been implemented, and change coordinators employ it to close out changes.

Topic No 242: CHANGE MANAGEMENT-III

CHANGE MANAGEMENT ROLES

The **change initiator** recognizes and identifies the need for change.

- The initiator should be someone who works directly with support services tools.
- Members of your team who provide support services to customers may be best suited for this position due to their frequent interaction with the system.
- The **change coordinator** assesses requests for change that originate from incident management, problem management, release management, or continuity management.
- The change coordinator registers changes as needed to handle requests for change or receives change requests from other change initiators; determines the risk and impact for requested changes;
- Prepares implementation plans by creating tasks; and monitors the progress of changes.
- The **change manager** is generally needed in mid-sized and larger organizations. If your IT department is part of a larger company, you will need to pick one or multiple persons to perform the role of change manager.

- These individuals are responsible for managing change procedures, receiving and prioritizing change requests, evaluating the risk level associated with requests, and keeping thorough records of the outcome of each change.
- The **change advisory board** is responsible for authorizing changes and further evaluating requests when the change manager determines that there is a high risk associated with these requests.
- The board takes into account the impact that a requested change may have on all affected parties.
- When these high-risk changes are brought to the attention of the change advisory board, the board will schedule a meeting with a detailed agenda to determine how to proceed.
- The **approver** decides whether to approve or reject changes.
- The **change implementation team** consists of the specialists on your team who are responsible for actually making changes.
- You will likely be part of this team and employees directly under you may also be assigned to implement changes.
- As an IT manager, you will often be responsible for overseeing changes.

Topic No 243: PROJECT MANAGEMENT FOR INFOSEC: PART 1

- **PART 1:**
  - Importance Of Project Management For Information Security
- **CYBER SECURITY CHALLENGES:**
  - Reactive
  - Superficial
  - Contention
  - Box-Approach
  - Governance-Overkill

Denial During The Last 10 Years

- Effective project management makes or breaks any project
- Project management is the sum-total of managing, organizing, and prioritizing all resources, and tasks in order to achieve a successful outcome within the stipulated timeframe
- Successful Security Transformation Implementation is heavily dependent upon the project being in the hands of an experienced project manager:
  - Has **authority**
  - Has **domain knowledge**
  - Has ability to suggest **solutions**
- In a nut-shell, effective project management for Security Transformation is about understanding the landscape, understanding what is required to solve the problem, **and being fully committed to ensure that the successful outcome is achieved within time**
- **Common Challenges During Projects:**
  - Discipline during the one year duration
  - Prior shortage of resources
  - New initiatives (diversions)
  - Constant slippage of tasks
  - Lack of commitment by team members

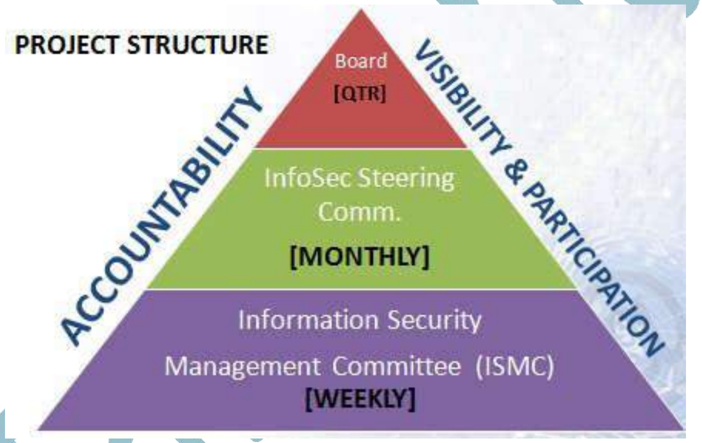
- Without bold, well-organized, disciplined, and committed project management, the Security Transformation cannot be achieved within an organization
- Effective project management is the cornerstone of achieving success for Security Transformation projects

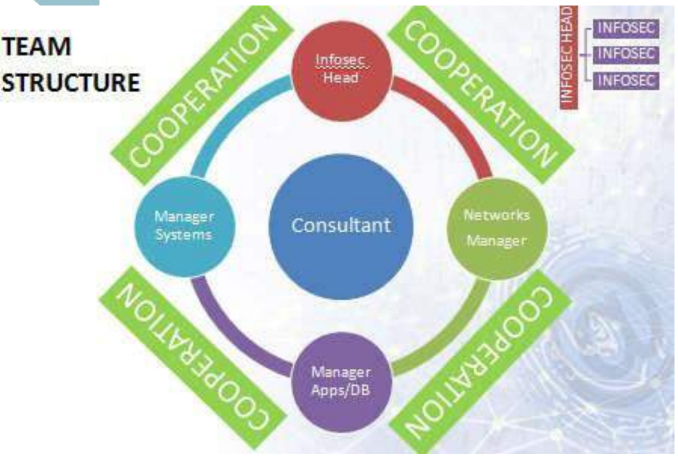
Topic No 244: PROJECT MANAGEMENT FOR INFOSEC: PART 2

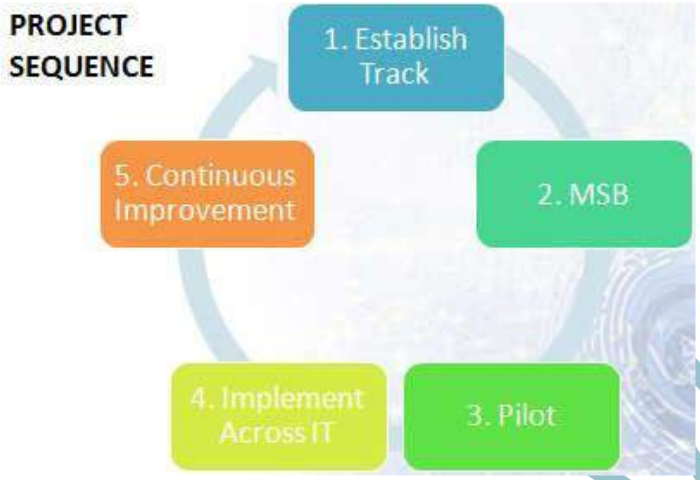
PART 2:

– STRUCTURE

- **Structure** refers to the hierarchy and organization of teams, their interaction along with frequency, reporting, and problem-resolution mechanisms







PROJECT SEQUENCE

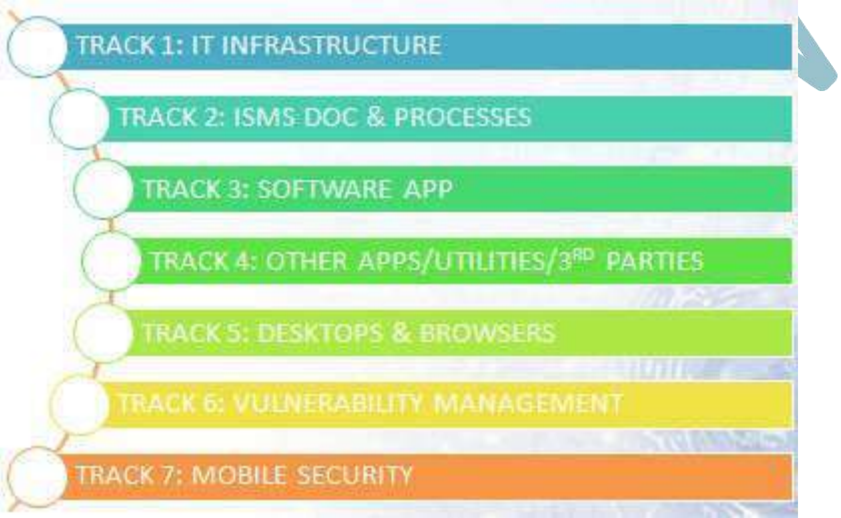
1. Establish Track

2. MSB

3. Pilot

4. Implement Across IT

5. Continuous Improvement



TRACK 1: IT INFRASTRUCTURE

TRACK 2: ISMS DOC & PROCESSES

TRACK 3: SOFTWARE APP

TRACK 4: OTHER APPS/UTILITIES/3RD PARTIES

TRACK 5: DESKTOPS & BROWSERS

TRACK 6: VULNERABILITY MANAGEMENT

TRACK 7: MOBILE SECURITY

- An effective project manager has a thorough understanding of what needs to be achieved, and is able to orchestrate resources, teams, hierarchy, and reporting in order to achieve a successful project outcome

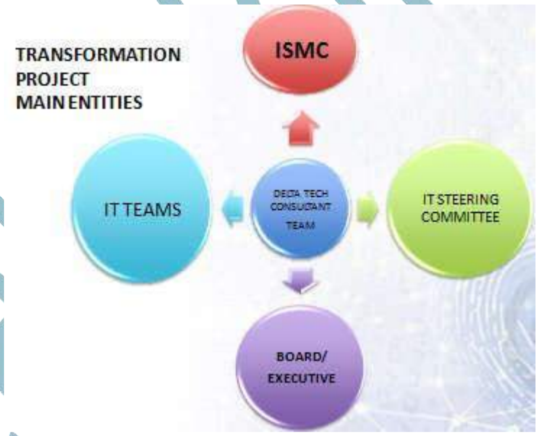
Topic No 245: PROJECT MANAGEMENT FOR INFOSEC: PART 3

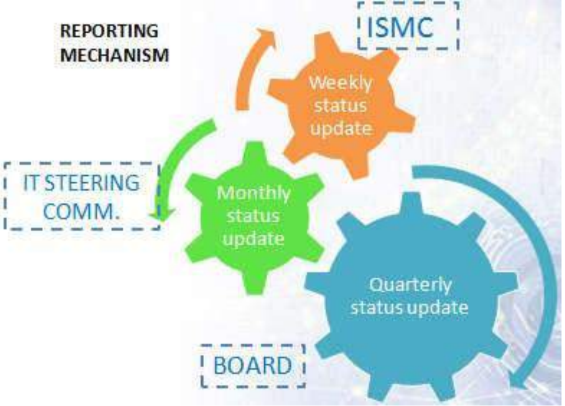
- **PART 3:**
  - REPORTING

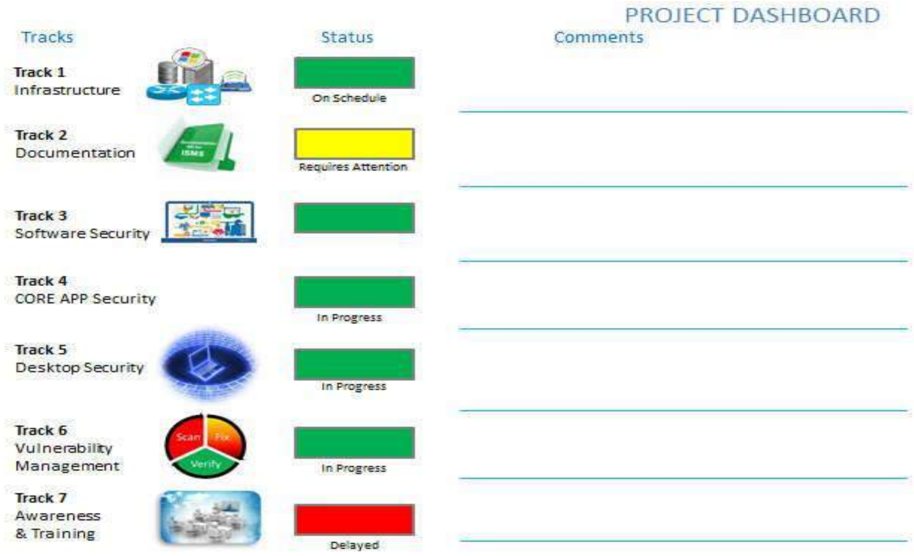
- **Reporting** is a critical component of effective project management and has the following objectives:

- **Reporting Objectives:**

1. Creating visibility
2. Keeping resources engaged for their inputs and involvement
3. Keeping management informed of successes & challenges
4. Creating credibility
5. Ensuring team members are on their toes


TRANSFORMATION PROJECT MAIN ENTITIES
ISMC
IT TEAMS
DELTA TECH CONSULTANT TEAM
IT STEERING COMMITTEE
BOARD/ EXECUTIVE





PROJECT DASHBOARD

Tracks	Status	Comments
Track 1 Infrastructure	🟩 On Schedule	
Track 2 Documentation	🟨 Requires Attention	
Track 3 Software Security	🟩	
Track 4 CORE APP Security	🟩 In Progress	
Track 5 Desktop Security	🟩 In Progress	
Track 6 Vulnerability Management	🟩 In Progress	
Track 7 Awareness & Training	🟥 Delayed	

ISMS
Scan
Fix
Verify

- **Dashboard Objectives:**

1. Provide simple & single view of all project tracks, and where the project stands
2. Highlight problem areas for management intervention and support
3. Monthly Steering Committee & Quarterly Board reports

Forum	Frequency	Report Format	Objectives
ISMC	WEEKLY	PDF MINS OF MEETING	IDENTIFY TASKS, RESPONSIBILITY, TIMELINE
STEERING COMMITTEE	MONTHLY	PPT PRESENTATION	INFORM RELEVANT HEADS OF PROGRESS, IDENTIFY CHALLENGES
BOARD MEETING	QUARTERLY	PPT PRESENTATION	CRITICAL LOOK AT PROGRESS ACHIEVED, IDENTIFY CHALLENGES & SOLUTIONS, SEEK ASSISTANCE

- By creating an accurate, honest, and disciplined reporting mechanism, the project manager ensures that all project stakeholders are informed, involved and helping where necessary for project success

Topic No 246: PROJECT MANAGEMENT FOR INFOSEC: PART 4

- **PART 4:**
  - LEADERSHIP
- The Security Transformation requires **significant effort** over a one year period
- All resources have to be **tightly focused** on the successful outcome
- Without leadership, the transformation cannot take place
- **Leadership:**

1. Authenticity
2. Openness and transparency
3. Respect for all individuals and teams
4. Creating motivation
5. Integrity
6. Boldness to take a stand

- Technical resources will always respect a leader who has knowledge of his/her domain, and is able to provide a clear and effective strategy
- **Security Transformation Leadership** is about creating trust, and a team environment to facilitate efforts resulting in positive outcome
- Security Transformation Leadership is about working with people, at all levels to create a credible and successful project

Topic No 247: Capacity Management – Part 1

- ISO27001:2013
  - 12.1.3: The use of resources should be monitored, tuned and projections made of future capacity requirements to ensure the required system performance
- What is capacity management?
  - *A*ims to ensure that the **capacity of IT services and the IT infrastructure is able to deliver the agreed service level** targets in a cost effective and timely manner.
  - The Capacity Management process **considers all resources required to deliver the IT service, and plans for short, medium and long term** business requirements.
- ITIL suggests three sub-processes:
  - **Business** capacity management
  - **Service** capacity management
  - **Component** capacity management
- **Business** capacity management:
  - Translates business plans and needs into requirements for IT services and architecture
  - As customers' business changes, so are service requirements changing. Change in service requirements usually has an impact on demand for capacity.
- **Service** capacity management:
  - Service capacity mngmt focuses on management, control and prediction of end-to-end performance of live IT services usage and workloads.
  - It's about measuring performance and comparing it to reqmts that are set in Service Level Agreements (SLAs) or Service Level Requirements (SLRs).
- **Component** capacity management:
  - Focuses on mngmt, control, performance prediction, utilization & capacity of technology components (e.g. a hard disc, processor, etc.).

Topic No 248: Capacity Management – Part 2

- In this module, lets look at capacity management guidance from **ISO27002:2013**
- ISO27002 guidance:
  - Capacity requirements should be identified, taking into account the **business criticality** of the concerned system.
  - **System tuning and monitoring** should be applied to ensure and, where necessary, improve the **availability and efficiency of systems**.
  - **Detective controls** should be put in place to indicate problems in due time.
  - **Projections of future capacity reqmts** should take account of **new business** and system reqmts and **current & projected trends** in the organization's info processing capabilities
  - Particular attention needs to be paid to any resources with **long procurement lead times or high costs;** therefore managers should monitor the utilization of key system resources.
  - Providing sufficient capacity can be achieved by **increasing capacity or by reducing demand.**
  - Examples of managing capacity demand include:

    a) **deletion of obsolete data** (disk space);

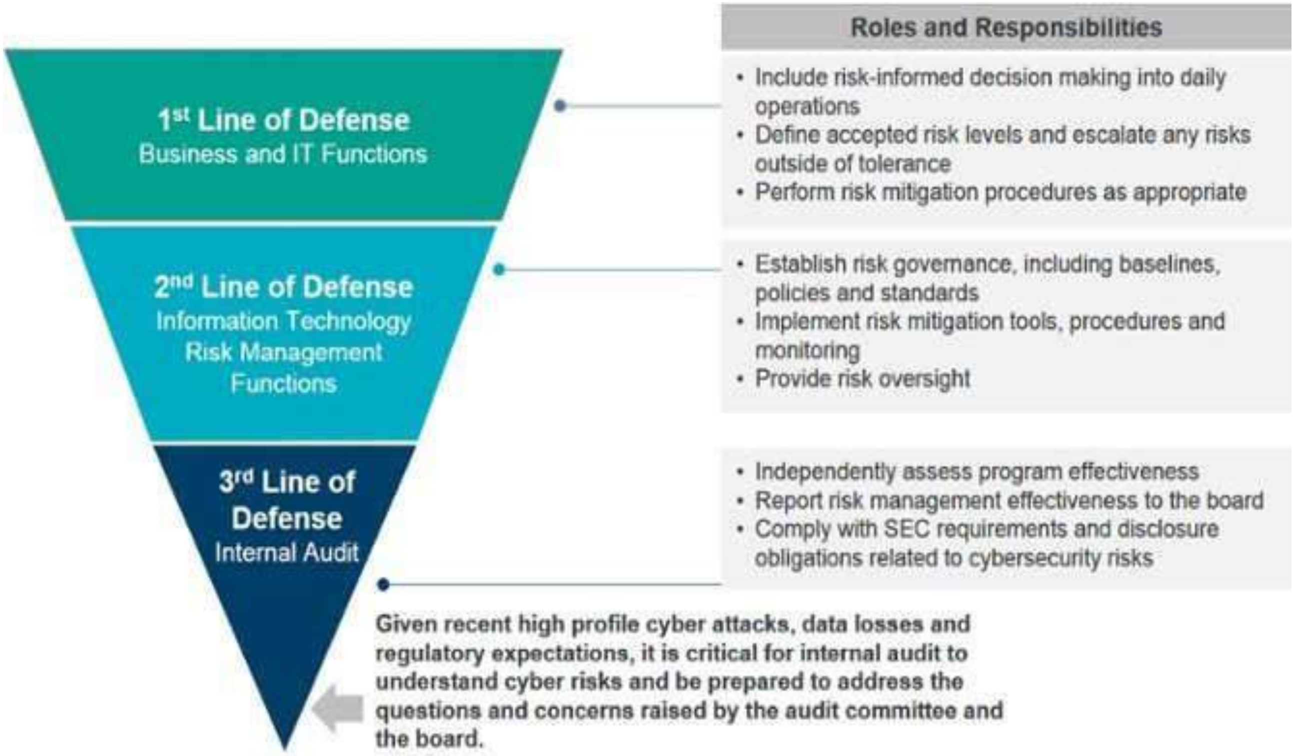
    b) **decommissioning** of applications, systems, databases or environments;

    c) **optimising** batch processes & schedules;
  - A documented capacity management plan should be considered for mission critical systems
  - Also consider human resources & offices/facilities

- **ITIL** looks at capacity management more in-depth under **service design phase**
- **ISO27002** provides some useful guidance
- In the industry we find that capacity management is not formalized as a process and lacks documentation

Topic No 249: RISK MANAGEMENT & INTERNAL AUDIT-I

Three Lines of Cyber Defense:



- Include risk-informed decision making into daily operations
- Define accepted risk levels and escalate any risks outside of tolerance
- Perform risk mitigation procedures as appropriate

- Establish risk governance, including baselines, policies and standards
- Implement risk mitigation tools, procedures and monitoring
- Provide risk oversight

- Independently assess program effectiveness
- Report risk management effectiveness to the board
- Comply with SEC requirements and disclosure obligations related to cybersecurity risks

Given recent high profile cyber attacks, data losses and regulatory expectations, it is critical for internal audit to understand cyber risks and be prepared to address the questions and concerns raised by the audit committee and the board.

1. Business & IT Functions (Management Control):

The first line encompasses the information security department as well as various business units that own their cyber risks. These entities need to understand how their assets are vulnerable and actively manage their cyber risks within organizationally acceptable tolerances. Sometimes called management control, this function is tasked with managing cyber risks by executing various controls. This means handling risk events, updating key risk indicators (KRIs), and deploying and managing controls that affect people, processes and technology.

2. Risk Management

- The second line of defense is composed of risk managers looking at aggregate risks at an enterprise level. It is often simply termed risk management but can also include compliance, legal, quality control and financial control.

- The second line looks at cybersecurity control frameworks, defines KRIs and metrics, creates risk assessments, and tests and reviews conformance by tracking the actions of the first line of defense and analyzing the impact of those actions to determine their effectiveness in mitigating cyber risks. In other words, this function monitors how management is doing in its handling of cyber risks by determining the extent that risks are actively monitored and appropriately managed.

- It is often performed under an umbrella of senior management and some board directors or a board-level committee, such as the audit committee or a risk committee. And, importantly, this second line can challenge the first line.

ISSUES WITH RISK MANAGEMENT IN PAKISTAN

1. Risk Management hierarchy not trained in IT
2. Separate Dept – not suitable given security maturity level
3. Seen as outsider
4. Low cooperation levels with IT

Topic No 250: RISK MANAGEMENT & INTERNAL AUDIT-I

Three Lines of Cyber Defense:

3. Internal Audit

- The third line of defense is internal audit. It may also include input from external auditors and/or regulators. This function, sometimes termed independent assurance, evaluates the overall process of cyber risk governance for the entire organization.
- It ensures that the organization's internal control framework is adequate for dealing with the risks the organization faces.
- As with the second line of defense, the third line can push back on the assertions of the previous lines regarding the adequacy of the controls in place. This function usually reports directly to the board or the audit committee.

Issues With Internal Audit In Pakistan

a. Not on the same page with other Depts
b. KPI seems to be highest number of observations – not organizational benefit
c. No common security vision in the organization
d. Large number of point observations do not help to improve the security posture
e. Internal audit not aware of IT team or security team framework being adopted

Topic No 251: MANAGEMENT REVIEW

How To Conduct ISO27001 Management Review

Purpose

- The purpose of the Management Review is to ensure the ISMS and its objectives continue to remain suitable, adequate and effective given the organisation's purpose, issues and risks.

Results

- The results of the management review will enable senior management to make well informed, strategic decisions that will have a material effect on information security and the way the organisation manages it.

What should be covered?

a) The status of actions from previous management reviews;

b) Changes in external and internal issues that are relevant to the information security management system;

c) Feedback on the information security performance, including trends in:

i. nonconformities and corrective actions;
ii. monitoring and measurement results;
iii. Audit results; and fulfillment of information security objectives.

d) Feedback from interested parties;

e) Results of risk assessment and status of risk treatment plan; and

f) Opportunities for continual improvement.

Who Should Attend?

- For the ISMS to be effective in an organization it needs senior management commitment and, as such, it makes sense for the members of an ISMS "Board' to have authority in matters pertaining to information security.

- Typically an ISMS Board might include the Chief Information Security Officer (CISO), Senior Information Risk Owner (SIRO), Chief Technical Officer and maybe even the CEO.
- The outputs of the management review will include decisions related to continual improvement opportunities and any needs for changes to the information security management system.

Topic No 252: Human Resource Security

In this module, lets look at human resource security.

- **Prior to employment (ISO27001):**
  - Screening
  - Terms & conditions of employment
- **ISO27002 guidance (Screening):**
  - availability of satisfactory character references, e.g. one business and one personal;
  - a verification (for completeness and accuracy) of the applicant's CV;
  - confirmation of claimed academic and professional qualifications;
  - independent identity verification (passport or similar document);
  - more detailed verification, such as **credit review or review of criminal records**
- **During employment (ISO27001):**
  - Management responsibilities
  - Awareness, education, and training
  - Disciplinary process
- **ISO27002 guidance (Disciplinary Process):**
  - The disciplinary process should not be commenced without prior verification that an infosec breach has occurred.
  - The formal disciplinary process should ensure **correct and fair treatment for employees** who are suspected of committing breaches of info security

  - The formal disciplinary process should provide for a **graduated response that takes into consideration factors such as the nature and gravity of the breach** and its impact on business;

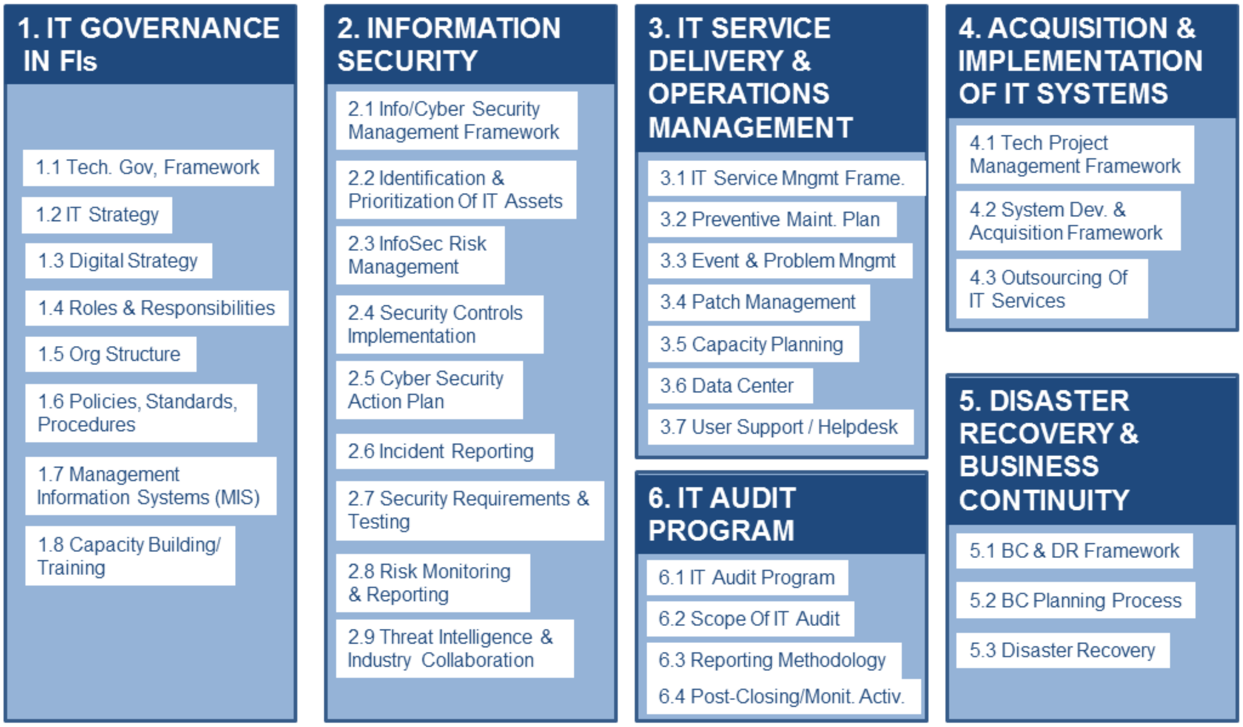
- **Termination or change of employment (ISO27001):**
  - Infosec responsibilities & duties are defined, communicated to employee or contractor & enforced

- **ISO27002 guidance (termination/change):**

- The communication of termination responsibilities should include **on-going infosec reqmts & legal responsibilities** &, where appropriate, responsibilities contained within any **confidentiality agreement & the terms & conditions of employment** continuing for a defined period after the end of the employee's or contractor's employment.
- As you can see, human resource security has quite a bit of detail
- ISO27002 provides very useful guidance and elaborates the ISO27001 controls

Topic No 253: SBP CIRC. # 5, TECHNOLOGY GOVERNANCE FRAMEWORK

Sbp Technology Governance And Risk Management Framework



1. IT GOVERNANCE IN FIs

1.1 Tech. Gov, Framework
1.2 IT Strategy
1.3 Digital Strategy
1.4 Roles & Responsibilities
1.5 Org Structure
1.6 Policies, Standards, Procedures
1.7 Management Information Systems (MIS)
1.8 Capacity Building/ Training

2. INFORMATION SECURITY

2.1 Info/Cyber Security Management Framework
2.2 Identification & Prioritization Of IT Assets
2.3 InfoSec Risk Management
2.4 Security Controls Implementation
2.5 Cyber Security Action Plan
2.6 Incident Reporting
2.7 Security Requirements & Testing
2.8 Risk Monitoring & Reporting
2.9 Threat Intelligence & Industry Collaboration

3. IT SERVICE DELIVERY & OPERATIONS MANAGEMENT

3.1 IT Service Mngmt Frame.
3.2 Preventive Maint. Plan
3.3 Event & Problem Mngmt
3.4 Patch Management
3.5 Capacity Planning
3.6 Data Center
3.7 User Support / Helpdesk

4. ACQUISITION & IMPLEMENTATION OF IT SYSTEMS

4.1 Tech Project Management Framework
4.2 System Dev. & Acquisition Framework
4.3 Outsourcing Of IT Services

5. DISASTER RECOVERY & BUSINESS CONTINUITY

5.1 BC & DR Framework
5.2 BC Planning Process
5.3 Disaster Recovery

6. IT AUDIT PROGRAM

6.1 IT Audit Program
6.2 Scope Of IT Audit
6.3 Reporting Methodology
6.4 Post-Closing/Monit. Activ.

OBJECTIVES

- The framework aims to provide enabling regulatory environment for managing risks associated with the acquisition, development, deployment and use of technology and shall serve as **SBP's baseline requirements for all FI(s).**
- The FI(s) shall **upgrade their systems, controls and procedures to ensure compliance** with this framework latest by **June 30, 2018.**
- The FI(s) shall assess and conduct a **gap analysis** between their current status & this framework and draw a **time-bound action plan to address the gaps and comply** with the guidelines in this framework

OVERVIEW

- The instructions are focused on **enhancing the proactive and reactive environments** in FI(s) to various facets and dimensions of technology including information security, technology operations, audit, business continuity, project/performance management and related domains (pg 5)

- FI(s) shall adopt an **integrated risk management approach to identify, measure, monitor and control technology risks** (page 5)
- The Framework consists of **6 domains and 35 sub-domains**
- Overall the **Framework is a combination of COBIT, ITIL, and ISO27001:2013 (ISMS)**

Implementation Mechanism

- Gap analysis
- Documentation
- Implementation

Topic No 254: CYBER SECURITY MATURITY MATRIX - OVERVIEW

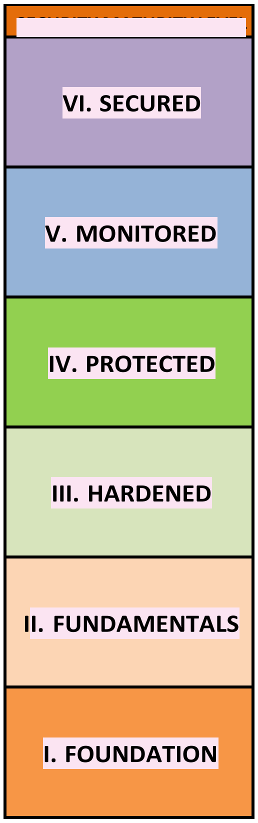
In this module we will introduce the Cyber Security Maturity Matrix (CSMM)

Industry Security Challenges:

- Grass-roots security controls have not been implemented
- Haphazard, reactive security approach
- Not following any structured security architecture or framework

What challenges does CSMM address?

- 5 characteristics of Information Security in Pakistan:
  - Reactive
  - Superficial
  - Box approach
  - Contention
  - Governance overkill



How is the local industry coping with security implementation?

a. Large organizations

b. Medium sized organizations

c. Small organizations

Issues with large organizations:

1. Missed out on security hardening
2. Vulnerability management effectively not being done as per Int’l best-practice
3. Attempting automation or box approach

Issues with medium sized organizations:

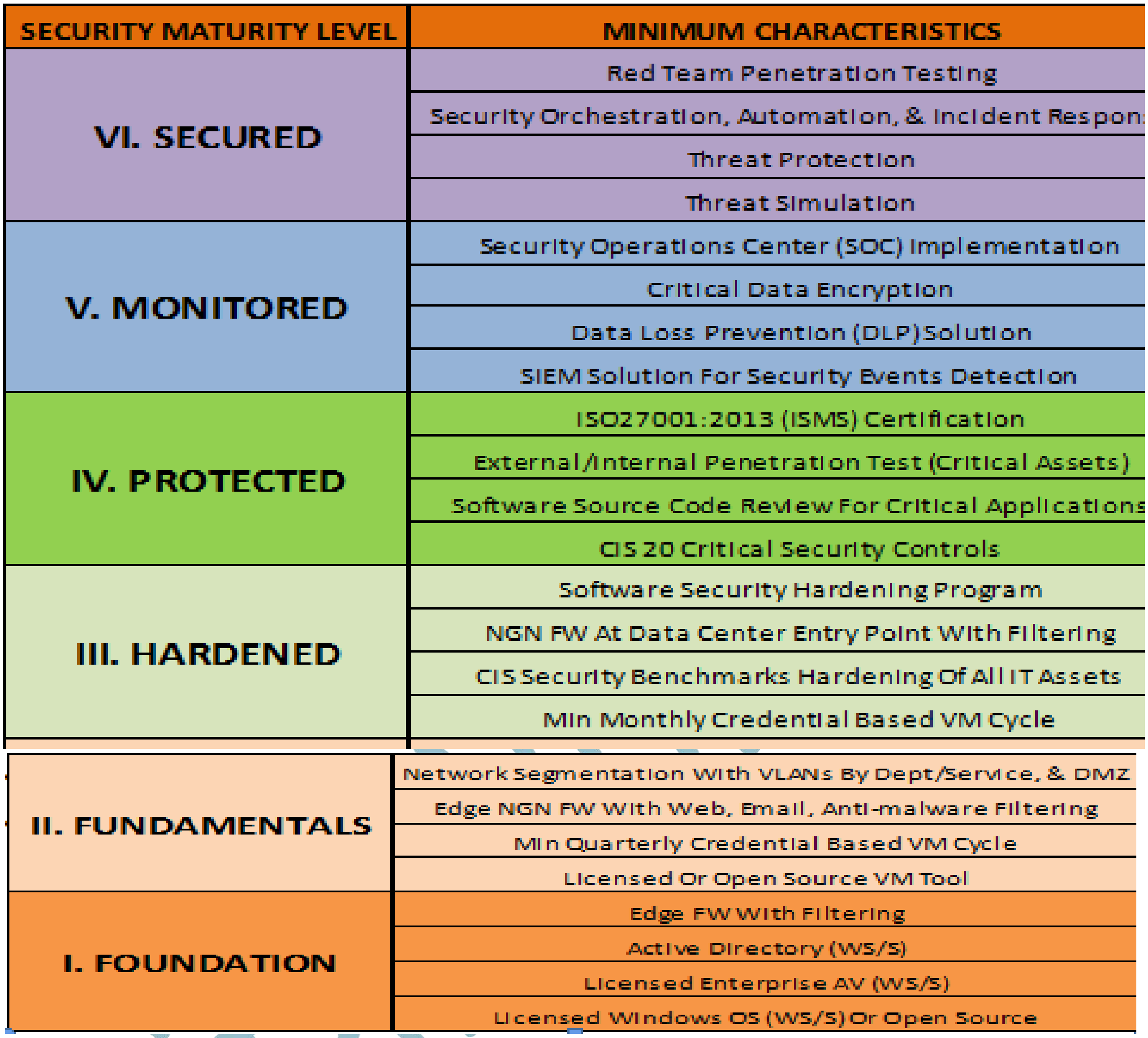
1. Don’t have sufficient security expertise and knowledge
2. Security was never a focus
3. Have built insecure IT networks just like the large organizations
4. VM and hardening missing here too

Issues with smaller organizations:

1. Mostly have pirated software
2. Enterprise antivirus and Microsoft Active Directory (AD) mostly missing
3. Not enough budget for security
4. No personnel allocated for security

The industry status:

1. Industry lacks a standard & authentic roadmap of how to achieve security
2. No mechanism to measure or certify security
3. Divergent understanding of how security will be achieved



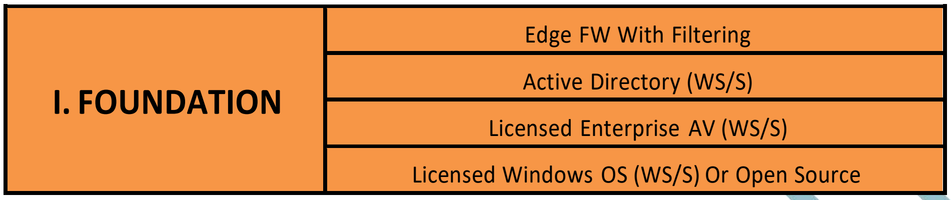
SECURITY MATURITY LEVEL	MINIMUM CHARACTERISTICS
VI. SECURED	Red Team Penetration Testing
	Security Orchestration, Automation, & Incident Respon
	Threat Protection
	Threat Simulation
V. MONITORED	Security Operations Center (SOC) Implementation
	Critical Data Encryption
	Data Loss Prevention (DLP) Solution
	SIEM Solution For Security Events Detection
IV. PROTECTED	ISO27001:2013 (ISMS) Certification
	External/Internal Penetration Test (Critical Assets)
	Software Source Code Review For Critical Applications
	CIS 20 Critical Security Controls
III. HARDENED	Software Security Hardening Program
	NGN FW At Data Center Entry Point With Filtering
	CIS Security Benchmarks Hardening Of All IT Assets
	Min Monthly Credential Based VM Cycle
II. FUNDAMENTALS	Network Segmentation With VLANs By Dept/Service, & DMZ
	Edge NGN FW With Web, Email, Anti-malware Filtering
	Min Quarterly Credential Based VM Cycle
	Licensed Or Open Source VM Tool
I. FOUNDATION	Edge FW With Filtering
	Active Directory (WS/S)
	Licensed Enterprise AV (WS/S)
	Licensed Windows OS (WS/S) Or Open Source

How does CSMM help?

- Offers a proactive, structured, sequential model to implement security
- Model is certifiable
- Cyber Security Certification Board (CSCB) will certify security status of organizations

Topic No 255: CSMM - LAYER 1 - FOUNDATION

- In this module we will introduce the Cyber Security Maturity Matrix (CSMM): layer 1



I. FOUNDATION	Edge FW With Filtering
	Active Directory (WS/S)
	Licensed Enterprise AV (WS/S)
	Licensed Windows OS (WS/S) Or Open Source

: LICENSED WINDOWS OR OPEN SOURCE

- Licensed windows (MS)
- Ubuntu open source
- Other numerous open source alternatives
- Basic requirement for a secure IT setup
- Pirated software infested with malware

: LICENSED ENTERPRISE ANTI-VIRUS

- Users usually do not update their AV
- Visibility dashboard, & central mngmt reqd
- Consistent mngmt of hundreds or thousands of anti-virus agents
- Many anti-virus agents are out-of-synch with the update-server

: ACTIVE DIRECTORY (AD)

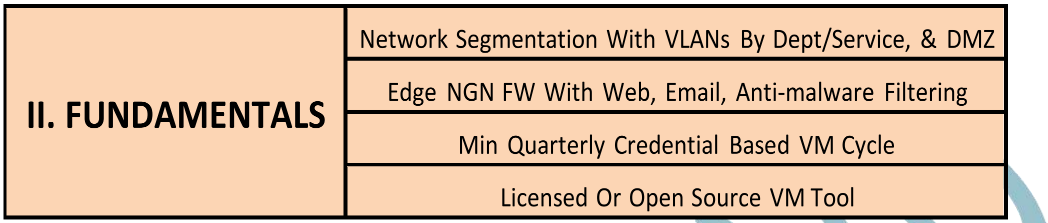
- Active Directory (AD) is essential not only to regulate account management (authentication and authorization) but also to enforce and manage security controls

: Edge FW with Filtering

- Forms first line of perimeter defense
- Filtering of incoming and outgoing traffic
- DMZ for hosted services
- Policy enforcement for security

Topic No 255: CSMM - Layer 2 - Fundamentals

- In this module we will introduce the Cyber Security Maturity Matrix (CSMM), layer 2



II. FUNDAMENTALS	Network Segmentation With VLANs By Dept/Service, & DMZ
	Edge NGN FW With Web, Email, Anti-malware Filtering
	Min Quarterly Credential Based VM Cycle
	Licensed Or Open Source VM Tool

: LICENSED OR OPEN SOURCE VM TOOL

- Vulnerability management or patch management is a foundational layer of security practice
- Open source: OpenVAS
- Licensed: Qualys, Nessus, Rapid7

: MIN QUARTERLY CREDENTIAL BASED VM CYCLE

- For those organizations that have not conducted VM practice before
- International best-practice is weekly VM cycle

: Edge NGN FW With Web, Email, Anti-malware Filtering

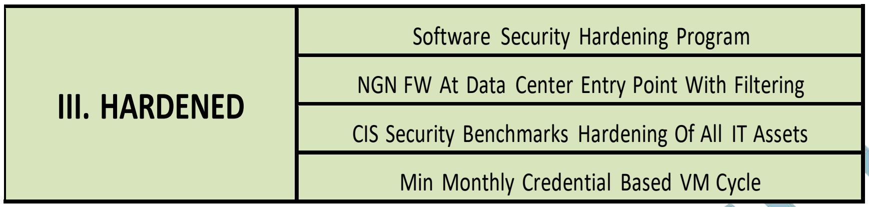
- Typical NGN FW: Fortinet
- Features: VPNs, web filtering, email anti-spam filtering, Antivirus, anti-malware, application visibility & control, access-lists

2.4. Network Segmentation With VLANs by Dept./Service & DMZ

- Network segmentation helps create separate broadcast domains
- Separate policies and filtering possible for each separate VLAN
- Helps manage traffic
- Segregates traffic into traffic-types

Topic No 257: CSMM - LAYER 3: HARDENED

- In this module we will introduce the Cyber Security Maturity Matrix (CSMM), layer 3



III. HARDENED	Software Security Hardening Program
	NGN FW At Data Center Entry Point With Filtering
	CIS Security Benchmarks Hardening Of All IT Assets
	Min Monthly Credential Based VM Cycle

: Minimum Monthly Credential Based VM Scan

- Now moved to monthly scan from quarterly scan
- Credential based scan from non-credential scan

: CIS BENCHMARKS HARDENING OF ALL IT ASSETS

- Hardening covered in detail in this course
- Planning, pilot, production implementation
- Usually takes 6-8 months depending upon size of organization

: NGN FW At Datacenter Entry Point With Filtering

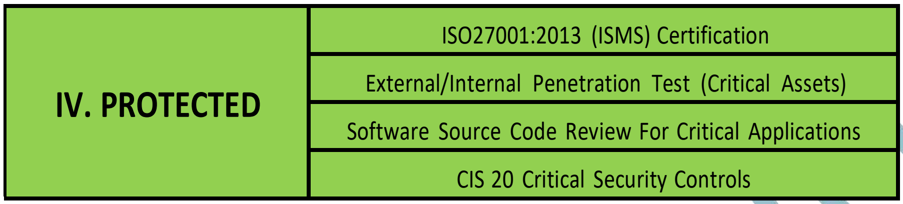
- Filtering and malware protection at datacenter entry point often ignored
- All traffic including internal user traffic entering or exiting data center needs to be filtered

: Software Security Hardening Program

- Software security program needs to be developed
- Software security hardening: controls identification, pilot controls implementation, validation, testing, change mngmt, PROD

Topic No 258: CSMM - LAYER 4: PROTECTED

- In this module we will introduce the Cyber Security Maturity Matrix (CSMM), layer 4



IV. PROTECTED	ISO27001:2013 (ISMS) Certification
	External/Internal Penetration Test (Critical Assets)
	Software Source Code Review For Critical Applications
	CIS 20 Critical Security Controls

: CIS 20 CRITICAL SECURITY CONTROLS

- Aggregate control set covering all aspects of IT
- CIS benchmarks covered individual asset hardening
- Excellent set of security controls
- Sets out International best-practices

: Software Source Code Review For Critical Applications

- Source code review is a specialized activity which may be conducted in a manual or automated manner
- Specific to the software technology platform
- Peer or third-party

: External/Internal Penetration Test (Critical Assets):

- and security hardening has been performed
- Third-party review of vulnerabilities and hacker-view of assets

: ISO27001:2013 (ISMS) Certification

- Global gold standard for Information Security governance
- Needs to be wisely used as it is both deep and broad
- Utilize as security governance framework leveraging VM and security hardening

Topic No 259: CSMM - LAYER 5: MONITORED

- In this module we will introduce the Cyber Security Maturity Matrix (CSMM), layer 5

V. MONITORED	Security Operations Center (SOC) Implementation
	Critical Data Encryption
	Data Loss Prevention (DLP) Solution
	SIEM Solution For Security Events Detection

: SIEM SOLUTION FOR SECURITY EVENTS DETECTION

- SIEM solutions provide security log collection, dashboard reporting, root-cause analysis, and correlation
- Leading SIEM solutions: LogRhythm, IBM Q-Radar, Splunk, Elastic Search

: DATA LOSS PREVENTION (DLP) SOLUTION

- Classification, visibility, and control of data
- Monitoring and blocking of data leakage and data exfiltration
- Network DLP and system DLP (agent)

: CRITICAL DATA ENCRYPTION

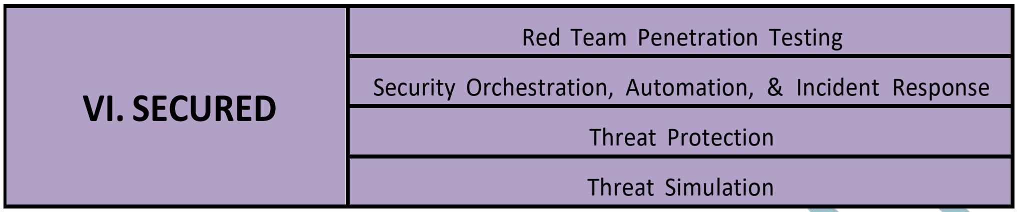
- Protect intellectual property and confidential information
- Confidentiality and integrity of data
- Encrypt data at rest, in transit, and in use
- Laptop HDD and removable media

: SECURITY OPERATIONS CENTER (SOC) IMPLEMENTATION

- After implementation of the first four layers, its time to consolidate security operations
- People, process, and technology/tools
- Similar to a NOC but for security purposes
- SIEM is starting point

Topic No 260: CSMM - LAYER 6: SECURED

- In this module we will introduce the Cyber Security Maturity Matrix (CSMM), layer 6



VI. SECURED	Red Team Penetration Testing
	Security Orchestration, Automation, & Incident Response
	Threat Protection
	Threat Simulation

: THREAT SIMULATION

- Platform such as Redwolf Security (www.redwolfsecurity.com)
- Security testing, load testing, and DDOS testing
- Misconfigured security devices and incident response

: THREAT PROTECTION

- Various threat protection solutions
- Best solutions will map to the vulnerability condition of your IT assets e.g. Qualys Threat Protect
- Helps to pinpoint most critical assets and prioritize patching
- Protection Live Threat Intelligence Feed displays the latest vulnerability disclosures and maps them to your impacted IT assets. You can see the number of assets affected by each threat, and drill down into asset details.

: SECURITY ORCHESTRATION, AUTOMATION, AND INCIDENT RESPONSE

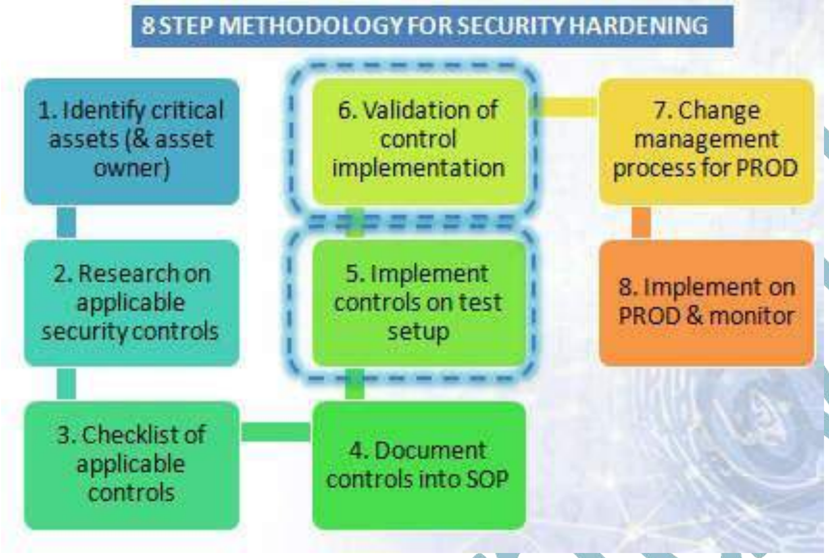
- Solution such as Cybersponse (www.cybersponse.com)
- From triaging and investigating alerts to collaboration and remediation between team members, CyberSponse takes your security operation team to the next level.

: RED TEAM PENETRATION TESTING

- Red team and blue team
- Attack & defense simulation
- Continuously find holes in security defenses
- Uncover security vulnerabilities before hackers exploit them

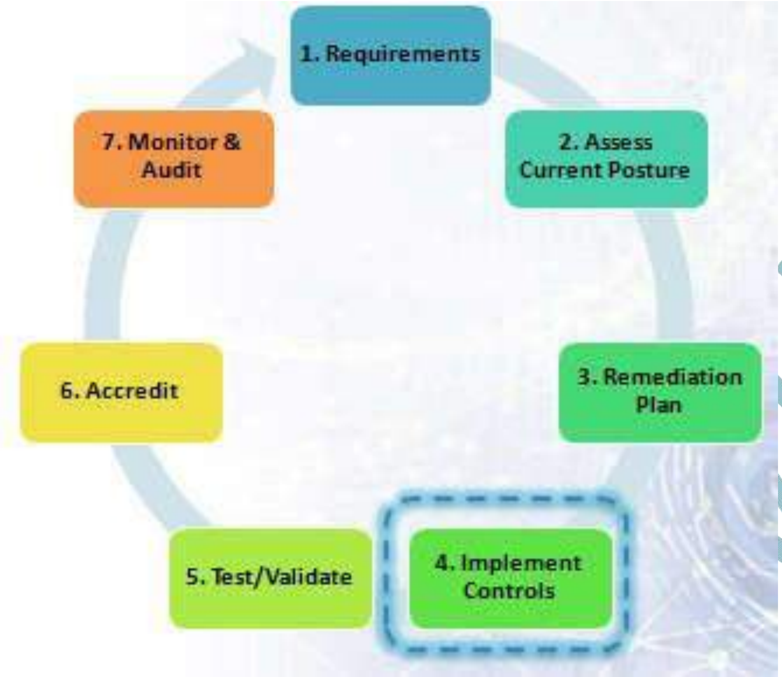
Topic No 261: InfoSecurity Lifecycle – Security Validation

- Lets have a re-look at the 8-Step Security Hardening Methodology

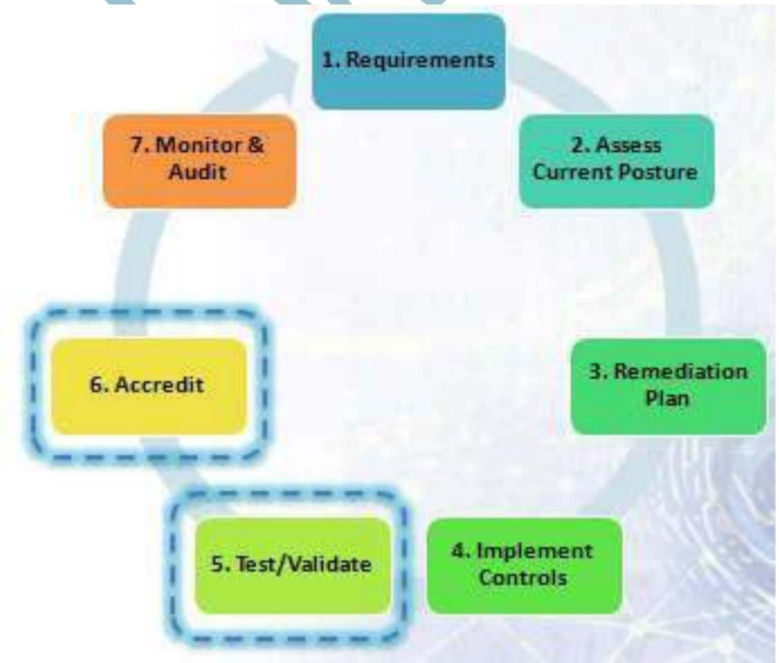


8 STEP METHODOLOGY FOR SECURITY HARDENING
1. Identify critical assets (& asset owner)
2. Research on applicable security controls
3. Checklist of applicable controls
4. Document controls into SOP
5. Implement controls on test setup
6. Validation of control implementation
7. Change management process for PROD
8. Implement on PROD & monitor

- **Validation during security hardening**:
  - Purpose here is to only **validate or confirm** that the intended controls have **been correctly and completely applied** in the pilot setup
  - Nothing mentioned for production environment
  - Nothing mentioned for **BUSINESS LAUNCH (GO-LIVE)**
- Now lets look at the more comprehensive Information Security Lifecycle (7 stages) which is not specific to security hardening



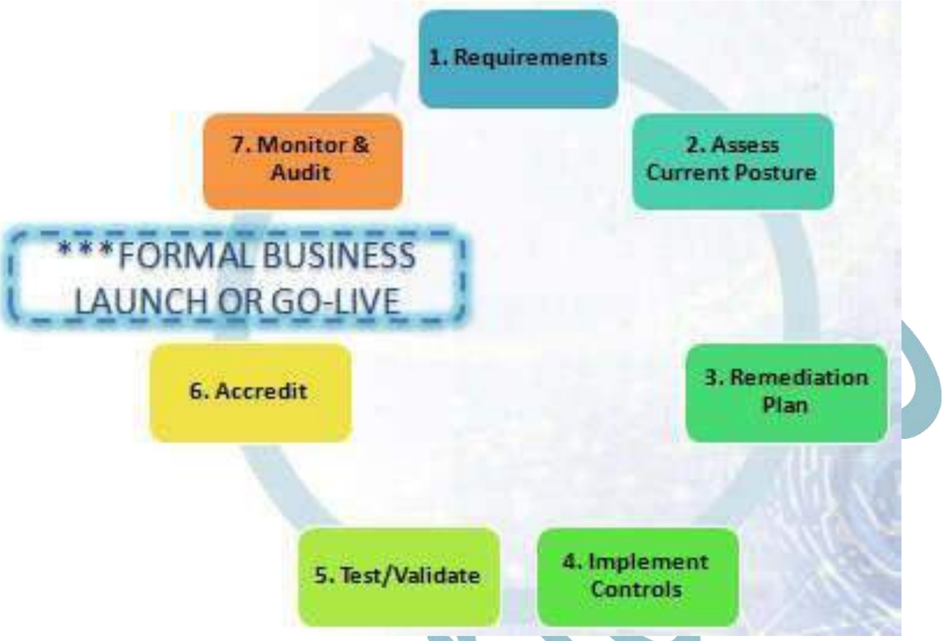
- In the Information Security Lifecycle chart, we have already gone into production **"environment"** with Stage 4
- However, formal approval for **BUSINESS LAUNCH** (GO-LIVE) has not yet been issued
- **Security accreditation has not taken place**



- In the Information Security Lifecycle chart Stage 5 & 6:

– Refer to activities carried out in PRODUCTION "environment"

- But before Business launch (GO-LIVE) has taken place



- The formal **business launch or GO-LIVE** only takes place after Information Security team **accredits** that the new application/portal or service is secure
- Business launch or GO-LIVE also has business related activities as dependencies such as marketing, & other
- Business launch or GO-LIVE **dependencies**:
  - UAT & application **bug testing and feature testing**
  - **Facilities** readiness
  - **Sales & marketing** Launch **ceremony**
  - **Partner** readiness
  - Org **service readiness**

- Lets look at the following steps in more detail and granularity in the following modules:
  - Security **validation**
  - Security **testing**
  - Security **accreditation**

Topic No 262: What is Security Validation?

- **What does security validation mean?**
  - To confirm via **walk-through of system or device** that the security controls implemented by an IT team have **actually been implemented correctly**
- **Who implements the security controls?**
  - Under the Security Transformation Model, security controls are implemented by the IT teams
- **Who conducts security validation?**
  -
- **Why do we need to validate security controls?**
  - To check the **completeness** of the controls
  - To check the **correctness** of the controls
  - As an overall **assurance**

1. To check the **completeness** of the controls:
   - Usually **100's of controls** need to be implemented
   - There may be **genuine omissions** by technical team members
   - There may have been **errors** made
2. To check the **correctness** of controls:
   - Technical **capabilities of teams** vary
   - Technical capabilities of **team members** vary
   - A technical issue may not have been understood correctly

3. As an overall assurance:
   - IT team may not have sufficient resources to ensure 100% completeness and correctness
   - Implementation by IT and validation by Information Security team forms a healthy team relationship
   - This is also referred to as **maker-checker** principal

- Some of the controls may have been designated as **"not-applicable"** or **"not possible"** and the reasons and justification needs to be reviewed
- **Significant resources are allocated** to the security transformational program; **even one control missed** may affect the security posture
- **Uncovered** at the time of **hack/attack**
- **Ability, integrity and diligence** of team members are key factors
- **Healthy technical debate and cross-checks** have a **positive outcome** on the program

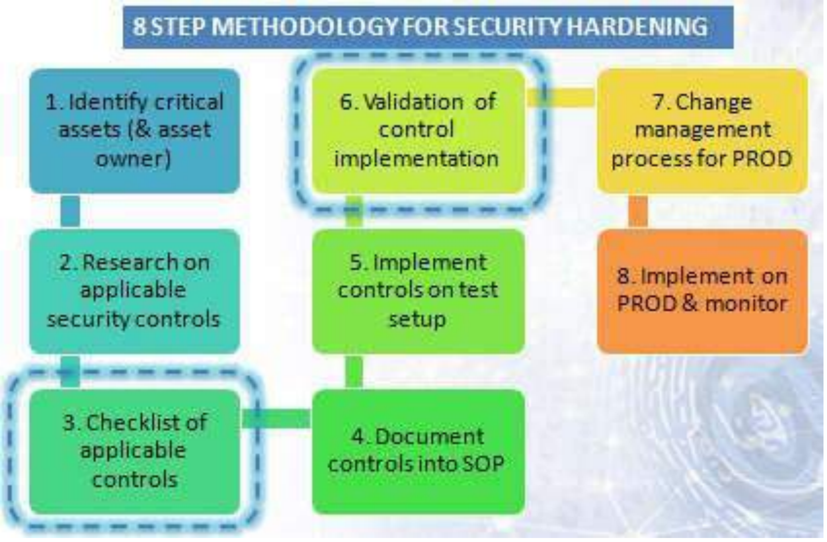
The Information Security team or the ISMC is tasked with the **overall responsibility** of the success of the program

Any **lapses discovered later** fall **squarely** under the **responsibility of InfoSec/ISMC**

- Security validation becomes an **essential activity** and needs to be established in an environment of **healthy & professional commitment** to ensure the **100% complete and correct implementation & upkeep** of the controls

Topic No 263: How is Security Validation Performed?

- **Ownership** of security validation lies with Information Security team, alternately with an Information Security consultant
- **Driven by ISMC or Head of Information Security**
- **Security validation is the same** irrespective if performed specific to 8-Step Security Hardening (Model) or to the Information Security Lifecycle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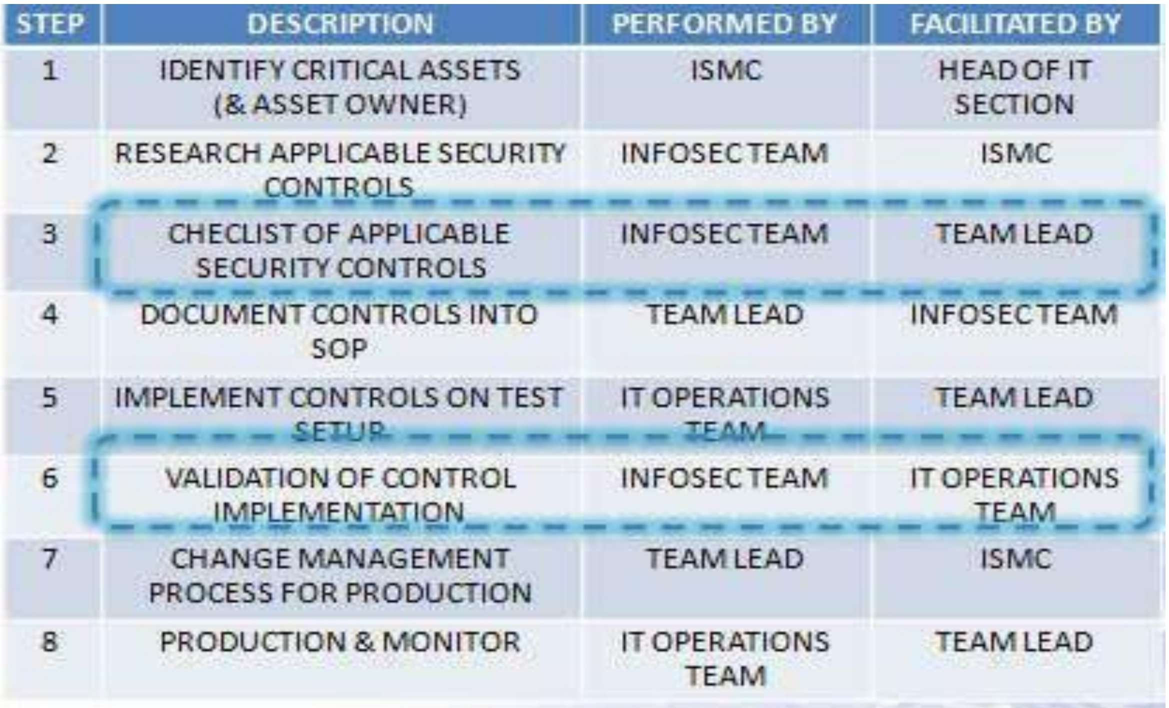
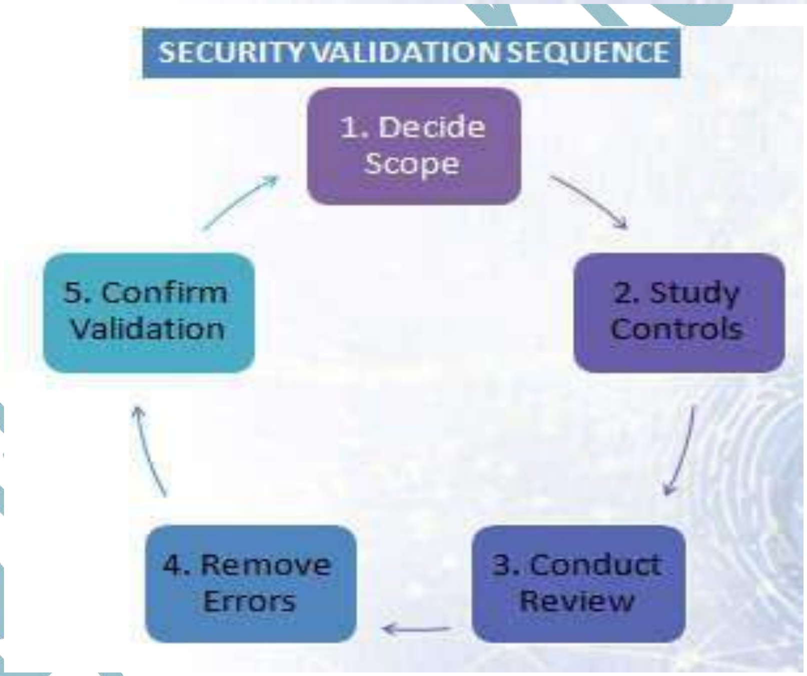


STEP	DESCRIPTION	PERFORMED BY	FACILITATED BY
1	IDENTIFY CRITICAL ASSETS (& ASSET OWNER)	ISMC	HEAD OF IT SECTION
2	RESEARCH APPLICABLE SECURITY CONTROLS	INFOSEC TEAM	ISMC
3	CHECLIST OF APPLICABLE SECURITY CONTROLS	INFOSEC TEAM	TEAM LEAD
4	DOCUMENT CONTROLS INTO SOP	TEAM LEAD	INFOSEC TEAM
5	IMPLEMENT CONTROLS ON TEST SETUP	IT OPERATIONS TEAM	TEAM LEAD
6	VALIDATION OF CONTROL IMPLEMENTATION	INFOSEC TEAM	IT OPERATIONS TEAM
7	CHANGE MANAGEMENT PROCESS FOR PRODUCTION	TEAM LEAD	ISMC
8	PRODUCTION & MONITOR	IT OPERATIONS TEAM	TEAM LEAD



SECURITY VALIDATION SEQUENCE

1. Decide Scope

2. Study Controls

3. Conduct Review

4. Remove Errors

5. Confirm Validation

1. **Decide Scope**
    - Acquire checklist of applied controls from IT team
    - Decide stakeholders who will conduct review (IT & InfoSec)
    - Schedule the review and send formal email to IT (plus calendar invite)

2. **Study Controls**
    - Information Security team to acquire original controls from CIS/DISA/other

- Study & understand the controls
- Mark the checklist & ensure correctness
- Prepare docs & notes for actual review

3. Conduct Review

- One person to conduct review & one to take notes
- Walkthrough of each control
- Random sampling of controls (20-30%)
- Agree on any action items for shortcomings with timeline

Important to discuss & understand controls marked by IT team as:

- Not-applicable
- Not-possible

Understand reasoning

Verify dependencies if any

Challenge the IT team view wherever appropriate

4. Remove Errors:

- IT team to remove any shortcomings or omissions in control implementation
- IT team reports back to InfoSec team when all shortcomings fixed

5. Confirm Validation

- InfoSec team schedules another session with IT team to confirm that all shortcomings have been removed
- InfoSec team adds a confirmation column & comments column to checklist
- Status of validation communicated to relevant IT teams & stakeholders
- Records updated to register the validation activity
- Project management stats updated accordingly (% complete)

Topic No 264: What Is Security Testing?

- **What is security testing?**
  - Security testing is a process intended to reveal flaws in the security mechanisms of an information system that protect data and maintain functionality as intended
- **Security testing is not validation**
  - Security testing consists of running tests through a manual process or automated tools to discover weaknesses, flaws, or bugs in the software, application or device
- **Types of security testing:**
  - Vulnerability assessment (VA)
  - Penetration testing (PT)
  - Other security tests through various automated tools
  - Code review (initiated in test environment)

1. **Vulnerability assessment:**
   - VA scanners have various tests built-in such as for malware, vulnerabilities, web application flaws (e.g. OWASP top ten)
   - Compliance scanning against CIS/DISA benchmarks

2. Penetration Testing:

- Penetration testing (also called pen testing) is the practice of testing a computer system, network or Web application to find vulnerabilities that an attacker could exploit.
- Usually outsourced to a third-party depending on nature and criticality of the application or service being launched
- Highly specialized skill not commonly found in-house
- Pen tests can be automated with software applications or they can be performed manually. Either way, the process includes gathering information about the target

before the test (reconnaissance), identifying possible entry points, attempting to break in (either virtually or for real) and reporting back the findings.

3. Other security tests:

- If the testing is being conducted in-house, the tests should be conducted in the pilot/testing/staging environment and re-validated in the Production environment
- If the testing is being conducted by a third-party specialist (such as for penetration testing), it will normally be conducted only in the Production environment (prior to GO-LIVE)

Other security tests (in-house):

- In-house testing capability & experience
- Conduct the tests (e.g. OWASP ZAP tool)
- Report findings
- Re-confirm once remediation done by IT

Other security tests (outsourced):

- As mentioned, will most likely be conducted in Production environment, prior to GO-LIVE
- Follow same sequence as for in-house testing

4. Code review:

- Code review examines flaws and vulnerabilities in programming source code
- A complete cycle, initiated early and in pilot testing phase
- May be conducted for production applications as well
- Requires a mature internal process, experience and capability
- May be integrated with software QA testing

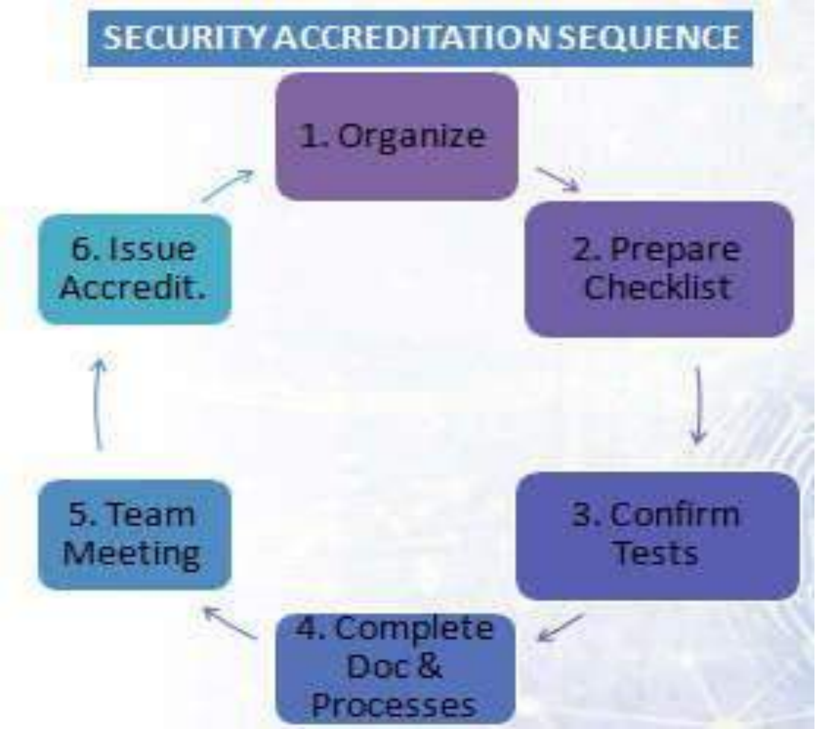
Topic No 265 & 266: What Is Security Accreditation?

- **What is security accreditation?**
  - Accreditation is the formal acceptance of the adequacy of the system's overall security by the management (SANS)

- Whenever a new, **significant portal, application, or service is launched**, management requires **Information Security team to certify after carrying out the required security validation & security testing** that the

- Security of the new portal/application or service has been **thoroughly examined & tested** and **meets the min requirements** as per **organizational security policy**

- That the new portal/application is safe & secure & is **free from security risks**



Security Accreditation Sequence

1. **Organize**

– Collect all security **requirements**, related security **policy & SOPs**, hardening checklists, validation **status reports**, **test reports**, completion status reports Information Security team ensures that the full context of the security risks/impact are understood

– Subsequent security hardening & testing has been fully covered

2. Prepare Checklist & Share With Stakeholders

– Checklist should cover all activities & their status for completion of accreditation

– Share with stakeholders for feedback

3. Confirm Tests

– Core activity: confirm that **all test reports are satisfactory**

– All tests and follow-up remediation measures have been completed

4. Documentation & Processes (Complete)

– Reconfirm **correct versions**

– Re-check **checklists, SOPs**

– **Backups & DR**

– All **change control measures** & **sign-offs**

– Re-check all **management approvals**

– Re-check **UATs,** customer sign-offs

– Check **application performance** issues

5. Team Meeting

– Call team meeting and **report status** of all activities

– List any **snags** & decide completion dates

– Seek **stakeholder sign-off** on accreditation form

- Clarify & recap security requirements & SOPs
- Clarify **what actions will invalidate** the security accreditation

6. Issue Accreditation

- Once all details completed on accreditation sign-off form issue accreditation
- Business has GO-LIVE permission using tested versions
- Enter activities for accredited IT assets into IT audit program
- Update Operations teams, incident management, and risk management register

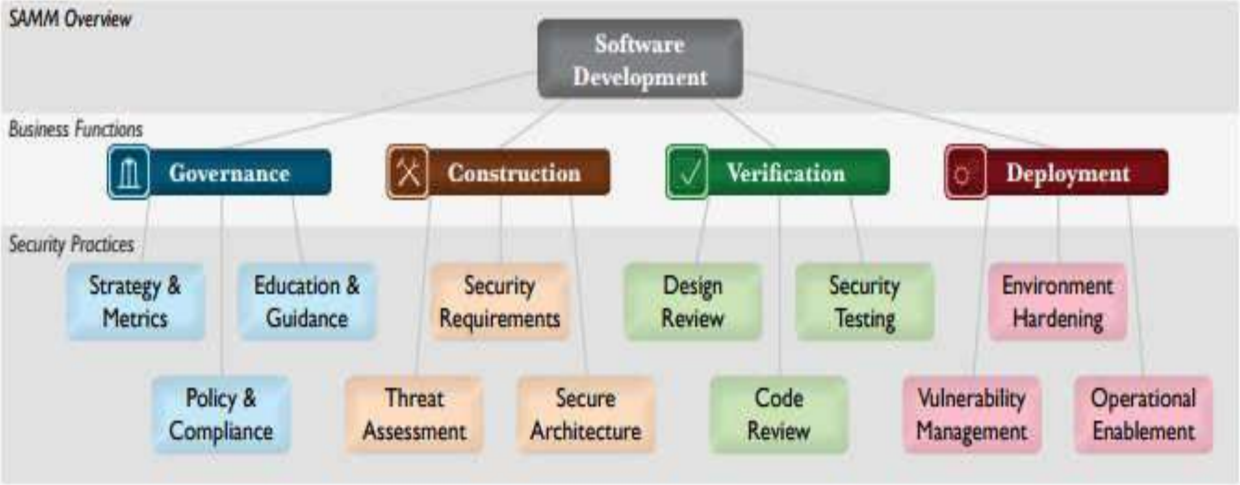
Topic No 267: Embedding InfoSec Lifecycle into SDLC

- The systems development life-cycle (SDLC) should embed the Information Security activities forming a sec-SDLC (secure SDLC)
- Software Assurance Maturity Model (SAMM) developed by OWASP
  - A guide to building security into software development
  - 96 page PDF

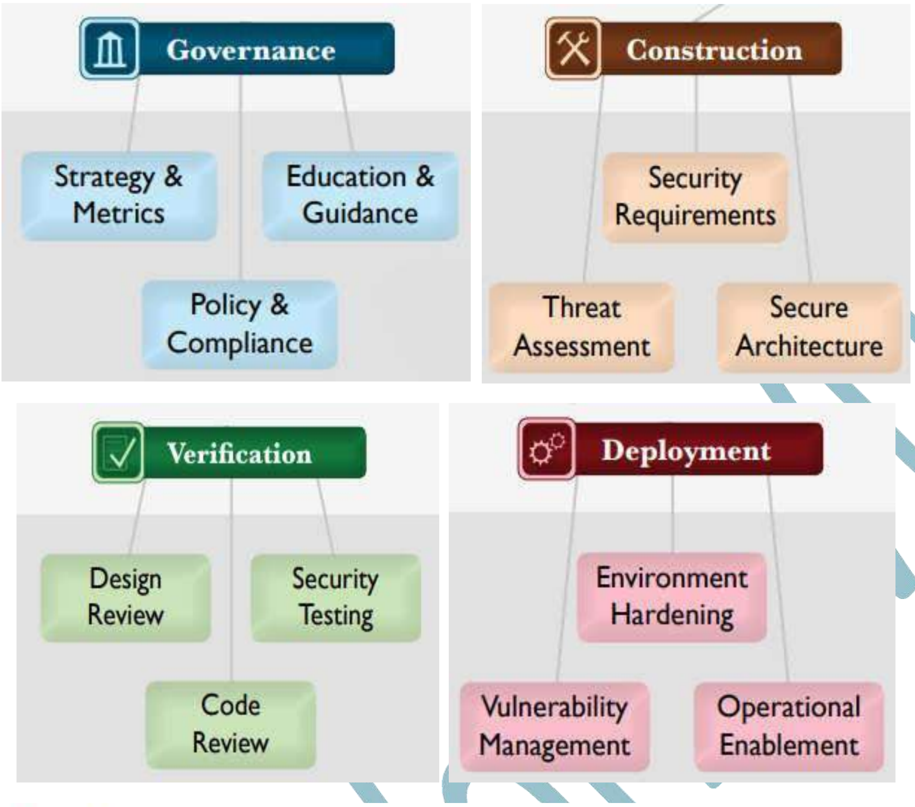
This is an OWASP Project

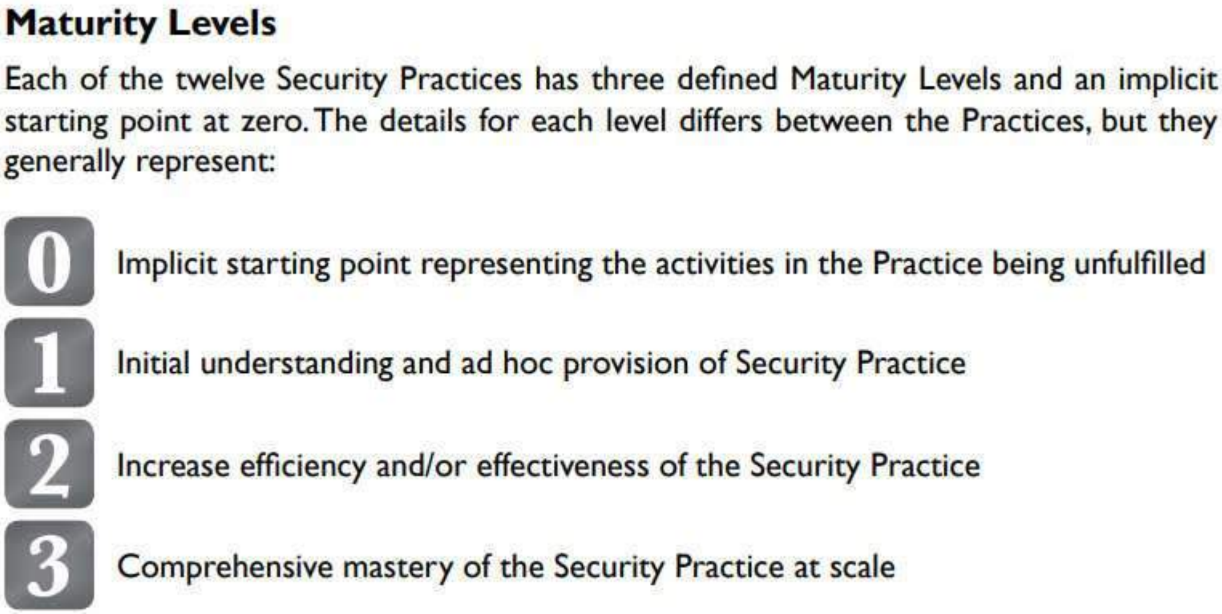
OWASP

The Open Web Application Security Project



- Four **critical business functions**
- For each business function there are **three security practices**
- For each security practice, **three maturity levels as objectives**
- The Software Assurance Maturity Model (SAMM) is an **open framework** to help organizations formulate and implement a strategy for software security that is tailored to the specific risks facing the organization.





Maturity Levels

Each of the twelve Security Practices has three defined Maturity Levels and an implicit starting point at zero. The details for each level differs between the Practices, but they generally represent:

0 Implicit starting point representing the activities in the Practice being unfulfilled

1 Initial understanding and ad hoc provision of Security Practice

2 Increase efficiency and/or effectiveness of the Security Practice

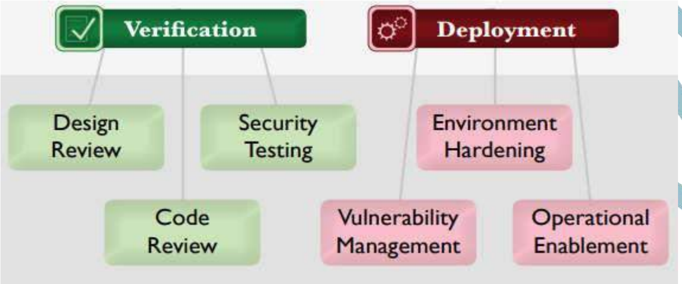
3 Comprehensive mastery of the Security Practice at scale

- The SAMM document sections:

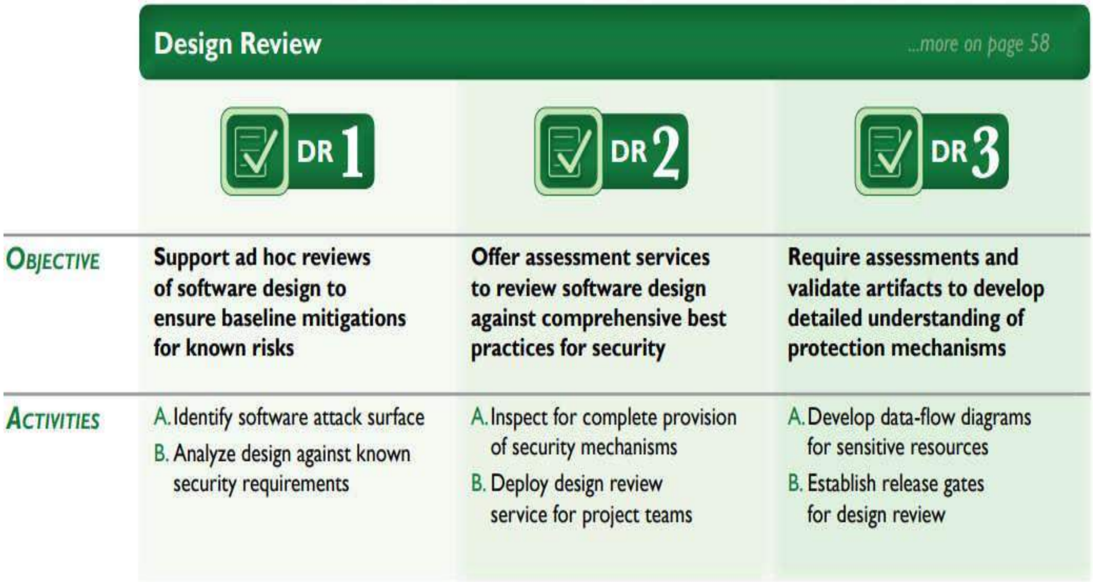
1. Understanding the model
2. Applying the model
3. Security practices
4. Case studies

Topic No 268: Software Security Testing & Validation–1

- testing & validation during the following phases:
  - Verification
  - Deployment



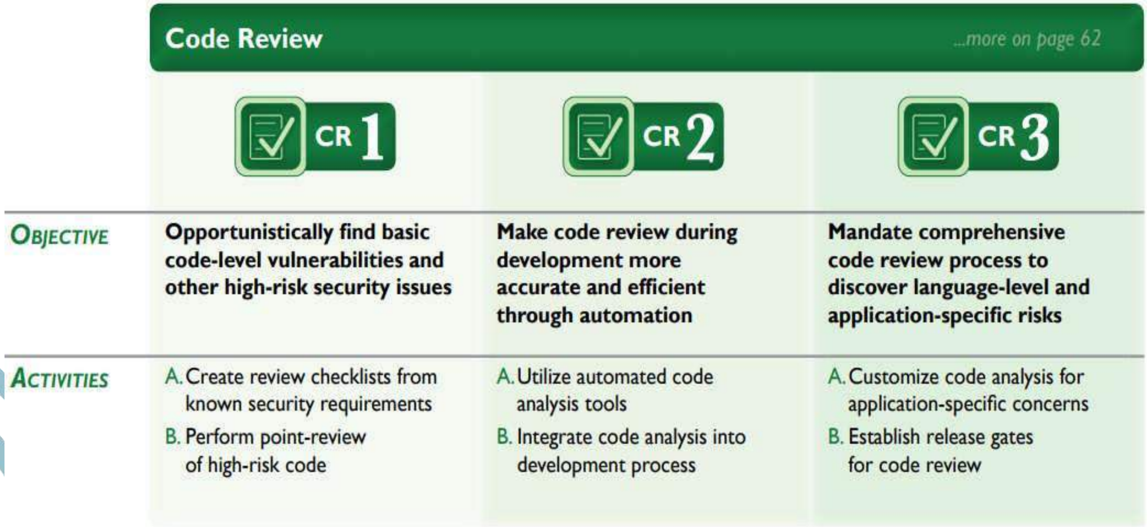
- **OWASP Software Assurance Maturity Model (SAMM) Verification Phase:**
  - Design Review
  - Code Review
  - Security Testing
- **Design Review:**
  - Focused on assessment of software design and architecture for security-related problems
  - Detect architecture-level issues early in software development and thereby avoid potentially large costs from refactoring later due to security concerns.



Design Review ...more on page 58

	DR 1	DR 2	DR 3
OBJECTIVE	**Support ad hoc reviews of software design to ensure baseline mitigations for known risks**	**Offer assessment services to review software design against comprehensive best practices for security**	**Require assessments and validate artifacts to develop detailed understanding of protection mechanisms**
ACTIVITIES	A. Identify software attack surface B. Analyze design against known security requirements	A. Inspect for complete provision of security mechanisms B. Deploy design review service for project teams	A. Develop data-flow diagrams for sensitive resources B. Establish release gates for design review

- **Code Review:**
  - Focused on inspection of software at the source code level in order to find security vulnerabilities.
  - Code-level vulnerabilities are generally simple to understand conceptually, but even **informed developers can easily make mistakes** that leave software open to potential compromise.

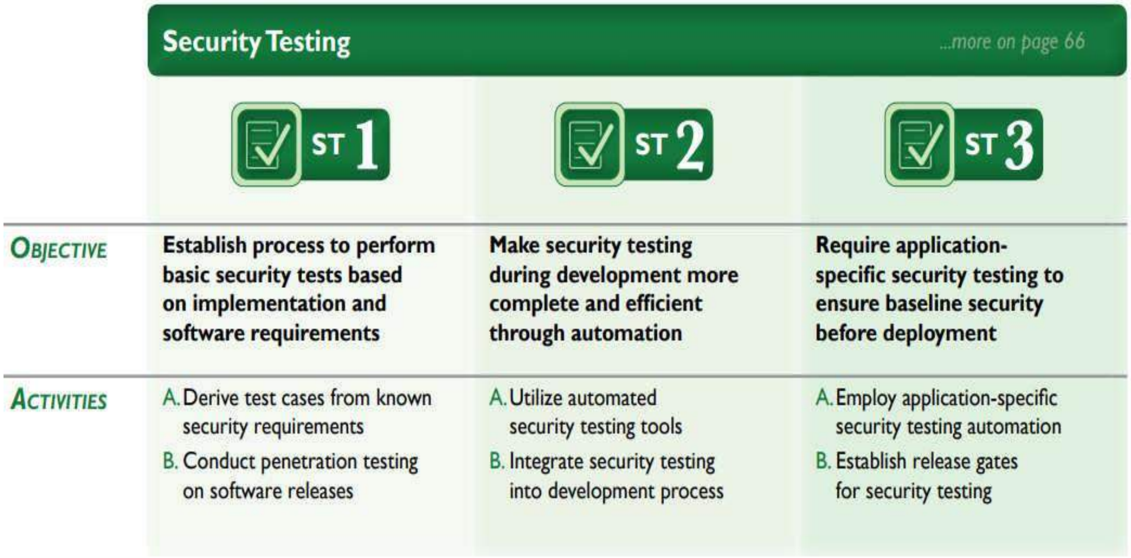


Code Review ...more on page 62

	CR 1	CR 2	CR 3
OBJECTIVE	**Opportunistically find basic code-level vulnerabilities and other high-risk security issues**	**Make code review during development more accurate and efficient through automation**	**Mandate comprehensive code review process to discover language-level and application-specific risks**
ACTIVITIES	A. Create review checklists from known security requirements B. Perform point-review of high-risk code	A. Utilize automated code analysis tools B. Integrate code analysis into development process	A. Customize code analysis for application-specific concerns B. Establish release gates for code review

- **Security Testing:**
  - Focused on **inspection of software in the runtime environment** in order to find security problems.

- These testing activities bolster the assurance case for software by **checking it in the same context in which it is expected to run**, thus making visible **operational misconfigurations or errors in business logic** that are difficult to otherwise find.

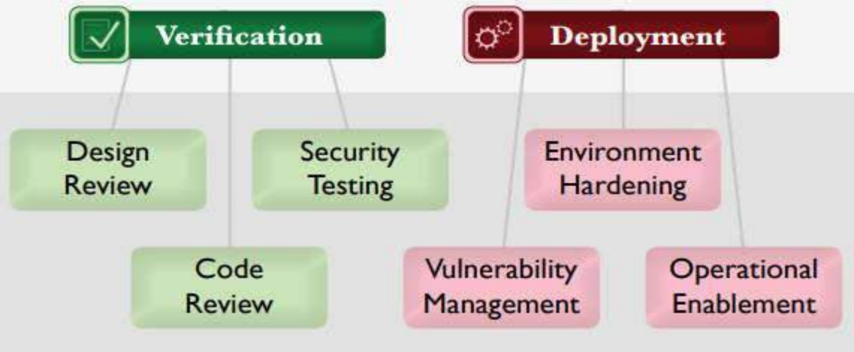


Security Testing ...more on page 66

	ST 1	ST 2	ST 3
OBJECTIVE	Establish process to perform basic security tests based on implementation and software requirements	Make security testing during development more complete and efficient through automation	Require application-specific security testing to ensure baseline security before deployment
ACTIVITIES	A. Derive test cases from known security requirements B. Conduct penetration testing on software releases	A. Utilize automated security testing tools B. Integrate security testing into development process	A. Employ application-specific security testing automation B. Establish release gates for security testing

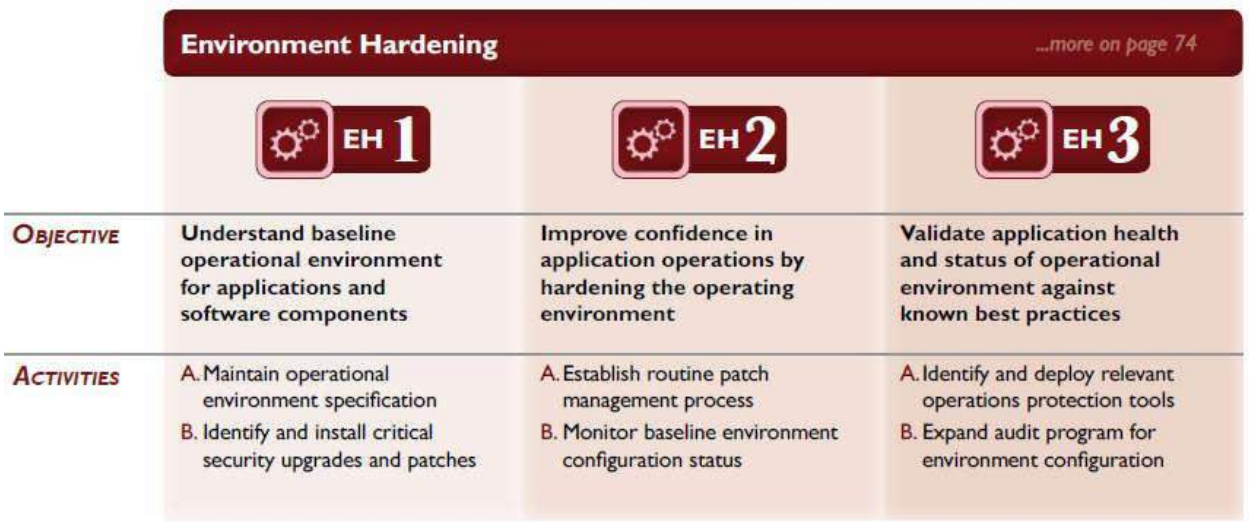
Topic No 269: Software Security Testing & Validation–2

- The OWASP Software Assurance Maturity Model (SAMM) undertakes software security testing & validation during the following phases:
  - Verification
  - **Deployment**



- OWASP Software Assurance Maturity Model (SAMM) **Deployment Phase:**
  - Environment Hardening
  - Vulnerability Management
  - Operational Enablement
- **Environment Hardening**:

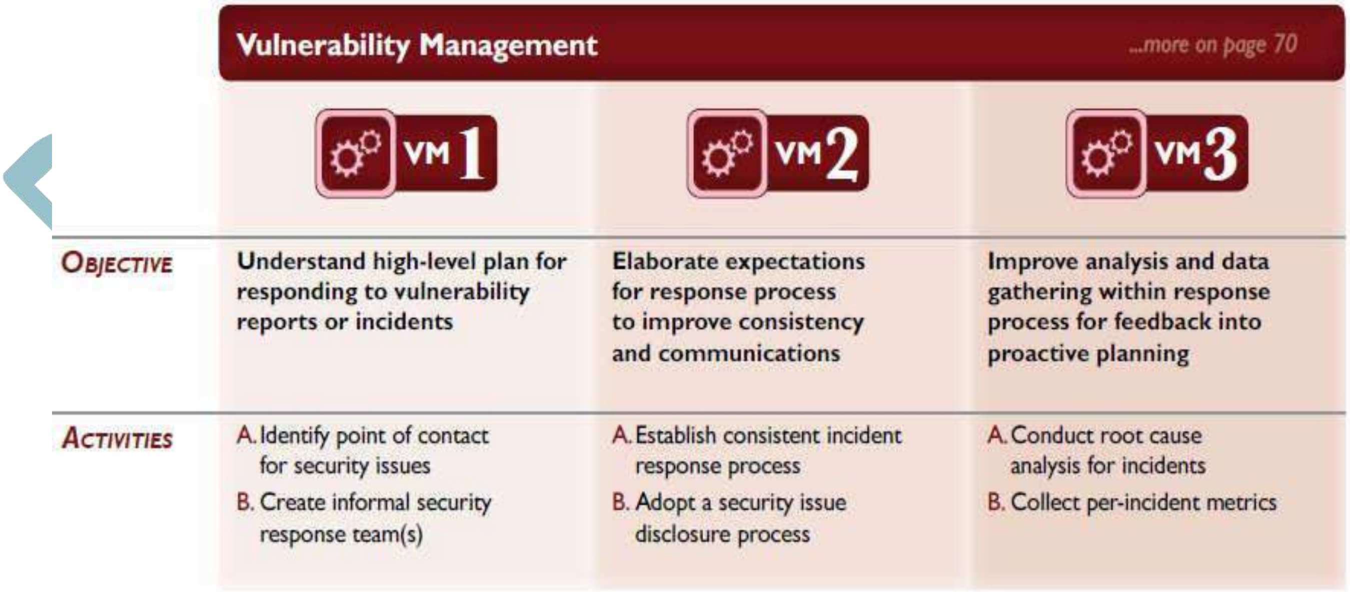
- Focused on **building assurance for the runtime environment** that hosts the organization's software.
- Since secure operation of an application can be **deteriorated by problems in external components**, hardening this **underlying infrastructure directly improves the overall security posture** of the software



Environment Hardening	EH 1	EH 2	EH 3
Objective	Understand baseline operational environment for applications and software components	Improve confidence in application operations by hardening the operating environment	Validate application health and status of operational environment against known best practices
Activities	A. Maintain operational environment specification B. Identify and install critical security upgrades and patches	A. Establish routine patch management process B. Monitor baseline environment configuration status	A. Identify and deploy relevant operations protection tools B. Expand audit program for environment configuration

...more on page 74

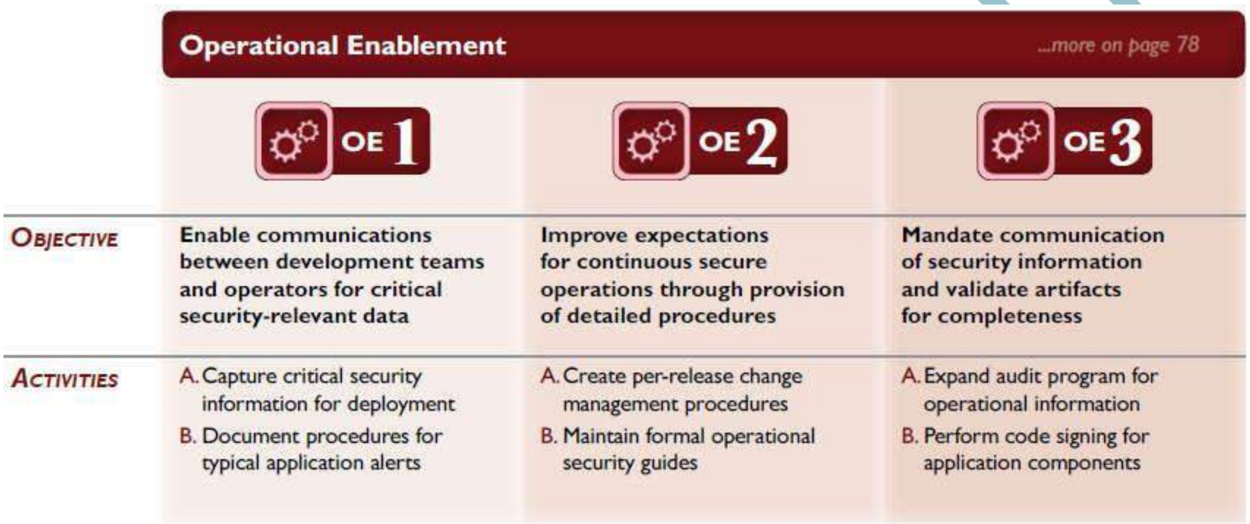
- **Vulnerability Management**:
  - Focused on the processes within an organization with respect to handling vulnerability reports and operational incidents.
  - By having these processes in place, an organization's projects will have consistent expectations and increased efficiency for handling these events, rather than chaotic and uninformed responses.



Vulnerability Management	VM 1	VM 2	VM 3
Objective	Understand high-level plan for responding to vulnerability reports or incidents	Elaborate expectations for response process to improve consistency and communications	Improve analysis and data gathering within response process for feedback into proactive planning
Activities	A. Identify point of contact for security issues B. Create informal security response team(s)	A. Establish consistent incident response process B. Adopt a security issue disclosure process	A. Conduct root cause analysis for incidents B. Collect per-incident metrics

...more on page 70

- **Operational Enablement**:
    - Focused on gathering security critical information from the project teams building software and communicating it to the users and operators of the software.
    - Without this information, even the most securely designed software carries undue risks since important security characteristics and choices will not be known at a deployment site.



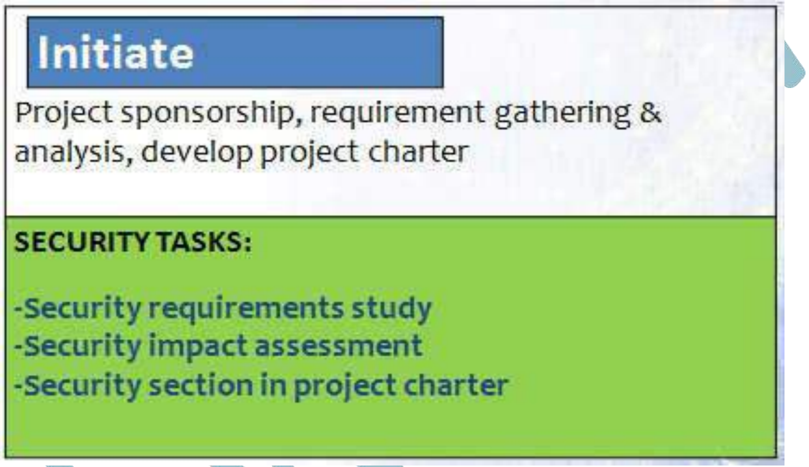
Operational Enablement ...more on page 78

	OE 1	OE 2	OE 3
OBJECTIVE	Enable communications between development teams and operators for critical security-relevant data	Improve expectations for continuous secure operations through provision of detailed procedures	Mandate communication of security information and validate artifacts for completeness
ACTIVITIES	A. Capture critical security information for deployment B. Document procedures for typical application alerts	A. Create per-release change management procedures B. Maintain formal operational security guides	A. Expand audit program for operational information B. Perform code signing for application components

- SAMM is an excellent model for software (security) assurance
- OWASP also has a multitude of additional materials, guidance, and tools for software and seb application security

Topic No 270: Embedding InfoSec Into Project Management

- PMIs five phases of project management:
  - Initiate
  - Plan
  - Executing
  - Controlling
  - Closing

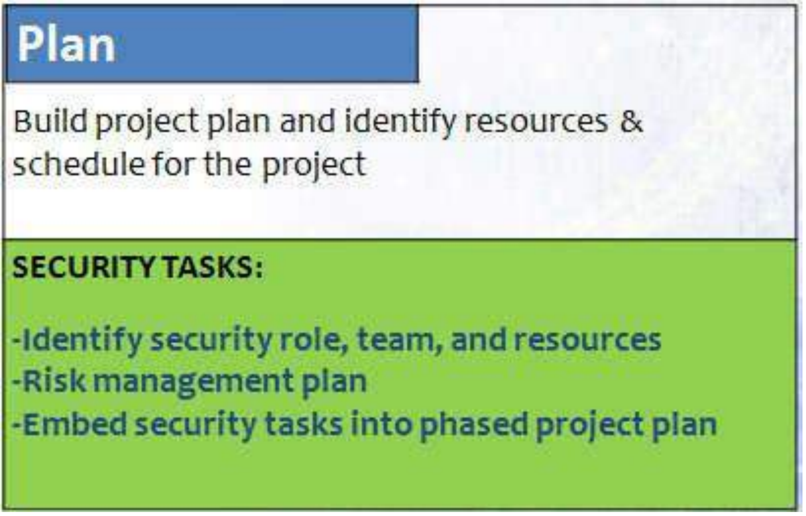


Initiate

Project sponsorship, requirement gathering & analysis, develop project charter

SECURITY TASKS:

-Security requirements study
-Security impact assessment
-Security section in project charter

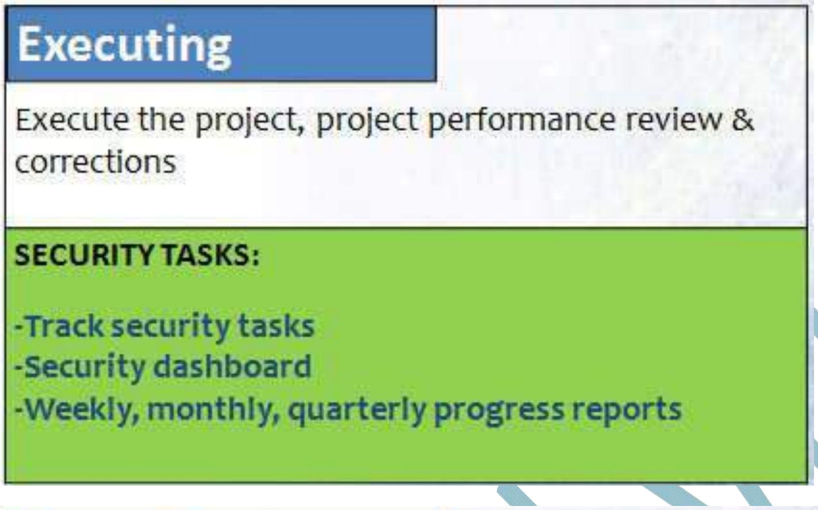


Plan

Build project plan and identify resources & schedule for the project

SECURITY TASKS:

-Identify security role, team, and resources
-Risk management plan
-Embed security tasks into phased project plan

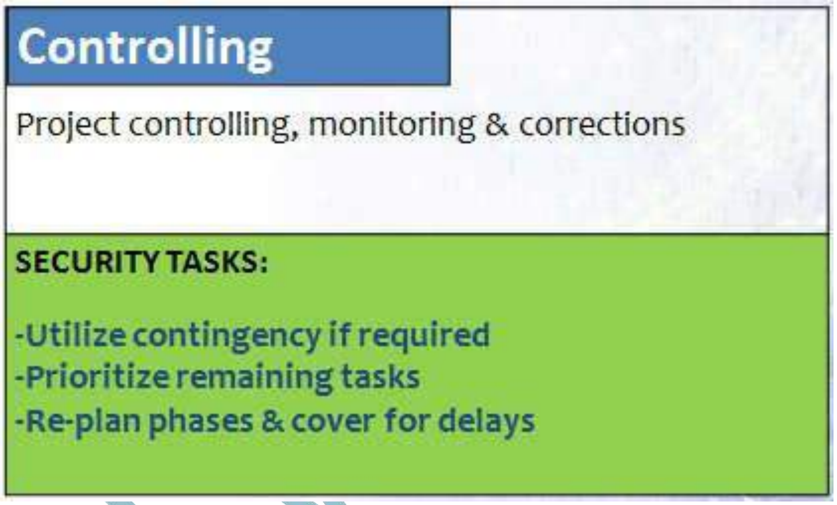


Executing

Execute the project, project performance review & corrections

SECURITY TASKS:

-Track security tasks
-Security dashboard
-Weekly, monthly, quarterly progress reports



Controlling

Project controlling, monitoring & corrections

SECURITY TASKS:

-Utilize contingency if required
-Prioritize remaining tasks
-Re-plan phases & cover for delays

- Senior management needs to ensure that security is integrated with IT project plans
- Sufficient security resources should be made available to manage the security aspects of projects

Topic No 271: How To Conduct Internal Security Assessment

- **What is an internal security assessment?**
  - An effort to assess the security posture, risks, or vulnerabilities for any project, service, application, or device
- **When is an internal security assessment required?**
  - Launch of a new IT project or service
  - When an incident has occurred
  - On change of leadership
  - Regulatory or compliance reqmts
- **Sequence of security assessment:**

1. Management approval or communication

2. Assign resources

3. Build plan, scope and objectives

4. Conduct assessment

5. Report findings & remediation measures

1. Management approval or communication:

- Authority of the assessment
- Cooperation from stakeholders
- Determine & communicate timeline
- Determine appropriate report format

2. Assign resources:

- Assign information security resources with relevant experience
- Identify respective resources for IT asset to be assessed
- Hold initial meeting with respective stakeholder POC

3. Build plan, scope & objectives

- Study IT asset & gather background security docs
- Clear scope boundary
- Clear objectives
- Determine assessment method based on report format

   - Build plan

4. **Conduct assessment:**
   - Conduct the necessary activities such as system walkthrough, vulnerability assessment, security testing, evaluation of security controls, review of process and documentation, etc

5.
   - Assimilate and analyze findings
   - Determine level of severity, risk and appropriate remediation
   - Tailor findings to report format & appropriate to forum
   - Share report

- **A few pointers:**
   - Security should not be reactive
   - Security transformation project should address security loopholes
   - Align the security assessment with benchmarks established already

Topic No 272: Different Types Of Security Assessments

- Vulnerability assessment
- Penetration test
- Audits
- Whitebox/greybox/ blackbox assessments
- Risk assessment
- Threat assessment
- Bug bounty
- Red team
- **Vulnerability assessment:**
   - Technical assessment to yield as many vulnerabilities as possible in an environment along with severity and remediation priority information
   - **Best when** security maturity is low to medium, need a prioritized list of everything that’s wrong, goal is to fix as many things as possible as efficiently as possible

- **Penetration test:**
  - A Penetration Test is a technical assessment designed to achieve a specific goal, e.g., to steal customer data, to gain domain administrator, or to modify sensitive salary information
  - Penetration Tests are for testing security that is assumed to be strong
  - No point in wasting the effort if hardening and vulnerability assessment have not been done
- **VA & PT difference:**
  - Vulnerability assessments look for security problems when you know/assume they exist, and penetration testing validates a configuration when you believe it to be secure
- **Audit:**
  - An audit can be technical and/or documentation-based, and focuses on how an existing configuration compares to a desired standard
  - Orgs use audits to demonstrate compliance
  - Importantly, compliance should not be used to demonstrate security
  - Compliant orgs more likely to be secure
  - Secure orgs are significantly more likely to be compliant (if checked), but compliant orgs should lay no claims to being secure just because they are in accordance with standard X or Y.
- **Lets look at the following in the next modules:**
  - Whitebox/greybox/ blackbox assessments
  - Risk assessment
  - Threat assessment
  - Bug bounty
  - Red team

Topic No 273: Types Of Security Assessments-Part 2

- Vulnerability assessment
- Penetration test
- Audits
- Whitebox/ greybox/ blackbox assessments
- Risk assessment
- Threat assessment
- Bug bounty
- Red team

TYPE OF ASSESSMENT	DESCRIPTION	BEST USED WHEN
	information available, such as network diagrams, source code, etc.	Best used with vulnerability assessments because you want to find as many issues as possible
GREYBOX	Tester has some information but not all	You want to give some information to the tester but not all
BLACKBOX	Tester is given no knowledge about the network – "attackers perspective"	Performing a penetration test

- **Risk assessment:**
  - Should involve determining what the current level of acceptable risk is, measuring the current risk level, and then determining what can be done to bring these two in line where there are mismatches. Risk Assessments commonly involve the rating of risks in two dimensions: probability, and impact.

  - Umbrella term for determining what you have of value, how it can be attacked, what you would lose if those attacks were successful, and what should be done to address the issues.

- **Threat assessment:**
  - The driver for the assessment is to determine how many resources—if any—should be spent on addressing the issue in question.
  - A threat assessment is best used in situations where someone has made a claim around performing an attack in the future, or such a potential is uncovered somehow.

Topic No 274: Types Of Security Assessments-Part 3

- Vulnerability assessment
- Penetration test
- Audits
- Whitebox/greybox/ blackbox assessments
- Risk assessment
- Threat assessment
- **Bug bounty**
- **Red team**
- **Bug bounty:**
  - A Bug Bounty is a type of technical security assessment that leverages crowdsourcing to find vulnerabilities in a system. The central concept is simple: security testers, regardless of quality, have their own set of strengths, weaknesses, experiences, biases, & preferences, & these combine to yield different findings for the same system when tested by different people.
  - Best used when you have done multiple Vulnerability Assessments already and have already found the easy stuff. Bug Bounties excel at finding issues not found using other methods.
- **Red team assessment:**
  - "Red team" is: an independent group that challenges an organization to improve its (security) effectiveness
  - Services should be continuous rather than point-in-time
  - Best used when an org has covered the basics of strong vulnerability management and has at least some capability to detect and respond to malicious or suspicious behavior in the environment
- Note: the term red team is taken from the military maneuvers where a red team simulates attacks and a blue team takes evasive measures against those attacks

Topic No 275: Types Of Security Assessments-Part 4

TYPE	SUMMARY	OUTPUT
VA	Designed to find as many vulnerabilities as possible for the purpose of prioritizing remediation efforts	The output is a list of prioritized issues.
PT	Designed to determine whether an attacker can achieve specific goals when facing your current security posture, such as stealing sensitive data or other activities that would harm the org	Report stating whether the goals were achieved or not
Audit	Designed to determine how a given organization measures against a given standard. Audits, as a rule, do not test security directly, but rather test compliance with a standard.	List of areas that must be fixed in order to achieve compliance

TYPE	SUMMARY
White Box, Grey Box, Black Box Assess-ments	Measure of how much information is being provided to a security testing organization during an assessment. These can be internal, external, application-based, network-based, with or without exploitation, etc

TYPE	SUMMARY	OUTPUT
Risk Assess-ment	determining the most important risks facing a given organization for the purposes of ensuring that they are brought within acceptable levels for the business.	List of prioritized risks followed by recommen-dations.
Threat Assess-ment	Determining whether a given threat is worth spending limited resources on.	Recommendation of what—if any—amount of effort should be dedicated to the issue

TYPE	SUMMARY
Bug Bounties	Crowdsourcing for the discovery of vulnerabilities in a system. Utilizes large collection of independent researchers who all bring their own perspectives to the testing

Topic No 276: STAGES OF 3RD PARTY PENETRATION TEST

1. SYSTEM PORT SCANNING
2. IDENTIFICATION OF SYSTEM SERVICES
3. IDENTIFICATION & VERIFICATION OF SYSTEM VULNERABILITIES
4. PENETRATION TESTING (SYSTEM EXPLOITATION)

1. SYSTEM PORT SCANNING

- Port scanning is one of the most important phases of a vulnerability assessment exercise prior to a penetration test.
- This will be the first tool used by an attacker once he has identified the IP address to be targeted.
- The key part here is to use a multiple of port-scanning tools in order to ensure the least false positives and the maximum information that can be gathered.

2. IDENTIFICATION OF SYSTEM SERVICES

- Once the open ports have been enumerated, it is important to determine the services that are keeping those ports open. - This is typically done by analyzing the banners thrown back when a default connection is made to the open port.
- The latest nmap version allows this to be done using the –sV switch.

3. IDENTIFICATION & VERIFICATION OF SYSTEM VULNERABILITIES

- During vulnerability identification, an assessor will perform several activities to detect exploitable weak points.

These activities include:

- Identify vulnerable services using service banners.
- Perform vulnerability scan to search for known vulnerabilities. Information regarding known vulnerabilities

Information regarding known vulnerabilities can be obtained from the vendors’ security announcements, or from public databases such as SecurityFocus, CVE or CERT advisories.

- Perform false positive and false negative verification (e.g. by correlating vulnerabilities with each other and with previously acquired information).

- Enumerate discovered vulnerabilities.
- Estimate probable impact (classify vulnerabilities found).
- Identify attack paths and scenarios for exploitation.

4. PENETRATION TESTING (SYSTEM EXPLOITATION)

Following the approvals of individual attacks by Customer, the assessor tries to gain unauthorized access by circumventing the security measures in place and tries to reach as wide a level of access as possible.

This process will have the following steps:

- Find proof of concept code/tool
- Find proof of concept code available in your own repository or from publicly available sources to test for vulnerabilities. If the code is from your own trusted repository and thoroughly tested, you can use it, otherwise test it in an isolated environment.
- Develop tools/scripts
- Under some circumstances it will be necessary (and cost effective) for assessors to create their own tools and scripts.
- Test proof of concept code/tool in an isolated environment
- Document findings

Topic No 277: Security Transformation: Failure?

- Let us examine the reasons for proposing a security transformation in the first place:
  - Information security almost one generation behind
  - Arduous to catch up with Information Security posture unless there is a "transformation"
- **Guaranteed failure:**

- Cosmetic commitment
- Not willing to invest in resources
- Deficient program structure
- Lack of effective project management

1. **Cosmetic Commitment:**
    - Lack of awareness & understanding
    - Short-term vision
    - Lack of priority
    - Poorly managed organization
2. **Not Willing To Invest In Resources:**
    - Deficient allocation of funds for Information Security Program
    - Not willing to allocate time for IT to perform security tasks
    - Loss-making organization
3. **Deficient Program Structure:**
    - Ineffective Information Security Management Committee (ISMC)
    - Not taking along other stakeholders
    - Inexperienced IT or security leadership
    - IT team not incentivized
4. **Lack Of Effective Project Management:**
    - Any project will fail without effective project management
    - Effective planning, execution, monitoring, and reporting
    - Experience & domain knowledge

- **Conclusion:**

- The Information Security Transformation requires a tremendous amount of hard work
- Not possible without commitment, right strategy, correct structure, and effective execution

Topic No 278: Benefits Of The Security Transformation

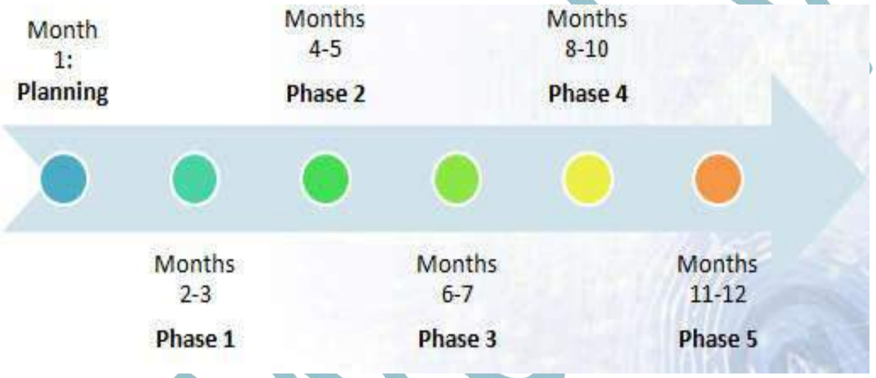
- Key Benefits:
  - Prevention of attacks
  - Prevention of fraud & pilferage
  - A reliable & robust IT setup
- Impact of attacks:
  - Loss of market goodwill
  - Loss of customer confidence
  - Regulatory fines, legal consequences
- Prevention Of Fraud & Pilferage:
  - An effective Information Security Program makes it harder to conduct fraud, abuse, or misuse without getting detected
  - Controls in business process
  - Audits
- A Reliable & Robust IT Setup:
  - Business continuity & DR
  - Redundancy
  - Backups
  - Capacity management
  - Change management

- Incident management

- Conclusion:
  - An effective Information Security Program (achieved through an Information Security Transformation) is essential wherever an IT setup exists
  - Not a luxury but an imperative

Topic No 279: Security Transformation Timeline

- Recommended timeline for security transformation project



- **Month 1: Planning**
  - Understand organization & security issues
  - Develop ISMC
  - Identify stakeholders for InfoSec Steering Committee
  - Identify assets for various phases
  - Project kickoff and awareness trainings

- **Months 2-3: Pilot (Phase 1)**
  - Perform hardening of key IT assets in test environment (Pilot)
  - Validate the hardening in the test environment
  - Prime IT & InfoSec teams for their roles
  - Vulnerability management pilot

- **Months 4-5 (Phase 2):**
  - Hardening of IT assets (minimum security baseline) identified for phase 2
  - Validation of hardening and moving the hardened IT assets to PROD environment through change management process

- **Months 6-7 (Phase 3):**
  - Hardening of IT assets (minimum security baseline) identified for phase 3
  - Validation of hardening and moving the hardened IT assets to PROD environment through change management process

- **Months 8-10 (Phase 4):**
  - Technical teams continue the IT assets hardening in phase 4
  - Raise vulnerability management program frequency to monthly
  - **Focus on governance (policies, SOPs, etc)**
- **Months 11-12 (Phase 5):**
  - ISO27001:2013 stage 1 and stage 2 certification
  - Stage 1 mostly documentation review
  - Stage 2 mostly implementation review

Topic No 280: Security Transformation Responsibility

- Responsibility for the security transformation is a balance between management & security team
- IT team led by the CIO plays an instrumental role in the success of the program

- **Management role:**
  - Commitment
  - Sets the tone at the top
  - Allocates resources
  - Assigns responsibility & roles
  - Conducts periodic performance review

- **Information Security Team:**
  - Builds an effective strategy & structure for the program
  - Identifies key players to enroll in ISMC
  - Ensures effective execution & project management
  - Conducts transparent reporting

- **IT Team:**
  - Mobilizes the resources for implementation of the security program
  - Ensures quality and process during the security transformation program
  - Resolves roadblocks in implementation

Conclusion:

- An effective Information Security Transformation can only be orchestrated through effective team work
- All parts of the organization have to play their due role to make the program a success

Topic No 281: Actions To Raise Management Support

- What can you do if your organizational management is not supporting for the Information Security Transformation Program?

a) Understand the organizational business requirements and potential impact
b) Understand regulations & sector best-practices
c) Evaluate the security posture
d) Assess the extent of work and resources required
e) Present your report

a. Understand the organizational business requirements & potential impact:

- Type of business/industry
- Business requirements
- Confidentiality, integrity, availability
- What can go wrong and impact?

b. Understand regulations and sector best-practices

- Financial industry (SBP)
- Telecoms & IT industry (PTA/MOITT)
- Oil & Gas (OGRA)
- Look at standards & best-practices (quality & security)

c. Evaluate the security posture

- Evaluate security posture against each of the four layers of Transformation Model
- Any recent incidents ?
- Org culture ?
- Quality and improvement emphasis ?

d. Assess the extent of work and resources required

- Size of organization and size of IT ?
- Extent of IT assets ?
- Internal software development ?
- Evaluate team size required for InfoSec and consultant option

e. Present your report

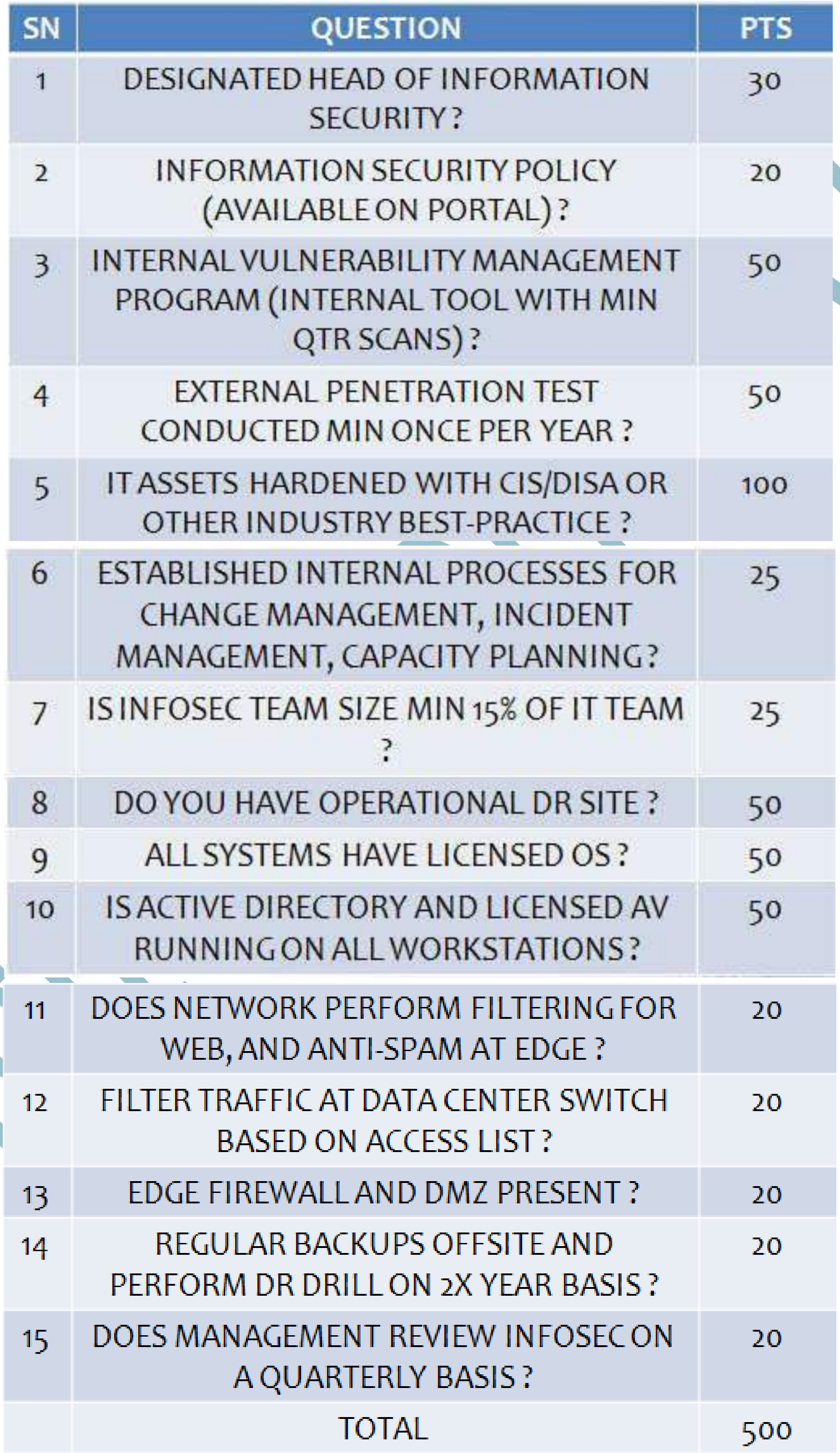
- Take key stakeholders on board
- Reach out to stakeholders before presentation
- The better researched and prepared you are, the better your chances to convince

Conclusion:

- Many of the problems associated with weak security posture are actually due to poor awareness
- Put yourself in the shoes of your audience and explain the need for a security program from their perspective
- Keep it high level

Topic No 282: Key Questions To Assess Security Posture

- What are the key questions that can be used to assess the security posture of the organization?



SN	QUESTION	PTS
1	DESIGNATED HEAD OF INFORMATION SECURITY ?	30
2	INFORMATION SECURITY POLICY (AVAILABLE ON PORTAL) ?	20
3	INTERNAL VULNERABILITY MANAGEMENT PROGRAM (INTERNAL TOOL WITH MIN QTR SCANS) ?	50
4	EXTERNAL PENETRATION TEST CONDUCTED MIN ONCE PER YEAR ?	50
5	IT ASSETS HARDENED WITH CIS/DISA OR OTHER INDUSTRY BEST-PRACTICE ?	100
6	ESTABLISHED INTERNAL PROCESSES FOR CHANGE MANAGEMENT, INCIDENT MANAGEMENT, CAPACITY PLANNING ?	25
7	IS INFOSEC TEAM SIZE MIN 15% OF IT TEAM ?	25
8	DO YOU HAVE OPERATIONAL DR SITE ?	50
9	ALL SYSTEMS HAVE LICENSED OS ?	50
10	IS ACTIVE DIRECTORY AND LICENSED AV RUNNING ON ALL WORKSTATIONS ?	50
11	DOES NETWORK PERFORM FILTERING FOR WEB, AND ANTI-SPAM AT EDGE ?	20
12	FILTER TRAFFIC AT DATA CENTER SWITCH BASED ON ACCESS LIST ?	20
13	EDGE FIREWALL AND DMZ PRESENT ?	20
14	REGULAR BACKUPS OFFSITE AND PERFORM DR DRILL ON 2X YEAR BASIS ?	20
15	DOES MANAGEMENT REVIEW INFOSEC ON A QUARTERLY BASIS ?	20
	TOTAL	500

SCORE RANGE	POSTURE	RECCOMENDED ACTIONS
LESS THAN 20%	SEVERE RISK	INFORMATION SECURITY TRANSFORMATION PROGRAM
20% TO 35%	HIGH RISK	INFORMATION SECURITY TRANSFORMATION PROGRAM
35% TO 50%	MEDIUM RISK	INFORMATION SECURITY TRANSFORMATION PROGRAM
50% TO 70%	FURTHER IMPROVEMENTS REQUIRED	THIRD-PARTY SECURITY REVIEW
70% TO 85%	SATISFACTORY	THIRD-PARTY SECURITY REVIEW
HIGHER THAN 85%	VERY GOOD!	GO FOR ISO@7001:2013 CERTIFICATION !

- By evaluating the security posture and comparing with a few other organizations (through a limited survey), the security posture can be portrayed in a quantitative manner
- The questions can be refined and customized for your organization

Topic No 283: Key Leadership Qualities Of InfoSec Head

- Lets examine the key leadership qualities of the Information Security Head or the key resource driving the Security Transformation Program
- Authenticity
- Candidness
- Fairness & fair play
- Team environment
- Recognizing talent and hard work
- Celebrating success!

- **Authenticity**
  - IT is complex
  - No one person "knows-it-all"
  - Communicate that each individual has limitations
  - Admit mistakes and failures
  - Give credit where it is due
- **Candidness:**
  - Call a spade a spade
  - Honesty and straight-talk
  - Hear feedback and give respect to views of everyone
- **Fairness & Fair Play:**
  - Promote performance and merit
  - Adjust players in the right positions based on their strengths
  - Coach and guide team to perform and achieve results
- **Team Environment:**
  - Discourage solo-flight and promote team consensus, team reviews, and team achievements
  - Single out and coach individuals playing turf tactics
- **Recognize Talent & Hard Work:**
  - Identify self-promotion versus talent combined with hard work
  - Encourage hard workers who are team players
- **Celebrate Success!**
  - Hold team celebrations
  - Recognize quiet workers and background workers as well
  - Promote team achievements