Quản lý nguy cơ

- Giới thiệu lý do cần phải có quản lý nguy cơ
- Các bước thực hiện
- Một số gợi ý

Một số câu hỏi

- Why Should a Risk Assessment Be Conducted?
- When Should a Risk Analysis Be Conducted?
- Who Should Conduct the Risk Analysis and Risk Assessment?
- Who within the Organization Should Conduct the Risk Analysis and Risk Assessment?

Một số câu hỏi

- How Long Should a Risk Analysis or Assessment Take?
- What Can a Risk Analysis or Risk Assessment Analyze?
- What Can the Results of a Risk Management Tell an Organization?
- Who Should Review the Results of a Risk Analysis?
- How Is the Success of the Risk Analysis Measured?

Một số câu hỏi

- WHY

- Management shows the diligence in decision-making processes.
- The output from the risk analysis and risk assessment processes
  - The first time will be when decisions are made
  - be used is when the “spam hits the
  - fan”

Một số câu hỏi

- WHEN

- Whenever money or resources areto be spent.
- Before starting a task, project, or development cycle

Một số câu hỏi

- WHO

- People that develop and run systems, applications, …
- Individuals with in-depth knowledge of the true workings of the business processes

- WHO WITHIN

- Project management office

Một số câu hỏi

- HOW LONG

- Should be completed in days
- Must be completed quickly with minimum impact

- WHAT CAN

- These processes can be used to review any task, project, or idea

Một số câu hỏi

- WHAT CAN THE RESULTS
- what the threats are and then establish a prioritization of these risks
- WHO SHOULD REVIEW
- Sponsor
- HOW IS THE SUCCESS
- The tangible way to measure success is to see a lower bottom line for cost

Overview

- Elements of Risk Analysis
- Quantitative vs Qualitative Analysis
- One Risk Analysis framework

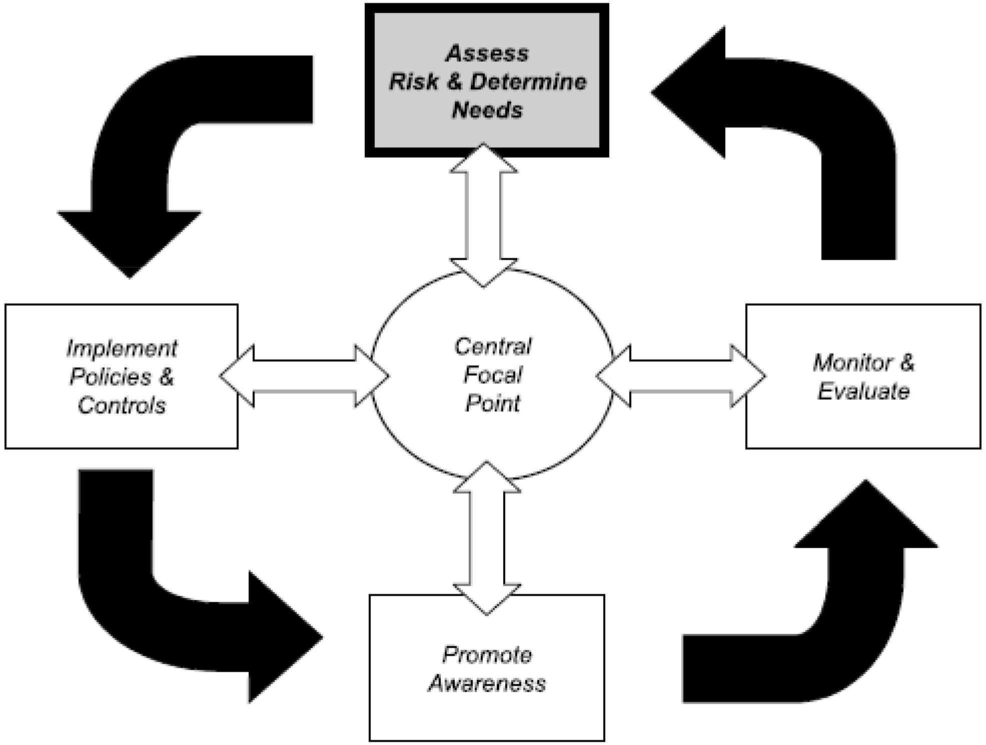
What is Risk?

- The probability that a particular threat will exploit a particular vulnerability
  - Not a certainty.
  - Risk impact – loss associated with exploit
- Need to systematically understand risks to a system and decide how to control them.

What is Risk Analysis?

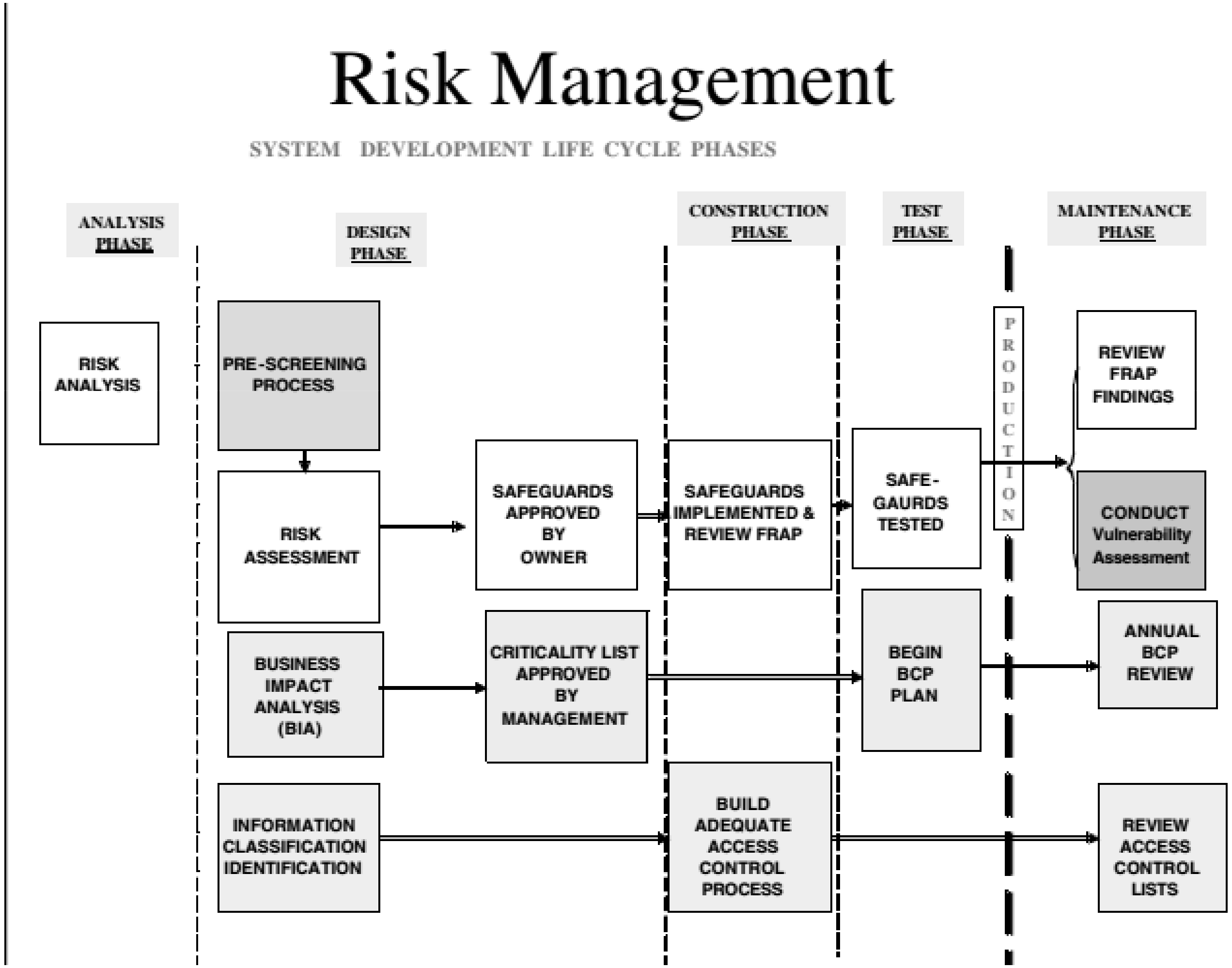
- The process of identifying, assessing, and reducing risks to an acceptable level
  - Defines and controls threats and vulnerabilities
  - Implements risk reduction measures
- An analytic discipline with three parts:
  - Risk assessment: determine what the risks are
  - Risk management: evaluating alternatives for mitigating the risk
  - Risk communication: presenting this material in an understandable way to decision makers and/or the public

Risk Management Cycle



From GAO/AIMD-99-139

Risk Management & System development life cycle phases



Risk Management

SYSTEM DEVELOPMENT LIFE CYCLE PHASES

ANALYSIS PHASE
DESIGN PHASE
CONSTRUCTION PHASE
TEST PHASE
MAINTENANCE PHASE
RISK ANALYSIS
PRE-SCREENING PROCESS
RISK ASSESSMENT
SAFEGUARDS APPROVED BY OWNER
SAFEGUARDS IMPLEMENTED & REVIEW FRAP
SAFE-GAURDS TESTED
PRODUCTION
REVIEW FRAP FINDINGS
CONDUCT Vulnerability Assessment
BUSINESS IMPACT ANALYSIS (BIA)
CRITICALITY LIST APPROVED BY MANAGEMENT
BEGIN BCP PLAN
ANNUAL BCP REVIEW
INFORMATION CLASSIFICATION IDENTIFICATION
BUILD ADEQUATE ACCESS CONTROL PROCESS
REVIEW ACCESS CONTROL LISTS

Basic Risk Analysis Structure

- Evaluate
  - Value of computing and information assets
  - Vulnerabilities of the system
  - Threats from inside and outside
  - Risk priorities
- Examine
  - Availability of security countermeasures
  - Effectiveness of countermeasures
  - Costs (installation, operation, etc.) of countermeasures
- Implement and Monitor

Who should be Involved?

- Security Experts
- Internal domain experts
  - Knows best how things really work
- Managers responsible for implementing controls

Identify Assets

- Asset – Anything of value
  - Physical Assets
    - Buildings, computers
  - Logical Assets
    - Intellectual property, reputation

Example Critical Assets

- People and skills
- Goodwill
- Hardware/Software
- Data
- Documentation
- Supplies
- Physical plant
- Money

Vulnerabilities

- Flaw or weakness in system that can be exploited to violate system integrity.

Example Vulnerabilities

- •Physical
- •V01 Susceptible to unauthorized building access
- •V02 Computer Room susceptible to unauthorized
- access
- •V03 Media Library susceptible to unauthorized
- access
- •V04 Inadequate visitor control procedures
- •(and 36 more)
- •Administrative
- •V41 Lack of management support for security
- •V42 No separation of duties policy
- •V43 Inadequate/no computer security plan policy

•V47 Inadequate/no emergency action plan

•(and 7 more)

•Personnel

•V56 Inadequate personnel screening

•V57 Personnel not adequately trained in job

•...

•Software

•V62 Inadequate/missing audit trail capability

•V63 Audit trail log not reviewed weekly

•V64 Inadequate control over application/program changes

Communications

•V87 Inadequate communications system

•V88 Lack of encryption

•V89 Potential for disruptions

•...

•Hardware

•V92 Lack of hardware inventory

•V93 Inadequate monitoring of maintenance personnel

•V94 No preventive maintenance program

•...

•V100 Susceptible to electronic emanations

Threats

- Set of circumstances that has the potential to cause loss or harm
- Attacks against key security services
  - Confidentiality, integrity, availability
- Threats trigger vulnerabilities
  - Accidental
  - Malicious

Example Threat List

- T01 Access (Unauthorized to System - logical)
- T02 Access (Unauthorized to Area - physical)
- T03 Airborne Particles (Dust)
- T04 Air Conditioning Failure
- T05 Application Program Change (Unauthorized)
- T06 Bomb Threat
- T07 Chemical Spill
- T08 Civil Disturbance
- T09 Communications Failure
- T10 Data Alteration (Error)
- T11 Data Alteration (Deliberate)
- T12 Data Destruction (Error)
- T13 Data Destruction (Deliberate)
- T14 Data Disclosure (Unauthorized)
- T15 Disgruntled Employee
- T16 Earthquakes
- T17 Errors (All Types)
- T18 Electro-Magnetic Interference
- T19 Emanations Detection
- T20 Explosion (Internal)
- T21 Fire, Catastrophic
- T22 Fire, Major
- T23 Fire, Minor
- T24 Floods/Water Damage
- T25 Fraud/Embezzlement
- T26 Hardware Failure/Malfunction
- T27 Hurricanes
- T28 Injury/Illness (Personal)
- T29 Lightning Storm
- T30 Liquid Leaking (Any)
- T31 Loss of Data/Software
- T32 Marking of Data/Media Improperly
- T33 Misuse of Computer/Resource
- T34 Nuclear Mishap
- T35 Operating System Penetration/Alteration
- T36 Operator Error
- T37 Power Fluctuation (Brown/Transients)
- T38 Power Loss
- T39 Programming Error/Bug
- T40 Sabotage
- T41 Static Electricity
- T42 Storms (Snow/Ice/Wind)
- T43 System Software Alteration
- T44 Terrorist Actions
- T45 Theft (Data/Hardware/Software)
- T46 Tornado
- T47 Tsunami (Pacific area only)
- T48 Vandalism
- T49 Virus/Worm (Computer)
- T50 Volcanic Eruption

Characterize Threat-Sources

Threat Source	**Method**	**Opportunity**	**Motive**
Cracker	Standard scripts, new tools	Network access	Challenge, ego , rebellion
Terrorist	Access to talented crackers	Network, infiltration	Ideological, destruction, fund raising
Insider	Knowledge	Complete access	Ego, revenge, money

Dealing with Risk

- Avoid risk
  - Implement a control or change design
- Transfer risk
  - Change design to introduce different risk
  - Buy insurance
- Assume risk
  - Detect, recover
  - Plan for the fall out

Controls

- Mechanisms or procedures for mitigating vulnerabilities
  - Prevent
  - Detect
  - Recover
- Understand cost and coverage of control
- Controls follow vulnerability and threat analysis

Example Controls

- •C01 Access control devices - physical
- •C02 Access control lists - physical
- •C03 Access control - software
- •C04 Assign ADP security and assistant in writing
- •C05 Install-/review audit trails
- •C06 Conduct risk analysis
- •C07Develop backup plan
- •C08 Develop emergency action plan
- •C09 Develop disaster recovery plan
- •…
- •C21 Install walls from true floor to true ceiling
- •C22 Develop visitor sip-in/escort procedures
- •C23 Investigate backgrounds of new employees
- •C24 Restrict numbers of privileged users
- •C25 Develop separation of duties policy
- •C26 Require use of unique passwords for logon

•C27 Make password changes mandatory

•C28 Encrypt password file

•C29 Encrypt data/files

•C30 Hardware/software training for personnel

•C31Prohibit outside software on system

•…

•C47 Develop software life cycle development
program

•C48 Conduct hardware/software inventory

•C49 Designate critical programs/files

•C50 Lock PCs/terminals to desks

•C51 Update communications system/hardware

•C52 Monitor maintenance personnel

•C53 Shield equipment from electromagnetic interference/emanations

•C54Identify terminals

Risk/Control Trade Offs

- Only Safe Asset is a Dead Asset
  - Asset that is completely locked away is safe, but useless
  - Trade-off between safety and availability
- Do not waste effort on efforts with low loss value
  - Don’t spend resources to protect garbage
- Control only has to be good enough, not absolute
  - Make it tough enough to discourage enemy

Types of Risk Analysis

- Quantitative
  - Assigns real numbers to costs of safeguards and damage
  - Annual loss exposure (ALE)
  - Probability of event occurring
  - Can be unreliable/inaccurate
- Qualitative
  - Judges an organization’s relative risk to threats
  - Based on judgment, intuition, and experience
  - Ranks the seriousness of the threats for the sensitivity of the asserts
  - Subjective, lacks hard numbers to justify return on investment

Quantitative Analysis Outline

1. Identify and value assets
2. Determine vulnerabilities and impact
3. Estimate likelihood of exploitation
4. Compute Annual Loss Exposure (ALE)
5. Survey applicable controls and their costs
6. Project annual savings from control

Quantitative

- Risk exposure = Risk-impact x Risk-Probability
  - Loss of car: risk-impact is cost to replace car, e.g. $10,000
  - Probability of car loss: 0.10
  - Risk exposure or expected loss = 10,000 x 0.10 = 1,000
- General measured per year
  - Annual Loss Exposure (ALE)

Quantitative

- Cost benefits analysis of controls
- Risk Leverage to evaluate value of control
  - ((risk exp. before control) – (risk exp. after))/
    (cost of control)
- Example of trade offs between different deductibles and insurance premiums

Qualitative Risk Analysis

- Generally used in Information Security
  - Hard to make meaningful valuations and meaningful probabilities
  - Relative ordering is faster and more important
- Many approaches to performing qualitative risk analysis
- Same basic steps as quantitative analysis
  - Still identifying asserts, threats, vulnerabilities, and controls
  - Just evaluating importance differently

Example 10 Step QRA

- Step 1: Identify Scope
  - Bound the problem
- Step 2: Assemble team
  - Include subject matter experts, management in charge of implementing, users
- Step 3: Identify Threats
  - Pick from lists of known threats
  - Brainstorm new threats
  - Mixing threats and vulnerabilities here...

Step 4: Threat prioritization

- Prioritize threats for each asset
  - Likelihood of occurrence
- Define a fixed threat rating
  - E.g., Low(1) … High(5)
- Associate a rating with each threat
- Approximation to the risk probability in quantitative approach

Step 5: Loss Impact

- With each threat determine loss impact
- Define a fixed ranking
  - E.g., Low(1) … High(5)
- Used to prioritize damage to asset from threat

Step 6: Total impact

- Sum of threat priority and impact priority

Threat	Threat Priority	Impact Priority	Risk Factor
Fire	3	5	8
Water	2	5	7
Theft	2	3	5

Step 7: Identify Controls/Safeguards

- Potentially come into the analysis with an initial set of possible controls
- Associate controls with each threat
- Starting with high priority risks
  - Do cost-benefits and coverage analysis (Step 8)
    - Maybe iterate back to Step 6
  - Rank controls (Step 9)

Safeguard Evaluation

-

Threat	Risk Factor	Possible Safeguard	Safeguard cost
Fire	8	Fire supression system	$15,000.00
Tornado	8	Business Continuity Plan	$75,000.00
Water Damage	7	Business Continuity Plan	$75,000.00
Theft	5		

Step 10: Communicate Results

- Most risk analysis projects result in a written report
  - Generally not read
  - Make a good executive summary
  - Beneficial to track decisions.
- Real communication done in meetings an presentations

Key Points

- Key Elements of Risk Analysis
  - Assets, Threats, Vulnerabilities, and Controls
- Quantitative vs qualitative
- Not a scientific process
  - Companies will develop their own procedure
  - Still a good framework for better understanding of system security