Effective Risk Analysis

Thomas R. Peltier, CISSP

Netigy SM

Driving eBusiness Performance ^{SM}

Netigy

Abstract

Effective Risk Analysis

- The dictionary defines RISK as "someone or something that creates or suggests a hazard". It is one of the many costs of doing business or providing a service today.
- Information security professionals know and understand that nothing ever runs smoothly for very long. Any manner of internal or external hazard or risk can cause a well running organization to lose competitive advantage, miss a deadline, or suffer embarrassment. As security professionals, management looks to us to provide a method that allows for the systematic review of risk, threats, hazards and concerns and provide cost-effective measures to lower risk to an acceptable level. This session will review the current practical application of cost-effective risk analysis.

Effective Risk Analysis

- Frequently Asked Questions
  - Why should a risk analysis be conducted?
  - When should a risk analysis be conducted?
  - Who should conduct the risk analysis?
  - How long should a risk analysis take?
  - What can a risk analysis analyze?
  - What can the results of a risk analysis tell an organization?
  - Who should review the results of a risk analysis?
  - How is the success of the risk analysis measured?

Netigy

Effective Risk Analysis

- Risk Analysis as part of an organization-wide information quality assurance program
  - Supporting Business Objectives or Mission requires
    - Identification of customer requirements
      - Sensitivity of information
      - Availability of the system or application
    - Basic enterprise requirements include
      - Information classification
      - Business Impact Analysis (BIA)
      - Risk analysis
      - Intellectual property safeguards

Netigy

Effective Risk Analysis

- The goal of an enterprise-wide information quality assurance program is to preserve the:
  - Integrity
  - Confidentiality
  - Availability

Effective Risk Analysis

- Information protection in quality assurance works with three key elements:
  - Integrity - the information is as intended without inappropriate modification or corruption
  - Confidentiality - the information is protected from unauthorized or accidental disclosure
  - Availability - authorized users can access applications and systems when required to do their job

Netigy

Effective Risk Analysis

- No matter what risk analysis process is used, the method is always the same:
  - Identify the asset
  - Ascertain the risk
  - Determine the vulnerability
  - Implement the corrective action
- Remember - sometimes accepting the risk is the appropriate corrective action.

Effective Risk Analysis

- The risk analysis process
  - When identifying safeguards, it will be necessary to determine those already in place
  - 80% - 90% of the controls that mitigate risks are already in place
  - Safeguards will only lower risks to an acceptable level
  - 100% security is not the goal

Netigy

Effective Risk Analysis

- Definitions
  - Threat - an undesirable event
  - Vulnerability - a condition of a missing or ineffectively administered safeguard or control that allows a threat to occur with a greater impact or frequency or both.
  - Losses - these include direct and indirect loss
    - disclosure
    - integrity
    - denial of service

Netigy

Effective Risk Analysis

- Definitions
  - Safeguard/Control - a countermeasure that acts to prevent, detect, or minimize the consequences of threat occurrence.
  - Exposure Factor - how much impact or loss of asset value is incurred
    - from 0% to 100%
  - Single-time Loss Algorithm (SLA) - when a threat occurs, how much the loss of asset value is expected to be in monetary terms
  - Annualized Rate of Occurrence (ARO) - how often a threat might be expected to happen in one year.

Netigy

Effective Risk Analysis

- Method
- Annualized Loss Exposure (ALE) - a value presented by the classic risk analysis process indicating loss expectancy for a given threat;
- Consider the asset value (V), the likelihood vulnerability exposure factor (L) will equal the ALE.
    - V x L = ALE

Effective Risk Analysis

- Now that we’ve identified the Assets and the Threats, we are now going to spend some time trying to establish a bottom line value for the assets.
- One of the basic methods for determining expected loss is to multiply the Value of the asset (V) by the Likelihood of occurrence (L).
- This formula will produce an *Annual Loss Expectancy (ALE)*.

Effective Risk Analysis

Annualized Loss Multiplier Table

Never		0.0
Once in 300 Years	1/300	0.00333
Once in 200 Years	1/200	0.005
Once in 100 Years	1/100	0.01
Once in 50 Years	1/50	0.02
Once in 25 Years	1/25	0.04
Once in 5 Years	1/5	0.20
Once in 2 Years	1/2	0.50
Yearly	1/1	1.0
Twice a Year	1/.5	2.0
Once a Month	12/1	12.0
Once a Week	52/1	52.0
Once a Day	365/1	365.0

Netigy

Effective Risk Analysis

- Exercise
- Now that we have identified the Value of our assets and the Likelihood of loss, let us use this information to do some quantitative risk analysis.
  - You have a $3 million data center located in a flood area. A major flood that would destroy the data center occurs once every 100 years.
  - Compute the *ALE*.
  - Using the computed *ALE*, what is the probability that management would be willing to spend $35,000 annually to control this threat?
  - Is it cost-effective?

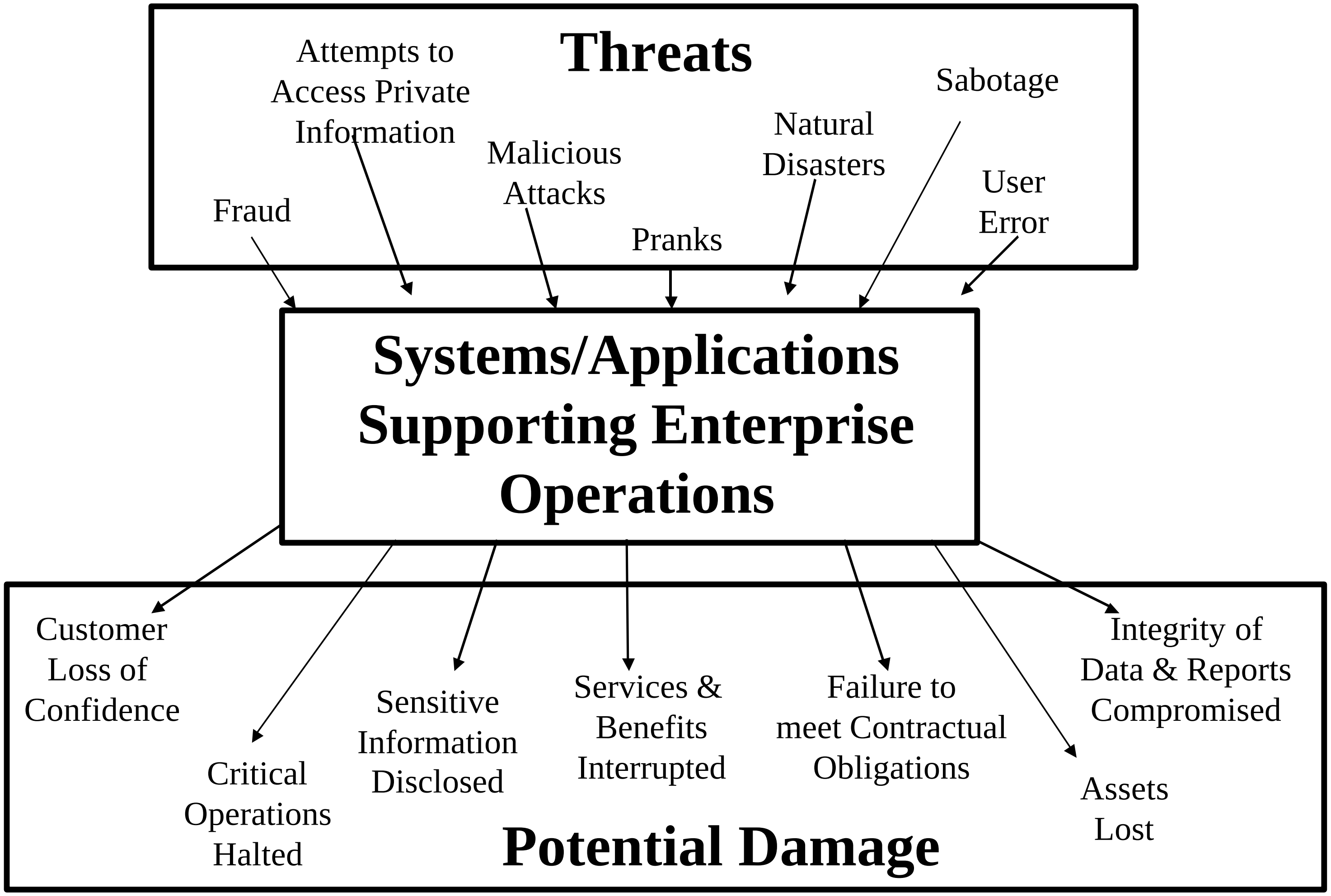
Netigy

Effective Risk Analysis

- Risk Analysis Objectives
  - Identify potential undesirable or unauthorized events, “RISKS,” that could have a negative impact on the *Integrity*, *Confidentiality*, or *Availability* of information by, or flowing through, an application or system.
  - Identify potential “CONTROLS” to reduce or eliminate the impact of RISK events determined to be of MAJOR concern.

Netigy

Effective Risk Analysis



Threats

Attempts to Access Private Information

Sabotage

Natural Disasters

Malicious Attacks

User Error

Fraud

Pranks

Systems/Applications Supporting Enterprise Operations

Customer Loss of Confidence

Integrity of Data & Reports Compromised

Sensitive Information Disclosed

Services & Benefits Interrupted

Failure to meet Contractual Obligations

Critical Operations Halted

Assets Lost

Potential Damage

Effective Risk Analysis

Information Security Objectives

- Maintain customer, constituent, stockholder, or taxpayer confidence in the organization
- Protect confidentiality of sensitive information (personal, financial, trade secret, etc.)
- Protect sensitive operational data from inappropriate disclosure
- Avoid third-party liability for illegal or malicious acts committed with the organization’s systems
- Ensure that organization computer, network, and data are not misused or wasted
- Avoid fraud
- Avoid expensive and disruptive incidents
- Comply with pertinent laws and regulations
- Avoid a hostile workplace atmosphere

Source GAO/AIMD 98-68

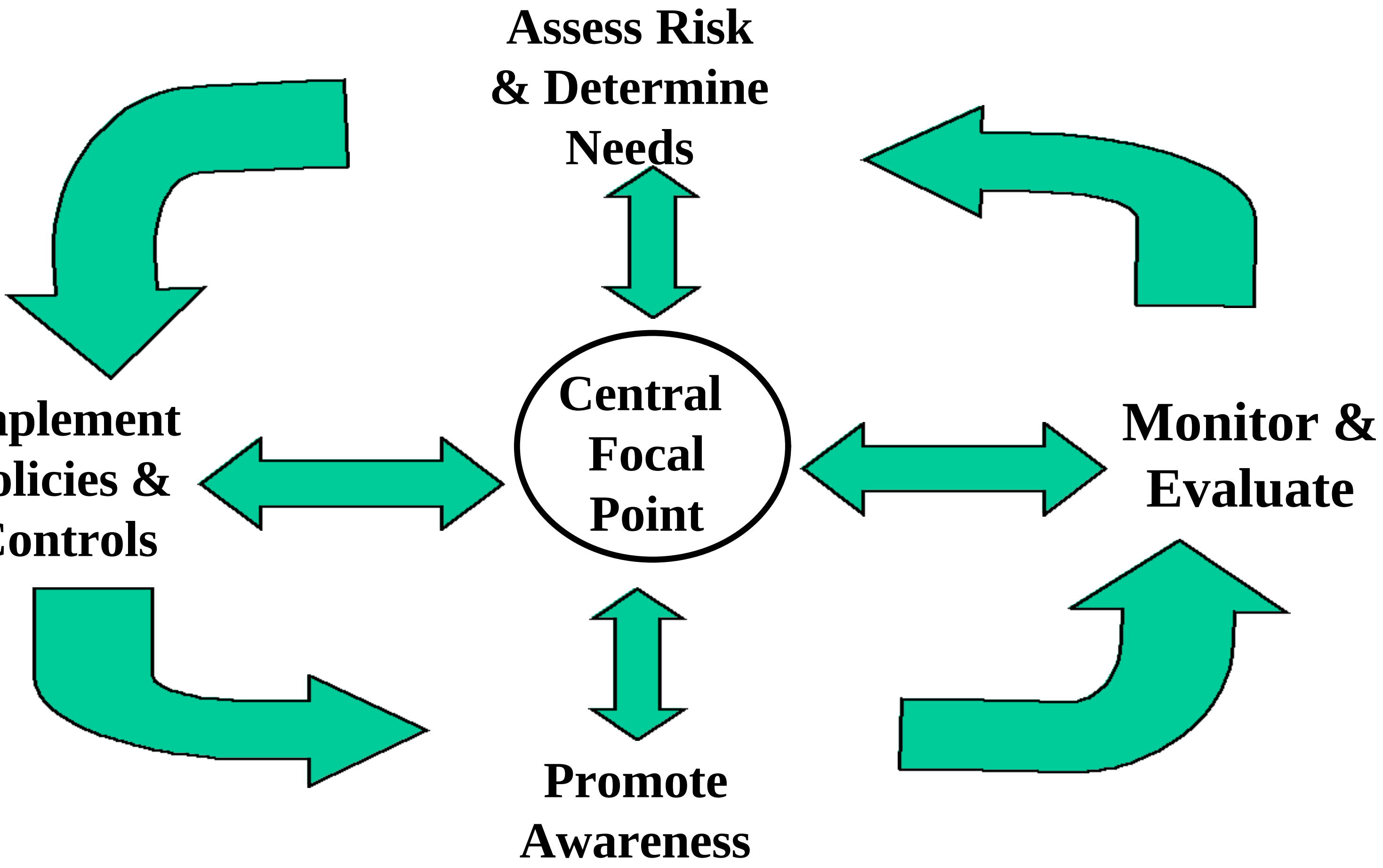
Netigy

Effective Risk Analysis

- Risk Management Principles
  - Assess risk and determine needs
  - Establish a central management focal point
  - Implement appropriate policies and related controls
  - Promote awareness
  - Monitor and evaluate policy and control effectiveness

Source GAO/AIMD 98-68

Risk Management Cycle



Assess Risk & Determine Needs

Implement Policies & Controls

Central Focal Point

Monitor & Evaluate

Promote Awareness

Source GAO/AIMD 98-68

Effective Risk Analysis

Sixteen Practices That Leading Use Organizations to Implement the Risk Management Cycle

Principle	Practices
• Assess Risk and Determine Needs	• Recognize information resources as essential organizational assets • Develop practical risk assessment procedures that link security to business needs • Hold program and business managers accountable • Manage risk on a continuing basis

Effective Risk Analysis

Sixteen Practices Used by Leading Organizations to Implement the Risk Management Cycle

Principle	Practices
• Establish a Central Management Focal Point	• Designate a central group to carry out key activities • Provide the central group ready and independent access to senior executives • Designate dedicated funding and staff • Enhance staff professionalism and technical skills

Netigy

Effective Risk Analysis

Sixteen Practices Used by Leading Organizations to Implement the Risk Management Cycle

Principle	Practices
• Implement Appropriate Policies and Related Controls	• Link policies to business risks • Distinguish between policies and guidelines • Support policies through central security group

Effective Risk Analysis

Sixteen Practices Used by Leading Organizations to Implement the Risk Management Cycle

Principle	Practices
• Promote Awareness	• Continually educate users and others on the risks and related policies • Use attention-getting and user-friendly techniques

Netigy

Effective Risk Analysis

Sixteen Practices Used by Leading Organizations to Implement the Risk Management Cycle

Principle	Practices
• Monitor and Evaluate Policy and Control Effectiveness	• Monitor factors that affect risk and indicate security effectiveness • Use results to direct future efforts and hold managers accountable • Be alert to new monitoring tools and techniques

Netigy

Effective Risk Analysis

- Assess Risk and Determine Needs
  - Risk considerations and related cost-benefit trade-off are the primary focus of a security program.
  - Security is not an end in itself
  - Controls and safeguards are identified and implemented to address specific business risks
- Understanding the business risks associated with information security is the starting point of an effective risk analysis and management program

Effective Risk Analysis

- “Information technology is an integral and critical ingredient for the successful functioning of major U.S. companies”
  - Deloitte & Touche LLP - Survey of American Business Leaders

Effective Risk Analysis

- Organizations that are most satisfied with their risk analysis procedures are those that have defined a relatively simple process that can be adapted to various organizational units and involve a mix of individuals with knowledge of business operations and technical aspects of the enterprise's systems and security controls.*

*Source GAO/AIMD 98-68

Effective Risk Analysis

- Different Methods - Qualitative vs. Quantitative

<u>Quantitative Pros</u>

- The results are based substantially on independently objective processes and metrics
- Great effort is put into asset value definition and risk mitigation
- Cost/benefit assessment effort is essential
- Results can be expressed in management-specific language
  - – monetary value, percentages, probabilities

Netigy

Effective Risk Analysis

- Different Methods - Qualitative vs. Quantitative

Quantitative Cons

- Calculations are complex
- Historically only works well with a recognized automated tool and associated knowledge base
- Large amount of preliminary work
- Not presented on a personnel level
- Participants cannot be coached easily through the process
- Difficult to change directions
- Difficult to address ‘out-of-scope” issues

Effective Risk Analysis

- Different Methods - Qualitative vs. Quantitative

Qualitative Pros

  - Calculations are simple
  - Not necessary to determine $ value of asset
  - Not necessary to quantify threat frequency
  - Easier to involve non-security and non-technical staff
  - Provides flexibility in process and reporting

Effective Risk Analysis

- Different Methods - Qualitative vs. Quantitative

<u>Qualitative Cons</u>

- Very subjective in nature
- Limited effort to develop monetary value for targeted assets
- No basis for the cost/benefit analysis of risk mitigation

Netigy

Effective Risk Analysis

Automated Checklists

- Typically ask business units a series of questions that prompt them to consider the impact of security controls
- The results are reported to senior management with:
  - stated business unit’s compliance with security policy
  - planned actions to become compliant
  - willingness to accept risk
- Reports submitted to management and auditing

Effective Risk Analysis

- Access Request Procedures
  - Connection to network requires Business Case which includes
    - risks associated with connection
  - Business case is reviewed by:
    - central security group
    - technical staff
    - requester

Effective Risk Analysis

- Request for Deviation
  - In order to deviate from a “mandatory policy” the business unit submits letter explaining reason for deviation and recognizing the related risks.
  - Where necessary, alternative safeguards are identified
  - Request is reviewed by:
    - Business unit executive
    - Central security staff
  - Ultimate decision left with business unit

Effective Risk Analysis

- Facilitated Risk Analysis Process (FRAP)
  - FRAP analyzes one system, application or segment of business process at a time
  - Team of individuals that include business managers and support groups is convened
  - Team brainstorms potential threats, vulnerabilities and resultant negative impacts to data integrity, confidentiality and availability
  - Impacts are analyzed to business operations
  - Threats and risks are prioritized

Effective Risk Analysis

- Facilitated Risk Analysis Process (FRAP)
- The FRAP users believe that additional effort to develop precisely quantified risks are not cost effective because:
  - such estimates are time consuming
  - risk documentation becomes too voluminous for practical use
  - specific loss estimates are generally not needed to determine if controls are needed

Effective Risk Analysis

- Facilitated Risk Analysis Process (FRAP)
  - After identifying and categorizing risks, the Team identifies controls that could mitigate the risk
    - A common group of 26 controls are used as a starting point
  - The decision for what controls are needed lies with the business manager
  - The Team's conclusions as to what risks exist and what controls are needed are documented along with a related action plan for control implementation

Netigy

Effective Risk Analysis

- Facilitated Risk Analysis Process (FRAP)
  - Each risk analysis session takes approximately 4 hours
  - Includes 7 to 15 people
  - Additional time is required to develop the action plan
  - Results remain on file for same time as Audit papers

Netigy

Effective Risk Analysis

- Facilitated Risk Analysis Process (FRAP)
  - Team does not attempt to obtain or develop specific numbers for threat likelihood or annual loss estimates
  - It is the team’s experience that sets priorities
  - After identifying and categorizing risks, the groups identifies controls that can be implemented to reduce the risk

Effective Risk Analysis

- The Risk and Control Summary Report is confidential and is owned by the Business manager requesting or sponsoring the FRAP

Effective Risk Analysis

- Business managers bear the primary responsibility for determining the level of protection needed for information resources that support business operations.
- Security professionals must play a strong role in educating and advising management on exposures and possible controls.

Netigy

Effective Risk Analysis

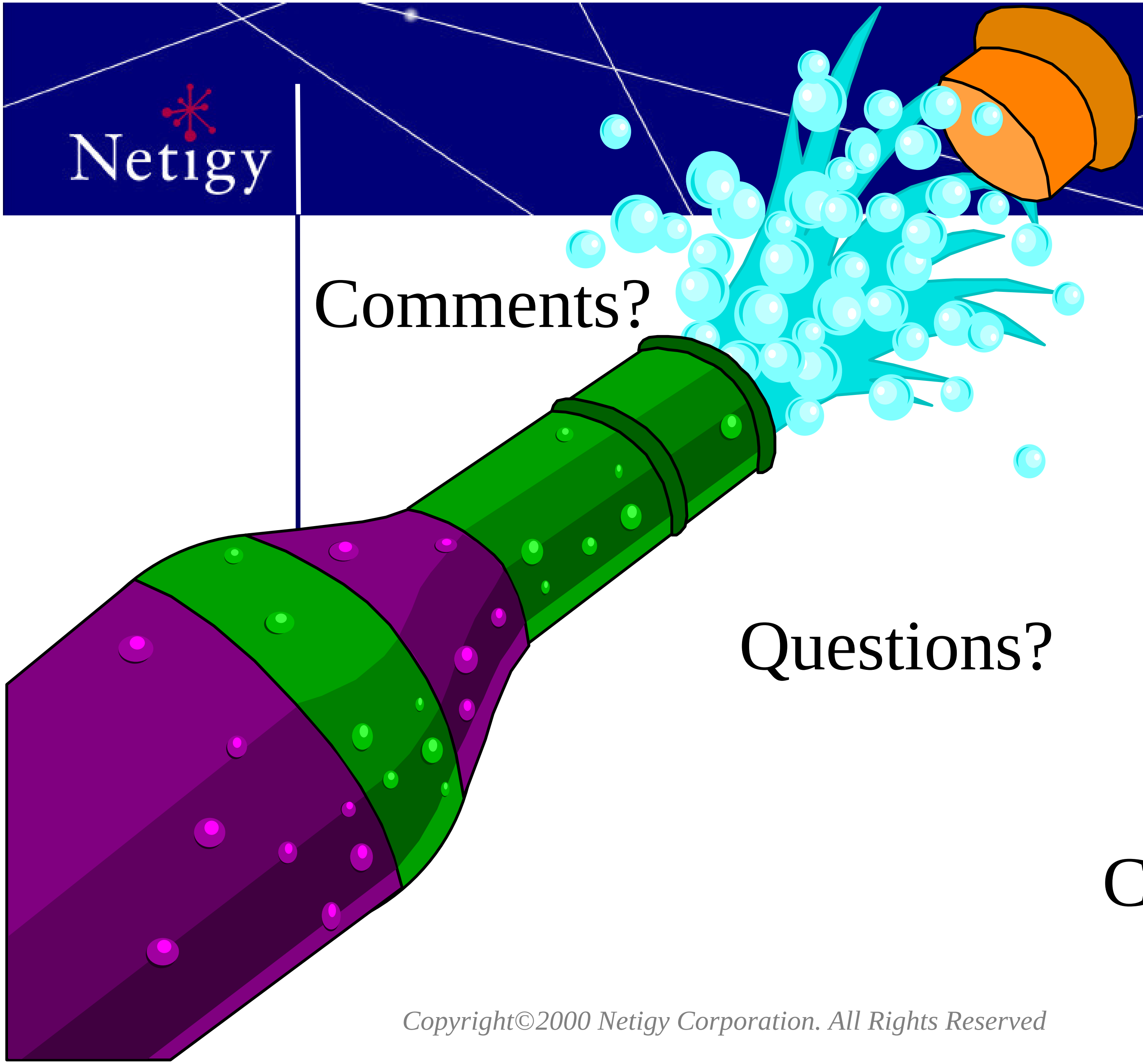
- Government Accounting Office May 1998 Executive Guide for Information Security Management (GAO/AIMD 98-68)
  - "OMB's 1996 revision of Circular A-130, Appendix III, recognizes that federal agencies have had difficulty in performing effective risk assessments . . . For this reason, the revised circular eliminates a long-standing federal requirement for formal risk assessments. Instead, it promotes a risk-based approach and suggests that, rather than trying to precisely measure risk, agencies should focus on generally assessing and managing risks."

Effective Risk Analysis

- We have discussed:
  - Why should a risk analysis be conducted?
  - When should a risk analysis be conducted?
  - Who should conduct the risk analysis?
  - How long should a risk analysis take?

Effective Risk Analysis

- We have discussed:
  - What can a risk analysis analyze?
  - What can the results of a risk analysis tell an organization?
  - Who should review the results of a risk analysis?
  - How is the success of the risk analysis measured?



Comments?

Questions?

Critiques!

Effective Risk Analysis

Thomas R. Peltier, CISSP

Netigy℠

Driving eBusiness Performance℠