Lotusphere2011
IBM Software

BP107 - Performing Your Own IBM Lotus Domino Security Review

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Smarter software for a Smarter Planet.

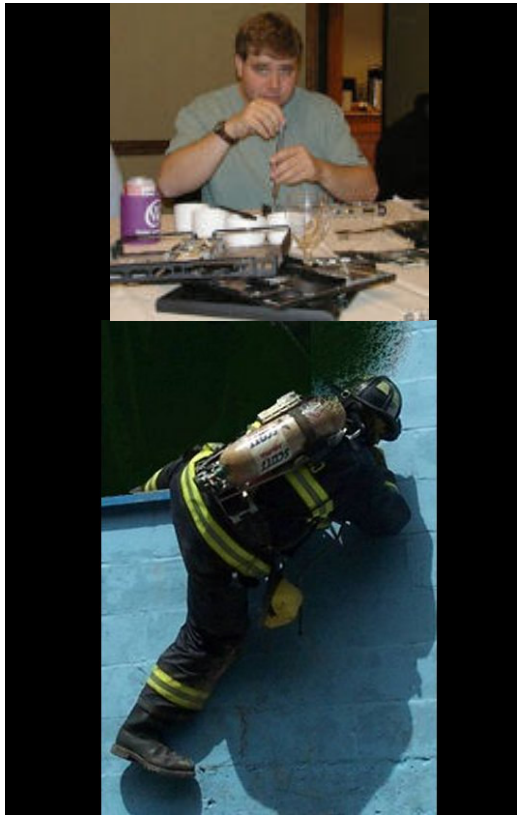
In This Session…

- Focus is on Process not Settings or Tools
  - Very Low Geek Factor
  - Big Picture Thinking Is Required
- Creating Manageable Review Portions
- What to look for – and Why
- Critical Areas

To a security administrator, there are only two levels of paranoia. Absolute, and insufficient

Who Am I?

- Administrator & Developer since version 2.0
- IBM Lotus Beacon Award Winner
- Products
  - NCT Search
  - NCT Compliance Search
  - NCT Simple Sign On
- Services
  - Site Performance Reviews
  - Application Development
  - Administrative Overhaul
  - Security Review & Penetration Testing
- Structural Firefighter
  - Lieutenant of Cumberland, Maine – Engine 1



Please Shut Off All Noisemaking Appliances

- I'm not judging, just shut them off while we're talking
  - Unless they are medically necessary

What We'll Cover …

- The Review Process
- Understanding Threat Vectors
- Performing the Review
- The Server Environment.
- Mail & User Access Administration
- Securing the Desktop Client
- Reviewing Applications
- Penetration Testing

THE REVIEW PROCESS

What About Tools

- There Are No Magic Tools
- Ports are not the Problem
  - Port scanning tools make nice “Gotcha” lists, but not very helpful
- Admin Policies, Domain Manager, & Event Monitor
  - These are great tools to help implement secure practices
  - Not security in themselves
- Focus on People, Paths, & Processes

The Goals of a Security Review

- To Improve Reliability & User Confidence
- To Protect Customers & Employees
- To Protect Administrators
- To Meet Regulatory Requirements

Difference Between Review & Audit

- Review
  - We Talk About It
  - What Do We Do?
  - Cooperative
  - A Few Days Work
- Audit
  - I Don't Believe You
  - Are We Really Doing It?
  - Adversarial
  - A Few Weeks Work

Clearly Define the Parameters

- What technical areas or processes are covered
  - "Domino" is too broad a subject for a single review
- What does "Secure" mean to us?
- What are we trying to protect?
- Threat Vectors - Where does the threat come from?
- What is the expected outcome or deliverable?
- Are we doing a review, or performing an audit?

Sources of Information

- Staff Interviews
  - Not definitive for an audit, but invaluable for a review
  - Provide the basis for all further investigation
  - Let People Talk – They know what is really happening
  - Be the “Good Cop” not the “Bad Cop”
- The Domino Directory
  - Contains Much of the Configuration
  - Provides backup and context to interview information
- The Catalog Database
  - Details ACL’s in use and Database Activity
  - Provides a shopping list for access groups
- Log Files and Events Database
  - Can provide detail for validation

Documented Policies & Procedures

- That they exist is often more important than the specifics
- Do they match the business objectives & security goals?
- If followed, will they work as expected?
- Do all of the appropriate people understand them?

Review Preliminary Findings

- Informal Discussion or Presentation
  - Include the Administration team you interviewed
  - Do not include senior management at this stage
- Use this time to refine your understanding
  - Allow the Admin team to correct any misconceptions
- Allow simple but major issues to be addressed
  - Do not omit the finding, but note that it's been addressed
- Use the team to help with wording and context
  - Help refine your result to be as helpful as possible
  - The right context changes threatening findings into funded solutions

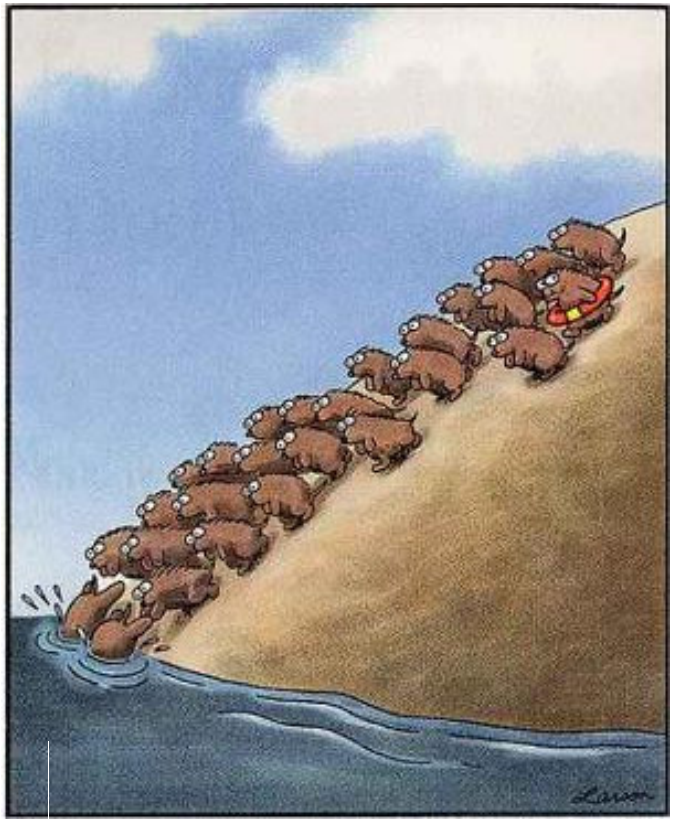
The Findings Report

- Clearly identify the level of cooperation from the Admin Team
- Clearly define the scope & depth of the review
- Clearly describe the review process
- Present recommended resolutions for each finding
- Use language and processes related to the business units

UNDERSTANDING THREAT VECTORS

Unskilled External Threats

- Extremely Common
  - General Spam
  - Malware via Email & Browser
  - Script Kiddies
- Easiest to Manage through application of best-practices
  - Anti-Virus / Anti-Spam
  - Operating System Updates
  - Software Patches



Skilled External Threats

- Least Common
  - Domino Aware & Site Aware
  - Focused Goals
  - Reasonably Manageable
    - If you've been paying attention

Unskilled Internal Threats

- May come from skilled administrators making mistakes
- Accidents & Unintended Consequences
- Users Bypassing the Rules & Processes
- Often results in data loss or exposure of private information
- Avoided by good security and administrative practices
- Managed through Backup & Restore, Disaster Recovery

Skilled Internal Threats

- The Most Dangerous Kind
  - Network & Domino Administrators
- Common Goals of Skilled Internal Threats
  - Unauthorized Access to Management Email or HR Information
  - Employee Harassment or Stalking
  - Retribution – often related to promotion, termination, or redundancy
  - Theft of Information – often related to leaving the company

False Accusation – The Biggest Threat Admins Face

- Email administrators are frequently accused of snooping
- Proactively protect your administrators & developers
  - Do not sign agents with admin or developer ID's
  - Protect access to ID files & credentials – even from Administrators
  - Require a distinct ID for each administrator
  - Require a separate ID for admin tasks – especially full access admin
  - Log & Notify when Full Access Administration is used
- If your practices & procedures limit access even to admins, they can be easily defended from false accusations

PERFORMING THE REVIEW

Four Distinct Review Areas

- Tackle Each Review Area Separately
  - The Server Environment
  - User & Access Administration
  - Mail, Contacts, and Calendars
  - Reviewing Applications
- Each of these encompasses a wide range of issues
- They are interdependent
  - You cannot trust a Mail Access review if you don't first tackle a server environment review….etc.

THE SERVER ENVIRONMENT

Critical Items

- Physical access
- Network file system access
- Software maintenance
- Disaster recovery

Reliability is Security

- Denial of Service is the most common threat
  - It is also the easiest hostile action to take, in most cases
- Service Levels can be Mission Critical
  - Financial Institutions the week before taxes are due
  - Decision Support Systems
  - Sales People and their Email
- Does a response plan exist?
  - Has it been tested?
- If the whole system fails – what will the result be?

Physical & Network Security

- Who accesses the hardware routinely?
- Who else can gain access to the hardware?
  - Including swapped RAID drives & Backup
- Support Facilities Security
  - Redundant Power
  - Redundant Cooling
  - Fire, Flood, Storm, and other Natural Events
  - Building Lock-Out Issues
  - Live Hot-Site Requirements
- Who Manages the Firewall, Switches, and Phone Systems?

Operating System Security

- Who manages the network level access?
- Are the database files stored with local encryption?
- Who manages the operating system?
  - Patches & Updates
  - Anti-Virus
  - Backup Software
  - Operating System network firewall
  - Domino Software Installation
- Is Remote Access software used?
  - VNC, Remote Desktop, Terminal Services, etc.
- What other OS level services are enabled?

Backups & Data Security

- Is the backup & restore process documented?
  - Has it been recently tested?
- Is the backup software certified for use on a Domino Server?
  - Have you checked the version?
- Is the backup data encrypted?
  - Who has the decryption keys?
- Is the backup data kept off-site?
  - Who has access to it?
  - How long does it take to retrieve it?

Enterprise Integration

- Key vector for credential spoofing or theft
- Common Integration Paths
  - End User Desktop Single Sign-on
  - Back end RDBMS, ERPS, & CRM
    - User Credential Pass-Through
    - Batch Data Transfer
- Each case is unique – look for exploitation paths
  - Access to stored credentials
  - Network intercept of tokens or credentials
  - Source Data poisioning
- SQL Injection Matters Here
  - While Domino itself tends to be fairly immune to sql injection, it can be used to pass data to other systems which are more vulnerable

Domino's Internet Ports Security

- Are unused ports disabled and blocked?
  - You should not be using SMTP internally. Block it.
- Are "internet passwords" kept in sync with userid passwords?
  - If not, they're often blank – or contain default passwords
  - Never accept the excuse "We don't enable any of those ports"
- Are password requirements sufficiently complex?
- Script kiddies use dictionary attacks against ALL ports, not just http
  - SMTP authentication based dictionary attacks common
  - Many sites only review the logs on known active ports

Anti-Virus/Anti-Spam

- Most malware is now in the form of worms & Trojan horses
  - Getting users to click on active spots is the key to most
  - Users will click on anything

- Almost any file format can be used for buffer overflow attacks
  - The exploits change every day
  - As of Q4 2009, the #1 Attack Vector was Adobe PDF & Flash

Your Lines of Defense – In Order of Importance

- Inbound mail gateway anti-virus & anti-spam
- Inbound firewall port blocking
- Desktop operating system anti-malware
  - If the software is not specifically Notes aware, do not scan NSF, NTF, and NDK files
- File Server anti-malware
- Outbound firewall port blocking
- Domino Server OS anti-virus
  - Yes, I consider this lower priority
  - Absolutely must be Domino Server aware

Server Security Settings

- Directory ACL Settings
  - The most critical security feature you have
- Public Key Checking
  - Helps Defend against stolen or spoofed userids
- Check Passwords on Notes IDs
  - Helps Defend against copied id files with old password
- Internet Authentication
  - More name variants means short names will match
- Key Server Access Fields – Usually Groups
  - More details ahead
- Programmability Access Fields
  - More details ahead

Administration Groups

- Who manages the groups
- Is membership routinely and regularly reviewed
- Some best practices include
  - No wildcards allowed
  - No subgroups allowed
  - Fully hierarchical names only
  - No agent signing IDs allowed
  - Specific Admin IDs Required
    - Admin IDs do not have mail access
      - Yes, this is cumbersome – but it is self defense

Full Access Administrators

- Always use a specific ID for each admin who will have this access
- Do not allow admins to use this ID for day to day activities
  - This ID file should not be in any other groups or database ACLs
  - To be used, it must be used in Full Access Administrator mode
- Use event reporting to immediately log and notify
  - Notifications should go to off-server and/or encrypted locations
  - This is a “ask forgiveness not permission” kind of setting
    - Sometimes you need it quickly, but you should be able to explain why afterword
- These rules are about protecting your administrative staff

Signed Agent Rights

- Specific Agent Signing IDs Should be used
- Different Agent IDs for unrestricted agents
- Agent signing IDs should not be in general purpose ACL groups that cover all databases
- Developers should not have design access to use these agents
  - A deployment process should detail the way agent code gets signed
  - On-the-fly “quick and simple” changes cause the most accidental damage
- Some databases may require their own specific agent signing id

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MAIL & USER ACCESS ADMINISTRATION

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Critical Items

- If your certifiers aren't considered secure, nothing is secure

- Administration staff no longer need certifier
- access to create users

- There is no longer any need for "
- backup copies" of user id's

The Certificate Authority & ID Vault

- The Certificate Authority (Administration Tool)
  - Allows delegation of tasks that used to require direct access to certifiers
  - Assume that once an admin has a certifier, they have it forever
  - See presentations by Gabriella Davis of for detailed instructions

- The ID Vault
  - Resolves many of the reasons why copies of ID files used to be needed
  - Handles password recovery and multiple computer access
  - See presentations by Gabriella Davis of for detailed instructions

Certifier Security

- When was the root certifier created?
  - Who made it, and were they supervised?
  - Who has had copies of it since then?
  - Organizational certifiers count too, if used
- Anyone who has ever had access to the cert, probably still does
- If your certifier is not known to be 100% secure, nothing else is
- Recent versions are increasingly good at handling rollover recertification without manually reconfiguring each client

User ID Security

- Is there a repository somewhere of originally created ID file copies?
  - Common administrative practice for many years
  - Frequently stored in a notes database or just a file share
  - Your administrators probably all have access to these
- Are ID file password policies documented? Enforced?
- If your administrators have access to a cache of ID files
  - They can be accused of inappropriate access
  - You cannot prove someone did something based on logs
  - Critical vector for further security breaches

Internet Password Security

- Is there a specific process for managing this field?
  - If not, it may contain the original password assigned at ID creation
- Do not neglect this field
  - Even if you don't think you use it
  - Field must be either blank, or managed with processes and rules
- Default values in this field may allow user impersonation
- More processes than you think can use this value
  - Java agents
  - SMTP, LDAP, POP3, IMAP, HTTP, NNTP, etc...

User Management Processes

- Are these processes documented?
  - New User Process
  - Lost Password Process
  - User Terminations
  - Mail Retention
- Are the processes followed?
- Do they meet their requirements?
- Are Terminations tied in some way to the HR department?
  - Avoid delays in this process
  - Lag time in terminations is a key weakness

Group Management

- Pay particular attention to user-managed database access groups
- Do database ‘owners’ regularly review membership?
- A review “signoff” every “N” months is a good practice
- Long term employees who have held several positions or moved regions may be in many groups
- The Catalog database can be a shopping list for group access
  - Find groups with access to both common and target databases
  - Request access to common databases which share access groups with targets

SECURING THE DESKTOP CLIENT

Critical Items

- Execution Control Lists
- Local File Encryption
- Anti-Malware Tools
- PDA Security
- Plug-In Security

Execution Control Lists

- Should be managed by security policies
- Do not allow end users to over-ride
  - End users will click “OK” to anything
- Should be locked to specific design IDs
  - NEVER use */org in an ECL
- Let me tell you a little story….

ECL Hack Code

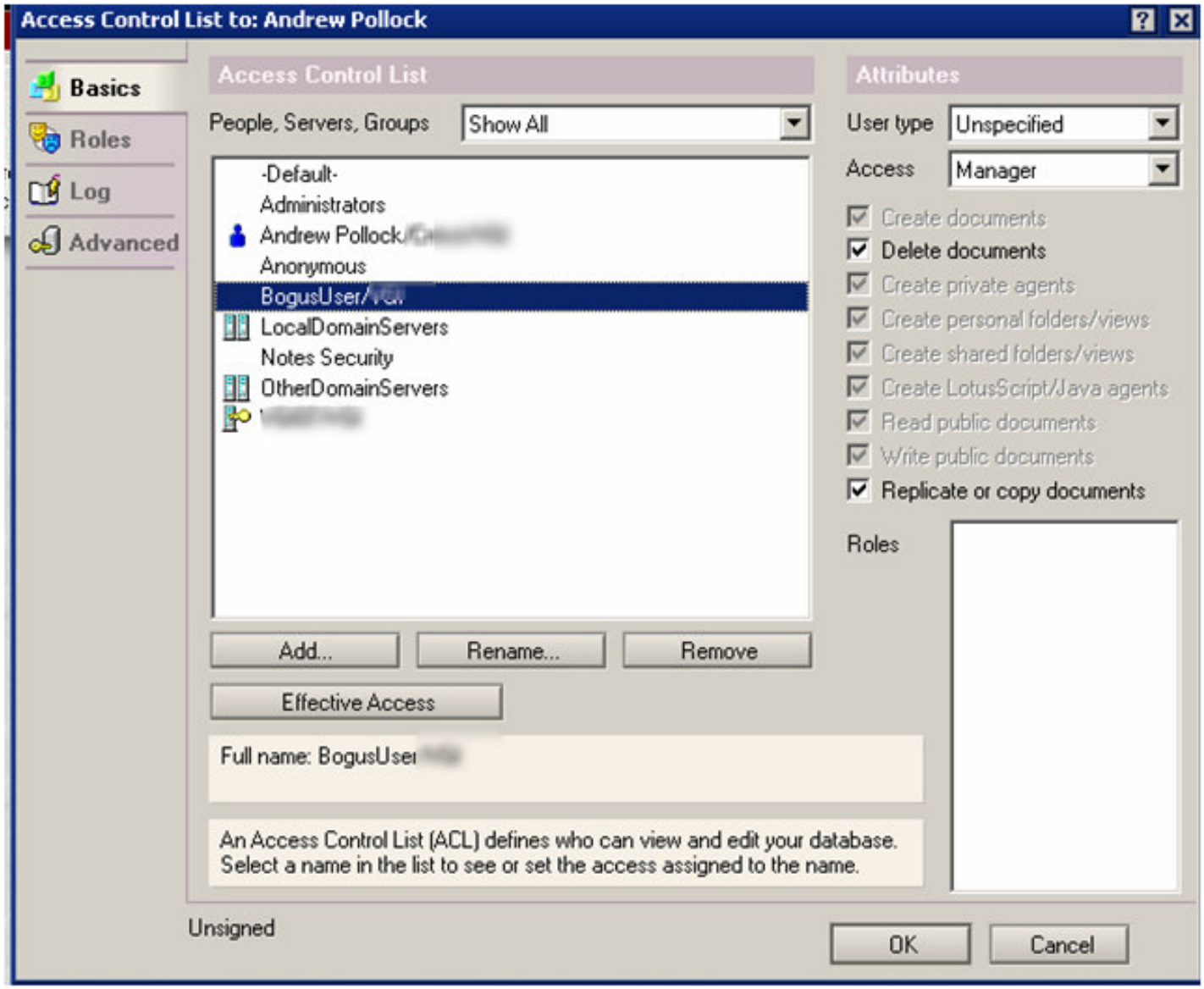
This is a link.

See what happens

Action HotSpot

```
Sub Click(Source As Button)
  On Error Resume Next
  Dim s As New notessession
  Dim db As NotesDatabase
  Set db  = s.CurrentDatabase
  Dim acl As NotesACL
  Dim aclentry As NotesACLEntry
  Set acl = db.ACL
  Set aclentry = acl.CreateACLEntry("BogusUser[illegible]", 6)
  Call acl.Save()
  Dim ws As New notesuiworkspace
  Call ws.URLOpen("http://www.cnn.com")
```

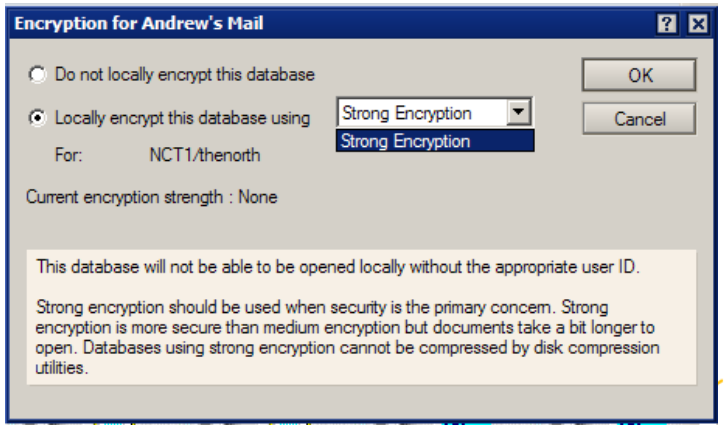
ECL Hack Result



Avoid Accidental Exposure of Private Data!

- There is NO excuse for not encrypting local database files that contain personal, customer, or important company data

- Companies end up on the front page of the
- newspaper after losing tens of thousands
- of customer data records



Client Side Policies

- Policies are a tool, not security per se
- They can be used to standardize and enforce settings
  - ECLs
  - Local Database Encryption
  - Certificate Rollover & Upgrade
  - Password Management

Anti-Malware Tools

- Blocking viruses and malware at the mail gateway is critical but not sufficient to protect the environment

- Desktop anti-malware tools are still required
  - Browser based malware is common
  - USB Drives are a common source
  - Files sent inside archives

- Avoid scanning NSF, NTF, and NDK files if the anti-virus software is not specifically notes aware

Blackberry's, iPhones, & Other PDA's

- Each of these devices has a unique security profile and a plan will need to be made for evaluating each

- General Considerations
  - If the device is accessed by a third party, is the data protected?
  - If the device is lost or stolen, can it be remotely erased?
  - Does the device require an authentication route that can be exploited?
  - Does the device provide a vector for bringing data into the environment that circumvents anti-malware?

REVIEWING APPLICATIONS

Critical Items

- Knowing the Content
- Knowing the Rules
- Knowing the Options at Design Time
- Matching the Security to the Content
- Long Term Access Management

Identifying the Risks

- What are you protecting the application from?
  - External exposure of internal or customer data
  - Employee access to inappropriate data
    - Salary and HR information
    - Personal mail
  - Falsification of critical decision making information
  - Loss or damage to information

Application Security Choices

- Database Access Controls
- Server Based Agent Access
- Reader Names Fields
- Local File Encryption
  - At the server or workstation
- Document Level Encryption
  - Individual or Shared Private Key
- Event Monitoring

Avoid making application security choices on an ad hoc basis

- Requires all developers to understand all the options and implications
- Requires business content owners to pay for expense of implementation
- Results in a complete lack of standards for securing applications

Create a criteria for evaluating applications

- Based on content
  - Employee Data
  - Customer Data
  - Competitive Secrets
- Based on purpose
  - Decision Support Data
  - Testing Results
  - Regulatory Requirements

Apply Security Standards Based on Ratings

- Rate application security requirements on your own scale
  - Green / Yellow / Red / Infrared / Ultraviolet
  - Public / Customer / Internal / Management / CEO / Burn Immediately
  - Pick your own scale

- Match Security Choices to Applications
  - Create a security requirements document for each level on your application security scale
  - Define which minimum security choices must be used for each level on the scale and which may not
  - Avoids conflicts at design time between developers and business units where the cost of security is played off against the risk

Long Term Access Management

- Does every application and database have a defined
  - Business Side Database Owner
  - Assigned Developer
  - Emergency Contact Person
  - Service Lifespan
  - Expected Size
- Are these database profiles reviewed and signed off on regularly?
- Are old databases removed from service?
- Is someone reviewing the access groups regularly?

PENETRATION TESTING

Set the Ground Rules First

- This isn't a Movie
  - No James Bond stuff
  - No Dumpster Diving
- The Goal is to Help, not to Show Off
- Non Destructive Testing Only
- Prove only the Ability to Access
  - You don't have to actually access the content to prove you can
- Prove only the Ability to Damage
  - Never actually damage content or take down servers

Work with an Internal Partner

- Establish Safety Procedures
  - "If I send you something, don't open it until I'm there"
  - Use "code words" instead of offensive content
    - It may be seen by people who are not "in the loop"
    - Your code or data may be there long after you leave
  - Never impersonate a real user – especially the boss

- No Surprise Testing
  - Do not provide the security guards an excuse to taze you
  - Do not cause the network security people to be woken up or called in from vacation time to deal with your threat

Assume an Educated Attacker

- Domino Designer is widely available
- There's Always Someone Smarter
- There are blogs, websites, and even scripts out there
- Your threat is most likely a current employee or administrator
- Your threat may be a former employee or administrator

Define the test Parameters

- What Role are you Playing
  - Internal or External
  - Always assume skilled
  - Always assume Domino Designer is available

- What is your Penetration Goal

Use A Realistic Starting Point

- For internal
  - Start with a standard “New Hire” or “Contractor” configuration
  - Simulate as a user with a few years experience by picking one and having your test id added to the same groups

- For external
  - Simulate a total outsider without any internal knowledge
  - Simulate a former employee with current or recent knowlede
  - Simulate a former administrator with an old ID and certifier

Limit Physical Plant Penetration

- Potentially Dangerous
  - Not everyone you encounter will be in the loop
  - You could inadvertently cause sever damage
  - The letter in your pocket from the CEO explaining your presence will not help you quickly enough to avoid being tazed, shot, or handcuffed and taken to jail.
- Frequently Unlawful
  - Even with a “general permission” agreement, it can still be against the law to break into a data center or office building
- Rarely Helpful
  - Most I.T. theft is not done this way except in the movies, and the kind that is would be far more capable than you can simulate

Limit “Human Engineering”

- These Are Process Issues
  - The help desk can be fair game in a very limited sense
  - Test only to see if they follow the defined process
- Don’t Embarrass Coworkers
  - You’re there to help make things better, not cause people stress
- Never Impersonate a Real Person
  - You may want to do something like send an email as someone else.
    - Use a made up name.
      - Example: “The Boss/Corporate/Organization”
    - This is just as effective as using the boss’s name, but does not carry the risk of being misinterpreted.

Resources

- Keep Up With The Latest
  - My blog frequently includes performance tips & tests
    - http://www.thenorth.com/apblog
  - Follow Bruce Schneir's blog for a solid general understanding
    - http://www.schneier.com/
- Learn More About
  - ID Vault and ECL Management with Gabriella Davis' Presentations
    - http://blog.turtleweb.com
  - Systems Security at CERT
    - http://www.cert.org/

Questions?

- Ask now, don't wait for the end and ask quietly at the podium

  - The most up to date copy of this presentation will be on my blog site: http://www.thenorth.com/apblog

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