Defeating Social Engineering with Voice Analytics

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Where I'm coming from...

- News & Online Editor VON Magazine
 - VoIP/IP communications
 - Security issues
 - Enterprise issues
- If you want a consultant on IT/Security issues, go hire one – not me ^(C)

I'm going to talk about...

- Voice Analytics (VA) What is it?
- How features of VA are being used in the corporate sector for security purposes today
- Applying VA as a defense layer against social engineering attacks

Voice Analytics - What it it?

- Definition: Analyzing the spoken content of recorded conversations (Mostly phone)
 - Also called speech analytics
- For this presentation, includes-
 - Voice print identification
 - Word spotting
 - Emotion Detection
 - Talk Analysis
 - Combine above with call data (date, time, duration, caller ID) and statistical analysis.
 - "Datamining phone calls"

"Echelon" – The Legend

- National Security Agency slurps up all overseas phone calls
- Massive computers farms scan calls for key words, voiceprints
- Speculation on capability as early as 1982 (Bamford, <u>The Puzzle Palace</u>)
- "Echelon" program reported 1999-2000
- 24 years of development (?)

Corporate America's "Echelon"

- Voice print, voice analytics in use today
- Big users are call centers for:
 - Fraud detection/prevention
 - Operational efficiency
 - Training, call escalation
 - Real-time business intelligence
 - Spot competitor offers, problems in service
- Multiple vendors providing speech analytics/voice analytics solutions to the call center market
- Call monitoring also used for regulatory compliance in financial, health care industries.

Why Call Centers?

Efficiency is everything

- Get calls resolved faster, happier customer, lower costs
- Large data collection mechanism
 - Cheap disks, cheap processors, sophisticated software
- Voice analytics allows companies to spot competitive trends in real time.

Enabling technologies

VoIP –

- IP PBX Everybody is going to bits, so voice just another data stream to manipulate
- Cheap disks, cheap processors = Store everything, analyze everything
- Software is now off the shelf
 - If you are already doing voice print in real-time or recording calls for "quality assurance purposes," voice analytics is the next step

Where is Voice Analytics being used today?

- Contact Centers (Call Centers)
 - It's datamining of the call content
- Financial institutions
 - Banking
 - Insurance
- Commercial organizations wanting to insure confidentiality of data
 - Health Care, Banking
 - Liability/Regulatory requirements HIPPA, financial, Sarbanes/Oxley

Voice Print Identification

- Unique digital "pattern" to one's voice
- Biometric means of identifying a person
- Multiple commercial solutions available for password replacement, such as
 - Nuance Verifier "Speaker Verification"
 - 150 million secure calls annually
 - Financial services, telecommunications, utilities, transportation and manufacturing.

Commercial Benefits of Voice Print ID

- Reduce PIN/password admin
- Savings by reducing live agent contact (i.e. "I forgot my password/PIN")
- Reducing potential for fraud and identity theft
- Improve customer service with a convenient means of security

How is Voice Print Used?

Authenticate identity

 Make "baseline" voice print or train recognition via selective vocabulary

Insurance companies use voice print for:

- "White list" Authenticate customer claim
- "Black list" Spot known bad actor
 - Starting to be used in combination with database
- Likely see voice print start to proliferate for consumer financial use (credit card, some banking apps) in next few years.

Vendors Offering Voice Print

- Teledata Technology White List/Password replacement
 - Voice Biometrics "T3 Viometrics reduces expenses associated with administering password policies and manual verification methods using live agent support."
- Courion, IBM, Nuance, Vocent, VoiceVault

Word Spotting

- Parsing out word or phrase in audio stream
 Go from speech to text, index, search
- Can look for single word, phrase, multiple phrases, depending on how detailed you want the rule set to be.
- The "Hot Tool" for Contact Centers
 - Store <u>all</u> phone conversations with agents
 - "Your call may be monitored" or "This call is monitored"
 - Being used to sift through customer calls today for
 - Good experience "Wow!"
 - Bad experience Profanity (with emotion detection)
 - Competition/competitive offers Look for mention of competitors name, "special offer," "great deal."

The FedEx "Wow!"

- FedEx searches inbound calls for "Wow"
- Calls are marked and forwarded to training
- New call center agents listen to fresh calls to learn how to be better call agents

You @#\$!!!

- Look at the angry customer
- In real-time, escalate to manager/troubleshooter
- Post-call, identify problems—
 - Bad business process
 - Bad product
 - Bad customer (Just profane or highly sensitive)
 - Agent in need of improvement

Word Spotting For Real-Time Competitive Intelligence

- Inbound calls are a massive source of data on customer, market trends
- Word spotting used to look for—
 - Name/mention of competitor
 - Mention of special offer, "great offer," other switch
- Daily run allows for <u>real-time</u> identification of competitive offers to steal away business
- Allows businesses to adapt their own marketing, sales strategies in near-real time -- rather than 3 months later with sales down 5-10%.

Other Voice Analytics Applications

• Generate profiles of

- "Good" customers
 - Make special/loyalty offers/bonuses
- "Bad"/trouble customers
 - Can pull out & examine multiple calls – Historical or on-the-fly
 - See if there's a bad history of interaction
 - Identify inbound for escalation/special handling.
 - Use in combination with emotion detection.

How it works – General Process

- Capture clone/copy VoIP stream
- Storage Put it on a server
- Retrieval Index everything nicely
- Analysis Set up rules and ad-hoc reports, look at the results

Profile of NICE Systems

- Traded on NASDAQ, \$311 million in 2005.
- The "Microsoft" of Voice Analytics
- Based in Israel, 20 years of operation
- 23,000 customers. over 100 countries, including 75 of Fortune 100
- American Express, Citibank, FedEx, Home Depot, Nextel, Time Warner, Vodafone
 - "NICE's solutions are changing the way organizations make decisions, help them improve business and operational performance, *address security threats and be proactive*"

NICE - The Good, The Interesting

- Supports Nortel, Cisco Call Manager, Avaya Communications Manager.
- Can link voice with other recording tools IM, screen lookup
- Can tie into SAS analytical models so you can do statistics to your heart's content
- Baseline analytics package costs \$100,000
 - Storing calls much cheaper.

Voice storage – Or Everyone is Storing

- Entry-level storage
 - Single (PC) box, PCI bus, Win XP, redundancy options
 - 48 recording channels per unit, usual phone interfaces.
 - Store up to 55,000 hours of audio
 - Can be scaled as a multi-site solution for distributed organizations: Branch offices, distributed PSAPs
- If not analyzing in real-time/near-real time, can at go back and "audit" interactions with software at a later date.
 - Interactions don't have to be phone
 - Radio communication

NICE's thoughts on storage

 "These days even small and medium-size enterprises need professional voice logging not just for reducing liability, resolving disputes or trapping nuisance callers but also for staff training, enhancing customer service or clarifying verbal instructions."

Commercial Uses of Voice Recording/Analytics

- Quality monitoring
- Liability/Regulatory
- Interactions analytics
- Looking at what is going on between call center and customers, spot trends, improve marketing, performance of agents.

Voice Analytics - Call Center Applications

In-Call

- To trigger direction to a specialist by phrase or emotion
 - Supervisor/escalation
 - Caller identification verification
 - Starting to database voice print
 - » Use voice print to verify identity; prevent identity theft
- Post-call Analyze trends
 - Customer mentioning offer/competitor
 - Data used to adjust marketing, sales strategies
 - Customer encountering problems with "X"
 - Use to update help desk, refine procedures

Liability/Regulatory requirements

HIPPA, financial, Sarbanes/Oxley HIPPA

- Track communications to ensure confidentiality of information
- Financial
 - Monitor for leakage of information, insider trading
- Sarbanes/Oxley
 - Everyone's paranoid about requirements, skew to overkill.
 - Provides "audit trail" of calls & monitoring

Applying Voice Analytics To Defend Against Social Engineering

An interesting datapoint..

www.vocent.com

- White paper picture/reference on their website "Social Engineering & Identity Theft: How Criminals Exploit Your Call Center"
- White paper has been **REMOVED** from their website.

Social engineering –The way in

- Outside caller impersonates "insider"
- Everyone is eager to cooperate with a friendly person.
- Easiest way to be compromised
 - Phone numbers
 - Passwords
 - Procedures/websites
- One piece of key information leads to others
 - (See Mitnick, Kevin)
- Despite written policies, user education, social engineering is still an effective way to breech corporate security.

Real-Time Defenses Against Social Engineering with Voice Analytics

- White List
- Black List
- Black List With Sharing
- Word Spotting
- Voice Analytics
 - All of the above, with computer/telephony data and statistical analytics)

Implementation

- Using existing technology
- No "blue sky" ideas, more—
 - Cut and paste (for word spotting)
 - Building rule sets/queries to combine existing real world functions
 - Combining white list/black list voiceprint with word spotting
 - Building multi-word/phrase word spotting
- VoIP/IP-PBX enables ease-of-implementation
 - It's already bits in the machine
- (Current) Price tag likely to be a deterrent for some orgs; others will try to shoehorn in on existing licenses.

White List - Voice print identification

- "My voice is my passport"
- Most common use
- In-house use to authenticate:
 - Technicians/IT staff (already being done in some places)
 - All staff
- Becomes more important as caller ID information is spoofed

Black List – Voice print identification

- Scan for Known "Bad Actors"
- Already being done in insurance & financial sectors to detect identity fraud.
- Once spotted, flag/deny access to rest of phone system; send to voice attendant hell
- Share bad actors voiceprint in central database (optional)

Black List with Sharing

- Voice print, but with a mutually shared database
- Insurance companies are already starting to database voiceprints
- Once caller blacklisted, share the voice print in the pool
 - Akin to "The Book" in Vegas of banned gamblers

Word Spotting

- Monitor vocabulary of words
 - "User login," "Password," "Phone number of"---
- Cross-match with caller ID.
 - Someone off the street is calling in asking for a password, sound the alarm
- Likely have to establish baseline/threshold to prevent false alarms.
 - "I've forgotten my login password, can you reset it?"

Post-attack reconstruction

- Identify bad actor via voice print and word spotting
- Track back through call logs, voice print
- Can trace back--
 - Who was called
 - Identify both methods & compromised info
 - "Why did he ask for that?"
- Generate a full time-stamped audit trail as to who called, when, where (if caller ID not manipulated)

Spy vs Spy

Tactics Against Voice Analytics and Countermeasures

White List -

Tactics/Countermeasures –

- Tactics Canned phrase from fixed vocabulary regenerated via recording
 - Sneakers "My voice is my passport" Tape recorder
 - These days, use a laptop to polish, iPod to play
- Countermeasure Emote
 - "Say it angry, say it calm"
 - Canned response will only have one "flavor"/version.
- Countermeasure "The Phrase that pays"
 - Daily randomly generated phrase analyzed on the fly
 - Much harder to spoof, especially in combination with time limit on response

Tactics And Countermeasures – Word Spotting

- Tactics Avoid "hot" words if possible/known
 - Use code phrases/substitution Thesaurus VERY useful
 - But could also be very awkward
- If using hot words, run a slow-attack to avoid baseline/threshold.
 - A call per day, every other day, every week
- Alternatively, blitz! (Inside the OODA cycle)
 - Try to get all needed information, load, fire attack, get out before security has a chance to react.
- Countermeasures Word Spotting
 - More sophisticated rules
 - Match on key-word monitoring AND unique voice print
 - Immediately flag if key-word and voice outside of whitelist/company directory

Tactics/countermeasures – Black List

- Tactic Use multiple people for social engineering attacks
 - Requires multiple people involved
 - How many people can you have involved?
 - "Three can keep a secret, if two are dead." Ben Franklin
- Countermeasures Shared Black Lists
 - If Black Lists are shared among companies in real time, social engineering attempts detected faster

Tactics– Hack the analytics box

- Voice Analytics Systems are Windows-based
- "Best Cast" Denial of Service attack or crashing the server
 - Attack/crash gives you a date/time for penetration
- Worst case If someone owns the box, and understands the software, everything is fair game
 - White List
 - Black List
 - Vocabulary of monitored phrases
- Countermeasures
 - Secure analytics box just like you would any other piece of sensitive equipment (Physically, network).

Summary

- Voice analytics is being used TODAY in call centers, government applications, Fortune 500
- Features of voice analytics are being used today as a tool to spot social engineering attacks
 - Insurance companies, fraud
- The (software) technology is not cheap, but prices are likely to decline
- First implementations in high-security/high-value organizations

Food for thought

- Echelon Sweden -- or NYC
 - Gear is cheap, software is off the shelf, multiple vendors
- Corporate/government You have no privacy
 - "Big Brother" monitor for job search, grudge against the boss
- And if you thought DNA was bad...
 - Speeches, public conversations, phone calls, podcasting – Your voice can be found everywhere
- Google Voice

Contact

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Questions?

Reference point URLs

- Nice Systems <u>http://www.nice.com/</u>
 2005 Revenues \$311.1 Million
- <u>http://www.saflink.com/</u>
- www.vocent.com
 - Now part of RSA through PassMark
 - Envision Telephony
 <u>http://www.envisioninc.com</u>

Others in the space

- www.etalk.com
- www.verint.com
 - Communication interception and call center businesses!
- <u>www.witness.com</u> Witness Systems