Behavioral Information Security

An Introduction

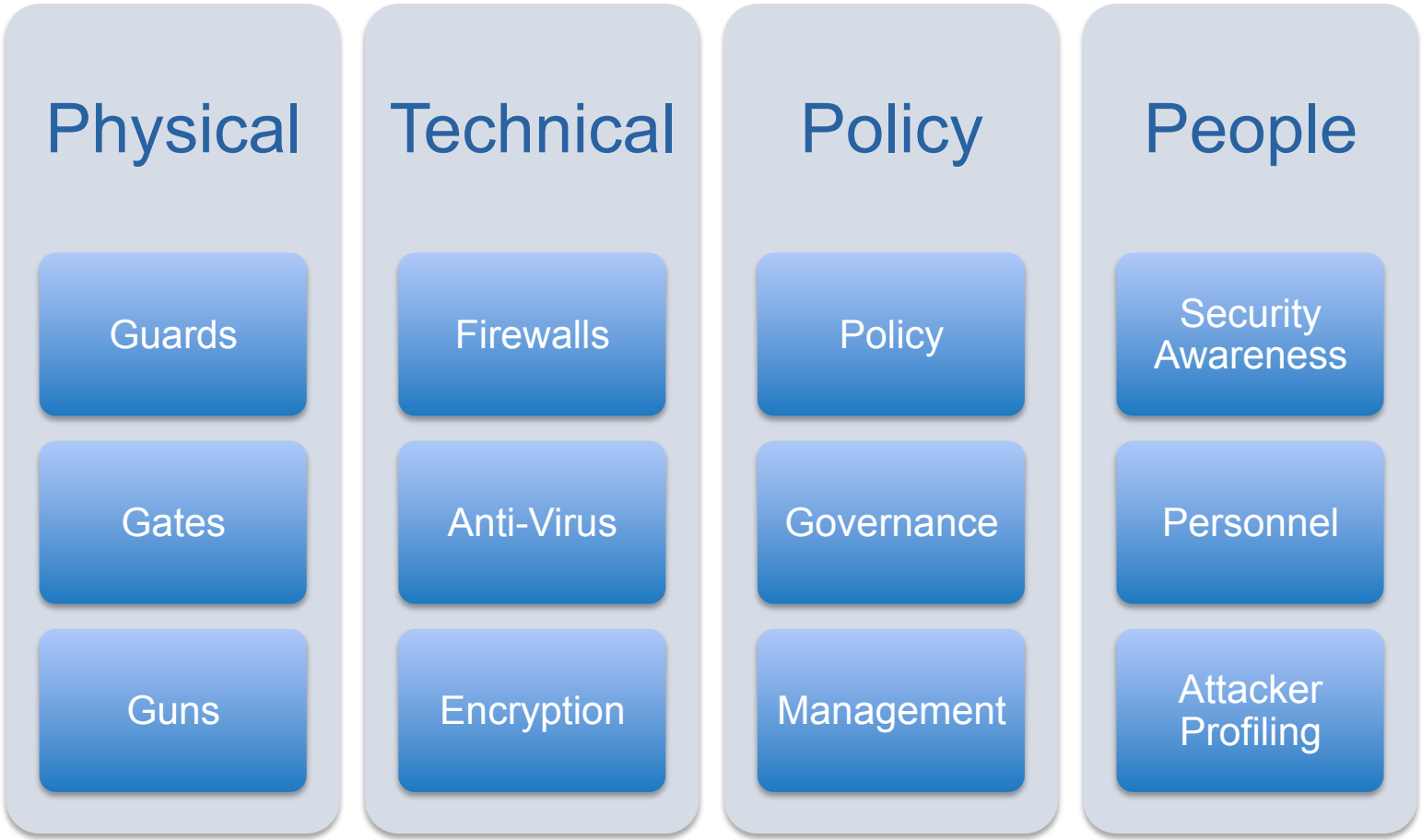
TRANSVASIVE

Transparent and Pervasive Security

Behavioral Information Security

- A new philosophy of Information Security, based on work begun in 2009
- Acknowledgements
  - Janet Wilth, who taught me the difference between IT Security and Information Security
  - Miles Edmundson, whose presentation on Homeostatic Risk Theory got me started
  - Jeff Stanton, who I found by searching for “Behavioral Information Security”

The Pillars of Information Security



The Pillars of Information Security

How proficient are we?

- Physical: Excellent. We've been doing it as long as there have been things to steal.
- Technical: Good. We've been doing it as long as there have been computers.
- Policy: OK. Established industry standards (ISO 27000), practices.
- People: Poor. "People are the problem."

“People are the problem.”

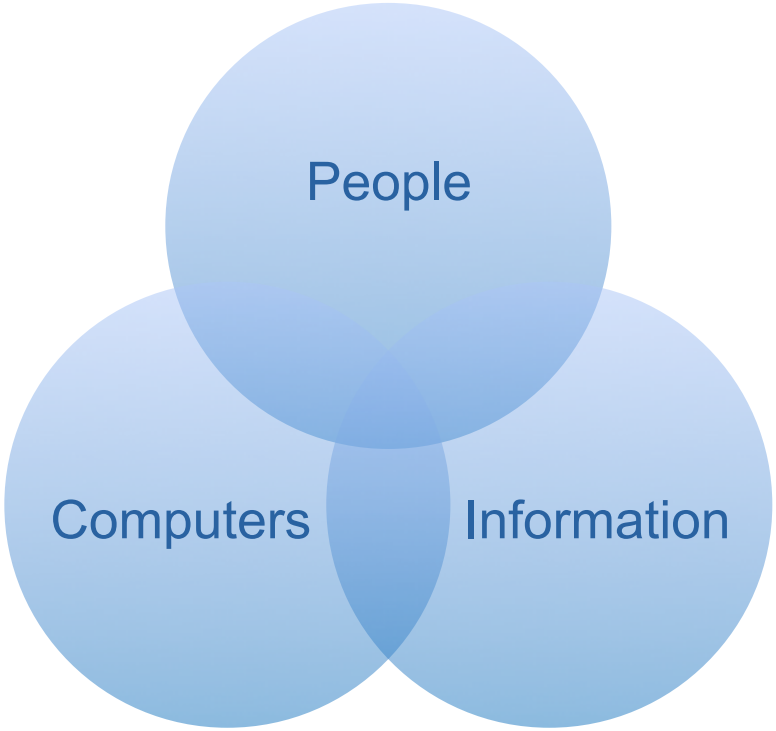
- InfoSec perception of people
  - “You can’t fix stupid.”
  - “People should know better.”
  - CVE-0 (http://isc.sans.org/diary.html?storyid=10933)
- Security Awareness Training
  - “Do good things”
  - “Security is everyone’s business”
  - POSTERS!

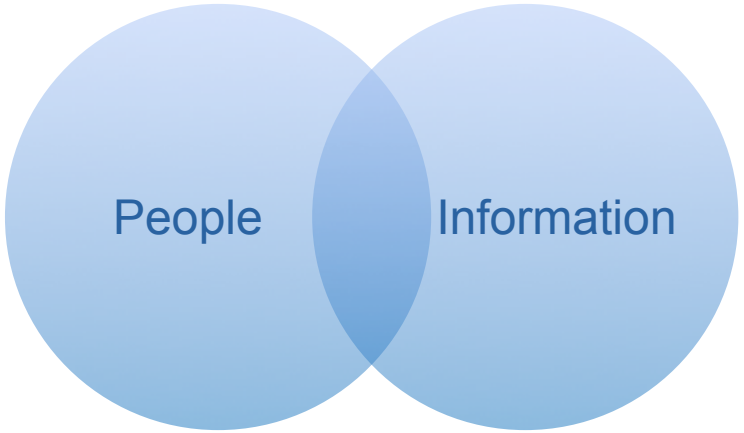
Jeffrey M. Stanton, PhD

“I have observed in my fieldwork that many IT and infosec professionals have a somewhat rigid and Skinnerian view of human motivation, and this adversely influences the creativity of their ideas about how to get people on board with positive patterns of action.”

Well, how did we get here?

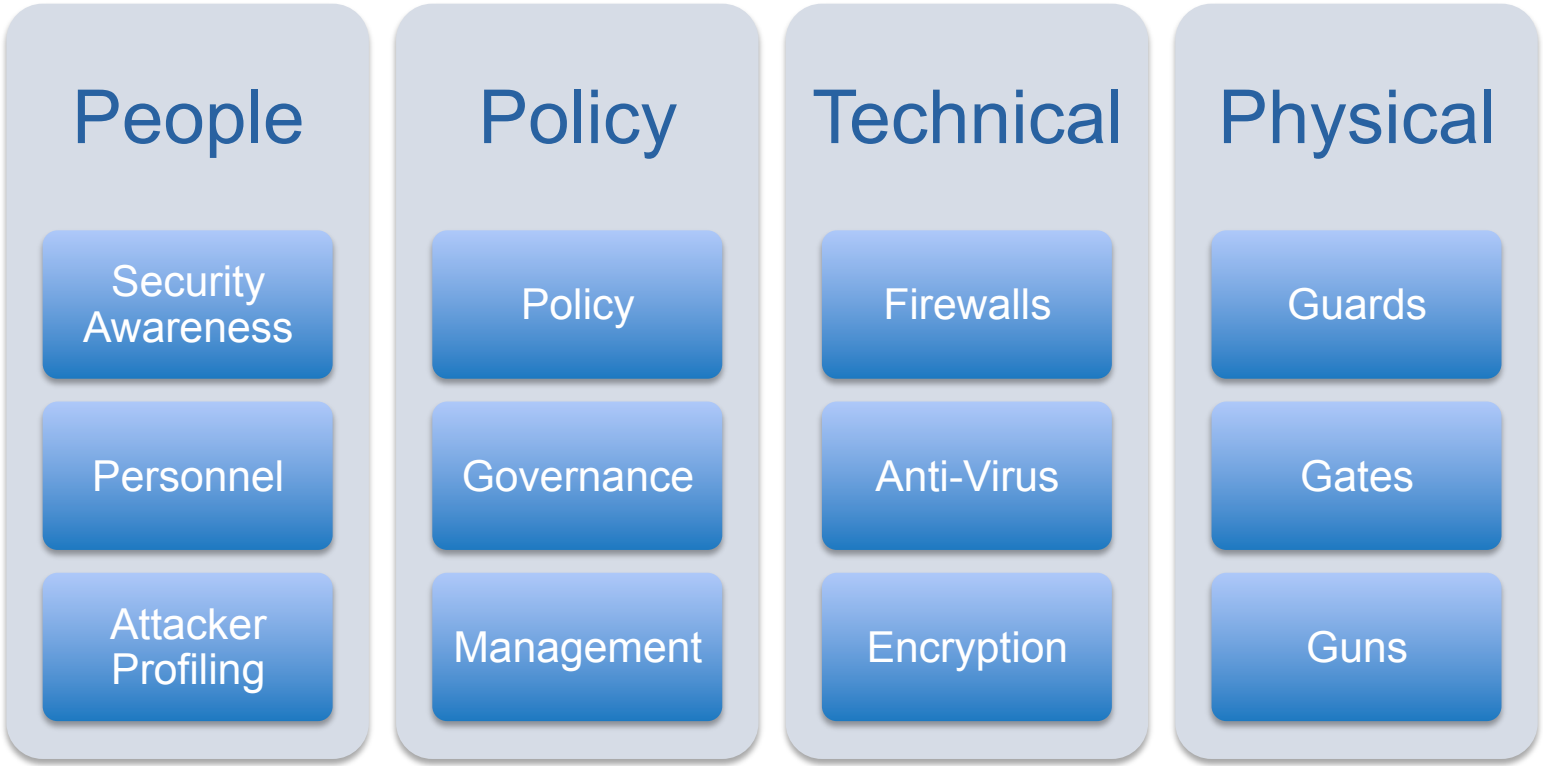
- Information Security Started as IT Security
- With change to Information Security, we need to change our focus from technology to people





Behavioral Information Security

- A philosophical shift, placing people in the center



Behavioral Information Security

- From Jeffrey Stanton:
- Defined as:
  - complexes of human action within organizations that influence the availability, confidentiality, and integrity of information systems and resources
- Mindsets and motivations of individuals whose actions have positive and negative influences on information security

Behavioral Information Security

- My definition:
  - A formal methodology to manage information risk, derived from knowledge of how humans behave and interact with information
- Design and implementation of security architectures and controls based on our understanding of people
  - “Human Interface Design” for InfoSec

Why BIS?

- Solve the “people problem”
- Develop new tools for information security
- Borrow from other disciplines
- Help modernize our profession

- **Reduce cost and improve effectiveness of Information Security**

BIS Resources

- Leverage work from other academic and professional disciplines
  - Economics, especially Behavioral Economics
  - Cognitive Psychology
  - Organizational Theory
  - Sociology
  - Information Science
  - Behavioral Profiling (Israeli Security Authority)
  - Human-Computer Interaction

BIS Resources

- Emerging ideas from others in the field
- Some talks I've attended 2009-2011:
  - Miles Edumundson,"Risk Homeostasis and What it Means for Info Security"
  - Rich Mogull and Mike Rothman, "Putting the Fun in Dysfunctional"
  - Pete Herzog, "Mastering Trust: Hacking People, Networks, Software, and Ideas"
  - Benjamin Tomhave, "Radical Thoughts on Security Reform"
  - Bruce Schneier, "The Dishonest Minority: Security's Role in Modern Society," others

BIS Resources

- Academic research and papers on Behavioral Information Security
  - Jeffrey Stanton and Kathryn Stam, “The Visible Employee: Using Workplace Monitoring and Surveillance to Protect Information Assets-Without Compromising Employee Privacy or Trust”
  - Jose Gonzalez and Agata Sawicka

Solutions

…because describing the problem is not enough

A New Perspective

- The philosophical shift from technology to people
- Sometimes, a change in perspective (restating the problem) alone can help
- Case Study: Vulnerability Management

Vulnerability Management

- Why do vulnerability management programs fail?
  - "Fix all the vulnerabilities!"
  - Buy a scanner…
  - Scan the network…
  - Send out the report…
  - A huge list of things to be fixed…
  - that is promptly ignored.

Restate the Problem

- What problem is vulnerability management trying to solve?
  - "Keep the bad guys from breaking in"
  - (really, only some kinds of bad guys)
- How do we keep the bad guys out?
  - "Fix the vulnerabilities the bad guys use to break in"
  - Reduces cost without reducing risk reduction
- How do we fix the vulnerabilities?
  - "Find the vulnerabilities, and assign ownership"
  - Social consequences for not fixing them
  - Management reports (it affects my review)
  - Departmental reports (competition - NASA)

BIS Research Results

- *The Visible Employee*, J Stanton, K Stam
  - 4 years of research (2001-2005)
  - Interviews with employees, managers, and IT professionals about their attitudes towards Information Security
  - Excellent raw data
  - Employee Survey Study
    - Compared to expected InfoSec success
    - Compared to independent external InfoSec audit

Employee Survey Study

- Security Training and Awareness
  - "My company provides useful training to help employees improve their awareness of computer and information security issues."
- Positive Security Culture
  - "The culture of my company encourages care and attention to information security issues."
- Security Self-Efficacy
  - "There's a lot I can do to keep the information I work with on my computer secure."

Employee Survey Study

- Acceptable Use Policies
  - "My company consistently enforces an acceptable use policy that governs what employees can and cannot do with their work computers."
- Monitoring Awareness
  - "My company lets workers know how their computer activities are monitored."
- Expected Security Outcomes
  - "My company will probably successfully avoid future problems due to information security breaches."

Predictors of Expected Success

- Statistical analysis of survey questions as a predictor of expected security outcomes
  - Survey predicted 64% of expected outcomes
  - Primary predictor: Training and Awareness
  - Secondary predictor: Positive Culture
- Interpretation: Employees with sufficient Security Awareness and Training feel confident in InfoSec success

Predictors of Audit Success

- Compared survey to independent, expert review of company's security posture
  - Survey predicted 39% of "actual" outcomes
  - Primary predictor: Monitoring Awareness
  - Secondary predictor: Acceptable Use Policy
  - Self-Efficacy and Security Culture were *negatively* correlated with experts' ratings
  - Experts' opinions and employees' opinions were not correlated

Survey Study Interpretation

- Companies may improve security by:
  - Establishing clear policies governing employee's behaviors affecting security
  - Consistently enforcing those policies
  - Transparently monitoring employee's behavior
- Self-sufficiency (strong culture and efficacy) may create overconfidence in the company's security
  - Negative correlation does not mean culture and efficacy negatively impact security

Future Directions

- Improved taxonomy of user behaviors
  - Standardize/codify Stanton & Stam research
  - Common language for BIS practitioners
- BIS design principles: (some examples)
  - Restate the problem in terms of people
  - It's usually easier to change technology than change people
  - If you prevent people from doing their jobs, they WILL find a way around security

Future Directions

- Behavioral Security Modeling
  - Model human / information interactions
  - Describe security requirements using socially defined roles and desired / expected properties of information
- Ultimate goal: development of a full BIS methodology
  - Complete toolkit for running a security program using BIS principles

Thank You!

Contact Information:

John Benninghoff

john@transvasive.com

http://transvasive.com/

Twitter: @transvasive

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