

"To paraphrase Lord Kelvin's famous quote, 'You cannot improve what you cannot measure,' Computer security has inhabited this sorry state for years, leaving too much room for snake oil, scare tactics, and plain old bull feathers. Andy's book helps to remedy this problem by sending a strong clear message that metrics are both necessary and possible. Buy this strikingly well-written book today and help put an end to security nonsense."

—Gary McGraw, Ph.D., CTO, Cigital, Author of *Software Security: Building Security in*



# SECURITY METRICS

Replacing Fear,  
Uncertainty, and Doubt



ANDREW JAQUITH

FOREWORD BY DANIEL E. GEER, JR.

## PRAISE FOR SECURITY METRICS

*“Throw out the security religion and make informed business decisions now!”*

—Mark Curphey

ISBPM, Inc.

“Connecting People, Process and Technology”

*“I’m very excited that Jaquith has written a text on metrics, and expect this will be the standard reference for years to come.”*

—Adam Shostack

*“Andrew devotes an innumerable amount of time and effort to helping our profession out at SecurityMetrics.org. His book is wonderful, entertaining, and well thought-out. I found myself nodding my head in agreement more than a few times.”*

—Alex Hutton

CEO, Risk Management Insight

*“Andrew has written a book that most people who work in information protection and those who manage and work with them should read, not because it is particularly informative about information protection, but because it is highly informative about the challenges of measuring protection programs effectively. While lots of books are out there about this or that aspect of security, from a security management standpoint, you cannot manage what you cannot measure, and Andrew puts his stake in the ground with this book about what you should measure and how to do it.”*

—Dr. Fred Cohen

CEO, Fred Cohen & Associates

<http://all.net/>

*“To paraphrase Lord Kelvin’s famous quote, ‘You cannot improve what you cannot measure.’ Computer security has inhabited this sorry state for years, leaving too much room for snake oil, scare tactics, and plain old bull feathers. Andy’s book helps to remedy this problem by sending a strong clear message that metrics are both necessary and possible. Buy this strikingly well-written book today and help put an end to security nonsense.”*

—Gary McGraw, Ph.D.

CTO, Cigital

Author of *Software Security: Building Security In*

# Security Metrics

## Table of Contents

Contents

Foreword

Preface

Acknowledgments

About the Author

Chapter 1 Introduction: Escaping the Hamster Wheel of Pain

Risk Management Is Where the Confusion Is

Metrics Supplant Risk Management

Summary

Chapter 2 Defining Security Metrics

Security Measurement Business Drivers

Roadblocks to Data Sharing

Modeling Security Metrics

Modelers Versus Measurers

Quality Assurance Literature

Public Health Terminology and Reporting Structure

Portfolio Management

Accelerated Failure Testing

Insurance

What Makes a Good Metric?

Metric Defined

Consistently Measured

Cheap to Gather

# **Table of Contents**

Expressed as a Number or Percentage

Expressed Using at Least One Unit of Measure

Contextually Specific

## **What Makes a Bad Metric?**

Inconsistently Measured

Cannot Be Gathered Cheaply

Does Not Express Results with Cardinal Numbers and Units of Measure

## **What Are Not Metrics?**

Misuse of Security Taxonomies

Annualized Loss Expectancy

## **Summary**

## **Chapter 3 Diagnosing Problems and Measuring Technical Security**

Using Metrics to Diagnose Problems: A Case Study

Defining Diagnostic Metrics

### **Perimeter Security and Threats**

E-mail

Antivirus and Antispam

Firewall and Network Perimeter

Attacks

### **Coverage and Control**

Antivirus and Antispyware

Patch Management

Host Configuration

Vulnerability Management

### **Availability and Reliability**

Uptime

System Recovery

Change Control

# **Table of Contents**

## **Application Security**

- Black-Box Defect Metrics

- Qualitative Process Metrics and Indices

- Code Security Metrics

## **Summary**

## **Chapter 4 Measuring Program Effectiveness**

### **Using COBIT, ITIL, and Security Frameworks**

- Frameworks

- Not Useful: Asset Valuation

### **Planning and Organization**

- Assessing Risk

- Human Resources

- Managing Investments

### **Acquisition and Implementation**

- Identifying Solutions

- Installing and Accrediting Solutions

- Developing and Maintaining Procedures

### **Delivery and Support**

- Educating and Training Users

- Ensuring System Security

- Identifying and Allocating Costs

- Managing Data

- Managing Third-Party Services

### **Monitoring**

- Monitoring the Process

- Monitoring and Evaluating Internal Controls

- Ensuring Regulatory Compliance

## **Summary**

## **Chapter 5 Analysis Techniques**

# **Table of Contents**

Mean (Average)

Median

Standard Deviation

Grouping and Aggregation

- Records and Attributes

- Grouping

- Aggregation

Time Series Analysis

Cross-Sectional Analysis

Quartile Analysis

- Quartile Summary Statistics

- First-Versus-Fourth Analyses

Correlation Matrices

Summary

## **Chapter 6 Visualization**

Design Principles

- It Is About the Data, Not the Design

- Just Say No to Three-Dimensional Graphics and Cutesy Chart Junk

- Dont Go off to Meet the Wizard

- Erase, Erase, Erase

- Reconsider Technicolor

- Label Honestly and Without Contortions

- Example

Stacked Bar Charts

Waterfall Charts

Time Series Charts

- Basic Time Series Charts

- Indexed Time Series Charts

# **Table of Contents**

Quartile Time Series Charts

Bivariate (X-Y) Charts

Two-Period Bivariate Charts

Small Multiples

Quartile-Plot Small Multiples

Two-by-Two Matrices

Period-Share Chart

Pareto Charts

Tables

Treemaps

Creating Treemaps

Thinking Like a Cannibal: the Case for Redrawing

A Patch Job for Ecora

Reorienting SecurCompass

Managing Threats to Readability

Summary

## **Chapter 7 Automating Metrics Calculations**

Automation Benefits

Accuracy

Repeatability

Increased Measurement Frequency

Reliability

Transparency

Auditability

Can We Use (Insert Your Favorite Tool Here) to Automate  
Metrics?

Spreadsheets

Business Intelligence Tools

# **Table of Contents**

Security Event and Incident Management (SIEM) Products

Technical Requirements for Automation Software

Data Model

Threats

Exposures

Countermeasures

Assets

Data Sources and Sinks

Data Sources

Data Sinks

Data Interfaces

Data Source Interfaces

Data Sink (Presentation) Interfaces

Metrics Program Management

Implementing Metrics Automation: a Case Study

Summary

## **Chapter 8 Designing Security Scorecards**

The Elements of Scorecard Style

Complete

Concise

Clear

Relevant

Transparent

The Balanced Scorecard

History

Composition

Flexibility of the Balanced Scorecard

Challenges and Benefits of the Balanced Scorecard

Creating the Balanced Security Scorecard



# **Table of Contents**

The Case Against Security-Centric Balanced Scorecards

The Process of Creating the Balanced Security Scorecard

Financial Perspective

Customer Perspective

Internal Process Perspective

Learning and Growth Perspective

Organizational Considerations for the Balanced Security Scorecard

Cascading Scorecards Build Bridges

Balancing Accountability and Acceptance

Speeding Acceptance Using Mock-Ups

Summary

Index