

# CONTENTS

<b>Preface</b>	<b>13</b>
<b>Prologue</b>	<b>19</b>
<b>1 UNWRAPPING THE GIFT</b>	<b>21</b>
1.1 The Pace of Change	22
1.2 Change and Unexpected Developments	24
1.2.1 Connections: Cellphones, Social Networking, and More	25
1.2.2 E-commerce and Free Stuff	33
1.2.3 Artificial Intelligence, Robotics, Sensors, and Motion	35
1.2.4 Tools for Disabled People	39
1.3 Themes	41
1.4 Ethics	44
1.4.1 What Is Ethics, Anyway?	44
1.4.2 A Variety of Ethical Views	46
1.4.3 Some Important Distinctions	54
Exercises	58
<b>2 PRIVACY</b>	<b>65</b>
2.1 Privacy Risks and Principles	66
2.1.1 What Is Privacy?	66
2.1.2 New Technology, New Risks	68
2.1.3 Terminology and Principles for Managing Personal Data	74
2.2 The Fourth Amendment, Expectation of Privacy, and Surveillance Technologies	78
2.2.1 The Fourth Amendment	79
2.2.2 New Technologies, Supreme Court Decisions, and Expectation of Privacy	81
2.2.3 Search and Seizure of Computers and Phones	84
2.2.4 Video Surveillance and Face Recognition	86
2.3 The Business and Social Sectors	88
2.3.1 Marketing and Personalization	88
2.3.2 Our Social and Personal Activity	93
2.3.3 Location Tracking	97
2.3.4 A Right to Be Forgotten	100

- 2.4 Government Systems 102
  - 2.4.1 Databases 102
  - 2.4.2 Public Records: Access versus Privacy 108
  - 2.4.3 National ID Systems 109
- 2.5 Protecting Privacy: Technology, Markets, Rights, and Laws 113
  - 2.5.1 Technology and Markets 113
  - 2.5.2 Rights and Law 118
  - 2.5.3 Privacy Regulations in the European Union 128
- 2.6 Communications 130
  - 2.6.1 Wiretapping and Email Protection 131
  - 2.6.2 Designing Communications Systems for Interception 133
  - 2.6.3 The NSA and Secret Intelligence Gathering 134
- Exercises 137

### 3 FREEDOM OF SPEECH

151

- 3.1 Communications Paradigms 152
  - 3.1.1 Regulating Communications Media 152
  - 3.1.2 Free Speech Principles 155
- 3.2 Controlling Speech 157
  - 3.2.1 Offensive Speech: What Is It? What Is Illegal? 157
  - 3.2.2 Censorship Laws and Alternatives 159
  - 3.2.3 Child Pornography and Sexting 164
  - 3.2.4 Spam 166
  - 3.2.5 Challenging Old Regulatory Structures and Special Interests 170
- 3.3 Posting, Selling, and Leaking Sensitive Material 171
- 3.4 Anonymity 177
- 3.5 The Global Net: Censorship and Political Freedom 181
  - 3.5.1 Tools for Communication, Tools for Oppression 181
  - 3.5.2 Aiding Foreign Censors and Repressive Regimes 183
  - 3.5.3 Shutting Down Communications in Free Countries 186
- 3.6 Net Neutrality Regulations or the Market? 187
- Exercises 189

### 4 INTELLECTUAL PROPERTY

197

- 4.1 Principles, Laws, and Cases 198
  - 4.1.1 What Is Intellectual Property? 198
  - 4.1.2 Challenges of New Technologies 200
  - 4.1.3 A Bit of History 203
  - 4.1.4 The Fair Use Doctrine 204
  - 4.1.5 Ethical Arguments About Copying 205
  - 4.1.6 Significant Legal Cases 208

- 4.2 Responses to Copyright Infringement 214
  - 4.2.1 Defensive and Aggressive Responses From the Content Industries 214
  - 4.2.2 The Digital Millennium Copyright Act: Anticircumvention 219
  - 4.2.3 The Digital Millennium Copyright Act: Safe Harbor 222
  - 4.2.4 Evolving Business Models 224
- 4.3 Search Engines and Online Libraries 226
- 4.4 Free Software 229
  - 4.4.1 What Is Free Software? 229
  - 4.4.2 Should All Software Be Free? 231
- 4.5 Patents for Inventions in Software 232
  - 4.5.1 Patent Decisions, Confusion, and Consequences 233
  - 4.5.2 To Patent or Not? 236
- Exercises 238

## 5 CRIME 247

- 5.1 Introduction 248
- 5.2 Hacking 248
  - 5.2.1 What is “Hacking”? 248
  - 5.2.2 Hacktivism, or Political Hacking 254
  - 5.2.3 Hackers as Security Researchers 255
  - 5.2.4 Hacking as Foreign Policy 257
  - 5.2.5 Security 259
  - 5.2.6 The Law: Catching and Punishing Hackers 263
- 5.3 Identity Theft and Credit Card Fraud 268
  - 5.3.1 Stealing Identities 269
  - 5.3.2 Responses to Identity Theft 271
  - 5.3.3 Biometrics 275
- 5.4 Whose Laws Rule the Web? 276
  - 5.4.1 When Digital Actions Cross Borders 276
  - 5.4.2 Libel, Speech, and Commercial Law 280
  - 5.4.3 Culture, Law, and Ethics 283
  - 5.4.4 Potential Solutions 284
- Exercises 285

## 6 WORK 293

- 6.1 Changes, Fears, and Questions 294
- 6.2 Impacts on Employment 295
  - 6.2.1 Job Destruction and Creation 295
  - 6.2.2 Changing Skills and Skill Levels 300
  - 6.2.3 Telecommuting 302
  - 6.2.4 A Global Workforce 305

- 6.3 Employee Communication and Monitoring 311
  - 6.3.1 Learning About Job Applicants 311
  - 6.3.2 Risks and Rules for Work and Personal Communications 314
- Exercises 322

## **7 EVALUATING AND CONTROLLING TECHNOLOGY 329**

- 7.1 Evaluating Information 330
  - 7.1.1 The Need for Responsible Judgment 330
  - 7.1.2 Computer Models 339
- 7.2 The “Digital Divide” 347
  - 7.2.1 Trends in Computer Access 347
  - 7.2.2 The Global Divide and the Next Billion Users 349
- 7.3 Neo-Luddite Views of Computers, Technology, and Quality of Life 350
  - 7.3.1 Criticisms of Computing Technologies 351
  - 7.3.2 Views of Economics, Nature, and Human Needs 354
- 7.4 Making Decisions About Technology 360
  - 7.4.1 Questions 361
  - 7.4.2 The Difficulty of Prediction 362
  - 7.4.3 Intelligent Machines and Superintelligent Humans—Or the End of the Human Race? 365
  - 7.4.4 A Few Observations 368
- Exercises 368

## **8 ERRORS, FAILURES, AND RISKS 379**

- 8.1 Failures and Errors in Computer Systems 380
  - 8.1.1 An Overview 380
  - 8.1.2 Problems for Individuals 382
  - 8.1.3 System Failures 385
  - 8.1.4 What Goes Wrong? 393
- 8.2 Case Study: The Therac-25 395
  - 8.2.1 Therac-25 Radiation Overdoses 395
  - 8.2.2 Software and Design Problems 396
  - 8.2.3 Why So Many Incidents? 398
  - 8.2.4 Observations and Perspective 400
- 8.3 Increasing Reliability and Safety 401
  - 8.3.1 Professional Techniques 401
  - 8.3.2 Trust the Human or the Computer System? 406
  - 8.3.3 Law, Regulation, and Markets 407
- 8.4 Dependence, Risk, and Progress 410
  - 8.4.1 Are We Too Dependent on Computers? 410
  - 8.4.2 Risk and Progress 411
- Exercises 413

<b>9</b>	<b>PROFESSIONAL ETHICS AND RESPONSIBILITIES</b>	<b>421</b>
9.1	What Is “Professional Ethics”? 422	
9.2	Ethical Guidelines for Computer Professionals 423	
9.2.1	Special Aspects of Professional Ethics 423	
9.2.2	Professional Codes of Ethics 424	
9.2.3	Guidelines and Professional Responsibilities 425	
9.3	Scenarios 428	
9.3.1	Introduction and Methodology 428	
9.3.2	Protecting Personal Data 430	
9.3.3	Designing an Email System With Targeted Ads 432	
9.3.4	Webcams in School Laptops <sup>1</sup> 433	
9.3.5	Publishing Security Vulnerabilities 434	
9.3.6	Specifications 435	
9.3.7	Schedule Pressures 436	
9.3.8	Software License Violation 439	
9.3.9	Going Public 440	
9.3.10	Release of Personal Information 441	
9.3.11	Conflict of Interest 442	
9.3.12	Kickbacks and Disclosure 444	
9.3.13	A Test Plan 445	
9.3.14	Artificial Intelligence and Sentencing Criminals 445	
9.3.15	A Gracious Host 448	
	Exercises 448	
	<b>Epilogue</b>	<b>455</b>
<b>A</b>	<b>THE SOFTWARE ENGINEERING CODE AND THE ACM CODE</b>	<b>457</b>
A.1	Software Engineering Code of Ethics and Professional Practice 457	
A.2	ACM Code of Ethics and Professional Conduct 465	
	<b>Index</b>	<b>473</b>

