

Index

- #
- 2-factor authentication, 57, 295, 296
- 9/11/2001. *See* September 11, 2001
- 60-Day Cyberspace Policy Review, 100–101, 130, 259
- 256-bit encryption, 193
- 300A and 300B reports, 170
- 414s (hackers), 6
- 1930s IT infrastructure, 185
- 1940s IT infrastructure, 75
- 1950s IT infrastructure, 75–76, 185–
- 1960s cybersecurity issues, 4, 76–77, 95
- 1970s cybersecurity issues, 5, 179
- 1980s cybersecurity issues, 4–9, 77–81, 82, 185
- 1990s cybersecurity issues, 9, 81–90, 223–225, 276
- 2000s cybersecurity issues, 9, 89, 90–101, 220, 276
- 2010s cybersecurity issues, 10, 101–104, 221–222, 276
- A**
- A circulars. *See under* OMB
- AC (actual cost), 152–154, 156, 299–300, 302
- acceptable levels of risk, 36
- acceptable quality level (AQL), 145
- accepting risks, 16, 20, 22, 60–61
- access codes, 236
- access points, 233, 258
- accessibility of systems
 - corporate systems, 233
 - health care systems, 224
 - mainframe computers, 76
 - network access points, 233, 258
 - physical sites, 236
 - vs. security, 22
- account number access, 273
- accounting, 148–149, 230
- accounting machines, 185
- accreditation (IT systems), 171–172
- accuracy of warnings, 112
- acquisition program baseline (APB), 142
- acquisitions and procurement
 - acquisition documents, 143–148
 - acquisition phase, 143–148
 - Brooks Act, 76–77
 - CIOs and, 83–84
 - compliance, 168–169
 - GSA and, 77
 - OMB and, 82, 83–84
 - Paperwork Reduction Act, 82
 - supply chain security, 166, 170
- active responses to threats, 207–208, 237–238
- acts of law, 263
- actual cost (AC), 152–154, 156, 299–300, 302
- ACWP (actual cost of work performed), 152
- “adequate security,” 171
- Administrative Procedure Act (APA), 266
- advanced notices of proposed rulemaking (ANPR), 260, 266
- advanced persistent threats (APTs), 203–204, 276, 277
- Advanced Research Projects Agency (ARPA), 4
- Advanced Research Projects Agency Network (ARPANET), 4, 179
- African Network Information Centre (AfriNIC), 278
- agencies
 - audits, 241
 - budgets, 260
 - civilian. *See* civilian agencies
 - classified/unclassified protective markings, 79
 - compliance standards, 168–169
 - creation of, 266
 - cybersecurity policy role, 69–70
 - Federal Register rules publication, 260
 - FISMA requirements, 97–98, 171
 - impact on projects, 123
 - intelligence. *See* intelligence agencies
 - inter-agency cooperation, 87
 - military. *See* Defense Department
 - operational planning model, 124
 - procurement responsibilities, 83
 - public hearings, 266–267
 - public-private partnerships. *See* private-public partnerships
 - regulations, role in, 265–268
 - regulatory agencies, 265–266
 - supervision of, 74
 - top-down analysis, 50–52
- aggravated identity theft, 273
- agriculture as critical infrastructure, 96
- “ahead of schedule” variances, 155, 298–299
- Air Force, 71, 72
- alerts
 - as cybersecurity capability, 203, 207

- as high-level requirement, 136
 - National Cyber Alert System, 94
 - trusted Internet connections example, 139
 - warning systems, 110–113, 122–123, 136, 203, 207
- Allen, William T., 217
- alternative hypotheses (H_a), 39, 49, 291
- alternative scenarios, 119–120, 138
- ambiguity in survey design, 288
- amendments, bills, 262, 263
- American Recovery and Reinvestment Act, 225, 241
- American Registry for Internet Numbers (ARIN), 278
- analyzing threats, 104, 136, 203, 206–207
- Anil, Suleyman, 101, 283
- anomalies
 - corporate detection, 237–238
 - DHS monitoring case study, 162–163
 - network detection, 203, 206
 - simulating, 206–207
- anonymity, 279, 281
- Anonymous, 19
- ANPR (advance notice of proposed rulemaking), 260, 266
- Antarctica, 278
- Anti-Referral Payments Law, 217
- antivirus software
 - corporate obligations and, 220
 - informing internal information, 162
 - in internal monitoring, 205
 - McAfee, 115
 - TJX data breach and, 227
- as warning system, 207
- APA (Administrative Procedure Act), 266
- APB (acquisition program baseline), 142
- APNIC (Asia-Pacific Network Information Centre), 279
- appeals and appeals courts, 268
- APT (advanced persistent threat), 203–204, 276, 277
- AQL (acceptable quality level), 145
- ARIN (American Registry for Internet Numbers), 278
- Army, 71, 72
- ARPA (Advanced Research Projects Agency), 4
- ARPANET (Advanced Research Projects Agency Network), 4, 179
- arraignments, 274
- Asia, 279
- Asia-Pacific Network Information Centre (APNIC), 279
- assembly language, 180–181
- assessing plans, 120
- assessing results, 120–121
- assessing risks. *See* risk assessments
- assessing threats. *See* threat assessment
- assets
 - capital, 149, 150, 169–170
 - corporate, 234
 - critical, 31–33, 61
 - FISMA compliance, 170–172
 - GAO labeling system, 31–33
 - identifying, 160–161
 - assistance as high-level requirement, 136
- assistant to the president for homeland security and counterterrorism, 100
- assumptions
 - risk determination and, 33
 - in risk management framework, 16, 20, 21
 - spear phishing survey, 42
 - in survey design, 288
- asymmetrical warfare, 6
- “at rest” encryption, 194
- atomic bombs/nuclear arms, 6, 7
- atomic energy. *See* nuclear facilities
- attachments (email), 195, 235
- attacks and exploits, 195–196
 - active/passive responses, 207–208, 237–238
 - alerts. *See* alerts
 - anomalies and, 162–163, 203, 206–207, 237–238
 - BGP, 191–192
 - botnets, 198
 - brute force, 193
 - buffer overflow, 201
 - code injection, 201
 - crashing and recovery, 201
 - data breaches. *See* data breaches
 - denial of service, 198, 203, 204, 275
 - DHS monitoring case study, 162–163
 - DNS cache poisoning, 200
 - factors aiding in, 202
 - growth in 2000s, 99
 - history of, 275–276
 - insider threats, 200, 233
 - malware, 195, 196, 271
 - man in the middle, 198–199
 - phishing/spear phishing, 41–46, 197–198
 - private sector breaches, 213
 - private sector plans, 211–212
 - SEC disclosures, 229
 - simulating, 206–207, 234–235
 - threat signature technology, 99–100
 - time before discovery, 281
 - types of, 187
 - unknown vulnerabilities, 201–202
 - warnings. *See* warning systems
 - zero-day exploits, 201–202
- attribution for attacks, 190, 195, 281

- audits, 240
 - agencies, 241
 - corporate policies, 239–241
 - financial, 167
 - FTC consent agreements, 226
 - health care systems, 173, 224
 - internal/external, 166–168, 239–241
 - IT, 167, 173
 - monitoring functions and, 204
 - risk assessment, 240
 - Sarbanes-Oxley Act, 230
 - technical, 167
 - types of, 166–168
- Australia, 279
- authentication tokens, 213
- authority, transnational, 281–282
- authorization, 133, 134–135, 139
- automatic alert systems, 112
- Automatic Data Processing Act (Brooks Act), 76–77, 80, 83
- availability, threats to, 187
- avoiding risks, 16, 20, 60, 61
- awareness campaigns, 207, 224
- Azerbaijan, 277
- B**
- BAC (budget at completion), 157, 300, 301, 302
- back-ups, off-site, 236
- backbones, 4, 188
- backwards engineering (op models), 141
- badges, 236
- bail, 274
- bandwagon fallacy, 249
- banking and finance systems
 - criminal information access, 271, 273
 - as critical infrastructure, 86, 87
 - cyber threats, 87
 - Estonian attacks, 101
 - GLB Financial Modernization Act, 222–223
 - Sarbanes-Oxley Act, 168, 230
 - TJX breach losses, 220, 226–227, 272
 - written security plans, 223
- baselines, establishing, 160–161, 171
- BCWP (budgeted cost of work performed), 153
- BCWS (budgeted cost of work scheduled), 152
- behavioral detection, 206, 233
- “behind schedule” status, 163, 298–299
- best practices, 103, 304
- BGP (Border Gateway Protocol), 187, 188, 190–192, 198–199
- biases, 288, 289
- big picture, senior managers and, 115, 116
- bills, legislative, 261–263
- binary code, 180, 193
- binary dependent variables, 292
- BJR (business judgment rule), 219
- Black Hand, 276
- black hole servers, 204
- blackouts, 92
- “Blueprint for a Secure Cyber Future,” 130, 259
- boards of directors
 - business judgment rule, 219
 - duty of care, 215–219
 - liability, 218
 - obligations, 221–222
 - role in company, 214
 - role in cybersecurity, 211–212, 214, 231–232
 - as senior managers, 110
- Border Gateway Protocol (BGP), 187, 188, 190–192, 198–199
- botnets, 198
- bottom-up assessments (PWS), 145
- Bottom-Up Review report (BUR), 130, 259
- boy genius hackers, 5–6, 27
- brokerage firms, 228
- Brooks, Jack, 76
- Brooks Act, 76–77, 80, 83
- brute force attacks, 193
- budget at completion (BAC), 157, 300, 301, 302
- budgeted cost of work performed (BCWP), 153
- budgeted cost of work scheduled (BCWS), 152
- budgets
 - APBs, 142
 - comparing projects, 157–158, 298–302
 - congressional control, 74
 - CONOPS and, 138
 - as constraints, 21
 - developing, 120, 149–152
 - EVM development of, 149–152
 - EVM indexes, 298–302
 - EVM management, 148
 - manager’s role, 117
 - OMB control, 84
 - over or under status, 156
 - in proposed legislation, 262
 - trade-offs in risk management, 23
 - understanding, 150–152
- buffer overflow attacks, 201
- bulk power systems, 229–230
- BUR (Bottom-Up Review report), 130, 259
- Bureau of the Budget. *See* OMB (Office of Management and Budget)

- Bush administration
- CNCI founding, 99–101
- critical infrastructure directives, 95–97
- E-Government Act, 97–98
- Executive Orders, 257
- FISMA act, 97–98
- Homeland Security history, 90–99
- HSPDs, 95–97
- national security instruments, 255
- presidential power expansion, 129–130
- Sarbanes-Oxley Act, 168, 230
- business continuity plans, 238
- Business Corporation Law of New York State (NY BCL), 216
- business interruption insurance, 238
- business judgment rule (BJR), 219
- businesses. *See* private sector
- bylaws, corporate, 214

- C**
- C++, 181
- CAATs (computer-assisted audit techniques), 167
- cable companies, 188
- cache, 184
- cache poisoning, 200
- California
 - data breach laws, 227–228
 - electrical grid attacks, 276
- cameras, activating, 102
- Canada, 278
- capabilities
 - capability-based planning, 136–137
 - capability gaps, 133–134, 135, 137, 139
 - CONOPS, 137–140
 - defining for monitoring systems, 159
 - examples, 26–27, 202–208
 - identifying for threat assessment, 25
 - identifying in PWSs, 145
 - mission needs statements, 133–134
 - op models, 141
 - organizational needs, 118–119
 - translating goals into, 114
- capability-based planning, 136–137
- capability gaps, 133–134, 135, 137, 139
- capacitors, 185
- capital, 109
- Capital Asset Plan and Business Case (Exhibit 300), 169–170
- capital assets, 149, 150, 169–170
- Caremark International lawsuit, 216–219
- Caribbean region, 278, 279
- catastrophes. *See* disasters
- “catastrophic” label (GAO), 31–33
- causation vs. correlation, 57
- CD-ROM drives, 182
- CDs, 185
- Central Asia, 279
- Central Intelligence Agency. *See* CIA
- central processing units (CPUs), 181
- CEOs (chief executive officers)
 - business judgment rule, 219
 - cybersecurity role, 211–212, 215, 232
 - duty of care, 215–219
 - liability, 218
- certificates (HTTPS), 194
- certification (IT systems), 171–172
- “CF Disclosure Guidance: Topic No. 2,” 229
- CFAA (Computer Fraud and Abuse Act), 8–9, 270–272
- CFR (Code of Federal Regulations), 172, 268
- challenge questions, 295, 296
- changes, identifying
 - evolution of threats, 105
 - in file data, 195
 - monitoring risks, 62–63, 64
 - risk management framework, 16, 20
- charging criminals, 274
- Charter Pacific Bank, 222
- charters, corporate, 214
- Chechnya, 276
- checklists, going beyond, 66
- chi square test, 291
- chief executive officers (CEOs), 211–212, 215–219, 232
- chief information officers. *See* CIOs (chief information officers)
- Chief Information Officers Council (CIO Council), 84, 256
- chief information security officers (CISOs), 232
- chief infrastructure assurance officers (CIAOs), 89
- child prodigy hackers, 5–6, 27
- China, 37, 276
- CIA (Central Intelligence Agency), 72, 73, 77, 90, 91
- CIAO (Critical Infrastructure Assurance Office), 89, 94–95
- CIAOs (chief infrastructure assurance officers), 89
- CICG (Critical Infrastructure Coordination Group), 87
- CIKR (critical infrastructure and key resources), 97. *See also* critical infrastructure
- CIO Council, 84, 256
- CIOs (chief information officers), 59
 - business judgment rule, 219
 - cybersecurity role, 83–84, 211–212, 215, 232
 - duty of care, 215–219

- FISMA compliance, 171
 - liability, 218
- CISOs (chief information security officers), 232
- Citigroup, 218–219
- citizen concerns, military information control, 80
- civilian agencies
 - Brooks Act responsibilities, 77
 - capability-based planning, 136–137
 - CONOPS, 137–140
 - cybersecurity role, 69–71, 73
 - DHS as, 95
 - Einstein 3 monitoring, 100
 - EVM accounting and, 148
 - FISMA requirements and, 98
 - mission needs statements, 126–127
 - national cybersecurity threats management, 8
 - op models, 140–142
 - tensions with military, 70, 71, 78–81, 104–105
- CIWG (Critical Infrastructure Working Group), 86
- claims processors, 225
- classified information
 - CNCI declassification, 101
 - criminal information access to, 270
 - document markings, 79
 - early cybersecurity policies, 8
 - NSA classified computer systems, 80
 - NSA SBU IT, 81
 - personal computer security, 78
- classified technology, 81
- Clinger-Cohen Act of 1996, 83–84, 126, 168–169
- Clinton administration
- CIO Council, 84
- cybersecurity and terrorism, 85–90
- executive orders, 256
- national security instruments, 74, 86–90, 255, 261
- Presidential Decision Directives, 74, 86–90, 255, 261
- Y2K preparations, 89
- closed-ended questions, 288
- cloud providers, 202, 219–222
- CMS (continuous monitoring system), 122–123
- CNCI (Comprehensive National Cybersecurity Initiative), 111
 - history of, 99–102
 - mission requirements in, 130
 - partial declassification, 101, 257
 - TIC initiative, 258
 - warnings capability, 110
- Coast Guard, 71
- Coast Guard Intelligence, 72
- COBIT (Control Objectives for Information and Related Technology), 239–240
- code breaking agencies. *See* NSA
- code injection, 201
- Code of Federal Regulations (CFR), 172, 268
- coefficient of determination, 292
- Cold War, 3–4, 76, 78
- collaboration, as high-level requirement, 136
- color-coding project status, 165
- .com domains, 192
- command and control attacks, 196
- commenting on proposed rules, 266
- Commerce Department, 77, 89, 98, 278
- Committee of Sponsoring Organizations (COSO), 239
- committees, congressional, 262
- communication pathways, 185, 240–241. *See also* networks
- communication systems, 85, 87, 96
- communications, intercepting, 272. *See also* attacks; data breaches
- companies. *See* private sector
- completion dates (POA&M documents), 147–148
- compliance, 167
 - audits, 166–168
 - compliance officers, 167
 - corporate employees, 235
 - Exhibit 300, 169–170
 - federal CIOs role, 84
 - federal practices, 168–169
 - FISMA requirements, 170–172
 - HIPAA example, 172–174
 - internal controls, 239–240
 - monitoring risks, 62–63, 64, 204
 - noncompliance consequences, 172
 - operational planning model, 125
 - operational requirements documents, 140
 - post-breach reports, 237
 - risk management framework, 16, 20
- “Compliance and Reporting” block, 125
- compliance officers, 167
- components (hardware), 181, 182–183
- Comprehensive National Cybersecurity Initiative. *See* CNCI
- compromised systems, 195
- computer-assisted audit techniques (CAATs), 167
- Computer Fraud and Abuse Act (CFAA), 8–9, 270–272
- Computer Readiness Team (US-CERT), 94, 122–123, 259
- computer science, 179–180
- Computer Security Act of 1987, 79, 80–81
- computers, 180
 - attacks and exploits. *See* attacks
 - cryptographic technologies, 193–195

- cybersecurity operation capabilities, 202–208
- federal standards for, 169
- history of, 179
- mainframes, 75–76
- memory, 184–185
- multiple processors, 182
- personal computers. *See* PCs
- processors, 181–182
- procurement. *See* acquisitions and procurement programs, 181–182
- protected, 272
- research systems, 4
- as systems, 182–184
- vulnerabilities, 200–202
- Concept of Operations (CONOPS), 137–140
- conditional events (probability), 48–49
- conference committees, 263
- confidence intervals (statistics), 291
- confidential information. *See* classified information; customer information; personal information
- confidentiality breaches, 187
- configuration, network, 201, 237
- Congress
 - agency creation, 266
 - agency supervision, 74
 - authority, 260
 - Congressional Research Service, 264–265
 - cybersecurity policy role, 69–70
 - federal regulations, 265–268
 - GAO information, 264
 - legislation process, 261–263
 - military/civilian security control policies, 71
 - mission requirements, 127, 128
 - power of the purse, 260
 - proposed bills and law research, 264
 - research sources, 250–251, 264
 - response to NSDD-145, 80–81
 - as senior managers, 110
- Congressional Record, 263, 264
- Congressional Research Service (CRS), 264–265
- CONOPS (Concept of Operations), 137–140
- consent agreements, 226, 227
- consequence assessments, 30–33
 - in consequence equation, 31
 - DHS monitoring case study, 161–162
 - metrics, 33
 - model corporate cyber program, 232, 234
- consequences, 23, 30
 - analyzing threats/vulnerabilities, 33–37
 - assessing. *See* consequence assessments
 - assigning values to, 35–37
 - in consequence equation, 31
 - corporate governance and, 216
 - direct/indirect, 30
 - identifying, 38
 - illustrated, 38
 - increases in, 33
 - metrics, 33
 - in PRA risk management, 47
 - in risk assessment, 23, 47
 - in risk determination, 36
 - in risk equation, 23
 - in risk management framework, 16, 20
- Constitution, 250, 251, 262, 268
- constraints
 - in CONOPS, 137–140
 - identifying, 140
 - internal/external, 123
 - in risk management framework, 16, 20, 21–22
 - user-friendly websites and, 58, 59
- containing threats
 - as capability, 203
 - “contain” task in risk management, 15
 - corporate policies, 237
 - risk responses, 61
- continuity plans, 238
- continuous monitoring system (CMS), 122–123
- contracting officers, 146–147
- contractors. *See* vendors/contractors
- contracts, 238
- control activities (businesses), 240
- control environments (businesses), 240
- Control Objectives for Information and Related Technology (COBIT), 239–240
- convenience sampling, 289
- Convention on Cybercrime, 284
- coordination role (management)
 - failures of, 123
 - functions, 115–117
 - as high-level requirement, 136
 - managing vs. doing, 113–114
- Coreflood virus, 198
- Corporate Finance Division (SEC), 228
- corporate governance, 213–215
- corporations. *See* private sector
- correlation vs. causation, 57
- COSO (Committee of Sponsoring Organizations), 239
- Cost Performance Index (CPI), 157, 299–300, 301, 302
- cost variances (CVs), 155–158, 163–164
- costs
 - attack simulations, 235
 - in budgets, 150–152

- cost variances, 155–157, 163–164
- data breaches, 9, 220, 221, 229, 236
- DHS monitoring case study, 160–161
- District Design case study, 151–154
- IGCE estimates, 146–147
- objective and threshold values, 142–143
- op models, 140–142
- Sony PlayStation breach, 221
- TJX data breach, 220
- worm damage estimates, 9
- Council of Europe, 284
- counterintelligence, 99–102, 281. *See also* espionage; intelligence agencies
- counterterrorism review of policies, 100–101
- courses of action, 135. *See also* plans; strategies
- Court of Appeals, 268
- courts
 - international, 282
 - U.S. *See* judicial branch of government
- CPI (Cost Performance Index), 157, 299–300, 301, 302
- CPU (central processing unit), 181
- credit and debit cards
- criminal information access, 273
 - liability for breaches, 219–222
 - personal information sales, 222
 - prosecutions for breaches, 272
 - Sony PlayStation Network breach, 221–222
 - TJX data breach, 220, 226–227, 272
- credit reporting agencies, 228
- criminal acts. *See also* attacks; data breaches
 - Computer Fraud and Abuse Act, 270–272
 - Federal crimes, 269–270
 - federal prosecution process, 273–275
 - identity theft, 219, 270, 271, 273
 - international issues, 282
 - Wiretap Act, 272
- criminals. *See* hackers; nation-state hackers; organized crime groups
- crisis management, DHS role in, 95
- critical assets
 - consequence assessments, 31
 - GAO labeling system, 31–33
 - removing, 61
- “Critical Foundations: Protecting America’s Infrastructures,” 86–87
- Critical Infrastructure Assurance Office (CIAO), 89, 94–95
- critical infrastructure components, 85. *See also* critical infrastructure protection
 - agriculture, 96
 - banking and finance systems, 86, 87
 - blackouts, 92
 - CIKR (critical infrastructure and key resources), 97
 - communication systems, 85, 87, 96
 - electrical grid, 85, 87
 - emergency services, 87
 - Energy Department management, 96
 - food systems, 96
 - identifying critical infrastructure, 95–97
 - Internet, 275
 - in policy formation, 74
 - power plants, 229–230
 - private sector ownership, 85
 - sectors of, 96
 - transportation systems, 85, 87, 96
 - water systems, 87, 96
 - Y2K preparations, 89
- Critical Infrastructure Coordination Group (CICG), 87
- “Critical Infrastructure Identification, Prioritization, and Protection,” 95–97
- critical infrastructure protection. *See also* critical infrastructure components
 - board of directors role, 231–232
 - CIWG review, 86
 - corporate policies, 235
 - Critical Infrastructure Assurance Office, 89
 - Critical Infrastructure Protection Board, 92–93, 257
 - Critical Infrastructure Working Group, 86
 - Cybersecurity Act of 2012, 103
 - DHS responsibilities, 18, 90–91, 93–95, 96, 97, 104
 - executive orders. *See* EOs
 - National Coordinator for Security, Infrastructure Protection and Counter-Terrorism, 88
 - National Infrastructure Advisory Council, 93
 - National Infrastructure Assurance Council, 87
 - National Infrastructure Protection Center, 89–90, 94–95, 261
 - National Infrastructure Protection Council, 93–94
 - National Infrastructure Protection Plan, 18, 87, 94, 96, 97, 104
 - National Policy for Infrastructure Protection, 87
 - NSC (National Security Council), 87, 93
 - Office of Infrastructure Protection, 94, 131
 - Office of National Infrastructure Assurance, 87
 - national security instruments. *See* national security instruments
 - instruments
 - policies, 74, 87–90
 - President’s Commission on Critical Infrastructure Protection, 86–87, 255, 256
 - private sector ownership, 85, 105
 - public-private partnerships, 70, 85, 87–88, 105
 - sentencing and, 275

- Y2K preparations, 89
 - Critical Infrastructure Protection Board, 92–93, 257
 - Critical Infrastructure Working Group (CIWG), 86
 - “critical” label (GAO), 31–33
 - criticality, defined, 31
 - CRS (Congressional Research Service), 264–265
 - cryptographic technologies, 193–195
 - cryptological agencies. *See* NSA
 - CS&C (Office of Cybersecurity and Communications), 94, 122, 131
 - customer information
 - banks selling, 222
 - business’s duty towards, 212–213
 - criminal access to, 271, 273
 - FTC and, 225–228
 - leak example, 55–60
 - Sony PlayStation Network, 221–222
 - statistical models for risk, 292–296
 - TJX data breach, 220, 226–227, 272
 - CVs (cost variances), 155–158, 163–164
 - Cyber Defense Policy (NATO), 283
 - cyber intrusions, defined, 195
 - “Cyber Security Incident Reporting and Response Planning,” 230
 - cyber security incident response plans, 230
 - cyber warfare
 - Estonia, 101
 - history of, 275–276
 - Olympic Games program, 102
 - UN and, 283
 - cybersecurity. *See also* computer science; federal government; legislation; policies; private sector; research; risk management
 - capabilities, 202–208
 - facets of, 11–13
 - global issues in, 275–284
 - history of issues, 3–10
 - model corporate framework, 231–238
 - risks in cyberspace, 15–17
 - Cybersecurity Act of 2012, 102–103
 - cybersecurity coordinator (White House), 101, 103, 259
 - cybersecurity insurance, 61–62
 - cybersecurity management framework
 - best practices, 125
 - capability-based planning, 136–137
 - civilian agencies, 136–142
 - congressional/presidential input, 128–131
 - CONOPS and op Models, 137–142
 - DHS framework, 125–126
 - high-level requirements, 132–136
 - mission needs statements, 126–127, 132–136
 - objective values, 142–143
 - sector differences, 127
 - cybersecurity managers. *See* program/project managers
 - cybersecurity operation capabilities, 202–208
 - Cyberspace Policy Review, 100–101, 130, 259
 - cyclical nature of management, 121
- D**
- damages
 - attacks, 196
 - business data breaches, 212
 - examples, 26–27
 - identifying in threat assessment, 25
 - lethality, 25, 26–27
 - mitigating, 237
 - model corporate cyber program, 232
 - risk tolerances, 22
 - data, 180
 - analyzing traffic, 206–207
 - backing up, 236
 - business transactions, 212–213
 - cryptographic technologies, 193–195
 - encryption, 235–236
 - monitoring, 203–205
 - packet analyzers, 204
 - removal/exfiltration, 196
 - data breaches
 - business implications, 212–213
 - costs of, 9, 220, 221, 229, 236
 - Federal Trade Commission and, 225–228
 - HIPAA, 223–225
 - international issues, 282
 - liability for, 219–222
 - notifications, 236–237
 - sentencing penalties, 275
 - Sony PlayStation Network, 221–222
 - TJX case study, 220, 226–227, 272
 - types of violations, 187
 - databases, 212–213
 - DCA (Defense Communications Agency), 4
 - DDoS attacks (distributed denial-of-service), 10, 198
 - DEA (Drug Enforcement Administration), 72
 - deadlines, project, 135
 - debit cards. *See* credit and debit cards
 - decision-making process, 117–121
 - declassification of CNCI, 101
 - decryption, 193
 - defense, as high-level requirement, 136
 - Defense Communications Agency (DCA), 4
 - Defense Department
 - agencies and commands, 71–73

- ARPANET, 4
 - CNCI directives, 99
 - computer procurement, 77
 - FISMA and, 98
 - on Homeland Security Council, 91
 - ISAC participation, 90
 - managing national cybersecurity threats, 8
 - planning, programming, budgeting and execution, 127
 - WBS budgeting, 150
 - Defense Information Systems Agency, 4
 - Defense Intelligence Agency (DIA), 72
 - Delaware Court of Chancery, 217, 219
 - Denial of Service (DoS) attacks, 198, 203, 204, 275
 - departments of government. *See* names of specific departments (Defense Department, DHS, EPA, etc.)
 - dependent variables (modeling), 56, 292, 293, 294
 - dependent variables (research), 247
 - descriptive research, 248
 - detailed technical guidance, 304
 - detection, as high-level requirement, 136
 - DHS (Department of Homeland Security)
 - agencies collected under, 93–95, 131
 - capability-based planning, 136–137
 - Critical Infrastructure Protection Board, 93
 - cybersecurity agencies in, 94
 - cybersecurity management framework, 125–126
 - cybersecurity policies, 97
 - cybersecurity reports, 130–131
 - DHS Risk Lexicon. *See* DHS Risk Lexicon
 - EVM systems, 148, 158–164
 - expanded scope of government and, 129
 - FISMA and, 102–103, 258
 - founding of, 90–91
 - guidance statements, 130
 - infrastructure protection, 93, 104
 - military and intelligence agencies, 71–73
 - mission needs statements, 130–131, 133
 - monitoring system case study, 158–164
 - National Infrastructure Protection Plan, 18, 96, 97
 - “National Strategy to Secure Cyberspace,” 95
 - National Vulnerability Database, 201
 - program managers, 127
 - Strategic Plan, 259
 - structure of, 131
 - TIC mandate, 258
 - warning systems challenges, 112
 - DHS Risk Lexicon
 - consequences, 30
 - game theory, 56
 - likelihood, 37
 - risk assessment, 23
 - risk transfer, 61
 - threat shifting, 28
 - threats, 25
 - vulnerabilities/vulnerability assessments, 29
 - DIA (Defense Intelligence Agency), 71
 - Digital Equipment Corporation, 5
 - digital signatures (domains), 192
 - direct consequences, defined, 30
 - direct relationships (logit models), 56
 - directives
 - defined, 304
 - presidential. *See* presidential directives
 - disasters
 - “catastrophic” label, 31–33
 - risk management models and, 17
 - threats resulting from, 233
 - as unintentional threats, 26
 - disclosures, 228–229, 237
 - disjoint events (exclusive events), 48–49
 - disseminating information, as capability, 159
 - distributed denial-of-service attacks (DDoS), 10, 198
 - distribution attacks, 196
 - district courts, 268
 - District Design case study
 - budgeting, 149–154
 - cost variances, 156–157
 - EVM indexes, 298–302
 - introduction, 149
 - schedule variances, 155, 158
 - division (voting), 263
 - DNS cache poisoning, 200
 - DNS (Domain Name System), 188, 192, 277, 278
 - DNSSEC (Domain Name System Security Extensions), 192
 - document classification, 79
 - “doing,” vs. managing, 113–114
 - domain name registries, 192
 - Domain Name System (DNS), 188, 192, 277, 278
 - Domain Name System Security Extensions (DNSSEC), 192
 - DoS (denial of service), 198, 203, 204, 275
 - downloading files, 235
 - drones, 276
 - Drug Enforcement Administration, 72
 - duty of care, 215–222, 238
 - DVDs, 185
- E**
- E-Government Act of 2002, 97, 171
 - EA (enterprise architecture), 169
 - EAC (estimate at completion), 157, 301–302
 - Earned Value. *See* EV (earned value)

- earned value management. *See* EVM (earned value management)
- ecological fallacy, 249
- economic incentives, 87, 103, 145
- EDGAR (Electronic Data Gathering, Analysis, and Retrieval), 229
- .edu domains, 192
- educating users. *See* training
- effective dates (regulations), 267
- effectiveness
 - monitoring risks, 62–63, 64
 - risk management framework, 16, 20
 - warning systems, 112
- Einstein 3 program, 99–100, 101
- Eisenhower administration, 3–4
- electrical grid
 - California attacks, 276
 - as critical infrastructure, 85, 87
 - damage and consequences, 32
 - Northeast Blackout, 2003, 92
 - power plants, 229–230
- Electricity Sector Information Sharing and Analysis Center (ES ISAC), 230
- Electronic Communications Privacy Act, 270, 272
- Electronic Data Gathering, Analysis, and Retrieval (EDGAR), 229
- electronic voting systems, 263
- email
 - attachments, 195, 235
 - corporate policies, 235
 - phishing attacks, 41–46, 197–198
 - testing vulnerability to, 41–46
 - threats to, 87
 - as vulnerability, 200
- EMC Corporation, 212–213
- emergency corporate policies, 237
- emergency services, 87, 224
- Emerging Security Challenges Division (NATO), 283
- employees, 200, 233, 235. *See also* users
- encryption
 - corporate data, 220, 235–236
 - methods, 193–194
 - NSA responsibilities, 73
 - Sony PlayStation breach, 221
 - TJX data breach, 227
 - websites, 194
- Energy Department, 72, 87, 96
- energy systems, 87, 96, 229–230. *See also* electrical grid
- enforcement of law and regulations, 269
- Enron, 168, 230
- enterprise architecture (EA), 169
- enterprise risk management (ERM), 239
 - “Enterprise Risk Management-Integrated Framework,” 239
 - enterprise servers, 185
 - Environmental Protection Agency (EPA), 47
 - EOP (Executive Office of the President)
 - information management functions, 82
 - National Security Council, 253
 - OMB role, 253–254
 - OSTP technical advice, 254, 259
 - research sources, 254
 - executive orders, 256–258
 - Federal Register, 259
 - OMB memoranda, 258–259
 - OSTP memoranda, 259
 - national security instruments, 255
 - White House strategy/guidance, 259
 - structure of, 252–253
- EOs (executive orders), 256–257, 304
 - as authorization, 134
 - Bush post-9/11 orders, 90–93, 257
 - Clinton’s infrastructure protection, 86–87, 256
 - EO 13010 (PCCIP), 256
 - EO 13011 (CIO Council), 256
 - EO 13228 (Homeland Security), 90–91, 257
 - EO 13231 (Cyberspace Security), 92–93, 257
 - EO 13636 (Critical Infrastructure), 104, 256
 - Federal Register listing, 260
 - functions of, 74, 256–257
 - mission requirements and, 127–130
- EPA (Environmental Protection Agency), 47
- epistemology, 247
- equations
 - consequence equation, 31
 - Cost Performance Index, 299–300
 - cost variances, 155–157
 - estimate at completion, 157, 301–302
 - estimate to complete, 300, 301
 - logistic regression equation, 294, 295
 - logit model, 292
 - risk equation, 23–25, 34–35
 - Schedule Performance Index, 299
 - schedule variances, 154–155
 - total risk equation, 35
 - variance percentages, 157–158
- ERM (enterprise risk management), 239
- errors
 - of omission, 26
 - survey design, 288–290
- ES ISAC (Electricity Sector Information Sharing and Analysis Center), 230
- espionage
 - attribution, 281

- corporate, 233
 - early network threats, 4, 5
 - Flame worm, 102, 276
 - monitoring for, 204
 - in threat spectrum, 28
 - estimate at completion (EAC), 157, 301–302
 - estimate to complete (ETC), 157, 300, 301, 302
 - Estonia, 101, 275, 276, 283
 - ETC (estimate to complete), 157, 300, 301, 302
 - ethical hackers, 208
 - Europe, 279, 283, 284
 - European Network and Information Agency, 37
 - EV (earned value)
 - cost variances, 156
 - CPI equations, 299–300
 - District Design case study, 152–154
 - EAC equations, 302
 - ETC equations, 300, 301
 - as percentages, 157–158
 - schedule variances, 154–155
 - SPI equations, 298–299
 - evaluation criteria (RFPs), 146–147
 - event tree analysis, 49–52
 - events in probability analysis, 48–52
 - evidence, 281
 - EVM (earned value management), 148–149
 - budgets, 149–152
 - comparing projects, 157–158
 - DHS monitoring system case study, 158–164
 - forecasting, 300–302
 - indexes, 298–302
 - primary metric breakdown, 153–154
 - red, yellow, and green status, 165
 - tracking projects (variances), 154–157
 - variances as percentages, 157–158
 - work breakdown structure, 146, 148, 160
 - EVM forecasting, 300–302
 - EVM indexes, 298–302
 - EVM primary metric breakdown, 153–154
 - exclusive events (probability), 48–49
 - executive branch of government, 251–252. *See also* presidents
 - cybersecurity coordinator, 101
 - Executive Office of the President, 82, 252–260
 - Federal Register, 260
 - federal regulations, 265–268
 - mission requirements, 127, 128–131
 - policy documents, 254
 - executive orders, 256–258
 - OMB memoranda, 258–259
 - OSTP memoranda, 259
 - national security instruments, 255
 - White House strategy and guidance, 259
 - research sources, 250–251
 - role in cybersecurity law, 69–70
 - structure, 252–253
 - National Security Council, 253
 - Office of Science and Technology Policy, 254
 - OMB, 253–254
 - Executive Office memoranda, 128
 - Executive Office of the President, 82, 252–260
 - executive orders. *See* EOs (executive orders)
 - exfiltration, 196
 - Exhibit 300 reports, 169–170
 - experimental research, 247
 - experts, RFIs and, 143–144
 - explanatory research, 248
 - exploits. *See* attacks and exploits
 - exploratory research, 248
 - Explorer 1, 3
 - external audits, 166–168, 240
 - external constraints, 123
 - external information gathering, 162
 - external project information, 119
 - external risks, 240
 - external threats, 28
 - extortion, 272
 - extrapolation in research, 40
- F**
- F-test, 291
 - Facebook phishing attacks, 197
 - failed projects, 122–123
 - false flagging operations, 281
 - false positives, 206
 - FASA V (Federal Acquisition Streamlining Act), 169
 - fault tree analysis, 50–52, 53, 54
 - favorable variances, 155, 156, 158, 298, 299–300
 - FBI (Federal Bureau of Investigation), 72, 90, 91
 - FDA (Food and Drug Administration), 265–266
 - FedCIRC (Federal Computer Incident Response Center), 94–95
 - Federal Acquisition Streamlining Act (FASA V), 169
 - Federal Bureau of Investigation, 72, 90, 91
 - Federal Computer Incident Response Center (FedCIRC), 94–95
 - federal courts. *See* judicial branch of government
 - Federal Emergency Management Agency (FEMA), 93
 - Federal Energy Regulatory Commission (FERC), 230
 - federal government
 - agencies. *See* names of specific agencies (CIA, FBI, etc.)

- Cold War and technology development, 3–4
 - compliance, 168–169
 - criminal computer access penalties, 271
 - cyber attack capabilities, 37
 - cybersecurity research documents. *See* research sources
 - departments. *See* names of specific departments (Defense Department, DHS, etc.)
 - early hackers' threats, 5–6
 - executive branch. *See* executive branch of government
 - expanded scope of, 129
 - growth and information needs, 75
 - judiciary. *See* judicial branch of government
 - as largest U.S. information agency, 81–82
 - legislation, history of. *See* legislation
 - legislative branch. *See* Congress
 - managerial roles, 110
 - military, intelligence, and civilian agencies, 69–73
 - personal computer security, 77–81
 - policies. *See* policies (Federal)
 - regulations. *See* regulations
 - tensions related to cybersecurity, 70, 71, 78–81, 104–105
 - Federal Information Security Management Act. *See* FISMA
 - federal legal system. *See* judicial branch of government
 - Federal Network Resilience division (FNR), 94
 - Federal Register, 260, 266
 - federal regulations. *See* regulations
 - Federal Sentencing Guidelines, 274–275
 - Federal Trade Commission Act (FTCA), 226
 - Federal Trade Commission (FTC), 225–228
 - FEMA (Federal Emergency Management Agency), 93
 - FERC (Federal Energy Regulatory Commission), 230
 - final events (probability analysis), 51
 - final rules (regulations), 260, 267
 - final total costs, 300–302
 - finance systems. *See* banking and finance systems
 - financial audits, 167
 - Financial Privacy Rule, 223
 - “FIPS 200 Minimum Security Requirements for Federal Information and Information Systems,” 174
 - fire hazards, 236
 - firewalls, 30
 - corporate networks, 220
 - DHS monitoring case study, 162
 - internal monitoring, 205
 - phishing attacks and, 198
 - role in cybersecurity, 204
 - TJX data breach, 227
 - as vulnerabilities, 30
 - FISMA (Federal Information Security Management Act)
 - as authorization, 134
 - compliance and reporting, 170–172
 - establishment of, 258
 - focus on government resources, 97–98
 - OMB's oversight, 102–103, 129
 - requirements, 169
 - scope of, 129
 - Flame worm, 102, 276
 - flood hazards, 236
 - floor debates, 263
 - FNR (Federal Network Resilience division), 94
 - focus groups in research, 40
 - FOIA (Freedom of Information Act), 79
 - Food and Drug Administration (FDA), 265–266
 - food systems, 96
 - forecasting (EVM), 300–302
 - foreign hackers. *See* nation-state hackers
 - foreign relations, 270. *See also* global cybersecurity issues
 - formulas. *See* equations
 - forward selection (modeling), 294
 - frameworks, 125. *See also* cybersecurity management framework; risk management frameworks
 - framing risks, 19
 - assumptions, 19, 21
 - constraints, 19, 21–22
 - illustrated, 16
 - priorities, 19, 23
 - risk management and, 20
 - risk management framework, 16, 17, 18, 19–23
 - risk tolerance, 19, 22
 - trade-offs, 19, 23
 - France's cyber defenses, 37
 - fraud, 271
 - fraud scrubs, 222
 - freedom issues, 282
 - Freedom of Information Act (FOIA), 79
 - FTC consent agreements, 226
 - FTC (Federal Trade Commission), 225–228
 - FTCA (Federal Trade Commission Act), 226
 - FTE (full-time equivalent), 160, 161
 - functions (line and staff), 115–117
 - “Funding Information Systems Investments,” 83
 - funds. *See* budgets; resources
- G**
- game theory, 55, 56
 - GAO (Government Accountability Office), 33
 - asset criticality labeling system, 31–33

capability definitions, 203
 functions, 264
 internal monitoring tools, 205
 proposed federal regulations, 267
 US-CERT failure, 122–123
 warning notification, 111
 gap analysis, 133–134, 135, 137, 139
 GB (gigahertz), 182
 General Accounting Office. *See* GAO
 general counsel (corporate), 211–212
 General Services Administration. *See* GSA
 genetic fallacy, 249
 Georgia, 277
 German cyber defenses, 37
 gigahertz (GB), 182
 GLB Financial Modernization Act, 222–223
 global cybersecurity issues, 275–277
 attribution problems, 281
 Council of Europe, 284
 foreign relations, 270
 IETF, 192, 278–279, 280
 Internet coordination, 277–279
 lack of transnational authority, 281–282
 NATO and, 283–284
 United Nations efforts, 283
 globalized supply chains, 166, 170
 goals
 CONOPS, 138
 establishing, 118–119
 failure to establish, 123
 missions, 114
 operational planning model, 124
 reviewing plans against, 120–121
 Gonzalez, Albert, 272
 “good faith efforts,” 217–218
 “goodness of fit,” 292
 Google, 190, 198, 276
 .gov domains, 192
 Government Accountability Office. *See* GAO
 GPS tracking devices, 269
 Gramm-Leach-Bliley Financial Modernization Act (GLB),
 222–223
 grand juries, 273
 graphical user interface (GUI), 182
 Great Worm (Morris), 8–9, 270
 green project status, 165
 GSA (General Services Administration)
 Brooks Act procurement, 77
 functions of, 73
 procurement role, 83
 project management/acquisition phase, 143

 responses to RFPs, 147–148
 tensions over control, 78–80
 GUI (graphical user interface), 182
 guidance, defined, 304
 guidance statements (DHS), 130–131
 “Guide for the Security Certification and Accreditation
 of Federal Information Systems” (NIST SP 800-37),
 172
 guilty pleas, 274

H

H_a (alternative hypotheses), 39, 49, 291
 hackers
 attribution, 190, 195, 281
 boy genius, 5–6, 27
 Computer Fraud and Abuse Act, 270–272
 criminal prosecution, 270–272
 ethical hackers, 208
 federal crimes, 269–270
 federal prosecution process, 273–275
 history of, 3–10, 275–276
 identity theft, 219, 270, 271, 273
 international issues, 281–282
 monitoring for, 204
 nation-state. *See* nation-state hackers
 organized crime. *See* organized crime groups
 personal information breaches, 219–222
 prosecution of, 6, 9, 268–275
 strength of, 57, 295, 296
 in threat spectrum, 28
 types of attacks, 187
 Wiretap Act, 272
 hard drives, 182, 185
 hardware, 181
 insecurity of, 202
 IT systems, 185
 physical security, 236
 procurement. *See* acquisitions and procurement
 securing, 220
 harms. *See* damages
 hashing, 194–195
 Health and Human Services Department, 172, 225, 241
 Health Information Technology for Economic and Clinical
 Health Act (HITECH), 225, 241
 health insurance companies, 225
 Health Insurance Portability and Accountability Act
 (HIPAA), 172–174, 223–225, 241
 healthcare fraud, 217
 healthcare provider security, 223–225
 healthcare records, 172–174, 219–222, 223–225
 Heartland Payment Systems, 272

- high-level directives, 127, 128–131, 132–136
 - high-level requirements (HLRs), 132–137
 - higher courts, 268
 - higher-order languages, 181
 - HIPAA (Health Insurance Portability and Accountability Act), 172–174, 223–225, 241
 - HITECH (Health Information Technology for Economic and Clinical Health Act), 225, 241
 - HLRs (high-level requirements), 132–137
 - H₀ (null hypotheses), 39, 49, 290, 291
 - “holes,” patching, 195
 - Homeland Security. *See* DHS
 - Homeland Security Act of 2002, 93–95, 129, 134, 261
 - Homeland Security Council, 91
 - Homeland Security Presidential Directives. *See* HSPDs
 - honeypots, 207, 237
 - “the hopper,” 261
 - hops, 190
 - hosts, 185
 - House of Representatives, 261–263. *See also* Congress
 - HRA (human reliability analysis), 53
 - HSA (Homeland Security Act of 2002), 93–95, 129, 134, 261
 - HSPDs (Homeland Security Presidential Directives)
 - Bush administration, 255
 - HSPD-7 (Homeland Security Presidential Directive 7), 7, 95–97, 104, 129, 257
 - HSPD-23 (Homeland Security Policy Directive 23), 99–102, 257
 - HTTP protocol, 194
 - HTTPS protocol, 194
 - “Human Capital” block, 125
 - human error, 41–46, 53, 200, 233
 - human reliability analysis (HRA), 53
 - human rights groups, 279
 - hypotheses
 - creating, 248, 249
 - cybersecurity research, 246
 - designing, 39
 - examples, 39
 - null and alternative, 39, 49, 290, 291
 - quantitative testing, 49
- I**
- IANA (Internet Assigned Numbers Authority), 277
 - IBM personal computers, 4–5
 - ICANN (Internet Corporation for Assigned Names and Numbers), 192, 277–278, 279
 - ICT (information and communications technology), 166
 - ideal levels of risk, 36
 - identifying
 - attackers (attribution), 190, 195, 281
 - critical infrastructure, 95–97
 - threats, 205–208
 - identity theft, 219, 270, 271, 273
 - Identity Theft Penalty Enhancement Act, 270, 273
 - IDS (intrusion detection system), 30
 - corporate implementation, 237–238
 - DHS monitoring case study, 162
 - internal monitoring, 205
 - role in cybersecurity operations, 204
 - signatures and, 206
 - vulnerabilities, 30
 - warning systems, 111, 207
 - IETF (Internet Engineering Task Force), 192, 278–279, 280
 - IGCE (independent government cost estimate), 146–147
 - ignoring attacks, 207
 - IGs (inspectors general), 171
 - illegal wiretaps, 272
 - IMP (integrated master plan), 148, 149, 168
 - impact, 31
 - identifying for projects, 123
 - identifying in CONOPS, 140
 - identifying in MNS, 136
 - “improbable” events, 15–16
 - IMS (integrated master schedule), 148, 149, 168
 - in-house monitoring, 204–205
 - “in motion” encryption, 194, 198
 - “in the wild” vulnerabilities, 201–202
 - incentives, 87, 103, 145
 - incorporation, 214
 - independent events (probability), 48–49
 - independent government cost estimate (IGCE), 146–147
 - independent variables (modeling), 56, 292, 293, 294
 - independent variables (research), 247
 - indicators (variables), 47, 53
 - indictments, 273
 - indirect consequences, 30
 - indirect relationships (logit models), 56
 - industrial espionage, 28. *See also* espionage
 - industries. *See* private sector
 - inferior courts, 268
 - information and communications technology (ICT), 166
 - information assurance, 72
 - information auditing, 240–241
 - information resources
 - CIWG review, 86
 - cybersecurity and, 70, 71
 - data. *See* data

- government's growth in, 81–82
- internal and external, 119
- researching. *See* research methods; research sources
- information security, 97, 166, 170–172
- information sharing, 89–90, 103, 223, 230
- Information Sharing and Analysis Center (ISAC), 89–90, 230
- information sharing policies, 223
- Information Systems Audit and Control Association (ISACA), 240
- information technology. *See* IT systems
- information technology audits, 167
- Information Technology Management Reform Act (Clinger-Cohen), 83–84, 126, 168–169
- information warriors, 28
- infrastructure. *See* critical infrastructure
- initiating events (probability analysis), 50
- Initiative #3 (CNCI), 99
- insider threats, 200, 233
- inspectors general (IGs), 171
- insurance, 61–62, 238
- integrated master plan (IMP), 148, 149, 168
- integrated master schedule (IMS), 148, 149, 168
- integrity of data, 187
- intelligence agencies
 - CNCI directives, 99–102
 - FISMA requirements and, 98
 - ISAC participation, 90
 - military and civilian, 71–73
 - monitoring civilian networks, 100
- intention (threat assessment), 25–26
- “Inter-Intra-Agency Requirements” block, 124
- intercepting communications, 272
- interdependencies (IMS), 148
- interim final rules, 267
- internal audits, 166–168, 239–241, 240
- internal constraints, 123
- “Internal Control-Integrated Framework,” 239
- internal controls, 230, 239–241
- internal information gathering, 162
- internal monitoring, 204–205
- internal project information, 119
- internal risks, 240
- internal systems (corporate), 218
- internal threats, 28
- international issues. *See* global cybersecurity issues
- International Strategy for Cyberspace, 259
- Internet
 - attacks and exploits, 195–202
 - BGP connections, 190–192
 - dependency, 275
 - diagrammed, 186
 - DNS system, 192
 - encryption methods, 193–195
 - global management of, 275
 - growth of, 186–187
 - history of, 179, 185–187
 - IANA/ICANN/IETF, 277–280
 - insecurity of, 202
 - operations of, 188–189
 - origins of, 4
 - protocols, 189–190
 - structure of, 187–188
 - Internet Assigned Numbers Authority (IANA), 277
 - Internet Corporation for Assigned Names and Numbers (ICANN), 192, 277–278, 279
 - Internet Engineering Task Force (IETF), 192, 278–279, 280
 - Internet Protocol. *See* IPv4; IPv6; TCP/IP
 - Internet Protocol Security (IPSec), 279
 - Internet service providers (ISPs), 188, 202, 204
 - interstate commerce crimes, 271
 - interviews, 40, 288
 - “An Introductory Resource Guide for Implementing the HIPAA Security Rule” (NIST 800-66), 174
 - intrusion detection systems. *See* IDS (intrusion detection system)
 - intrusion prevention systems. *See* IPS (intrusion prevention system)
 - investment
 - duty of care, 215–219
 - justifying, 133, 135–136
 - SEC disclosures and, 229
 - investment advisors, 228
 - IP addresses, 189–190
 - BGP functions, 190–192
 - DDoS attacks, 198
 - DNS and, 192, 278
 - DNS cache poisoning, 200
 - faking, 191–192
 - global Internet management, 277–279
 - human-readable, 192
 - translating, 188
 - vulnerabilities, 190
 - IP (Internet Protocol)(TCP/IP), 187, 188, 189
 - IP (Office of Infrastructure Protection), 94, 131
 - IPS (intrusion prevention system)
 - cybersecurity operations role, 204
 - Einstein 3, 99–100
 - internal monitoring, 205
 - signatures and, 206

- as warning system, 207
- IPSec (Internet Protocol Security), 279
- IPv4 (Internet Protocol version 4), 189, 279
- IPv6 (Internet Protocol version 6), 189, 279
- Iran
 - offensive cyber capabilities, 37
 - DDoS attacks, 10, 198
 - drones, 276
 - Flame virus, 102, 276
 - Stuxnet virus, 10, 102, 275–276
- ISAC (Information Sharing and Analysis Center), 89–90, 230
- ISACA (Information Systems Audit and Control Association), 240
- ISPs (Internet service providers), 188, 202, 204
- Israel, 10, 37, 102, 276
- “IT Capital Asset Summary,” 170
- IT systems, 18
 - audits, 167, 173
 - best practices, 126
 - Clinger-Cohen Act, 126
 - communication pathways, 185
 - corporate assessments, 233
 - corporate governance and, 216
 - costs, 160
 - Exhibit 300 reports, 169–170
 - hardware in, 185
 - health care providers, 224
 - internal controls, 239–240
 - procurement, 83
 - repairing, 237
 - software in, 185
 - Sony PlayStation breach, 221
 - standards for, 169
 - systems in, 185
 - vulnerabilities, 30
- J**
- Java, 181
- judicial branch of government, 268–270
 - CFAA rulings, 270–272
 - cybersecurity role, 250–251, 269–270
 - federal criminal process, 273–275
 - federal regulations and, 267–268
 - identity theft rulings, 273
 - Justice Department, 72, 90
 - structure of, 268–269
 - Wiretap Act rulings, 272
- judicial precedent, 269
- jurisdiction, 269–270, 281–282
- Justice Department, 72, 90
- justification section (MNS), 134, 135–136
- K**
- Kennedy administration, 95
- keyboards, 181
- keys (encryption), 193, 271
- kiddy hackers, 5–6, 27
- known exploit signatures, 206
- known vulnerabilities, 201
- Kosovo, 276
- L**
- L-3 security breach, 213
- labor, 109, 125, 146
- LACNIC (Latin America and Caribbean Network Information Centre), 279
- LANs (local area networks), 188
- laptops, 182, 183
- Latin America and Caribbean Network Information Centre (LACNIC), 279
- law enforcement agencies, 89–90, 202, 236–237, 281
- laws, 69. *See also* legislation
- lawsuits, 216–219, 220, 221–222
- leading questions (surveys), 288
- legal system. *See* judicial branch of government
- legislation, 304. *See also* specific acts of law (Brooks Act, Computer Security Act, etc.)
 - CIWG review, 86
 - compliance, 167
 - congressional process, 261–263
 - Congress’s mandates, 251, 260
 - crafting, 74
 - cybersecurity and, 69–70, 261
 - federal regulations and, 265–268
 - government agencies/branches, 70–74
 - history of cyber law
 - origins (1945-1984), 74–77
 - control conflict (1984-1995), 77–81
 - cyber developments (1995-2001), 81–90
 - Homeland Security (2001-2008), 90–98
 - CNCI/cyber warfare (2008-present), 99–102
 - recent developments, 102–104
 - impact on projects, 123
 - law, defined, 69
 - mission requirements and, 127, 128
 - passing bills into law, 261–263
 - private sector regulations, 222–230
 - protecting personal information, 212
 - state laws, 227–228
- legislative branch of government. *See* Congress
- lethality, 25, 26–27

- leveraging technologies, 159
 - liabilities
 - data breaches, 219–222
 - duty of care, 217–218
 - Library of Congress, 264–265
 - Lieberman, Joseph, 102–103
 - lifetimes (programs), 133, 135, 136
 - likelihood, 37, 38, 59. *See also* probability
 - line functions, 116
 - linear regression models, 292
 - local area networks (LANs), 188
 - local threats, 233
 - Lockheed Martin, 213
 - logging attacks, 207
 - logic decision processes, 55
 - logical fallacies, 249
 - logistic regression equation for probabilities, 294, 295
 - logistic regression (logit), 56–57
 - logit models, 56–57, 292–293
 - logs, 236
 - Los Alamos National Laboratory, 6
 - lower-order programming languages, 180–181
 - Lulz Security (LulzSec), 19
- M**
- M memoranda. *See* OMB
 - machine code, 180–181
 - magnetic badges, 236
 - magnitude of risk, 37, 47
 - mainframe computers, 75–76, 185
 - malware, 195, 196, 271
 - man in the middle attacks, 198–199
 - “manage” task (risk management), 15
 - management and acquisition phase (Op Model), 143–148
 - “Management of Information Resources,” 83
 - managers, 113. *See also* program/project managers; senior managers
 - compliance and reporting, 166–174
 - constraints, 123–124
 - coordinating functions, 115–117
 - corporations, 214–215
 - cybersecurity framework. *See* cybersecurity management framework
 - in cybersecurity operations, 202
 - cyclical nature of management, 121
 - decision-making processes, 117–121
 - earned value management, 148–165
 - functions of, 109–110
 - goals/missions and, 114–115
 - management and acquisition, 143–148
 - managing vs. doing, 113–114
 - measurable outcomes, 117
 - operational planning model, 124–125
 - strategies and plans, 114–115
 - types of, 109–110
 - US-CERT failure case study, 122–125
 - managing risks. *See* risk management
 - “marginal” label (GAO), 31–33
 - Marine Corps, 71
 - Marine Corps Intelligence, 72
 - mark-up sessions, 262
 - material costs, 146
 - “material information” disclosures, 229
 - mathematical risks, 53–55
 - MB (megahertz), 182
 - McAfee Inc., 114, 115
 - McVeigh, Timothy, 85
 - MD5 (message digest hash), 194–195
 - “Measurement” block, 125
 - measurements. *See* metrics and measurements
 - medical records, 172–174, 219–225. *See also* HIPAA
 - Medicare and Medicaid fraud, 217
 - megahertz (MB), 182
 - memory, 182, 184–185
 - message digest hash (MD5), 194–195
 - metrics and measurements
 - DHS monitoring case study, 163
 - establishing, 118–119, 123
 - EVM accounting, 148
 - EVM measurements, 151–154
 - failure to establish, 123
 - FISMA requirements, 171
 - identifying in MNS, 135
 - metrics, defined, 117
 - op models, 140–142
 - operational planning models, 125
 - plan outcomes, 117
 - in PWSs, 145
 - qualitative research, 40
 - red, yellow, and green status, 165
 - reviewing plans against, 120–121
 - risk research questions, 39
 - WBS tasks, 150
 - microphone activation, 102
 - Middle East, 279
 - milestones
 - DHS monitoring case study, 160
 - identifying, 135
 - IMS depiction, 148
 - operational requirements documents, 140
 - POA&M documents, 147–148
 - military. *See also* Defense Department agencies and commands, 71–73

- CNCI directives, 99
 - FISMA requirements and, 98
 - role in cybersecurity, 69–71
 - tensions over control, 70, 71, 78–81, 104–105
 - minicomputers, 185
 - minimum operational values, 142
 - misconfiguration, 201
 - mission needs statement. *See* MNS
 - missions, 109
 - driving projects, 123
 - operational planning model, 124–125
 - strategies and plans, 114, 115
 - mistakes of logic, 249
 - mitigating damages, 237
 - mitigating risks
 - federal CIOs role, 84
 - as high-level requirement, 136
 - risk levels and, 36
 - in risk management framework, 16, 20
 - risk responses, 60, 61
 - Mitnick, Kevin, 5–6
 - MNS (mission needs statement)
 - authorization section, 134–135
 - capabilities in, 133–134
 - capability gaps, 133–134
 - courses of action, 135
 - developing, 126–127
 - high-level input sources, 131, 132–136
 - high-level requirements, 132–137
 - justification section, 134, 135–136
 - lifetimes, 135
 - outcomes, 135
 - translating into capabilities, 132–133
 - model corporate cybersecurity program, 231
 - board of directors, 231–232
 - business continuity plans, 238
 - CEO and CIO roles, 232
 - education and training, 235
 - encryption, 235–236
 - intrusion detection systems, 237–238
 - penetration testing, 234–235
 - physical security, 236
 - response program, 236–237
 - risk assessment, 232–234
 - vendor management, 238
 - written plans, 234
 - monitoring internal controls, 241
 - monitoring risks
 - Citigroup lawsuit, 218–219
 - compliance, 62–63, 64
 - corporate implementation, 237–238
 - corporate responsibilities, 218
 - cybersecurity operations, 203–205
 - DHS case study, 158–164
 - effectiveness, 62–63, 64
 - as high-level requirement, 136
 - identifying changes in environment, 62–63, 64
 - internal monitoring, 204–205
 - obligations, 221–222
 - policy monitoring, 205–206
 - risk management framework, 16, 17, 18, 20
 - tool list, 205
 - Monte Carlo analysis, 53–55
 - Morris, Robert Tappan, 8–9, 270
 - Morris worm, 8–9, 270
 - mortgage crisis, 218–219
 - motherboards, 181, 182
 - multi-core processors, 182
 - multiple-choice questions, 288–289, 290
 - multiple processors, 182
 - multivariate statistical analysis, 53–55, 58–60
 - mutually-exclusive events (probability), 48–49
- N**
- NASA (National Aeronautics and Space Administration), 47
 - Natanz nuclear facility, 10
 - nation-state hackers
 - early cyber spying, 6
 - international cyber defense capabilities, 37
 - international law enforcement, 281–282
 - levels of risk and, 35
 - monitoring for, 204
 - threat assessments, 27
 - National Aeronautics and Space Administration (NASA), 47
 - National Bureau of Standards. *See* NIST
 - National Communications System, 94, 95
 - national coordinator for security, infrastructure protection and counter-terrorism, 88
 - National Cyber Security Center, 130
 - National Cyber Security Division (NCSA), 122
 - National Cybersecurity and Communications Integration Center (NCCIC), 94, 122
 - National Cybersecurity Council, 103
 - National Geospatial Intelligence Agency, 72
 - National Infrastructure Advisory Council, 93
 - National Infrastructure Assurance Council, 87
 - National Infrastructure Protection Council (NIPC), 89–90, 94–95, 261
 - National Infrastructure Protection Plan (NIPP), 18, 87, 94, 96, 97, 104
 - National Institute for Standards and Technology. *See* NIST

- national intelligence workers, 28
- National Nuclear Security Agency (NNSA), 41–46
- National Policy for Infrastructure Protection, 87
- National Policy on Telecommunications and Automated Information Systems Security (NSDD-145), 7–8, 78–80
- National Protection and Programs Directorate (NPPD), 94, 122, 131
- National Reconnaissance Office, 72
- National Science Foundation, 4
- National Science Foundation Network (NSFNET), 4
- national security
 - board of directors role in, 231–232
 - civilian vs. military cybersecurity control, 70, 71
 - criminal information access, 270
 - personal computers and, 5
 - procurement function and, 77
 - sentencing and, 275
 - threat spectrum, 28
- National Security Act, 253
- National Security Agency. *See* NSA
- National Security Council (NSC), 74, 87, 93, 253
- National Security Decision Directives (NSDDs), 7–8, 78–80
- national security instruments, 74, 255
 - as authorization, 134
- National Security Policy Directives. *See* NSPDs
- “National Strategy to Secure Cyberspace,” 95
- National Vulnerability Database (NVD), 201
- NATO Computer Incident Response Capability (NCIRC), 283–284
- NATO (North Atlantic Treaty Organization), 101, 276, 283–284
- Navy
 - attacks on, 276
 - Office of Naval Intelligence, 71, 72
- NCCIC (National Cybersecurity and Communications Integration Center), 94, 122
- NCIRC (NATO Computer Incident Response Capability), 283–284
- NCSD (National Cyber Security Division), 122
- negative relationships (logit models), 56
- “negligible” label (GAO), 31–33
- NERC (North American Electric Reliability Corporation), 229–230
- NERC Standard CIP-008-4, 230
- Netherlands’ cyber defenses, 37
- network cards, 182
- networks
 - altering configuration during attacks, 207, 237
 - anomalies, 162–163, 203, 206–207, 237–238
 - BGP connections, 190–192
 - civilian network monitoring, 100
 - CNCI protections, 99–102
 - continuous monitoring systems, 122–123
 - cybersecurity operation capabilities, 202–208
 - denial of service attacks, 198, 203, 204, 275
 - early policy decisions, 7–8
 - firewalls. *See* firewalls
 - FISMA protection, 97
 - honeypots, 207, 237
 - ISP access to, 188
 - liability for data breaches, 219–222
 - monitoring case study, 158–164
 - types of, 188
 - vulnerabilities, 200–202
 - zombie networks, 198
- Network Security Deployment division (NSD), 94
- New Deal agencies, 75
- New York state law, 216
- New Zealand, 279
- Nichols, Terry, 85
- NIPC (National Infrastructure Protection Center), 89–90, 94–95, 261
- NIPP (National Infrastructure Protection Plan), 94, 96
 - Clinton administration commissions, 87
 - DHS goals in, 97
 - DHS risk management, 18
 - Office of Infrastructure Protection, 94, 131
 - replacing, 104
- NIST (National Institute for Standards and Technology)
 - compliance, 171
 - functions of, 73
 - “Guide for the Security Certification and Accreditation of Federal Information Systems,” 171–172
 - IT vulnerabilities list, 30
 - NIST 800-53 (Recommended Security Controls for Federal Information Systems and Organizations), 174
 - NIST 800-66 (An Introductory Resource Guide for Implementing the HIPAA Security Rule), 174
 - NVD (National Vulnerability Database), 201
 - “Recommended Security Controls for Federal Information Systems and Organizations,” 174
 - risk management frameworks, 18, 98
 - security practices role, 80
- Nixon administration, 253–254
- NNSA (National Nuclear Security Agency), 41–46
- non-experimental research, 247–248
- non-volatile memory, 184, 185
- noncompliance consequences, 172
- North American Electric Reliability Corporation (NERC),

- 229–230
 - North Atlantic Treaty Organization (NATO), 101, 276, 283–284
 - Northeast Blackout, 2003, 92
 - Norway, 4
 - “Not Applicable” answers, 288
 - not-mutually exclusive events (probability), 48–49
 - notice and comment period, 266–267
 - notifications. *See also* alerts; warning systems
 - as capability, 203
 - costs of, 236
 - as passive response, 207
 - state laws, 227–228
 - NPPD (National Protection and Programs Directorate), 94, 122, 131
 - NRC (US Nuclear Regulatory Commission), 47, 53
 - NSA (National Security Agency)
 - civilian/military control tensions, 78–81
 - classified computer systems and, 80
 - Einstein 3 program, 99–100
 - founding of, 128
 - role in cybersecurity, 71–73
 - NSC (National Security Council), 74, 87, 93, 253
 - NSD (Network Security Deployment division), 94
 - NSDD-145 (National Policy on Telecommunications and Automated Information Systems Security), 7–8, 78–80
 - NSFNET (National Science Foundation Network), 4
 - NSPDs (National Security Policy Directives)
 - Bush administration, 255
 - CNCI, 99–102
 - NSPD-54 (National Security Policy Directive), 99–102, 130, 257
 - nuclear arms, 6, 7
 - nuclear facilities
 - criminal information access, 270
 - human reliability in management, 53
 - PRA risk management, 47
 - virus attacks, 102, 276
 - Nuclear Regulatory Commission (USNRC), 47, 53
 - null hypotheses (H_0), 39, 49, 290, 291
 - NVD (National Vulnerability Database), 201
 - NY BCL (Business Corporation Law of New York State), 216
- O**
- Obama administration
 - cybersecurity initiatives and policies, 98–104
 - Cyberspace Policy Review, 130
 - executive orders, 104, 256
 - national security instruments, 104, 255
 - objective values (management), 142–143
 - objectives, 138, 146
 - OCIA (Office of Cyber and Infrastructure Analysis), 94, 131
 - ODNI (Office of the Director of National Intelligence), 72
 - off-site back-ups, 236
 - OEC (Office of Emergency Communications), 94
 - Office of Cyber and Infrastructure Analysis (OCIA), 94, 131
 - Office of Cybersecurity and Communications (CS&C), 94, 122, 131
 - Office of E-Government and Information Technology, 254
 - Office of Emergency Communications (OEC), 94
 - Office of Homeland Security. *See* DHS
 - Office of Information and Regulatory Affairs, 82, 254
 - Office of Infrastructure Protection (IP), 94, 131
 - Office of Management and Budget. *See* OMB
 - Office of National Infrastructure Assurance, 87
 - Office of Science and Technology Policy (OSTP), 254, 259
 - Office of the Director of National Intelligence (ODNI), 72
 - Office of the National Counterintelligence Executive (ONCIX), 72
 - OHS (Office of Homeland Security). *See* DHS
 - OIRA (Office of Information and Regulatory Affairs), 82, 254
 - Oklahoma City bomb, 85–86, 256
 - Olympic Games cyberwar program, 102
 - OMB (Office of Management and Budget)
 - circulars
 - A-11 (capital assets), 149, 150
 - A-130 (information resource management), 83, 172
 - Exhibit 300 reports, 169–170
 - FISMA compliance, 98, 171
 - FISMA oversight, 102–103, 129
 - functions of, 73
 - information management, 82–84
 - IT system requirements, 169–170
 - memoranda, 258–259
 - M-08-05 (trusted Internet connections), 138–139
 - M-10-28 (DHS responsibilities), 103, 257, 258–259
 - M-97-02 (funding information systems), 83
 - role of, 253–254
 - TIC mandate, 22, 138–139, 258
 - ONCIX (Office of the National Counterintelligence Executive), 72
 - online retailer examples, 55–60, 292–296

- online surveys, 289–290
 - ontology, 246–247
 - op models (operating models), 142, 143–148, 160
 - open-ended questions, 288, 290
 - open standards organizations, 279
 - operating models (op models), 142, 143–148, 160
 - Operation Aurora, 276
 - operational planning models, 124–125
 - operational processes (CONOPS), 138
 - operational requirements document (ORD), 140
 - opting out (financial information), 223
 - oral communications, 272
 - ORD (operational requirements document), 140
 - “Organizational Capital” block, 124–125
 - organizational structure, 123
 - organizations, 109
 - impacts of structures, 123
 - top-down analysis, 50–52
 - organized crime groups, 19
 - levels of risk and, 35
 - prosecution, 268–275
 - risk determination example, 36
 - risk management outline, 20
 - threat assessment, 25, 26–27
 - in threat spectrum, 28
 - OSTP (Office of Science and Technology Policy), 254, 259
 - OSTP Resource Library, 254
 - “Other” answers, 288
 - outcomes
 - in CONOPS, 140
 - defining, 135
 - measurable, 117
 - in op models, 140–142
 - operational planning model, 124
 - in PWSs, 145
 - regression modeling, 56
 - success and, 120
 - over budget status, 156, 163
 - overriding vetoes, 263
 - oversight
 - congressional, 74
 - corporate failure, 215–219
 - duty of care, 217
- P**
- p-values, 291
 - Pacific Bell, 5
 - packet analyzers (sniffers), 204, 272
 - packets, 187, 188–189
 - Paperwork Reduction Act (PRA), 82, 254
 - participants in CONOPS, 138
 - passive responses to threats, 207–208, 237–238
 - passwords
 - brute force attacks, 193
 - corporate data, 220
 - corporate policies, 235
 - corporate systems, 233
 - logit analysis, 295, 296
 - selling, 271
 - strong passwords, 57, 220, 235
 - as vulnerabilities, 200
 - wireless systems, 227
 - patches, 195, 200, 227
 - Patriotic Hacker attacks, 276
 - Payment Card Industry Data Security Standards, 221
 - PCCIP (President’s Commission on Critical Infrastructure Protection), 86–87, 255, 257
 - PCs (personal computers)
 - attacks and exploits, 195–202
 - changes in national security and, 77–81
 - criminal information access, 271
 - cybersecurity operation capabilities, 202–208
 - early federal policies, 7–8
 - early years of, 4–5
 - FISMA protection, 97
 - in IT infrastructure, 185
 - protected computers, 272
 - systems, 182–184
 - virus attacks, 102
 - vulnerabilities, 200–202
 - worms, 8–9
 - PDDs (Presidential Decision Directives), 74. *See also*
 - national security instrument
 - Clinton administration, 74, 255
 - PDD-63
 - critical infrastructure protection, 87–90
 - energy information sharing, 230
 - HSA elements of, 261
 - Oklahoma City response, 255
 - replacement of, 257
 - penetration testing, 234–235
 - percentages (comparing projects), 157–158
 - performance
 - APBs, 142
 - objective and threshold values, 142–143
 - red, yellow, and green status, 165
 - performance-based acquisitions, 145–146
 - “performance measurement report,” 170
 - performance work statements (PWS), 144, 145–146
 - period of performance (POP), 155, 164
 - personal computers. *See* PCs
 - personal information
 - bank sales of, 222

- business's duty towards, 212–213
- civilian vs. military cybersecurity control, 70, 71
- criminal computer access, 271
- criminal information access, 273
- customer information leak example, 55–60
- liability for breaches, 219–222
- phishing attacks, 197–198
- protected health information, 173
- Sony PlayStation Network breach, 221–222
- spear phishing attacks, 41–46
- TJX data breach, 220, 226–227, 272
- personal interviews, 40, 288
- PHI (protected health information), 173, 225
- phishing attacks, 41–46, 197–198
- phone companies, 188
- phone surveys, 40
- physical security, 236
- plan of action and milestones (POA&M), 147–148
- planned value. *See* PV (planned value)
- planning, programming, budgeting and execution (PPBE), 127
- plans, 114–115
 - alternative scenarios, 119–120
 - assessing, 120
 - capability-based planning, 136–137
 - choosing, 120
 - CONOPS, 137–140
 - executing, 120
 - measurable outcomes, 117
 - op models, 140–142
 - operational planning model, 124–125
 - POA&M documents, 147–148
 - plausible deniability, 281
 - plea bargains, 274
 - POA&M (plan of action and milestones), 147–148
- Poindexter, John, 7–8, 78–81, 98
- point system (sentencing), 274–275
- policies
 - as authorization, 134
 - compliance, 167
 - in CONOPS, 138, 140
 - federal. *See* policies (federal)
 - impact on projects, 123
 - internal controls, 239–240
 - mission needs statements and, 128–130
 - policy directives, 304
 - policy monitoring, 205–206
- policies (federal), 69
 - agencies involved in, 70–74
 - crafting, 74
 - cybersecurity and, 69–70
 - Cyberspace Policy Review, 100–101
 - DHS frameworks, 95
 - FISMA requirements, 98
 - history of cybersecurity, 70–74
 - origins (1945–1984), 7–9, 74–81
 - control conflict (1984–1995), 77–81
 - cyber development (1995–2001), 81–90
 - Homeland Security (2001–2008), 90–98
 - CNCI/cyber warfare (2008–present), 99–102
 - recent developments, 102–104
 - sentencing, 274
- policy directives, 304
- policy monitoring, 205–206
- POP (period of performance), 155, 164
- population, 41, 289–290
- positive relationships (logit models), 56
- power grid. *See* electrical grid
- power plants, 229–230
- PPBE (planning, programming, budgeting and execution), 127
- PPDs (Presidential Policy Directives), 255
- PRA (Paperwork Reduction Act), 82, 254
- PRA (probabilistic risk assessment)
 - event tree analysis, 49–52
 - fault tree analysis, 50–52, 53, 54
 - human reliability analysis, 53
 - logistic regression equation, 294, 295
 - Monte Carlo analysis, 53–55
 - quantitative risk determination, 47–48
- precedents, judicial, 269
- predicting leaks, 58–60
- predicting threats, 206–207
- predictive analysis, 206–207
- preponderance of evidence, 281
- presidential directives, 74, 129. *See also* executive orders; national security instruments; HSPDs
 - mission requirements and, 127, 128–130
- Presidential Policy Directives (PPDs), 255
 - PPD-21, 104
- Presidential Study Directives (PSDs), 255
- presidents
 - agency creation, 266
 - agency supervision, 74
 - bill signing or vetoing, 263
 - cybersecurity policy role, 69–70
 - Executive Office of. *See* EOP
 - executive orders. *See* EOs
 - as first responders, 251, 252
 - military or civilian security control policies, 71
 - mission requirements, 127, 128–131
 - national security instruments, 74
 - presidential directives, 74, 129. *See also* executive orders; national security instruments; HSPDs

- scope of power, 128–130
- as senior managers, 110
- President's Commission on Critical Infrastructure Protection (PCCIP), 86–87, 255, 256
- President's Council on Year 2000 Conversion, 89
- primary consequences, defined, 30
- printers, 182, 183
- priorities
 - FISMA requirements, 171
 - risk management framework, 16, 20, 21, 23
- privacy issues
 - bank sales of personal information, 223
 - civilian vs. military cybersecurity control, 70, 71
 - court cases, 269
 - IPv6 and, 279
 - policy formation, 74
- Privacy Rule (HIPAA), 224
- private corporation governance, 213–215
- private-public partnerships
 - board of directors role, 231–232
 - critical infrastructure protection, 70, 85, 87–88, 105
 - DHS agencies charged with, 94, 96
 - DHS strategies, 259
 - incentives for, 87, 103, 145
 - National Infrastructure Assurance Council, 87
 - outlining shared threats, 87, 99
 - policy formation, 74
 - post 9/11, 92–93
 - threats to critical infrastructure, 87
- private sector
 - business interruption insurance, 238
 - corporate governance, 213–222
 - critical infrastructure owned by, 85
 - cyber incident reports, 103
 - cybersecurity overview, 211–213
 - duty of care, 213–222
 - electrical grid, 229–230
 - HIPAA compliance, 172–174
 - incentives for partnerships, 87, 103, 145
 - internal audits and controls, 239–241
 - legislative requirements, 222–230
 - liabilities, 213–222
 - model cybersecurity programs, 231–238
 - NSDD-145 computer security issues, 8
 - partnerships. *See* private-public partnerships
 - policy formation, 74
 - protecting critical infrastructure, 70, 85–88, 105
 - risk management strategies, 212
 - Sarbanes-Oxley Act and, 230
 - SEC disclosures, 228
 - security roles, 231–232
 - strategy questions, 211–213
- proactive safeguards, 220, 231
- probabilistic risk assessment. *See* PRA (probabilistic risk assessment)
- probability
 - calculating, 35–37
 - illustrated, 38
 - logistic regression equation, 295–296
 - PRA risk management, 47. *See also* PRA
 - predicting leaks with statistical analysis, 58–60
 - probability distribution, 48
 - probability sampling, 290
 - probability theory, 48–49
 - quantitative risk determination, 48–49
 - values, 54
- probable cause, 273
- procedures, 114, 167
- processors, 181–182
- procurement. *See* acquisitions and procurement
- “Products and Services” block, 124
- professional auditors, 241
- program/project managers, 110, 113
 - comparing projects, 157–158
 - compliance and reporting, 166–174
 - CONOPS, 137–140
 - defining capabilities, 136
 - DHS cybersecurity programs, 127
 - earned value management, 148–165, 298–302
 - forecasting, 300–302
 - function coordination, 115–116
 - high-level requirement analysis, 132
 - management and acquisition, 143–148
 - mission needs statements, 126–127
 - objective and threshold values, 142–143
 - op models, 140–142
 - tracking projects, 153–157
 - warning system example, 110–113
- programming languages, 180–181
- programs. *See* software
- project managers. *See* program/project managers
- proposed bills, 261–264
- proposed rules, 260, 266
- prosecution of cybercriminals, 6, 9, 268–275
- prosecutors, 273
- protected computers, 272
- protected health information (PHI), 173, 224
- protection
 - as capability, 203
 - as high-level requirement, 136
 - infrastructure. *See* critical infrastructure protection

- networks, 97, 99–102
 - PCs, 97
 - personal information, 173
 - protected computers, 272
 - protective markings, 79
 - protocol identifier assignments, 277
 - protocols, 188, 189–190, 277
 - PSDs (Presidential Study Directives), 255
 - public corporation governance, 213–215
 - public hearings, 260, 262, 266
 - public image, 212
 - public-private partnerships. *See* private-public partnerships
 - PV (planned value)
 - District Design case study, 152–154
 - percentages, 157–158
 - schedule variances, 154–155
 - SPI equations, 299
 - PWS (performance work statement), 144, 145–146
- Q**
- Quadrennial Homeland Security Review report to Congress (QHSR), 130, 259
 - qualitative risk determination, 37–46
 - quantitative risk determination, 37–39, 47
 - event tree analysis, 49–52
 - fault tree analysis, 50–52, 53, 54
 - human reliability analysis, 53
 - Monte Carlo analysis, 53–55
 - online retailer example, 55–60
 - probabilistic risk assessment, 47–48
 - probability basics, 48–49
 - statistical modeling, 55
 - questionnaires. *See* survey designs
 - questions
 - advanced research methods/sources, 284–286
 - computer technical fundamentals review, 208
 - cybersecurity law and policy review, 105–107
 - cybersecurity management review, 174–176
 - private sector cybersecurity review, 242–243
 - qualitative research questions, 39–41
 - research questions, 247
 - risk determination review, 65–66
 - risk research questions, 38–39
- R**
- radio signal badges, 236
 - RAM (random access memory), 182, 184–185
 - random sampling, 290
 - ratings agencies, 228
 - re-engineering backwards, 141
 - Reagan administration, 7–8, 74, 78–80, 128
 - reason, mistakes of, 249
 - reasonable doubt, 274
 - reckless behavior, 271
 - “Recommended Security Controls for Federal Information Systems and Organizations” (NIST SP 800-53), 174
 - reconciliation, 263
 - reconnaissance attacks, 196
 - recovery from attacks
 - business continuity plans, 238
 - as capability, 203
 - corporate policies, 237
 - “National Strategy to Secure Cyberspace,” 95
 - red project status, 165
 - reducing risk (capability), 159
 - regional Courts of Appeals, 268
 - Regional Internet Registries (RIRs), 278–279
 - registries (Internet addresses), 278–279
 - regression modeling, 56, 291, 292, 294–295
 - regulations, 265–266, 304
 - Code of Federal Regulations, 268
 - compliance, 167
 - Congressional and Judicial roles in, 267–268
 - creating, 266–267
 - Federal Register publication, 260
 - impact on projects, 123
 - regulatory agencies, 236–237
 - reliability, 39
 - reliability standards (NERC), 230
 - reliability tests, 249
 - Reno, Janet, 86
 - rental botnets, 198
 - repairing systems, 237
 - reports
 - audits, 166–168
 - corporate policies, 235, 237
 - DHS cybersecurity reports, 130–131
 - energy grid cybersecurity, 230
 - Exhibit 300, 169–170
 - federal government practices, 168–169
 - FISMA requirements, 170–172
 - health care system breaches, 225
 - internal controls, 239–240
 - operational planning model, 125
 - Sarbanes-Oxley Act, 230
 - Requests for Comments (RFCs), 279
 - requests for information (RFIs), 143–144
 - requests for proposals (RFPs), 144–148
 - research methods, 245–249
 - research questions

- creating, 247
- dependency on Internet, 275
- risk research, 38–39
- spear phishing attack vulnerabilities, 41–46
- statistical modeling, 56
- survey design, 288–296
- research sources
 - Code of Federal Regulations (CFR), 268
 - Council of Europe, 284
 - executive branch, 251–260, 254
 - executive orders, 256–258
 - Federal Register, 260
 - OMB memoranda, 258–259
 - OSTP memoranda, 259
 - national security instruments, 255
 - White House strategy and guidance, 259
 - GAO website, 264
 - government documents, 249–251
 - Internet Engineering Task Force, 279
 - legislative, 264–265
 - Congressional Record, 264
 - Congressional Research Service, 264–265
 - proposed bills and law, 264
 - NATO, 283–284
 - THOMAS.gov, 264
 - United Nations, 283
- research subjects, 248
- Réseaux IP Européens Network Coordination Centre (RIPE NCC), 279
- resources
 - as constraints, 21
 - decision-making process, 121
 - identifying in MNS, 135
 - impact on projects, 123
 - management and acquisition phase, 143–148
 - POA&M documents, 147–148
 - risk monitoring and, 63
 - time and money, 150–152
 - trade-offs in risk management, 23
- responding to attacks
 - active responses, 207–208, 237–238
 - containing threats, 61
 - corporate plans, 234, 236–237
 - NATO teams, 284
 - passive responses, 207–208, 237–238
 - presidents as first responders, 251, 252
 - types of responses, 207–208
- responding to risks
 - acceptance, 16, 20, 36, 60–61
 - avoidance, 60, 61
 - as capability, 203
 - cybersecurity insurance, 61–62
 - as high-level requirement, 136
 - mitigation, 60, 61
 - risk management framework, 16, 17, 18, 20
 - risk responses, defined, 60
 - transfer, 16, 20, 60, 61–62
 - unacceptable risks, 22
 - response rates (surveys), 42
 - responsibilities in CONOPS, 138, 140
 - restitution to victims, 273
 - results, assessing, 120–121
 - reviewing warnings, 112
 - RFCs (Requests for Comments), 279
 - RFIs (requests for information), 143–144
 - RFPs (requests for proposals), 144–148
 - Ridge, Tom, 90
 - RIPE NCC (Réseaux IP Européens Network Coordination Centre), 279
 - RIRs (Regional Internet Registries), 278–279
 - risk, 17
 - assessing. *See* risk assessments
 - benefits of, 64
 - determination. *See* risk determination
 - framing. *See* framing risks
 - graphing, 33
 - internal audits, 167
 - levels of, 33–37
 - management. *See* risk management; risk management frameworks
 - responding to. *See* responding to risks
 - risk equation, 23
 - risk formula, 23–33
 - severity, 37, 47
 - tolerances, 16, 20, 21, 22
 - unacceptable, 22
 - risk assessments, 23–24
 - audits, 240
 - Cybersecurity Act, 103
 - DHS monitoring case study, 161–162, 164
 - FISMA requirements, 97–98
 - model corporate cyber program, 232–234
 - risk determination and. *See* risk determination
 - risk equation, 23–24, 34–35
 - risk management framework, 16, 17, 18, 20
 - risk-based decisions, 19, 98
 - risk determination, 33–37
 - methodologies, 37–39
 - quadrant diagram, 36
 - qualitative methods, 37–46
 - quantitative methods, 37–39, 47–60
 - review questions, 65–66

risk assessment in, 33
 risk equation, 23–25, 34–35
 risk framing. *See* framing risks
 risk management, 15–17
 consequence assessment, 30–33
 federal agency roles in, 83–84
 frameworks, 16, 18
 health care systems, 224
 operational planning model, 125
 organized crime example, 20
 plans, 15
 presidential directives for, 96
 private sector strategies, 212
 process, 18–19
 risk, defined, 17
 risk assessment, 23–33
 risk determination, 33–60
 risk formula, 23–33
 risk framing, 19–23
 risk managers, 26
 SEC guidelines, 228–229
 strategies, not checklists, 66
 threat assessment, 25–28
 threat shifting, 28
 vulnerability assessment, 29–30
 risk management frameworks, 16, 17, 18, 20
 risk management plans, 15
 risk research questions, 38–39
 risk responses. *See* responding to risks
 risk tolerances, 16, 20, 21, 22
 roles (CONOPS), 138, 140
 Roosevelt administration, 75, 128
 root server management, 277
 routers, 182, 183, 185, 187, 188, 190–192, 198–199
 routing attacks through other countries, 282
 routing tables, 190
 RSA SecurID breach, 198, 212–213
 rules, 205–206, 266
 Russian-Chechen conflict, 276
 Russian Federation, 279
 Russian-Georgian conflict, 277

S
 Safeguards Rule, 223
 sample populations, 41, 289–290
 Sarbanes-Oxley Act (SOX), 168, 230
 satellites, 3
 SBU IT (sensitive-but-unclassified information technology), 81
 Scalia, Antonin, 269
 scanning systems, 201, 205

Schedule Performance Index (SPI), 157, 298–299
 schedule variances (SVs), 154–158, 163–164
 schedules
 acquisition performance baselines, 142
 delays in, 163–164
 DHS monitoring case study, 160
 Integrated Master Schedules, 148, 149
 manager's role, 117
 objective and threshold values, 142–143
 variances, 154–155
 Schmidt, Howard A., 101
 "Scientific Integrity," 259
 scientific issues, 259
 scientific methods, 248
 screen locks, 235
 search warrants, 272
 SEC (Securities and Exchange Commission), 228–229, 237
 SECIR (Stakeholder Engagement and Cyber Infrastructure Resilience division), 94
 Secret Service, 90, 93
 sector-specific agencies (SSAs), 96
 sectors in management framework, 127
 secure hash algorithm (SHA-2), 194–195
 SecurID data breach, 198, 212–213
 Securities and Exchange Commission (SEC), 228–229, 237
 security
 vs. accessibility, 22
 certification and accreditation, 171–172
 OMB role in, 82
 security even correlation tools, 205
 Security Rule (HIPAA), 224
 self-administered surveys, 40, 41–46, 288
 Senate, 261–263
 senior managers, 110, 113, 115, 116
 sensitive but unclassified information, 8, 78, 79, 233
 sensitive-but-unclassified information technology (SBU IT), 81
 sensitive information, 233
 sentencing
 CFAA offenses, 270–272
 cyber criminals, 269
 guidelines, 274–275
 September 11, 2001
 executive orders after, 257
 reorganizations after, 90
 risk planning after, 15–16
 scope of presidential power and, 129
 sequences of events, 50
 servers, 185, 204, 220

- service providers (ISPs), 188, 202, 204
- severity of attacks, 207
- severity of risk, 37, 47
- SHA-2 (secure hash algorithm), 194–195
- shared threats, 28, 87, 88
- shareholders, 213, 214, 215–219, 221–222
- shunning attacks, 207
- signal intelligence, 72
- signature-based tools, 99–100, 205, 206, 237–238
- signatures
 - digital, for DNS, 192
 - IDS/IPS tools, 206
 - internal monitoring, 205
 - known exploits, 206
 - threat signature technology, 99–100, 237–238
- simulating attacks, 206–207, 234–235
- SME (subject matter expert), 161
- sniffers (packet analyzers), 204, 272
- social engineering attacks, 235
- social media phishing attacks, 197
- Social Security numbers, 273
- software, 182
 - antivirus. *See* antivirus software
 - exploits, 195
 - IDS/IPS tools, 206
 - insecurity of, 202
 - in IT systems, 185
 - malware, 195, 196, 271
 - programs, defined, 181
 - signature-based tools, 99–100, 205, 206, 237–238
 - vulnerabilities, 200–202
- Sony PlayStation Network, 221–222
- SOOs (statements of objectives), 144, 146
- South Ossetia, 277
- sovereignty, 282
- Soviet Union. *See also* Russian Federation
 - Cold War, 3, 76, 78
 - computer security and, 78
 - Sputnik, 3
- SOWs (statements of work), 144
- SOX (Sarbanes-Oxley Act), 168, 230
- SP 800-37 (Guide for the Security Certification and Accreditation of Federal Information Systems), 171
- space allocation (ICANN), 277
- Space Race, 3
- spam filters, 197
- Speaker of the House, 262
- spear phishing attacks, 41–46, 197–198
- Special Advisor for Cyberspace Security, 93, 257, 259
- speed of processors, 182
- SPI (Schedule Performance Index), 157, 298–299
- spies. *See* espionage
- sponsors, bills, 261
- spoofed websites, 198
- Sputnik, 3
- SSAs (sector-specific agencies), 96, 104
- staff functions, 116
- staffing in models, 125
- Stakeholder Engagement and Cyber Infrastructure Resilience division (SECIR), 94
- stakeholders, 138, 140, 160
- standard deviations, 291
- standards, 304
- state attorneys general, 220
- state court jurisdictions, 269–270
- State Department, 72
- state laws, 227–228
- statements of objectives (SOOs), 144, 146
- statements of work (SOWs), 144
- statistical modeling, 290–292
 - Monte Carlo analysis, 53–55
 - online retailer probability example, 55–60
 - predicting leaks, 58–60
 - quantitative risk determination, 55
 - regression modeling, 56
- “statistically significant,” 290, 291
- statutes, 304. *See also* legislation
- steps (op models), 141
- stock, 213–214, 228–229, 238
- stock values, 212
- storage, 184–185
- strategic objectives in models, 124
- “Strategic Risk Management” block, 125
- strategies, 114, 115
 - alternative scenarios, 119–120
 - capability-based planning, 136–137
 - choosing, 120
 - CONOPS, 138
 - executing, 120
 - mission needs statement, 133
 - operational planning model, 124–125
- strengths in models, 124–125
- strong passwords, 57, 220, 235
- Stuxnet, 10, 37, 275–276
- subject matter experts (SMEs), 161
- subprime mortgage crisis, 218–219
- supercomputing centers, 4
- supply chains, 166, 170
- Supreme Court, 268. *See also* judicial branch of government
- survey designs, 288–299
 - building models, 293–296

- logit models, 292–293
 - NNSA example, 41–46
 - qualitative risk determination, 39–41
 - response rates, 42
 - sample populations, 289–290
 - statistical models, 290–292
 - SVs (schedule variances), 154–158, 163–164
 - symbols, fault tree, 52, 53
 - Syria, 276
 - systems, computer, 140, 182–184, 185, 195
 - systems of systems, 182–184, 187
- T**
- t-test, 291
 - target audiences, 111, 112, 113
 - “targeted and actionable” warnings, 112–113
 - targets, 25, 27, 190, 202
 - tasks, 120, 148, 150
 - Taves, Kenneth H., 222–223
 - TCP/IP (Transmission Control Protocol/Internet Protocol), 187, 188, 189
 - technical audits, 167
 - technical guidance, 304
 - telephone surveys, 40
 - tensions
 - between military and civilian control, 70, 71, 78–81, 104–105
 - between security and freedom, 282
 - terminating sessions, 207
 - terrorism
 - aggravated identity theft, 273
 - board of directors role in prevention, 231–232
 - counterterrorism reviews, 100–101
 - international issues, 281
 - monitoring for, 204
 - Oklahoma City, 1995, 85–86
 - September 11th, 2001, 15–16, 129
 - in threat spectrum, 28
 - World Trade Center, 1993, 85
 - test groups, 247
 - test statistics, 290
 - testing
 - FISMA requirements, 98
 - hypotheses, 248–249
 - penetration testing, 234–235
 - risk research questions, 39
 - theories (cybersecurity research), 246
 - THOMAS.gov, 264
 - threat assessment
 - components, 25–28
 - DHS monitoring case study, 161–162
 - mission needs statements, 133
 - model corporate program, 232–233
 - threat environments, 133
 - threat shifting, 28
 - threat signature technology, 99–100
 - threats, 23, 25
 - analyzing consequences/vulnerabilities, 33–37
 - assessing. *See* threat assessment
 - attacks. *See* attacks and exploits
 - corporate governance and, 216
 - critical infrastructure focus, 87
 - espionage, 4
 - evolution in, 105
 - external, 28
 - factors aiding in, 202
 - growth in, 99
 - identifying, 38, 133, 205–208
 - increases in, 33
 - insider, 200, 233
 - internal, 28
 - malware, 195, 196, 271
 - risk assessment and, 23
 - in risk determination, 36
 - in risk equation, 23
 - in risk management framework, 16, 20
 - shared, 8, 87
 - signature technology, 99–100, 205, 206, 237–238
 - simulating, 206–207
 - spectrum, illustrated, 28
 - threat environments, 133
 - threat shifting, 28
 - worms. *See* worms
 - threshold values, 142–143
 - TIC Access Providers, 22
 - TIC (Trusted Internet Connection), 22, 138–139, 141, 258
 - time in budgets, 150–152
 - time-out tries, 295, 296
 - timelines, 120
 - TJ Maxx, 220
 - TJX data breach, 220, 226–227, 272
 - TLDs (top level domains), 192
 - tokens, security, 213
 - tolerances, risk, 16, 20, 21, 22
 - top-down analysis, 50–52
 - top level domains (TLDs), 192
 - total risk equation, 35
 - tracking projects
 - atypical variances, 302
 - comparing projects, 157–158
 - EVM budgeting, 153–158

- EVM indexes, 298–300
 - over budget status, 163
 - red, yellow, and green status, 165
 - variances, significance of, 165
 - trade-offs
 - risk management framework, 16, 20, 21, 23
 - secure websites, 59
 - trade secrets, 233
 - training
 - corporate programs, 235
 - costs, 160
 - education as capability, 159
 - FISMA requirements, 98
 - health care systems, 224
 - transferring risks, 16, 20, 60, 61–62
 - Transmission Control Protocol (TCP/IP), 187, 188, 189
 - transnational issues. *See* global cybersecurity issues
 - transparency in corporate governance, 215
 - transportation systems, 85, 87, 96
 - travel costs, 146, 160
 - Treasury Department, 72
 - treaties, 284
 - trial courts, 268
 - trial-out tries, 295, 296
 - trials, 274
 - Trojan horses, 196
 - Truman administration, 128
 - trust, customers, 220, 238
 - trust protocols, 179, 188, 191–192, 198–199
 - Trusted Internet Connection (TIC), 22, 138–139, 141, 258
 - Trusted Internet Connections Initiative, 138–139, 258
 - Twitter phishing attacks, 197
 - Tyco, 230
- U**
- unacceptable risks, 22
 - unauthorized access, 9
 - unclassified information, 79
 - unconstitutional regulations, 267–268
 - under budget status, 156
 - undesired events (probability analysis), 51
 - unfavorable variances, 155, 156, 158, 298, 299–300
 - unintentional threats, 25–26
 - United Kingdom cyber defenses, 37
 - United Nations cybersecurity efforts, 283
 - United State Sentencing Commission (USSC), 274
 - United States
 - government. *See* Federal government
 - government agencies. *See under* agency names (i.e., Defense Department, EPA)
 - Internet number registry, 278
 - Stuxnet virus, 10, 102, 275–276
 - United States v. Jones, 269
 - units of analysis, 248, 249
 - unknown vulnerabilities, 201–202
 - updating tools, 238
 - U.S. Attorneys, 273, 274
 - U.S. Computer Readiness Team (US-CERT), 122–123
 - U.S. Cyber Command, 73
 - US-CERT (U.S. Computer Readiness Team), 122–123
 - USB memory sticks, 185
 - “useful life,” defined, 149
 - users
 - behavioral detection, 206
 - in cybersecurity operations, 202
 - numbers of, in modeling, 57, 295, 296
 - user-friendly websites, 58, 59
 - as vulnerabilities, 200
 - USNRC (Nuclear Regulatory Commission), 47, 53
 - USSC (United States Sentencing Commission), 274
- V**
- validity tests, 249
 - values (binary code), 180
 - variables
 - logit models, 292
 - PRA risk management, 47
 - regression modeling, 56
 - research, 248
 - test statistics, 291
 - variances (EVM)
 - atypical, 302
 - comparing projects, 157–158
 - vs. EVM indexes, 298
 - favorable/unfavorable, 155, 156, 158, 298, 299–300
 - percentages, 157–158
 - significance of, 165
 - understanding, 154–158
 - variance triangle, 156
 - vendors/contractors
 - compliance, 168
 - cybersecurity operations, 202
 - health care systems, 224
 - IMS documents, 148
 - POA&M documents, 147–148
 - policies for managing, 238
 - PWS documents, 145
 - RFIs and, 143–144
 - RFP responses, 147–148
 - security breaches, 213

- selection, 147–148
 - SOO documents, 146
 - threats resulting from, 233
- vetoing
 - bills, 263
 - regulations, 267
- victims, 273, 275
- violating policies, 205–206
- virus software. *See* antivirus software
- viruses
 - capabilities, 196
 - Coreflood virus, 198
 - criminal prosecution, 271
 - Flame, 102, 276
 - government efforts to focus on, 87
 - Stuxnet, 10, 102, 275–276
- viva voce, 263
- voicemail hacking, 5
- volatile memory, 184–185
- volunteer sampling, 289–290
- voting, 263
- vulnerabilities, 23, 195–196
 - analyzing threats/consequences, 33–37
 - assessing, 23, 29–30, 161–162, 232, 233
 - BGP, 191–192
 - complexity of systems and, 184
 - corporate governance and, 216
 - databases of, 201
 - DHS monitoring case study, 161–162
 - hash detection methods, 195
 - human, known, and unknown, 200–202
 - identifying, 38
 - increases in, 33
 - Internet, 179
 - IP addresses, 190
 - mainframes, 76
 - “National Strategy to Secure Cyberspace,” 95
 - personal computers, 78–80
 - public-private shared research, 87
 - risk determination, 36
 - risk equation, 23
 - risk management framework, 16, 20
 - trust protocols and, 188
- vulnerability assessments, 23, 29–30, 161–162, 232, 233
- W**
- WANs (wide area networks), 188
- War Games, 6
- Warner Amendment, 81
- warning systems, 110–113
 - as capability, 203, 207
 - effectiveness, 112
 - as high-level requirement, 136
 - importance of warnings, 111
 - management, 110–113
 - too many warnings, 112, 113
 - US-CERT failure, 122–123
- water systems, 87, 96
- WBS (work breakdown structure), 146, 148, 160
- weaknesses. *See* vulnerabilities
- websites
 - cyber attacks, 276
 - District Design. *See* District Design case study
 - DNS cache poisoning, 200
 - encrypting, 194
 - fraudulent credit card usage, 222
 - history of, 185–186
 - phishing attacks, 197–198
- White House, 259, 276. *See also* EOP; presidents
- wide area networks (WANs), 188
- WiFi networks, 198, 227
- wireless systems, 198, 227
- Wiretap Act, 272
- work breakdown structure (WBS), 146, 148, 160
- Working Group on Web Security, 280
- World Summit on the Information Society (WSIS), 283
- World Trade Center attacks
 - 1993, 85
 - 2001, 15–16, 90–99, 129, 257
- World Wide Web, 9, 185–186
- WorldCom, 168, 230
- worms
 - capabilities, 196
 - criminal prosecution, 271
 - Flame, 102, 276
 - Morris, 8–9, 270
 - Stuxnet, 10, 102, 275–276
- written cybersecurity plans, 234
- WSIS (World Summit on the Information Society), 283
- Y**
- Y2K preparations, 89
- yellow project status, 165
- Z**
- z-test, 291
- zero-day exploits, 195, 201–202, 206
- zombie networks, 198