
Index

A

- Aarts, J., 168
- Access: physical control of, 259, 266; technical control of, 260, 267–269
- Accessibility of data, 50, 55
- Accreditation: by Accreditation Association for Ambulatory Care (AAAHC), 74; by American Osteopathic Association (AOA), 73–74; benefits of, 65; by Commission on Accreditation of Rehabilitation Facilities (CARF), 74; by Joint Commission on Accreditation of Healthcare Organizations (JCAHO), 64, 65–66; by National Committee for Quality Assurance (NCQA), 72–73; overview of, 65
- Accreditation Association for Ambulatory Care (AAAHC), 74
- Accreditation Association for Ambulatory Health Care (AAAHC), 74
- Accredited Standards Committee (ASC), X12N standards, 235, 242–243
- Accuracy of data, 50, 55
- Acquisition. *See* System acquisition
- Ad hoc standards, 234
- Addressable specifications, HIPAA Security Rule, 257
- Administration, IT, as function of IT department, 284–285
- Administrative information systems, 92, 94–95
- Administrative safeguards, 261–265; chief security officers as, 258, 263–264; HIPAA Security Rule standards on, 257–259; risk analysis and management as, 258, 262–263; system security evaluation as, 259, 264–265
- Admission/discharge records, 9
- Adverse drug events, 124
- Agarwal, R., 309, 312
- Agency for Healthcare Quality and Research, 126
- Aggregate data and information: administrative, 28–29, 30; clinical, 27–28; combining clinical and administrative, 29, 31
- Alignment. *See* IT strategy and alignment
- Altis, Inc., 191
- Amatayakul, M., 75
- Ambulatory care: benefits of CPOE systems in, 126–127; scope of episode of care in, 16; Uniform Ambulatory Care Data Set (ACDS), 19, 21
- American Academy of Pediatrics (AAP), 244
- American College of Physicians, 65
- American College of Radiology (ACR), 241
- American College of Surgeons, 65
- American Health Information Management Association (AHIMA), 81, 243; on content of patient medical records, 8–11; data quality management model, 49–57; guidelines on legal health record, 75–79; on HIPAA standards, 256, 257; overview of, 458; on retention of and destruction of health records, 79–80
- American Hospital Association (AHA), 17, 65

- American Medical Association (AMA), 243; Current Procedural Terminology (CPT) published by, 21, 23, 25, 26; and formation of JCAHO, 65; NUCC formed by, 17; on-line communication guidelines of, 137–138
- American Medical Informatics Association (AMIA), 153, 243, 458
- American National Standards Institute (ANSI): bar code standard of, 220; standards development process of, 235, 236
- American Nurses Association (ANA), 243
- American Osteopathic Association (AOA), 73–74
- American Telemedicine Association, 105, 142–143
- Antivirus software, 275–276
- Applegate, L., 366, 367, 368, 369
- Application program interface (API), 194
- Application service providers (ASPs), 158–159, 304
- Applications: as component of IT asset, 326; integration of, 228; “killer,” 356–357, 358; management of, as function of IT department, 283–284; outsourcing development of, 304; visionary, 375–376
- Applications programmers, 289
- Applications software, 190
- Architecture. *See* Information systems architecture
- Arden Syntax for Medical Logic Systems, 241
- Arnon, A., 119
- ARPANET, 211
- Artificial intelligence (AI), 216–217
- Arts, D., 57–58
- Ash, J., 126, 169
- Assembly languages, 190
- Associated Press, 252
- Asynchronous Transfer Mode (ATM), 204
- Atomicity of data, 53, 56–57
- Audit trails, 272
- Audits, postimplementation, 435–437
- Austin, R., 366, 367, 368, 369
- Authentication: entity, 261, 269–272; of patient medical records, 74, 80–81
- Authority: clarified by governance mechanisms, 363–364; deemed, 64, 65, 74
- Authorization forms: overview of, 85–88; in patient medical records, 10–11, 14; vs. consent forms, 87–88
- Automated medical records, 113
- Automatic log-off, 260, 269
- ## B
- Baggage, organizational: created by competition, 357–359; as reason for IT initiative failure, 409
- Baker, L., 104
- Balanced scorecards, 32
- Balas, D., 119
- Bandwidth, 206, 208–209
- Bar coding, 108, 219–220, 348–349
- Barcode-enabled point of care (BPOC) medication administration systems, 131–132, 220
- Barlas, S., 132
- Barlow, S., 120
- Bates, D., 119, 120, 124, 126, 129, 131, 143, 420
- Bazzoli, E., 233
- Bearden, A., 121
- Beath, C., 354, 377, 422
- Belcher, J., 131
- Benchmarking, 31–32, 438
- Bensaou, M., 339
- Bentley, L., 92, 173
- Berg, M., 168
- Berkman, E., 346
- Berman, J., 119
- Bertram, D., 112
- Best-of-breed architecture, 228, 230–231
- Billing: as focus of early health care information systems, 93, 95; as purpose for patient medical records, 8; standard forms for, 17, 18–19, 20. *See also* Reimbursement
- Biometric identification systems, 271
- Bird, J., 119
- Bits per second (bps), 209
- Bleich, H., 120
- Bluetooth, 204
- Blumenthal, D., 119, 143
- Board of directors, IT responsibilities of, 370–371
- Bond, C., 131
- Books, health care industry, 457
- Boren, S., 119
- Brailer, D., 118, 125
- Bresnahan, J., 445
- Briceland, L., 131
- Bridges, network, 209
- Briney, A., 153, 252, 254, 270, 271
- Broadbent, M., 339, 377, 379, 444
- Brown, C., 373
- Brown, G., 119
- Brown, J., 446
- Brown, N., 132, 133, 142
- Budgets. *See* IT budgets
- Bundorf, M. K., 104
- Burke, J., 119
- Burnum, J., 112
- Bus typology, 205–206
- Bush, G. W., 248
- Business owners, project management, 398
- Business sponsors, project management, 397–398, 399
- ## C
- California HealthCare Foundation, 81, 134, 180
- Capital budgets, 384
- Capitated reimbursement, 100
- Carr, N., 446
- Carriers, telecommunications, 208
- Cash, J., 355, 408, 411
- Cathode ray tube (CRT) technology, 221
- Catizone, C., 131
- Cecil, J., 352
- Census statistics, 29
- Center for Healthcare Information Management (CHIM), 459
- Centers for Medicare and Medicaid Services (CMS), 85, 88, 256; aggregate data from, 17, 38, 39; CMS-1500 form of, 17, 20; deemed authority given by, 64, 65, 74
- Certification, Medicare and Medicaid, 62, 64
- Champy, J., 173
- Change. *See* Organizational change
- Chief executive officers (CEOs), 287, 382–383

- Chief financial officers (CFOs),
CIOs reporting to, 287
- Chief information officers (CIOs):
CTO duties handled by, 287;
and IT departmental organization,
299–300; and IT effectiveness,
376, 378, 379, 380, 381;
job description for, 290–291; re-
sponsibilities of, 285–287, 288;
strategic discussion role of, 331,
332, 333, 336; telecommunica-
tions function managed by, 284
- Chief medical informatics officers
(CMIOs), 151, 287–288,
292–294
- Chief operating officers
(COOs), 287
- Chief security officers (CSOs), 258,
263–264, 287, 288
- Chief technology officers (CTOs),
287, 288
- Chin, H., 121
- Chin, T., 128
- Christensen, C., 353, 358
- Cimino, J., 234, 242
- Ciphertext, 273
- Classen, D., 119
- Client/server systems, 210
- Clinical Context Management
(CCM) standards, 241
- Clinical data repositories, 198
- Clinical information systems: barriers
to adoption of, 141–144;
common types of, 94–95, 111;
critical success factors in imple-
menting, 415; defined, 92–93;
EMR as “hub” of, 137, 140. *See also*
System acquisition; System
implementation
- Clinical research and outcomes
analysis, and poor-quality docu-
mentation, 47
- Clinton, B., 103
- CMS-1450. *See* UB-92
- CMS-1500, 17, 20
- Coaxial cable, 208
- Coding: as basis for DRG determi-
nation, 23; standards for, 25;
systems for, 21, 23–25, 26
- College of Healthcare Information
Management Executives
(CHIME), 240, 243, 285–286,
459
- Collins, J., 354–355, 447
- Commission on Accreditation of
Rehabilitation Facilities
(CARF), 74
- Committee on Workforce Needs in
Information Technology, 296
- Committee to Study the Impact of
Information Technology on the
Performance of Service Activi-
ties, 422, 444
- Common Criteria, 264–265
- Communication: data, 200; and
failure of IT initiatives, 410;
network, devices and protocols
for, 201–204, 209; of progress
in IT initiatives, 176–177,
412–413; as purpose for patient
medical records, 8; in system ac-
quisition process, 163; in system
implementation, 176–177; of
value of IT investments, 438.
See also Electronic mail (e-mail)
- Compact disks (CDs), 222
- Comparative data and information,
31–40
- Competition, IT strategies based on
views about, 323–325
- Competitive advantage, IT-enabled,
342–359; baggage created by
pursuit of, 357–359; continuous
and multiple initiatives for,
356–357, 358; examples of
companies with, 343–346; fac-
tors limiting, 354–356; sources
of advantage with, 346–351;
sustaining, 351–354, 377–378
- Competitive forces model, 324
- Comprehensiveness of data, 51, 55
- Computer networks. *See* Networks
- Computer Sciences Corporation,
339
- Computer-based patient records
(CPRs): IOM definition of,
102–103, 112; rate of adoption
of, 103. *See also* Electronic med-
ical record (EMR) systems
- Computer-Based Patient Records*
(Institute of Medicine),
102–103, 112
- Computer-Based Patient Records
Institute (CPRI), Nicholas E.
Davies Award, 121, 122, 123
- Computerized medical record sys-
tems, 113–114, 117. *See also*
Document imaging systems
- Computerized provider order entry
(CPOE) systems, 122, 124–130;
benefits of, 126–127; defined,
124–125; patient safety im-
proved by, 106, 124, 126, 420;
physician resistance to, 179–180;
problems in implementing,
127–130; rates of usage of,
125–126; sample screen from,
125; setting goal of implement-
ing, 170; training for, 175–176
- Computers: external storage
devices for, 221–222, 223;
input devices for, 218–220;
laptop computers, 223, 224;
mainframe, 95–96, 98; micro-
computers, 100–101, 104; mini-
computers, 96–97, 99; output
devices for, 221; personal digital
assistants (PDAs), 107, 225;
smart phones, 225; tablet
computers, 223, 224
- Conditions of Participation (CoPs), 64
- Confidentiality, 81–83; defined, 81;
of drug and alcohol treatment
records, 83; as factor in lag in
health care IT use, 108; federal
laws on, 82–85; recent breaches
of, 82
- Consensus-based standards, 234–235
- Consent forms: in patient medical
records, 10, 14; vs. authoriza-
tion forms, 87–88
- Consistency of data, 51, 55
- Consultants, IT services evaluation,
305
- Consultation notes/reports, 10
- Context-based access, 268
- Continuity of Care Record (CCR)
standard, 244–245
- Contracting: with application ser-
vice providers (ASPs), 158–159;
with system developers, 159
- ConWay Transportation Services,
Inc., 343–344
- Copeland, D., 356, 357, 378, 381
- Core processes, IT strategies based
on improvement of, 320–321,
322
- Coronel, C., 192
- Cost savings: with adoption of elec-
tronic transactions under
HIPAA, 103; with CPOE sys-
tems, 127; with electronic

- medical records (EMRs), 120;
 - IT investments for, 424
 - Cost-based reimbursement, 93
 - Cost-benefit analysis, system acquisition, 161–162
 - Costs, health care: for documentation, 47; methods of containing, 99–100
 - Court cases, poor-quality documentation's consequences for, 46
 - Covered entities (CEs): HIPAA Privacy Rule, 84, 256; HIPAA Security Rule, 257
 - Cox, D., 104
 - Cruz, G., 306, 450
 - Cryptography, 272
 - Currency of data, 52, 55
 - Current Procedural Terminology (CPT), 21, 25, 26
- D**
- Data: clean, 176, 198; as component of IT asset, 327; rapid and accurate provision of, 348–349; standards for interchange or integration of, 239–243. *See also* Health care data
 - Data communications, 200. *See also* Networks
 - Data conversion, system implementation, 176
 - Data definition language (DDL), 193–194
 - Data dictionaries, 198
 - Data encryption, 260, 261, 272–274, 276
 - Data manipulation language (DML), 194
 - Data manipulation layer, 194
 - Data marts, 200
 - Data mining, 200
 - Data modeling, relational, 194–197
 - Data warehouses, 198, 199–200
 - Database administrators, 289, 291
 - Database management systems: object-oriented (OODBMSs), 197; object-relational (ORDBMSs), 197; relational (RDBMSs), 193–194
 - Databases, 192–200; clinical data repository, 198; data dictionaries for, 198; data mart, 200; data mining of, 200; data warehouse, 198, 199–200; information processing distribution schemes for, 210; object-oriented (OODBs), 192, 197; object-relational (ORDBs), 192; on-line transactional processing (OLTP), 198–199; relational (RDBs), 192–197
 - Davenport, T., 173
 - Davies Award, 121, 122, 123
 - Davis, G., 99
 - De facto standards, 234
 - DeBor, G., 420
 - Dechter, M., 121
 - Decision making: IT governance, archetypes of, 374; steps in process of, 215; support systems for, 215–218; and types of problems, 215
 - Decision-support systems (DSS), 216, 323
 - Deemed authority, 64, 65, 74
 - Definitions of data, 52, 55–56
 - DeKeizer, N., 57–58
 - DeLuca, J., 157, 301
 - Department of Defense, *Trusted Computer System Evaluation Criteria* (TCSEC), 264
 - Department of Health and Human Services (HHS), 103, 246, 247, 248; Office of Inspector General (OIG), 25
 - Department of Labor, Bureau of Labor Statistics, 289, 291
 - Designated standard maintenance organizations (DSMOs), 246
 - Destruction of patient medical records, 79–80
 - Deuser, J., 134
 - Diagnosis related groups (DRGs): ICD-9-CM coding as basis of, 23; Medicare reimbursement system based on, 99–100
 - Digital Imaging and Communications in Medicine (DICOM) standard, 234, 241–242
 - Digital video disks (DVDs), 222
 - Disaster notification systems, 421
 - Discharge statistics, 29
 - Discharge summaries, 11, 14
 - Disease and procedure indexes, 27, 28
 - Disease management programs, 102
 - Disk drives, 221
 - Dittman, K., 92, 173
 - Dittus, R., 119
 - Dobias, K., 104
 - Document imaging systems: advantages and disadvantages of, 220; computerized medical record systems as, 113–114, 117; financial analysis of, 428; IT value of, 421
 - Documentation. *See* Health care documentation
 - Dold, C., 102, 119
 - Domain Name System (DNS) servers, 212
 - Domain names, 213, 214
 - Donald, J., 120
 - Doorewaard, H., 168
 - Downes, L., 356
 - Dragoon, A., 433
 - Drazen, E., 362
 - Drug and alcohol treatment records, confidentiality of, 83
 - Duxbury, B., 119
 - Dvorak, R., 381–382
 - Dykstra, R., 169
- E**
- e-mail. *See* Electronic mail (e-mail)
 - e-procurement systems, 421
 - Earl, M., 286, 339, 340, 382
 - Effectiveness. *See* IT effectiveness
 - Efficiency, electronic medical records (EMRs), 120
 - eHealth Initiative, 243, 248
 - EHR Collaborative, 243
 - Electronic data interchange (EDI), 210, 420
 - Electronic health records (EHRs), 116, 117; Continuity of Care Record (CCR) standard, 244–245; EHR Functional Model and Standard, 241, 243–244. *See also* Electronic medical record (EMR) systems
 - Electronic mail (e-mail), 104; advantages of using, 135; current use for physician-patient communication, 135; policies and guidelines on, 136–137, 138–139; problems in using, 136; protocols for, 214
 - Electronic medical record (EMR) systems, 112–121; barriers to

- Electronic medical record (EMR) systems (*continued*)
 adopting, 141–144; benefits of, 119–121; and computer-based patient records (CPRs), 102–103, 112; Davies Award for implementing, 121, 122, 123; EMRs defined, 112, 114–116, 117; example of acquisition of, 148–150; as “hub” of clinical information systems, 137, 140; and levels of computerization of patient health information, 112–117; rates of usage of, 103, 118; reasons for adoption of, 118–119; sample screens from, 11, 115; setting goal of implementing, 170–171; value of, 420. *See also* Electronic health records (EHRs); Patient medical records
- Electronic medical records (EMRs). *See* Electronic medical record (EMR) systems
- Electronic patient records, 116
- Electronic signatures, 80–81
- Encoders, 25
- Encryption, 260, 261, 272–274, 276
- Encryption algorithm, 273
- Eng, J., 272
- Enmark, R., 157, 301
- Enterprise Rent-a-Car, 345–346
- Entity authentication: automatic log-off for, 260, 269; common methods for, 269–272; defined, 269; HIPAA Security Rule standard on, 261; unique identifiers for, 260, 269
- Entity relationship diagrams (ERDs), 194–197
- ePHI, 256
- Etheridge, Y., 274
- Ethernet, 204, 205, 207
- Evaluation: of effectiveness of IT services, 305–312; of governance, 306; of system acquisition, 306; of system implementation, 307; of system security, 259, 264–265; of vendor proposals, 159–161, 442
- Evans, J., 120
- Evans, R., 119, 124
- Executive information systems (EISs), 216
- Expert systems, 217
- Extensible markup language (XML): and current standards, 240, 242, 244; defined, 212, 213; as messaging standard of future, 233, 234
- External storage devices, 221–222, 223
- Extranets, 215
- F**
- Face sheets, 9
- Failure: to deliver returns on IT investments, 438–443, 444; of IT initiatives, 407–414
- Fairchild, D., 120
- Fee-for-service reimbursement, 100
- Feeney, D., 286, 382
- Feld, C., 368
- Fiber-optic cable, 208
- File server systems, 210
- File Transfer Protocol (FTP), 214
- Financial analyses, IT project proposals, 426–427, 428
- Financial barriers, adoption of clinical information systems, 141–143
- Firewalls, 274–275
- First Consulting Group, 124, 125, 180
- Fiskio, J., 120
- Flash memory, 222, 223
- Fluke Networks, 276
- Fordham, D., 119
- Fortin, J., 175, 180
- Fournier, L., 126, 169
- Fourth generation languages (4GLs), 190
- Freedman, D., 355
- Freedom of Information Act (FOIA), 83
- Frelinger, D., 235
- Fundamental change, 393
- Fuzzy logic, 218
- G**
- Gadd, C., 121
- Gandhi, T., 119
- Gantt charts, 163, 164
- Garb, C., 119
- Gardner, R., 120
- Garr, D., 119
- Garrett, L., Jr., 120
- Gateways, network, 209
- Gawande, A., 119, 120, 124
- Given, R., 135
- Glaser, J., 227, 308–309, 420, 433
- Goals: of IT investment, 441–442; of system acquisition, 151–152, 153; of system implementation, 170–171
- Goldsmith, J., 103, 104
- Goldstein, M., 352
- Goodhue, D., 354, 377
- Gopalakrishna, R., 272
- Gorman, P., 126
- Governance. *See* IT governance
- Governing concepts, 328–330
- Government mandates: as reason for IT investments, 423–424; standards established by, 234
- Granularity of data, 53, 56–57
- Gue, D., 256, 257
- H**
- Haddad, S., 121
- Hagel, J., 446
- Hammer, M., 173
- Hammond, W., 120, 234, 242
- Hankin, R., 220
- Harrah’s Entertainment, 344–345
- Hatoum, H., 131
- Hayashi, A., 120
- Health care: costs of, 47, 99–100; reasons for lag in IT use by, 108–109
- Health care data: characteristics of, for quality management, 50–57; errors in, 57–58, 59; needed to process reimbursement claims, 16–17, 18–19, 20; vs. health care information, 44–45. *See also* Data
- Health care data quality, 43–60; activities for improving, 59; AHIMA model of, 49–57; consequences of poor, 45–47; data errors and, 57–58; example of importance of, 60; MRI principles for ensuring, 48
- Health care documentation: consequences of poor-quality, 45–47; costs of, 47; legal status of, 8; MRI principles of, 48; parts of, 47. *See also* Patient medical records

- Health care information: complexity of, 108; defined, 4–5; types of, 5–7; vs. health care data, 44–45
- Health care information systems (HCISs): categories of, 92–93, 94–95; defined, 92; history and evolution of, 93, 95–108. *See also* Clinical information systems; System acquisition; System implementation
- Health care information systems standards. *See* Standards
- Health care IT industry, 449–460; major vendors in, 454–455; market structure of, 452–453; professional associations in, 457–460; publications on, 455–457; research firms in, 457; size of, 450–452
- Health care knowledge, defined, 44, 45
- Health care organizations, defined, 92
- Health care statistics, 29
- Health Industry Bar Code (HIBC) standard, 220
- Health Industry Business Communications Council (HIBCC), 220
- Health information. *See* Health care information
- Health Insurance Portability and Accountability Act (HIPAA): health information definition of, 4; and history of health care information systems, 103–104; impact on health care information standards, 234, 246–247; overview of, 83–84; Privacy Rule, 82–83, 84–85; Security Rule, 256–261
- Health Level Seven (HL7) standards, 235, 240–241; EHR Functional Model and Standard, 241, 243–244
- Health Plan Employer Data and Information Set (HEDIS): overview of, 32–35; report cards using data from, 35–37
- Health Privacy Project, 81, 82
- Health records. *See* Patient medical records
- Healthcare Common Procedural Coding System (HCPCS), 25, 26
- Healthcare Information and Management Systems Society (HIMSS), 126, 153, 304; Bar Coding Task Force, 131, 132; Davies Award, 121, 122, 123; and health record content standards, 243, 244; overview of, 459
- HealthGrades, 40
- Heda, S., 99
- HEDIS. *See* Health Plan Employer Data and Information Set (HEDIS)
- Henderson, J., 315
- Hershey, C., 112
- Herzlinger, R., 342
- HHS. *See* Department of Health and Human Services (HHS)
- Hill-Burton Act, 93
- Hillman, J., 135
- HIPAA. *See* Health Insurance Portability and Accountability Act (HIPAA)
- History and physical, 9, 14
- Holen, E., 381–382
- Honour, M., 143
- Horsky, J., 120
- Hospital Corporation of America (HCA), 109
- Hospital Survey and Construction Act, 93
- Hospitals: deaths due to medical errors made in, 122, 124; evolution of Medicare reimbursement to, 93, 99–100; JCAHO-accredited, and federal accreditation standards, 64; patient medical records generated from admissions to, 12–14; scope of episode of care with stay in, 16
- Hubs, network, 206, 209
- Hudd, S., 121
- Hughes, G., 277
- Hui, S., 120
- Hulkower, S., 119
- Hutchinson, R., 131
- Hypertext markup language (HTML), 212, 213
- Hypertext Transfer Protocol (HTTP), 212, 213, 214
- I**
- IBM Token Ring, 205
- ICD-9-CM, 21, 23–25
- ICD-10-CM, 25
- Identification sheets, 9, 12
- IEEE 802.11 standards, 204, 276
- Imaging reports, 10
- Implementation. *See* System implementation
- Implementation team, system implementation, 168–169
- Incentives, and organizational change management, 395–396
- Incremental change, 392, 393–394
- Inertia, and IT initiative failure, 409
- Informatics officers, 151
- Information. *See* Health care information
- Information capture, 47
- Information management, JCAHO standards on, 67, 68
- Information systems (ISs): administrative, 92, 94–95; defined, 92; executive (EISs), 216; terminology, 92. *See also* Clinical information systems; Health care information systems (HCISs)
- Information systems architecture, 226–231; approaches to, 227–228; defined, 226–227; examples of, 228–229; terminology, 227; value of focus on, 229–231
- Information technology (IT): as commodity, 446–447; defined, 92; great companies' orientation to, 354–355; and history of health care information systems, 95–98, 99, 100–101, 104, 105, 107–108; infrastructure of, for system implementation, 182; maturity of, and failure of IT initiatives, 413–414; new, IT strategies based on role of, 321–322; reasons for health care's lag in use of, 108–109; reviewing new, 332–333, 335; standards for, 233–234, 235, 264–265; as tool, 354–356, 445. *See also* entries beginning with "IT"
- Infrastructure: information systems architecture, 227; IT, for system implementation, 182; as IT asset component, 327; IT investments for, 423; local healthcare information infrastructures (LHISs), 248; National Healthcare Information Infrastructure (NHII),

- Infrastructure (*continued*)
 247–248; Public Key Infrastructure (PKI), 272–274
- Input devices, 218–220
- Institute of Medicine (IOM): Committee on Data Standards for Patient Safety, 105–106, 114; *Computer-Based Patient Records*, 102–103, 112; and EHR Functional Model, 243; *Patient Safety*, 105–106; *To Err Is Human*, 105, 106, 122, 124
- Integrated delivery system (IDS): competitive advantage gained with, 352, 353; IT departmental organization with, 298–299; IT governance to support, 364–365
- Integrated services digital network (ISDN) services, 208
- Integration: application, by information system architecture, 228; data, standards for, 239–243; and lag in IT use in health care, 106–107, 108–109
- Interface engines, 191–192, 193
- Internal rate of return (IRR), 426–427, 428
- International Classification of Diseases: ICD-9-CM, 21, 23–25; ICD-10-CD, 25
- International Organization for Standardization (ISO), 235, 236, 264
- Internet: health care organizations' use of, 210–211, 213–214; and history of health care information systems, 104–105; overview of, 211–214. *See also* Electronic mail (e-mail)
- Internet Message Access Protocol (IMAP), 214
- Internet model, 201, 203
- Internet Protocols (IPs), 212, 214
- Internet telephoning, 214
- Intranets, 214–215
- IT. *See* Information technology (IT)
- IT asset: components of, 326–328; as critical for IT effectiveness, 381; defined, 318, 325–326; leveraging, for competitive advantage, 353–354
- IT budgets, 383–388; categories in, 384–386; development of, 386–388; evaluating, 306; in project charters, 468; strategies for reducing, 429–430
- IT committees, 370–371, 437
- IT departments, 282–304; attributes of, 303–304; centralization vs. decentralization of, 300–301; core competencies of, 301–303; core functions of, 283–285; organizational structure of, 297–300; responsibilities of, 282–283, 366–367. *See also* IT services; IT staff
- IT effectiveness: evaluating, 305–312; organizations with high level of, 375–382; senior leader's contribution to, 382–383; studies of, and return on IT investments, 443
- IT governance, 362–374; archetypes of, 374; characteristics of well-developed, 363–364; as component of IT asset, 328; defined, 362–363; evaluating effectiveness of, 306; IT department responsibilities for, 366–367; organization strategies linked to, 364–366; senior management's responsibility for, 368–370; structures for, 370–374, 437; users' responsibilities for, 367
- IT investments: diverse IT value of, 420–425; factors increasing value from, 379; increased accountability for results of, 435, 436; management actions to improve value from, 433–438; reasons for failure to deliver returns on, 438–443, 444; relationship between organizational performance and, 444–445; types of, 422. *See also* IT projects
- IT liaisons, 331–332, 372–373
- IT managers, project management responsibilities of, 399
- IT planning: application agenda resulting from, 316; objectives of, 314–315; in organizations with IT excellence, 340–341. *See also* IT strategy and alignment; Project plans
- IT projects: factors contributing to failure of, 407–414; sustained incremental vs. “big bang,” 356–357, 358, 446–447. *See also* IT investments; *entries beginning with “project”*
- IT services: evaluating effectiveness of, 305–312; in-house vs. outsourced, 304–305; and IT department organizational structure, 297–300
- IT staff: attributes of, 295–296; as component of IT asset, 327–328; and IT department organizational structure, 297–300; leadership roles/positions on, 285–288, 290–291, 292–294; as liaisons for strategic discussions, 331–332; recruitment and retention of, 296–297; responsible for technical support, 181–182; roles vs. functions of, 295; technical roles/positions on, 288–289, 291, 294–295. *See also* IT departments
- IT steering committees, 372
- IT strategy and alignment: areas requiring, 318; challenges of creating, 339–342; formulation of, 317; and governing concepts, 328–330; implementation of, 317; linked to organization strategy, 320, 439–440; normative approach to developing, 330–338; vectors for arriving at, 318–325
- IT value, 418–447; diversity of, 420–425; factors increasing, from IT investments, 379; failure of IT investments to return, 438–443, 444; management actions to improve realization of, 433–438; and project proposals, 425–433; significance of, 420; studies of, 444–447; tangible and intangible, 419–420
- IT-enabled competitive advantage. *See* Competitive advantage, IT-enabled

J

- Jaggi, T., 143
 Jenkins, C., 119
 Jenkins, M., 131
 Jenkins, R., 119
 Johns, M., 44

Johnson, J., 120
 Johnson, L. B., 93
 Johnston, B., 134
 Johnston, D., 126, 127
 Joint Commission on Accreditation of Healthcare Organizations (JCAHO): accreditation by, 64, 65–66; authentication definition of, 80; formation of, 65; health care information categories of, 4–5; information management standards, 67, 68; knowledge-based information definition of, 40; ORYX initiative, 37–38; standards for content and maintenance of patient records, 67, 69–72
 Just-in-time training, 175–176

K

Kaiser Permanente, 134; Institute for Health Policy, 119
 Karson, A., 120
 Katz, S., 104
 Kaushal, R., 131, 143
 Keen, P., 347, 391, 394, 445
 Kelly, D., 32
 Kelly, P., 158, 159
 Kennedy, O., 99
 Keys, encryption systems, 273
 Kilbridge, P., 299
 Kittleson, B., 454
 Knowledge-based information, 40–41
 Kuperman, G., 119, 120, 129
 Kurtz, M., 240

L

Laboratory reports, 10
 Lake, K., 357
 Landis, S., 119
 Langberg, M. L., 128, 129
 Languages: markup, 212, 213; programming, 190–191, 194. *See also specific languages*
 Laptop computers, 223, 224
 LaTour, K., 19, 21
 Lavelle, M., 126
 Leadership: actions, to improve IT value realization, 433–438; contribution to IT effectiveness, 382–383; IT governance

responsibilities of, 368–370, 371–372; for managing organizational change, 394; support from, and failure of IT initiatives, 408–409. *See also specific leadership positions*
 Leapfrog Group, 40, 106, 124, 125
 Lee, F. W., 44, 120, 169, 197, 252, 262, 265, 267, 270
 Legal documentation, patient medical records as, 8
 Legal health record (LHR), AHIMA guidelines on, 75–79
 Legler, J., 121
 Legrow, G., 158, 159
 Leitman, R., 135
 Lesar, T., 131
 Levinson, M., 345
 Levit, K., 120
 Libicki, M., 235
 Licensure of facilities, 62, 63
 Linux, 191, 235
 Lipton, M., 342
 Liquid crystal display (LCD) technology, 221
 Litzelman, D., 119
 Local area networks (LANs), 101, 205
 Local healthcare information infrastructures (LHIIIs), 248
 Logical Observation Identifiers Names and Codes (LOINC), 238
 Low, D., 131
 Lyman, J., 126

M

MacDonald, K., 104, 134, 135, 136
 Machine languages, 190
 Mainframe computers, 95–96, 98
 Maintenance: following system implementation, 183; Web-site, 294–295, 304
 Managed care organizations (MCOs), NCQA accreditation of, 72, 73
 Management, of organizational change, 391–396. *See also Leadership*; Project management
 Mandates. *See* Government mandates
 Mark, D., 381–382
 Markup languages, 212
 Marotta, D., 240, 241
 Marshall, P., 121

Martin, D., 120
 Mason, R., 356, 357, 378, 381
 Massaro, T. A., 127
 May, S., 120
 McAfee, A., 415–416
 McAloon, M., 112
 McDonald, C., 119, 120
 McDowell, S., 147
 McFarlan, W., 355, 366, 367, 368, 369, 408, 411
 McKenney, J., 355, 356, 357, 378, 381, 408, 411
 McPhee, S., 119
 Media, network, 206, 208
 Media controls, 260, 265
 Medicaid: certification for, 62, 64; and history of health care information systems, 93, 95, 96, 97, 98, 100, 105; telemedicine reimbursement by, 142
 Medical errors: information management practices contributing to, 47, 106; IOM report on, 105, 106, 122, 124; reduced with computerized order entry system, 420; reduced with information technology use, 119–120. *See also Patient safety*
 Medical records: automated, 113. *See also Electronic medical record (EMR) systems*; Patient medical records
 Medical Records Institute (MRI): on factors influencing EMR adoption, 118; on health care documentation, 47, 48; on levels of computerization of health information, 112–117, 244
 Medicare: certification for, 62, 64; cost reports, 29, 30; evolution of reimbursement systems of, 93, 99–100, 101–102; and history of health care information systems, 93, 95, 96, 97, 98, 99–100, 101; telemedicine reimbursement by, 142
 Medication administration systems, overview of, 131–132
 Medication errors: defined, 124; medication administration systems to reduce, 131–132; reduced with computerized provider order entry (CPOE) systems, 126

Medication records, 9
 Meehan, W., III, 381–382
 Memorial Sloan-Kettering Cancer Center, 120
 Mendelson, D., 141
 Merchia, P., 119
 Metzger, J., 125, 175, 180
 Michelson, J., 147
 Microcomputers, 100–101, 104
 Microwave transmission, 208
 Middleton, B., 126
 Middleware, 192
 Miller, E., 126
 Miller, M., 119, 120
 Miller, R., 135, 169
 Minicomputers, 96–97, 99
 Minimum Data Set (MDS), 19, 21
 Mon, D., 243
 Monitors, computer, 221
 Monolithic architecture, 228, 231
 Moyer, C., 104
 Mui, C., 356
 myPHR, 8

N

National Alliance for Health Information Technology (NAHIT), 233, 243
 National Center for Health Statistics, UHDDS developed by, 19
 National Center for Healthcare Statistics, ICD-9-CM (International Classification of Diseases) published by, 21, 23–25
 National Committee for Quality Assurance (NCQA): accreditation by, 72–73; health plan report cards from, 35–37, 73; HEDIS developed by, 32–35; mission and vision of, 72; report cards on health plans approved by, 35–37
 National Committee on Vital and Health Statistics (NCVHS): ACDS approved by, 21; and National Healthcare Information Infrastructure (NHII), 247, 248; recommendations on standards for patient medical record information (PMRI), 237–238, 239
 National Council for Prescription Drug Programs (NCPDP), 242

National Electrical Manufacturers Association (NEMA), 241, 242
 National Healthcare Information Infrastructure (NHII), 247–248
 National Library of Medicine (NLM), Unified Medical Language System (UMLS), 238–239
 National Uniform Billing Committee (NUBC), 17
 National Uniform Claim Committee (NUCC), 17
 Natural language processing (NLP) programs, 217
 Net present value (NPV), 426, 428
 Network administrators, 291, 294
 Network interface cards (NICs), 205
 Network operating systems (NOSs), 204
 Networks, 200–209; communication devices in, 209; communication protocols for, 201–204; information processing distribution schemes for, 210; LAN vs. WAN, 205; media and bandwidth of, 206, 208–209; neural, 218; typologies of, 205–206, 207
 Neural networks, 218
 New projects, IT budget, 384
 Newman, J., 169
 North American Industry Classification System (NAICS), 452–453
 Notebook computers, 223, 224
 Nursing informatics officers, 151

O

Oates, R., 121
 Object-oriented database management systems (OODBMSs), 197
 Object-oriented databases (OODBs), 192, 197
 Object-oriented programming, 190–191
 Object-relational database management systems (ORDBMSs), 197
 Object-relational databases (ORDBs), 192
 Office of the National Coordinator for Health Information Technology, 248
 On-line transactional processing (OLTP) databases, 198–199
 Ongoing projects, IT budget, 384

Open Database Connectivity (ODBC) standard, 194
 Open Standards Interconnection (OSI) model, 201, 202–203
 Operating budgets, 306, 384
 Operating systems, 191, 234, 235; network (NOSs), 204
 Operative reports, 11
 Optical bar-code recognition devices, 219–220
 Optical disk technology, 222
 Optical tape, 222
 Orange Book (Department of Defense), 264
 Organizational change: strategies for managing, 393–396; types of, 391–393
 Organizational form or characteristics, competitive advantage from changing, 350–351
 Organizational performance, relationship between IT investments and, 444–445
 Organizational processes, leveraging, 346–348
 Organizational strategy: formulation of, 316–317; implementation of, 317–318; IT governance linked to, 364–366; IT investment for initiatives related to, 424–425; IT strategies linked to, 320, 439–440. *See also* IT strategy and alignment
 Ornstein, S., 119, 120, 169
 ORYX, 37–38
 Osborn, E., 119
 Outcomes: CPOE systems as improving, 127; electronic medical records (EMRs) as improving, 119–120; failure to manage, 442, 443
 Outcomes measures, 31–32
 Output devices, 221
 Overhage, J., 119, 120
 Oz, E., 191, 209, 211, 212, 213, 214, 215, 216, 218, 219, 220, 221, 222, 223, 225, 264, 270, 272, 274, 275, 300, 301

P

Packet filter firewalls, 275
 Palmetto Physicians Primary Care, 154–155

- Pan, E., 126
- Partners HealthCare, 296–297, 302–303
- Passino, J., 407
- Password systems, 270–271
- Pastore, R., 344
- Pathology reports, 11
- Patient care: continuity of, and
poor-quality documentation, 47;
as purpose of patient medical
records, 7
- Patient encounters: form for, show-
ing HCPCS/CPT codes for, 26;
for hospital admission, 12–14;
for office visit to physician,
15–16; types of data and infor-
mation from, 6
- Patient medical record information
(PMRI), standards for terminol-
ogy in, 237–239
- Patient medical records: authentica-
tion of, 74, 80–81; consequences
of poor-quality documentation
in, 45–47; content of, 8–12;
JCAHO standards for content
and maintenance of, 67, 69–72;
as legal documents, 75–79; pri-
vacy and confidentiality of,
81–85; problems with paper-
based, 112; purpose of, 7–8; re-
tention and destruction of,
79–80; from typical hospital ad-
missions, 12–14; from typical
physician's office visits, 15. *See also* Electronic medical record
(EMR) systems
- Patient safety: computerized
provider order entry (CPOE)
system as improving, 106, 124,
126, 420; electronic medical
records (EMRs) as improving,
119–120; Institute of Medicine
report on, 105–106; and poor-
quality documentation, 47, 106.
See also Medical errors
- Patient Safety* (Institute of Medicine),
105–106
- Patient-specific data and informa-
tion: administrative, 16–21,
22–23; clinical, 7–16; combin-
ing clinical and administrative,
21, 23–26. *See also* Patient med-
ical records
- Penrod, L., 121
- Periodicals, health care industry,
455–456
- Personal digital assistants (PDAs),
107, 225
- Pestonik, S., 119
- Physical. *See* History and physical
- Physical access controls, 259, 266
- Physical safeguards, 265–267; as-
signed security responsibility for,
265; HIPAA Security Rule stan-
dards on, 259–260; media con-
trols as, 260, 265; physical access
controls as, 259, 266; worksta-
tion security as, 260, 266–267
- Physicians: adoption of clinical in-
formation systems resisted by,
143–144; CPOE systems re-
sisted by, 179–180; evolution of
methods of reimbursing, 100,
101–102; patient medical
records generated from office
visits to, 15
- Physician's orders, 10, 14
- Piccione, R., 154–155
- Picture archival and communica-
tion systems (PACS), 421
- Pierson, S., 119
- PIN systems, 270–271
- Pineault, R., 121
- Plaintext, 273
- Planning, for managing change, 396.
See also IT planning; IT strategy and
alignment
- Platforms, information systems ar-
chitecture, 227
- Plug-ins, 212
- Poon, E., 143
- Porter, M., 324, 343
- Post Office Protocol 3 (POP3), 214
- Potvin, L., 121
- Precision of data, 53, 57
- Pretty Good Privacy (PGP), 273, 274
- Printers, computer, 221
- Privacy, 81–83; defined, 81; federal
laws on, 82–85; recent viola-
tions of, 82; and security, 251
- Privacy Act of 1974, 83
- Privacy Rule, HIPAA, 82–83, 84–85
- Problem lists, 9
- Problems, types of, 215
- Procedural programming lan-
guages, 190
- Productivity, and electronic medical
records (EMRs), 120
- Products: differentiation of, compet-
itive advantage gained with,
349–350; focus on inappropri-
ate aspects of, 442; new, IT in-
vestments for development of,
424
- Professional associations, 457–460
- Programmers, 289
- Programming languages, 190–191,
194
- Progress notes, 10, 14
- Project charters, 401, 461–472
- Project complexity, and failure of
IT initiatives, 410–411
- Project management, 396–407;
committees for, 399–400; man-
gled, and return on IT invest-
ments, 443; objectives of,
396–397; and project charter,
401, 461–472; and project plan,
402–405; and project status re-
port, 405–407; roles important
for, 397–399
- Project manager, responsibilities of,
398–399
- Project plans: and project manage-
ment, 402–405; for system im-
plementation, 171–177
- Project proposals: common prob-
lems in reviewing, 431–433; di-
versity of IT value from,
420–425; required for all IT
projects, 434; scoring, 336, 337,
427, 429; value portion of,
425–433. *See also* IT budgets
- Project repositories, system acquisi-
tion, 162–163
- Project review committee, 400
- Project status reports, 405–407
- Project steering committee: for proj-
ect management, 399–400; for
system acquisition, 150–151
- Project teams, 400
- Proposals, vendor, 159–161, 442.
See also Project proposals
- Protected health information (PHI),
4; ePHI, 256; under HIPAA,
84–85, 256
- Protocols: Hypertext Transfer Pro-
tocol (HTTP), 212, 213, 214;
Internet, 212, 214; network
communication, 201–204; vs.
standards, 201
- Proxy server firewalls, 275

Public Key Infrastructure (PKI), 272–274
 Public safety, and poor-quality documentation, 47
 Purohit, A., 131
 Purpose, clarity of, and IT initiative failure, 408

Q

Quality. *See* Health care data quality
 Quality Compass, 35, 72
 Quality improvement, IT investments for, 424
 Quality of care: improved with electronic medical records (EMRs), 119–120; monitored with patient medical records, 8
 Quinsley, C. A., 256

R

Radical change, 393
 Random data errors, 57, 58
 Raymond, B., 102, 119
 Recruitment and retention, IT staff, 296–297
 Redundant array of independent disks (RAID), 221–222
 Reengineering process, 173
 Registers, specialized, 27–28
 Reimbursement: as barrier to adopting clinical information systems, 141–143; capitated, 100; cost-based, 93; DRG-based system for, 99–100; fee-for-service, 100; forms for processing claims for, 16–17, 18–19, 20; resource-based relative values scale (RBRVS), 101–102; for telemedicine, 105, 134, 142–143. *See also* Billing
 Relational database management systems (RDBMSs), 193–194
 Relational databases (RDBs), 192–197; database management systems for, 193–194; and relational data modeling, 194–197
 Release of information, 85–88
 Relevance of data, 53, 57
 Remondin, M., 121
 Renner, K., 120
 Repeaters, 209

Report cards: from HealthGrades, 40; on NCQA-approved health plans, 35–37, 73
 Report generation, 47
 Request for information (RFI), system acquisition, 156–157
 Request for proposal (RFP), system acquisition, 154, 155–156, 157, 159–160, 161, 165
 Required specifications, HIPAA Security Rule, 257
 Research, as purpose for patient medical records, 8
 Research firms, health care IT industry, 457
 Resistance, user, to system implementation, 143–144, 179–181
 Resource-based relative value scale (RBRVS) reimbursement, 101–102
 Resources: allocating, in system implementation, 181–182; limited, and failure of IT initiatives, 411–412
 Retention: of IT staff, 296–297; of patient medical records, 79–80
 Return on investment (ROI), 424, 440–441
 Reward system, and failure of IT initiatives, 410
 Reynolds, G., 197, 200, 201, 204, 209, 211, 212, 213, 215, 217, 219, 222
 Ridsdale, L., 121
 Ring typology, 205, 206
 Risk analysis, 258, 262–263
 Risk management, 258, 263
 Rob, P., 192
 Roberge, D., 121
 Rodnick, J., 119
 Role-based access control (RBAC), 268
 Ross, J., 354, 363, 374, 377, 422
 Routers, network, 209
 Rust, P., 119
 RxNorm, 239
 Rybak, M., 119

S

Safran, C., 120
 Sambamurthy, V., 309, 312, 373, 375

Satisfaction: with CPOE systems, 127; improved with electronic medical records (EMRs), 120–121
 Scheffer, G., 57–58
 Schmitz, J., 119
 Schneider, J., 235
 Schott, S., 45, 46, 60
 Scoring, project proposals, 336, 337, 427, 429
 Scottsdale Institute, 459
 Second generation languages, 190
 Security, 250–277; administrative safeguards of, 257–259, 261–265; general aspects of, 251–252; physical safeguards of, 259–260, 265–267; standards for, 257–261, 264–265; technical safeguards of, 260–261, 267–276; threats to, 252–255; with wireless technologies, 276–277. *See also* Security Rule, HIPAA
 Security officers, 258, 263–264
 Security Rule, HIPAA: overview of, 256–257; standards of, 257–261
 Sentinel events, 66
 Service carriers, network, 208
 Services: competitive advantage with differentiation of, 349–350; improved with electronic medical records (EMRs), 120–121; new, IT investments for development of, 424
 Severance, D., 407
 Shakir, A., 56
 Shared computing systems, 96
 Short, J., 173
 Signatures, electronic, 80–81
 Sim, I., 169
 Simon, H., 215
 Simple Mail Transfer Protocol (SMTP), 214
 Singer, S., 104
 Sittig, D., 129
 Slack, W., 120
 Slomovic, A., 235
 Smart phones, 225
 Smith, H., 268
 SNOMED International, 237, 238
 Software: antivirus, 275–276; and interface engines, 191–192, 193; middleware, 192; programming

- languages used in, 190–191; system, 190–191; terminal emulation, 210; types of, 190
- Solomon, G., 121
- Source data input devices, 219–220
- Sousa, K., 134
- Speech output, 221
- Speech recognition, 220
- Spread spectrum radio transmission, 208
- Spurr, C., 119, 397
- Staff: saving fractions of effort by, 431; training, for system implementation, 174–176, 182–183. *See also* IT staff
- Stair, R., 197, 200, 201, 204, 209, 211, 212, 213, 215, 217, 219, 222
- Standards, 233–249; as barrier to adopting clinical information systems, 144; for coding, 25; for data interchange and integration, 239–243; development of, 234–236; for health record content, 243–245; in HIPAA Security Rule, 257–261; impact of HIPAA on, 234, 246–247; IT, 233–234, 235, 264–265; vs. protocols, 201; for wireless networks, 204, 276. *See also specific standards*
- Standards development organizations (SDOs), ANSI-accredited, 235, 236
- Star typology, 206, 207
- State laws, 74–75
- Stavri, P., 169
- Stead, W., 120, 129
- Steck, J., 120
- Stein, D., 131
- Step-shift change, 392–393, 394
- Stern, D., 104
- Stoddard, D., 368
- Store and forward technology, telemedicine programs, 133
- Straisor, D., 362
- Strassman, P., 444
- Strategic planning. *See* IT planning; IT strategy and alignment
- Strategic trajectories, IT strategies based on, 322–323
- Strategy. *See* IT strategy and alignment; Organizational strategy
- Structured query language (SQL), 190, 194, 233, 234
- Stuntz, L., 420
- Superior Consultant Company, 160
- Support: following system implementation, 183; as function of IT department, 283; for integrated delivery system (IDS), 364–365; in IT budget, 384; leadership, and failure of IT initiatives, 408–409
- Support systems, for decision making, 215–218, 323
- Switches, network, 209
- System acquisition, 146–166; common problems in, 164–165; communication in, 163; cost-benefit analysis in, 161–162; defined, 147; evaluating, 306; evaluating vendor proposals in, 159–161, 442; example of, 148–150; exploring contracting options in, 157–159; goals in, 151–152, 153; identifying system requirements in, 153–155; negotiating with vendors in, 162, 165; prerequisite for, 147; project management tools used in, 162–164; project steering committee for, 150–151; request for information (RFI) in, 156–157; request for proposal (RFP) in, 154, 155–156, 157, 159–160, 161, 165; researching products and vendors in, 152–153; steps in, 149; summary report and recommendations in, 162
- System analysts, 288–289
- System champion, system implementation, 169
- System implementation, 167–185; allocating resources for, 181–182; checklist for, 415–416; common problems in, 177–183; communicating progress in, 176–177; data conversion in, 176; defined, 168; evaluating, 307; go-live date in, 177; goals and expectations of, 170–171, 178–179; implementation team for, 168–169; installation of system components in, 174; managing organizational change accompanying, 391–396; project plan for, 171–177; recommendations for, 414–415; shortened cycle of deliverables in, 437; staff training in, 174–176, 182–183; system champion for, 169; user resistance in, 179–181; workflow analysis in, 172–174
- System maintenance and support, 183
- System software, 190–191
- Systematic data errors, 57, 58
- Systematized Nomenclature of Medicine—Clinical Terms (SNOMED CT), 237–238
- Systems programmers, 289

T

- T-1 lines, 208
- Tablet computers, 223, 224
- Tape drives, 221
- Targets, budget, 385
- Tate, K., 120
- Taylor, H., 135
- Technical safeguards, 267–276; access control as, 260, 267–269; audit trails as, 272; data encryption as, 260, 261, 272–274, 276; entity authentication as, 261, 269–272; firewalls as, 274–275; HIPAA Security Rule standards on, 260–261; virus checking as, 275–276
- Technology. *See* Information technology (IT)
- Teich, J., 119, 124, 129, 130
- Telecommunications carriers, 208
- Telecommunications specialists, 294
- Telehealth, 104, 132, 134–137. *See also* Electronic mail (e-mail)
- Telemedicine, 132–134; benefits of, 134; current programs for, 132–133; defined, 104–105, 132; methods of delivering, 133; reimbursement for, 105, 134, 142–143; vs. telehealth, 132
- Telephones: Internet telephoning, 214; smart phones, 225; telephone callback procedures, 271–272
- Telesurgery, 133

- Terasawa, E., 118, 125
 Terminal emulation software, 210
 Terminal-to-host distribution schemes, 210
 Terminology: information systems architecture, 227; information systems (ISs), 92; standards for patient medical record information (PMRI), 237–239
 Thin client schemes, 210
 Third generation languages, 190
 Thumb drives, 222, 223
 Tierney, W., 119, 120
 Timelines: in project charter, 469; for proposed projects, 336, 338
 Timeliness of data, 54, 57
To Err Is Human (Institute of Medicine), 105, 106
 Tokens, 272
 Toole, J., 415
 Top-level domains (TLDs), 213, 214
 Torvald, L., 191
 Touch screens, 218–219
 Trackballs, 218
 Trackpads, 218
 Training: health care information systems damaged by lack of, 253–254; just-in-time, 175–176; strategy for, in project charter, 471–472; for system implementation, 174–176, 182–183
 Transmission Control Protocol/Internet Protocol (TCP/IP), 201
 Trigger events, HL7-defined, 240
 Trojan horses, 252–253, 275
 Trust, and managing organizational change, 395
Trusted Computer System Evaluation Criteria (TCSEC, Department of Defense), 264
 Turisco, F., 125
 Turnkey systems, 99
 Twisted pair wire, 208
 Two-way interactive television (IATV) technology, telemedicine programs, 133
- U**
- UB-92, 17, 18–19
 Uncertainty, and failure of IT initiatives, 411
- Unified Medical Language System (UMLS), 238–239
 Uniform Ambulatory Care Data Set (ACDS), 19, 21
 Uniform data sets, 16–21, 22–23
 Uniform Hospital Discharge Data Set (UHDDS), 17, 19, 21, 22–23
 Uniform resource locators (URLs), 212, 213, 214
 Unique identifiers, 260, 269
 University HealthSystem Consortium, 459
 University of Kansas Medical Center, telemedicine program, 132–133
 University of Texas Medical Branch (UTMB), telemedicine program, 133
 User-based access, 268
 Users: governance responsibilities of, 367; resistant to system implementation, 143–144, 179–181
- V**
- Value. *See* IT value
 Van Hentenryck, K., 240
 Vectors: for arriving at IT strategy, 318–325; defined, 319
 Vendors: evaluating proposals of, 159–161, 442; major, in health care IT industry, 454–455; negotiating with, 162, 165; researching, 152–153
 Venkatraman, N., 315
 Viruses, computer, 252–253, 275–276
 Visionary applications, 375–376
 Visual integration architecture, 228, 231
 Visual programming, 190
 Voice over Internet Protocol (VoIP), 214
 Voice recognition, 107–108, 220
 Voluntary Hospitals of America, 459
- W**
- Waegemann, C., 112
 Wager, K., 120, 121, 144, 169
 Wagner, T. H., 104
 Wahl, R., 147
 Walker, J., 126
 Walsh, T., 262, 264, 270
 Wang, S., 120, 420
 Ward, D., 120, 169
 Weaver, L., 120
 Web browsers, 212
 Web developers, 295
 Web masters, 294–295
 Web-site development and maintenance, outsourcing, 304
 Webopedia, 205, 272
 Weil, S., 262
 Weill, P., 339, 363, 374, 377, 379, 444
 Weingarten, S., 119
 Whatis?com, 194, 201, 204, 208, 209, 211, 212, 213, 214, 270, 271, 274, 275
 Wheeler, L., 134
 White, A., 120, 169
 White, C., 201, 208, 270, 271, 273, 274, 275, 276
 Whitten, J., 92, 173
 Wi-Fi (802.11) standard, 204, 208
 Wide area networks (WANs), 205
 Wired Equivalent Privacy (WEP), 276
 Wireless technologies, 107, 276–277, 335
 Wise, P., 243
 Workflow analysis, system implementation plan, 172–174
 Workstation security, 260, 266–267
 World Health Organization, International Classification of Diseases, 21, 25
 World Wide Web (WWW), 212–213
 Worms, 252–253, 275
- X**
- X-ray reports, 10
- Y**
- Yarnall, K., 119
- Z**
- Zaran, F., 119
 Zhou, X., 119
 Zimmermann, P., 274
 Zmud, R., 375