Glossary

Chapter 1

- **Business analyst:** Individuals with expertise in business process redesign as well as technology. They help ensure that the business processes and software programs at the heart of an information system are jointly optimized and work smoothly together.
- **Chief information officer (CIO):** The individual in charge of the information systems function.
- **Data scientist:** The individual in charge of the analytics efforts who has an overview of the end-to-end process.
- **Digital entrepreneurship:** The creation of new economic activities embodied in or enabled by digital technologies.
- **Digital innovation:** The application of digital technologies by an existing organization to create new and improved products, processes, or services.
- **Digital transformation:** The application and exploitation of digital technology to radically rethink organizational business and operational models. Digital transformation is underpinned by the redesign of existing organizational information systems.
- **Digitization:** The process by which content and processes become expressed and performed in digital form.
- **End users:** Those individuals who have direct contact with software applications as they use them to carry out specific tasks.
- **IT professionals:** Those employees of the firm who have significant technical training and are primarily responsible for managing the firm's technology assets.
- **Manager:** A knowledge worker of modern business and not-for-profit organizations who is in charge of a team, a functional area (i.e., a functional manager), an entire organization, or a business unit (i.e., a general manager).
- **Supply chain:** The set of upstream firms that produces and sells the resources that an organization needs to perform its transformation process (e.g., raw materials, energy, equipment).
- **World Wide Web:** One of the most popular services available on the Internet. It consists of "pages" and other resources that can be easily created, published, and accessed by way of uniform resource locator (URL) addresses.

Chapter 2

- **Effectiveness:** The ability to achieve stated goals or objectives. Typically, a more effective firm is one that makes better decisions and is able to carry them out successfully.
- **Efficiency:** The ability to limit waste and maximize the ratio of the output produced to the inputs consumed. In other words, a firm is more efficient when it produces more with the same amount of resources, produces the same with fewer resources, or produces more with fewer resources.
- **External environment:** The world outside the firm that creates influences, such as regulation, the competitive landscape, and general business and social trends (e.g., outsourcing, customer self-service).
- **Firm culture:** The collection of beliefs, expectations, and values shared by the members of an organization.
- **Firm strategy:** The manner in which the organization intends to achieve its objectives.
- **Information system (IS):** A formal, sociotechnical, organizational system designed to collect, process, store, and distribute information.
- **Information technology (IT):** Hardware, software, and telecommunication equipment.

- **IT infrastructure:** The set of shared IT resources and services of the firm, forming a firm's technological backbone, that constrains and enables opportunities for future information systems implementations.
- **Organizational structure:** The organizational design, reporting, and relationships within the information system.
- **Process:** The series of steps necessary to complete an organizational activity.
- **Systemic effects:** The notion that the different components of a system are interdependent and that change in one component affects all other components of the system.

Chapter 3

- **Big Data:** The general term used to refer to the increasing volume, velocity, and variety of today's data, requiring organizations to use new technology and a new management paradigm.
- **Business integration:** The unification or creation of tight linkages among the diverse but connected business activities carried out by individuals, groups, and departments within an organization.
- **Business intelligence (BI):** The ability to gather and make sense of information about your business. It encompasses the set of techniques, processes, and technologies designed to enable managers to gain superior insight into and understanding of their business and thus make better decisions.
- **Business intelligence infrastructure:** The set of applications and technologies designed to create, manage, and analyze large repositories of data in an effort to extract value from them.
- **Business process:** The series of steps that a firm performs in order to complete an economic activity.
- **Business process reengineering (BPR):** A managerial approach calling for a process view of organizational activities. The BPR methodology calls for internal business integration and seeks dramatic performance improvements through rationalization of activities and the elimination of duplication of efforts across separate functions and units.
- **Cloud computing:** The use of the Internet as a gateway for pooling IT resources. In other words, applications or computational or storage components—the building blocks of IT solutions, if you will—are offered online by a provider.
- **Customer relationship management (CRM):** A strategic orientation that calls for iterative processes designed to turn customer data into customer relationships through active use of, and by learning from, the information collected.
- **Database:** A self-describing collection of related records.
- **Database management system (DBMS):** A software program (or collection of programs) that enables and controls access to a database.
- **Data mart:** A scaled-down version of a data warehouse that focuses on the needs of a specific audience.
- **Data mining:** The process of automatically discovering nonobvious relationships in large databases.
- **Data warehouse:** A software program that collects and consolidates data from multiple source systems, both internal to the organization and external, with the purpose of enabling analysis.
- **Decision support systems (DSS):** Systems designed to provide information needed by functional managers engaged in tactical decision making in the form of regular reports and exception reports.
- **Digital resources:** A specific class of digital objects that offers a useful capability (e.g., payment processing) that can be used as modules or components in a new application (e.g., Instacart using Stripe payments) and are plugged into the new application via a software interface, typically an application program interface (API). In this sense, they (a) are *modular*; (b) *encapsulate objects of value*, assets, and/or capabilities; and (c) are

accessible by way of a *programmatic bitstring interface*.

- **Enterprise system (ES):** Modular, integrated software applications that span (all) organizational functions and rely on one database at the core. Also known as ERP.
- **Executive information systems (EIS):** Systems designed to serve the long-range planning and decision-making needs of senior managers.
- **Functional systems:** Systems expressly designed to support the specific needs of individuals in the same functional area.
- **Information systems cycle:** An analytical model that portrays the progression of business data from their inception in transaction processing systems, to their storage in data repositories, and finally to their use in analytical tools.
- **Infrastructure as a service (IaaS):** A class of cloud services where a vendor provides customers with the use of hardware functionality—in essence, computational power, storage capacity, and network connectivity. In the IaaS model, the client rents the virtualized hardware. All software—including the operating system, backup and recovery, and the like—are the client's responsibility. The IaaS provider takes care of the running and maintenance of the infrastructure, for a fee. Like all the other cloud models, IaaS platforms offer scalable resources that can be adjusted on demand.
- **Integration:** The process that an organization, or a number of related organizations, uses to unify, or join together, some tangible or intangible assets.
- **Knowledge management:** The set of activities and processes that an organization enacts to manage the wealth of knowledge it possesses and ensure that such knowledge is properly safeguarded and put to use to help the firm achieve its objectives.
- **NoSQL** databases overcome the intrinsic limits of relational DBMSs by being more simple and flexible (or schema-less) to accommodate heterogeneous data, having greater horizontal scalability adapted to distributed environments composed of commoditized servers, and having higher availability.
- **Online analytical processing (OLAP):** A class of software programs that enables a knowledge worker to easily and selectively extract and view data from an analytical database.
- **Platform as a service (PaaS):** A cloud software environment a vendor provides to customers on which the client builds its own applications. This model is generally used for development, testing, and deployment of applications, as components are already in place.
- **Software as a service (SaaS):** A software delivery approach in which a provider hosts the application in its data centers and the customer accesses the needed applications' functionalities over a computer network. Instead of licensing the application and requiring the customer to install, maintain, and generally support it, in the SaaS model, the provider shoulders these tasks—customers simply gain access to the needed applications in much the same way they gain access to utilities (e.g., water, electricity).
- **Supply chain management (SCM):** The set of logistic and financial processes associated with the planning, execution, and monitoring of supply chain operations.
- **System integration:** The unification or tight linkage of IT-enabled information systems and databases.
- **Transaction processing systems (TPS):** Systems mainly concerned with automating recurring activities and structuring day-to-day activities to ensure that they are performed with speed and accuracy.

Chapter 4

- **Aggregator:** An organization that manages an integrated digital platform and a marketplace. It aggregates customer demand (e.g., a restaurant's patrons), thus attracting

to its platform those suppliers who desire to capture such demand (e.g., restaurants).

- **Classic information goods:** Goods purchased for the sole purpose of gaining access to the information they contain.
- **Data:** Codified raw facts—things that have happened—coded as letters and numbers and increasingly stored by way of a computer.
- **Disruptive innovation:** Novel value propositions (i.e., new products, services, solutions) that start as inferior to the dominant solution on the primary performance dimension but offer a different bundle of characteristics and a rate of improvement on key performance metrics that outstrip the rate of improvement expected by the mainstream market.
- **Disruptive technologies:** Technologies that offer a different set of attributes than the technology a firm currently uses in its products and whose performance improvement rate is higher than the rate of improvement of market needs.
- **Information:** Data in context.
- **Information-intensive goods:** Those tangible products and services (i.e., not classic information goods) for which information is either one of the critical components or a necessary resource during the production process.
- **Internet:** A global, publicly accessible network of digital networks relying on distributed ownership and open standards.
- **Marketplace:** Communities of buyers and sellers who transact via digital technologies. A digital marketplace represents the virtual space where transactions take place. A marketplace typically has a sponsor that controls it.
- **Message reach:** The number of possible recipients of a message.
- **Message richness:** The amount of information that can be transmitted, the degree to which the information can be tailored to individual needs, and the level of interactivity of the message.
- **Negative feedback:** The self-reinforcing process by which the strong get weaker and the weak get stronger.
- **Network effects:** The process by which a network becomes more valuable as its size increases—that is, when a new node, while pursuing his or her own economic motives, joins the network, the network is more valuable for all the other members.
- **Network node:** Any device connected to a network.
- **Physical networks:** Networks where the nodes are connected by physical links (e.g., railroad tracks, telephone wires).
- **Platform:** An evolving sociotechnical system that exposes digital resources supporting suppliers' competitive actions.
- **Positive feedback:** The self-reinforcing process by which the strong get stronger and the weak get weaker.
- **Process virtualizability:** A process that represents the likelihood of a goal-oriented series of activities to be virtually performed—in other words, the likelihood of a process to be completed without physical interaction among participants or among participants and objects. Process virtualizability depends on process characteristics and the current state of technology.
- **Sustaining technology:** A technology that maintains or rejuvenates the current rate of performance improvement of the products and services that use it.
- **Tipping point:** That moment in the evolution of a market where one organization or technology reaches critical mass and goes on to dominate the market—the point of no return where winners and losers are defined.
- **Tippy market:** A market that is subject to strong positive feedback, such that the market will "tip" in favor of the firm that is able to reach critical mass and dominate the market. A tippy market is therefore a market with "winner-take-all" tendencies.
- **Two-sided network:** A network that has two types of members, each creating value for the other.
- **Virtual networks:** Networks in which the connections between nodes are not physical but intangible and invisible. The nodes of a virtual network are typically people rather than devices.

Chapter 5

- **Advertisement support:** A revenue model where a firm's content or services are made available for free in an effort to attract a large audience. The firm then "sells access to its audience" to interested advertisers, much like radio stations do.
- **Algorithmic economy** (or **API economy**): A business ecosystem where digital entrepreneurs identify software components that are general and widely used across applications. They then focus on building world-class digital resources and making them available, for a fee, to firms who use them in the innovative digital products they create (e.g., Stripe).
- **Affiliate:** A revenue model where a firm seeks to generate revenue from a third party based on customer traffic to the firm's website (e.g., Amazon Associates).
- **Brick and mortar:** A term used to refer to "traditional" organizations, those firms that have physical operations and don't provide their services through the Internet.
- **Bricks and clicks:** Organizations that have hybrid operations involving both physical and online operations.
- **Business model:** A business model captures the firm's concept and value proposition while also conveying what market opportunity the company is pursuing, what product or service it offers, and what strategy the firm will follow to capture a dominant position.
- **Business model canvas:** A useful "thinking tool" that can help managers conceptualize and crystallize the design of a new business model. It also provides a language for describing and communicating the model.
- **Business-to-business (B2B):** A form of electronic commerce involving two for-profit organizations in the transaction.
- **Business-to-consumer (B2C):** A form of electronic commerce involving a for-profit organization on one side and the end consumer on the other side of the transaction.
- **Channel conflict:** A term that captures the dilemma faced by organizations deciding whether to disintermediate their legacy distribution channels.
- **Consumer-to-business (C2B):** A form of electronic commerce enabling individuals to transact with business organizations not as buyers of goods and services but as suppliers.
- **Consumer-to-consumer (C2C):** A form of electronic commerce enabling individual consumers to interact and transact directly.
- **Crowdsourcing:** An online activity in which an individual or an organization proposes to a heterogeneous "crowd" of individuals via an open call the voluntary undertaking of a task.
- **Digital business:** A general term for referring to both electronic business and electronic commerce.
- **Disintermediation:** The process by which a firm's distribution chain is shortened through the elimination of one or more intermediaries.
- **eGovernment:** A form of electronic commerce involving legislative and administrative institutions in the transaction.
- **Electronic business:** The digital enablement of internal organizational business processes.
- **Electronic commerce:** An online exchange of value.
- **Freemium:** A term resulting from blending the words *free* and *premium*, indicating a revenue model where a firm gives away its product or service for free and attempts to build a large customer base by reducing the obstacle created by the payment. Once the firm has gained traction and enlisted a large customer base, it offers premium services or enhanced versions of the product for a fee.
- **Internet of things (IoT):** Interconnectivity of physical smart objects, sensors, or other devices, bringing the benefits of the Internet into the physical space.
- **Long tail:** The observed phenomenon where "not-so-popular" products deliver a greater share of sales than the fat head of popular items. In other words, the fact that digital business enables new strategies focusing on the sale of a large number of products that sell in small quantities as contrasted with the typical approach of focusing on the few best-selling ones.
- **Online-to-offline (O2O):** A set of techniques aimed at engaging online customers in the

physical retail space, and new approaches emerge as new information technologies are introduced and adopted by customers.
- **Pay for service:** A revenue model where a firm offers a product (e.g., books) or a service (e.g., insurance) for sale, and it is compensated much like a traditional store or service provider. It may result in transaction fees in marketplaces (e.g., eBay) or in a metered usage for cloud providers (e.g., hourly costs in AWS).
- **Protocol:** An agreed-upon set of rules or conventions governing communication among the elements of a network (i.e., network nodes).
- **Pure play:** Organizations that have no physical stores and provide their services exclusively through the Internet.
- **Reintermediation:** The process by which new online intermediaries carve a niche for themselves alongside their brick-and-mortar counterparts.
- **Revenue model:** Specifies how the firm intends to draw proceeds from its value proposition—in short, how it plans to make money.
- **Subscription:** A revenue model where customers pay for the right to access the content and then are able to "consume" as much of the content as they need.
- **Wearable devices:** A diversified category ranging from bulky head-mounted displays or backpacked systems to rings or futuristic subcutaneous devices. The interest in wearable technologies lies in the massive personal and behavioral data that they could potentially generate.
- **Web 2.0:** A term that identifies a collection of trends and technologies that mark the shift from a static, mostly broadcast, paradigm for the World Wide Web to a dynamic paradigm centered around user participation and involvement.

Chapter 6

- **Critical success factors (CSFs):** A technique centered on identification of a limited number of areas, typically three to six, that executives must effectively manage to ensure that the firm will survive and thrive. CSFs represent those fundamental things that "must go right" for the business to flourish.
- **Information systems assessment:** The process of taking stock of the firm's current information systems resources and evaluating how well they are fulfilling the needs of the organization.
- **Information systems guidelines:** A set of statements, or maxims, specifying how the firm should use its technical and organizational information systems resources.
- **Information systems vision:** A concise statement that captures what the planning team believes should be the role of information systems resources in the firm. It provides an articulation of the ideal state the firm should strive for in its use and management of information systems resources.
- **Planning team:** The set of individuals, company employees, and hired consultants who work together to develop the firm's strategic information systems plan.
- **Strategic alignment:** The degree of fit between the priorities and activities of the IS function and those of general and functional managers involved in the day-to-day operations of the business.
- **Strategic impact grid:** An analytical framework that helps in defining the role of information systems in a specific company by analyzing two dimensions: the current need for reliable information systems and the future need for new information system functionalities.
- **Strategic information systems planning process:** The process by which the planning team develops the planning documents.
- **Strategic initiative:** A long-term (three- to five-year) proposal that identifies new systems and new projects or new directions for the IS organization.
- **Strategic plan:** An organization's mission and future direction, performance targets, and strategy. Strategic plans are a prerequisite to information systems planning.

Chapter 7

- **Added value:** That portion of the total value created that would be lost if the firm did not partake in the exchange.
- **Competitive advantage:** The condition where a firm engages in a unique transformation process and has been able to distinguish its offerings from those of competitors. When a firm has achieved a position of competitive advantage, it is able to make above average profits.
- **Customer willingness to pay:** The maximum amount of money the firm's customers are willing to spend in order to obtain the firm's product.
- **Firm cost:** The actual amount of money the firm disbursed to acquire the resources needed to create its product or service.
- **IT-dependent strategic initiatives:** Identifiable competitive moves and projects that enable the creation of added value and that rely heavily on the use of information technology to be successfully implemented (i.e., they cannot feasibly be enacted without investments in IT).
- **Strategic information systems:** Information systems that are designed to support or shape the competitive strategy of an organization. Those information systems that enable the creation and appropriation of value.
- **Supplier opportunity cost:** The minimum amount of money suppliers are willing to accept to provide the firm with the needed resources.
- **Tactical information systems:** Systems that do not position the firm to create added value. In other words, they do not enable distinctive initiatives that allow the firm to create unique economic value.
- **Total value created:** The difference between customer willingness to pay and supplier opportunity cost.
- **Transformation process:** The set of activities the company engages in to convert inputs purchased from suppliers into outputs to be sold to customers.
- **Value appropriation:** The process by which the total value created in the transaction is split among all the entities who contributed to creating it (i.e., suppliers, the firm, and the customer).
- **Value creation:** The process by which new economic value is generated through a transformation process.

Chapter 8

- **Churn rate:** The number of customers leaving the platform in a defined period (e.g., month).
- **Customer service life cycle (CSLC):** A framework designed to draw managers' attention to the potential for value creation offered by the relationship between the firm and its customers.
- **Data monetization:** A general term capturing the notion of profiting through strategies that use digital data as the core asset and analytics as the means of value extraction.
- **Degree of customizability:** The extent to which the product or service offered by a firm can be tailored to the specific needs and requirements of individual customers or a segment of the customer base.
- **Degree of unobtrusive data capture:** The extent to which, in the normal course of business, customer data can be collected and stored in a readily usable format by a firm.
- **Expected customer lifetime value:** The forecasted value of a customer, generally calculated on the basis of current and historical data.
- **Improving:** A data monetization strategy aimed at devising initiatives leveraging digital data to improve operational processes and to refine decision-making processes in the organization.
- **Industry analysis:** A framework that identifies the five forces shaping the profitability potential of an industry.

- **Linkages:** The points of contact between the separate value chains of the firms in a value network.
- **Mirroring capabilities:** An application of the virtual value chain that enables the firm to perform some economic activities previously completed in the physical value chain in the information-defined world.
- **Monthly recurring revenue (MRR):** The (normalized) monthly subscription revenue that represents the foreseeable revenue that a firm expects monthly.
- **New digital value:** An application of the virtual value chain that enables the firm to increase customers' willingness to pay for new information-enabled products or services.
- **Platform play:** A digital strategy aimed at developing resources that can be exposed to other organizations who will leverage them into their own digital innovations. In other words, the platform is a provider and orchestrator of resources rather than a provider of finished products or services in a linear value chain. Resources can be assets (i.e., tangible or intangible things the firm controls) or capabilities (i.e., competencies the firm developed).
- **Selling:** Data monetization strategies aimed at advancing initiatives that leverage data for generating revenue as a stand-alone offering, not as part of some other product or service.
- **Value chain:** A framework that maps a firm's transformation process as a set of sequential value-adding activities.
- **Value matrix:** A framework combining the physical value chain and virtual value chain models.
- **Virtual value chain (VVC):** A framework that uses the basic value chain structure to draw attention to data as a valuable input resource in the transformation process.
- **Visibility:** An application of the virtual value chain that enables the firm to "see through" organizational processes that it was previously treating as a black box.
- **Wrapping:** A data monetization strategy consisting in designing initiatives using data and analytics to "augment" the value proposition of a company's main products or services.

Chapter 9

- **Asset-stock accumulation:** The process by which a firm accrues or builds up a resource over time.
- **Barriers to erosion:** The difficulty, expressed in time and money, that competitors must overcome to match the value proposition offered by the leading firm.
- **Capability development:** The process by which an organization is able to improve its performance over time by developing its ability to use available resources for maximum effectiveness.
- **Resources:** Assets (i.e., things the firm has) and capabilities (i.e., things the firm can do) that the firm can deploy and leverage as part of its IT-dependent strategic initiatives.
- **Response lag:** The time it takes competitors to respond aggressively enough to erode a firm's competitive advantage; the delay in competitive response.
- **Response-lag drivers:** The characteristics of the technology, the firm, its competitors, or the value system in which the firm is embedded that combine to make replication of the IT-dependent strategic initiative difficult and costly. Response-lag drivers combine their effect to levy barriers to erosion.
- **Sustained competitive advantage:** The condition where a firm is able to protect a competitive advantage from competitors' retaliation.

Chapter 10

- **Allocation:** A method of funding information systems where the cost of services is billed to the organizational function that uses them based on some stable metric (e.g., size, revenues, number of users).
- **Business case:** A formal document prepared and presented by the general or functional manager sponsoring the project. It provides the rationale for pursuing the opportunity.
- **Chargeback:** A method of funding information systems where the cost of services is billed to the organizational function that uses them based on actual usage.
- **Cloud centers of excellence (CCOE):** A cross-functional team formed by employees with a wide range of competencies aiming to develop best practices and repeatable processes for managing cloud computing resources with a life cycle approach.
- **Governance:** In general terms, the set of processes, policies, and practices for administering and controlling an entity.
- **Information systems governance:** The set of decision rights and the guiding accountability framework designed to ensure that IT resources are employed appropriately in the organization.
- **Information systems outsourcing:** The process of contracting with an outside firm to obtain information systems services.
- **Overhead:** A method of funding information systems where the cost of services is not billed to the organizational function that uses them. Rather, information systems assets and services are funded directly from the organization's overall budget.
- **Steering committee:** A committee, composed of representatives from the various functional areas and IS professionals, that provides guidance for the use of information systems assets and shares the responsibility for aligning IS efforts with business strategy.
- **Total cost of ownership (TCO):** A financial estimate designed to explicitly recognize the life cycle cost of IT assets.

Chapter 11

- **Agile:** A group of software development approaches and methods characterized by rapid development and deployment.
- **Build:** The build phase of the SDLC is concerned with taking the system requirements document and producing a robust, secure, and efficient software application.
- **Continuous delivery (CD):** The process of moving software code into production. CD builds on CI to create workflows where software updated with changes is automatically built, tested, and automatically prepared for production.
- **Continuous integration (CI):** The regular merging of code changes into a central repository where automated builds and tests run to provide ready access to the system's most updated version. A critical element of CI is automated testing, which is triggered when changes are committed.
- **Custom-designed software:** A software program that is created in single copy to address the specific needs and design requirements of an organization.
- **Custom software development:** The process by which an organization, or a contracted software house, creates a tailored software application to address the organization's specific information processing needs.
- **Definition:** The phase of the SDLC concerned with clearly identifying the features of the proposed information system.
- **DevOps:** A combined term between development and operations, it is a lean and agile-inspired philosophy streamlining software development and operation.
- **End-user development:** The process by which an organization's non-IT specialists create software applications.
- **Implementation:** The phase of the SDLC concerned with taking the

technology component and integrating it with the other elements (people, process, structure) to achieve a working information system.
- **Off-the-shelf application:** A software program that is mass-produced and commercialized by a software vendor.
- **Open source:** A type of software licensing agreement that enables the licensee to obtain and modify the source code of a software program.
- **Programmer:** A highly skilled IT professional who translates a software design into a set of instructions that can be executed by a digital computer.
- **Prototyping:** A systems development approach predicated on the notion that it is impossible to clearly estimate and plan in detail such complex endeavors as information systems design and development projects.
- **Scrum:** The most-used agile software development methodology that progresses via a series of iterations called sprints, lasting usually two to four weeks.
- **Shadow system:** The end-user-developed solutions built and used inside the organization but beyond the control of the IT function or without formal authorization.
- **Software application:** A software program or, more commonly, a collection of software programs, designed to perform tasks of interest to an end user (e.g., write a memo, create and send invoices).
- **Software development outsourcing:** An arrangement where an external provider (i.e., a software house) custom develops an application for an organization.
- **System analyst:** A highly skilled IS professional whose role is to help users identify and articulate the system requirements.
- **System architect:** A highly skilled IT professional who takes the system requirements document (i.e., what the applications should do) and designs the structure of the system (i.e., how the application will perform its tasks).
- **Systems development life cycle (SDLC):** A general engineering approach to system design, development, and implementation. The SDLC process articulates in three phases—definition, build, and implementation—each one further divided into three steps.
- **System selection and acquisition:** The process by which an organization identifies and purchases an off-the-shelf software application to address its information processing needs.
- **Waterfall:** A popular approach to the SDLC in information systems implementations where the focus is on limiting iteration between phases, as in a waterfall, where water only flows downstream.

Chapter 12

- **5G:** The fifth-generation wireless network standard. 5G comprises, in a single framework, all the usage that is today covered by a plethora of different protocols and private solutions, facilitating interoperability, standardization, and digital innovation.
- **Artificial intelligence (AI):** A term generally used when referring to devices or software applications exhibiting humanlike cognitive capabilities. The Turing test, invented in the 1950s by the British mathematician Alan Turing, is purposely designed to assess the ability of an AI to fool a human into thinking he or she is having a conversation with another human instead of with a machine. Fueled by machine learning, increasingly a new breed of smart devices is revolutionizing various aspects of our life.
- **Augmented reality (AR):** A field of computing concerned with superimposing an information layer on a real image, thus providing users with a simultaneous view of real objects and contextual information about those objects.
- **Bitcoin:** Based on blockchain technology, probably the most famous cryptocurrency. Beyond being the first decentralized digital currency, Bitcoin allows transactions to take

place without the need of a centralized system, representing an alternative to the existing banking system.
- **Blockchain:** A distributed ledger where actors can securely record information (e.g., transactions) without the need of a centralized authority or trustee.
- **Deep learning:** A machine learning technique based on artificial neural networks that can discriminate essential features of an input on the basis of provided data; in other words, a technique that allows classification of inputs (e.g., pictures) based on the inferred features to determine a successful discrimination (e.g., distinguish between cat and human pictures).
- **Digital data stream (DDS):** The continuous digital encoding and transmission of data describing a related class of events. The transmission or flow of these digital representations of events makes the DDS, which may be human generated (e.g., a tweet, an Instagram) or machine generated (e.g., a CO_2 reading, a GPS location). DDG is about capturing the event; DDS is about leveraging the potential of the flow of these events for decision making and operational change.
- **Digital manufacturing:** A production process where layers of material are laid down following a fully digital project. Digital manufacturing is an additive process working the opposite of traditional manufacturing techniques like lathing or milling, where material is removed to obtain the desired object.
- **Digital twin (DT):** A digital representation of a unique physical object implemented as a software program capable of mirroring, in the virtual space, an object's useful characteristics and properties. A DT is associated, or tethered, through DDS to the physical object so that, for example, sensor readings can be used to know the state of the object, make predictions on activities and performance, and react to an object's environmental or contextual conditions.
- **Quantum computing:** The use of the properties of matter at the quantum level (superposition and entanglement) to solve more efficiently the current system's specific classes of problems.
- **Serverless computing:** A computing model where applications and services are made available in the cloud without developing or managing the supporting infrastructure.

Chapter 13

- **Backdoor:** Code built into software programs to allow access to an application by circumventing password protection.
- **Biometrics:** In the context of computer security, the term *biometrics* is used to refer to the use of physical traits as a means to uniquely identify users.
- **California Consumer Privacy Act (CCPA):** State of California regulation that grants consumers both the right to and control over their personal data, including the right to know, the right to delete, and the right to opt out from the sale of information or its sharing beyond the original collector.
- **Cybersecurity standard:** Frameworks and techniques proposed by regulatory and standardization bodies to promote the adoption of structured cybersecurity practice at individual and industry levels.
- **Denial-of-service attack:** A digital assault carried out over a computer network with the objective to overwhelm an online service so as to force it offline.
- **Digital risk management:** The process by which the firm attempts to identify and measure information systems security risks and devise the optimal mitigation strategy.
- **Encryption:** A technique designed to scramble data so as to ensure that if the wrong individuals gain access to the data, they will be unable to make out its meaning.
- **Firewall:** A hardware or software tool designed to screen and manage traffic in and out of an organization's computer network.
- **General Data Protection Regulation (GDPR):** European directive setting individual rights and firms' responsibilities in data collection and processing.

- **Hacker:** The term *hacker* simply means someone who possesses superior computer skills. It has come to be associated in the media and general terminology with more (black hat) or less (white hat) maliciously intentioned individuals who attempt to subvert computer security defenses.
- **Information systems security:** The set of defenses an organization puts in place to mitigate threats to its technology infrastructure and data resources.
- **Intrusion:** The intrusion threat consists of any situation where an unauthorized attacker gains access to organizational IT resources.
- **Malware:** The general term *malicious code*, or malware, refers to software programs that are designed to cause damage to individuals' and/or organizations' digital assets.
- **Personal data:** Any information relating to an individual who could be identified through an attribute such as a name, an identification number, location data, an online identifier, or one or more factors specific to physical, physiological, genetic, mental, economic, cultural, or social identity.
- **Phishing:** The process of collecting sensitive information by tricking, in more or less automated ways, those who have it to provide it, thinking they are giving it to a legitimate concern.
- **Privacy:** In the context of information systems, privacy is the ability of individuals to control the terms and conditions under which their personal information is collected, managed, and utilized.
- **Ransomware:** A malware that limits the access to a computer system or users' data and that requires the user to pay a ransom to regain control.
- **Risk analysis:** The process by which the firm attempts to quantify the risks identified in the risk assessment.
- **Risk assessment:** The risk assessment process consists of auditing the current resources, technological as well as human, in an effort to map the current state of the art of information systems security in the organization.
- **Risk mitigation:** The process of matching the appropriate response to the security threats a firm has identified.
- **Social engineering:** The practice of obtaining restricted or private information by somehow convincing legitimate users or people who have it to share it.
- **Spyware:** Software that, unbeknownst to the owner of the computer, monitors behavior, collects information, and either transfers this information to a third party via the Internet or performs unwanted operations.
- **Trojan horse:** A computer program that claims to, and sometimes does, deliver some useful functionality. But the Trojan horse hides a dark side and, like a virus, delivers a malicious payload.
- **Troll factories:** Organizations, either private or state sponsored, specializing in the writing and posting of targeted articles, online reviews, and comments seeking to discredit or promote a product, firm, or other organization's reputation.
- **Virus:** A type of malicious code that spreads by attaching itself to other legitimate, executable software programs.
- **Worm:** A piece of malicious code that exploits security holes in network software to replicate itself.