សាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ

ROYAL UNIVERSITY OF PHNOM PENH

CHAPTER 1

# An Introduction to Information Systems

MIS

Chea Daly

# Data and Information

- Data:
  - raw facts, such as an employee number, total hours worked in a week.
- Information:
  - Collection of facts organized in such a way that they have value beyond the individual facts.
  - For example, a sales manager may want individual sales data summarized so it shows the total sales for the month.

# Types of Data

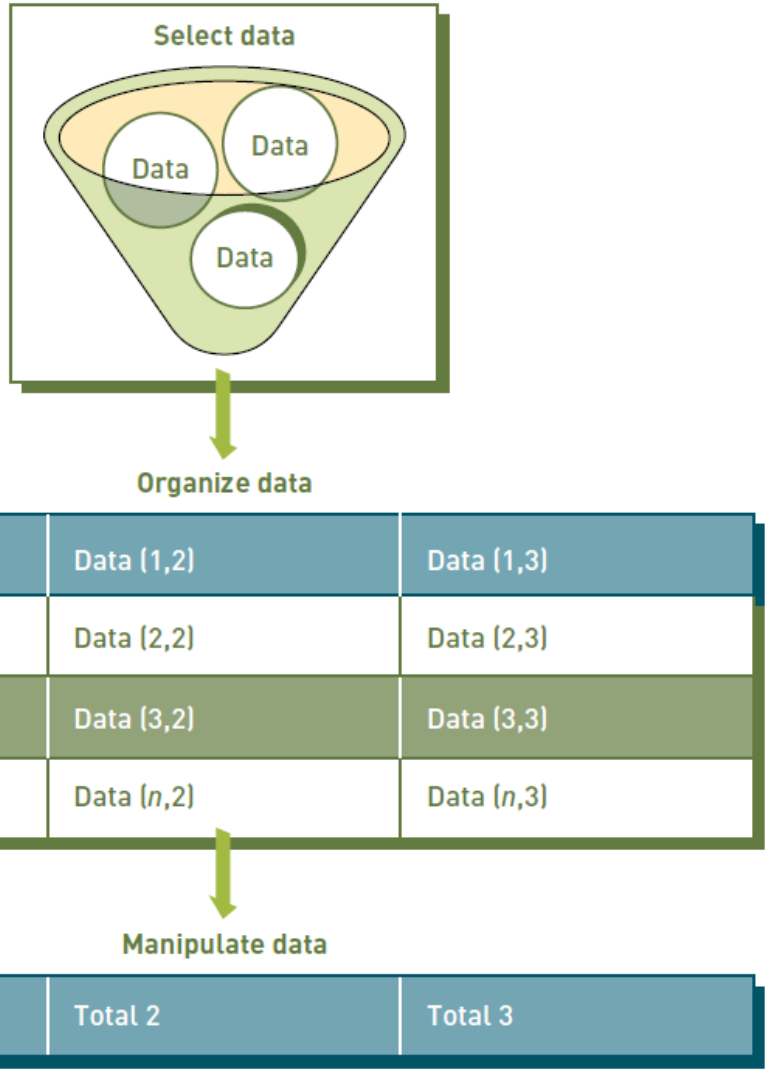
| Data | Represented By |
| --- | --- |
| Alphanumeric data | Numbers, letters, and other characters |
| Audio data | Sounds, noises, or tones |
| Image data | Graphic images and pictures |
| Video data | Moving images or pictures |

# Data → Information

FIGURE 1.1

**Process of transforming data into information**

Transforming data into information starts by selecting data, then organizing it, and finally manipulating the data.



# Knowledge

- The process turning data into useful information requires **knowledge.**
- Knowledge:
  - The awareness and understanding of a set of information and the ways in which that information can be made useful to support a specific task or reach a decision.

# The Value of Information

- Information is one of an organization's most valuable resources.
- Quality information can help people perform tasks more efficiently and effectively.

# The Value of Information

- If an organization's information is not accurate or complete, people can make poor decisions, costing thousands, or even millions, of dollars.
  - For example, Experian (a global information services firm) estimates that on average, 22 percent of an organization's customer contact data is wrong. Companies can easily waste over $100 per inaccurate customer contact data record on things like direct-mail marketing sent to wrong addresses. For an organization with 100,000 customers and a 22 percent error rate, that projects to a loss of $2.2 million.

# Characteristics of Quality Information

| Characteristics | Definitions |
|---|---|
| Accessible | Information should be easily accessible by authorized users so they can obtain it in the right format and at the right time to meet their needs. |
| Accurate | Accurate information is error free. In some cases, inaccurate information is generated because inaccurate data is fed into the transformation process. (This is commonly called garbage in, garbage out [GIGO].) |
| Complete | Complete information contains all the important facts. For example, an investment report that does not include all important costs is not complete. |
| Economical | Information should also be relatively economical to produce. Decision makers must always balance the value of information with the cost of producing it. |
| Flexible | Flexible information can be used for a variety of purposes. For example, information on how much inventory is on hand for a particular part can be used by a sales representative in closing a sale, by a production manager to determine whether more inventory is needed, and by a financial executive to determine the total value the company has invested in inventory. |
| Relevant | Relevant information is important to the decision maker. Information showing that lumber prices might drop might not be relevant to a computer chip manufacturer. |
| Reliable | Reliable information can be trusted by users. In many cases, the reliability of the information depends on the reliability of the data-collection method. In other instances, reliability depends on the source of the information. A rumor from an unknown source that oil prices might go up might not be reliable. |
| Secure | Information should be secure from access by unauthorized users. |
| Simple | Information should be simple, not overly complex. Sophisticated and detailed information might not be needed. In fact, too much information can cause information overload, whereby a decision maker has too much information and is unable to determine what is really important. |
| Timely | Timely information is delivered when it is needed. Knowing last week's weather conditions will not help when trying to decide what coat to wear today. |
| Verifiable | Information should be verifiable. This means that you can check it to make sure it is correct, perhaps by checking many sources for the same information. |

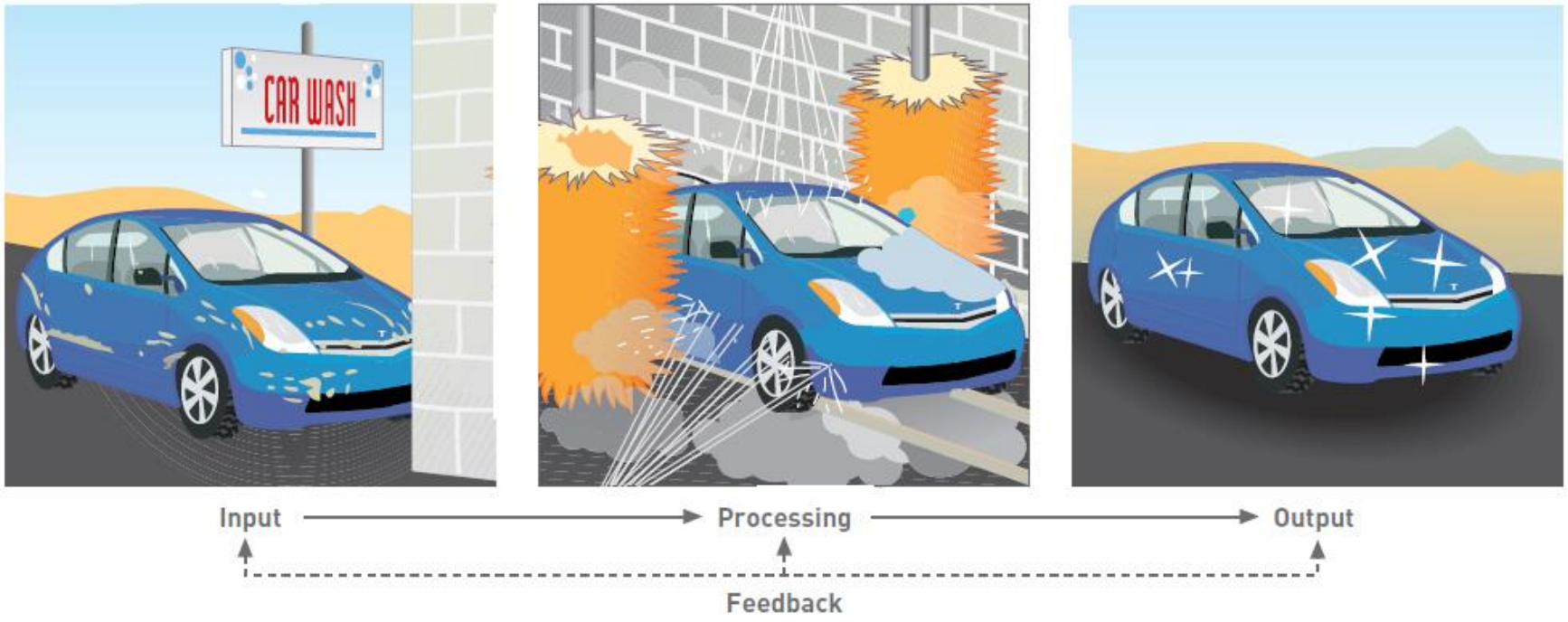
# Characteristics of Quality Information

- Depending on the type of data you need, some characteristics become more important than others.

# System Concepts

- System:
  - Set of elements or components that interact to accomplish a goal.
- Components of a system:
  - Inputs
  - Processing
  - Outputs
  - Feedback

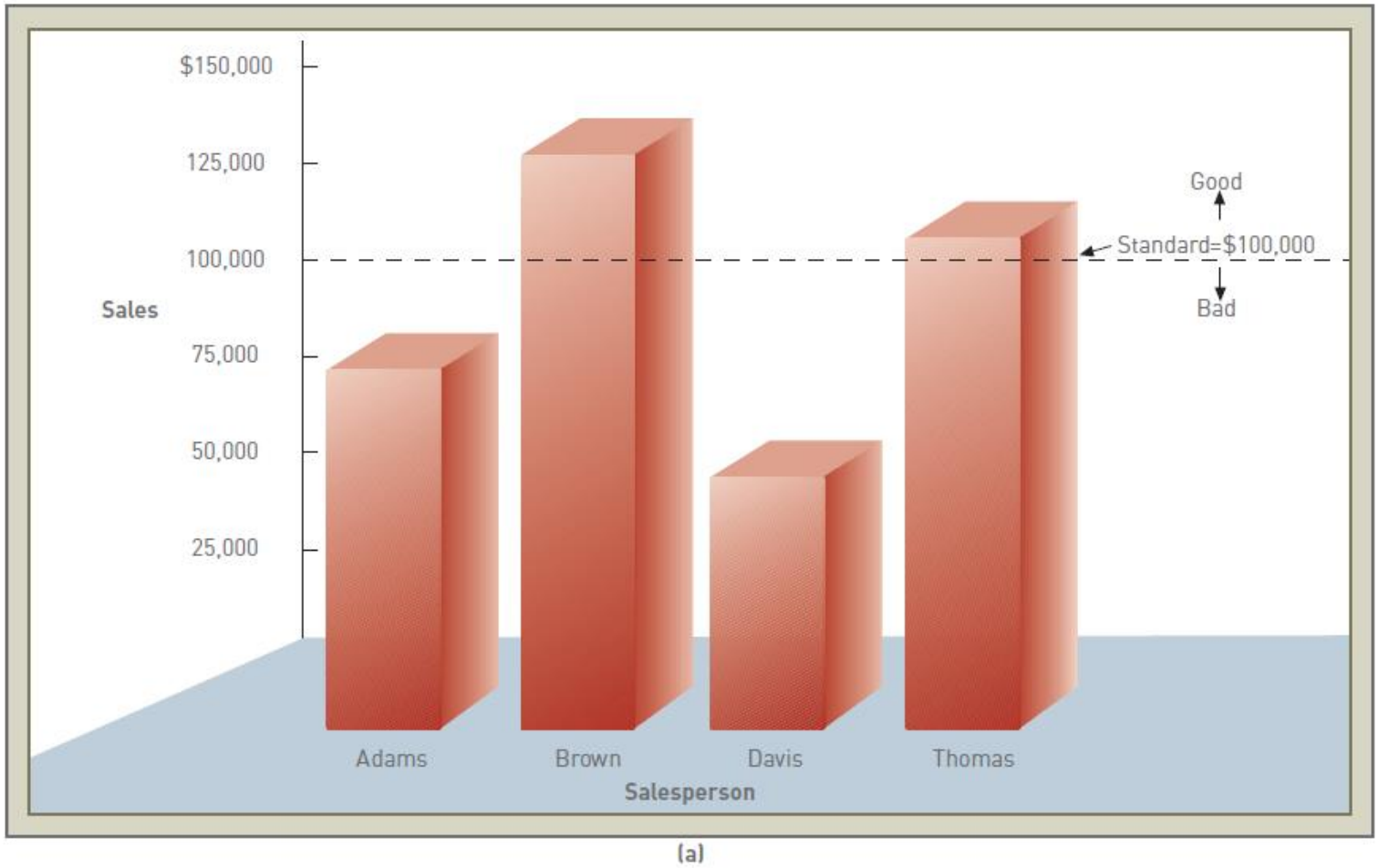
# System Concepts



# System Performance and Standards

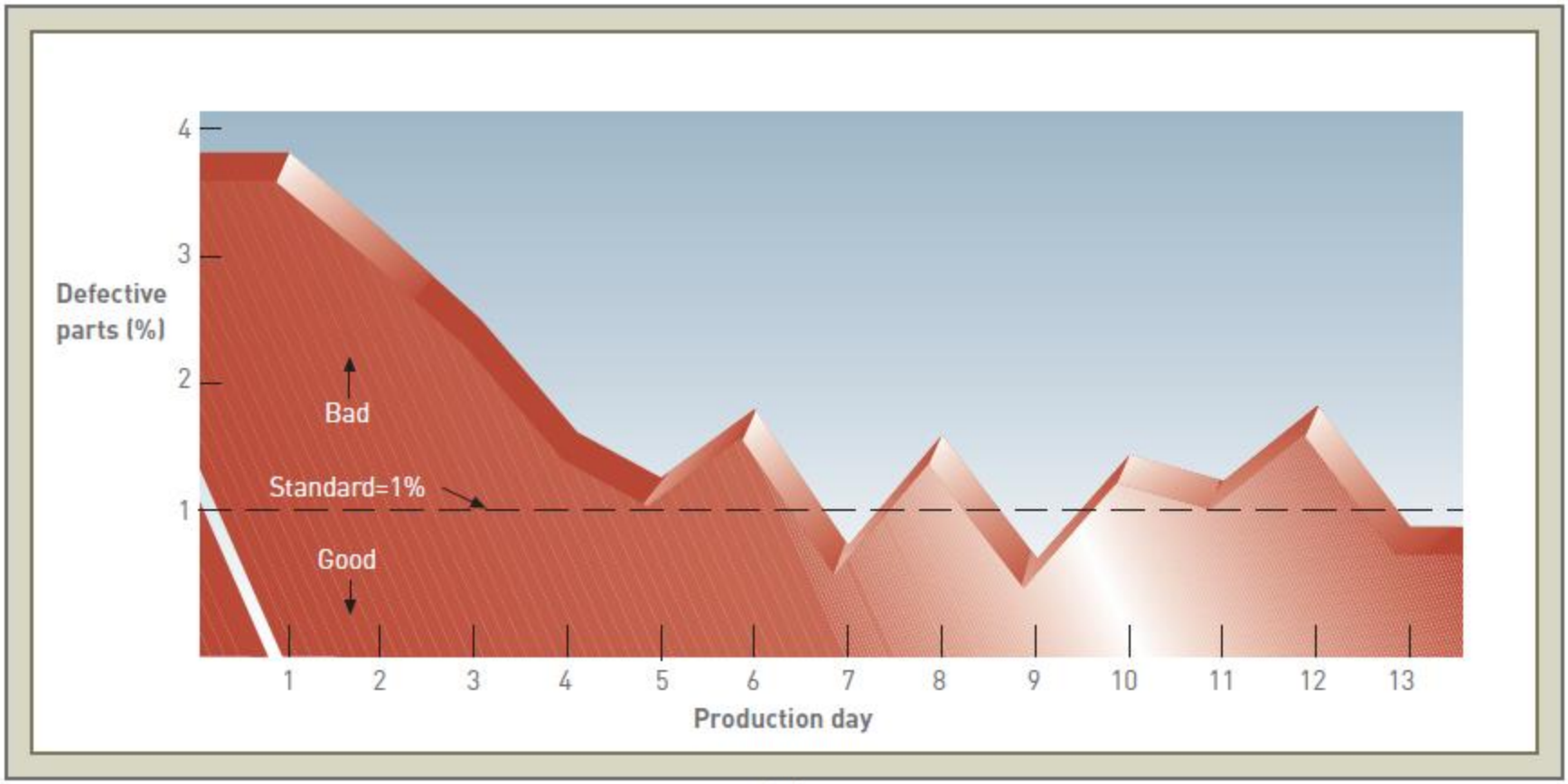
- Efficiency:
  - Measure of what is produced divided by what is consumed
- Effectiveness:
  - Measure of the extent to which a system attains its goals
- System performance standard:
  - Specific objective of the system

# System Performance and Standards




(a)

# System Performance and Standards

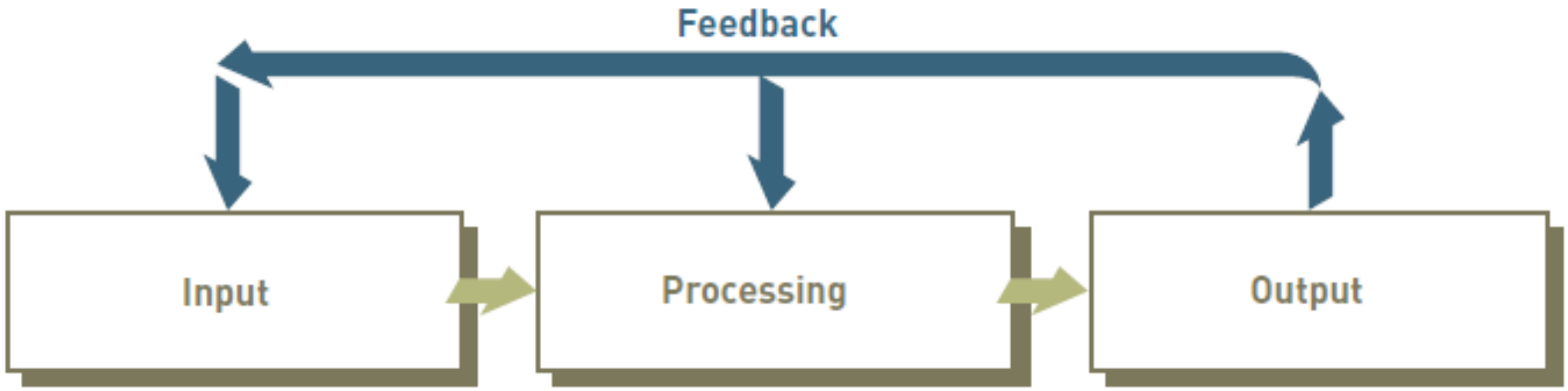



(b)

# What is Information System?

- Information system (IS):
  - A set of interrelated components that collect (input), process, store, and disseminate (output) data and information and provide feedback (corrective reaction) to meet an objective.
- Businesses:
  - Can use information systems to increase revenues and reduce costs.

# What is Information System?




- Feedback is critical to the successful operation of the organization.

# Components of Information Systems

- Input:
  - Activity of gathering and capturing raw data
- Processing:
  - Converting data into useful outputs
- Output:
  - Production of useful information, usually in the form of documents and reports
- Feedback:
  - Information from the system that is used to make changes to input or processing activities

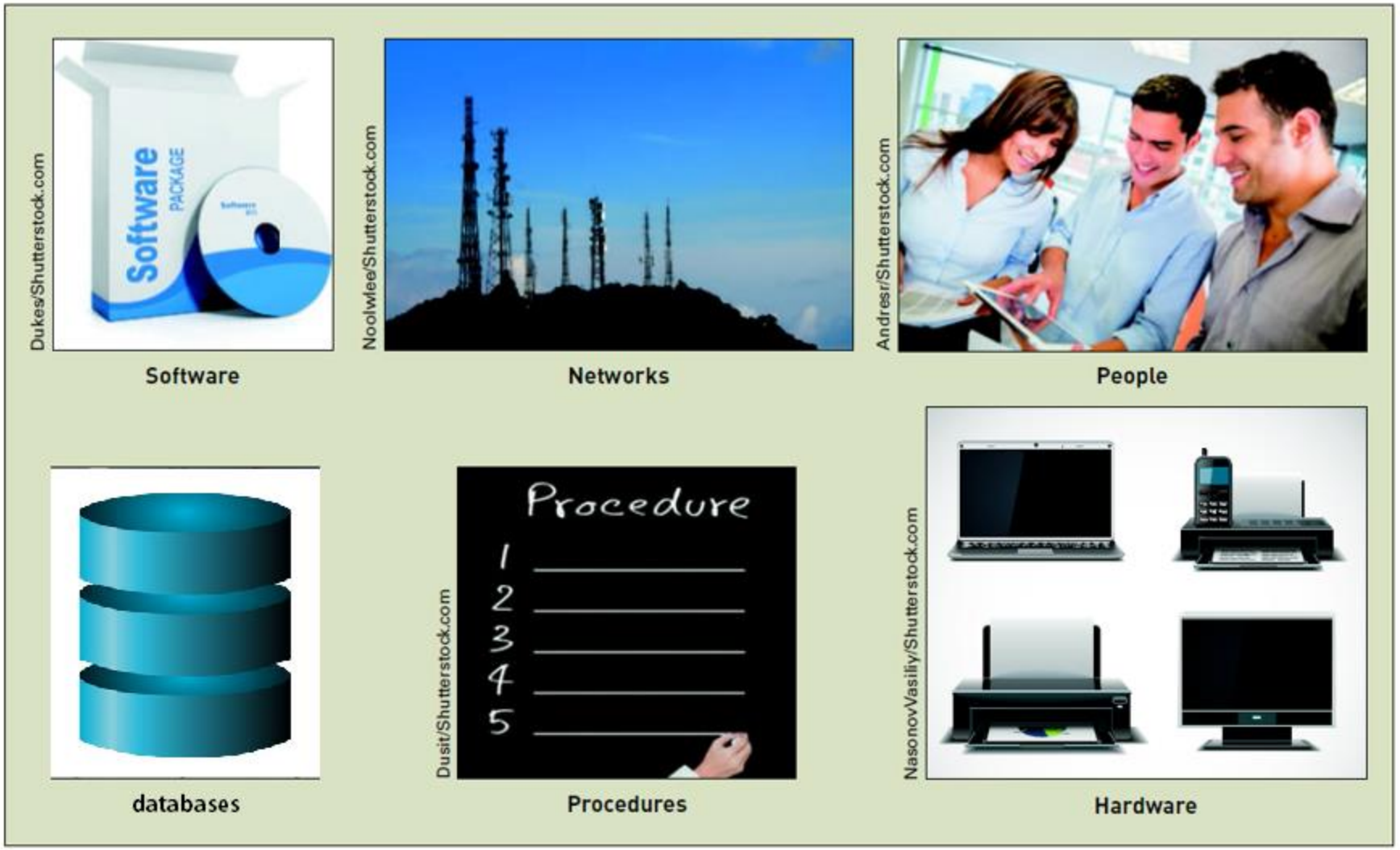
# Manual and Computerized Information Systems

- Manual information system:
  - Example: Investment analysts manually draw charts and trend lines to assist them in making investment decisions.
- Computerized information systems:
  - Example: Follow stock indexes and markets and suggest when large blocks of stocks should be purchased or sold.

# Computer-Based Information Systems

- A **computer-based information system** (CBIS) is a single set of hardware, software, databases, networks, people, and procedures that are configured to collect, manipulate, store, and process data into information.

# Components of Computer-Based Information Systems



# Computer-Based Information Systems

- Hardware:
  - Consists of computer equipment used to perform input, processing, and output activities.
- Software:
  - Consists of the computer programs that govern the operation of the computer.
- Database:
  - Organized collection of facts and information, typically consisting of two or more related data files

# Computer-Based Information Systems

- Networks
  - Connect computers and equipment to enable electronic communication
- People:
  - The most important element in most computer-based information systems.
  - Includes people who manage, run, program, and maintenance the system.
- Procedures:
  - Include strategies, policies, methods, and rules for using the CBIS.

# Hardware and Mobile Devices

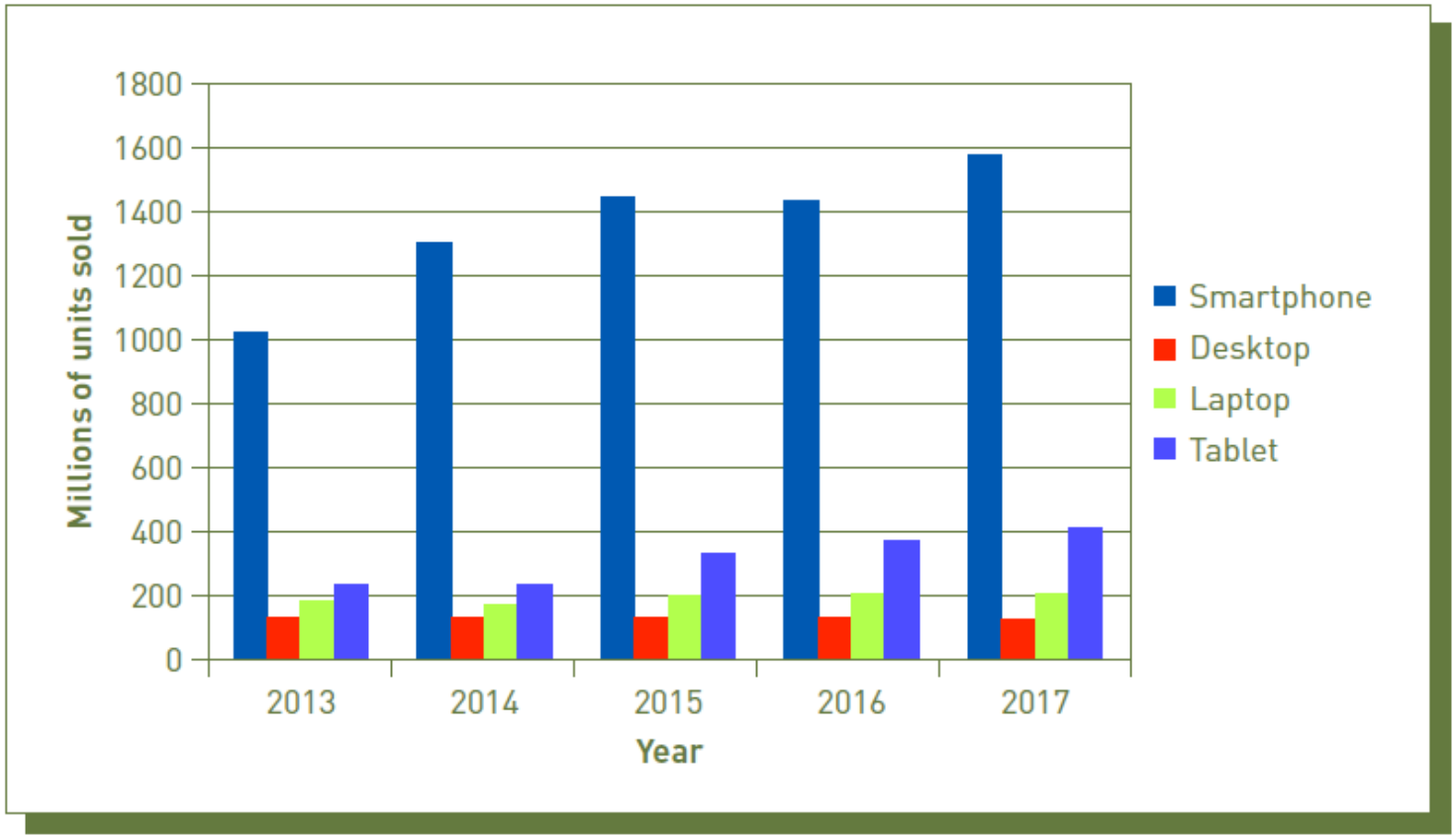
- The trend in the computer industry is to produce smaller, faster, and more mobile hardware, such as smartphones, laptops, and tablet computers.

# Hardware and Mobile Devices

In addition, innovative new hardware devices are being developed, such as the following:

- Laptops and displays that connect wirelessly, thus eliminating the need for expensive HDMI or DisplayPort display cables
- Computing devices with embedded 3D cameras, which will be able to recognize objects and even measure distances between things
- Keyboards that enable users to log in to Web sites via fingerprint authentication so they will not have to remember dozens of passwords for different sites.
- Very-high resolution display devices that will show content in incredible detail and dramatically improve the viewing experience (think clarity and resolution way beyond 1080p HD)

# Millions Of Computing Devices Sold Worldwide




The number of smartphones sold worldwide far exceeds the combined number of desktop, laptop, and tablet computers.

# Software and Mobile Applications

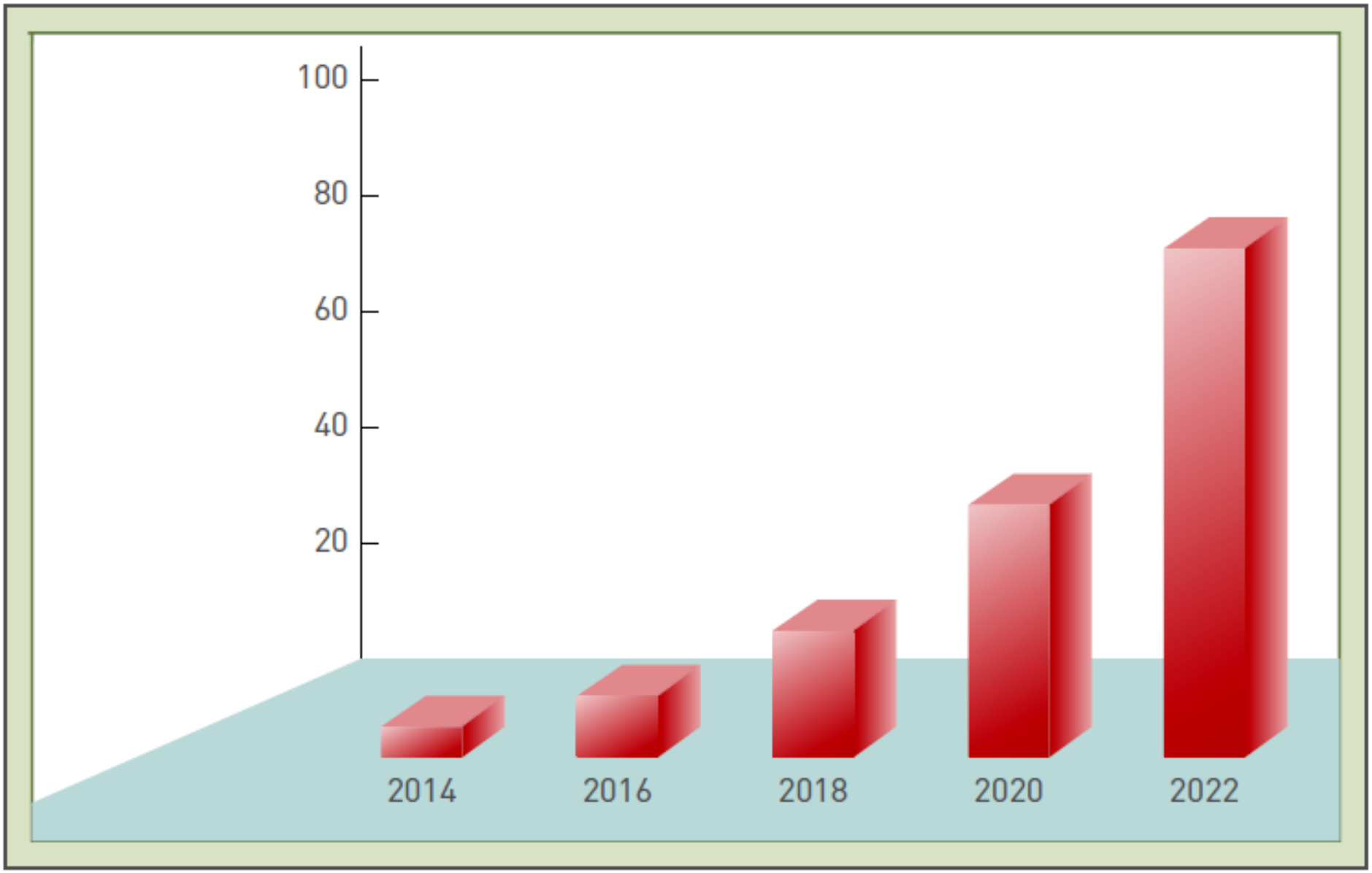
- As of June 2015, 1.6 million applications were available for devices that run under the Android operating system and roughly the same (1.5 million) available for download from Apple's App Store. The number of apps for each operating system is increasing by roughly 25,000 to 50,000 per month.

# Database Systems

- A **database** is an organized collection of data stored and accessed electronically from a computer system.
- A database is essential to the operation of a computer-based information system.
- A **data warehouse** is a database that stores large amounts of historical data in a form that readily supports analysis and management decision making.

# Big Data

- **Big data** is a term used to describe data collections that are very large (petabytes or larger) and complex (e.g. social media data) that traditional data management software, hardware, and analysis processes are incapable of dealing with them.
- To gain a perspective on the quantity of data some organizations are struggling to manage, consider that the amount of data traveling over mobile networks alone is expected to exceed 10 exabytes per month by 2016.




The size of digital data (zettabytes) is expected to double every two years.

# Units Of Measure For Data

| Unit of Measure | Size |
|---|---|
| Byte | 1 byte |
| Kilobyte | 1,000 bytes |
| Megabyte | 1,000 kilobytes |
| Gigabyte | 1,000 megabytes |
| Terabyte | 1,000 gigabytes |
| Petabyte | 1,000 terabytes |
| Exabyte | 1,000 petabytes |
| Zettabyte | 1,000 exabytes |
| Yottabyte | 1,000 zettabytes |

# Big Data

- More data will lead to more accurate, insightful analyses and better decision making.
- For that to happen, society will need to address the many issues associated with big data, including concerns over invasions of privacy and the potential for overly intrusive monitoring of individuals by governments and organizations.

# Business Information Systems

Information systems are used in all functional areas of business organizations:

- Accounting and finance
- Customer service
- Human resources
- Research and development
- Sales and marketing
- …

# Business Information Systems

Information systems are also used in nearly every industry such as:

- Agriculture
- Banks
- Health care

# Business Information Systems


Healthcare organizations use information systems to diagnose illnesses, plan medical treatment, track patient records, and bill patients.

# Business Information Systems

Information systems are also used in nearly every industry such as:

- Mining
  - Companies use global positioning systems to identify and evaluate promising areas for mineral exploration, model mine construction,
- Professional services
  - Accounting, tax preparation, and investment firms use information systems to improve the speed and quality of the services

# Business Information Systems

Information systems are also used in nearly every industry such as:

- Retail
  - Companies use information systems to help market products and services, manage inventory levels, and forecast demand, as well as take orders directly from customers over the Web.
- …

# Electronic Commerce

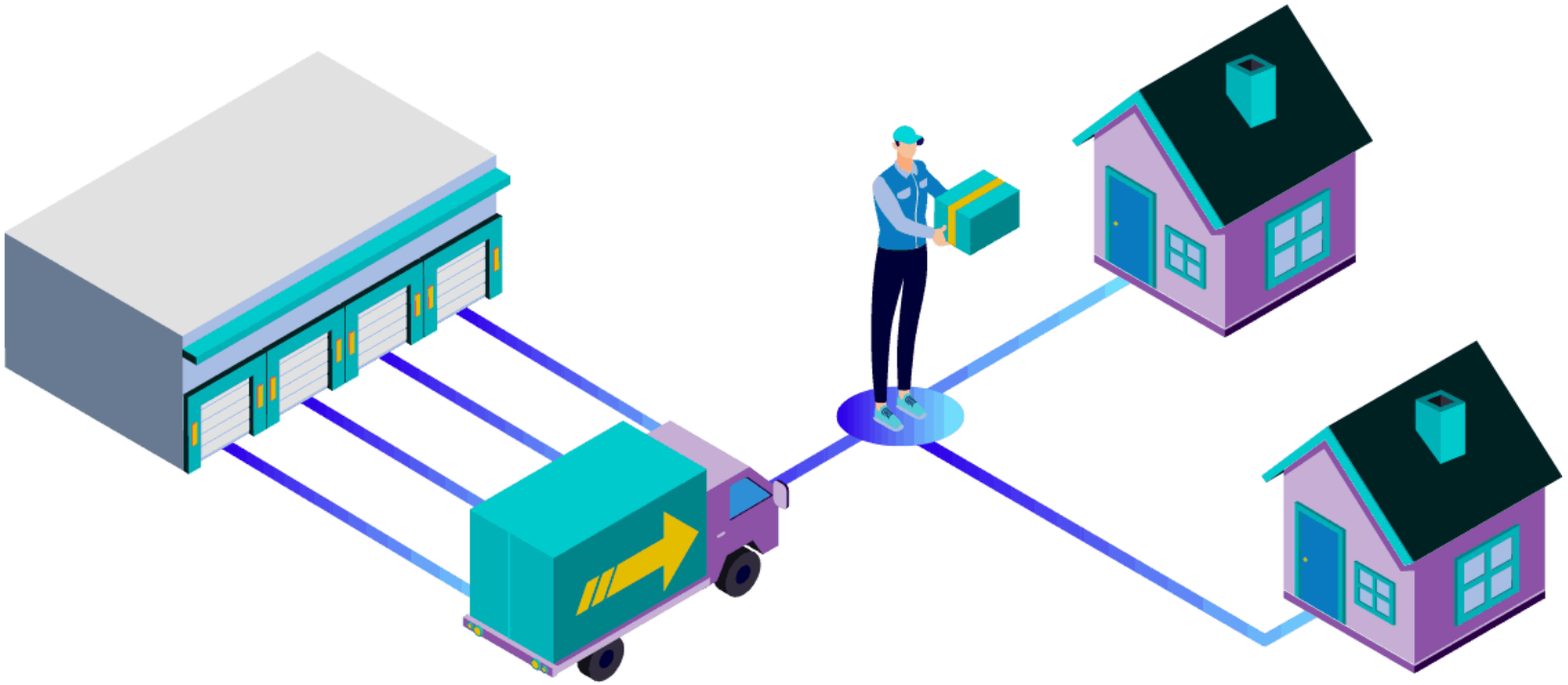
- **E-commerce** involves the exchange of money for goods and services over electronic networks.
- Forms of e-commerce:
  - business-to-business (B2B)
  - business-to-consumer (B2C)
  - consumer-to-consumer (C2C)
  - …

# E-commerce: Business-to-business (B2B)

- Business-to-business is a situation where one business makes a commercial transaction with another. This typically occurs when: A business provides raw material to the other company that will produce output.

# E-commerce: Business-to-consumer (B2C)

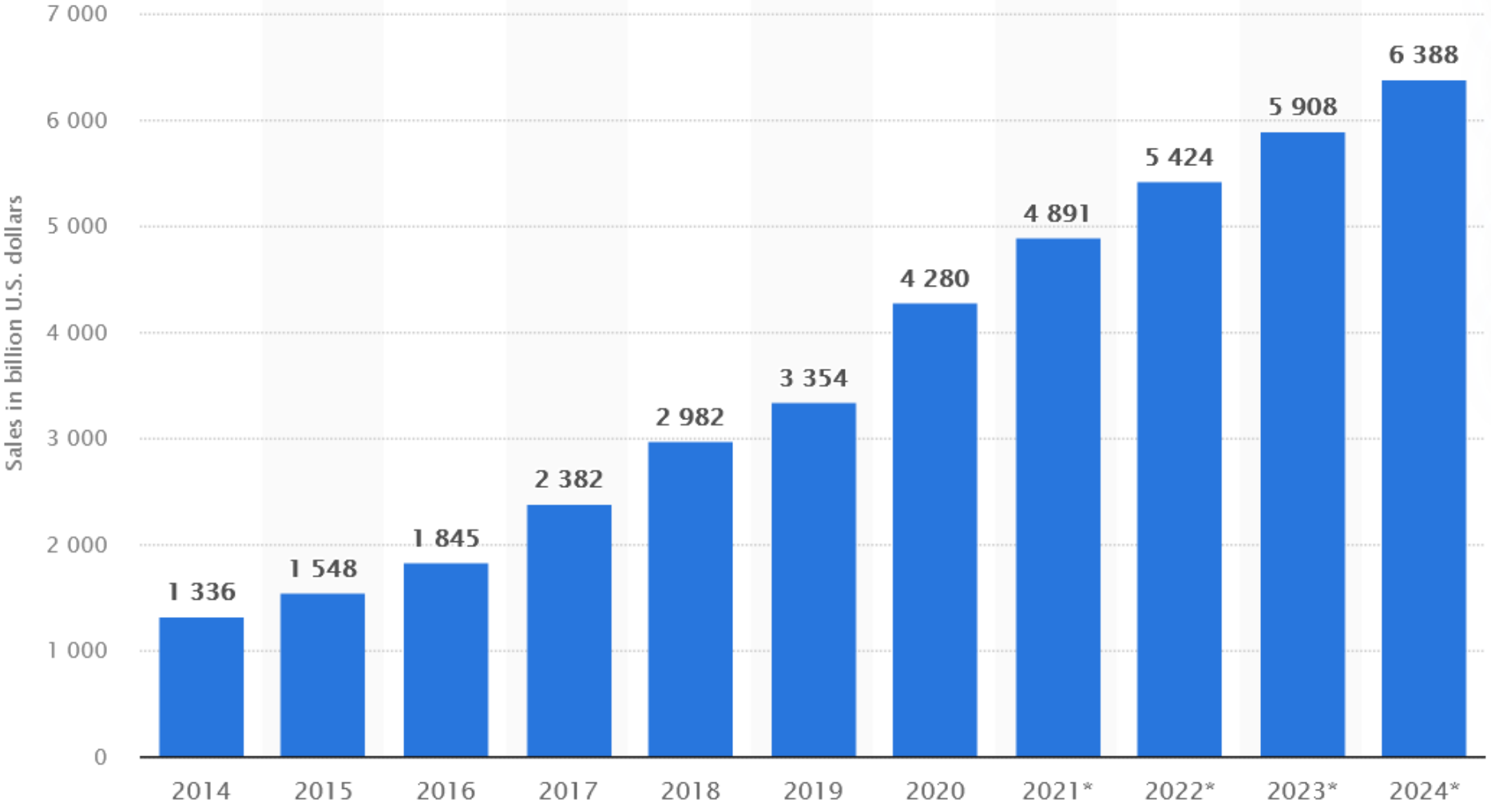
- B2C refers to the process of selling products and services directly between a business and consumers who are the end-users



# E-commerce: Consumer-to-consumer (C2C)

- C2C refers the process of selling products and services between private individuals.

# Retail e-commerce Sales Worldwide From 2014 to 2024



# Mobile Commerce

- **M-commerce** is the buying and selling of goods and/or services using mobile devices such as smartphones and tablets.

# Mobile Commerce

- E-commerce is a constantly growing, but mobile commerce is growing at an even faster rate.
- To be clear, m-commerce is **not a separate entity from e-commerce**: instead, it is a more specific sub-group of e-commerce transactions that involves the use of smartphones and tablets, instead of desktop and laptop computers.
- M-commerce can be used to support all forms of e-commerce.

# Mobile Commerce

- Failing to provide a mobile-friendly shopping experience might just be putting you at a disadvantage, given the growing number of smartphone and tablet users.
- The main goal in m-commerce is to ensure that your business' shopping experience is well-suited to the smaller screen sizes that we see on smartphones and tablets.

# Electronic Business

- **E-business** is the electronic connection of business operations to customers, suppliers, and other partners.
- **E-business** is not just buying and selling goods and services.

# Electronic Business

- **E-business** goes beyond e-commerce by using information systems and the Internet to perform all business-related tasks and functions.

# Transaction Processing Systems

- Transaction:
  - Any business-related exchange, such as payments to employees and sales to customers.
- Transaction processing system (TPS):
  - TPS automates routine and repetitive tasks that are critical to the operation of the organization, such as preparing a payroll and billing customers.
  - Primary purpose to perform transactions and collect data

# Transaction Processing Systems

- One of the first business systems to be computerized was the payroll system.
- Other high-volume, repetitive processes, such as order processing, customer billing, and inventory control, were soon computerized as well.

# Management Information Systems

- MIS is the use of people, procedures, hardware, software, databases, and devices to collect, store and process data to produce information that managers or decision makers can use to make day to day decisions.
- An MIS typically provides standard reports generated using data from a TPS.
- Primary purpose to process data into information.

# TPS and MIS

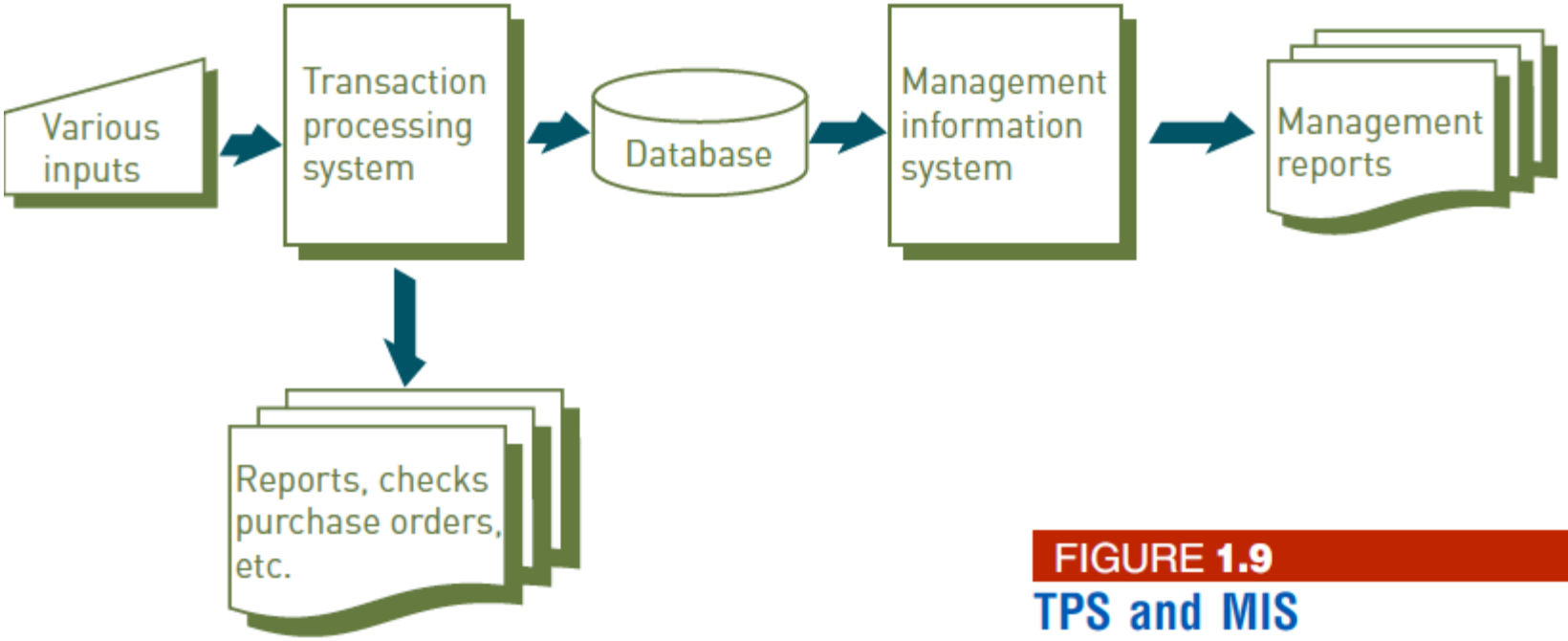



**FIGURE 1.9**

**TPS and MIS**

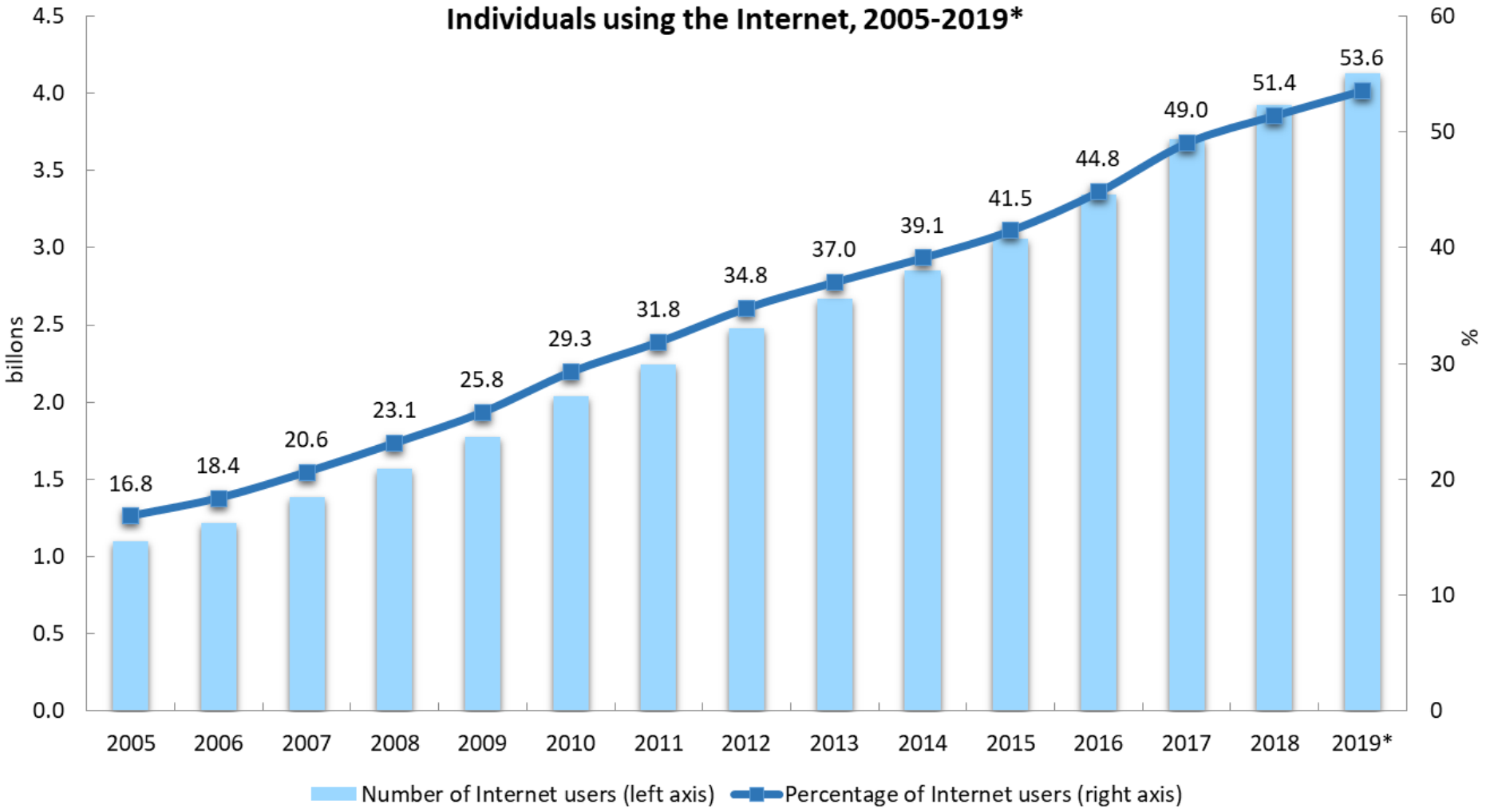
The TPS and MIS work together to process business transaction and create standard management reports.

# TPS and MIS

- The TPS receives input from various sources, which it then edits and processes to create various outputs and to update a database. This database can be accessed by an MIS to create various reports such as periodic reports, exception reports, summary reports, etc.

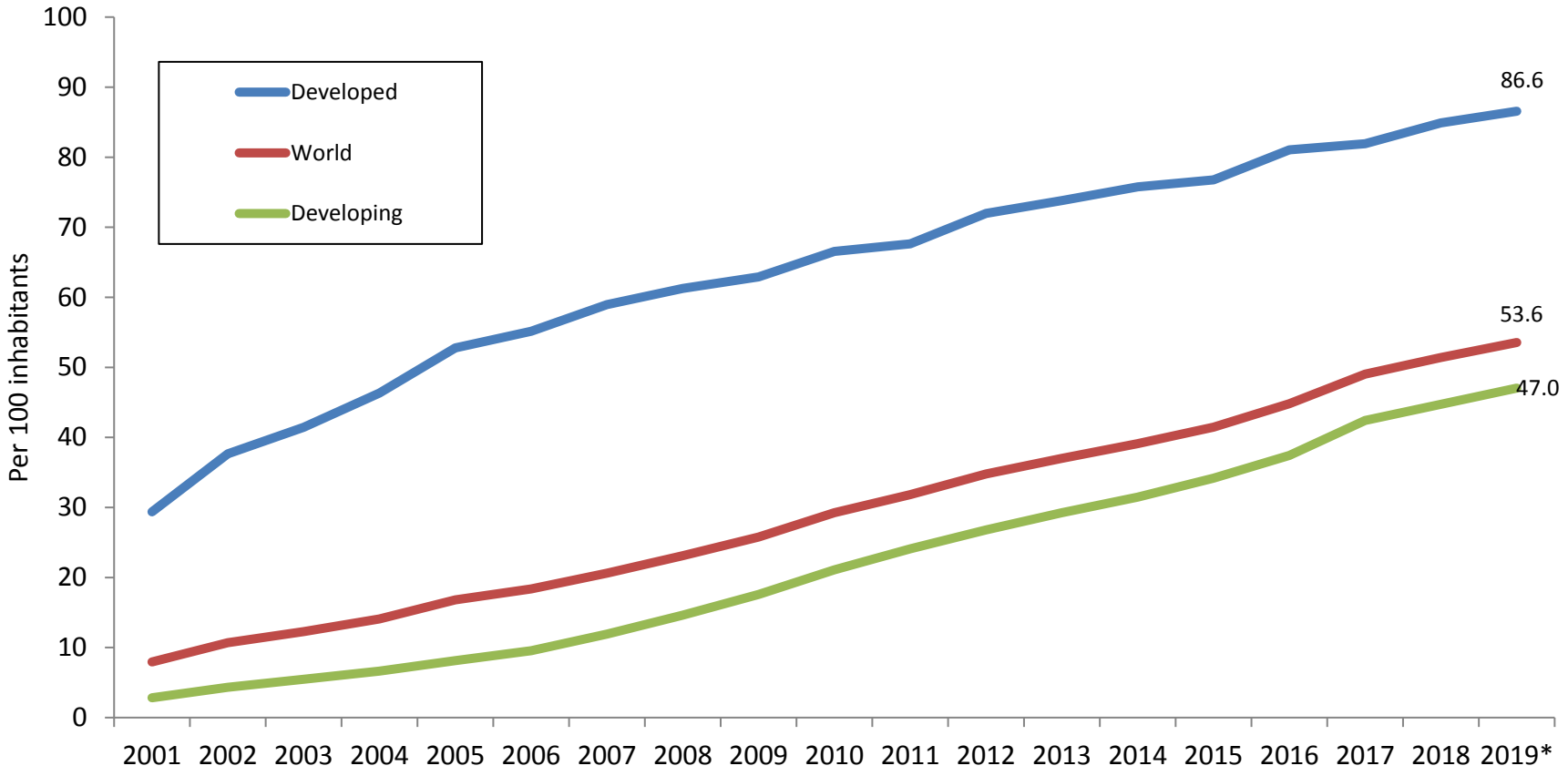
# Digital Divide

- Digital divide refers to the difference between people who do and do not use modern technology such as computers and the Internet to improve their standard of living.




Note: * ITU estimate
Source: ITU.

It is estimated that at the end of 2019, 53.6 per cent of the global population, or 4.1 billion people, are using the Internet.


Individuals using the Internet per 100 inhabitants, 2001-2019*
Per 100 inhabitants
100
90
80
70
60
50
40
30
20
10
0
Developed
World
Developing
86.6
53.6
47.0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019*

# Digital Divide

More than 4 billion people are able to connect to the Internet, most of them living in the industrialized areas.

Many people cannot live anymore without ICTs while some billions of people around the globe have not yet had a chance to use ICTs. This is what we call the **Digital Divide**.

**Digital Divide** is a term that refers to the gap between those who benefit from the Digital Age and those who do not.

# Digital Divide

Even among populations with some access to ICT, the Digital Divide can be evident in the form of:

- lower-performance computers,
- lower-speed wireless connections,
- limited access to some contents,
- restricted access to some contents, etc.

# Digital Divide

The Digital Divide typically exists between:

- those in urban areas and those in rural areas
- the educated and the uneducated individuals
- the more and less industrially developed nations.
- …

# References


- **Reynolds, George Walter, Stair, Ralph M.** "Principles of information systems", 13e – 2017