Module 4
IT Applications, Societal and Ethical Considerations

Lec 6

Module Outline

- IT Application Domains:
  - Education and E-learning
  - Medical and healthcare
  - Agriculture
  - E-Business and E-Commerce
  - Manufacturing
  - Law enforcement
  - E-government
  - Entertainment
- Impact on environment & other ecological considerations
- Information and Knowledge economy.
- Information Technology ethics

Module Outline

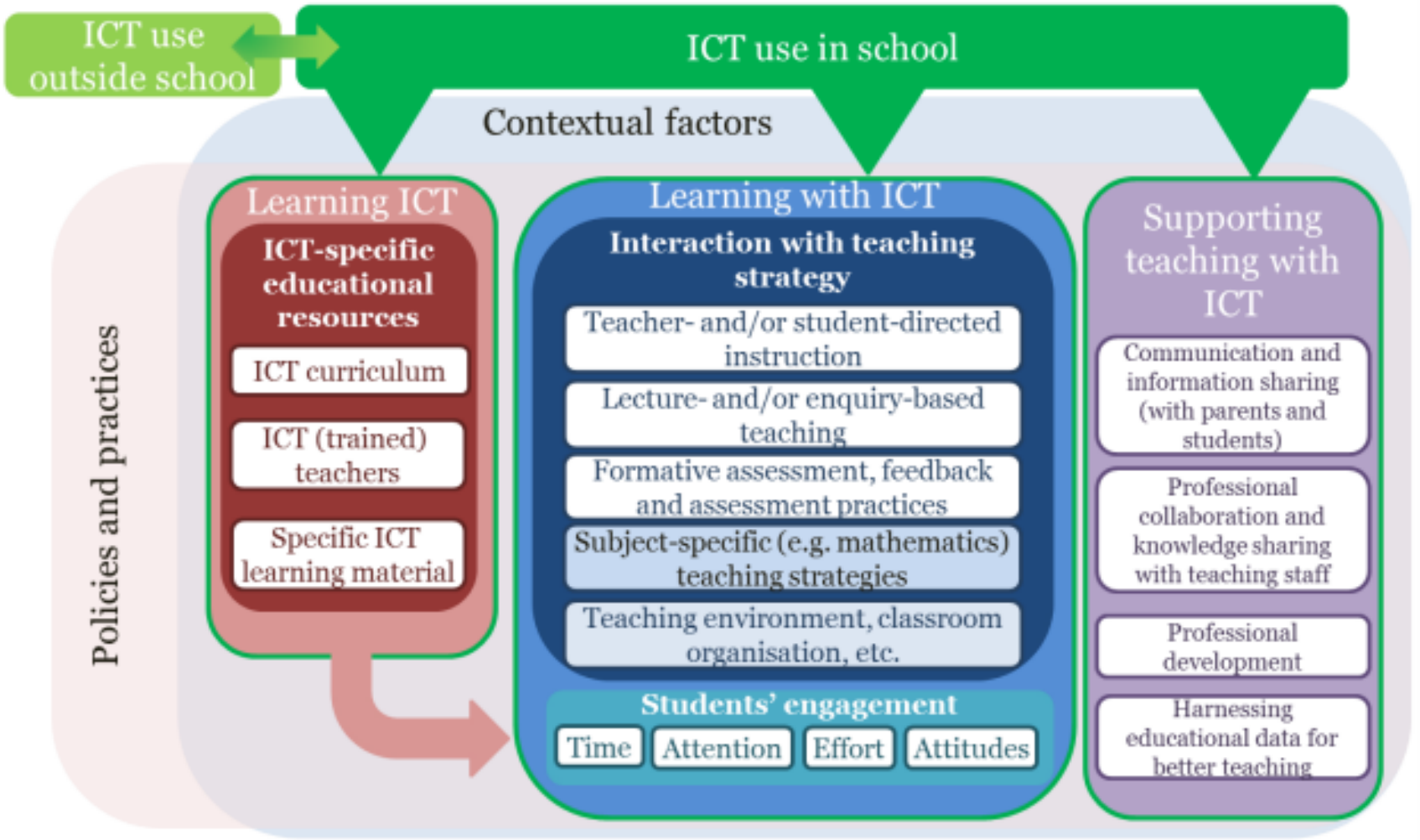
- IT Application Domains:
  - Education and E-learning
  - Medical and healthcare
  - Agriculture
  - E-Business and E-Commerce
  - Manufacturing
  - Law enforcement
  - E-government
  - Entertainment
- Impact on environment & other ecological considerations
- Information and Knowledge economy.
- Information Technology ethics

Education and E-learning

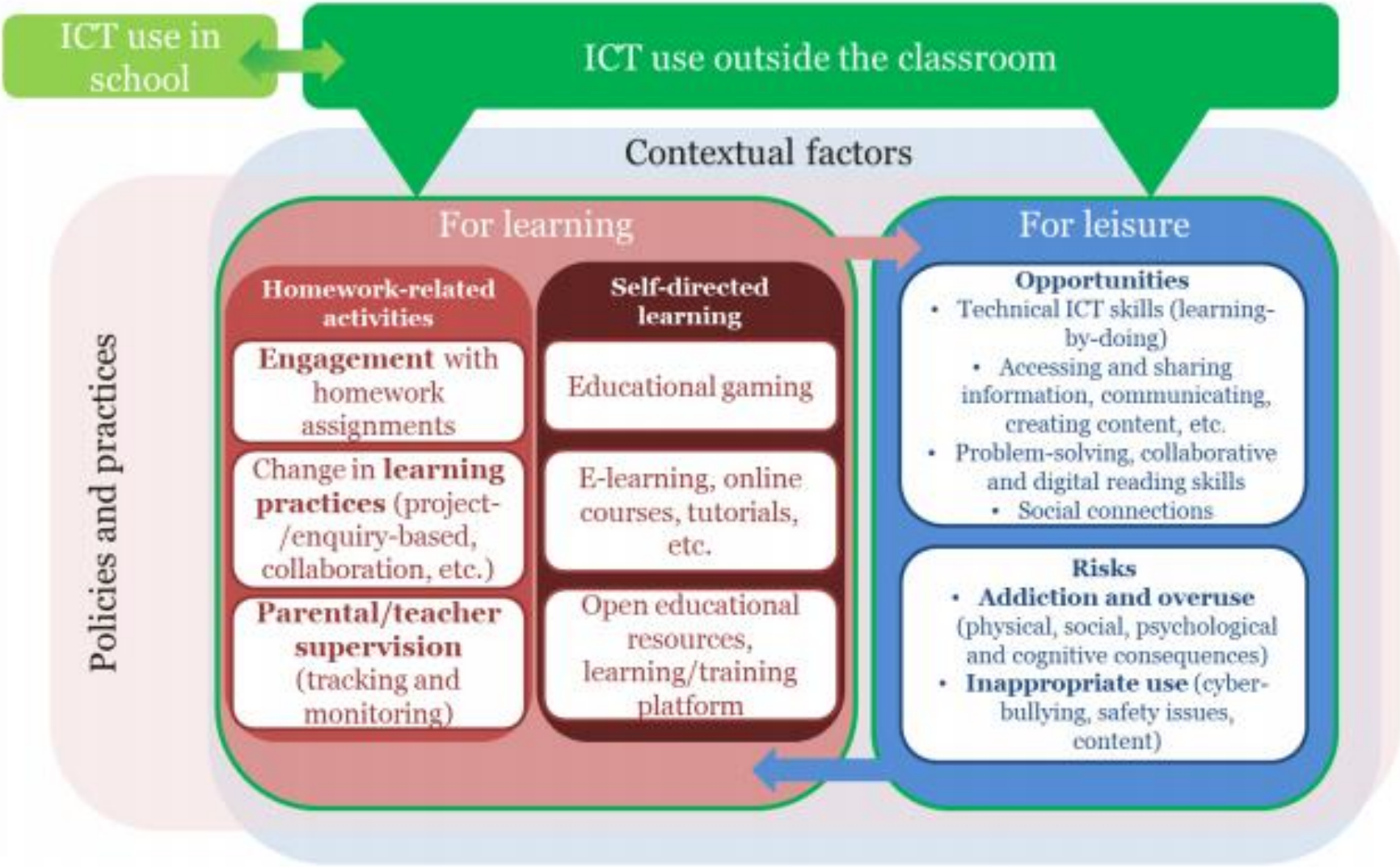
Introduction

- The entrance of ICT into educational field resulted into efficiency increase and more effects of education system, as technology makes the learning environment more attractive and applicable.
- Computer-based games and simulations began to be incorporated in education and training to achieve specific learning objectives.
- Learning is not limited only to what has been performed in classroom, but it may lead to benefiting from technology for development of education for all levels of society.

Usage of ICT in schools and universities



Usage of ICT outside classrooms



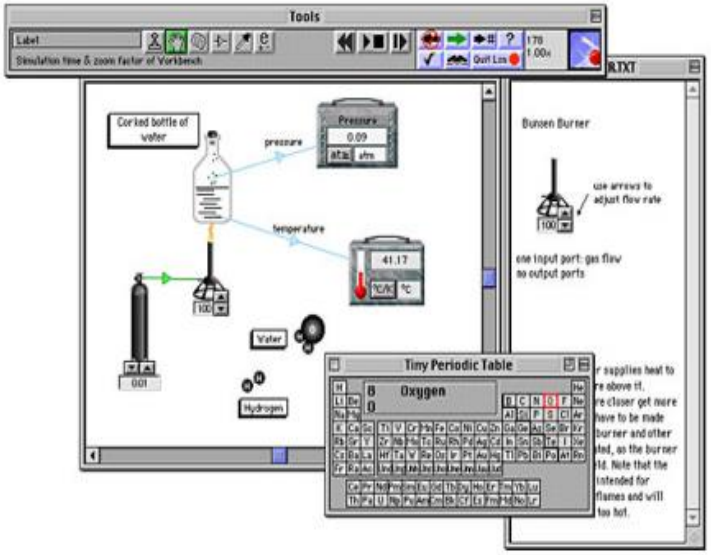
The advantages of ICT in Teaching/Learning (1 of 3)

1- Revising & supplying of items:

- Usage of simulation to submit ideas, processes and activities which are difficult and/or impossible without technology.

Example:

- The medical field.
- **ActivChemistry** : is a simulation of a chemistry lab.



The advantages of ICT in Teaching/Learning (2 of 3)

2- Access to information:

- Learners may find easy access to some information through different technologies, such as **internet, to study interesting and motivating items**, and to provide **suitable content for institutions with weak resources**.

3- More variety and changes:

- Benefiting from technology **creates a fundamental change in learning process**, such as easy learning process, accelerating of time and data analysis, and involvement of learners.

The advantages of ICT in Teaching/Learning (3 of 3)

4- Cooperation:

- Learners may collect wide range of information by cooperation in groups of learners and other scientific activities.

5- Providing new educational position:

- The instructor may provide more concepts on both practical and imaginary forms for the learners.

Examples of applying ICT in Education/Learning

- Students use **email** **to set up appointments with professors, discuss grades, or get clarification of an assignment**.
- Instructors use presentation graphics software such as **PowerPoint** **to show their lecture outlines and other materials on classroom screens** .
- **Moodle, Blackboard, WebCT, Google classroom and other course-management software** are used **for administering online assignments, schedules, examinations, and grades**.

Examples of applying ICT in Education/Learning

- **Distance learning (e-learning) can**:
  - Bring career and technical courses to high school students in remote areas
  - Pair gifted science students with master teachers in other parts of the country
  - Help busy professionals obtain further credentials outside business hours.
- **In companies**, **Employees training programs** may find themselves engaged in mock conversations with **avatars (computer depictions of humans)**that represent imaginary customers and coworkers, combining the best parts of computer-based learning with face-to-face interaction.

Medical and Healthcare

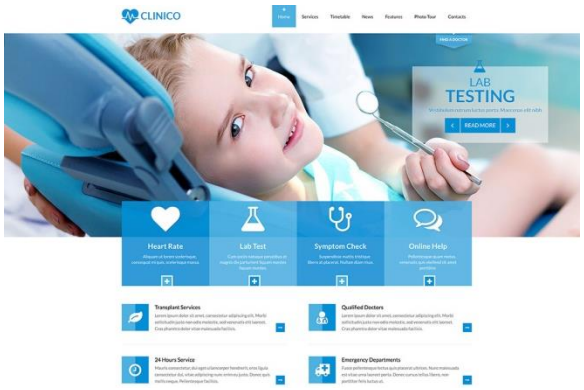
Introduction

- Information Technology has brought major improvements in health-care delivery, ranging from better and faster diagnoses, to expedited research and development of new drugs, to more accurate monitoring of critically ill patients.
- One technology that has made a special contribution is **Artificial Intelligence**.

Usage of Internet

The Internet is a gold mine of medical information.

- There are numerous Web sites devoted to all kinds of specific health topics:
  - Some web sites **provide up-to-date medical, fitness, nutrition, or exercise information**.
  - others maintain lists of doctors and dentists to **help you find the one that suits your needs. They have chat rooms, so that you can talk to others diagnosed with similar conditions**.
  - Some Web sites even **allow you to order prescriptions online**.
- Growth of Internet has profound *effect on health care organizations* business.
- Vendor community explodes.
- Products more widely available and affordable.
- Enterprise-wide systems.



Hospital Information System

- It may comprise a number of subsystems:
  - **The Administrative Subsystem includes**: **Patient registration, medical and other technical staff information, nursing schedule, accounting, billing, and payroll**.
  - **The Medical Subsystem includes**: **Clinical laboratories, radiology department, operations rooms, Intensive Care Unit, and pharmacy**.
- Advances in **database systems** and **Local Area Networks** facilitate the implementation of such systems.

Diagnosing التشخيص

- The medical industry has long been using advanced technologies to diagnose and treat health problems, here are few examples:
  - **Expert systems support diagnosis of diseases تشخيص الأمراض**
  - **Machine vision is enhancing the work of radiologists.**
  - **Cardiologists can interpret patients' hearts' vital signs from a distance تفسير العلامات الحيوية لقلوب المرضى من مسافات بعيدة**
  - **Using devices such as a small transistor that a sick person can wear on a necklace. If the person needs help, a computer chip automatically activates the telephone to notify an operator who can contact an emergency service or a physician. تقوم شريحة الكمبيوتر تلقائياً بتنشيط الهاتف لإخطار عامل الهاتف الذي يمكنه الإتصال بخدمة الطوارئ أو الطبيب**

Long-distance Health Care (1 of 2)

1- **Telemedicine التطبيب عن بعد: It is use of telecommunication technologies to provide medical services.**

- Health-care professionals in separate locations conduct live conferences on the computer. For example, a doctor at one location can have a conference with a doctor at another location to discuss a bone X-ray. Live images of each doctor, along with the X-ray, are displayed on each doctor's computer.
- It involves transmitting medical information **for the purpose of diagnosis and treatment of patients using: PCs, communication links, and special imaging equipment**.
- **Telemedicine consists of :both real-time interactive consultations and batch processing of patient.**
- It could also be used **in continuing medical education**.
- **It provides medical service to patients who cannot travel long distances due to health reasons**.
- **Its services may be essential for remote areas.**

Long-distance Health Care (2 of 2)

2- Telesurgery, also called **remote surgery**, where a surgeon performs an operation on a patient **who is not located in the same physical room as the surgeon**.

- Surgeons started to use **virtual reality** to plan complex surgeries, and used a surgical robot to perform long distance surgery. Telesurgery enables surgeons to direct robots to perform an operation via computers connected to a high-speed network.
- **Surgical robots** :**can allow military doctors to perform operations remotely in battle field.**
- **الروبوتات الجراحية : يمكن أن تسمح للأطباء العسكريين بإجراء العمليات عن بعد في ميدان المعركة.**

Surgical Robots

Agriculture

Introduction

- **Precision Agriculture (PA)** : **is a whole-farm management approach using information technology, satellite positioning (Global Navigation Satellite System-GNSS) data, remote sensing and proximal data gathering.**
- These technologies **have the goal of optimizing** returns on **inputs enabling important gains in efficiency and productivity, while potentially reducing environmental impacts**.

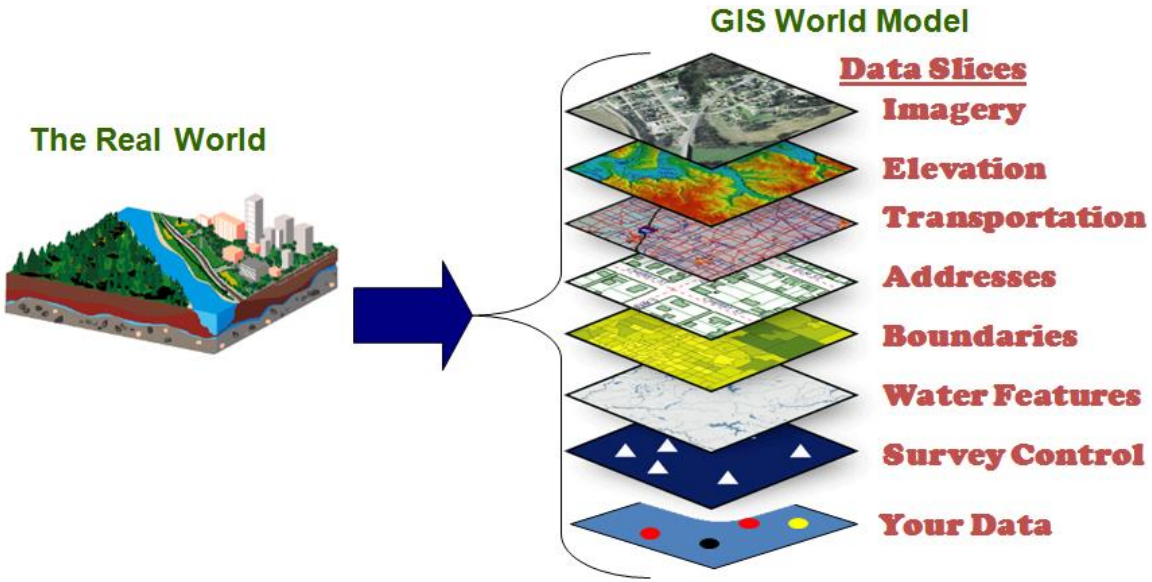
ICT activities in agricultural sector

ICT activities in this sector are **related to**:

- **Diagnosing of disease, field monitoring, crop yield analysis, soil erosion, variable rate of fertility, Water resource management, and Climate monitoring.**
- **Agriculture Biodiversity and Genetic Engineering (GE)** aspects can benefit from **"genetic banks" containing vast amounts of information** and could be accessed through the Internet.

Geographical Information Systems (GIS)

- **A Geographic Information System (GIS)** : **is a framework for gathering, managing, and analyzing data**.
- **GIS** has **the capability to analyze soil data** and determine which crops should be planted where and how to maintain soil nutrition so that the plants are best benefitted.
- **GIS in agriculture** وظيفته : **helps farmers to achieve increased production and reduced costs by enabling better management of land resources.**

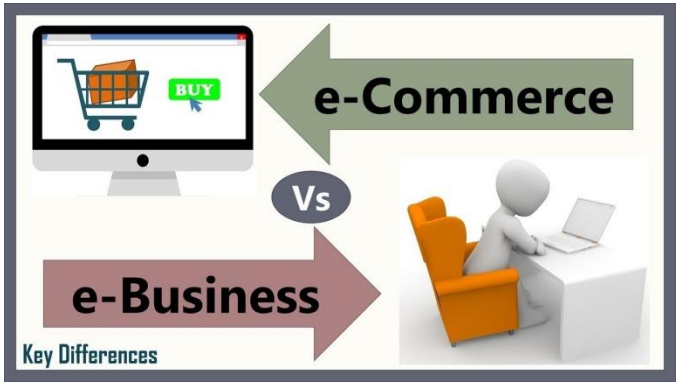


Global Positioning Systems (GPS)

- **The Global Positioning System (GPS) :is a satellite-based radio-navigation system.**
- **GPS allows farmers to accurately navigate to specific locations in the field, year after year, to collect soil samples or monitor crop conditions**. Crop advisors use **rugged data collection devices with GPS for accurate positioning to map pest, insect, and weed infestations in the field**.
  - **For example, GPS is optimizing the usage of the tractor, this includes driver's assistance to optimize routes and shorten harvesting and crop treatment, while reducing fuel consumption.**

E-Business and E-Commerce

Introduction



Electronic commerce (EC or e-commerce) : describes the process of buying, selling, transferring, serving, or exchanging products, services, or information via computer networks, including the Internet.

E-business : **refers to a broader definition of EC, not just the buying and selling of goods and services**, but also servicing customers, collaborating with business partners, conducting e-learning, and conducting electronic transactions within an organization.

Important Types of E-commerce (1 of 2)

1- Business-to-business (B2B): involves sales of goods and services among businesses as both the sellers and the buyer, are business organizations.

- **The vast majority of EC** volume is of this type.
- B2B is **based on proprietary systems for electronic data interchange (EDI)**, which enables the computer-to-computer exchange between **two organizations** of standard transactions such as invoices, bills, shipment schedules, or purchase orders.

Important Types of E-commerce (2 of 2)

2-Business-to-consumers (B2C): the sellers are organizations, and the buyers are individuals, involves retailing products and services to individual shoppers. **B2C is also known as e-tailing**.

3-Consumer-to-consumer (C2C), an individual sells products or services directly to other individuals. You also will see the term C2C used as **"customer-to-customer."**

Major EC Mechanisms

1. Electronic markets : is a virtual marketplace in which sellers and buyers meet and conduct different types of transactions.
2. Electronic catalogs : consist of a product database, directory and search capabilities, and a presentation function.
3. Electronic auctions : المزادات الإلكترونية تنقسم إلى
    1. Forward auctions : are auctions that sellers use as a selling channel to many potential buyers.
    2. Reverse auctions, there is one buyer, and Suppliers are invited to submit bids.
4. Online bartering المقايضة عبر الإنترنت: electronically supported exchange of goods or services without a monetary transaction.

M-commerce (Mobile Commerce)

- **The emergence of wireless mobile devices such as smartphones, tablet computers using either cellular networks, or Wi-Fi wireless networks lead to mobile commerce** or **m-commerce**.
- M-commerce applications have taken off for services that are time-critical, that appeal to people on the move, or that accomplish a task more efficiently than other methods.
- Banks and credit card companies are rolling out services that let customers manage their accounts from their mobile devices. High percent of online retailers now have m-commerce Web that make it possible for shoppers to use cell phones to place orders through apps for m-commerce sales.