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Plan Knowledge Area
Build Knowledge Area
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EUCIP CORE 3.0
COURSE BOOK

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Plan Knowledge Area: Use and Management of Information Systems

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A.1.4 Business Plans

Learning Objectives

- Outline the typical components of a business plan and its relevance for investors
- Describe the role of performance indicators and analysis techniques, such as SWOT, in relating business strategies to market and environmental factors
- Describe a suitable ICT solution for a given business plan

A.1.4.1 Outline the typical components of a business plan and its relevance for investors

A business plan precisely defines your business, identifies your goals, and serves as one of the primary drivers of your company. The basic components include a current balance sheet, an income statement, and a cash flow analysis. A business plan helps you allocate resources properly, handle unforeseen complications, and make good business decisions. Because it provides specific information about your company and how you will repay borrowed money, a good business plan is an essential part of any loan application. Additionally, it informs sales personnel, suppliers, and others about your operations and goals whether the plan is to modify an existing process or radically reengineer your business in a paradigm shift.

Generic Attributes of a Business Plan

Before developing a business plan, ensure that it reflects the following generic attributes:

- Credibility
- Objectivity
- Unambiguous and specific language
- Clarification of key assumptions
- Introduction of sufficient independent corroborating evidence
- Internal consistency
- Demonstrated awareness of critical success factors, key risk areas, and critical vulnerabilities

Business Plan Basics

The importance of a comprehensive business plan should not be under estimated. Everything depends on it:

- Outside funding
- Credit from suppliers
- Management of the operation and finances
- Promotion and marketing of the business
- Achievement of the goals and objectives.

Despite the critical importance of a business plan, many entrepreneurs are slow when it comes to preparing a written document. They argue that their marketplace changes too fast for a business plan to be useful or that they just don't have enough time. But just as a builder won't begin construction without a blueprint, eager business owners shouldn't rush into new ventures without a business plan.

The area of economic elasticity (estimated demand elasticity) with regard to quantity and price should be examined to highlight to stake holders whether there is flexibility in the proposed process

or workflow. One typical application of the concept of elasticity is to consider what happens to consumer demand for a product (for example, sugar) when prices increase. As the price of a product rises, consumers will usually demand a lower quantity, perhaps by consuming less, substituting other products, and so on. The greater the extent to which demand falls as price rises, the greater the price elasticity of demand. Conversely, as the price of a product falls, consumers will usually demand a greater quantity, by consuming more, dropping substitutes, and so forth. However, there may be some products that consumers require, cannot consume less of, and cannot find substitutes for even if prices rise (for example, certain prescription drugs). Another example is oil and its derivatives such as petrol. For such products, the price elasticity of demand might be considered inelastic.

A.1.4.2 Describe the role of performance indicators and analysis techniques, such as SWOT, in relating business strategies to market and environmental factors

Techniques such as critical success factors, swot analysis and market research all come into play when preparing business strategies. Before beginning a business plan, four core questions should be considered:

- What service or product does the business provide and what needs does it fill?
- Who are the potential customers for the product or service and why will they purchase it?
- How will the business reach its potential customers?
- Where will the financial resources come from to start the business?

Writing the Plan

A business plan can be divided into four distinct sections:

1) Description of the business
2) Marketing
3) Finances
4) Management

In addition, an executive summary, supporting documents, and financial projections over five years should be included.

Elements of a Business Plan

1. Purpose and Scope

2. Table of Contents

Defining The Business in terms of:

- Description of business
- Marketing
- Competition
- Operating procedures
- Personnel
- Business insurance

Defining Financial Data in terms of:

- Loan applications
- Capital equipment and supply list
- Balance sheet and Breakeven Analysis
- Profit & loss statements
- Three-year summary
- Pro-forma cash flow

Supporting Documents:

- Tax returns of principals for last three years
- Personal financial statement
- Franchise contract for franchised businesses
- Copy of proposed lease or purchase agreement for buildings
- Copy of licenses and other legal documents
- Copy of resumes of all principals
- Copies of letters of intent from suppliers, etc.

Presenting a Business Plan

The format of a business plan depends on its presentation context. It is not uncommon for businesses, especially start-ups to have three or four formats for the same business plan:

- an "elevator pitch" - a three minute summary of the business plan's executive summary. This is often used as a teaser to awaken the interest of potential funders, customers, or strategic partners.
- an oral presentation - a hopefully entertaining slide show and oral narrative that is meant to trigger discussion and interest potential investors in reading the written presentation. The content of the presentation is usually limited to the executive summary and a few key graphs showing financial trends and key decision making benchmarks. If a new product is being proposed and time permits, a demonstration of the product may also be included.
- a written presentation for external stakeholders - a detailed, well written, and pleasingly formatted plan targeted at external stakeholders.

- an internal operational plan - a detailed plan describing planning details that are needed by management but may not be of interest to external stakeholders. Such plans have a somewhat higher degree of candour and informality than the version targeted at external stakeholders.

If you are preparing a business plan which will include major software investment and services from a supplier, it is essential to include a form or detailed list of questions which would be submitted to suppliers to determine if the vendor's product can meet all of your essential requirements. This form is often referred to as a Request For Proposal (RFP).
An information systems plan is also required which is a detailed plan or roadmap indicating proposed network structures, systems scope and direction and the proposed implementation plan and budget.

A.1.4.3 Describe a suitable ICT solution for a given business plan

Many companies use the white-paper method for drawing up a business plan. This involves high level round table discussion and literally, putting pen to paper. This information is then transferred to a Word processing document or spreadsheet template. There are numerous business modelling techniques, workflow management systems and data modelling techniques available which can help in the process. However, all business plans stem from an idea whether innovate or for business or process improvement. One important concept to bear in mind is that business planning, like technology, is ever changing, therefore, no matter what form a business plan takes, it must be easily modified, adaptable and easily understood for transferability.

Sample Questions:

1. Why are the generic attributes of a business plan so important?
2. What are the main sections of any given business plan?
3. What is Demand Elasticity?
4. Draw up a summary business plan with the following scenario:
   You are the directors of a subsidiary pharmaceutical company which manufactures and packages approved tablets for European and American markets.
   Your company requires funding to build and accommodate a new laboratory which will develop and validate a new pharmaceutical product for the treatment of human heart failure.

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B.2.3 Data Modelling

Learning Objectives

- Define data abstraction and describe the difference between physical level, conceptual (logical) level, view (user) level
- Distinguish between different groups of data models, such as the object-based logical model, record-based logical model, physical data model
- Describe the principles of record-based logical models, such as hierarchical model, network model.
- Describe the principles of object-based logical models, such as the entity-relationship model and the object-oriented model

B.2.3.1 Define data abstraction and describe the difference between physical level, conceptual (logical) level, view (user) level

Data Abstraction

The major purpose of a database system is to provide users with an abstract view of the system. The system hides certain details of how data is stored and created and maintained. Good design provides that complexity should be hidden from database users

A Database Management System (DBMS) provides the ability for many users to share data and process resources. This causes the difficulty of many different user needs. For example, some HR users of a company database will need to see salary details while other users in the same function may need to see only work performance or attendance records.

In order to solve this problem the DBMS provides different views of the database data: (a) the conceptual or logical level and (b) the physical level and (c) the user level.

The physical level is concerned with the data structures, the files, folders and servers that make up the system. It describes how the data is stored. It contains complex low level structures described in detail. It is the lowest level of abstraction.

The conceptual level identifies the set of familiar task-oriented objects and actions the user needs to know about in order to use the system. It is the next level above the physical level. It describes what data is stored and the relationships between that data.

The User level is the highest level of abstraction. It describes part of the database for a particular group of users and there can be many views.

B.2.3.2 Distinguish between different groups of data models, such as the object-based logical model, record-based logical model, physical data model

Data models are a collection of conceptual tools for describing data, the relationships between this data, data semantics and data constraints.

Data semantics can be described as the meaning and the use of data. In a systems context semantics can be thought of as an object stored in a database system and the real world object it represents.
Data constraints are those rules that must be followed when entering data into a database system. This is used to maintain the integrity of data in a table.

For example, when you delete a value that is used in one or more related tables, a ForeignKey Constraint can determine whether the values in the related tables are also deleted, set to null values, set to default values, or whether no action occurs.

There are three different groups of data models

Object based logical models

Object based logical model describe data at the conceptual and view levels and provide reasonably flexible structuring capabilities. They allow the designer to specify data constraints explicitly. There over 30 of these models and they include:

- Entity Relationship model
- Object-Oriented model
- Binary model
- Semantic data model
- Infological model
- Functional data model

Record based logical models

Record based logical models also describe data at the conceptual and view levels.

A record based logical model is so called because the database is structured in fixed format record of several types. Each record type defines a fixed number of fields and each field is usually of a fixed length.

The most widely accepted models are:

- Relational
- Network
- Hierarchical

Physical Data models

Physical Data models are used to describe data at the lowest level. It is a representation of a data design which takes into account the facilities and constraints of a given database management system.

There are very few models, e.g.
Unifying model and Frame memory

B.2.3.3 Describe the principles of record-based logical models, such as hierarchical model, network model

Record-based logical models:

Record-based logical models describe data at the conceptual and view levels. Unlike object-oriented models they are used to specify overall logical structure of the database, and to provide a higher-level description of the implementation.

Record-based logical models are so named because the database is structured in fixed-format records of several types. In this method each record type defines a fixed number of fields, or attributes. Also each field is usually of a fixed length which simplifies the implementation.

Record-based models do not include a mechanism for direct representation of code in the database. Separate languages associated with the model are used to express database queries and updates.

The three most widely-accepted models are the relational, network, and hierarchical.

The Hierarchical model:

The Hierarchical model is similar to the network model.
The organization of the data is represented by collections of records and relationships among data are represented by links organized as a collection of trees, rather than arbitrary graphs

The Network model:

Data is represented by collections of records.
Relationships among data are represented by links.
Organization is that of an arbitrary graph.

B.2.3.4 Describe the principles of object-based logical models, such as the entity-relationship model and the object-oriented model

Object-based logical models describe data at the conceptual and view levels. They are characterized by the fact that they provide fairly flexible structuring capabilities and allow data constraints to be specified explicitly. There are many such models of which we will discuss both the entity-relationship model and the object-oriented model.

The Entity-Relationship model:

The entity relationship model is based on the perception of a world consisting of a collection of basic objects and the relationship between these objects.
An entity is a distinguishable object that exists.
A database usually contains groups of entities that are similar. For example, employees of a company share the same attributes. However, every employee entity has its own values for each attribute. An entity type defines a set of entities that have same attributes. A name and a list of attributes describe each entity type.

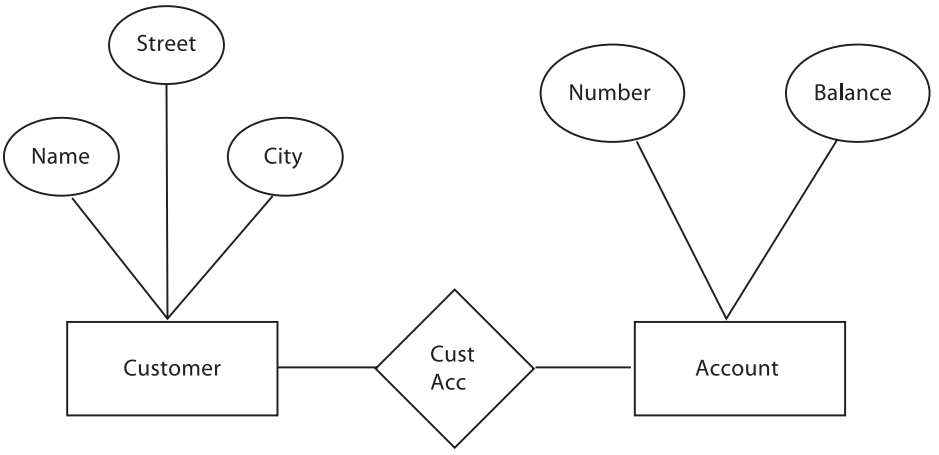
An entity set is a set of entities of the same type that share the same properties, or attributes. For example, all developers working in the department involved in the Internet projects can be defined as the entity set InternetGroup. The individual entities that constitute a set are called extensions of the entity set. Thus, all individual software engineers in the Internet projects are the extensions of the entity set InternetGroup Each entity has associated with it a set of basic attributes that describe it.

A relationship is an association between several entities. The set of all entities or relationships of the same type is called the entity set or relationship set.

Another essential element of the E-R diagram is the mapping cardinalities, which express the number of entities to which another entity can be associated via a relationship set.

The overall logical structure of a database can be expressed graphically by an Entity-Relationship diagram:

- Rectangles: represent entity sets.
- Ellipses: represent attributes.
- Diamonds: represent relationships among entity sets.
- Lines: link attributes to entity sets and entity sets to relationships. See example below.



Object-oriented model

Object-Oriented programming is based on the philosophy that software objects can usefully correspond to real-world entities. This is why we create a conceptual model that 'looks' object-oriented: it includes modelling elements referred to as 'classes', which have instances referred to as 'objects' The object-oriented model is based on a collection of objects, like the Entity-Relationship model.

An object contains values stored in instance variables within the object.
Unlike the record-oriented models, these values are themselves objects.
Therefore objects contain objects to an arbitrarily deep level of nesting. An object also contains bodies of code that operate on the object. These bodies of code are called methods.
Objects that contain the same types of values and the same methods are grouped into classes. A class may be viewed as a type definition for objects. The only way in which one object can access the data of another object is by invoking the method of that other object. This is called sending a message to the object. Internal parts of the object, the instance variables and method code, are not visible externally. This results in two levels of data abstraction.

Unlike entities in the Entity-Relationship model, each object has its own unique identity, independent of the values it contains:
Two objects containing the same values are distinct.
Distinction is created and maintained in physical level by assigning distinct object identifiers.

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C.1.2 Computer Architecture

Learning Objectives

- Identify, using diagrams, the architecture of a general purpose computer
- Describe the concept of chipset and the purpose of the various types of buses in a computer system
- Describe the concept of memory hierarchy, such as hierarchy levels, faster memory versus slower storage devices, cache efficiency, and its implications in computer systems
- Identify the range of computer systems available, such as handheld, laptop, desktop, multiprocessor servers, mainframes, and outline the main differences in their architectures

C.1.2.1 Identify, using diagrams, the architecture of a general purpose computer

At the heart of any computer is a simple circuit called an ALU, or Arithmetic Logic Unit. It is comprised of a few simple operations which can be done very quickly. This, along with a small amount of memory running at processor speed called registers, make up what is known as the CPU, or Central Processing Unit.

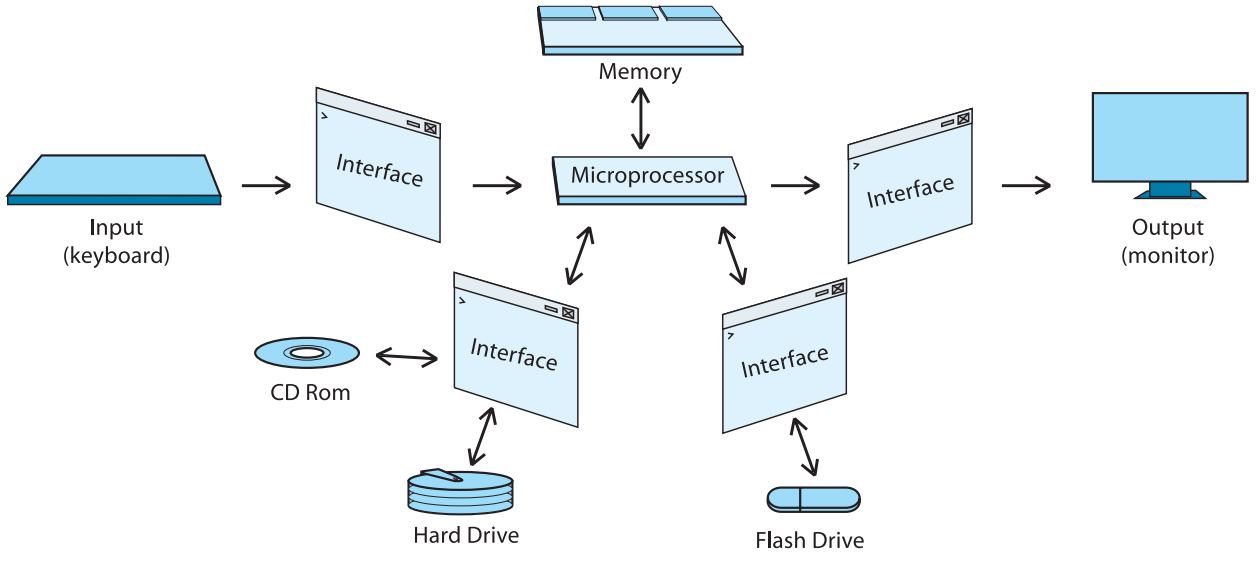
A CPU isn't very useful unless there is some way to communicate to it, and receive information back from it which is where the system bus comes in. The CPU is fed long streams of data via the system bus. The CPU receives at least two types of data:

1. Instructions on how to handle the other data.
2. Data, which must be handled according to the instructions.

The Bus is the input/output, or I/O gateway for the CPU. The primary area the CPU communicates with is system memory (RAM). Depending on the platform, the CPU may communicate with other parts of the system, or it may communicate just through memory.

The size of a platform is the native amount of bits that can be moved over the RAM<->CPU bus. Early computers varied on bit sizes, but most modern computers work in multiples of 8 bits, commonly known as a Byte.

Basic Computer Diagram:



In the diagram, the arrows indicate the direction of data flow.
Some data flows in one direction only.
In some cases it flows in both directions.

Microprocessor functions

The processor is made up of a group of interrelated units (or control units). Microprocessor architecture varies considerably from one design to another, but the main elements of a microprocessor are as follows:

A control unit that links the incoming data, decodes it, and sends it to the execution unit. The control unit is made up of the following elements:

- Sequencer that synchronizes instruction execution with the clock speed. It also sends control signals
- Ordinal counter that contains the address of the instruction currently being executed
- Instruction register that contains the next instruction.

An execution unit (or processing unit) that accomplishes tasks assigned to it by the instruction unit. The execution unit is made of the following elements:

- The arithmetical and logic unit (written ALU). The ALU performs basic arithmetical calculations and logic functions
- The floating point unit (written FPU) that performs partial complex calculations which cannot be done by the arithmetical and logic unit.
- The status register;
- The accumulator register.

A bus management unit (or input-output unit) that manages the flow of incoming and outgoing information and that interfaces with system RAM

C.1.2.2 Describe the concept of chipset and the purpose of the various types of buses in a computer system

One of the most important decisions made by anyone buying a new PC is which processor to choose. The factors to consider when making this decision are based on what type, speed and even what number of processors to use. The key to making such decisions lies in the motherboard chosen, and in particular the chipsets that control it.
A chipset is a group of microcircuits that manage data throughput to and from key components of a PC, such as the Central Processing Unit (CPU), the main memory and the secondary cache etc. They are transported by what's known as a bus. The bus carries the data to where it needs to go via the chipset.

Computer System Buses

Within PC's, there is an internal transport system which moves data between different areas via imaginary parallel lines. System buses are a common digital pathway between resources and devices and can operate in either a synchronous or asynchronous mode.

In a computer, there are two major types:

The system bus

Peripheral bus

The **system bus** is the internal path from the CPU to memory and is split into address bus and data bus subsets. Addresses are sent over the address lines to signal a memory location, and data are transferred over the data lines to that location.
System buses transfer data in parallel. In a 32-bit bus, data are sent over 32 wires simultaneously. A 64-bit bus uses 64 wires.

The **peripheral bus** is the pathway to the peripheral devices such as a disk or printer. PCI and PCI Express are widely used peripheral buses. Devices connect to these parallel buses with cables to controller cards that plug into slots on the motherboard.
Another common bus is USB, and devices are cabled to ports on the computer. USB is a serial bus, in which data travels over one wire. USB is a serial bus standard to interface devices to a host computer. USB was designed to allow many peripherals to be connected using a single standardized interface socket and to improve the plug-and-play capabilities by allowing devices to be connected and disconnected without rebooting the computer.
Other peripheral buses have been used, including ISA and Micro Channel.

Electronic buses were originally shared pathways, in which all devices receive the same signals. Subsequently, buses with point-to-point topologies were developed that send signals to only one device. In either case, there is no relationship to a vehicle that stops at bus stops, one after the other. The only data transfer technology somewhat similar to a real bus is a Token Ring network.

C.1.2.3 Describe the concept of memory hierarchy, such as hierarchy levels, faster memory versus slower storage devices, cache efficiency, and its implications in computer systems

As already discussed in C1.1, the memory hierarchy within most computers is as follows:

Memory Type	Speed of Access	Size
Registers	Fastest	Smallest
L1 Cache		
L2 Cache		
Main Memory (DRAM SRAM)		
Disk Storage		
Tertiary Storage	Slowest	Biggest

Registers are very fast, expensive, small in size and small in capacity.

Cache memory is fast, expensive of small size and small capacity but larger than registers.

DRAM is fast, affordable, of medium size and medium capacity.

Flash or USB memory is slower, cheaper small in size and large in capacity.

Hard drives are slow, cheap, large in size and capacity.

Tape backup is very slow, cheap, large in size and very large in capacity.

C.1.2.4 Identify the range of computer systems available, such as handheld, laptop, desktop, multiprocessor servers, mainframes, and outline the main differences in their architectures

An **IT system** can consist of computers, the telecommunications network and other programmable electronic devices.
There are many types of computer that are used for a variety of different needs.

Mainframe

A mainframe is a large and powerful computer that is capable of serving a vast number of users as the same time. Users connect to it using another smaller computer known as a dumb terminal. The terminal consists simply of a keyboard and screen to enter and display information. The terminal does not process or store any data itself. Mainframes need to process and store information for

many different users. Therefore they require much more processing power and storage capacity than other computers. They are generally faster and have more memory and hence can be very expensive. Large corporate and government data processing departments often use a mainframe computer (i.e., for many users accessing large amounts of information). Mainframes allow information to be centrally stored and controlled. As an example of the use of a mainframe – would be an automatic cash dispenser at a bank. It is used to access a central mainframe computer, which stores information about your account and processes your request.

Multiprocessor servers

Multiprocessing is a type of processing in which two or more processors work together to process more than one program simultaneously. It allows the server to do more work in a shorter period of time, keeping elaboration time at a reasonable level. Multiprocessor servers is also known as parallel servers which means that multiple processors are tied together in some manner. Generally the processors are in close communication with each other. They share common data structures and a common system clock.

Some advantages of multiprocessor servers are as follows:

- Reduced Cost: Multiple processors share the same resources such as power supply or mother board.
- Increased Throughput: An increase in the number of processes completes the work in less time.

Examples of multiprocessor uses are large computers used for computer aided weather forecasting or financial market analysis. (Bloomberg)

Personal Computer

A computer is usually known as a PC (Personal Computer or Desktop Computer). The user sits in front of the PC and works directly with it, rather than connecting to it using another computer. A PC requires far less processing power and storage than some types of computer and this helps to make the PC much cheaper. PC's can vary widely in terms of performance and the sort of tasks they are suitable for, depending on the underlying hardware and software on the PC. A PC is often used as an intelligent terminal to connect to a mainframe or minicomputer. The advantage of this over using a dumb terminal is that users can process and store some information locally. This reduces the burden on the central computer. The main reason why the PC has become so popular for home and office uses is that it is a versatile tool that can be used for a wide range of applications.

Portable Computers (laptop, notebooks and palmtops)

A laptop computer also often called a notebook is a portable computer designed to fit inside a briefcase. Most laptops are approximately 12" wide by 2" high. Laptops have most of the features and components provided by PC's and offer the same level of flexibility in performing a wide range of tasks.

A palmtop computer is a hand-held device around 6" wide by ¾" high.
Palmtops do not have quite the same features and components as PC's. They are used mostly as personal organisers to store contact information, to store lists and also for email/internet access. Portable computers can be carried around easily and use a Liquid Crystal Display and special re-chargeable battery which can last for many hours.

Sample Questions

1. List the main elements of a CPU and their functions:
2. List three advantages of multiprocessor machines: