

# Management Information Systems

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### Introductions – You!

- Name
- Brief background
  - Education
  - Work experience
- Objective for joining EPGDBM
- Expectations from this course

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### **Course Overview**

- Course Name: Management Information Systems
- Course No:
- Number of Credits: 2
- Recommended Books:
  - Management Information System Managing the Digital Firm, Kenneth C. Lauden and Jane P. Lauden
  - Business Information Systems Analysis, Design and Practice, Graham Curtis and David Cobham
  - Management Information Systems The Manager's View, Robert Schultheis and Mary Sumner

#### **Course Overview – Learning Objectives**

- What is MIS
- Where is it used
- Why is it needed
- When do we use it
- Who uses MIS
- How are MIS designed, developed and implemented

### **Management Information Systems**

- Management:
  - The organization and coordination of the activities of a business in order to achieve defined objectives.
- Information:
  - knowledge that you get about someone or something : facts or details about a subject.
- Systems:
  - a set of principles or procedures according to which something is done; an organized scheme or method.

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- Worlds largest taxi company owns no taxis UBER
- Largest accommodation provider owns no real estate Airbnb
- Largest phone companies own no telco infrastructure Skype, WeChat
- Worlds most valuable retailer has no inventory Alibaba
- Most popular media owner creates no content Facebook
- Fastest growing banks have no actual money SocietyOne
- Worlds largest movie house owns no cinemas Netflix
- Largest software vendors don't write apps (Apple and Google)

- Ethiraj: Give me an illustration of what is changing and which is exposing a gap in your learning?
- Kurien: Let me give you one simple example that I talk about every day. A couple of years ago, a customer of ours came to us and said, "You know what, if I look at my enterprise, between operations and technology, I have today about 700 people handling the most basic function that runs at every enterprise, which is travel."
- So, the question that was thrown at us was that, "Hey listen! There are secretaries, there are travel departments, there are external vendors, everybody is working on this. So, is there a way by which we can fundamentally look at this process and see how you can disintermediate it?" So, about a year ago, we started developing a product that could do this.

- Now we have come up with a product where if you are sitting in Bombay today and you want to go to Bangalore – on your mobile phone there's an app; you click the app and you put your schedule on your calendar assuming that you have to be on Brigade Road in Bangalore at two o' clock in the afternoon. It will then tell you specifically which flights you should take based upon the traffic in Bangalore.
- Then, based upon the flights if you got linked back to a particular airline, only that airline will only show up in your schedule because that's your corporate travel. The minute you press the button, tickets get booked, the boarding pass gets sent to you and the boarding pass also lands in your phone. That's the level of integration that sits in these kind of applications.

 Now, this came out of a customer idea. We have implemented with three customers already, we are implementing within Wipro. In Wipro, we have 700 people doing travel. That number would come down to 20. Just an example of how things can completely change when you use location, mobility and context, to really take information and use it effectively.

(Ref: http://www.boomlive.in/middle-managers-act-routers-future-

wipro-ceo-kurien/)

# **Benefits of a good MIS**

- Increase efficiency of the Managers
- Makes it easier for functional managers to track and monitor functional targets
- Functional managers have clear visibility to the progress, achievement and shortfall in the activity and targets
- Managers are provided alerts to make them aware of exception situations
- Managers can identify potential problems early and take necessary corrective actions
- Saves valuable time by making the information available in a such a way that it can be used straight away

# **Benefits of a good MIS**

- Leads to a better understanding and streamlining of organisational processes
- Creates a common nomenclature and understanding of the organisational data entities and their attributes across the organisation
- This in turn improves the internal communication and understanding within the organisation

### There are 4 main components to MIS

<ul><li>People Resources</li><li>End Users</li><li>IS Specialists</li></ul>		Data • Databases • Data Warehouses	
	Manag Informatio	ement on Systems	
Hardware + Networks <ul> <li>Processors</li> <li>Storage Media</li> <li>Communication Infrastructure</li> </ul>		Software <ul> <li>Systems</li> <li>Programs</li> <li>Procedures</li> </ul>	

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### **Information Systems in Organizations**



The Information Management Book of Knowledge (IMBOK) Framework

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- Five Knowledge Areas
  - Information Technology
  - Information Systems
  - Business Process / Business Information
  - Business Benefits
  - Business Strategy
- These areas determine the required management competencies

- Four Processes Move ideas and values between the five knowledge areas
  - Projects
  - Business Change
  - Business Operations
  - Performance Management

- Helps us assess and answers the following:
  - Do you have the technical competency required to make the most of IT?
  - Do you have the system competencies required to satisfy the users needs?
  - Do you understand your business processes and information needs? Are responsibilities clear?
  - Do you have the internal discipline to define and manage benefits?
  - Have you got a grip on your strategies? Is IT aligned with business strategy?

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- The Management is divided into three levels based on their business activities
- The three levels are:
  - Strategic Management (Top Management)
  - Management Control
  - Operational Control

- Operational Control It is the process of ensuring that the specific tasks are carried out efficiently and effectively
  - These activities are performed by the people at the lowest level of management
  - The purpose is full utilisation of resources without any wastage
  - Helps the organisation produce quality deliverables in the required time frame

- Management Control It is the process by which managers ensure that resources are obtained and used efficiently and effectively in order to achieve organisational goals
  - Facilitates smooth operations
  - Keeps a check on operations and people involved in the operations to ensure that resources are used appropriately and that there is no wastage

- Strategic Management This involves deciding the objectives of the organisation and framing policies and strategies to achieve these objectives
  - It sets a clear direction for organisational goals
  - Clearly defines and articulates the policies and strategies to be used to achieve these goals
  - Reviews the market conditions and external environment to assess their impact on the organisation and make necessary changes



- Herbert A. Simon developed a model of decision making.
- The model consisted of three steps,
  - intelligence,
  - design, and
  - choice

- In the intelligence phase, the problem is identified, and information is collected concerning the problem. This can be a long process, as the decision to be made comes from the information.
- The design phase develops several possible solutions for the problem.
- Finally, the choice phase chooses the solution.

- The intelligence phase consists of finding, identifying, and formulating the problem or situation that calls for a decision.
- This has been called *deciding what to decide*.
- The intelligence stage may involve, for example, comparing the current status of a project or process with its plan. The end result of the intelligence phase is a decision statement.

• The name of this phase, "intelligence," can be confusing. Intelligence as we usually use the term informally, is talking about decision making, it is what we use after we know a decision must be made. Simon borrowed the term from its military meaning, which involves the gathering of information without necessarily knowing what it will lead to in terms of decisions to be made. In business decision making, we must often collect a great deal of information before we realize that a decision is called for.

- The design phase is where we develop alternatives. This phase may involve a great deal of research into the available options. During the design phase we should also state our objectives for the decision we are to make.
- In the choice phase, we evaluate the alternatives that we developed in the design phase and choose one of them. The end product of this phase is a decision that we can carry out.

- The model is sometimes extended with the addition of two more phases
- Implementation The decision that is ultimately carried out.
- Review In this phase, decision implemented is evaluated.
   Was the course of action taken a good choice?



#### Parallel between Simon's Model and SDLC

Simon's Model	SDLC
Intelligence	System Investigation
Design	System Analysis
Choice	System Design
Implementation	Implementation
Review	Maintenance

### **Simons Categorisation of decisions**

 Simon also proposed that decision making processes fall along a continuum that ranges from highly structured to highly unstructured decisions.



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### **Gorry and Scott Morton Framework**

- In 1971, George Anthony Gorry and Michael S. Scott Morton proposed a framework for using technology for decision support
- This was based on Simon's (1977) idea that decision making falls along a continuum that ranges from structured to unstructured &
- Robert Anthony's (1965) taxonomy of managerial activities i.e. operational control, managerial control and strategic planning

### **Gorry and Scott Morton Framework**

	Operational Control	Managerial Control	Strategic Planning	Technical Support Needed
Structured	- Accounts Receivables, - Order Entry	- Short Forecasting	- Financial Management	MIS, Models, Processing
Semi Structured	Production Scheduling	- Credit Evaluation	- Mergers and Acquisitions	DSS
Unstructured	Loan Approvals	- Recruiting an executive	- New product development	DSS, ESS
Technology Support Needed	MIS, Management Science	Management Science, ERP, EIS	ERP, EIS	© SCCE, Pune

#### Data, Information, Knowledge and Wisdom



The IT Systems In Business have also followed a similar path in their evolution

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### **Evolution of IT systems – Data Processing**

- Perhaps the first commercial use of computers
- Mostly operated in "Batch" mode
- Used "Files" to store data
- Primarily used for carrying out operations such as
  - Conversion
  - Validations
  - Sorting
  - Summarization
  - Aggregation
  - Analysis
- Typical Applications were
  - Payroll Processing
  - Exam Results Processing
- Generated reports about historical events (i.e. monthly)

# **Evolution of IT systems – TP / OLTP**

- Move from processing data to processing transactions
- Move from Batch to Online
  - Less time for validation and corrections
- Covered all aspects of a "Transaction"
- The data was captured and processed at the same time
- Started using "Databases"
  - The Database provided added features to make these systems robust
- Generated reports about historical events but the elapsed time was less (Daily/Weekly)

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#### Evolution of IT systems – MRP – MRP II -ERP

- MRP and MRP II were primarily Focussed on Manufacturing and material management
  - Procurement, Inventory, Production Planning, Capacity Planning, etc.
- Developed to handle the Manufacturing Planning and Optimisation Process
- Primary drivers were
  - Material cost
  - Manufacturing Capacity
  - Sales forecast and demand
  - Manufacturing Schedule matched to sales forecast

# Evolution of IT systems – MRP – MRP II - ERP

MRP systems automated the manufacturing planning process



#### **Evolution of IT systems – Porters Value** Chain

s	Administrative, Legal, accounting, financial management						
Activitie	Human resources Person management		nel, lay recruitment, training, staff planning, etc.				
Support /	Product and technology development	Product ar engineerin	d process design, production g, market testing, R & D				
ļ	Procurement Supplier management, funding, subcontracting, specification						
- Primary Activities	INBOUND LOGISTICS Examples: Quality control; receiving; raw materials control; supply schedules	OPERATION Examples: Manufacturing; packaging; production control; quality control; maintenance	OUTBOUND LOGISTICS Examples: Finishing goods; order handling; dispatch; delivery; invoicing	SALES & MARKETING Examples: Customer management; order taking; promotion; sales analysis; market research	SERVICING Examples: Warranty; maintenance; education and training; upgrades	less Cost = Profit margin	
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### **Evolution of IT systems – From MRP to ERP**

- With ERP the focus shifted to Finance
- These systems integrated ALL functions of a business
- They also converted all business transactions into their financial impact and created helped build the financial statements
- Covered all "Resources" rather than just "Material"
- Gave Management the ability to have a Real Time financial status of the business, i.e. ability to view and review financial performance on a daily basis

# **Evolution of IT systems – Beyond ERP**

- The design and development principals used to build ERP systems were then extended to automate other areas of business as well.
- Industry Specific ERP Packages
- Human Resources Management System
  - Automate all HRMS processes from "Recruitment" to "Retire"
- Supply Chain Management Systems
  - Automate complex supply chain business models such as TPL service providers
- Customer Relationship Management
  - Have a single view of the customer, as a prospect, a customer, a debtor....

#### Evolution of IT systems – Some Popular Packages

- Oracle EBS
- SAP
- JE Edwards
- BAAN
- Microsoft Dynamix
- Tally ERP
- Openbravo
- Open ERP

Salesforce.com		
<ul> <li>Peoplesoft</li> </ul>		
• Siebel		
Oracle HRMS		
• RAMCO		
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# **Evolution of IT systems – OLAP Systems**

- OLAP Systems were developed to facilitate analysis and presentation of data captured by the OLTP / ERP Systems
- The design requirements for Transaction Processing are very different than those for Analysis
- Typical OLAP Systems can
  - Receive data from multiple sources / systems
  - Rearrange data to provide a multi dimensional view
  - Provide time intelligence
  - Support complex calculations and analysis

## From OLTP to OLAP to DSS



IT Applications in Business

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#### **Evolution of IT systems – Schematic Relationship**





## The way forward



## **Some IT Based Business Models**

- Flipkart
  - www.flipkart.com
- Air BNB
  - www.airbnb.com
- Rent A Coder / Elance
  - <u>www.elance.com</u>

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## **Quality of Information**

# **Quality of Information**

- How Business / Management information is classified
- What are the characteristics of good information
- How do we assess the quality of information?
- What care needs to be exercised while
  - Providing Information
  - Consuming / Using Information

# **Classification of Information**

- By Usage Characteristics
  - Strategic usage
  - Tactical Usage
  - Operational Usage
- By Application
  - Planning
  - Controlling
  - Recording
  - Measuring
  - Decision Making

### **Characteristics of Information - Relevance**

- Relevant information
  - Increases knowledge
  - Reduces uncertainty surrounding the problem under consideration
- Irrelevant information can lead to
  - Increase in the quantum of information being provided causing information overload
  - Analysis Paralysis
  - Hide the important / relevant information OR make it difficult to access the relevant information.

## **Characteristics of Information - Accuracy**

- The degree of accuracy has to be coherent with the importance of the decision to be taken
- Information has to be true, free of errors and mistakes and not deceptive
- Usually varies based on
  - the level (within the organisation) at which it is used
  - The purpose for which it is used
- Some level of inaccuracy may be inevitable and hence accepted.
- Sometimes accuracy may have to compromised!
  - Especially when time available is less
  - This only reduces the level of accuracy, e.g. 90% vs 100%. It does not mean that 'inaccurate' information is provided!

#### Characteristics of Information -Completeness

- This refers to what is "Possible" as against what is "Required"
  - We may obtain information based on a Sample (as against the population)
  - The sample will be covered 100%!
- The information must be as "complete" as possible
- The completeness usually refers to the key points of the problem under analysis
- Completeness covers both the depth and the width of the information
  - Depth Level of detail
  - Width Coverage (functional, departmental, etc.)
    - A Feasibility Study must cover all business functions at an adequate level of detail.

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#### **Characteristics of Information – Source Trustworthiness**

- Information must originate from a "Trusted" source
- The source can be internal or external
- Trust can be built in multiple ways
  - Track record and history
  - Reconciliation
  - Validation with multiple sources
- Particularly important
  - when information is used for strategic purposes
  - When information is obtained for the first time OR for one time usage

# **Characteristics of Information – Delivered to the right person**

- The right information to the right person
  - Tactical information is not useful to Senior Management who takes Strategic Decisions
- Wrong information to the right person! (Accuracy Issue)
- Right information to the wrong person! (Delivery Issue)

#### Characteristics of Information – Punctuality & Timeliness

- Good information is delivered just when it is needed
  - Not before time
  - Not after time
- Good information is Current!
- The frequency of delivery should be linked to business and operational cycles
- Not all information needs to be provided in real time
- The need to obtain information quickly may compromise its accuracy!

# Characteristics of Information – Level of Detail

- Must contain the minimum level of detail that is needed for effective decision making
- More detail is not necessarily good:
  - Requires added effort
    - Both for generation of information &
    - Analysis of information
  - May require more time
  - May increase the irrelevant part of the information
  - Can cause distraction

# Characteristics of Information – Presentation & Comprehension

- Information must be easy to understand and comprehend
- Presentation should be appropriate for the information being relayed
  - Tables
  - Graphs
  - Descriptions
- Should be appropriate for the level to which the information is communicated
- Should use appropriate medium
  - Paper
  - Desktop / Laptop
  - Tablet / Mobile

## **Elements of Information Quality**



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## **Elements of Information Quality - Intrinsic**

- Refer to the contents of the Information
- Is assessed based on:
  - Accuracy
  - Objectivity
  - Believability
  - Reputation

### Elements of Information Quality -Contextual

- Refer to the purpose and the audience of the Information
- Is assessed based on:
  - Relevance
  - Value Addition
  - Timeliness
  - Completeness
  - Quantum of Information

### Elements of Information Quality -Representational

- Refers to the medium and format of the Information
- Is assessed based on:
  - Interpretability
  - Format
  - Coherence
  - Compatibility
  - Presentation

## Elements of Information Quality -Accessibility

- Refers to the ease with which the information can be accessed and retrieved
- Is assessed based on:
  - Accessibility
    - Ease
    - Repeatability
  - Access Control and Security

# **Quality of Information - Exercise**

- Select any five different types of information
- Assess each using the different elements of information quality as described earlier
- Rate each quality parameter on a scale of 1 to 4 as
  - 1: Poor
  - 2: Average
  - 3: Good
  - 4: Excellent
- Discuss your findings

## **MIS Value Chain**

## **MIS Value Chain**

- The purpose of the MIS value chain is to create value (i.e. profit)
- Value = Revenue Cost
- Value can be increased by:
  - Increasing Revenue while keeping Cost constant
  - Decreasing Costs while keeping Revenue constant
  - Increasing Revenue AND decreasing the cost

## **MIS Value Chain**



## MIS Value Chain – Complimentary Assets

- Complimentary Assets: Additional Assets required to derive value from a primary asset (Teece, 1988)
- Complementary Assets to IT are:
  - New Business Models
  - New Business Process
  - Management Bahviour
  - Culture
  - Training

# MIS Value Chain – Complimentary Assets

Organizational	Managerial	Social
Supportive organisational culture that values efficiency and effectiveness	Strong senior management support for technology investment and change	Internet and telecommunication infrastructure
Efficient business processes	Teamwork and collaborative work environment	IT enriched trainings that enhance organisational computer literacy
Decentralised authority	Incentive for management innovation	Standards (Government Imposed and Industry Accepted)
Distributed decision making rights	Trainings to enhance managerial skills	Laws and regulations to create a stable and fair market environment
Strong IS development team	Culture that values flexibility and knowledge based / objective decision making	Access to technology and service firms to assist in IT adoption and implementation

# DSS, DMS, Expert Systems, EIS...

- Decision Support Systems
- Decision Making Systems
- Expert Systems
- Executive Information Systems

# **Decision Support Systems**

- Systems that support
  - Unstructured decisions
  - Decisions that require complex processing
- Help in resolving problems that are unique and rapidly changing
- Used extensively for "What If" analysis
- Examples:
  - What will be the impact on headcount / utilisation if the sales double in the next quarter
  - What will be the impact on Revenue / Profit if the set up of an ODC is delayed by 6 months
  - What will be the impact on Revenue / Profitability if the new release is delayed by 3 months
# **Decision Making Systems**

- These are Decision Support Systems +
- These systems arrive at a decision and also implement it
- Used where complex processing is required to arrive at the right decision
- Examples
  - Automated traffic signal management systems
  - Auto pilot in Aeroplanes

## **Expert Systems**

- Systems that capture tacit knowledge in a very specific and limited domain of human expertise
- The knowledge is captured in the form of a set of rules in a software system
- The system consists of two parts
  - The Knowledge Base Knowledge collected as a set of rules
  - Inference Engine The strategy or logic of searching thru the set of rules

## **Expert Systems**

- The two most commonly used strategies are Forward Chaining and Backward Chaining
- Forward Chaining: User inputs the information and the system then navigates thru the set of rules to arrive at a conclusion
- Backward Chaining: The system is given a hypothesis (i.e. proposed conclusion) and the system works backwards by asking the user questions about selected facts until the hypothesis is either confirmed or disproved

## **Executive Information Systems**

- A system that caters to and supports the needs of senior management
- It takes care of both information and decision making needs
- Provides easy access to both internal and external information relevant to organisational goals
- Highlights business specific key performance indicators
  - Market price of shares
  - Current Outstandings in days

#### **Network Economy & Strategies**

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## **Network Economy**

- Traditional Economy follows the law of diminishing returns
- Law of Diminishing Return states that the more is any resource applied to production, the lower is the marginal gain in the output
  - Inducting additional people in a project does not linearly decrease the time required to complete it!
- The Network Economy does not follow the law of Diminishing Returns

## **Network Economy**

- Metacalfe's Law: This law states that the power of a network group increases exponentially as a function of the number of members in the network
- Follows the principal of Operating Leverage where the marginal cost of adding a resource is negligible, but the marginal gain is much higher

#### **Network Strategies – Virtual Companies**

- It is a company that exists virtually
- It uses a network of other companies to support its value chain.
- The value addition is achieved by getting the best companies to work on the specific components of the value chain which results in best value to the end customer
- The companies may be fully or partly virtual

### **Business Ecosystems**

- Comprises of a Keystone firm and an ecosystem of supporting firms around it
- The Keystone firm drives the ecosystem by providing a common platform which can be accessed and used by others
- The ecosystem can comprise of customers, suppliers and service providers.