Software Engineering and Information System

Lecture 01: <u>INFORMATION FOR MANAGEMENT</u>

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INFORMATION FOR MANAGEMENT

1.1 Data and Information, types of information : Operational, tactical, strategic, Statutory

1.2 Why do we need information systems, management structure, requirements of information at different levels of management

1.3 Functional allocation of management, requirements of information for various functions.

1.4 Qualities of information

1.5 Varieties of information system

MOTIVATION

- Large number of jobs today for computer science and engineering graduates is in creating information systems for managing organizations

- Students should know what is information and how it is different from data

- Should know types of information needed to manage organizations

<u>MOTIVATION</u>

▪ Should know nature of organizations and their structure to design appropriate information system.

▪ Should know management structure and needs of each level of management

▪ Should know functional areas of management and information needs for each area

LEARNING GOALS

1. Distinction between Data and Information
2. Description of types of Information: Tactical, Operational, Strategic, Statutory.
3. Division of Management into different hierarchical levels.
4. Type of Information needed at different levels of management.
5. Division of organizations into several functional areas and their information requirements
6. Attributes of Information.

DATA : Raw Material

- Data collection costs money

- Collect only necessary and sufficient data

- Data is generally used by machines

- Data is useless unless it is processed to create INFORMATION

INFORMATION : Processed data

▪ Data processed by machines giving information

▪ Information is used to run an organization efficiently

▪ Information used by managers to initiate actions

EXAMPLE OF INFORMATION NEEDED BY A SHOPKEEPER

- Daily sales account
- List of low stock items to be re-ordered
- List of overstock items
- Long overdue payments
- Profit and loss account

Used to streamline day to day operations called Operational information

- Slow or fast moving items
- Reliable supplier of items
- Sales trends

Used to improve profitability of shop called
Tactical information

- Whether to stock different varieties of items
- Whether to diversify
- Whether to start a new branch in a different locality
- Whether to start an e-shop
- Information to expand business and explore new opportunities
- Known as <u>Strategic Information</u>

- Income tax account
- Sales tax account
- Used to provide information to the government
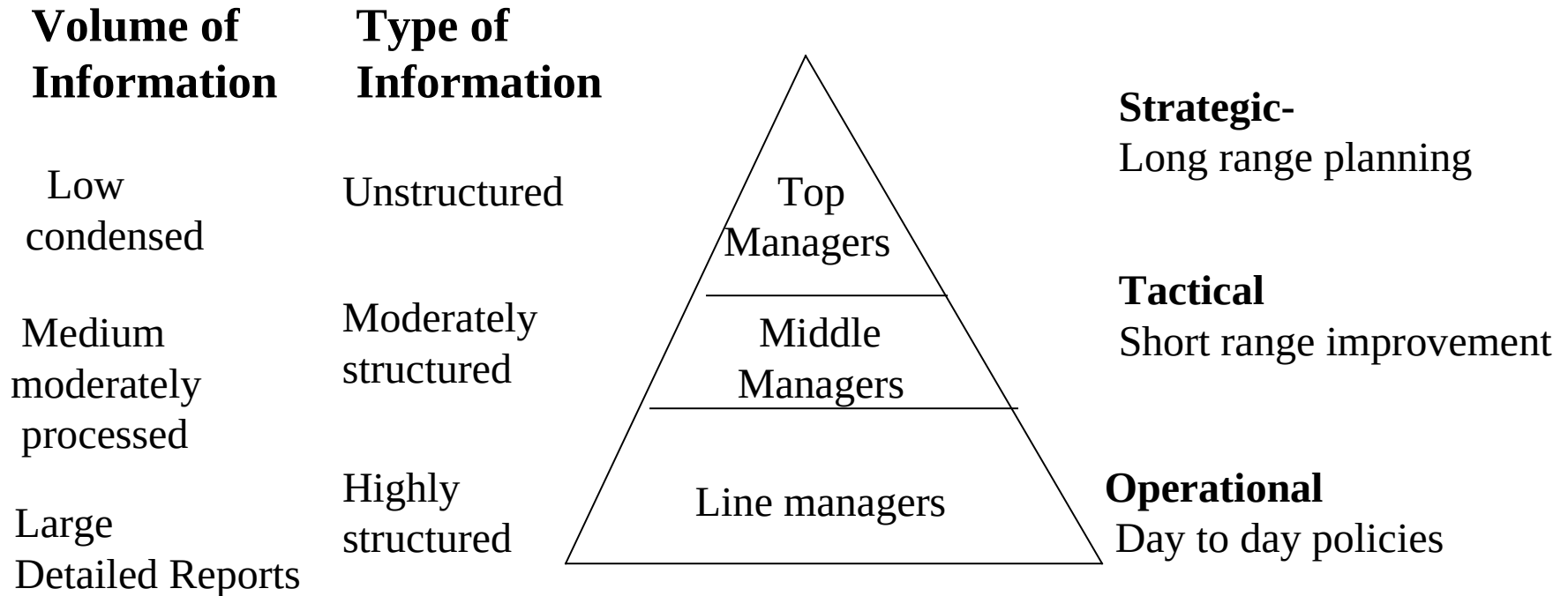- Known as <u>Statutory Information</u>

TYPES OF INFORMATION

- ***STRATEGIC :*** Needed for long range

  planning and directions. This is less structured.

- ***TACTICAL :*** Needed to take short range

  decisions to improve profitability and performance.

TYPES OF INFORMATION

- **_OPERATIONAL :_** Needed for day to day operations of the organization.

   Eg: Daily Sales, Billing.

- **_STATUTORY :_** Needed by law to sent to government authorities.
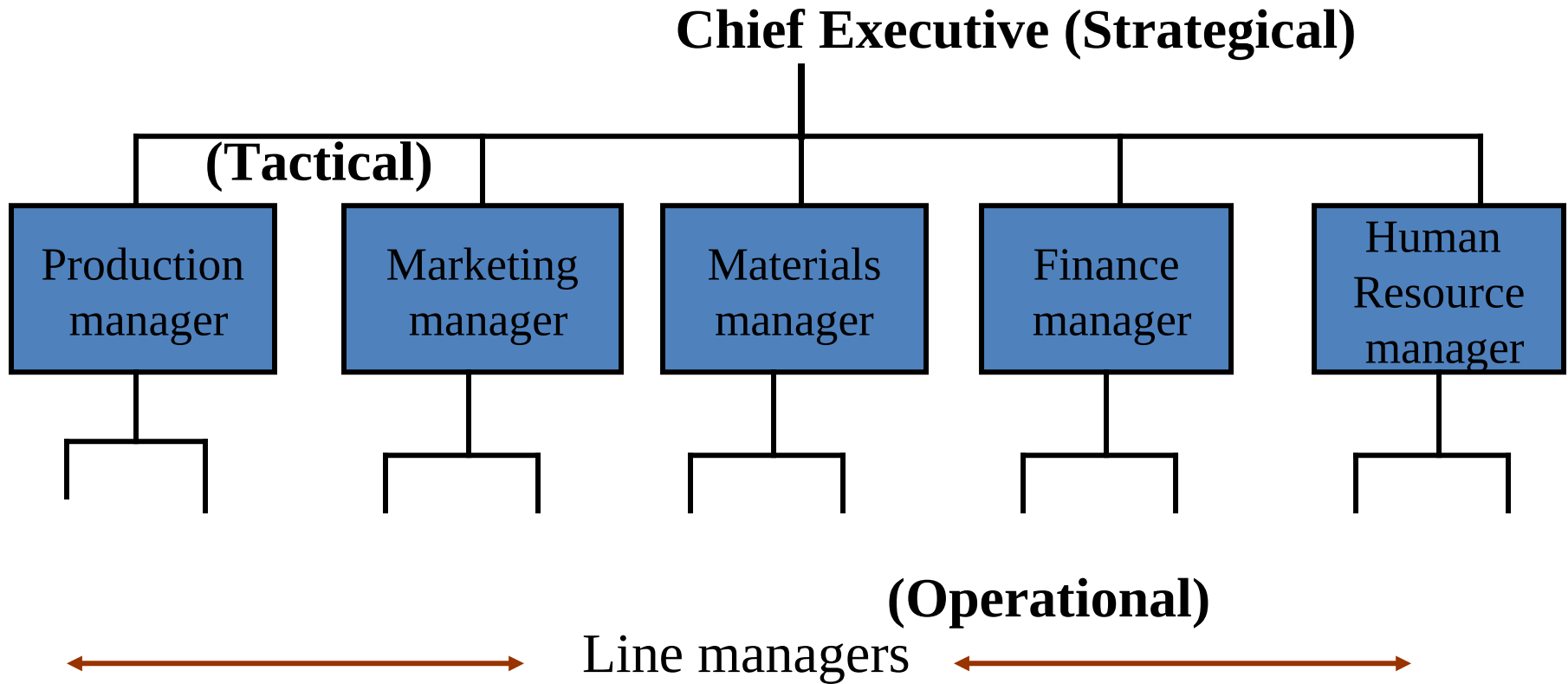
   Eg: Sales tax return.

MANAGEMENT HIERARCHY AND INFORMATION NEEDS

Volume of Information	Type of Information		
Low condensed	Unstructured	Top Managers	**Strategic-** Long range planning
Medium moderately processed	Moderately structured	Middle Managers	**Tactical** Short range improvement
Large Detailed Reports	Highly structured	Line managers	**Operational** Day to day policies

- Increasing size of organizations thus data volume increases
- Timely processing for fast action
- Better competitiveness with better information
- . Increasing of complexity of organizations require

  innovative processing
- Distributed organizations
- Same data can be processed in different ways

MANAGEMENT STRUCTURE

Chief Executive (Strategical)

(Tactical)

Production manager	Marketing manager	Materials manager	Finance manager	Human Resource manager

(Operational)

Line managers

TOP MANAGEMENT

- Chief Executive known as CEO

- Executive Directors for each functional areas such as Production, Finance, HRD etc.

- Take strategic decisions

MIDDLE MANAGEMENT

- General managers, divisional managers,Vice presidents etc

- Each functional area may have 2 to 3 middle level managers reporting to top management

- Take Tactical decisions

LINE MANAGERS

- Group managers, Assistant Group managers, Assistant managers

- Each functional area may have several line managers reporting to middle level managers.

- Take Operational decisions

FUNCTIONAL AREAS

- PRODUCTION
- MARKETING
- MATERIALS – purchase, stores
- FINANCE –Accounts
- HUMAN RESOURCE DEVELOPMENT(HRD)
- RESEARCH AND DEVELOPMENT (R&D)

MANAGEMENT STRUCTURE (CONTD)

FUNCTIONAL AREAS

- All organizations need not have identical functional areas
- However some are common such as
    - MARKETING
    - FINANCE
    - HUMAN RESOURCE DE VELOPMENT(HRD)

Strategic Information

▪ Yearly and monthly production quotas and alternate schedules

▪ Policies on machine replacement, augmentation, and modernization.

▪ Identifying best product mix.

Production Management

Tactical Information

- Identifying and controlling areas of high cost.
- Identifying critical bottlenecks in production.
- Identifying alternate production schedules based on tools, machines etc.
- Performance measures of machines to decide replacement.

Operational Information

- Monitoring up to date production information by examining assemblies, detecting likely shortages and giving early warning.
- Scheduling better production dynamically.
- Preventive maintenance schedules.
- Monitoring tool, machine and personnel availability

Marketing Management

Strategic Information

- Search for new markets and marketing strategies.

- Analysis of competitors strategy.

- Technology and demographic forecasts and product changes.

Marketing Management

Tactical Information

- Advertising techniques and analysis of their impact.
- Customer preference surveys.
- Correlation of prices and sales.
- Sales force deployment and targets.
- Exploring alternate marketing channels.
- Timing of special sales campaigns.

Marketing Management

Operational Information

- Sales analysis by regions,customer class, sales person.
- Sales target versus achievement.
- Market share and trends.
- Seasonal variations.
- Effect of model changes.
- Performance of sales outlets
- Costs of campaigns and benefit.

Material Management

Strategic Information

- Developing vendors for critical items.

- Determining optimal levels of inventory

- Determining proportion of material needed

- Reducing varieties of inventory.

Material Management

Tactical Information

- Developing vendor performance measures.
- Determining optimal reorder levels.
- Determining issues of items to shops versus standard needs.
- Controlling high value of inventory.
- Determining impact on material cost and procurement with design changes and new product introduction.

Material Management

Operational Information

- List of excess & deficient items received.
- List of items rejected.
- Critical items received.
- Stores in transit and in inspection.
- Value of inventory in hand.
- Goods received, rejected and issued.

Finance Management

Strategic Information

- Methods of financing.

- Pricing policies.

- Tax planning.

Finance Management

Tactical Information

- Variations between budget and expenses.
- Large outstanding payments/Receipts.
- Credit and payment status.
- Cost increases and pricing.
- Impact of taxation on pricing

Finance Management

Operational Information

- Periodic financial report.
- Budget status to all functional managers.
- Tax returns.
- Share transfers.
- Profit and loss account.
- Payments and receipts.
- Payroll,provident fund accounts.

Human Resource Management

Strategic Information

- Long range human resource requirements.
  at different levels.

- Policies on human resource development and training

- Policies on personnel welfare and facilities

Human Resource Management

Tactical Information

- Performance appraisal.
- Demographic make-up of personnel and its impact on retirement.
- Production incentives.
- Morale of personnel.
- Absentee reduction.
- Leave and overtime policies.
- Personnel deployment policies.

Operational Information

- Routine assessment.

- Skills inventory.

- Loan/advances and recoveries.

- Leave record.

Strategic Information

- Which products are to be developed?

- What types of improvements are required?

- What long range research is more promising?

- What technical collaboration would be appropriate?

Research Design & development Management

Tactical Information

- Setting intermediate goals.
- Checking availability of equipment & appropriate selection
- Determining proportions of resources to be allocated to different projects.
- Deployment of personnel to projects.
- Information on similar and related research projects undertaken by other companies

Operational Information

- Progress against goals.

- Budgeted expenses versus actual expenses.

- Status of outstanding orders for equipment and components.

QUALITIES OF INFORMATION

Quality	*How to ensure quality*
▪ Accurate	Ensure correct input and processing rules.
▪ Complete	Include all data.
▪ Timely	Give at right time

QUALITIES OF INFORMATION

Quality	How to ensure quality
▪ Trustworthy	Do not hide unpleasant information.
▪ Relevant	Understand user needs.
▪ Brief	Summarize relevant information.

QUALITIES OF INFORMATION

Quality	*How to ensure quality*
▪ Up-to-date	Include all data up to present time.
▪ Significance	Use attractive format & graphical charts.

VARIETIES OF INFORMATION SYSTEMS

- Business Data processing
  - Operational information
- Management information system
  - Tactical information
- Decision support system(DSS)
  - strategic information

Business data processing system

- Enter data to be processed
- Edit, check input data
- Control check to see if the data is correct and reasonable
- Store clean data as an organized data base in a storage

Business data processing

There are 2 methods of business data processing
 1. On-line transaction processing(OLTP)
 2. Batch processing

OLTP is used for query processing and rapid actions to requests
Example: Finding balance in one's bank account
            Booking railway tickets
Batch processing used for periodic data processing of massive data
Example: Processing university exam results at the end of each
            semester
            Payroll computation each month

Online transaction processing

- Database (or master file) available online on disk
- Request in specified format accepted from requestor
- Check request for validity
- Retrieve record from database
- Take appropriate action

Batch processing

- Collect a batch of requests
- Key in
- Validate
- Create request file
- Called transaction file
- Update master file using transaction file
- Create result file
- Print responses for requests

OLTP Vs BATCH

- Response time   -   OLTP FAST
- Throughput

(No of transaction/unit time)   -   BATCH HIGH

- Enquiry systems   -   ONLINE
- Periodic processing   -   BATCH

   - Once a day   -   STORES ISSUES
   - Once a month   -   PAYROLL

MANAGEMENT INFORMATION SYSTEM

- Analyse outputs of routine data processing using statistical or operations research tools

Eg: -Observe periodic demands by statistical analysis & use for tactical decisions

-Use operations research tools to decide product mix using demand and cost data to maximize profit

DECISION SUPPORT SYSTEM

- Unstructured and difficult to obtain precise information
- Use of analytical and simulation models
- Aids to conceptualise through graphs ,animation etc
- Use of archival data to infer trends and rules
- Some artificial intelligence tools may be used

DECISION SUPPORT SYSTEM

- Data mining a useful tool
- What is data mining?
- Data collected during routine data processing archived over a long period-massive amount(Tera Bytes)
- Some hypothetical rules guessed by experienced managers and correlated with archival data-called data mining

DECISION SUPPORT SYSTEM

Example of data mining
- From archival data a rule guessed by managers
that in some months there are long waiting lists for sleeper
berths is verified-Data mining gives precise quantitative data

↓ Action

Increase number of sleeper coaches

or

Introduce special trains

- Unexpected results of analysis of archival data more
valuable for DSS