Fall semestre

DATABASE DESIGN and

its applications in architecture

Information System Design and
Applications in Construction Industry
by
Prof.Dr. **Alaattin KANOĞLU**
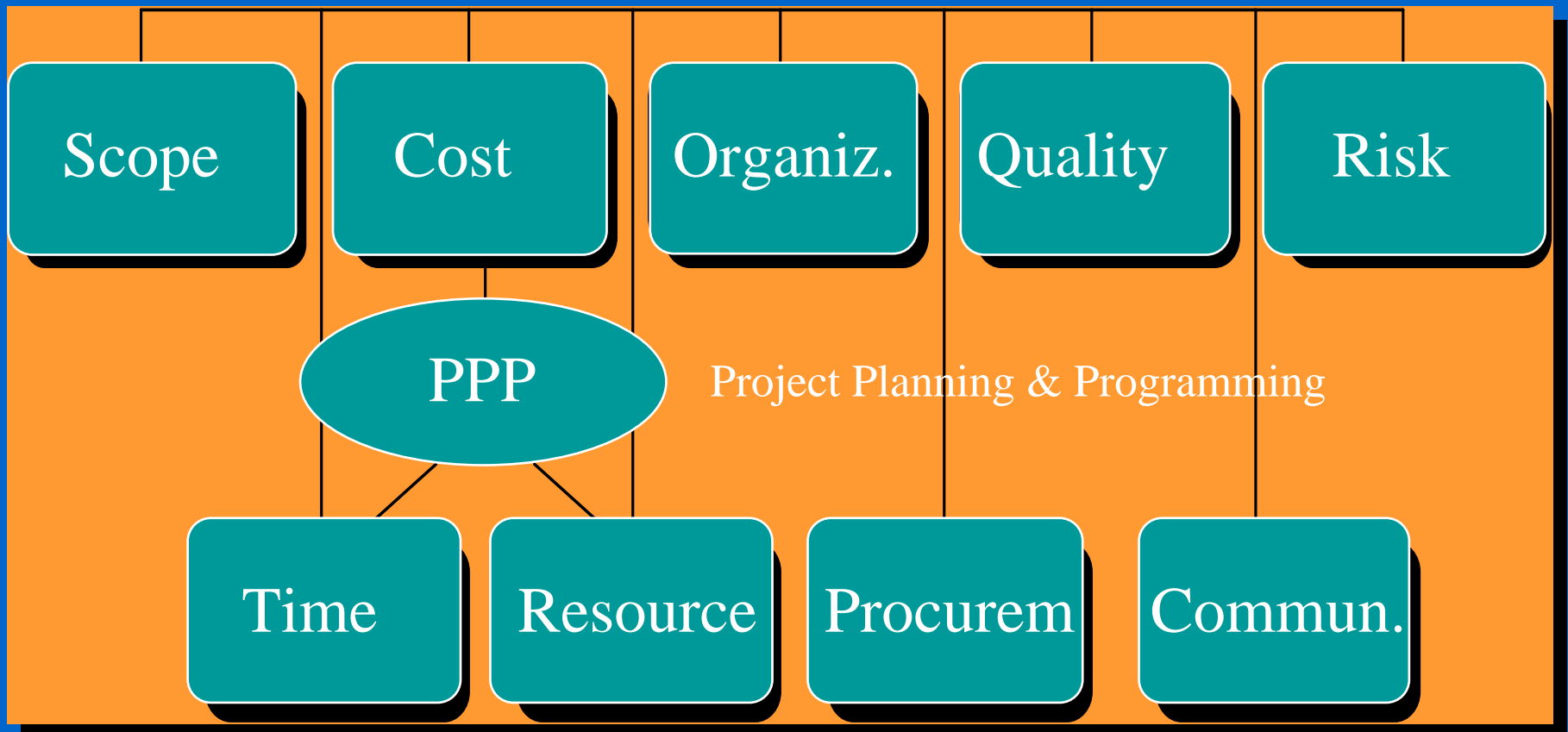**I.T.U. Faculty of Architecture**

Outline

- Basic concepts
- Basic problem areas in CM
- Basic objectives of IS
- Information types required in Building Production Process
- Components of CBIS in conceptual dimension
- Information System analysis
- Steps of IS analysis
- Eras of IS
- Diffusion and Infusion concepts in IS
- Patterns of IS
- Basic dimensions of IT in Building Production Process

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Basic Concepts

- ○ Information
- ○ Information System (IS)
- ○ Information Technology (IT)
- ○ Information Society

Basic problem areas in construction project

- Scope
- Cost
- Organiz.
- Quality
- Risk

PPP — Project Planning & Programming

- Time
- Resource
- Procurem
- Commun.

Information concept

1. <u>Knowledge</u> obtained by education, experience etc.

2. <u>Intelligence</u> related to a certain event or situation,

3. <u>Data</u> Group*: statistical information,*

4. <u>News</u>

5. <u>Messages</u> transmitted as sounds and images via phone lines or computer networks or radio waves , neural impulses in living organisms etc..

Types of Information

- knowledge

- intelligence

- data

- news

- impressions

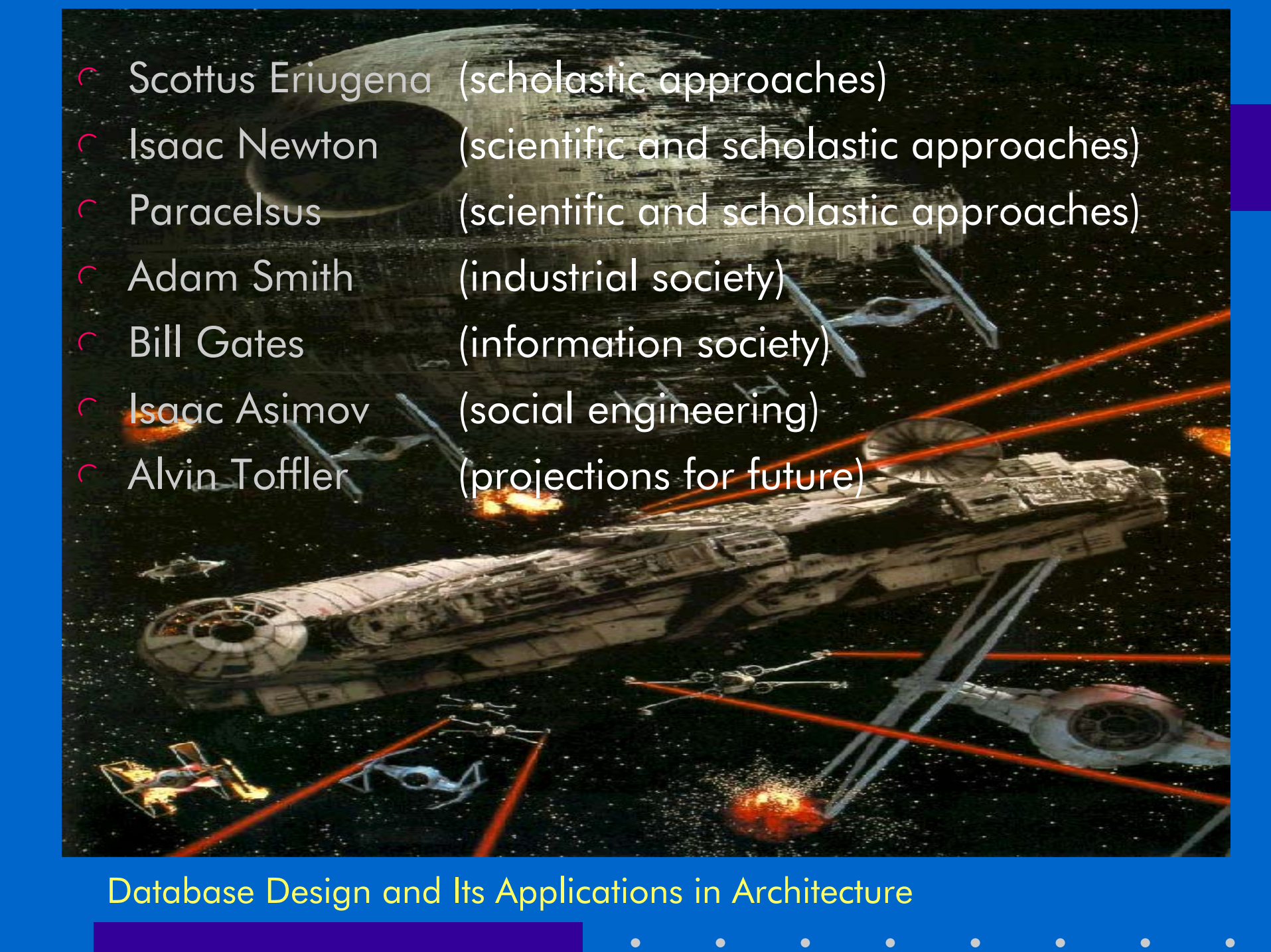- messages

- etc.

What is information system?

Information system (IS):

An organized combination of people, hardware, software, communication networks, and data resources that collects, transforms and disseminates information in an organization.

What is information technology?

Information technology (IT):

Any device which is used for gathering, recording, transforming and disseminating the information.

- Scottus Eriugena   (scholastic approaches)
- Isaac Newton   (scientific and scholastic approaches)
- Paracelsus   (scientific and scholastic approaches)
- Adam Smith   (industrial society)
- Bill Gates   (information society)
- Isaac Asimov   (social engineering)
- Alvin Toffler   (projections for future)

What is the objective of IS's?

A positive contribution by information systems can come in three forms;

- Efficiency measured by productivity-doing things better (support of business operations)

- Effectiveness accomplished by broadening the scope of individual tasks- doing better/right things (support of managerial decision making)

- Competitive advantage gained by enterprise - doing better and new things (support of strategic management)

Strategical Level

Tactical Level

Operational Level

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Information types required in BPP?

Different types of information are needed in building production process management.

For example;

- <u>Knowledge</u> related to construction technology,

- <u>Intelligence</u> related to competitors,

- <u>Data</u> related to cost, duration of activities etc.,

- <u>News</u> related to bids, competitors, materials etc.,

- <u>Impressions</u> related to construction market,

- etc.

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Who utilize the information technology?

- Entrepreneurs
- Designers
- Consultancy Companies
- Suppliers /Vendors
- Contractors / Sub-contractors

- Software Developers
- Education Foundations
- Research Foundations
- Information Providers
- Public Authorities
- etc.

Information required by Entrepreneurs?

- **Decision Making Phase** Information related to technical, organizational, economic feasibility studies, etc.,

- **Design Phase** Information related to costs of alternatives, etc.,

- **Bid & Tender Phase**

  Information related to project delivery approaches, organizational patterns, etc.,

- **Contracting Phase** Information related to preparing contracts and specifications, etc.,

- **Construction Phase** Information related to work progress, cash flow, quality, etc.,

- **Marketing Phase** Information related to Market conditions, consumer tendencies, maintenance plan, etc.,

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Information required by Designers?

- Projects available in the market,

- Preliminary decisions which will be based on in design phase,

- Technology, cost limitation, customer profile,

- Legal limitations, codes and regulations related to construction and the project,

- Special information for special parts of projects,

- Feedback information from site related to problems originating from design failures ,

- Information which will be obtained from engineering offices for integration of subsystems in project...

- etc.

Impacts of new organizational patterns?

Total Involvement Engineering (TIE)

is an approach which

- is based on team concept instead of a hierarchical organization and improving this concept during construction process ,

- obtains the participation of stakeholders via more organic relationships,

- due to this, requires advanced information systems and technology

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Information flow in TIE approach?

Owner/Entrepreneur/Investor

Consultancy Group

Design Group

Project

General Contractor

Project Manager

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Information required by Constructors?

- **Procurement Phase**
  Information related to available projects, competitors, etc.

- **Bidding Phase**
  Information for determining bid price and markup, risks, competitors' strategies, company strategy, past experiences, etc.,

- **Contracting Phase**
  Information for determining contract conditions to minimize the risks, etc.,

- **Planning Phase**
  Information related to crews, their performances and duration of activities, etc.,

- **Construction Phase**
  Information related to progress, problems and solutions, etc.,

- **Close out Phase**
  Information related to closeout process, work progress, quality problems, etc....

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Substructure for information flow

- Communication among functional departments within design office or site - Intranet

- Communication among HQ's functional departments - Intranet

- Communication among HQ and offices/sites - Internet

- Communication among offices/sites - Internet

Components of CBIS Model ?

problems

decisions

information

solutions

Komp...ter Destekli

(CBIS)

data process.s.

manag.inform.s.

decision supp.s.

office autom.s.

expert systems

deli

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Functions vs IS Components

Information System Components				
DB	MIS	DSS	ES	OAS

Functions	DB	MIS	DSS	ES	OAS
Planning	X	X	X	X	
Personnel	X	X	X		
Equipment	X		X		
Material	X	X	X	X	
Cost	XXX	X	XXX		
Quality	X	X	X		
Subcontractor	X	X			X
Communication	X				XXX
Design	X		X		X

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Data Processing System Model

Şekil - 5 - Veri Ypleme Sistemi Modeli

Management Information System Model

Decision Support System Model

decision support system

Office Automation System Model

COMPANY

problem solver

non-computer-based OAS application

computer-based OAS application

communication

communication

other problem solvers

information

information

information

database

office automation system

input physical resources

transformation

output physical resources

environment

Şekil 10- Ofis Otomasyon Sistemi Modeli

Expert System Model

user

instructions & information

solution & explanations

uzman sistem

tal
enformasy

user interface

expert system

solution & explanations

instructions & information

knowledge

meaning

knowledge base

knowledge

problem
problem area
alanı

instructions & information

knowledg e

development engineer

knowledge

expert & knowl. engineer

environment

Þekil 11 - Uzman Sistem Modeli

System Life Cycle Loop

system
lifecycle
loop

1. Planning
…Phase

2. Implem.
…Phase

2. Analysis
…Phase

4. Testing
…Phase

3. Design
…Phase

Information System Analysis

- Analysis of Current Structure & Processes
- System Development
- Testing The System
- System Implementation
- Feedback

SATINALMA-AMBAR SÝSTEMÝ AKIÞ DÝYAGRAMI (2)

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Eras of Information Systems

		DP	→	MIS	→	SIS
Nature of Technology		Computers	→	Distributed Proc.	→	Networks
		Fragmented	→	Interconnected	→	Integrated
		Hardw.Limitat.	→	Softw.Limitation	→	People/Vision L.
Nature of Operations		Remote from users, controlled by DP.	→	Regulated by management services	→	Available and supportive to users
Issues in system development		Technical issues (programming, project manag.)	→	Supporting user needs (inform. management)	→	Related to business strategy
Reasons for using technology		Reduce costs (espec.admin.) (techno.driven)	→	Support business (espec.managers) (user driven)	→	Enable the business (business driven)
Characteristic of system		Regimented Operational (internal)	→	Accommodating control	→	Flexible / Strategic (external)

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Two concepts related to IS/IT

- Diffusion

  The degree to which IT has become dispersed throughout the organization and decisions concerning its use are decentralized.

- Infusion

  The degree to which an organization becomes dependent on IS/IT to carry out its core operations and manage the business

Patterns of information systems

High

DIFFUSION

opportunistic
largely decentralized control, giving business managers the ability to satisfy their local priorities, but the resulting systems are not critical to the business.

complex
largely decentralized control, but the business depends on the systems for success, both in avoiding disadvantage and in achieving its overall business objectives.

traditional
highly centralized control of IT resources and IS is not critical to the business.
companies use IT solely to improve efficiency

backbone
highly centralized control of IT resources and IS is critical to the business. the business could be seriously disadvantaged if system fails.

Low

High

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INFUSION

Dr. Alaattin Kanoglu, I.T.U.

Steps of system analysis study

1 OBTAINING REQUIRED INFORMATION RELATED TO COMPANY AND INVESTIGATING THE PROBLEM FORMULATION AND SCOPE OF STUDY SUGGESTED BY THE COMPANY

2 REFORMULATION OF THE PROBLEM STATEMENT AND SCOPE OF STUDY AFTER EVALUATING THE INFORMATION GATHERED from MEETINGS WITH COMPANY EXECUTIVES

Steps of system analysis study

3 DEVELOPING THE ANALYSIS PLAN CONSIDERING THE OBJECTIVES, RESTRICTIONS OF STUDY AND DETERMINING ANALYSIS TOOLS TO BE USED

4 APPROVAL OF THE ANALYSIS PLAN BY THE EXECUTIVES OF THE COMPANY

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Steps of system analysis study

5 PREPARING THE DETAILED ANALYSIS SCHEDULE AND ARRANGING THE APPOINTMENTS FOR THE PERSONS TO BE SURVEYED.

6 SYSTEM ANALYSIS REALISATION PHASE

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Steps of system analysis study

7 EVALUATION OF INFORMATION GATHERED IN SYSTEM ANALYSIS REALISATION PHASE

8 DRAWING THE PICTURE OF EXISTING INFORMATION SYSTEM, INDICATING THE PROBLEMS AND RECOMMENDATIONS FOR SOLUTIONS WHICH WILL BE BASED ON AT FOLLOWING PHASE

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Basic dimensions of IT in BPP

Hardware

- Personal computers (PC)
- Local area networks (LAN)
- Wide area networks (WAN)
- Mainframe
- Global networks (Bitnet, Internet)

Software

- Database software
- MIS software
- Decision support software
- Artificial intelligence s.
- Office automation software

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Data flow among the functional components

GLOBAL PLANLAMA MODÜLÜ

SÜRE(Ç) PLANLAMA ALTMODÜLÜ	KAYNAK PLANLAMA ALTMODÜLÜ			MALÝYET PLANLAMA ALTMODÜLÜ	SÖZLEÞME (ÝHALE) PLANLAMA ALTMODÜLÜ
	Ýnsan Kaynaklarý Planlama Ýþlevi	Malzeme Planlama Ýþlevi	Ekipman Planlama Ýþlevi		

SÜRE(Ç) PLANLAMA ALTMODÜLÜ
- eylem kodlama sistematiði
- kaynak kodlama sist.
- performans standartlarý
- süre(ç) programý (planlanan)
- süre(ç) programý (gerçekleþen)
- iþ ilerleme verileri

Ýnsan Kaynaklarý
- insan kayn .kodlama sist.
- personel özlük bilgileri
- personel puantajlarý
- personel ihtiyaç planý
- personel baþvuru bilgileri
- personel performans bilg.
- personel temin planý

Malzeme Planlama
- malzeme kodl. sistematiði
- satýcýlara iliþkin bilgiler
- malzeme ihtiyaç planý
- malzeme giriþ-çýkýþ bilg.
- malzeme sipariþ verileri
- malzeme temin planý
- malzeme özellikleri

Ekipman Planlama
- ekipman kodl. sistematiði
- ekipman ihtiyaç planý
- ekipman parký (firma)
- ekipman parký (þantiye)
- ekipman temin planý
- ekipman bakým-onarým pl.
- ekipman nitelikleri

MALÝYET PLANLAMA
- maliyet kodl. sistematiði
- ekipman maliyet verileri
- malzeme maliyet verileri
- personel maliyet verileri
- taþeron maliyet verileri
- genel giderler
- planlanan nakit giriþi
- nakit çýkýþý
- finansman planý

SÖZLEÞME PLANLAMA
- sözleþme kodl. sistematiði
- taþeron kodl. sistematiði
- sözleþme belgeleri
- taþeron ihtiyaç planý
- taþeron performans veril.
- taþeron özlük bilgileri
- taþeron temin planý

ÝÞ TAKÝP ve ÝLERLEME MODÜLÜ	ÝNSAN KAYN. YÖNETÝM MODÜLÜ	MALZEME YÖNETÝM MODÜLÜ	EKÝPMAN YÖNETÝM MODÜLÜ	MALÝYET YÖNETÝM MODÜLÜ	TAÞERON YÖNETÝM MODÜLÜ

DÝÐER ÝÞLEVSEL MODÜLLER

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