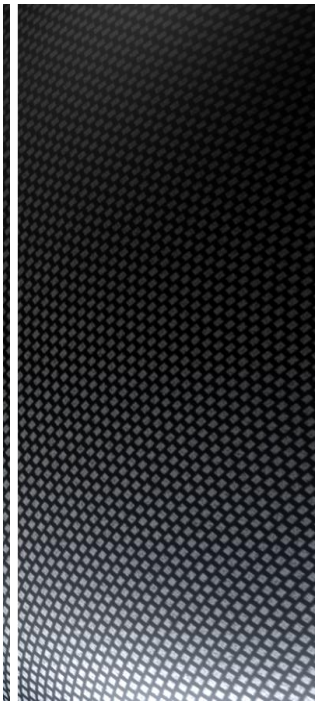
MIS
(Management Information System)



Sharif University of Technology

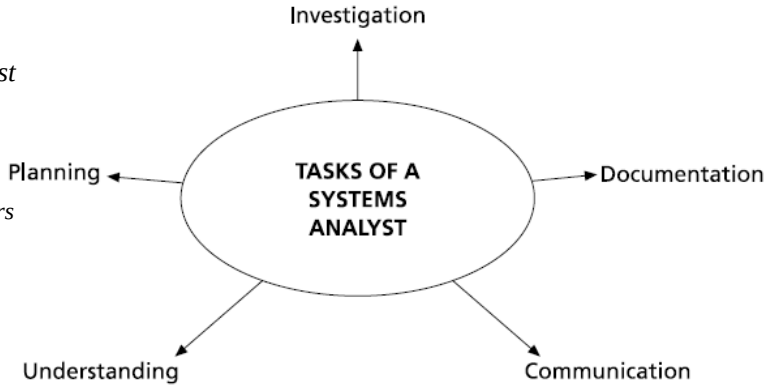
Session # 8

Session schedule

- *Contents*
  - *Systems Analysis and Design*
    - *Planning the approach*
    - *Asking questions and collecting data*
    - *Recording the information*
    - *Interpreting the information collected*
    - *Specifying the requirement*

Information system development

- *System Analysis*
  - *Five areas of a system analyst tasks:*
    - *Investigation*
    - *Communication with customers*
    - *Documentation*
    - *Understanding*
    - *Preparation & planning*



Information system development

- *System Analysis*
  - *System analysis process:*
    - *The PARIS Model*

  Analysis can be considered to be a Five-stage process
    - *Planning the approach*
    - *Asking questions and collecting data*
    - *Recording the information*
    - *Interpreting the information collected*
    - *Specifying the requirement*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *It is important to make sense of the data, to*
      - *Draw out the underlying logic of the system and to*
      - *Map out the requirements for the new system.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Creating a Logical Model of Current Processing*
      - *Three different data flow models (DFMs) are produced during a project:*
      - *The current physical DFM,*
        represents the current system;
      - *The logical DFM,*
        is produced by removing any duplicated or redundant processing or data from the current physical DFM;
      - *The required system DFM,*
        shows how the new processing and data required by the users are incorporated into the logical model.

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Creating a Logical Model of Current Processing*
      - *The current physical DFM, represents the current system;* → *The logical DFM, removing any duplicated or redundant processing or data*
      - *Bottom-level processes are merged, either because they are duplicates of each other or because they represent a sequence of small tasks that can be combined into one larger task.*
      - *Processes are removed if they do not update the information in the system but only reorganize it – for instance by sorting it – or output it in reports or enquiries.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Creating a Logical Model of Current Processing*
      - *It is important that the logical DFM is checked against the current physical DFM to make sure that nothing essential has been lost and nothing added during logical analysis.*
      - *It is also important that the model fits together and makes sense, and that it ties in with the logical data model.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Modeling the Required System*
      - *The logical DFM,* → *The required system DFM,*

      is produced by removing any duplicated or redundant processing or data from the current physical DFM;

      shows how the new processing and data required by the users are incorporated into the logical model.

      - *Having created logical models of the current system, the requirements for the new system, documented during the analyst's investigation, can be added to these models.*
      - *Existing processes that are to be automated in the new system are carried over from the logical DFM to the required system DFM, making sure that changes resulting from the new requirements are included.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Modeling the Required System*
      - *The logical DFM,* → *The required system DFM,*

      - *New processes are modeled based on the information contained in the requirements catalogue, and added to the DFDs at the appropriate points with any new data flows, data stores and external entities that are needed.*
      - *In a similar way, entities and their relationships are carried over, added or removed to create the required entity model, and the data dictionary is updated to reflect the changes to the models.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Modeling the Required System*
      - *The logical DFM,* → *The required system DFM,*
      - *Once the new models are fully documented in the data dictionary they are reviewed and checked against each other and against the requirements catalogue.*
      - *Every requirement in the catalogue must have a cross-reference to the process or processes that are intended to satisfy it.*
      - *To make sure that data requirements are satisfied, the contents of the data stores in the process model are checked against the contents of entities in the entity model using the updated logical data store/ entity cross-reference.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *Two techniques are introduced:*
        - *Entity life histories,*
          which provide a data-oriented view, and
        - *Effect correspondence diagrams,*
          which provide a process-oriented view.

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *An event is something that happens – an occurrence.*
      - *Kinds:*
        - *real-world events,*
        - *business events and*
        - *system events.*
      - *Real-world events cause business events, which in turn cause system events.*
      - *A system event acts as a trigger for a process or set of processes to update a defined set of data.*
      - *The data flow represents the trigger for the processing associated with the event.*
      - *An initial set of system events can therefore be identified by picking out all the data flows entering data stores in bottom-level DFDs in the required system DFM and tracing them back to an initial trigger either inside or outside the system.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *Externally triggered events*

      It requires data to enter the system from an external entity

      An initial set of system events can therefore be identified by picking out all the data flows entering data stores in bottom-level DFDs in the required system DFM and tracing them back to an initial trigger either inside or outside the system.

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *There are also two other types of event, both of which originate from within the system rather than outside it.*
      - *Time-based event*

      Time-based events are triggered by the arrival of a specified date or time, or by the passage of a specified period of time following another event.
      - *System recognized event*

      System-recognized events are caused by the system recognizing a change in its state caused by a piece of data it holds being changed to a specified value.

      - *They are both likely to be handled by batch processes, as they do not have input from an external entity.*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*
      - *Two types of model are produced in entity–event modeling.*

      - *Entity life histories (ELHs)*

      diagrams that show which events affect particular entities and in what order.

      - *Effect correspondence diagrams (ECDs)*

      show all the entities that may be affected by a single event plus any entities that may need to be read for navigation or reference purposes.

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*
      - *The first step in entity–event modeling is to create a matrix that cross-refers entities to the events that affect them.*
      - *For every entity in the matrix, determine which events create it, which modify it and which delete it, and letter them C, M or D as appropriate*

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*

Entity	Title	Edition	Book	Loan	Reservation	Borrower
Event						
Book Acquired	C	C	C			
Book Catalogued			M			
Book Borrowed				C	D	M
Book Reserved				M	C	
Book Returned				D	M	M
Borrower Registered						C
Membership Terminated			M	D	D	D

Information system development

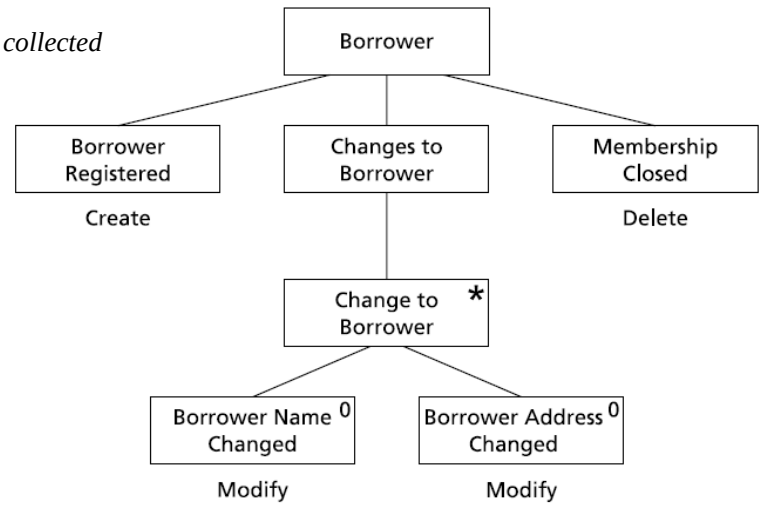
- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*
      - *Entity life histories (ELHs)*

      - *An entity life history (ELH) is a diagrammatic way of representing the different types of event that may affect an entity, the order in which they may occur, and the effects that they may have.*

      - *ELHs effectively summaries all the different life paths that occurrences of an entity may take between their creation on the system and their deletion.*

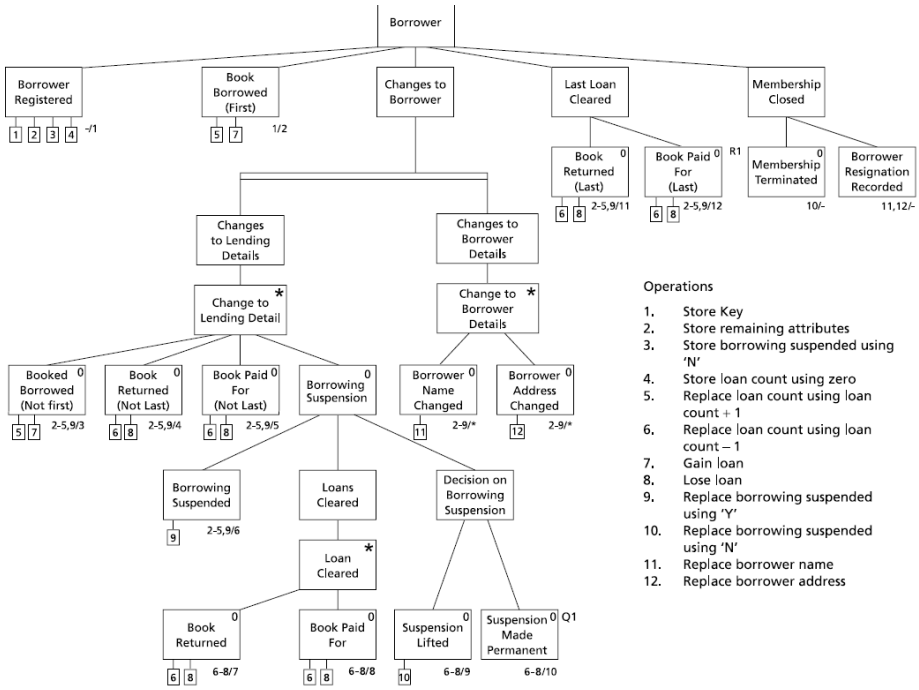
Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*
      - *Entity life histories (ELHs)*



Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*
      - *Entity life histories (ELHs)*
      - *Also, The additional features are*
        parallel lives,
        quits and resumes,
        operations and
        state indicators.



Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*
      - *Effect correspondence diagrams (ECDs)*

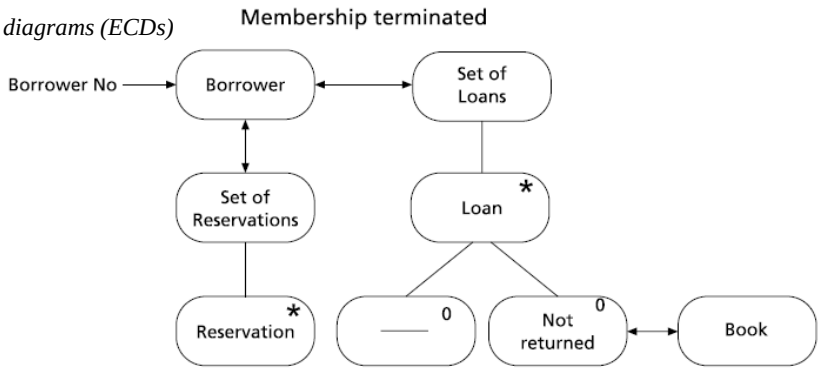
Effect correspondence diagrams (ECDs) represent an alternative, event-focused, view of some of the information shown in ELHs.

An ECD is produced for every event that can affect the system and shows all the entities that may be updated or read by the process corresponding to the event.

ECDs are named after the event they represent, and show 1:1 correspondences between the entities which are updated by the event.

Information system development

- *System Analysis*
  - *Interpreting the information collected*
    - *Adding the Time Dimension*
      - *entity–event modeling*
      - *Effect correspondence diagrams (ECDs)*



Information system development

- *System Analysis*
  - *Specifying the requirement*

Information system development

- *System Analysis*
  - *Specifying the requirement*
  - *We have seen that the purpose of systems analysis is to find out what the users of the proposed information system want, prior to beginning its development.*
  - *It is necessary to specify the requirements in some form that is:*
    - *accessible and intelligible to the user;*
    - *unambiguous;*
    - *reasonably practical and amenable to execution.*

Information system development

- *System Analysis*
  - *Specifying the requirement*
    - *For any given system requirement, there are always a number of solutions available:*
    - *At the one end will be the very simple solutions, providing a minimum level of functionality but requiring little time and money to develop and implement.*
    - *At the other extreme are the systems with full wide functionality providing every desired function, complete system help facilities and probably a very attractive user interface. Such a system will cost a lot of money, and take a lot of time to develop.*
    - *Between these extremes, there are all sorts of possibilities, including systems that have a limited number of fully developed elements, often referred to as core functions, and more rudimentary ways of providing less-used facilities.*

Information system development

- *System Analysis*
  - *Specifying the requirement*
  - *The factors that will influence the way the system will be developed include:*
    - *The speed of implementation;*
    - *The funds available;*
    - *The technical environments available, especially where the new systems must operate alongside existing implementations;*
    - *The technical sophistication of the target users. Can they reasonably be expected to grapple with the complexities of a multi-menu system?*

Information system development

- *System Analysis*
  - *Specifying the requirement*
  - *The Use of Prototyping*
    - *A persistent problem of systems analysis and design is that it is very difficult for the users of the proposed system to envisage, before it is built, what it might look like.*
    - *In analysis and design there are two distinctly different approaches to prototyping:*
    - *Throwaway prototyping,*

    a representation of the proposed system, or of parts of it, are created, probably using some screen-painting tool, and used to test out ideas with the users;
    - *Evolutionary prototyping,*

    elements of the system are created in outline in the actual chosen technical environment: these parts are then developed and refined and form part of the finished system.

Information system development

- *System Analysis*
  - *Specifying the requirement*
  - *The Quantification of Options*
    - *It involves the application of some form of cost–benefit analysis to each of our options.*
      - *Development costs;*
      - *Development timescales;*
      - *Hardware costs;*
      - *Other costs;*
        - *training of users for the proposed system;*
        - *additional equipment that may be required;*
        - *the need to redesign office layouts;*
        - *the costs of possible parallel running of the old and new systems;*
        - *the need to recruit new staff with special, or additional, skills to operate the new system;*
        - *possible costs of redundancy payments, or retraining costs, for staff displaced by the new system*
      - *Other impacts;*
      - *Lifetime costs.*

Information system development

- *System Analysis*
  - *Specifying the requirement*
  - *Writing the Functional Specification*
    - *Once the client has selected one of the system proposal options presented by the analyst, the functional specification is written.*
    - *This is a document that specifies in detail the functions to be performed by the new system and describes any constraints that will apply.*

    - *System Performance*

    Response times, throughput, dealing with hardware & software failures
    - *Inputs to the System*

    Sources, types, formats, procedures
    - *Outputs from the System*

    Contents, format, layout
    - *Constraints*

    Hardware, software, environment and operational
    - *Other Aspects*

    System start-up and shut-down, security procedures

Information system development

- *System Analysis*
  - *Specifying the requirement*