Info 530: ERD & DFD Diagrams

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Q1: ERD and DFD diagrams. What do we learn from these diagrams for system projects? And, what information do they lack?

Systems development is a methodology which a systems analyst may choose to employ to solve a problem. This methodology involves the usage of systems analysis, systems design, as well as systems implementation. Systems development projects often use data modeling. Data modeling is a technique that is often used by the analyst to aid in organizing and documenting a system’s data. (1)

The system analyst, in his or her effort to create or improve the finality of the business system, will often turn to the model-driven analyst approach. This approach uses pictures or diagrams, such as the entity relationship diagram (ERD) and the data flow diagram (DFD), to help communicate business problems, requirements, and solutions.

We will first discuss the ERD diagram. The ERD diagram is a data model which utilizes notations to depict data in terms of the entities and relationships described by the data. (2) This data diagram consists of entities, attributes, and relationships. An example would be the “Publisher Printing” ERD which was used in the INFO 780 homework assignment.

The “Publisher Printing” ERD contained 5 separate entities. The ERD was drawn with the following assumption: one print order equaled one print job. The following were listed entities: The book publisher submitting purchase order (one to many), the purchase order requiring materials (many to many), the print manager assigned print jobs, (one to
many), the employees assisting the print manager (one to many), and the purchase order containing print jobs (many to many).

The ERD diagram provides the system analyst with the basic blueprint or outline for the proposed system project. It is intended to serve as a useful tool for future phases of the system development project. The ERD diagram is not designed to include details such as information flow, external events, or temporal events.

Next, we will discuss the DFD diagram. The DFD diagram is a process model which is used to depict the flow of data through a system and the work or processing performed by the system. (2) This data diagram consists of processes, external agents, and data stores. Again, an example would be the “Publisher Printing” DFD which was used in the homework assignment.

The “Publisher Printing” DFD diagram contained 5 external agents, 12 processes, and 10 data stores. I chose to create my DFD using the Gane and Sarson shapes. The DFD diagram is useful for identifying what work or activity is being performed. It allows the systems analyst to tentatively identify the proposed data stores, external agents, and processes. As in the ERD diagram mentioned earlier, the DFD diagram is considered to be a basic tool in the system development project.

Like the ERD diagram, the “Publisher Printing” DFD diagram does have some limitations. While the DFD diagram facilitates the identification of the data stores, external agents, and processes, the DFD diagram is not designed to identify issues of data processing time, data volume, or data consistency.
The data flow diagram is an excellent tool for summarizing and organizing detailed information about a systems boundaries, processes, and data entities. It provides the analyst with a logical map of the system. The creation of a data flow diagram is a process driven task. (3) Thus, it is very easy to overlook key data elements and information flows.

The DFD diagram, with its various processes, can be drawn to indicate the simultaneous execution, (or operation) of several processes at the same time. This is more consistent with the way business operations are actually conducted. The DFD diagram also has the advantage of being able to include processes that involve time. Namely processes which happen hourly, daily, weekly, yearly, or on demand. In contrast, in the ERD diagram processes on the flowchart can only execute one at a time.

In summary, data flow diagrams are very effective tools for identifying processes, but they are not very useful for mapping out the logic inside these processes. The DFD diagram has the advantage of being able to identify processes in terms of time. As we have discussed, both the ERD diagram and the DFD diagram have their strengths. Both of these diagrams are useful tools for the system analysts as they facilitate the analysts efforts to create an efficient information system. The system analyst, thru the usage of scope definition, system analysis, and feasibility studies, can identify and develop the system processes which are needed in the systems development project.

References:

(2) Ibid, p. 725.

Q4: Describe ways system analysts use the principle of decomposition.

Data flow diagrams are tools that depict the flow of data through a system and the work or processing performed by that system. (1) A decomposition diagram is, in reality, a DFD planning tool that shows the top-down functional decomposition and structure of a system.

Decomposition is the process by which a system is broken down into its component subsystems, processes, and sub-processes. (2) Decomposition allows the analyst to partition a system into logical subsystems of processes for improved communication, analysis, and design. (3) Decomposition diagrams provide a logical hierarchical decomposition of a system.

One example of a decomposition model is the Cisco business decomposition model. (4) The Cisco model provides a high level overview of the business process under investigation, separates that process into sub-processes, and identifies the applications that support each process. (5)

A decomposition diagram typically shows a high-level function, process, data area, or other type of object broken down into lower level, more detailed components. (6) For example, decomposition diagrams may represent organizational structure or functional decomposition into processes.
Part of the analysts job is to draw a functional decomposition diagram, aka a “top-down” functional decomposition diagram. The analyst will typically propose a top-level, event-response list of information flow. As another example, I will refer to the “Publisher Printing” scenario from my class homework.

In the “Publisher Printing” scenario, a book publisher submitted an order for a printing job. There were 5 external agents, and 12 action items in the DFD diagram. However, the decomposition diagram, as a top-down diagram, does not detail the actual flow of information.

There are a number of advantages to creating a decomposition diagram. For example, the “Publisher Printing” decomposition diagram is intended to give the analyst an overall view of the components of the publisher printing company’s system. In my homework diagram I had 5 main subsystems. They consisted of operations, orders, marketing, materials, and employees.

The decomposition diagram is a tool to help identify and delineate the various components or departments of the system. Creation of this diagram helps the system analyst map out the components of the system. Once this diagram is created, it can be used as a talking point for collaboration with corporate department heads. Group consultation can then result in the diagram being amended as needed.

There is another important aspect to the functional decomposition diagram. This is referred to as balancing. Balancing encourages consistency and completeness in data flow diagrams. (7)
In terms of disadvantages, it is rather obvious that the decomposition diagram does not elaborate on information flow, information updates, or time issues. The main purpose of the decomposition diagram is to identify components of the system, and nothing more.

In summary, the decomposition diagram, aka the hierarchy chart, is limited in its system information. It is intended to show the top-down functional decomposition and structure of a system. In essence it is a planning tool for the more detailed diagrams, such as the data flow diagram.

References:

(1) http://cs.tju.edu.cn/faculties/zyfeng/Course/system%20analysis%20and%20design%20methods/whitten/whitten_student_cd/projects_&_cases/case_study_2_ecs_-_milestone_06_process_modeling.doc


(3) Ibid, p. 322.


(5) Ibid, pg3.

(6) http://en.wikipedia.org/wiki/Decomposition_(computer_science)

Q5: Proposed technical solution for a new information system: choose the solution most compatible with developer’s technical expertise, fastest solution, or the most cost-effective?

The first step towards revamping or updating an existing information system is the request for outside technical assistance by the system owners. The system owner is an information system’s sponsor, executive advocate, and is usually responsible for funding the information system project. (1) This technical assistance is often in the form of the system analyst. The system analyst is considered to be the systems specialist. He or she is typically hired or contracted to study the problems and needs of an organization to determine how people, data, processes, and information technology can best accomplish improvements for the business. (2)

The system analyst is a problem solver. He or she is usually tasked with the responsibility of observing the existing information processes, identifying more efficient processes, and then updating or tweaking these processes to meet the needs of the system owners and users. This can be referred to as systems Development.

Systems development is a methodology which the systems analyst may choose to employ to analyze the information system. This methodology involves the usage of systems analysis, systems design, as well as systems implementation. As part of the analysis, the systems analysis will most likely use the requirements analysis process.
The requirements analysis process can be a long and tedious process. When approaching a new project, the analyst must strive to identify the system owner’s requirements. There are three options which can be pursued by the system analyst: the system can be selected based on timely development time, the system can be selected based on the cost (least expensive) effectiveness, or the system can be selected based on which is most closely aligned with the analyst’s technical expertise or style.

Per our text, the definition of requirement Analysis is that it, “defines the business requirements for a new system.” (3) This analysis is also referred to as the definition phase or logical design phase. The analyst seeks to identify what the users would actually need in an information system.

The **Requirements Analysis** phase consists of four phases or steps:

1. Identify the system requirements.
2. Prioritize the system requirements
3. Update and refine the plan
4. Communicate to determine effectiveness

The analyst must consider the operational, technical, as well as economic feasibility of the proposed system. Putting a system in place which does not support the users objectives, or a system which is too expensive to maintain to be used, will probably not achieve the desired objective. Some of the system requirements may include identification of required data input and output. The analyst must determine the type of data being stored, retrieval options, and volume of usage.
The project plan must be periodically updated and refined. This is due to the ever-changing nature of the overall system. System owners and users are not frozen in time. They have information needs which can periodically change as their objectives change. The system owners may decide to change or modify the various departments. Or there may be a decision to increased or decrease the level of information that is available to authorized users.

Communication is the key. The system analyst needs to establish whether the system is actually performing the tasks as required by the stakeholders. Functionality is key. The analyst must determine whether the various components of the system, and the resulting flow of information, meet the objectives set by the system owner.

The analyst must strive to identify the real needs of the customer. This can be challenging especially if the customer doesn’t actually know his or her system needs. An inefficient system will result in wasted staff hours, lost data, and overall corporate inefficiency.

In an effort to identify the customer’s needs, the analyst will usually strive to identify the system owner’s needs by conducting interviews with the stakeholders and any relevant staff. The analyst will also strive to work successfully with all relevant IT staff. The goal is to ensure that any required user system documentation is drafted clearly and concisely.
In order to effectively identify the customer’s needs, there are several techniques which can be used. These techniques may include staff interviews or staff focus groups. Other techniques include prototyping, and use cases. (5) In some cases, the analyst can use a combination of these methods to identify the needs of the system owners.

One aspect of creative analysis is the need for the systems analyst to convey the message to the system users and owners that everyone is important. This is very important as the system users will either feel that their input is being ignored, or believe that the proposed system will result in the elimination of their position(s). The potential danger of alienating system users is detailed in Steve McConnell’s book, “Rapid Development.” In his book, McConnell lists a number of ways that users can inhibit requirements gathering. McConnell believes that it is absolutely essential for the system analyst to make everyone feels like a team player, even if some personnel are of only marginally importance. (6)

It is very important for the system analyst to effectively communicate with the stakeholders and system users. The question of the best information system would most probably be a combination of creating the most expedient IT solution, combined with cost effectiveness, based on the system analyst’s expertise. As we do not live in an ideal world, there are probably a number of cases where the system owner’s found that they were not pleased or satisfied with the performance of their contracted system analyst.

The effective usage of communication is an important ingredient to ensure the exchange of ideas and needs between the system owners and users and the system analyst. The
system analyst, as a professional, should be cognizant that the integration of a new system inevitably changes the environment and relationships between people. So it is important to identify all the stakeholders, take into account all their needs and ensure they understand the implications of the new system.

As we live in a litigious society, it would be in the system analyst’s best interest to ensure that a well written contract is drawn up between the analyst and the system owner prior to the commencement of work. This will help to ensure an avoidance of any unpleasant legal or financial repercussions.

Finally, the system analyst should clarify the finalized information system structure with the system owner prior to implementation. It is very important that the system analyst and the system owner reach an agreement regarding the final decision on the scope, cost, and feasibility of the proposed system. The reality is that the system is going to be used by the system owners and users, and not by the system analyst. So, it is incumbent upon the system analyst to realize that not every completed system will be his or her version of an ideal or perfect system.

The reality is that the analyst must strive, to the best of his or her ability, to develop an information system which is, at best, a compromise. The final system may not be viewed (by the systems analyst) as the most expedient option, it may not be seen as the most efficient or cost effective solution, and it’s final form may not contain all of the processes and/or structure preferred by the systems analyst.
In closing, if the completed information system demonstrates an overall improvement in performance and productivity over the old system, and makes the system owner(s) happy, than the systems analyst should feel confident that he or she has made a best effort attempt to accomplished the goals and objectives as spelled out in the contract. By ensuring the system owner’s satisfaction, the system analyst can not only be confident of a potential business referral, but also the potential for the subsequent renewal of system maintenance contracts.

References:


(2) Ibid, p 11.

(3) Ibid, p. 185.

(4) [http://www.fdsc.net/skills/requirement-analysis.html](http://www.fdsc.net/skills/requirement-analysis.html)
