

Chapter
1

INTRODUCTION

*Get on the
Fast Track!*



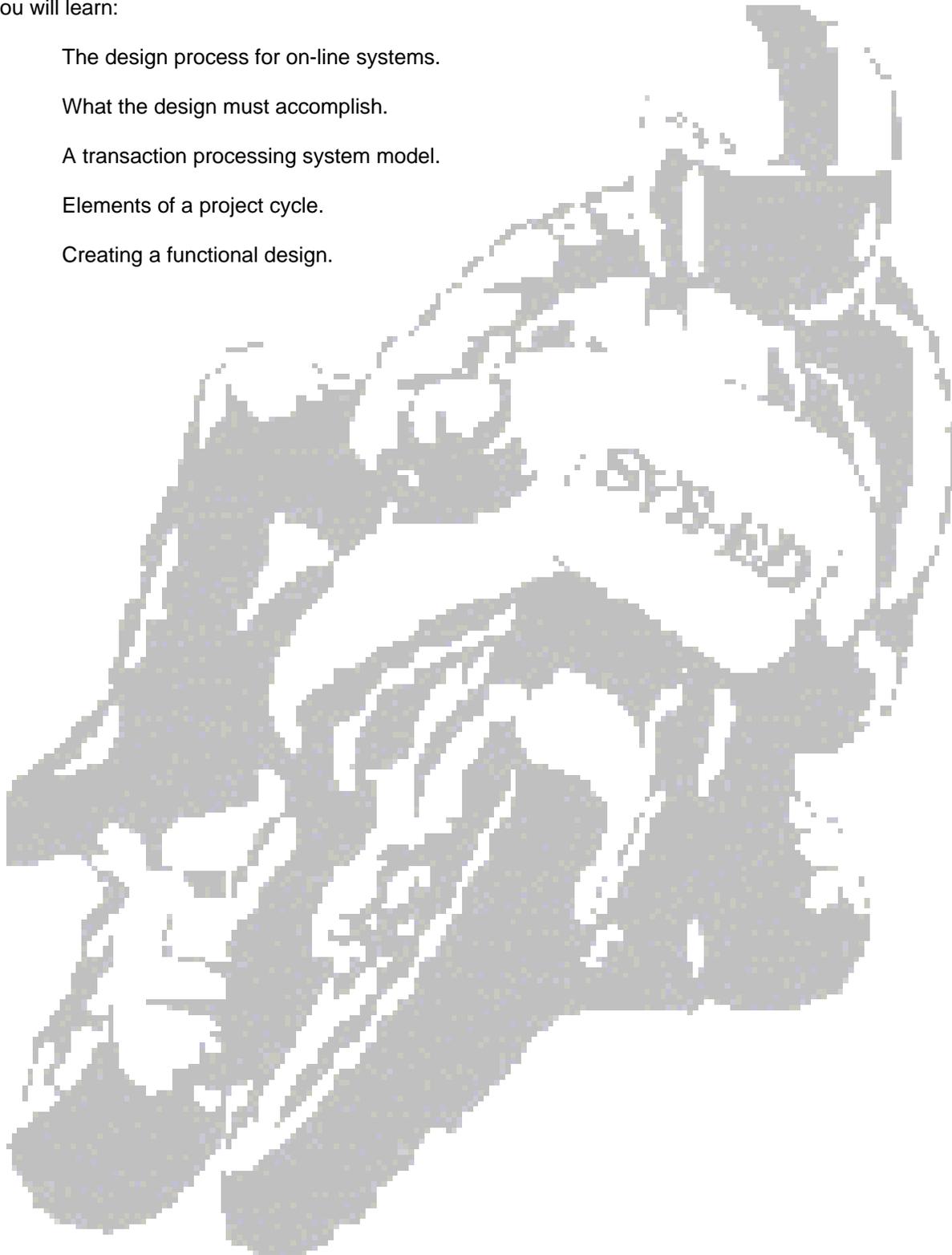
TM

**SYS-ED/
COMPUTER
EDUCATION
TECHNIQUES, INC.**

Objectives:

You will learn:

- C The design process for on-line systems.
- C What the design must accomplish.
- C A transaction processing system model.
- C Elements of a project cycle.
- C Creating a functional design.



1 Process of Designing an On-line System

Organizing the Design Process

- C The tasks which need to be performed.
- C The sequence in which each task should be performed.
- C What the results of each task should be.
- C The required output of the design phase.

Problems in Organizing the Design

- C Designing a system is not a precise science.
- C A task can not be considered as separate. Each task must be considered in relation to its effect on the system.
- C The design of any system is directly related to the imagination of the designer.
- C The decisions/choices facing the designer are not clear cut; many decisions are judgmental.
- C Decisions and tradeoffs need to be made in areas such as:
 - recovery vs. performance.
 - functions vs. time-frame.
 - capacity vs. cost.

2 Systems Designer's Tasks

The tasks of a system designer include:

- C Meeting the needs and expectations of the users.
- C Understanding and incorporating the capabilities of the user.
- C Recognizing and utilizing the available personnel.
- C Anticipating the training needs of the users, operation personnel, application programmers, and systems programmers.
- C Developing the framework for standards and procedures.
- C Establishing a user interface.
- C Planning for a user review process.
- C Planning for user testing.
- C Sufficient planning and time frame for coding testing and conversion.
- C Procedures for phasing in the application.

3 Structured Model of a Data Processing System and a Project

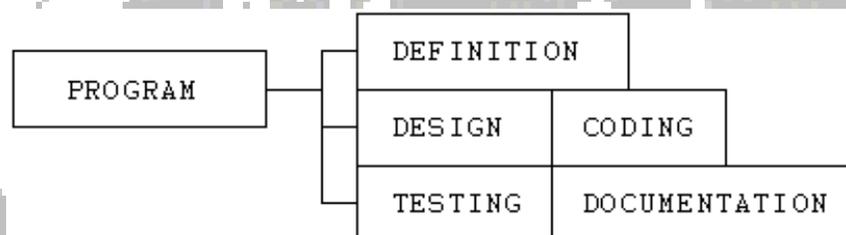
A System Model

- C A data processing system consists of system elements, such as procedures, programs, files, etc. Associated with each element are one or more project tasks needed to build that element.
- C The system element consists of procedures. Systems are distinguished from each other because their procedures differ.
- C The procedure element consists of a series of one or more tasks acting upon data. There are basically two types of procedures, batch and on-line, named after the types of tasks in the procedures. Procedures are distinguished from each other because their tasks differ.
- C A task element consists of one logic element acting upon data elements.

When a user is communicating directly with a computer, the task is on-line. More useful terms are transaction processing versus interactive.

- C Transaction Processing means that the user generates a string of data fields while the computer is performing other tasks. The user then sends this data to the computer, which - after a small delay - processes the fields. CICS is a Transaction Processing system.
- C Interactive means the computer (or a front-end processor intimately connected to the CPU) is handling the users commands.

Program Tasks

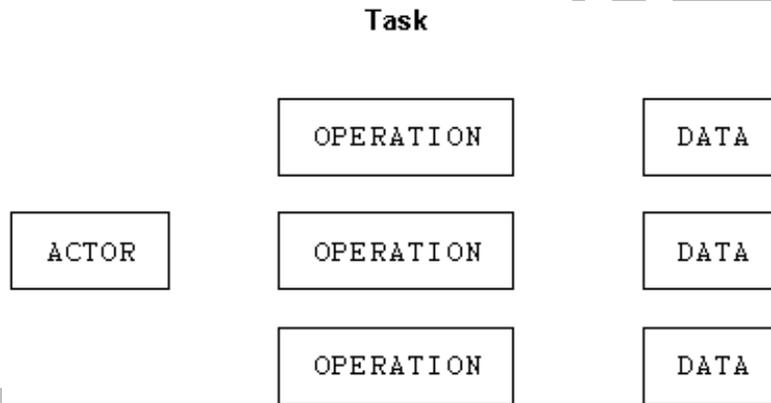


4 A Structured System Model

A System Model

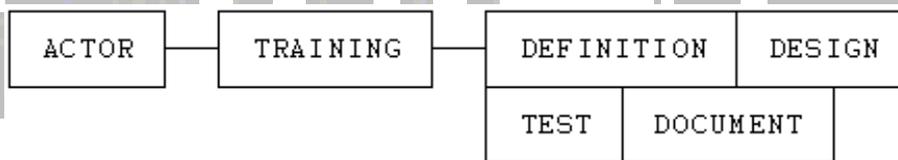
Batch tasks are tasks which are not on-line -including printing reports, sorting, sequential updating of files and similar tasks. All on-line systems have an associated batch portion (reports, backups etc).

Tasks are distinguished from each other because their actors, operations and data differ.



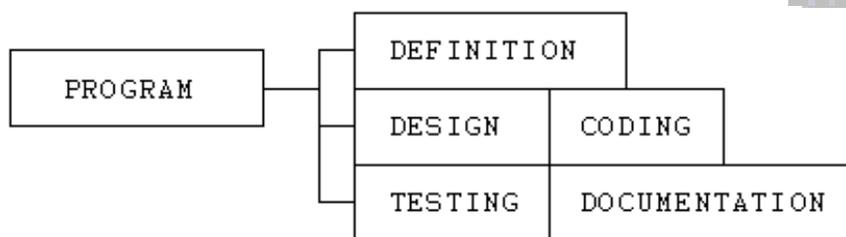
Actor

Associated with each human Actor Type of element is the Project task of Training, and this training task must be defined, designed, tested and documented.



PROGRAM

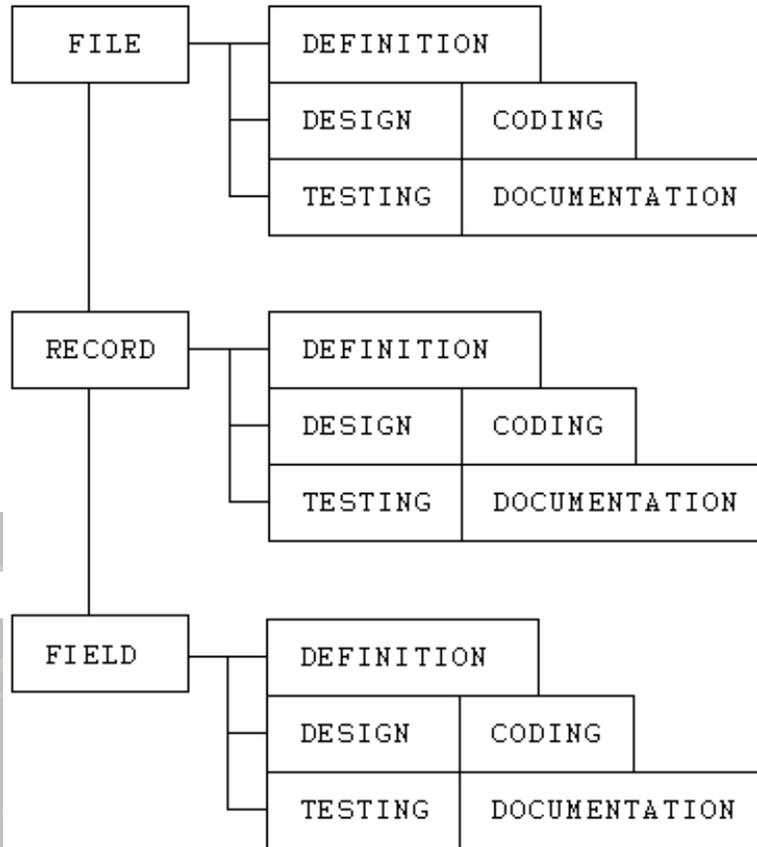
Associated with each computer operations (program) element are the project tasks of definition, design, coding, testing and documentation.



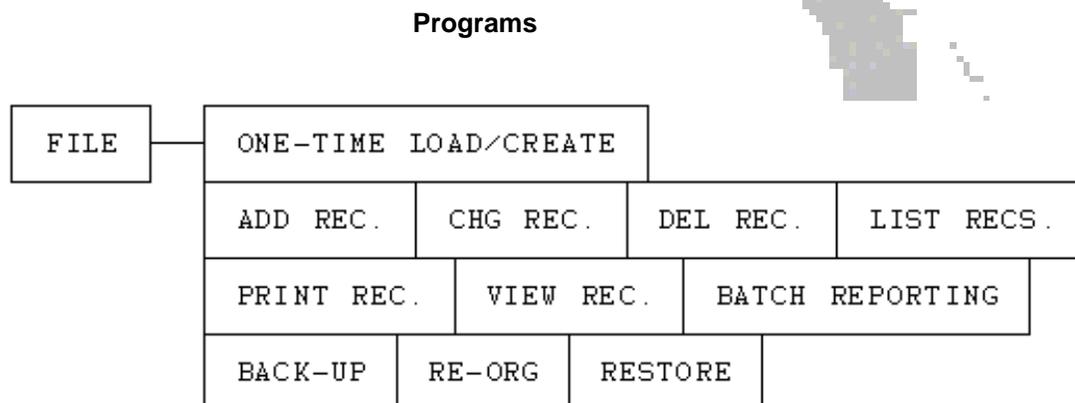
- C The Data element is a means of recording information. Data is composed of either File or Data Stream elements.
- C FILES are composed of record elements which consist of field elements which consist of character elements (or bytes).
- C DATA STREAMS are composed of word and character elements (such as a Text file) or keyword, parameter, and other such elements.
- C Reports are a type of file.
- C Communication areas passed between modules are technically records. We treat them like one-record files.
- C The data flowing to and from terminals can be considered to be either files or data streams. CICS and other transaction processing systems consider the terminal to be a type of file, supplying records to and obtaining records from programs. These records are called MESSAGES, and Programs SEND and RECEIVE messages, just as they WRITE and READ records from a disk file.
- C Since data streams are rarely used in Transaction Processing systems, we will concentrate on files in this course.

FILE

Associated with each file, record and field type of element are project tasks of definition, design, coding, testing and documentation.



It is even more important to recognize that each file we specify in a Transaction Processing system causes us to create at least 11 functions:



C And each of these programs needs the 5 Project tasks of Definition, Design, Code, Testing and Documentation. And those Programs which are on-line require a human Actor which gives rise to 5 more Project tasks. One file with one type of record with only one field, can give rise to 100 Project tasks! Although it is true that testing is a task which overlaps elements, and some tasks are almost trivial (such as coding a field), it is still true that data files cause a lot of work.

C The obvious implication is to reduce the number of files as much as possible. Yet, files are what data processing is all about, and it is very difficult to eliminate files. This means we must simplify files and their contents as much as possible, so that the tasks they cause are simple.

C Another implication: the more thought and attention we give files in the Definition and Design stages, the less work will have to be done in the later stages.

The point is: **Only during the definition and design tasks do we have the opportunity to reduce the amount of work in a project.**

C There is also another fact of our profession - every program needs to be maintained.

C We return to where we began: the best way to save money for our employer is to minimize the amount of work that must be done, both during the building of a system and during the life of a system.

5 Project Cycle

Design Phase Inputs

Again, since each company has its own definition of which activities should be included in which phase of the project cycle, we here present the assumptions underlying this manual.

- C Define the requirements of the new system.

- C Inputs are the existing system and the improvements the end users want.

- C Primary outputs are:
 - Draft system specification (Documenting the SYSTEM element).
 - This includes an organizational chart relating project decision makers, application system managers, data suppliers and end-users.
 - Draft specifications of the major functions and/or problems to be solved; these drafts will become the procedure and task element definitions as a result of our design process.
 - Draft layouts of screens and reports.
 - Draft training notes for each screen and report.
 - The beginnings of a data dictionary.

- C Other outputs include estimated cost and duration ranges for the next phase and the rest of the project.

- C Design the system.
 - Primary input is the documentation from the definition phase.
 - Other inputs are the experience and knowledge of the analyst, and the hardware and software environments.

For on-line procedures/tasks, you should also have the following outputs:

- C Network Diagram for each procedure (if the networks for the procedures differ), showing:
 - Location and number of terminals; VTAM and CICS terminal Ids.
 - Line speeds of each communications path.
 - Site manager - the one who co-ordinates the resolution of hardware and software problems.
 - Names and telephone numbers of the people providing hardware, applications software, and communications network support.

Simple communications systems can get by with text descriptions instead of the diagram, but systems with many alternate communications paths, differing line speeds and multiple hosts need a diagram. Often the communications department has such diagrams available, so all you need to do is add the names of the key people.

The tasks the END-USER manager and his/her people need to follow to determine if problems are due to hardware, communications or software.

C	Include a definition of technical jargon which could be used.
C	Often wise to provide examples of what to say to the hardware and communications technicians.

Other Design Phase outputs include estimated cost and duration ranges for the next phase and new estimates for the rest of the project.

C	Data (procedural) flow diagrams.
C	For on-line procedures, detailed transaction-task flow possibilities.
C	Written procedures.
C	Completed screen and report layouts.
C	Normalized files and record lay-outs.
C	File specs - required DEF CLUSTER options, unusual processing requirements; a cross-reference table to each program/module which accesses this file.
C	Completed data dictionary.

Written program specs for each of the above functions; when the file is used on-line, each of the above functions will probably be a separate CICS COBOL module; when a file is used exclusively in batch, it is almost always most efficient to perform many or all the above functions in one program. Avoid having both batch and on-line updating of a file.

6 Functional Design Process

Phase 1:

INPUT

The draft documentation from the Definition phase, which includes descriptions of the present procedures and draft layouts of the proposed reports and screens.

Unless the definition phase documentation is unusually complete, major inputs to this process are: doing the work in the using department and extensive discussions with the end-users.

ACTIVITIES

Functional description of procedures, tasks; mention the organizational units involved, and if there are source, receiving or sibling systems for data or control. Keep notes and comments on separate papers.

Functional description of data store contents and required access modes by function; consider updating, reporting, creation/loading, back-up, restore. Keep notes and comments on separate papers.

Functional description of how data comes to the terminal operator for input; Functional description of how data on the screen is used. May be part of the procedure description, above. Keep notes and comments on separate papers.

Functional description of how data on the report is used. May be part of the procedure description above. Keep notes and comments on separate papers.

Phase 2:

INPUT

Knowledge of CICS hardware and software; some knowledge of your communications system.

Resolve questions, ambiguities. If comments relate to future work, save them with system documentation.

- C Normalize the files within a procedure. Join files from different procedures which have many data elements in common.
- C Draft a procedure chart starting with the output, working back to the input, naming the programs, identifying manual tasks by position title, showing data stores and how they are accessed.

OUTPUTS

- C Layout files; update the file specs and data dictionary.
- C For procedures, draft procedure descriptions.
- C For batch procedures, draft work/data/system flow diagrams; draft program I/O diagrams.
- C For transaction processing procedures, draft transaction flow diagrams, maybe "menu trees" or "screen charts"; draft module I/O diagrams.
- C For programs, draft specs.
- C For manual tasks, draft job descriptions.
- C Draft training tasks on using reports and screens.

Next Steps:

- C Review design with end-user, preferably by doing a dry run on each procedure and task.
- C Finalize design and specs, obtain approval for development phase.
- C Tools to Consider:

Organizational Chart	Control Table Checklists	DB2 Checklist
Existing Procedures	Design Checklists on Screens, Communications	VSAM Checklist
Existing maps	Task Logic	Inter-computer communications
Network Tables	IMS Checklist	

These tools can be especially important in downloading/uploading microcomputers and mainframe and exchanging transactions of microcomputer and mainframe.)

DESIGN PHASE INPUTS

Phase 3:

Dry run of proposed design:

C	Primary input is the above written specs and diagrams.
C	Major output is changes to the design or sign-offs by the user.

Phase 4:

C	Develop procedures, tasks and programs.
C	Test the programs.
C	Test the work flows.
C	Test the training materials and tasks.

Major outputs are JCL and the source code for the programs, and the user's acceptance sign-off.

For CICS Transaction Processing procedures, the following control tables are a major output:

Sign-on Table	SNT	Interval Control Table	ICT
Terminal Control Table	TCT	Temporary Storage Control Table	TSCT
File Control Table	FCT	Journal Control Table	JCT
Program Control Table	PCT	System Initialization Table	SIT
Processing Program Table	PPT	System Recovery Table	SRT
Destination Control Table	DCT		

Phase 5:

Train end-users and install the system.