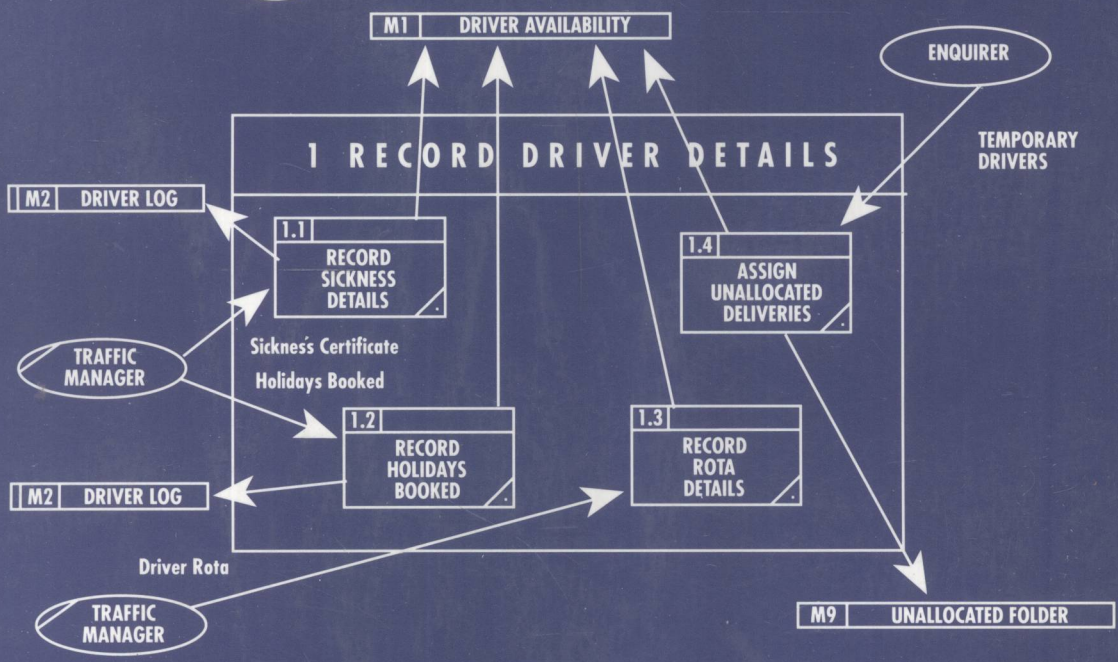
SSADM Version 4 Models & Methods



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SSADM Models and Methods Version 4

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NCC Blackwell
MANCHESTER • OXFORD

British Library Cataloguing in Publication Data
Skidmore, S.
SSADM.
1. Management. Information systems. Application of computer systems. Structured systems analysis & systems design
I. Title II. Farmer, R. III. Mills, G.
658.40380285421

ISBN 0–85012–796–3

Published for NCC Publications by NCC Blackwell Limited.

Editorial Office, The National Computing Centre Limited, Oxford Road, Manchester M1 7ED, England.
NCC Blackwell Limited, 108 Cowley Road, Oxford OX4 1JF, England.

Typeset in England by Bookworm Typesetting, Manchester and printed by Hobbs the Printers Ltd of Southampton

ISBN 0–85012–796–3

Preface

The Structured Systems Analysis and Design Method (SSADM) is a set of procedural, technical and documentation standards for systems development. It is owned by the Central Computer and Telecommunications Agency (CCTA) which is currently part of HM Treasury and the centre of information system policy and procurement in government. CCTA has adopted an 'open' strategy in which SSADM is non-proprietary and is publicly available.

SSADM has a rigorous release strategy with the broad content of the next version published about nine months in advance of its actual release. This book examines Version 4, which was launched by the CCTA in May 1990.

SSADM strategy is determined by a Design Authority Board comprising members of the CCTA, the Computing Services Association (CSA), the British Computer Society (BCS) and the National Computing Centre (NCC). The official reference manual is published by NCC-Blackwell.

The Systems Analysis Examination Board (SAEB) of the BCS controls examination standards in SSADM and awards certificates of proficiency to successful candidates.

SCOPE OF THIS BOOK

This book considers the construction and use of the fundamental models of SSADM. Each technique is examined in depth, giving detailed guidelines on notation, construction, presentation and documentation. The progressive development of each model is illustrated using detailed examples from a selection of applications. Chapter 12 is a brief introduction to the framework of application, showing where each model and technique appears in SSADM and illustrating the relationships between them.

This emphasis on the products of models of SSADM has been adopted for three main reasons. The first is that the management framework is explored in detail in complementary NCC publications (*see* References) and these will be of interest to the practitioner. Secondly, the techniques can be used independently of the framework and this may be of particular significance to teachers and lecturers in further and higher education who wish to use the **notation** of SSADM but not its prescription. SSADM employs methods which are also fundamental to other structured methodologies and so there is not an inextricable link between the modelling methods and their framework of application.

Finally, SSADM Version 4 is a product oriented methodology with progress determined and monitored through the production of models defined to a particular standard and quality.

The NCC-Blackwell Reference Manual is particularly comprehensive and it is not the purpose of this book to provide a "cut-down" summary of it. Figure 1 (reproduced from the Reference Manual) shows the three main components of SSADM:

- the Dictionary defining 'what' should be produced;
- the Structural Model describing 'when' to produce it;
- the Procedural Chapters explaining 'how' to do it.

This book concentrates on the 'how' of SSADM for most of the products defined in the Dictionary. The index of Product Descriptions of the Reference Manual is reproduced at the end of this Preface (Figure 3) together with page references for this book. This allows readers to assess the product scope of the book. The 'when' perspective of the Structural Model is confined to Chapters 1 and 12. Cross references between the text and the Structural Model are included in the Structural Model Diagrams of Chapter 12.

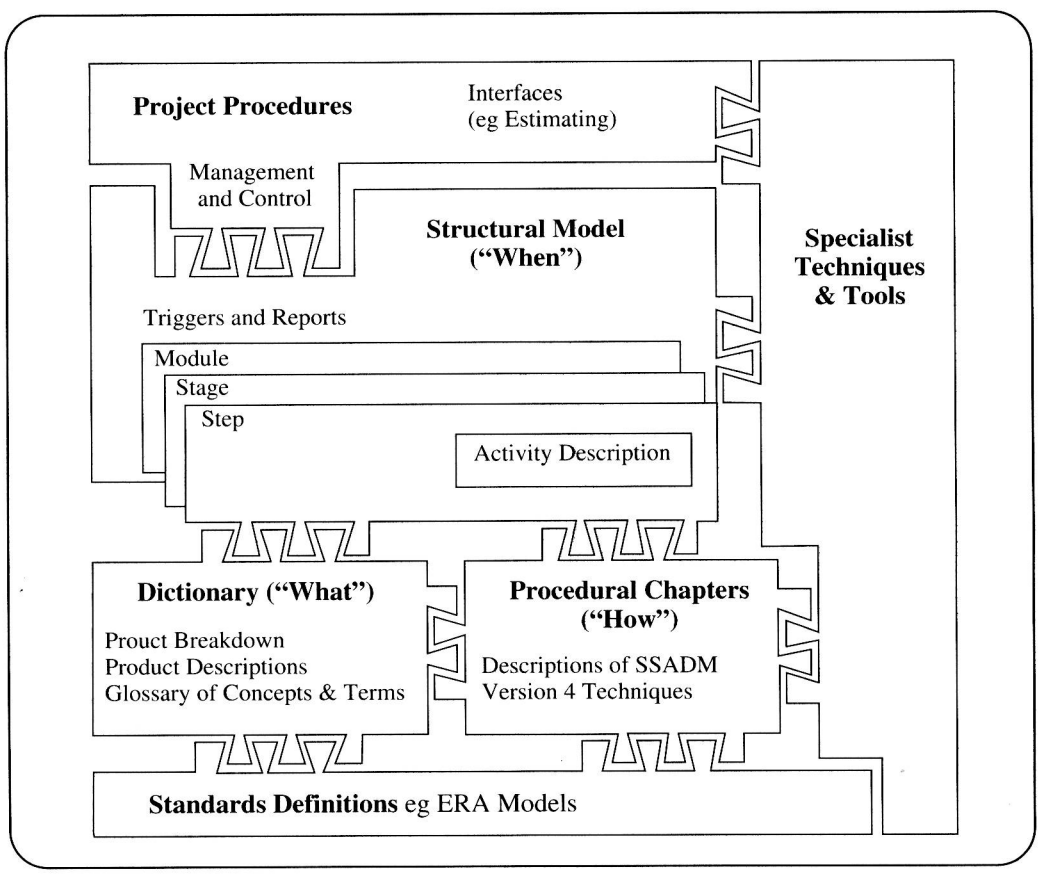

Figure 1 The three main components of SSADM

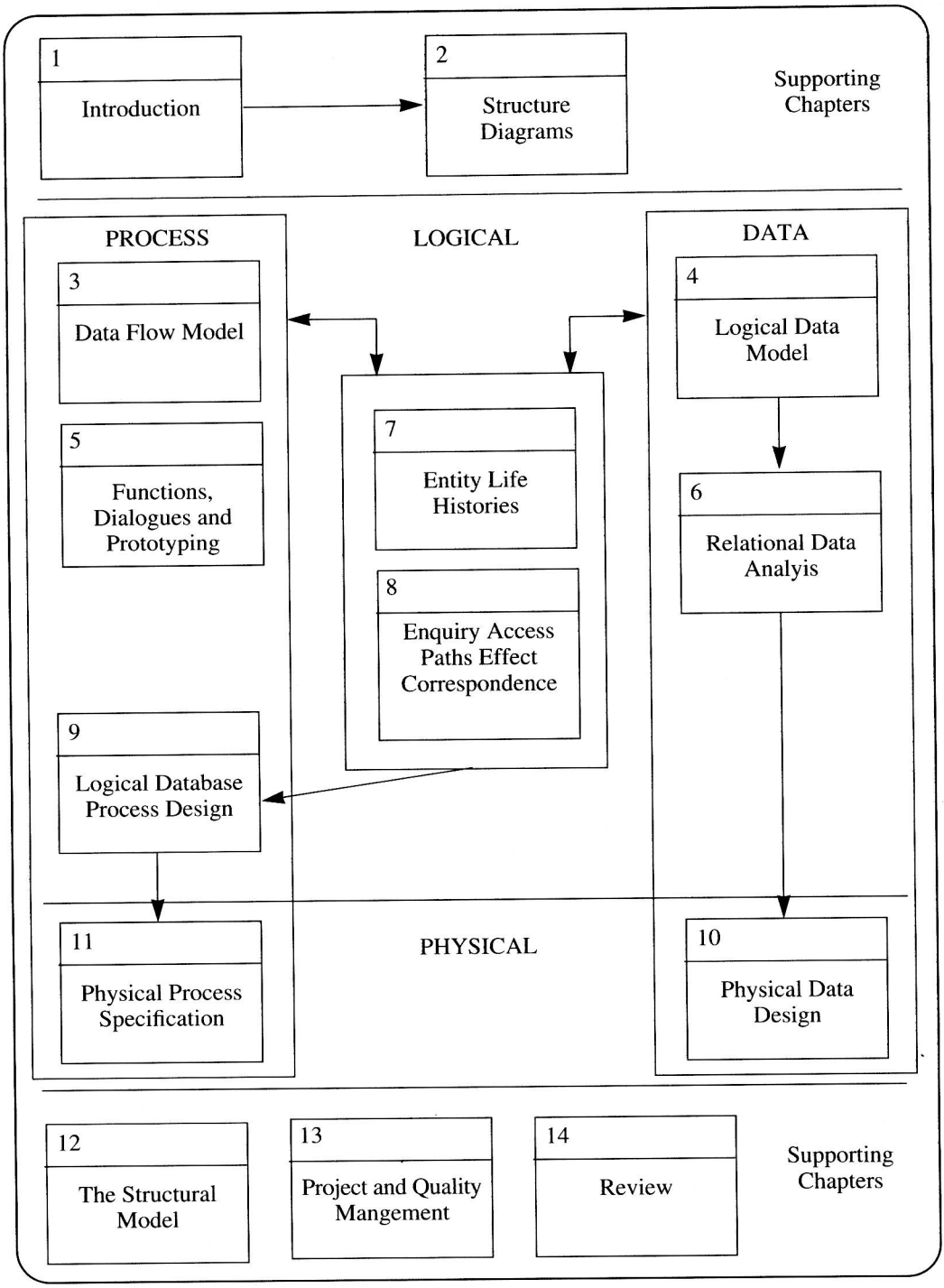

Figure 2 Content & Structure of this Book

CONTENT OF THE BOOK

A diagram showing the content and structure of this book is shown in Figure 2. A brief introduction to each of the principal chapters is given below:

Chapter 1 Introduction

Chapter 2 Structure Diagrams

The SSADM Structure Diagram is used in several different techniques. Chapter 2 describes the notation in general to avoid unnecessary repetition in subsequent chapters. Top-down and bottom-up approaches to deriving the diagram are both examined because neither approach is always superior in all circumstances.

Chapter 3 Data Flow Model

Data Flow Diagrams (DFD) show the passage of data through the system. They focus on the processes that transform incoming data flows into outgoing ones. DFDs are used in most structured methodologies and indeed were the principal model of the two books that effectively launched structured analysis (*deMarco 1979, Gane and Sarson, 1979*). Chapter 3 examines the development of a DFD from two perspectives.

- Bottom-up. This traces the construction of a DFD from its use as a description of the current system (so-called current physical) through its logical equivalent (current logical) to encompassing agreed user requirements (required logical).
- Top-down. General principles of DFD development are given starting with a consideration of the inputs and outputs of the system. This is used to define a one process DFD (or context diagram) which is progressively developed and decomposed.

Data Flow Diagrams are supported by various documentation which contribute to the completion of the Data Flow Model.

Chapter 4 Logical Data Model

The Logical Data Structure (LDS) is a static representation of the data used in the system. It shows how the data is logically grouped and how these logical groupings are related to each other. Similar models are found in most structured methodologies. Chapter 4 introduces the notation and construction of these models together with a brief examination of the documentation used to support the LDS in the Logical Data Model.

Chapter 5 Functions, Dialogues and Prototyping

The processes of the DFD describe the main functional requirements of the system. However these processes are not constructed within a business or user context and hence do not necessarily reflect how the user perceives the functionality of the system. Consequently SSADM has introduced the definition of functions as a super-technique for describing sets of system processing which the user wishes to carry out at the same time to support a certain business activity.

The interaction between the user and the function is modelled with Dialogue Structures and can be validated and explored with prototype construction and experimentation. This chapter looks at the construction of functions, dialogue models and prototype control and documentation.

Chapter 6 Relational Data Analysis

The logical groupings of data described in the Logical Data Model are most useful when they are well normalised. Chapter 6 examines the construction of data structures which are unambiguous, free from redundant duplication, flexible and easy to maintain. This is achieved through Relational Data Analysis (RDA). Two detailed examples are given.

The first is a complex data structure which is normalised using a formal consideration of the functional dependencies between data items. The second example demonstrates the normalisation of a relatively simple data set using a cook-book approach. A set of rules for converting the normalised data groups into a Logical Data Model is also provided.

Chapter 7 Entity-Event modelling: Entity Life Histories

Entity-event modelling provides a third view of system requirements. It is concerned with identifying events, the sequence in which these events occur and the effect these have on the data held in the system. It is often represented as a "time perspective" of the system and is used to amend or extend the process and data models.

Two modelling techniques are used in entity-event modelling. Chapter 7 describes the Entity Life History (ELH) which is used to investigate and document the life of each entity contained in the Logical Data Model. It graphically illustrates how occurrences of each entity are created, modified and deleted.

Chapter 8 Enquiry Access Paths and Effect Correspondence Diagrams

Each update and enquiry function requires an access path through the Logical Data Structure in order to locate the required data. Enquiries are modelled using Enquiry Access Paths and update functions are defined in Effect Correspondence Diagrams (ECD). The ECD is the second modelling technique of entity-event modelling. These are developed from the Entity Life Histories and highlight how the effects on entities are related to each other.

Chapter 8 illustrates the development of Enquiry Access Paths and Effect Correspondence Diagrams for the Entity Life Histories constructed in Chapter 7.

Chapter 9 Logical Database Process Design

Logical Database Process Design produces Enquiry Process Models (EPM) and Update Process Models (UPM) which provide a detailed process specification. They are largely developed from the Enquiry Access Paths and Effect Correspondence Diagrams described in the previous chapter.

This chapter looks at the development of the two models as well as examining general issues of process design which must be taken into account in their construction.

Chapter 10 Physical Data Design

Physical Data Design is concerned with translating the data groups of the Logical Data Structure into a physical file and data base design for a specific implementation environment. Chapter 10 examines a general strategy for moving from the logical to the physical data model and encourages the development of a design strategy that formally documents local experiences and knowledge.

Chapter 11 Physical Process Specification

Physical Process Design is concerned with the conversion of logical processes and functions into program specifications, physical input/output formats and physical dialogues. The detail of the conversion obviously depends upon the target hardware and software environment and so a general strategy can only be described. This chapter examines many of the issues involved and again emphasises the importance of developing a formal installation design strategy that takes into account local knowledge and experience.

Chapter 12 The Structural Model

This chapter provides a brief introduction to the modules which make up the Structural Model of SSADM. Each module is described with reference to its objectives, steps, products and primary techniques. Most of the products and techniques listed in the module descriptions can be directly cross-referenced back to the contents of Chapters 3-11.

Chapter 13 Project and Quality Management

This chapter examines selected issues of project management and quality control. It is not a detailed examination of either of these areas but rather a summary of the project and quality controls that will surround the products described in this book.

Chapter 14 Review

CONTEXT OF THE BOOK

This book concentrates on the fundamental modelling methods of SSADM, not the fundamental skills of analysis and design. It must be recognised that SSADM demands an underpinning of good principles and practice in analysis and design. This is explicitly recognised in the Certificate of Proficiency in SSADM, where an oral examination is designed to:

> "assess whether a candidate has the skills, knowledge and personal qualities to enable him or her to make an effective contribution to systems analysis and design generally".

This particular text builds upon the foundations laid in *Introducing Systems Analysis* and *Introducing Systems Design,* Skidmore and Wroe (1988,89).

Finally, this book does not attempt to justify the use of SSADM or compare it to other methodologies. It assumes that the decision to implement, teach or research SSADM has already been taken.

Figure 3 Cross-reference to SSADM products

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