

Information technology — Software measurement — Functional size measurement —

Part 4: Reference model

ICS 35.080

National foreword

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Summary of pages

This document comprises a front cover, an inside front cover, the ISO/IEC TR title page, pages ii to vi, pages 1 to 95 and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

© BSI 24 October 2002

ISBN 0 580 40635 0

TECHNICAL REPORT

ISO/IEC TR 14143-4

First edition
2002-08-15

Information technology — Software measurement — Functional size measurement —

Part 4: Reference model

*Technologies de l'information — Mesurage du logiciel — Mesurage de la
taille fonctionnelle —*

Partie 4: Modèle de référence

Reference number
ISO/IEC TR 14143-4:2002(E)



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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind than that which is normally published as an International Standard (“state of the art”, for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Technical Reports are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 14143 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 14143-4, which is a Technical Report of type 2, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software engineering*.

ISO/IEC 14143 consists of the following parts, under the general title *Information technology — Software measurement — Functional size measurement*:

- *Part 1: Definition of concepts*
- *Part 2: Conformity evaluation of software size measurement methods to ISO/IEC 14143-1:1998*
- *Part 3: Verification of functional size measurement methods*
- *Part 4: Reference model*
- *Part 5: Determination of functional domains for use with functional size measurement*

Annexes A and B form a normative part of this part of ISO/IEC 14143. Annex C is for information only.

Introduction

The user of an FSM Method must establish that the FSM Method is appropriate to quantify the functional size of the software. The conformity to ISO/IEC 14143-1:1998 will be necessary but may not be sufficient. An evaluation process of an FSM Method will have to consider practical evidence of the performance of the FSM Method. Such an evaluation may require benchmarking the chosen FSM Method to compare its results for a collection of known Reference User Requirements (RUR) with those obtained from a Reference FSM Method.

Part 4 of ISO/IEC 14143 provides standard RUR together with guidance on Reference FSM Methods. Figure 0.1 shows how these are used to establish reference results. The FSM Method to be evaluated determines functional size results for a collection of appropriate RUR. The same collection of RUR is measured by one or more Reference FSM Methods and these reference results are then compared with the results obtained from the FSM Method to be evaluated.

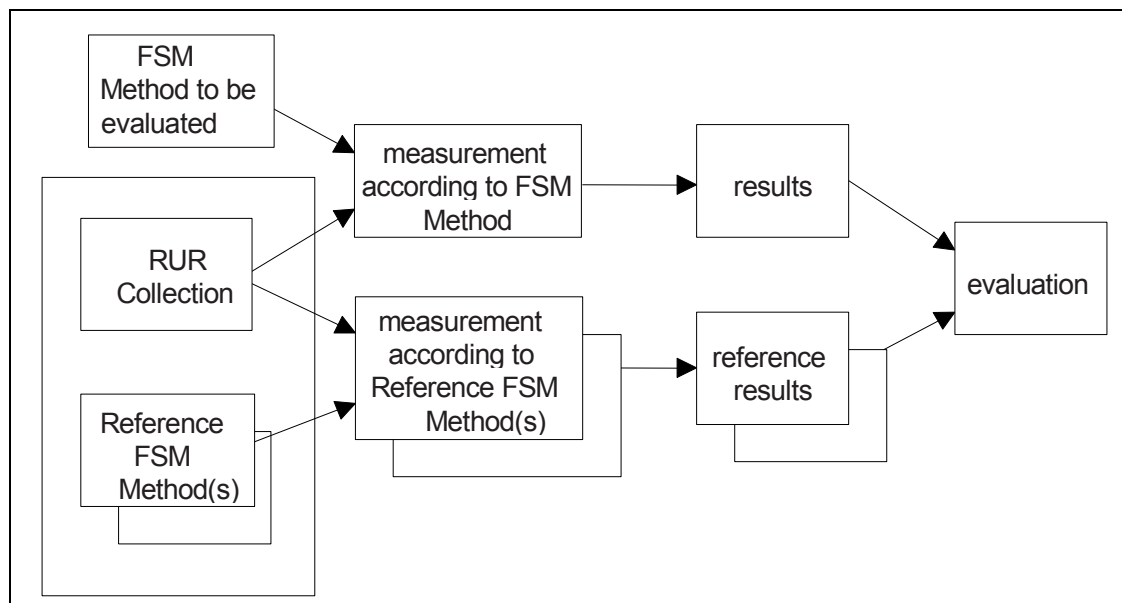


Figure 0.1: Use of RUR and Reference FSM Methods

Clause 5 of this part of ISO/IEC 14143 defines a framework for identifying, classifying and selecting RUR. Annexes A and B provide examples of such RUR in two different domains. While it would be desirable to have an exhaustive set of such RUR, the size of such collection would be prohibitive. Further RUR can be found in the RUR reference list presented in Annex C. Additional appropriate RUR may be constructed according to the basic guidelines stated in clause 5 RUR.

Clause 6 of this part of ISO/IEC 14143 introduces the general requirements for Reference FSM Methods. The reference FSM Methods provide reference points, against which other FSM Methods can be compared.

Information technology — Software measurement — Functional size measurement —

Part 4: Reference model

1. Scope

Part 4 of ISO/IEC 14143 defines the reference model (Figure 0.1) to be used when verifying a Functional Size Measurement (FSM) method.

The reference model consists of two components:

- a classification framework of Reference User Requirements (RUR) which can be sized using an FSM Method. Included are examples of such RUR as well as references to further publications of User Requirements (UR) which can be used for RUR, and
- guidance on selecting Reference FSM Methods, against which an FSM Method can be compared.

The reference model is an input to the evaluation process of an FSM Method. The formulation and execution of evaluation tests and the interpretation of their results is outside the scope of this Technical Report.

The RUR and additional references contained in this Technical Report only represent examples of UR in some domains and situations. Additional RUR and RUR for domains and situations not covered by Annex A, B, or C may be generated with the assistance of the framework described in this Technical Report.

The requirements for Reference FSM Methods may assist in selecting Reference FSM Methods.

2. Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 14143. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 14143 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 14143-1:1998, *Information technology — Software measurement — Functional size measurement — Part 1: Definition of concepts*.

ISO/IEC 9126:1991, *Information technology — Software product evaluation — Quality characteristics and guidelines for their use*.

3. Terms and definitions

For the purposes of this Technical Report, the terms and definitions given in the normative references and the following apply. Figure 3.1 describes the composition of User Requirements, RUR, and RUR Collection.

3.1

Functional User Requirements (FUR)

A sub-set of the User Requirements. The Functional User Requirements represent the users practices and procedures that the software must perform to fulfil the users' needs. They exclude Quality Requirements and any Technical Requirements.

NOTE As defined by ISO/IEC 14143-1:1998.

3.2

Quality Requirements (QR)

Any requirements relating to software quality as defined in ISO/IEC 9126.

NOTE As defined by ISO/IEC 14143-1:1998. Quality Requirements are a subset of the User Requirements.

3.3

Reference FSM Method

An FSM Method to be used for comparison reasons when verifying the Functional Size Measurement results. It conforms to the requirements as specified in 6.1.

3.4

Reference User Requirements (RUR)

A standard set of User Requirements which conforms to the requirements as specified in 5.1.1.

NOTE Figure 3.1 shows the relationship of UR and RUR.

3.5

Reference User Requirement Collection (RUR Collection)

A subset of RUR which is selected to match the purpose in a specific evaluation. The selection requirements are specified in 5.1.2.

NOTE Figure 3.1 shows the relationship of RUR and RUR Collection.

3.6

Technical Requirements (TR)

Requirements relating to the technology and environment, for the development, maintenance, support and execution of the software.

NOTE As defined by ISO/IEC 14143-1:1998. Technical Requirements are a subset of the User Requirements.

3.7

User Requirements (UR)

The complete description of the set of user needs for the software to be provided. User Requirements include Functional User Requirements, Technical Requirements and Quality Requirements.

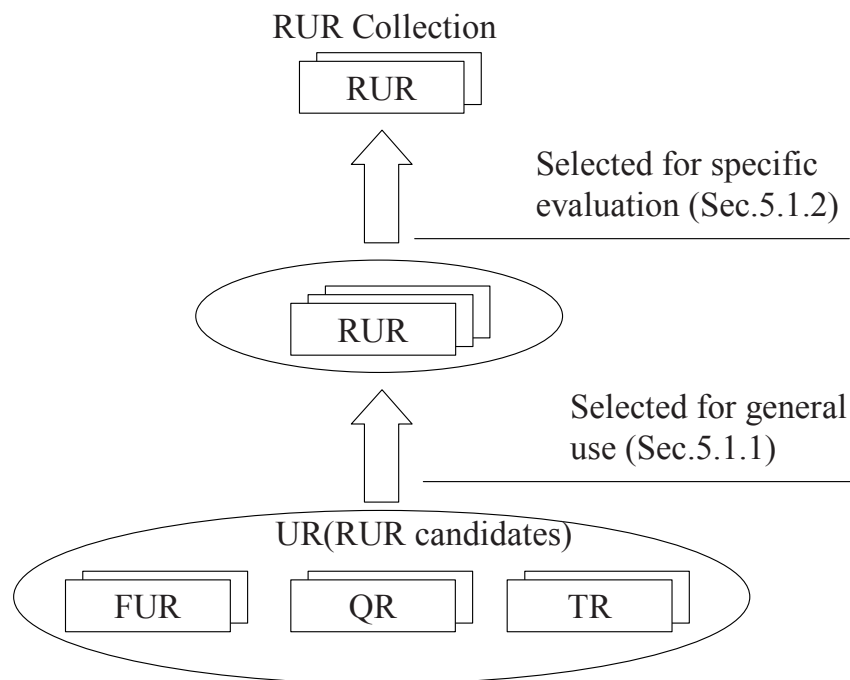


Figure 3.1: Composition of User Requirements and RUR (informative)

4. Abbreviated terms

FSM	Functional Size Measurement
FUR	Functional User Requirements
QR	Quality Requirements
RUR	Reference User Requirements
TR	Technical Requirements
UR	User Requirements

5. Reference User Requirements

5.1. General requirements

To be acceptable for the evaluation of an FSM Method, the RUR Collection shall consist of RUR complying with 5.1.1 and which are selected according to the rules stated in 5.1.2.

5.1.1. RUR requirements

Individual RUR shall:

- a) be documented in such a form that they can be understood by a human user specialised in the area addressed by the RUR,

NOTE The RUR should be representative of the user requirements. Acceptable presentation formats include textual and graphical descriptions of the functionality, acceptable to the users in the particular Functional Domain. Examples of unacceptable forms of documentation are technical design documentation, computer program listings, or terminology representative of Information Technology.

- b) represent a complete and self contained user practice or procedure, and

NOTE The RUR should provide all requirements necessary to perform a user practice or procedure but need not provide a complete set of requirements as would be needed for a practical system. Different FSM Methods will have different methods of identifying Base Functional Components. RUR containing only a subset of a user practice or procedure may therefore distort the results. An example of partial FUR would be the data entity requirements only (A.1.3) for the Hotel Accommodation System in RUR A1, or the screen layout of the RES function in A.1.2.2.1 of RUR A1.

- c) be tested and be free of ambiguities and inconsistencies.

NOTE Acceptable compliance with this requirement would be that the RUR has been successfully implemented as a software product, been published in a refereed textbook or journal, or been used successfully in an Functional Size Measurement.

5.1.2. RUR Collection selection requirements

RUR selected for a RUR Collection shall:

- a) be representative of the Functional Domain for which the FSM Method is evaluated,

NOTE The RUR should represent the Functional Domain(s) selected for evaluation of the FSM Method. The functionality should be consistent with the characteristics of the Functional Domain.

- b) not biased to a particular FSM Method or evaluation process,

NOTE The RUR should be constructed or selected without any bias. They should not favour, or discriminate against, a particular FSM Method or evaluation process.

- c) include example FUR with equal, unequal, and significantly unequal Functional Size,

NOTE The RUR should have example functions of different Functional Sizes to enable an FSM Method to distinguish between small and large functionality. In the absence of an absolute Functional Size indicator such distinctions can only be rough and at the order of magnitude level. Selection criteria could be user perception or any quantifiable functional characteristic such as number of data fields, decision alternatives, business rules or data references.

- d) include User Requirements not restricted to Functional User Requirements as defined in ISO/IEC 14143-1:1998,

NOTE Some RUR should include requirements such as Quality Requirements or Technical Requirements. Examples of non-functional requirements include reliability, cost, development time, or computer architecture constraints.

- e) when assessing an FSM Method for independence from technology or implementation techniques include different versions of the same user requirement with different:
 1. implementation technologies,
 2. development methodologies, or
 3. documentation levels,

NOTE The RUR should enable the FSM Method to demonstrate its independence from implementation technology and development methodology and its coverage at various stages of software development.

and

- f) include examples of changes of requirements when assessing an FSM Method for software enhancement measurement.

5.2. Examples

Annexes A and B include examples of RUR for the areas of business application and real time / control. Annex C provides references to published User Requirements, which in addition could be used as RUR. The references in Annex C, however, have not been formally checked against the rules stated in 5.1.1.

5.2.1. Business application

Annex A lists 8 RUR: RUR A1 to RUR A8. The first 6 RUR describe part of a hotel reservation system but do so in different forms and functionality. As such they provide an example for the requirements 5.1.1.a) (documentation), 5.1.1.b) (completeness), 5.1.1.c) tested and unambiguous, 5.1.2.c) (range of functional size), 5.1.2.e) (implementation independence) and 5.1.2.f) changed requirements:

- RUR A1 includes a detailed specification of the layout of the user interfaces,
- RUR A2 provides a more general description of the same requirement, but lacks some of the details shown in RUR A1,
- RUR A3 has the same user interface as RUR A1 but only simulates the business functions rather than executing the business logic of the operations,
- RUR A4-A6 describe several modifications to RUR A1, and
- RUR A7 and RUR A8 are examples of complex RUR, describing sections of actual requirements used by a financial organisation.

5.2.2. Real Time /control

Annex B contains several RUR of different size and implementation. These RUR provide examples for the requirements 5.1.1.b) (completeness), 5.1.2.c) (range of functional size), and 5.1.2.d) (non-functional requirements):

- RUR B1 sets the baseline for RUR B2 to B7,
- RUR B2 should have a substantially larger functional size compared with RUR B1 since it contains three times the number of functions of RUR B1. RUR B3 again should be larger in functional size when compared with RUR B2 since additional functions are performed,
- RUR B4, RUR B5, and RUR B6 describe three different non-functional technical or implementation requirements for RUR B3,
- RUR B7 describes a different use for the requirement of RUR B3,
- RUR B8 addresses a process control application, which continuously monitors and controls a communication line,
- RUR B9 describes a valve control application, and
- RUR B10 is an example of a complex RUR for a communication control system.

6. Reference FSM Method

Reference FSM Methods in combination with RUR can be used to establish a known baseline of results (see figure 0.1). This will then allow a benchmark to be performed for an FSM Method (see figure 0.1). Compared with results of a Reference FSM Method, an FSM Method can establish its position relative to that Reference FSM Method.

A Reference FSM Method may be valid for only some Functional Domains. It will provide a reference point for the relative evaluation of a chosen FSM Method for a specific situation.

6.1. General requirements

A Reference FSM Method itself shall:

- a) conform to ISO/IEC 14143-1:1998 according to ISO/IEC 14143-2,
- b) cover the same Functional Domain as that described within the FSM Method to be assessed,
- c) be publicly available, and
- d) be verified for its minimum effectiveness to the purpose of the evaluation.

6.2. Example Use of Reference FSM Methods

Using several different Reference FSM Methods will provide a range of references in relation to which FSM Methods can be positioned. Suitable Reference FSM Methods for the creation of such a range of reference results would be a superficial Reference FSM Method at one end of the range and a comprehensive Reference FSM Method at the other end.

6.2.1. Superficial Reference FSM Method

A superficial Reference FSM Method would formally conform to ISO/IEC 14143-1:1998. Verification according to PDTR 14143-3, however, should reveal a very limited capability of measuring Functional Size. Such a superficial Reference FSM Method could be the starting point of an evaluation scale.

6.2.2. Comprehensive Reference FSM Method

A comprehensive Reference FSM Method would have an enhanced capability of identifying Functional Size in a wide range of instances. Compared with a superficial Reference FSM Method, its performance parameters, as established by PDTR 14143-3, should be substantially improved.

Annex A (normative)

Business application RUR

A.1 RUR A1: Hotel Accommodation System (Reservation)

A.1.1 Overview

The hotel reservation system is part of an accommodation system of a general hotel system. This section provides an overview of the requested system. The detailed functionality of the hotel reservation system together with the navigation to reach it within the hotel system will be described in the next section.

The reservation system supports the following business functions related to the letting of hotel rooms:

- maintain reservations
- confirm reservations

Room data used relates to room type, price, and description (in Dutch, English, French, or German), and anyone can make a reservation for a room type. The System confirms a reservation in either English, Dutch, German or French. It is possible to cancel a reservation.

The system uses a number of general data entities, which are maintained by other parts of the hotel accommodation system:

- HOTEL, data includes: name, address, telephone, telex, fax, hotel manager name,
- COUNTRY, data includes country code and country name, and
- ROOM and ROOM TYPE, describe a hotel room and the various room classes.

The hotel reservation system ensures consecutive numbering by storing the last issued reservation number in a file called "PARAMETERS."

The following general requirements apply to all parts of the hotel accommodation system:

- help information must be available on screen level and field level,
- error messages are standard on Line 24 of the screen.

A.1.2 Detailed specifications

To identify the type of data entered into the accommodation system the menu layouts in this specification use a string of "9" to denote numeric and a string of "x" to denote alphanumeric data.

A.1.2.1 Navigation

A.1.2.1.1 Main menu of hotel system

The main menu of the hotel system offers two choices: accommodation and invoice & payment. The reservation system is part of the accommodation system.

Screen layout for the main menu:

< Hotel name > **HOTEL SYSTEM**

1 ACCOMMODATION
2 INVOICE & PAYMENT

Choice: < S> F10
End

Functions:

F10 : Exit application

Screen elements:

Menu choice, Hotel name

A.1.2.1.2 Accommodation menu selections

Screen layout for the accommodation menu:

< Hotel name > **ACCOMMODATION SYSTEM**

1 RESERVATION
2 CHECK-IN
3 CHECK-OUT
4 CANCEL RESERVATION
5 MAINTAIN ROOM DATA

Choice: <S> F10
MENU

Function:

F10 : Return to Main menu

Screen elements:

Menu choice, Hotel name

NOTE The reservation system functions are reached via the first option: Reservation.

A.1.2.2 Functions

A.1.2.2.1 Function: RES Reservation

A reservation request can be entered using the screen RES. All data except the reservation number is entered. When changing the reservation data using screen RES, the reservation number can be found by name, or part of a name. All data, except reservation number, can be changed. If there is more than one reservation with the same name, the selection - screen (SEL- RES) is shown. The system further checks if the stated quantity of rooms for the desired room type is available in the desired period (not occupied or not reserved). "Being occupied" is checked on the basis of the data: room type, start date, number of days, and quantity of reserved rooms.

If necessary more room types can be stored for the same period. Only room type and quantity of rooms can be entered.

If the request can be met, the acceptance screen ACP-RES stores the reservation and a confirmation of the reservation (CON-RES) is produced for the billing address. If the request cannot be met, room type report (RT-REP) is called to look up an alternative choice.

Used screens: RES (request for reservation), SEL-RES (selection reservations), ACP-RES (accept reservation), RT-REP (room type report), CON-RES (confirmation of reservation).

Screen layout for RES(ervation) function:

< Hotel name >

RESERVATION

Reservation number:

999999

Arrival date:

DD/MM/YYYY

Number of days:

99

Room type & quantity:

xx99

Name:

XXXXXXXXXXXXXXXXXXXXXXXXXXXX

Street & number:

XXXXXXXXXXXXXXXXXXXXXXXXXXXX999

Post code, City, Country:

99999XXXXXXXXXXXXXXXXXXXXXX

Telephone number:

999999999999

Language code:

xx

F1

F2

F3

F10

Continue

Confirm

Change

Menu

Functions:

- F1 : Continue reservation for the same period
- F2 : Confirm reservation
- F3 : Change reservation data (except reservation number) of this reservation number
- F10: Return to previous menu

Screen elements:

Arrival date	Street	Number of days
Street number	Telephone number	Quantity
Name	Country code	Reservation number
City	Hotel name	Room type
Post code	Language code	

A.1.2.2.2 Function: ACP-RES Accept reservation

This function is performed by function RES when a reservation request can be met. It displays the reservation details and the assigned reservation number. An accepted reservation can then be confirmed.
Screen layout for ACP-RES function:

< Hotel name >

ACCEPT RESERVATION

Reservation number:

999999

Name:

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Arrival date:

DD/MM/YYYY

Number of days:

99

Room type & quantity

Room type & quantity

xx99

xx99

xx99

xx99

xx99

xx99

xx99

xx99

xx99

xx99

F1

F2

F10

Continue

Accept

Menu

Functions:

- F1 : Continue reservation
- F2 : Accept reservation, print confirmation, and return to previous menu
- F10: Return to previous menu

Screen elements:

Arrival date	Number of days	Reservation number
Name	Quantity	Room type
Hotel name		

A.1.2.2.3 Function: SEL-RES Select Reservation

Reservation report based on the partial name of the one who makes the reservation. This function is activated by RES when a reservation is accessed by billing name and there is more than one reservation stored for that name. Screen layout for SEL-RES function:

< Hotel name >

SELECT RESERVATION

Name	City	Arrival Date	Res.no.
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999
XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	DD/MM/YYYY	999999

F1
Select

F9
Prior

F10
Menu

Functions:

- F1 : Select a reservation and return to previous screen
- F9 : Return to previous screen
- F10: Return to previous menu

Screen elements:

Arrival date	City	Reservation number
Name	Hotel name	

A.1.2.2.4 **Function: RT-REP Room Type Report**

This report is provided when a requested room type is not available. Room type report shows the quantity of rooms which:

- are not occupied, and
- are not reserved

Screen layout for RT-REP function:

< Hotel name >

ROOM TYPE REPORT

Arrival Date: DD/MM/YYYY 999999

Number of days: 99

Room type

Quantity

xx99

xx99

xx99

xx99

xx99

xx99

F9

F10

Prior

Menu

Functions:

- F9 : Return to previous screen
- F10: Return to previous menu

Screen elements:

Arrival date	Quantity	Room type
Hotel name	Number of days	

A.1.2.2.5 **Function: CON-RES Confirmation of the reservation**

This function is performed when an accepted reservation is confirmed. The confirmation can be made in four languages (EN, FR, GE, or NL).

Report layout for CON-RES function:

 $\langle 1 \rangle$

<2>

<3> <4>

Phone: <5>

Fax: <6>

<7>

&lt8>

<9> <10>

<11>

CONFIRMATION OF RESERVATION

Reservation Number: <12>

Date: <13>

Dear Madam/ Sir,

We have made the following reservation:

Number of days: <14> Arrival Date: <15>

[illegible]

Kind Regards

Hotel Manager

<19>

Report elements:

<1> hotel name	<7> name	<14> number of days
<2> hotel street address	<8> street address	<15> Arrival date
<3> postcode – hotel	<9> postcode	<16> room type
<4> city - hotel	<10> city	<17> quantity
<5> telephone number – hotel	<11> country	<18> description of room type
<6> fax - hotel	<12> reservation number	<19> hotel manager
	<13> date (system)	

A.1.3 Description of Entities

The following business entities will be used by the Hotel Reservation System:

A.1.3.1 BILLING ADDRESS

A person or institution that will pay or has booked a reservation. The person or institution is identified by a system generated Billing-identification.

Data elements:	Billing-identification (key)	6
	name	25
	street address	30
	post code	4
	city	20
	telephone number	12
	country code	2

A.1.3.2 ROOM

Contains data about a room that can be let. There is at least 1 room and at most 30 rooms per room type.

Data elements:	Room number (key)	3
	Room type	2

A.1.3.3 HOTEL

Contains data concerning the hotel that uses the system. The entity contains only one occurrence and can never contain more.

Data elements:	Hotel name (key)	30
	Street address	30
	City	20
	Post code	7
	Telephone number	12
	Telex	12
	Fax	12
	Hotel manager	25

A.1.3.4 ROOM CLASS

Indicates the quality and price of a number of similar rooms. There are at most 10 room types.

Data elements:	Room type (key)	2
	Price of accommodation	6
	Description-EN	30
	Description-FR	30
	Description-GE	30
	Description-NL	30

A.1.3.5 COUNTRY

Country where the person, who has made/ paid the reservation, lives. Do not confuse Country code with language. There are 4 languages supported by the system but the customers may live in many more countries.

Data elements:	Country code (key)	2
	Country-EN	25
	Country-FR	25
	Country-GE	25
	Country-NL	25

A.1.3.6 PARAMETERS

Parameter data for reserving rooms and producing invoices.

Data elements:	Last issued reservation number	6
	Last issued invoice number	6
	Last issued payment number	6

A.1.3.7 RESERVATION

The number of rooms of a certain type that have been promised for a reservation. Language code can be one of the 4 supported languages (EN, FR, GE, NL).

Data elements:	Reservation number (key)	6
	Start date	10
	Number of days	2
	Billing-identification	6
	Language code	2

A.1.3.8 RESERVATION DETAIL

Denotes the quantity in a certain room type that has been promised for a reservation.

Data elements:	Reservation number (key)	6
	Room type	2
	Quantity	2

A.2RUR A2: Hotel Accommodation System (Reservations) - Initial Requirement

A.2.1 Business Functions to be supported

The system supports the following administrative functions of a hotel business in relation to the letting of hotel rooms:

a) maintain reservations

- 1) create a reservation: obtain a reservation no. and enter all reservation details
- 2) update a reservation: change any reservation details except reservation number
- 3) continue a reservation: continue a complex reservation of more than one input screen
- 4) accept a reservation: finalise a reservation

b) confirm reservations

- 1) letter to client confirming the reservation details

c) reports

- 1) room type report: lists room availability from an arrival date for a number of days
- 2) reservation report: lists arrival date and reservation number for the reservation's billing name and address.

Room data used relates to room type, price, and description (in Dutch, English, French, or German).

Anyone can make a reservation for a room type. The System confirms a reservation in English, Dutch, German or French.

A.2.2 General requirements

The accommodation reservation system has to ensure consecutive and unique numbering of the reservation number.

The following general conventions apply to the accommodation system:

- identification – each functional screen should list the hotel name and the function name,
- navigation – function keys should be used to select, confirm, change, scroll, or continue business processes,
- help information must be available on screen level and field level, and
- error messages should be displayed when applicable on each screen.

A.2.3 Data Model

The general data files used by the accommodation reservation system include HOTEL, COUNTRY, ROOM, and ROOM TYPE.

These data files are maintained by other parts of the hotel system.

Entity Descriptions are as follows:

BILLING ADDRESS - A person or institution that will pay or has booked a reservation,

HOTEL - Data concerning the hotel that uses the system. The entity never contains more than one occurrence,

ROOM - A room, which can be let. There is at least one room and at most 30 rooms per room type,

ROOM CLASS - Indication of quality and price of a number of similar rooms. There are at most 10 room types,

COUNTRY - Country where the person, who has made/ paid the reservation, lives,

RESERVATION - Promise to a customer that during a certain period a stated number of rooms for stated room types can be accommodated, and

RESERVATION DETAIL - Number of rooms in a certain room type that has been promised for a reservation.
The data model of the hotel reservation system is shown in Fig.A.1.

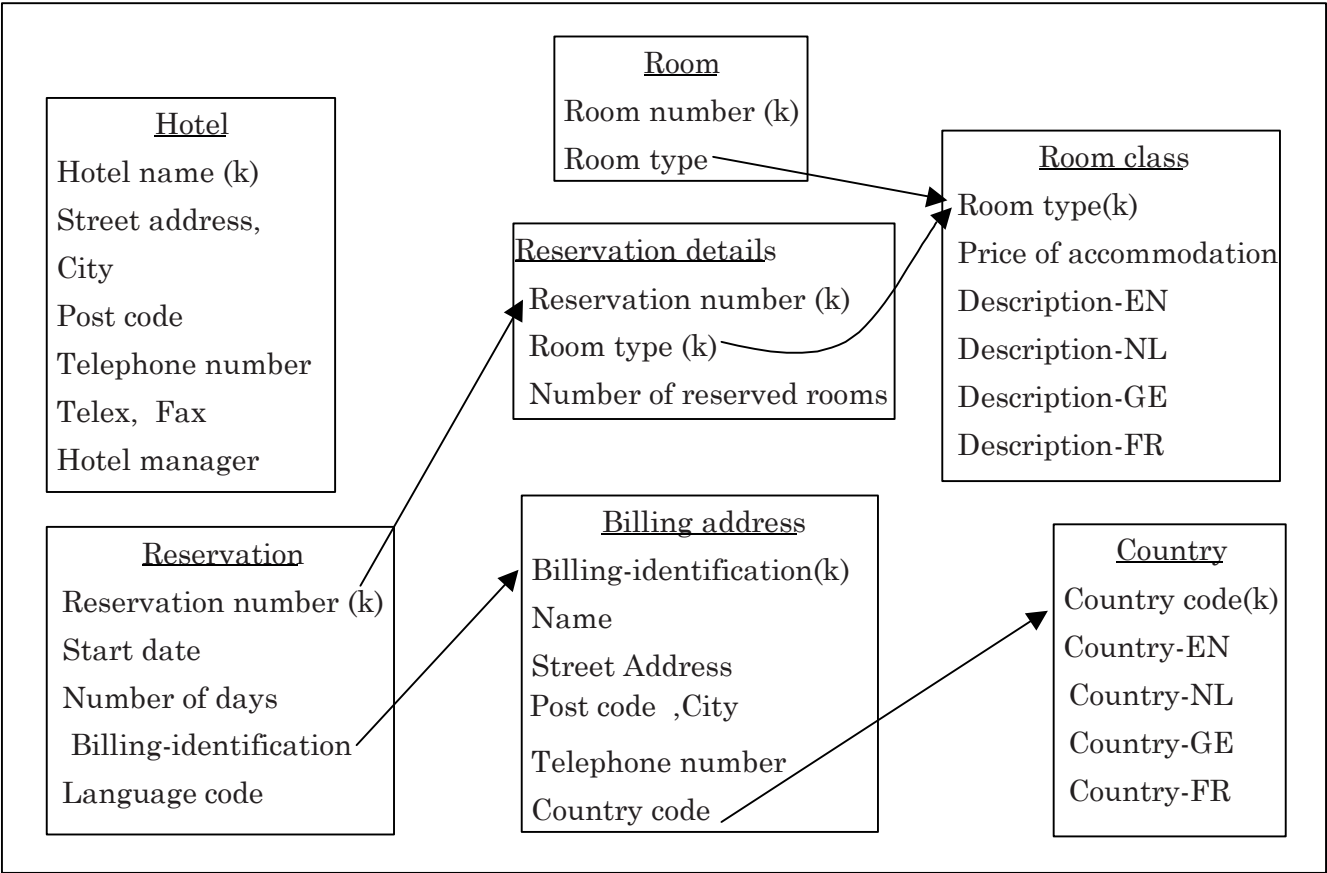


Figure A.1 — Data model of Hotel Reservation System

A.3 RUR A3: Hotel Accommodation System (Reservations) – Mock-up

A.3.1 Requirement

A.3.1.1 Overview

For demonstration purposes, a mock-up version is requested to illustrate the functions of the reservations part of a Hotel Accommodation System. The demonstration system should provide the “look and feel” of the application, emulating the user interfaces of all functions of the Hotel Accommodation System (Reservations) as defined as RUR A1 in Annex A.1. It should emulate all file access but it should not perform any calculations or logical operations. Instead, any information presented is made up just to conform to the interface format.

A.3.1.2 Details

The mock-up Hotel Accommodation System (Reservations) contains all entities described in A.1.3. Each entity, however, can only store up to three entries or records. The first entry in an entity would always be used by any function for updating purposes. No referential integrity, verification or format checks are performed for data entered into the mock-up system.

All data is displayed as on file or, if derived, made up irrespective of the actual values. The mock-up system shows only the correct format, but not the correct values. Error messages are only displayed in the appropriate locations as “error messages are shown here”. Help functions are implemented as showing “help information is displayed here”.

All data is accepted and stored in the first entry of the respective entity as entered. No data validation of any form is made. Data stored in such a way will be displayed by appropriate display functions including all mistakes, which may have been entered.

A.4 RUR A4: Adding automatic name look-up to Hotel Reservation System

Once the original Hotel Reservation System described in RUR A1 has been completed, the following facility should be added to the Hotel Reservation System:

In function RES, when entering the name into the reservation screen, the system should check if that exact name already exists in a previous reservation. If so, the system should automatically enter the details (street address, post code, city, country, telephone number, language code) into the new reservation.

If there are several different addresses for the same name the system should choose the details of the most recent reservation.

The reservation address details can be corrected if necessary.

A.5 RUR A5: Adding automatic name look-up to Hotel Reservation System

Once the original Hotel Reservation System described in RUR A1 has been completed, the following facility should be added to the Hotel Reservation System:

In function RES, when entering the name into the reservation screen, the system should check if that exact name already exists in a previous reservation. If so (and when no other name exists), the system should automatically enter the details (street address, postcode, city, country, telephone number, language code) into the new reservation.

If there are several different addresses for the same name the system should show all duplicates in a pop-up window, allowing the user to select the appropriate choice.

The reservation address details can be corrected if necessary. Alternatively the user could reject all choices and enter the data manually.

A.6RUR A6: Adding automatic name look-up to Hotel Reservation System

Once the original Hotel Reservation System described in RUR A1 has been completed, the following facility should be added to the Hotel Reservation System:

In function RES, when entering the name into the reservation screen, the system should check if that exact name already exists in a previous reservation. If so (and when no other or similar name exists), the system should automatically enter the details (street address, postcode, city, country, telephone number, language code) into the new reservation.

If there are several different addresses for the same name (or for a similar name) the system should show all candidates in a pop-up window, allowing the user to select the appropriate choice.

A name should be considered as similar when the differences result from:

upper and lower case presentation,

fillers such as space, full stop, or dash, or

abbreviations and the shorter name can be matched with parts of the longer name.

Phonetically similar names should also be included in the candidate list.

The reservation address details can be corrected if necessary. Alternatively the user could reject all choices and enter the data manually.

A.7RUR A7: TRAX Transaction Reporting

The purpose of this document is to document and agree the rules for transaction reporting through TRAX, i.e., the reporting mechanism of the International Securities Market Association ("ISMA"). The rules covered include the rules of ISMA, the Securities and Futures Authority ("SFA"), the Amsterdam Stock Exchange ("ASE") and the Bank of England ("BoE").

The document is structured by general product area and then within that the rules which apply to the relevant reporting bodies.

A.7.1 Overview of the ISMA Requirements

- members of the council of reporting dealers must report to ISMA every transaction in International Securities entered into with another member of the council or any other TRAX subscriber;
- members in the UK must report to ISMA every transaction in international securities whether or not entered into with a member of ISMA (XXBANK is based in the UK);
- transaction reporting must be effected by electronic transmission through ISMA's TRAX system (unless exempted by ISMA due to the small number of transactions, i.e., under 50 transactions per calendar month). In the case of manual transmission, reporting must be within 20 minutes of execution. However this exemption is not applicable to XXBANK and XSSA as the number of transaction in any one calendar month exceeds 50.

A.7.2 Overview of the SFA Requirements

SFA requires that members report all transactions in Investments, which it effects through an approved reporting mechanism unless the Investment or transaction is exempted.

A.7.3 Overview of ASE Requirements

The ASE requires that members report all transactions in ASE listed bonds (i.e. both corporate and government). XXBANK is a Special Corporate Member of the ASE and has elected to report its transactions using ISMA's TRAX system.

A.7.4 Overview of BoE Requirements

The BoE requests that all participants in gilt repo report their transactions either manually or through TRAX. XXBANK is a participant in the gilt repo market and decided to voluntarily report its transactions using ISMA's TRAX system.

A.7.5 Reporting Requirements

A.7.5.1 Convertibles, Warrants & GDRs

A.7.5.1.1 Product definition

- A **Convertible bond** gives its owner the privilege of exchange for other securities of the issuing company at some future date and under prescribed conditions.
- A **Warrant** confers on the holder the right, but not the obligation, to purchase or sell a fixed amount of an underlying asset at a fixed price and at a fixed future date. Similar to an OTC option except that they are usually have a longer maturity, and options usually grant rights over assets, which are currently available. For example the exercise of a warrant issued by a company will usually lead to the creation of new equity capital in that company.
- A **Global Depository Receipt (GDR)** is a receipt for shares in a foreign based corporation traded in capital markets around the world. GDRs allow companies in Europe , Asia, the US and Latin America to offer shares in many markets around the world.

A.7.5.1.2 Systems and Products

System	Entries	Products
QUOTESHEET	TD trades & ccs	Convertibles, Warrants, GDRs
TRUK (Taps)	TD trades & TD ccs	Convertibles, Warrants, GDRs, Covered warrants
TWUL	TD trades & ccs	Convertibles

Convertibles, Warrants & GDRs products can be booked to any office from any location for example from London to Tokyo and Frankfurt, and to London from New York.

A.7.5.1.3 ISMA Transaction Reporting Requirements

A.7.5.1.3.1 XSSA

XSSA, which is listed in the register of members of the council of reporting dealers, is required to report to ISMA every transaction in International Securities, e.g. most Corporate Bonds and some Government Bonds, entered into with another member of the council or another TRAX subscriber.

A.7.5.1.3.2 XXBANK

XXBANK as an ISMA Member in the United Kingdom is required to report to ISMA every transaction in International Securities whether or not entered into with a member of ISMA. XXBANK may also report to ISMA other transactions in securities that are not International Securities where XXBANK is not subject to obligations to report transactions in such securities to any other recognised or designated exchange, for example, the London Stock Exchange. These obligations are described in more detail in the sections below.

International Securities for the purposes of this rule means the securities in ISMA's list of reportable securities, published from time to time by the board. ISMA produces a listing of all domestic or international securities (the preface of the listing is attached). The listing of securities and their status is also obtainable from the TRAX system. *Covered Warrants will normally be reported in the same way that we are reporting the underlying stock that in most cases will be via TRAX. In some instances where no cusip has been allocated, we need to report direct to the SFA using the DRS system.*

A.7.5.1.3.3 Timing for ISMA Reporting

Generally transaction reports made under ISMA's rules must be filed with ISMA no later than thirty minutes from the time the terms of the transaction are agreed between the counter-parties (i.e. within 30 minutes of the time of execution).

A transaction in International Securities is subject to transaction reporting under ISMA's rules which occurs (i.e. executed) between 5:00 pm and 10:00 am local time in the country where the transaction is to be booked, or which is entered into in one country but booked in a country with a different time zone, and occurring between 5:00 pm and 10:00 am local time in the country where the transaction is to be booked (the after-hours period), shall for the purposes of this section be an after-hours transaction.

Transaction reports concerning after-hours transactions must be filed with ISMA no later than 10:30 am local time in the country where the transaction is to be booked on the next business day following the after-hours period (i.e. 10:30 am London time in the case of trades on XXBANK's books and 10:30 am Paris time in the case of trades on XSSA's books) and shall show the time and date (adjusted to show the corresponding time in the country in which the transaction is to be booked) when the transaction was entered into originally (i.e. the time of execution of a transaction executed overseas should be adjusted to show the equivalent London/Paris time depending on whether the trade is booked to XXBANK or XSSA).

"Business day" shall refer to the period from 10:00 am to 5:00 pm on each day.

A.7.5.1.3.4 Other Matters

Where a TRAX subscriber is unable to make transaction reports within the time provided because of software, hardware or communications failure it shall immediately notify ISMA. As soon as the failure has been overcome the TRAX subscriber shall notify ISMA and shall file all outstanding transaction reports as soon as possible thereafter.

TRAX subscribers must regularly during a business day access ISMA's TRAX system in the prescribed manner for the purpose of determining matched, unmatched, advisory and other transactions in respect of them.

Where a TRAX subscriber has been notified of an advisory transaction by a counter-party, the subscriber shall immediately effect a transaction entry to match or deny the advisory transaction.

TRAX subscribers must access ISMA's TRAX system in a secure manner approved by ISMA.

A.7.5.1.4 SFA Transaction Reporting via TRAX

SFA requires that XXBANK report all transactions in Investments, which it effects through an approved reporting mechanism unless the Investment or transaction is exempted. In the case of secondary convertibles, warrants and GDRs there are no product exemptions

In addition no reporting is required to be made to SFA where a firm has reported the transaction to an appropriate Qualifying Exchange (attached). This is not applicable in the case of cash convertibles, warrants and GDRs as XXBANK is not currently a member of any other Qualifying Exchange (for the purpose of trading these products).

As mentioned in A.5.5.1.3.2 XXBANK reports its transactions in International Securities through TRAX. XXBANK has decided to use the TRAX system, which has been designated as an Approved Reporting Mechanism (attached), to report transactions to SFA in other convertibles, warrants and GDRs).

A.7.5.1.4.1 Timing of Transaction Reports for SFA reporting

Reports of transactions to SFA must be made no later than close of business on trade date + 1.

A.7.5.1.5 Contents of Transaction Reports via TRAX

Under SFA rules the following fields are mandatory:

- the firm's identifying code, i.e., the SFA firm code,
- the investment's identifying code of an approved security type (attached) or a full description,
- the date and time of the transaction,
- the transaction size, price and currency,
- whether the transaction is a purchase or sale,
- whether the firm dealt as principal or agent,
- the settlement date,
- the transaction's reference number,
- any other mandatory fields required by the reporting system,
- whether the transaction is a cancellation, and
- in the case of a derivative transaction, the appropriate expiry date, strike price and whether a put or call.

With effect from May 6th 1997 a counter-party identifier will also have to be reported for investment firms, credit institutions and group companies. With effect from October 1997 counter-party identifiers for other counter-parties will be reportable.

In addition, transaction reports to ISMA must contain all details regarding the transaction that are required ISMA's TRAX system rules from time to time in force for transaction matching in the format required by those rules (see attached listing of required fields). On TRAX the special condition code of "A" should be added for all transactions where XXBANK/XSSA act as agent (if this code does not appear ISMA will assume that the member firm acted as principal). If stock lending/borrowing transactions are reported a matchable condition code of "W" should be entered.

A.7.5.2 FID - Bonds

A.7.5.2.1 Product Definition

Bonds are interest bearing or discounted government or corporate securities that oblige the issuer to pay the bond holder a specified sum of money, usually at specific intervals, and to repay the principal amount of the loan at maturity. Bondholders have an IOU from the issuer but no corporate ownership privileges as stockholders do.

Secured bonds are backed by collateral, which may be sold by the bondholder to satisfy a claim if the bond's issuer fails to pay interest and principal when they are due.

Mortgage Backed Securities is a security where investors receive payments out of the interest and principal on the underlying mortgages.

A.7.5.2.2 Systems and Products

System	Entries	Products
BSS	TD trades & TD ccs	All
TWUL	TD trades & TD ccs	All
TRUJ	TD+1 ccs	
GTUA	TD+1 ccs	US Govt bonds
SZUA	All	
TRUJ (Taps)	TD+1 ccs	all except IBS
GHY	All	High yield products
MBUC	All	Mortgage backed securities

A.7.5.2.3 ISMA Transaction Reporting Requirements**A.7.5.2.3.1 XSSA**

XSSA, which is listed in the register of members of the council of reporting dealers, is required to report to ISMA every transaction in International Securities, e.g. most Corporate Bonds and some Government Bonds, entered into with another member of the council or another TRAX subscriber.

A.7.5.2.3.2 XXBANK

XXBANK as an ISMA Member in the United Kingdom is required to report to ISMA every transaction in International Securities whether or not entered into with a member of ISMA. XXBANK may also report to ISMA other transactions in securities that are not International Securities where XXBANK is not subject to obligations to report transactions in such securities to any other recognised or designated exchange, for example, the London Stock Exchange. These obligations are described in more detail in the subclauses below.

International Securities for the purposes of this rule means the securities in ISMA's list of reportable securities, published from time to time by the board. ISMA produces a listing of all domestic or international securities (the preface of the listing is attached). The listing of securities and their status is also obtainable from the TRAX system.

A.7.5.2.3.3 Timing for ISMA Reporting

Generally transaction reports made under ISMA's rules must be filed with ISMA no later than thirty minutes from the time the terms of the transaction are agreed between the counter-parties (i.e. within 30 minutes of the time of execution).

A transaction in International Securities subject to transaction reporting under ISMA's rules which occurs (i.e. executed) between 5:00 pm and 10:00 am local time in the country where the transaction is to be booked, or which is entered into in one country but booked in a country with a different time zone, and occurring between 5:00 pm and 10:00 am local time in the country where the transaction is to be booked (the after-hours period), shall for the purposes of this section be an after-hours transaction.

Transaction reports concerning after-hours transactions must be filed with ISMA no later than 10:30 am local time in the country where the transaction is to be booked on the next business day following the after-hours period (i.e. 10:30 am London time in the case of trades on XXBANK's books and 10:30 am Paris time in the case of trades on XSSA's books) and shall show the time and date (adjusted to show the corresponding time in the country in which the transaction is to be booked) when the transaction was entered into originally (i.e. the time of execution of a transaction executed overseas should be adjusted to show the equivalent London/Paris time depending on whether the trade is booked to XXBANK or XSSA).

"Business day" shall refer to the period from 10:00 am to 5:00 pm on each day.