



**COSMIC Measurement Manual  
for ISO 19761**

**Expert System  
Measurement Case Study**

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**FOREWORD.**

**Purpose of this document.**

The COSMIC method measures a ‘functional size’ of software based on functional user requirements (FUR). The purpose of this document is to show that the functional size of the FUR of an expert system can be measured with the COSMIC Function Points method.

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## 1 FUNCTIONAL USER REQUIREMENTS.

An expert system is a computer system that emulates the decision-making ability of a human expert. It does so by:

- storing the rules used by an expert in decision-making, and
- providing logic to allow a client to use the same experts rules for making decision himself (using expert knowledge embedded into the expert system).

The following is an initial statement of requirements for a simple expert system.

For ease of understanding, maintenance and explanation, the expert system shall be rule-based.

Note. To ensure traceability and correspondence between the functional requirements and the measurement, the functional requirements are indicated by numbers in brackets that correspond to the numbers in the 'Req#' column of the measurement table.

### 1.1 Functional requirements for the client users.

*(1) An expert system must be developed for retrieving possible holidays for clients:*

*The client user must answer a number of questions, such as:*

- *the type of the holiday (beach, cruise, city travel, etc.),*
- *destination, and*
- *price.*

*'Any of the above' is allowed as an answer.*

*When all questions have been answered the expert system will:*

- *(2) display the questions and answers, and*
- *(3) list and provide details of the holidays that satisfy the entered answers, if any are found.*

*(1,2,3) The client may subsequently repeat the functional process to see the effect of changing the input requirement parameters.*

*(4) The user may store any set of questions and the given answers for re-use, under a name to be entered.*

*(5) The expert system shall explain why it has posed a question when the user enters 'Why?' rather than an answer.*

- *The expert system shall then show the rules in which the answer to this question is a factor.*

*(6) When the expert system shows the holidays that satisfy the entered answers it shall explain how it derived these results when the user enters 'How?'*

- *The expert system shall then show the rules that were used in deriving the results.*

(7) An error message shall be displayed in case no holiday satisfies the requirements. A confirmation message shall be displayed as the client needs assurance that the set of questions and answers has been saved.

## 1.2 Functional processes for the client user.

The functional processes to be expected are, amongst others:

- Specify the client's wishes by entering answers to the questions, store the questions and answers if desired, and show the holidays, if any, that satisfy the entered answers;
- Show the list of names of the previously stored question and answer sets;
- Show the questions and answers of a specific set;
- Allow the user to modify the answers to one or more questions and to show the resulting holidays that satisfy the modified answers (the 'what-if' scenario);

## 1.3 Functional requirements for the system administrator.

- Maintenance of holiday data (add, change, delete holiday data).
- List all holidays stored.
- Show data of a specific holiday.
- Maintenance of the rules (add, list, change, delete rules).
  - *List all rule names.*
  - *Show data of a specific rule.*

Note. Depending on the functionality of the expert system, there may be one or more functional processes for the drop-down lists for answering the questions.

## 2 SIZING OF THE FUNCTIONAL PROCESSES WITH COSMIC.

The first functional process for the client user is 'Show holidays'. We assume there will be one functional process to enable the client to enter his/her 'wishes' in answer to all questions, which has the following data movements.

### 2.1 Functional process 'Show holidays'.

Note. This functional process obviously has rule-processing logic which we assume accesses a set of persistently-stored rules to generate the list of recommended holidays from the entered set of holiday requirements and the stored holiday knowledge. This rule-processing logic, which is pure data manipulation, is associated with the 'Selected holiday details' Exit.

**Functional size is 13 CFP:**

<b>DM</b>	<b>Key Attribute(s)</b>	<b>Data Group</b>	<b>Req#</b>
<i>Entry</i>	<i>Question ID</i>	<i>Answer</i>	<i>1</i>
<i>Read</i>	<i>Rule ID</i>	<i>Holiday rule</i>	<i>1</i>
<i>Read</i>	<i>Holiday ID</i>	<i>Holiday details</i>	<i>1</i>
<i>Exit</i>	<i>Question ID</i>	<i>Question and answer</i>	<i>2</i>
<i>Exit</i>	<i>Holiday ID</i>	<i>Selected holiday details</i>	<i>3</i>
<i>Entry</i>	<i>Set name for client's questions and answers</i>	<i>Set name (if desired to store the questions and answers)</i>	<i>4</i>
<i>Write</i>	<i>Set name for client's questions and answers</i>	<i>Set name</i>	<i>4</i>
<i>Write</i>	<i>Set name, Question ID</i>	<i>Question and answer</i>	<i>4</i>
<i>Entry</i>	<i>Why</i>	<i>Selection criteria for rules involved in the Why request (user answered 'Why')</i>	<i>5</i>
<i>Exit</i>	<i>Rule ID</i>	<i>Rule involved in the Why request</i>	<i>5</i>
<i>Entry</i>	<i>How</i>	<i>Selection criteria for rules involved in the How request (user entered 'How' when seeing the holidays)</i>	<i>6</i>
<i>Exit</i>	<i>Rule ID</i>	<i>Rule involved in the How request</i>	<i>6</i>
<i>Exit</i>	<i>Error</i>	<i>Error/confirmation message</i>	<i>7</i>