



ITU-ZNIIS joint project
«International Telecommunication Testing Centre»
(ITTC)

CONCEPT

Construction principles of Knowledge DataBase Information resource

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INTRODUCTION

At the moment, the world recognized and successfully operated a number of operators laboratories and telecom manufacturers whose activities are directed at identifying the equipment complies with the market and issues for interoperability. These aspects certainly lead to a multitude of information on the results of data centers, analysis of which is quite difficult and limited in their access to them.

In order to improve efficiency in the processing of this type of information is possible to create a unified approach of data centers for several regions of the world (RSS, Europe, Asia, Africa, Latin America, USA). This approach was described in the framework of the existing ITU-T recommendation Q.3903 «Formalized of test results", which introduces a new definition to such systems - Knowledge Base (KB below).

In a ITU - ZNIIS joint project of creates unified testing center of telecommunications (ITTC) for the region's countries participating RSS.

Knowledge Base - One of the results of the ITTC implemented in full accordance with the requirements of ITU-T recommendation Q.3903. Concept of building a knowledge base is contained in this document contains 4 sections.

The first section sets out the general provisions of the information system ITTC. This section contains the rationale for the development of a unique specific software product - the Knowledge Base.

The second section is devoted to the definition of system requirements. Describes the basic documents, which formulated the requirements for information resources: Technical specifications and standards.

In the third section outlines the design principles of information systems knowledge base. The design process is described step by step knowledge base: concept, architectural design and physical implementation.

The fourth section covers the principles of operation of KB. Section includes a description of how the data filling the ITTC project portal, storing downloaded data, as well as its visual presentation to the user.

Information:

A joint project of ZNIIS - ITU (7RER07820) aims to establish the International Telecommunication Testing Centre (ITTC), working in the field of new technologies, and training professionals from developing countries in the field of telecommunications. This project is an important step on the evolutionary path of development of telecommunication networks in the

world, the results of which will be directly distributed to the administrations of developing countries
- members of the ITU-D.

ABBREVIATIONS

KB	Knowledge Base
ITU	International Telecommunication Union
ITTC	International Telecommunication Testing Centre
PMI	Program and methodology of testing
TR	Technical request
VF	Visualization form

Knowledge Base - is an information system for the collection, storage, presentation and analysis of an interconnected information on the project ITTC. Information resource materials processing knowledge base in addition to the activities of the center of the testing is aimed at training professionals in developing countries to testing and implementation of telecommunications technologies NGN, formalizing and structuring all the tried and tested project ITTC materials. The principal materials of the project include: the methodology of testing facilities NGN, the relevant ITU-T Rec. ITU-T Q.39xx; archive test results of technology and communication services and an archive of teaching materials for testing systems-networking solutions, services and quality of service.

The uniqueness of the Knowledge Base is due to the specifics of ITTC (testing and training) and the possibility of a future tool for semantic analysis.

Ergonomics user interface, knowledge base is executed in a public form, through access to information resources via the traditional web interface.

Construction of information resource knowledge base includes the development of an overall strategy and define a set of required features.

In developing a strategy to analyze the best practices of implementation of these information systems in the world, define the goals implemented an information resource, and then define the requirements for the functionality of KB.

Planning knowledge should begin with a clear definition of technical specifications for the project knowledge base. The terms of reference should be defined the main objectives of KB, and describes how clearly defined the requirements for information resource. The terms of reference helps to clarify the appointment of the project knowledge base and look forward to creating an effective information system.

After preparing the technical specifications necessary to determine the technical requirements. They consist of the general specifications and specific requirements. Technical requirements should include a list of specific tasks, implemented using the knowledge base. One should bear in mind that the goals set in the specifications will be achieved if the knowledge base ensures that the tasks defined in the specifications.

To substantiate the technical specifications and technical requirements should be prepared some additional information that allows to describe, in general terms what work should be done and what resources, including human and financial, necessary to distinguish it.

Planning for the development of the database should also include the development of standards that define how data will be collected and the presentation of data, how will the format, which require documentation and will be implemented as the design and implementation of applications.

The development of standards can be carried out in a graphical format and provide a form of imaging applications KB. Form of visualization - a graphical representation of the site.

The development and maintenance standards may be associated with considerable expenditure of time, and their initial implementation and follow-up may require significant resources. However, a clearly defined set of standards to create a good basis for further training and organization of quality control and ensure execution of work on well-defined patterns, regardless of skills and experience. In addition, you must carefully document any existing legal or technical requirements for the data in a form accessible to the end user and designer to the portal. The situation is easier when working with quantitative criteria, which include response time, the cost of modifications, the cost of memory, time to build, the cost of the reorganization. At the same time,

there are many optimality criteria that are immeasurable qualities, it is difficult to quantify expressible in the form of representation or the objective function. Qualitative criteria could include flexibility, adaptability, accessibility for new users, compatibility with other systems, the ability to convert to a different computing environment, the possibility of recovery, the possibility of the distribution and expansion.

2.1. Requirements to composition and functionality of the Knowledge Base main elements

As shown in Figure 1 KB consists of three main functional elements: a primary treatment system, storage system and the system of reporting.

Primary treatment system is designed to convert incoming data into a format suitable for storage in KB. Then the processed information is passed to the storage system.

The storage system provides a reliable structured data storage. Also, the storage system transmits data on demand reporting system.

Reporting system translates the user queries the knowledge base storage system. The storage system responds to requests from data reporting system, which converts the responses into a format suitable for the user's perception of the knowledge base and sends them to him. Access to the requested user information, the knowledge base in accordance with security policies defined by the administrator of the knowledge base.

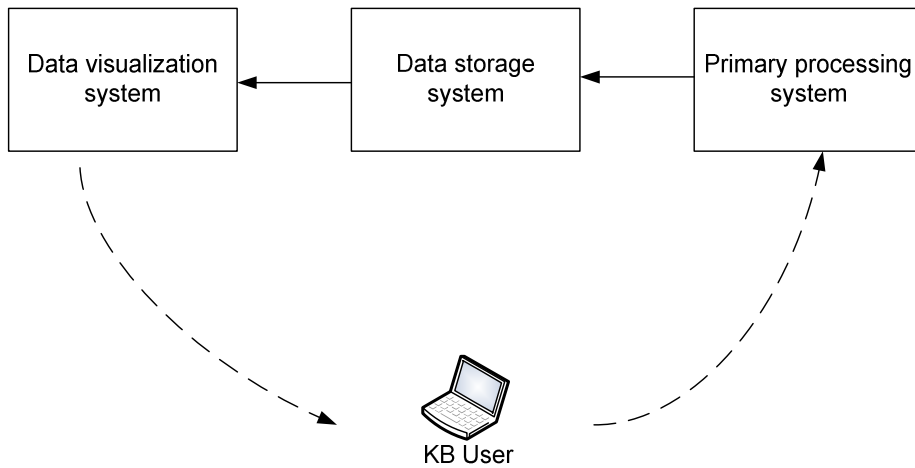


Figure 1. KB functional elements

2.2. Design requirements to Knowledge Base

Depending on the type of information stored in different sections of the KB. These sections and the relationships between them are shown in Figure 2.

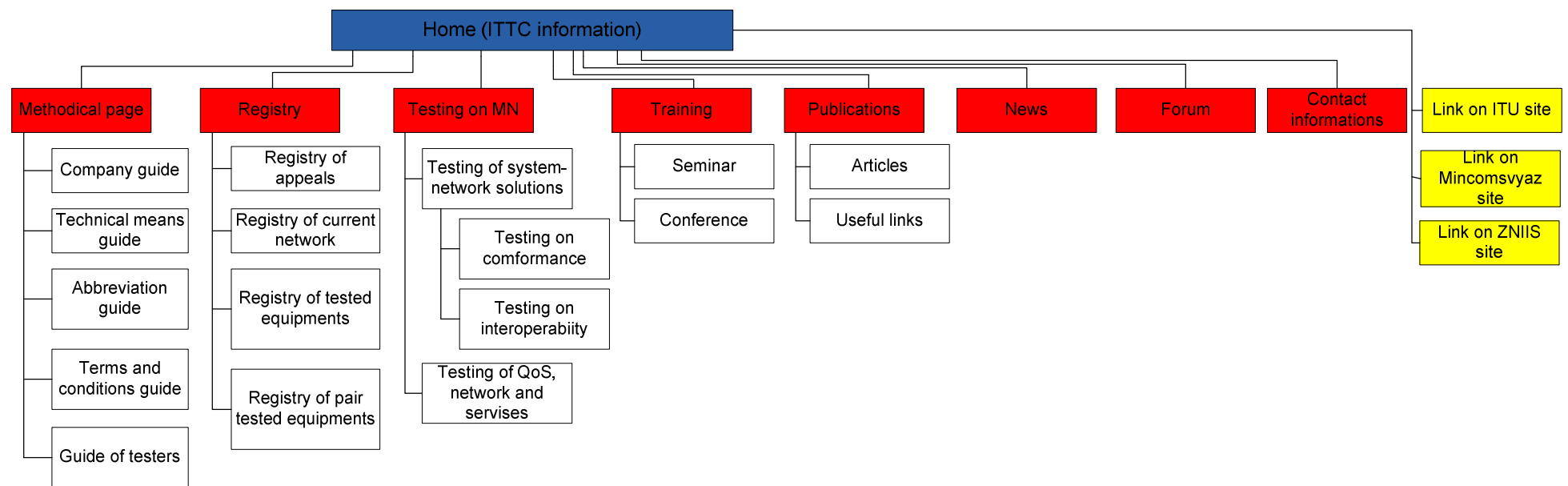


Figure 2. KB Structure

In the organization of the project ITTC testing as a system-network solutions, as well as QoS and communication services are realized three operating process to be formalized in the KB:

- testing system-networking, QoS, and communication services;
- training of approaches and principles of the testing system-networking, QoS, and communication services;
- internal arrangements.

The structure of the knowledge base in terms of testing should reflect the approach to the classification of all ITTC implemented under the project of testing.

In the section "Symbols and abbreviations" presented reference symbols and abbreviations used in the documents with the appropriate knowledge base is generally accepted the decoded version.

In the section "Definitions" is presented handbook of terms used in documents KB, and the corresponding conventional definitions

2.3. Requirements to composition and type of information provided in Knowledge Base

For storage of materials testing and use them in activities designed ITTC the appropriate section of Knowledge Base "Testing on Model Network"

To optimize the project to test the knowledge base must be loaded the following documents. For convenience, the knowledge base is proposed to divide the documents into two categories:

- test documents;
- test results.

The documents include the testing of the following documents:

- documents;
- application testing;
- hardware specification;
- program and methods of testing (PMI) ;
- wiring to the test zone;
- schedule of tests;
- daily summary;
- traces on the results of observations identified.

Schedule - a document containing a table for each day of testing with the test program, responsible persons, time frames prescribed procedures.

Specification document containing the characteristics of the test object. Composed of responsible persons, in whose interest is being tested. The specification is designed to prepare the ITTC Model network for testing in accordance with the type of tests organized by object features and testing. This document together with the contract must be submitted in ITTC.

Program and methods of testing (PMI) - a document developed during the planning phase of testing, designed to create a test program objectives and determine the testing technologies. The main points of the contents of this document are:

- introduction;
- test scripts;
- test program;
- testing procedures.

The highest value for the immediate implementation of the process is testing the section "Test Procedure." This paragraph contains a set of tests that describe the testing procedure, including those tests, normative references, which specify verifiable parameters or procedure, the configuration of the network model, the initial state of communications, test procedure and the expected result.

By the results of testing are:

- test report;
- conclusion.

Test Report - a document summarizing the results of testing equipment, mandatory sections which are:

- introduction;
- purpose of testing;
- objects tests;
- configuration data;
- test results;
- opinion on test results.

Conclusion - summary document containing an analysis of test results and a conclusion.

To store of teaching materials and use them in training is the appropriate section of the Knowledge Base "Training".

Consistent with the approach to the classification ITTC types of education offered to allocate two sections:

- training seminar;
- conference.

To inform the participants of training activities in the knowledge base necessary to download the following documents:

- program;
- members;
- training materials.

Upon completion of the training should submit all materials to be stored in knowledge base:

- presentations;
- guidance on testing;
- reports;
- training materials.

Press releases with photo documentation of the experiences of learning can also provide storage in the relevant sections of the KB.

As materials for the training workshop, the following documents: presentations, lectures (handbook), a course of practical training (guidelines for the implementation of practical work), a program of the course. As materials for the conference (WorkShop) are: presentations, abstracts and brief information about the participants of the conference agenda.

The course program - a document containing a list of seminars, indicating those who organize the seminar, the exact time of the workshop.

Presentation - an electronic version of a document containing information specific seminar/conference.

Toolkit - a document in print or electronic format, which is the theoretical basis for teaching approaches and principles of the testing system-network solutions.

Guidelines for the implementation of practical work - a document in print or electronic format, provides guidance for the acquisition of practical skills testing of system-network solutions.

Brief information about the participants of the conference - an information paper summarizing information about the participants of the conference, declared their participation at the registration stage.

To implement the possibility of communication tools should be provided KB forum. To optimize the orientation on the topics the forum, it is proposed to formulate the key areas of discussion. It is proposed to create the following forum thread:

- testing of QoS, NP, communication services;
- test match;
- testing and interaction;
- provision of Knowledge Base;

- standards;
- miscellaneous.

2.4. Requirements to storage and primary processing of information in Knowledge Base

KB should be capable of storing all the necessary information not only in the form of structured data, but also in the form of files.

KB should be able to store large amounts of text data (notes, opinions, etc.).

KB should be able to store data in two languages - English and Russian.

Such as data entry project, program and methodology, test, Daily report, a preliminary protocol, the protocol and the conclusion of the test results should have a unique identification number or a unique name.

KB should be able to backup storage. Possible to implement multiple backup systems:

- automatic backup system, the timing of the next backup is, and their volume determined by the size of the accumulated knowledge base of information;
- automatic backup system, the timing of the next backup is determined by the schedule;
- manual backup system that runs on the orders of the Administrator KB.

Keeping backup copies should be physically separated by several carriers.

KB means should be protected from unauthorized access to information. Access to the knowledge base should be based on authentication and authorization procedures.

Initial processing of information in the Knowledge Base should be carried out by means of an information retrieval system. Finding information is a process of identification in a variety of documents and database records of those who are devoted to this subject and meet a predetermined condition of the user's request. By means of the Knowledge Base shall be implemented the ability of semantic search - search for documents by content. When implementing semantic search logic search engine operates on the entire contents of the document to determine its meaning, and then forms a picture of its relevance.

To implement semantic search requires that the contents of documents and queries were translated into the language information retrieval and search images are composed of documents and queries as well as the search is made indicating the description of additional search terms.

The Knowledge Base design process consists of three main phases: conceptual, architectural design and physical implementation.

3.1. Concept

The first step in the process of designing the Knowledge Base is a conceptual design. This step is to describe the synthesis and the information requirements of users in the initial draft of the database. The input data can be set at the user's documents or the classical approach, the algorithms applications (algorithms of business) in the present approach. The result of this stage is a high level view (in the form of tables in the database) the information requirements of users based on different approaches.

The specific form and content of the conceptual database model to the selected for the formal apparatus. Commonly used graphical notations, such as information flow diagrams (presented in Appendix 1).

Most often, the conceptual model of the database include:

- description of information objects, or concepts of the project and links between them;
- description of the requirements for valid data values and the links between them.

3.2. Architectural design

The process of creating a database scheme based on high-level presentation of information requirements. The purpose of this phase is to create a logical data model. Conceptual data model, created in the previous step is refined and converted into a logical data model.

Convert the conceptual model into a logical model, is usually performed by formal rules. This step can be largely automated. In the process of developing a logical data model is constantly being tested and checked for compliance with the requirements of users. Created logical data model is a source of information for the physical design stage and also plays an important role at the stage of operation and maintenance of finished information system. When properly organized, accompanied by maintained up to date data accurately model and visualize any insertion in the database changes.

3.3. Physical implementation

Physical design is the third and last step in creating a database project, under which the designer makes decisions about how to implement the developed framework. The main goal of physical database design is a description of how the physical implementation of logical database project.

4.1. PRINCIPLES OF KB FILLING

In use, the database has an update operation (write, delete, modify data) and challenge-response (read).

Filling the knowledge base and download documents in the database should be carried out in two languages: Russian and English. The registration form is a new record in the database should contain an option to change the language for the duplication of records in another language. Files and documents should be stored in two languages. For the convenience of finding and downloading the necessary materials. name these files with the documents must contain the identifier belonging to the language (for example, Protocol_rus, Protocol_eng).

KB can be filled either automatically or by the database administrator's knowledge.

The work is carried out automatically by processing the file format of a standard means of primary data.

User knowledge in accordance with the access rights shall fill it by entering the data into standard formats.

Members must pay the full or agreed in some cases, reduced data. Besides the addition of a specific object of one of the main categories of knowledge base to make it only when writing all of its required parameters: since all the required fields must be marked or marked with "*" with appropriate explanations to the user. If the user leaves the field blank must be filled, KB shall notify the user with a proposal on making the data in these fields, but do not have to save your entries. If the user enters data into all fields are required, transmit them to the knowledge base storage system. In addition to this knowledge base to inform the user about trying to save the information already introduced earlier, if it contradicts the concept of data storage systems.

KB should be carried out by means of various data validation, including:

- technical data validation, namely the data type of storage system data type introduced by the user, except the conversion of data types of primary data processing system;
- spell checking, see the "Designer of programs and methods," "designer of the test results";
- other tests determined by the administrator in accordance with the requirements of the test participants.

Principles of recording a new project

In accordance with the qualifier of projects during the registration of a new assignment record is record the registration number. As the registration number should be understood as a unique sequence of characters consisting of numbers, letters and "_" (underscore), "." (Point). Registration number is designed to simplify the search for the project knowledge base.

At the stage of registration of the new project will select the company that initiated the test.

Information on the project name entered by the user knowledge base on the stage of registration of a new project. This information is presented as a sequence of literal characters. Designed for the formation of project documents, such as a program and testing procedures, test report, the conclusion of the test results.

Under the responsible person should understand the organization's representative, implementing the project, which is responsible for the timely execution of the projected procedures and providing report documents the results of the project, etc. In that case, if the project consists of several phases, you can assign responsible persons for each phase separately. Then the information on the person in charge of the project can be completed by the user knowledge base manually or automatically defined set of information on persons responsible for components of the project phases.

Information about the date of commencement and completion of the project is stored in the user knowledge base on the stage of registration of a new project.

4.2. BASIS OF PRESENTATION AND IMAGING INFORMATION of KB

KB should allow the stored information in it as a display of records and to file the documents for download.

Information of Knowledge Base in the form of tables with records in accordance with that of the KB. For each entry includes the basic fields that characterize this record and can be used for the organization of semantic search.

In accordance with the rights enshrined in the user profile, you can edit and delete any entry KB, download the downloaded document, using the appropriate menu button..

4.3. PRINCIPLES OF ACCESS TO KNOWLEDGE BASE RESOURCES

Access to resources should be provided to the Knowledge Base after registration. To perform the registration procedure a user prepares a request by filling out an electronic form at KB. The electronic form of the registration request must contain the following information:

- name;

- company;
- position;
- contact information (phone, e-mail address).

KB functionality should allow the automatic creation of letters to request the electronic form, completed online knowledge base, and send it by e-mail ITTC. The administrator sends a request to the knowledge base alignment specialists ITTC and positive decision creates a new user account in accordance with the prescribed access policy.

Depending on access rights granted by the site knowledge base should provide a minimum of three user profiles:

Profile #1 - KB administrator (the user has read, add, edit, download and delete records and documents of all types of online knowledge base, create and delete user accounts)

Profile #2 - the user has read, add, edit, and download records and documents of all types of online knowledge base

Profile #3 - the user has read access to records and documents to download KB site.

When you create a new user account functionality provides for the automatic creation of knowledge base and sending the announced e-mail newsletter with information login password required to access the site KB.

To gain access to resources KB registered user logs on to the site as a result of authentication and authorization procedures.

Information flow diagram

