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ESTABLISH A STANDARDS INFORMATION AND DOCUMENTATION SYSTEM
AT THE INSTITUTE OF STANDARDS AND INDUSTRIAL RESEARCH
OF IRAN

DP/IRA/87/013

ISLAMIC REPUBLIC OF IRAN

Technical report: Computerized information system for Persian Standards
at the Institute of Standards and Industrial Research of Iran*

Prepared for the Government of the Islamic Republic of Iran by the
United Nations Industrial Development Organization, acting as
executing agency for the United Nations Development Programme

Based on the work of David Haynes,
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United Nations Industrial Development Organization
Vienna

* This document has not been edited

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Explanatory Notes

Currency

Abbreviations and Acronyms

CD-ROM	Compact Disc - Read Only Memory. Compact disc used for storage of data using laser technology to read the data.
CDS-ISIS	Computer text retrieval package licensed by Unesco
CE	Computer Expert
DOS	Disk Operating System (used on the IBM PC and compatible microcomputers)
E-Mail	Electronic mail
IBM	International Business Machines
IIA	Industrial Information Advisor
INTIB	Industrial and Technological Information Bank
IROST	Iranian Research Organisation for Science and Technology
ISIRI	Institute of Standards and Industrial Research of Iran
Modem	Modulator/demodulator used for data transmission between computers via a telephone line
PDN	Public Data Network
PS/2	Personal System 2 (IBM microcomputer)
Relational database	Database management system designed to handle complex data
Text retrieval package	Information retrieval package capable of handling free text. Uses inverted file structure.
UPS	Un-interruptible Power Supply
Windows	Mouse-driven operating system (used on the IBM PC/AT and compatible microcomputers)

Abstract

The Computer Expert visited ISIRI's main research site at Karaj in November 1992. During his mission he selected and installed a relational database package, Paradox, Version 3.5, adapted for use with Farsi and Latin scripts. The CE then developed an information system for Iranian Standards documentation. He also designed a system for managing the acquisition of documents by the Library and Information Service at ISIRI. Contact was established with the Iranian Research Organization for Science and Technology (IROST). IROST provides a gateway to the major international online services via their communications node in Tehran. An online link between ISIRI and Tehran was achieved during the mission. Finally staff training needs were reviewed and a proposed fellowship programme for the Computer Manager and Manager of the Library and Information Service was devised.

The CE recommends that:

1. The management information system for documentation at ISIRI should continue to be developed using locally available expertise. Paradox 3.5 should be the vehicle for development of the system in the immediate future. In particular the Acquisitions system should be implemented and a mailing list should be developed on the system.
2. The Librarian and the Computer Manager should be sent on a two-week fellowship in the United Kingdom, with one week of training on database design and one week of visits to organisations who have developed similar applications to those required by ISIRI. Basic training on the use of Paradox, and on online searching should be provided for ISIRI staff from locally-available courses.
3. ISIRI should establish an online connection via IROST in Tehran.
4. The Library and Information Service should acquire two additional microcomputers, two printers, and word processing software. The National Standards Database should be transferred to one of the new microcomputers so that the existing PS/2 is available for CD-ROM searches and online access.
5. The main branches of ISIRI should be equipped with microcomputers and copies of the national standards database for their own use. The staff in Karaj should be responsible for transferring skills to the branches where the effort is justified.

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INTRODUCTION

This report describes the two-week mission of the Computer Expert (CE) to implement a bibliographic database of Iranian Standards and to develop management information applications for the library and information service at ISIRI. The mission co-incided with the three-week mission of the Industrial Information Adviser (IIA), with whom he closely liaised.

The purpose of the project was to strengthen the Institute of Standards and Industrial Research of Iran (ISIRI). The specific objectives of the CE's mission were to:

1. Identify the software systems to be acquired to develop the Management Information system of ISIRI based on the PS/2 computer system.
2. Train the personnel in using the PS/2 and PERINORM database.
3. Design, develop and implement the database of Iranian standards held at ISIRI and train personnel in entering data and using it.

Objectives 1 and 3 were achieved during the mission. Objective 2, to train the personnel in using the PS/2 and PERINORM database was not necessary, as the staff in the Library and Information Service were already competent users of the system.

Specific recommendation on the development of the Library and Information Service are to be found in IIA's Terminal Report (Carpenter, 1992). This report will concentrate on the technical aspects of the management information system.

I. ACTIVITIES

A. Initial Situation

Industrial Information Advisor (IIA)

This mission was timed to overlap with that of the Industrial Information Advisor (IIA). The IIA had been on mission for one week prior to the arrival of the CE, during which time she had done a preliminary investigation into the availability of equipment and software locally. She had also audited project equipment and software already obtained by UNDP to determine its applicability and degree of installation support required. She had established, in consultation with ISIRI staff and UNIDO that the Komstar equipment was surplus to ISIRI's requirements. The CE agrees with this conclusion.

The IIA also confirmed the local availability of software for data management. An essential requirement is the ability to handle both Farsi and Latin script. CDS-ISIS and Paradox 3.5 were both considered as possible candidates, as was the possibility of developing a bespoke software application in Farsi.

Library management functions such as acquisition of books and journals, loans control and serials control are operated manually. The records are well organized and reflect good management practice. These applications are judged to be suitable for automation.

Standards information

The Perinorm CD-ROM system had been running successfully in the Standards Information Centre for most of 1992, and the library staff were competent at searching the system. Further training was not considered necessary, as the staff had all the skills required to handle enquiries using the system.

The main source of information on Iranian standards is the catalogue of Iranian standards which is printed in Farsi. It was

generated using a Farsi word processor. The printed catalogue has a printed index in the back. In addition a number of specialist catalogues are produced, covering specific products and technologies.

Online access

A modem had been connected to the IBM PS/2, but the previous CE did not have sufficient time to establish a successful online link. Communications software had also been installed. A further 14 modems had been purchased for installation in the ISIRI regional branches. These had not been unpacked for distribution.

Equipment

The following equipment had been installed and was operating satisfactorily:

- IBM PS-2 Model 80
- IBM PagePrinter (PostScript printer emulation)
- CD-ROM drive
- Modem
- Uninterruptible Power Supply

The Komstar equipment and the Microfiche reader/printers were still in crates and had not been assembled or installed.

Software

The following software had been installed on the IBM PS/2:

- Communications package
- CD-ROM database software
- CDS-ISIS database package (English version)

Information Service

The Library and Information Service is run by a Librarian with a team of professionally-qualified staff and clerical support staff.

The CE found that the professional staff were capable and highly-motivated and had adapted to working with the Perinorm system successfully. Apart from the Perinorm database, the staff had

little experience of computerized systems and depended to a large extent on manual systems for library management operations.

Two of the existing staff had benefitted from a two-month fellowship in UK in 1991.

The library services could be characterised as at the reactive stage of development. They are responsive to enquiries, but have until now have tended not to anticipate information needs of users. The focus of the IIA was to look at developing a pro-active service where Information Centre starts to go out to users and find out from them what they want. Development of management information systems will be geared to support this approach.

Computer Department

The Computer Department is headed by a Computer Science Graduate who has one graduate and three clerical staff working under her. The department supports microcomputer applications within ISIRI and was responsible for producing and printing the Catalogue of Iranian Standards in Farsi.

B. Objectives

The three objectives of the CE's mission were to:

1. Identify the software systems to be acquired to develop the Management Information system of ISIRI based on the PS/2 computer system.
2. Train the personnel in using the PS/2 and PERINORM database.
3. Design, develop and implement the database of Iranian standards held at ISIRI and train personnel in entering data and using it.

Objectives one and three are related, and a solution capable of addressing both objectives was considered appropriate.

C. Management Information System

The first activity was to assess the requirement at ISIRI for a management information system. This involved detailed interviews with staff in the Information Centre to identify the processes and systems currently in operation in the Library. The CE also examined samples of material which would be handled by the Management Information system.

The existing systems installed at ISIRI were examined to determine what additional resources were required to set up a Management Information System and the database of Iranian standards.

The priorities for development of the Management Information system were established in consultation with ISIRI staff. A list of applications (Annex 5) was produced to form the basis of future development of the Information system at ISIRI.

Once this examination and analysis had been completed a specification was drawn up in consultation with the IIA and the Head of the Library Services.

The software specification, agreed in consultation with the IIA and the ISIRI staff, was as follows:

- Ability to handle transactional data
- Capability for modifying database structure
- Farsi and Latin script both supported
- Operate under DOS or Windows or OS/2
- Locally-available support

The next activity was to identify and obtain a package capable of supporting the agreed applications. Paradox 3.5 (Farsi) was identified as the appropriate solution for the stated requirement. It was chosen because of its ready availability, the fact that it is supported locally, and its ability to support both Farsi and Latin scripts and process them effectively. Paradox 3.5 is widely used around the world and is recognised as a leading relational database system.

It is a package capable of developing sophisticated applications, which depend on transaction processing. Text retrieval was not considered a priority at this stage - especially not for development of library applications such as acquisitions and serials control.

Data analysis

The data analysis consisted of the following steps:

- Interviews with library staff
- Examination of existing standards material in Farsi
- Examination of Farsi catalogue of Iranian Standards
- Established requirements and priorities in consultation with ISIRI staff and the IIA
- Examination of existing sources of data (both computerized and printed)

During the CE's visit a prototype design for the acquisitions system was produced and is detailed in Annex 8.

Investigation of local services

As part of the development of a management information system, the CE explored the possibility of providing remote access to the ISIRI databases in Karaj. Several options were considered including access via the Public Data Networks (PDNs).

Although there is currently no national Public Data Network in Iran, with the rapid infrastructural development of the nation, it is likely that a PDN will be available within five years.

The Iranian Research Organisation for Science and Technology (IROST), which is a part of the Ministry of Higher Education, was visited by the CE and IIA. IROST provides an information service, primarily for the universities, but also for researchers in industry and in other Ministries. It has a team of information specialists who can conduct online searches of external online services such as DIALOG, ORBIT, STN, and BLAISE-LINE. There is a PAD at IROST which offers access to the international data networks for users in Iran.

During the CE's mission, experts from IROST visited ISIRI, installed communications software (TSI), and successfully established a link to the DIALOG online service. This connection was repeated to demonstrate its feasibility.

IROST have indicated that they can provide a service to ISIRI on signature of a contract. They will also install error correcting software so that the integrity of data is preserved during online searches.

Visits to other information services

The CE and the IIA visited the Ministry of Industry, under which ISIRI operates, to discuss project progress with the Deputy Minister, Dr Tofigh, and to look at the information services at the Ministry.

The issue of the Komstar equipment was discussed with the Deputy Minister, who offered to consider providing additional resources for the development of the information infrastructure at ISIRI. He indicated however that this would be independent from the disposal of the Komstar equipment, which he did not sanction.

The library at the Ministry of Industry contains a mixture of trade directories and technical information. Within the library is an information unit containing two CD-ROM drives and a number of CD-ROM databases.

There is also a copy of the INTIB database run on CDS-ISIS. The online connection to INTIB was not demonstrated, although we were assured that it had been. The Information Officer had not fully familiarised herself with the INTIB database but anticipated that she would be able to conduct searches in the near future.

In order to gain a better understanding of the state of the library and information profession in Iran the IIA (accompanied by the CE) visited Tehran University library. The library has a CD-ROM unit with a comprehensive collection of CD-ROMs covering many key scientific and medical bibliographic databases.

a CD-ROM unit with a comprehensive collection of CD-ROMs covering many key scientific and medical bibliographic databases.

The library contains a large back-up collection of reference and loans material which is mostly held in closed stacks. Access to the collection is via a manually produced card catalogue. One sequence is in Farsi and one sequence is in English. The catalogues are combined author-title-subject catalogues. Most cataloguing and classification is done manually. Like many libraries, including the library at ISIRI the period between 1979 and 1991 is poorly covered because of internal and external political circumstances, although attempts are now being made to fill the gaps.

We also appreciate that the central library does not represent the complete picture. Many faculties have their own libraries with specialist collections geared directly to the needs of the students and researchers.

D. Development of the National Standards Database

A prototype database was set up in English and was used as a basis for development of the Farsi database of Iranian Standards. Annex 6 shows the data structure for the database and Annex 7 lists the forms and report formats for the database.

During the mission the CE also looked at ways of populating the database with data already in machine-readable form. The Annual Catalogue is available in word processed format and in theory it is possible to transfer it to Paradox and import it into the database. However the word processing software has some limitations, one of them being the maximum line length of 147 characters. As Paradox interprets a 'Carriage Return' at the end of a line as the end of a field, it means that records with long titles or scope notes become unnecessarily fragmented.

E. Perinorm training

When the CE arrived at ISIRI he found that the staff were already experienced at using Perinorm and did not need further training. Attention was directed instead at possible ways of exploiting that data, to produce Current Awareness bulletins. This was done jointly with the IIA, in whose report details are to be found.

II. CONCLUSIONS

A. Komstar Equipment

After extensive consultations with ISIRI staff and the CE, the IIA came to the conclusion that the Komstar equipment is not relevant to the needs of ISIRI. The detailed reasoning will be found in the IIA's report, however a brief summary follows.

The decision to purchase the Komstar equipment was based on an erroneous assumption that the full text of the world's major standards was available in machine-readable form.

Furthermore, it was envisaged that this information could easily be transmitted using the telephone network. This kind of facility might exist in the future, when high-capacity data networks are widely installed and data compression and transmission techniques have developed considerably, but it is not a realistic option at present.

The only full text standards database which is commercially available is NORMimage which contains the full text and a graphic image of some standards on Quality Assurance and other selected subjects, held on CD-ROM.

B. CD-ROM Technology

CD-ROMs are widely used as a medium for distributing data, especially bibliographic data. The technology has the advantage that users are not dependent on telecommunications links or data networks, which can be unreliable. Increasingly information units, such as that at ISIRI's Karaj headquarters have CD-ROM drives and the expertise to set up and use a variety of CD-ROM databases. One possibility would be for the staff at Karaj to set up CD-ROM systems with Perinorm databases at five or six of the main branches of ISIRI around the country. There are 22 branches in all. This would depend on whether the likely level

of usage by the branches would justify the expense of additional subscriptions to Perinorm and similar databases.

Within the Karaj site we believe that as the other applications are developed there will be a need for additional microcomputers. Shortage of computer hardware will seriously limit the availability of the Perinorm database to users as there will be competing demands on the existing IBM PS/2 microcomputer which only supports one user at a time.

C. External sources of information

ISIRI depends on many external sources of bibliographic information. Because of lack of access to online services it has to rely on the partial coverage of publishers' catalogues. Many of the specialist bibliographic databases and alerting services could provide a useful means of identifying publications for acquisition by the library. This would make the acquisitions process less arbitrary than is presently the case, and will help to ensure that ISIRI's experts have access to the most suitable publications.

Local expertise is available for development of online services and should be used where possible. Contact has been established with IROST who have demonstrated the capability of accessing international online databases from Karaj.

D. Development of Library Services

ISIRI needs to develop pro-active services in the library, by releasing staff from more mundane tasks. Automation of certain functions, such as acquisitions, will provide a means of doing this.

Tasks such as compilation of publication lists and current awareness bulletins would benefit from the introduction of word processing in the library.

More complex tasks such as subscription control will depend on the development of the Management Information system.

The library should also develop out-reach services and support to branches of ISIRI so that experts at the branches have access to some of the services available centrally.

E. Library Management System

The Library house-keeping operations are well organised and manually based. Because of the volume of transactions and the complexity of some of those transactions, the housekeeping operations are well suited to automation. The most complex and burdensome activity is acquisitions. ISIRI obtains documentation and periodicals on behalf of its own experts, government ministries, and private industry. It deals with a large number of publishers and suppliers, mostly overseas and has to deal with complex invoicing procedures. Because the system is manually based, it is difficult to generate exception reports or to provide alerts for overdue payments or orders.

III. RECOMMENDATIONS

1. Development of Management Information system

We recommend that the main application on the Management Information System, the National Standards Database, should be populated with data from the 1992 Catalogue of ISIRI Standards. This should be done as a priority. ISIRI needs to consider ways of transferring word processed files to Paradox. In the first instance ISIRI should talk to the providers of the word processing software as well as the suppliers of Paradox, to see whether a simple solution is available. The alternative would be to re-key all the data in the catalogue onto the database.

Once the database has been established, we recommend that production of the annual catalogue should be given priority. The initial set up of the report structures in National Standards Database should provide a basis for this (see Annex 7). Other products such as subject sections should also be available from the database.

We strongly recommend that the next application for development should be the Acquisitions system. A preliminary data structure can be found in Annex 8 and can be used as the basis of the final database.

We recommend that the production of the current awareness bulletin (which lists new acquisitions to the library) should be integrated with the Acquisitions system. However while the Acquisitions system is being developed, the bulletin should be produced in the library using a word processor.

Paradox should be used for developing a mailing list of users of the services of ISIRI, including recipients of the catalogues and information bulletins.

2. Training

There is an immediate need for basic training on how to use Paradox. We recommend that the Librarian and the Computer Manager should both attend the training provided by Sinasoft in Tehran and which is included in the purchase price of the software.

Once online access via IROST has been established, we recommend that the Librarian and one of her staff participate in basic courses on online searching.

We recommend that the Librarian and the Computer Manager are sent on a fellowship to the United Kingdom, to attend a training course on database design and to visit organisations which have developed similar applications. The proposed programme for the training course is outlined in Annex 3.

The IIA has recommended that the Standards Officer, Mr Arab is sent on a study tour of DIN in Germany. This will give him an opportunity to see how standards information is organised in Germany and will broaden the experience of staff at ISIRI, whose main contact until now has been with BSI in the United Kingdom.

3. Development of access to external services

We recommend that ISIRI establishes online access to the major international online services via IROST. IROST is based in Tehran and has the expertise to train and support users in Iran. Currently ISIRI does not have access to online services and therefore is not able to use the most up-to-date sources.

4. Equipment and software

We recommend that ISIRI purchases two copies of a word processing package capable of dealing with Farsi and Latin scripts. An example of such a product is Multi-Lingual Scholar which retails at about \$700. One copy would be for use by the Computer

Department and the other would be used in the Library to produce bulletins and catalogues, as well as correspondence.

The Library should acquire two additional microcomputers, one for word processing and one for running the database. We recommend that the laser printer is transferred to the word processing microcomputer, and that two dot matrix printers are purchased for the existing microcomputer (used for online searching and for the CD-ROM databases) and one for the microcomputer running the Paradox Information System. A list of equipment appears in Annex 4.

We recommend that the Komstar equipment, the microfiche reader-printers and the IBM mainframe are disposed of. It will be necessary first to establish ownership of this equipment and to ensure that any cash raised is used by ISIRI to develop its information services.

5. Branch support

We recommend that the level of service provided by the branches is upgraded by transferring skills and providing support from Karaj. To begin with the effort should be concentrated on the five or six largest branches, especially those with designated information officers.

We recommend that a branch network is established based on the E-mail service provided by IROST. IROST should be contracted to install modems (already purchased) and software in the larger branches. They should also provide training. For the time being all online searches should be done through the main ISIRI research centre at Karaj, although eventually staff at the branches should acquire the skills to conduct their own searches.

Each of the major branches should have a basic package of services and equipment provided, immediately. The recommended equipment is listed in Annex 4.

ANNEXES

Annex 1. Job Description

Post title: Computer Expert

Duration: 0.5 m/m

Date required: August/September 1992

Duty station: Tehran, with travel within the country

Purpose of project: To strengthen the Institute of Standards and Industrial Research of Iran (ISIRI).

Duties: The expert will be attached to the ISIRI and will work in close co-operation with the National Project Director and other experts assigned to the project. The expert will specifically be expected to:

1. Identify the software systems to be acquired to develop the Management Information system of ISIRI based on the PS/2 computer system.
2. Train the personnel in using the PS/2 and PERINORM database.
3. Design, develop and implement the database of Iranian standards held at ISIRI and train personnel in entering data and using it.

The expert will also be expected to prepare a technical report setting out the findings of his mission, together with his recommendations on future action which might be taken by the Government.

Qualifications: University degree or equivalent in information science or engineering with extensive experience in establishing industrial information services, particularly computerized ones.

Language: English.

Annex 2. People Met

Mr Alast, Ministry of Industry
Mr Amiri, ISIRI
Mr Arab, ISIRI
Mr Banofsheh, UNDP
Ms Fasihi, ISIRI
Mr Fayyasi, IROST
Ms Hossain-Zadeh, ISIRI
Ms Keravash, ISIRI
Mr Nahvi, IROST
Ms Seifi, ISIRI
Dr Tofigh, Ministry of Industry
Ms Yari, Ministry of Industry

Annex.3. Proposed Training programme

Two-week Fellowship for Ms Seifi and Ms Fasihi

The two-week fellowship will be divided into two parts. The first part will consist of tutorials covering the principles of database design and application development. The second week will consist of visits to specific sites which have developed applications similar in complexity to those required by ISIRI. We anticipate that the period of the fellowship will be timed to co-incide with one of the major trade shows such as 'Computers in Libraries' or the 'Library Technology Fair'.

First Week

Thinking about the system

System approach, Analysis and design

Database structure and design

What the software does, and how to meet output requirements
DBMS, Inverted files, Terminology control

Inputs and outputs - exploiting the system

Sources of input
Online databases, CD-ROM databases
Bibliographic data, SDI, mailing lists, indexes
Quality of data

System development

Hardware/software selection
Criteria for selection
Specifying needs
Evaluating the tenders
Understanding demonstrations
Machine dependence
Upgrading and growth

Human factors and management

Staff resources
Skill, ability, training
Responsibility and motivation
Hidden costs
Quality versus quantity

Day-to-day running

Back-up and security
Proofing and editing
Database update
Documenting the system

The course will be run as a tailored tutorial by an experienced tutor, and will be based on similar courses delivered by The Information Partnership to the professional bodies in the UK and to post-graduate students.

Tutorial fee: £1,500 (for 1 week) (\$2,500 at current exchange rates - Dec. '92)

Second Week

Visits to the following organisations will be arranged.

Library Technology Fair (2-days)

Library Technology Centre (1-day)

Paradox user (1-day) (London Borough of Southwark)

Database producer (1-day) (Leatherhead Food RA)

Estimated costs: \$700 (estimated cost of 2 days of an
Expert's time to set up and manage the
fellowship)
\$300 travel for 2 fellows and one expert

Annex 4. Equipment to be provided

Equipment for ISIRI at Karaj

- 2 Word processing packages (Farsi/English)
- 2 Microcomputers
80486, 100 Mbytes HDD, 4 Mbytes RAM, 3½" FDD
- 2 Printers (Dot matrix)

Equipment for each of the main Branches of ISIRI

- 1 Word processing package (Farsi/English)
- 1 Microcomputer
80486, 100 Mbytes HDD, 4 Mbytes RAM, 3½" FDD
- 1 Printer (Dot matrix)
- 1 Modem (already supplied and stored at Karaj)
- 1 Communications package
- 1 Database package (Paradox 3.5)
- 1 Read-only version of the National Standards Database

Optional

- 1 CD-ROM drive
- 1 Perinorm subscription

Annex 5. List of Potential Applications

Based on priorities for development agreed with library staff:

Iranian standards database (in Farsi)
Acquisitions system
Serials control (Farsi)
Serials control (English)
Library catalogue (English)
Library catalogue (Farsi)
Iranian standards database (in English)

NATIONAL STANDARDS DATABASE

STANDARD	TECHNICAL COMMITTEE	NATIONAL COMMITTEE	CODES
<p><u>Standard No. (A10)</u></p> <p>Publication Date (A15)</p> <p>Edition/Revision (A8)</p> <p>Title (A100)</p> <p>Scope (A50)</p> <p>Standard Type (A3)</p> <p>Technical Comm. No. (N)</p> <p>English Translation? (A3)</p> <p>Cross Ref. (A50)</p> <p>International Ref. (A150)</p> <p>Format/Pages (A10)</p> <p>Price (A20)</p> <p>Description (A150)</p> <p>Data Entry (D)</p> <p>Status (A3)</p> <p>U. D. C. (A20)</p> <p>Standard Secretary (A50)</p>	<p><u>Technical Comm. No. (N)</u></p> <p>Committee Title (A150)</p> <p>Committee Sec. (A50)</p> <p>National Comm. No. (N)</p>	<p><u>National Comm. No. (N)</u></p> <p>National Comm. Title (A150)</p>	<p><u>Code (A3)</u></p> <p>Expansion (A35)</p>

Key to data types

A Alphanumeric
D Date
N Numeric

Annex 7. National Standards Database (Forms and Reports)

Database forms and reports

Form F = Standard Form
Form 1 = Data Entry Form
Report R = Catalogue listing

Report R (Catalogue listing)

Report Band

Page Band

Catalogue of National Standards 1992 Page No.

Group Band

Standard No. Title of Standard

Table Band

Scope

Group Band

Ed/Rev - Year, Format, Status, Price

Page Band

©ISIRI, 1992

ACQUISITIONS DATABASE

DOCUMENT
<u>Document ID (A10)</u>
Title (A100)
Year (D)
Journal (Y/N) (A1)
Currency (A15)
Price (N)
Author (A50)
ISBN/ISSN (A12)
Publisher (A50)

CUSTOMER
<u>Customer ID (A10)</u>
Name (A50)
Position (A50)
Department (A70)
Organization (A70)
Address 1 (A70)
Address 2 (A70)
City (A50)
Telephone (A15)
Fax (A15)

SUPPLIER
<u>Supplier ID (A10)</u>
Name (A50)
Position (A50)
Department (A70)
Organization (A70)
Address 1 (A70)
Address 2 (A70)
City (A50)
Code (A20)
Country (A50)
Telephone (A15)
Fax (A15)

ORDER
<u>Order No. (A10)</u>
Customer ID (A10)
Supplier ID (A10)
Document ID (A10)
Date of Request (D)
Date of Order (D)
Invoice Received (from supplier) (D)
Payment Received (from client) (D)
Payment Sent (to supplier) (D)
Document Received (D)
Order Dispatched (D)

Key to data types

A Alphanumeric
 D Date
 N Numeric