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The technology roadmap for industry data dictionary structure, utilization and implementation

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch

Commission Electrotechnique Internationale
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

THE TECHNOLOGY ROADMAP FOR INDUSTRY DATA DICTIONARY STRUCTURE, UTILIZATION AND IMPLEMENTATION

FOREWORD

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IEC 61908, which is a technical report, has been prepared by IEC technical committee 93: Design Automation.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
93/195+195A/DTR	93/205/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

In order for a standard to be effective, there need to be utilization and implementation. In today's global economy the leading edge companies forge ahead with their agenda and many times produce what are known as pseudo-standards. Whether driven by an individual company (i.e. Microsoft®) or a consortia group, the ability to satisfy a customer need is their main focus and goal. This, in many instances, puts the groups developing standards in a "catch-up" mode while they make sure that industry has accepted the new concept, domain or technology. Unfortunately, although there may be better ideas developed during the standardization process or the playing field be levelled by the standard requirement, there is a "reluctance to change" by those organizations or individuals that have invested a good number of resources in developing or implementing the new concept.

If the standard defines physical performance requirements or conformance details, the contractual agreements between members of the supply chain handle these according to an implemented revision level. Many engineering hours are spent in determining the variation between an existing version and a new change proposal, to ascertain whether the change is compatible with the implemented processes, or whether the change would require a major process overhaul. The effort to change, many times, impacts business relationships and thus support of the next revision of the standard.

When it comes to software these issues become more complex, and take on market share, technical competence, business process, and competitive rhetoric significance. Instead of working together to help the industry, many times the players work to enhance their own position. This is counter productive to helping the electronic industry make sound decisions and continue to follow along the path of outsourcing much of the supply chain transactions, whether purchasing, fabrication, assembly or testing of electronic hardware.

In order to clearly define the difference between a dictionary and a library; a dictionary contains only meta data (data about data supported by an Information model of such entries). So the definition according to a certain methodology is given of a specific characteristic, for instance "terminal diameter" For such a characteristic, the identification, description and value representation shall be defined. What is not given in the dictionary is the actual value(s) of diameters of something.

A library is like a catalogue. It uses dictionary entries to be built into the database. In a library you find the characteristics with their values, so you can compare components of different manufacturers on their characteristics.

THE TECHNOLOGY ROADMAP FOR INDUSTRY DATA DICTIONARY STRUCTURE, UTILIZATION AND IMPLEMENTATION

1 Scope

This Technical Report is applicable to the technology roadmap for industry data dictionary structure, utilization and implementation.

This report covers one aspect of industry relationships; that of data dictionaries. A data dictionary is made up of information about products. The products can be electronic components, base material, clothing, chemicals or any product that can be described in terms of an industry understood descriptive name (element) and the characteristics that make up that part (attributes). Another item that helps data dictionaries become very efficient is to reuse the characteristics (attributes) in more than one element. Reuse of information is desirable in any implementation strategy in order to reduce search time for the implementation software. The topic of discussion, therefore, in this report is the status, completeness, implementer goals, and standardization efforts related to electric components.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61360-1, *Standard data element types with associated classification scheme for electric components – Part 1: Definitions – Principles and methods*

IEC 61360-2, *Standard data element types with associated classification scheme for electric components – Part 2: EXPRESS dictionary schema*

IEC 61360-4, *Standard data element types with associated classification scheme for electric components – Part 4: IEC reference collection of standard data element types, component classes and terms*

ISO 13584-26, *Industrial automation systems and integration – Parts library – Part 26: Logical resource: Information supplier identification*

ISO 13584-42, *Industrial automation systems and integration – Parts library – Part 42: Description methodology: Methodology for structuring part families*

3 Overview

3.1 Dictionaries and Libraries

The ultimate goal is the transfer of product data in a **library** which can be interpreted by computer systems. For this reason, the structure and meaning of elements in the libraries have to be defined. In addition to a basic information model, which defines, for instance, that each product has to have a unique attribute Product ID, and that it contains a list of properties, the structure and meaning is defined by dictionary.

A **dictionary** contains the definitions of the properties which are used in libraries to describe products. As such, a dictionary may define a property "supply current", specify its type and potential value restrictions, define its meaning, its unique identifier, who has specified it, etc. Normally, the properties are organised in classes which themselves are often organised in an inheritance hierarchy.

A **Dictionary Information Model** describes the way in which a Dictionary is built. Thus, this model specifies how classes are described (e.g. that they have a unique identifier, a preferred name, a code, a set of synonyms, a textual definition, etc.), how properties are described (e.g. that they have a unique identifier, a preferred name, a code, a set of synonyms, a textual definition, a type definition, etc.), which data types are allowed for properties, how classes can be related to each other, how properties can be related to classes, etc.

Examples of Dictionary Information Models are IEC 61360-1, IEC 61360-2 and ISO13584-42, the DTD (plus verbal specifications) of the RNTD, and the table structure of the ECALS dictionary (plus some verbal specifications). If a Dictionary Model is populated by classes and property definitions, then a dictionary is produced (e.g. the RNTD or the IEC61360-4 or the ECALS dictionary, i.e. the content of the tables). Of course, different dictionaries can be built with the same Dictionary Information Model. For instance, besides the IEC61360-4 quite a few other dictionaries have been defined and are under development on the basis of the model of IEC61360-2 and ISO13584-42. A dictionary contains meta data in the sense that this data describes other data, namely the meaning of product data in a library (or in an exchange file which can be regarded as a library). For this purpose, in a library all elements are related to a dictionary, i.e. all products belong to a product class and all values are defined in a corresponding property of that class.

Electric component dictionaries are the most essential architecture in forming the basis for shared understanding that makes product information exchanges possible. At the time of this report there are three major Dictionaries that describe electric components being used through out the global electronics industry. These dictionaries are supported by either IEC standard bodies or Groups of consortia formed to address the global needs of their supply chain members. It should be understood that there are several conditions for the data dictionary to be useful to a trading partner transaction. These are:

- the dictionary descriptions must be clear and unambiguous;
- the dictionary shall have the possibility to be linked to a transport mechanism that must be available to create, send and match responses to queries to libraries and/or dictionaries;
- the dictionary development must be flexible for quick update and approval of new characteristics of products. The dictionary itself does normally not contain products information;
- the implementation of the library/catalogue must have been populated by industry supply chain members or the dictionary may also be populated by other organisations/persons;
- a group must be responsible for the development, maintenance and update;
- mapping software between different descriptions must be available;
- data dictionaries must be available on-line in an electronic format;
- there must be a depth of coverage that is aimed at completeness of the user needs.

3.2 The IEC Dictionary

The IEC Reference collection (dictionary) is published in IEC 61360-4. It has software support through EXPRESS information modelling and other STEP tooling. MERCI an IST project Number 12238 technically managed by the University of Hagen, Germany is based on that IEC dictionary. Since approval for new entries in the dictionary would require consensus by the countries that participate in the IEC, and the associated development and approval process would take too much time special delegation has been made to a maintenance agency and a validation agency to overcome this problem. By doing so, the IEC, being sensitive to industry needs, is able to meet these requirements using the expertise available in the many Technical Committees.

Sector Boards review project relevance to industry needs. The Presidents Advisory Committee on Future Technology (PACT) evaluates visions for the future. Due to the late IEC implementation of an on-line database of the dictionary, the number of implementations using the IEC dictionary is only now starting. The initial population of the dictionary was created in 1997 and has been under constant development ever since.

3.3 The ECALS Dictionary

The Second dictionary is an expansion of the IEC effort. The dictionary is managed by JEITA (Japan Electronic and Information Technology Association) under the consortia membership known as ECALS. The ECALS format was built on the IEC standard and the members have developed several search engines to help identify component availability. JEITA has a Memorandum of Understanding (MOU) with the IEC in order to use the standard in order to build the enhancements into the ECALS dictionary descriptions. Several of the ECALS consortia users are also impatient to have new products defined in the Data Dictionary used by ECALS. Delegates from Japan participate in the IEC Technical committee responsible for the IEC data dictionary TC3/SC3D. Implementation is minimal and is used mostly by Japanese OEMs who also produce electronic parts. The descriptions in the ECALS dictionary provide different characteristics (attributes) from those that are available in the IEC. This is part of the agreement reached in the MOU.

3.4 The RosettaNet Dictionary

The third dictionary is that of RosettaNet and its partners. RosettaNet has a dictionary that complements that of the IEC and ECALS also by adding other features. The attitude of RosettaNet members is that they must have a concept that is flexible, and has a fast approval cycle amongst the trading partners. Their goal is responsive turn-around time for new product descriptions or changes. Thus implementation and approval is measured in weeks as apposed to months or years, and implementations grow at a phenomenal rate. New parts, new members, new partners populating dictionaries have caused the need for high levels of implementation software, search engines, transport mechanisms and other tools to smooth the highway for B2B transactions. The energy level put into the RosettaNet consortia efforts has not gone unnoticed, thus other industries want to take advantage of the same strategies and goals. The RosettaNet dictionary has expanded outside electronic components descriptions, to IT, SM and soon TC. RosettaNet has no desire to become the standard developer; they do want to be the most robust implementation. To that end they have achieved their goal, however with that comes the problem of a different structure or description of the Data elements.

3.5 The Global Dictionary situation analysis

All three dictionaries use a number/naming scheme in order to keep track of their products, elements and attributes. As can be imagined, the alphanumeric descriptions are relatively different, although both ECALS and RosettaNet, at times, reuse each others main alphanumeric description. However, the attribute lists of an individual alphanumeric may be very different based on enhancements needed by ECALS or RosettaNet users. The IEC has a standard scheme for the IEC descriptions and will not adopt other schemes lest it upsets the significant organization of the information.

All three dictionary representatives, through their members, are active in the promotion of their approach. Most new features originate from the IEC SC3D working group 2, the EEC CIREP and MERCI projects and the close harmonisation work with ISO/TC184/SC4 PLIB. At that point the new information is part of the maintenance programme of the IEC and follows the natural process to update the standard on those items that are agreed to by the National Committees of participating countries following the relevant procedures as described in IEC 61360-3. The status of the three approaches is shown in Table 1.

Table 1 – Dictionary hierarchy and status (January 2003)

Dictionary	Characteristic description
IEC status	IEC has 483 class definitions IEC has 1354 property definitions (other IEC figures) IEC has 113 condition definitions
ECALS status	ECALS has 728 class definitions ECALS has 2688 EC characteristic instances (1316 unique characteristics) ECALS has 724 EC classes
RosettaNet status	RNTD has 915 EC classes RNTD has 44,279 characteristic instances (2774 unique characteristics) – 2708 instances for automotive (417 unique characteristics – 25121 instances for IT (907 unique characteristics) – 16450 instances for EC (1450 unique characteristics)

The IEC dictionary is published as IEC 61360-4: 1997. An amendment is in circulation that contains many additions to the IEC reference collection, mainly originating from IEC TC47 (geometries of electric components 50 %), the EEC ‘Good-Die’ project and TC47/PT62258 (DIE data 25 %) and JEITA/ECALS (connectors among others 25 %). The amendment has been accepted as a CDV and a consolidated version of Part 4 containing the new material is about to be circulated as an FDIS.

The IEC on-line database became operational in May 2003. It permits at present searching and browsing with simple download of class and property definitions. Besides this database, a CDROM database version has been produced by Dr. Radley; this contains, in addition to the IEC on-line database, a whole set of input tools, output generators and format converters for various data formats (tagged file, STEP physical file, XML and CSV formats) www.iec.ch.

The ECALS dictionary, ECDIC1.2J, dated January 2001, is available as Excel tables. It is implemented in several Japanese supplier and customers, however search engines and content are just evolving. http://www.e-parts.org

JEITA formed the ECALS steering committee in May 2000. In order to continue the efforts toward commercial application of the achievements of ECALS, the national project aimed at standardization and digitalization of catalogue data for semiconductor and electronic components. The committee commenced action in August 2000, and disclosed to the public version 1 of the ECALS dictionary developed in compliance with IEC standards. The dictionary concepts are used by e-Pianet /EIAK in Korea and some RosettaNet members. As a result of establishing guidelines for data distribution, improving software for such services, recruiting companies for business start-up, and other commercialization activities, the dictionary is spreading widely with disclosed data exceeding 310,000 as of July 2002. Dictionary standards and member data is managed centrally at JEITA and distributed to the members of the consortia. Parts data are kept in distributed storage by information suppliers and joint servers.

The RosettaNet dictionary RNTD1_3, dated August 2001, is available as an Excel table and an XML file. All versions of the dictionary include the same package of XML files and spreadsheet documents, and can be viewed with the RosettaNet viewer. The official release is the parsable XML file.

It is still a huge problem for non-XML users to read/study the RosettaNet results. The Excel files are almost unreadable for a human, while forcing companies to use an XML environment is in the author’s view still a bad proposition

Version RNTD1_4 is now also available as an XML file. It is clear that the RN dictionary was based on ECALS and many of the identifiers are the same in the two dictionaries. There are a number of cases where the two dictionaries use different identifiers for the same property probably due to RosettaNet modifying the entity at some level. There is some overlap between both classes and properties in the three dictionaries. However, the classification philosophy and the end user goals vary dramatically. The philosophy used in the IEC is to develop a standard that is bound by rigid rules; the philosophy of RosettaNet is to serve the industry in the quickest manner possible and that the transport and search engines are efficient in what they are supposed to do. Thus software implementation philosophy varies and each software expert has his preference for the code and practice used in the queries and response mechanisms. There are quite a few implementations and a good amount of content in the data dictionary supply chain hierarchy.

Each dictionary and each organization has a focus and a goal. The purpose of the IEC harmonization experiment was to explore the differences and the similarities between their respective approaches to data element dictionaries. The world is changing, as are the needs of the supply chain and the companies involved. In an ideal world everyone would use the same procedures. If the world can manage to work around different power and voltage extremes and different wall sockets, by exploring the conditions of interoperability and granularity of the data elements, software can accomplish some of the needed bridging of the gaps. The rule should be that all must work together. All must make a commitment that no one gets left behind. Figure 1 shows the data element pyramid where each domain in their specific focus needs to continue to serve the industry in their own way. RosettaNet has the broader view and in many instances represents the leading edge. They have a responsibility to work with ECALS enhancement. ECALS works to help populate RosettaNet dictionary descriptions, and then influences the IEC standardization process catch-up.

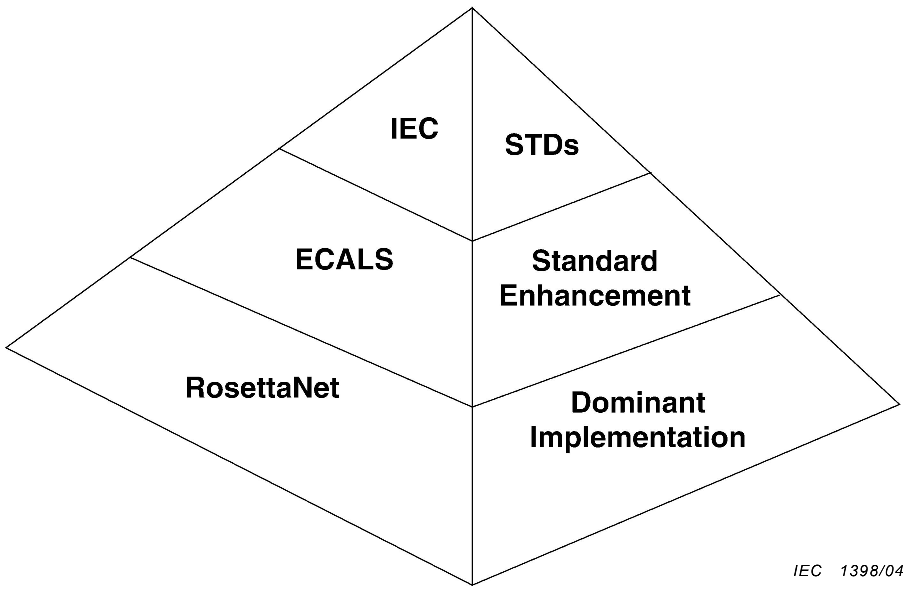


Figure 1 – Data element pyramid

3.6 The interoperability experiment

The intent of the "Electronic Component Description Interoperability Experiment" was to verify the ability of one system’s query about electronic component information to be handled correctly by another. As long as the software search engines are able to understand the communiqué and manage the information without ambiguity, certification tools can be developed that ensure that new techniques deal with the back and forward transfers are compatible without data loss.

There were several phases to the Electronic Component Data Interoperability Experiment programme. Each phase was intended to accomplish a particular function of the experiment. TC93/WG6 was assigned the responsibility to monitor the results of each phase and make any necessary adjustments in the subsequent phases. A preliminary report was to be issued at the end of each phase highlighting the results and making recommendations to either the participants or the concept developers. The three phases were:

- Phase I – Mapping and Database Structure;
- Phase II – Dictionary Interchanges (comprised of sub sections A, B, and C);
- Phase III – Formal Harmonization and Final Report.

3.7 Phase I mapping results

Mapping was intended to establish the relationship between the three formats and the database structure. All three dictionaries were included in a one-to-one mapping that contained as many classes as possible. The classes were selected from the most popular group of classes that had information content.

A purely random sample would not provide the best results of the experiment. It was determined that selection of classes with information content was essential. A list of populated classes was created and the random sample taken from that list.

3.8 Phase II Dictionary Interchange results

The test plan called for the following data transfer concepts of queries and responses being exchanged between the test plan participants in pair sets including:

Phase A:

RosettaNet Query>	*ECALS*	*<ECALS Response*
RosettaNet Query>	*MERCI (IEC)*	*<MERCI Response*

Phase B:

ECALS Query>	*RosettaNet*	*<RosettaNet Response*
ECALS Query>	*MERCI (IEC)*	*<MERCI Response*

Phase C:

MERCI (IEC)>	*RosettaNet*	*<RosettaNet Response*
MERCI (IEC)>	*ECALS*	*<ECALS Response*

For every possible partner query and response the following guideline was used to determine the queries to be used in the experiment:

- 32 classes chosen from ECALS, RosettaNet, MERCI containing product information;
- 32 classes for the experiment were selected randomly from most populated group of classes;
- 16 classes to be used by 3 fixed queries;
- 16 classes to be used by 5 queries based on business use cases;
- query results to be limited to 3 product listings per query response;
- RosettaNet Member Company to act as the single source for queries;
- class section was the same for sections A, B, and C.

Originally, all classes were to be selected randomly from all classes in the dictionary, but an investigation revealed that such a pure random sample would only have 20 % of the classes populated in real databases.

The ECALS and RN members suggested that classes with part information contents were essential for this experiment. A list of populated classes was created and a random sample taken from that list. The result of that sample is shown below.

3 classes	Populated in all three organizations
9 classes	Populated in two organizations
18 classes	Populated in one organization
2 classes	Not populated in any organization (they were selected intentionally)

The details of the experiment are provided in Clauses 4 and 5.

3.9 Phase III Formal harmonization results

The final phase of the experiment will involve doing a data analysis of the three phases of query response pairs (Phase A, Phase B, and Phase C). The results of the experiment will then be circulated to the test plan participants in order to produce a series of conclusions and recommendations. The goals of the conclusions and recommendations are to provide a roadmap or a practical guide on how to move forward in modifying existing and producing new dictionaries in order to achieve a greater level of interoperability.

4 Background

The need to determine interoperability between and among data element users was first discussed during the TC93 meeting held in Florence Italy, 2001. Proposed to the TC93 plenary session, the project was approved with the idea that a test plan should be developed and a group of individuals identified who could participate in the experiment. The project goals were identified during a meeting held in Arizona USA in February 2002. the project was discussed during the ACET and ACET Area 4 meetings held in Geneva in April 2003. Those discussions led to completion of the preliminary test plan that explained the goals and steps to completion. TC93 issued a new work item proposal based on those discussions and reports. It was circulated and approved by national committees in January 2003. It was 93/164/NP. This clause of the report details the original dictionary mapping proposal.

4.1 Evaluation techniques

Several phases were defined for the TC93/WG6 interoperability experiment. The goal of the activity was to determine harmonization complexity and what accomplishments can be shared with a global industry concerning evaluations of Phases I, II, and III evaluations. Some of the evaluations were performed by an independent group of participants who already were involved in the candidate's procedures, i.e. ECALS, RosettaNet, and MERCI. Other evaluations were to be performed by WG6 personnel. Evaluations involved in the programme included:

- comparison of class structure and variation;
- response from industry and exchange partners regarding class harmonization proposal;
- display of class and query information at http://www.rntd.info/harmony/query.asp;
- use of the NIST reflector tc93-wg6@nist.gov;
- store query results and analysis at an open IEC TC93 WG6 ftp site ftp://ftp.iec.ch;
- conference call strategy;

- issue tracking system and procedure;
- email notification when necessary on topics for review or input.

4.2 Proposed participation

All IEC member countries were invited to participate in the programme. Participants should have experience in Web-based data transfer and have the credentials from their National Committees. Participation in Phase I and Phase III would be as a part of the TC93 membership. These phases were coordinated through the central office as a part of the normal information distribution system.

Phase II was coordinated by the officers of TC93WG6. Individuals, with their National Committee approval, could make request directly to the officers of WG6 or through the IEC Central Office. As a part of Phase II all participants received their time frame and schedule for sending, receiving or returning query information. A master schedule was maintained by WG6 officers and was available for review on the programme's IEC Web site.

4.3 Proposed process flow

In order to understand the working of the programme, a process flow was developed for the proposed experiment. Coordination of this flow was delegated to WG6 officers who became the interface between the participants. The process flow also shows how the database on the Web site was managed.

During the programme, the process flow was used to identify various milestones. The status of each participant in any of the sections of Phase II was monitored by the officers of WG6 and made available for review by WG6 members, programme participants, the members of TC93, and the Central Office. WG6 officers retained the right to abort the performance of any individual if the manner in which they queried the database was distorting the information needed to evaluate the concepts of the three dictionaries or the search tools. It was made clear that the possibility of an abort would be preceded by the appropriate warnings and guidance to improve the performance of the applicant. In such a case, it is possible that the recommendation would have been to restart anew with new tools or procedures. All correspondence was sent to the Secretary of TC93 in order to avoid any political, technical, business or moral problems.

4.4 Reports

Reports were issued at different parts of the programme to provide status and issues. All reports were electronic in keeping with IEC's publication policy. Data files that provide background for the recommendations or results of each participant's performance sometimes supplemented reports. Since reports were made available to the industry, only code numbers were assigned to participants in each report as well as the final report, however each participant will know their own code number so that they can determine where they fit within the hierarchy of the industry sampling.

The final report, where possible, is separated into the various phases. Information is prepared in such a manner that the report can be used to facilitate further standards or software development. It is hoped the final report can be published as an IEC information document. It would also be a recommendation to revisit the programme as a part of a maintenance cycle for the Technical Report issued at the end of the programme.

4.5 Timing

Phases I and II of the round-robin test programme were expected to be completed by the fourth quarter of 2002. However, problems with compatibility of transport or search engine differences resulted in the delay of several aspects of Phase III that started in the first quarter of 2003. The final report was scheduled to be completed by early 2004 after a review by the National Committees and the participants of the programme, to ascertain and to ensure that all details were in order.

5 Introduction of the actual programme experiment

Phase I was intended to establish and to evaluate the mapping of the different formats by selecting those classes that are similar or identical. After mapping there may be a desire to harmonize those classes left out. Deliverables are the baseline output complete of classes in all three dictionaries that include a one-to-one mapping and as many classes as possible.

32 Classes for the experiment were selected randomly from the list of classes in the RosettaNet Technical Dictionary. A review of these classes concluded that there were too few classes where content was available across all three dictionaries. Additional classes were selected and then substituted for a portion of the classes known not to be populated by the experiment participants.

Initially a blanket set of queries was created with the intent to measure the breadth and depth of content coverage in the classes. Three queries were to be sent against each class. They basically covered the range of content existing by sampling at three levels.

a) the first query was for merely manufacturer names and part numbers that matched the classes queried on;
b) the second query had the same content as the first, extended to include all of the characteristics known as the root set (characteristics deemed to apply to all products;
c) the third query had the same content as the second query but also queried for every characteristic associated with the particular class.

After further discussion, it was decided to expand the context of the experiment by also focusing on business practical queries. To support this agreement, the 3 level queries cited above were used against half of the 32 classes (16) and 5 business scenario queries were applied against the other (16) classes.

Table 2 – Selection of classes

Number of classes	Organizational status
3	Populated in all three organizations
9	Populated in two organizations
18	Populated in one organization
2	Not populated in any organization (selected intentionally)

6 Procedure used for Section A experiment (RosettaNet to ECALS and MERCI)

The overall procedure of Section A of the experiment between RosettaNet and ECALS took place as follows:

a) RosettaNet (RN) sent out RN-style queries, contents of which were agreed upon in teleconferences. These queries were manually received by ECALS personnel;
b) the ECALS personnel converted the RN queries into the ECALS format;

c) the ECALS part information for the ECALS queries was retrieved from ECALS system in ECALS-style responses;

d) ECALS-style responses were converted back into RN format;

e) the RN formatted responses were returned to RosettaNet.

Figure 2 shows a graphic representation of the process flow between RosettaNet and ECALS.

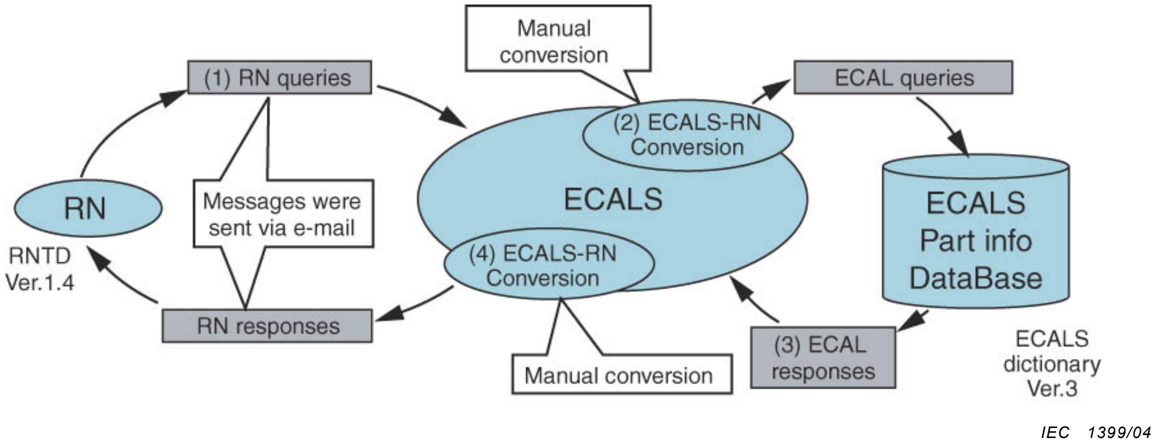


Figure 2 – Process flow for Phase II, Section A RosettaNet and ECALS

The overall procedure of Section A of the experiment between RosettaNet and MERCI took place as follows:

a) RN sent out RN-style queries, contents of which were agreed on in teleconferences. These queries were manually received by MERCI;

b) the mediator of MERCI converted the RN queries into MERCI queries on the basis of the IEC 61360 dictionary;

c) the IEC 61360 based part information was retrieved by the MERCI DB and automatically converted back into RN format.

Figure 3 shows a graphic representation of the process flow between RosettaNet and MERCI

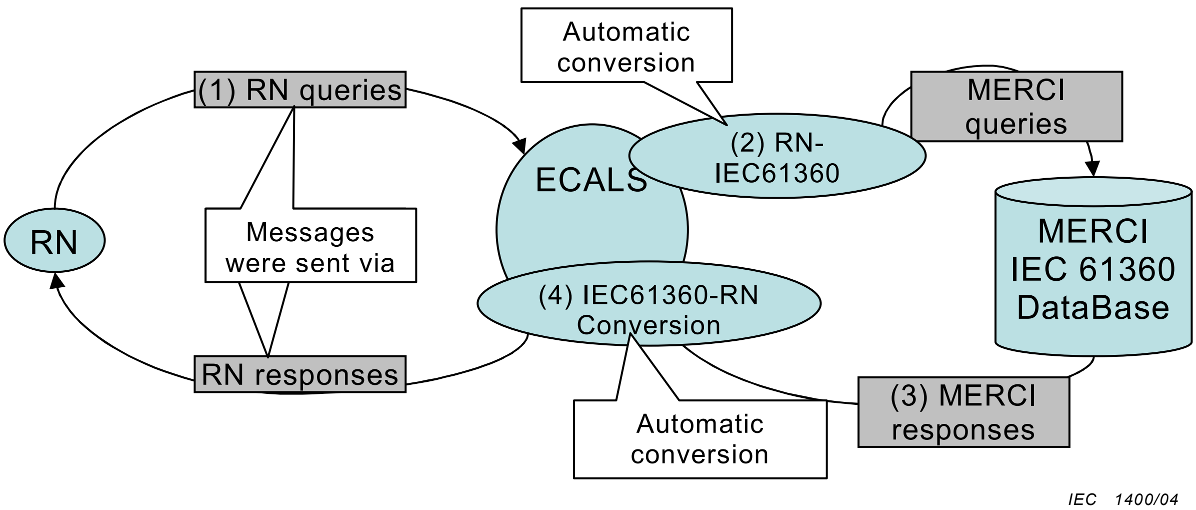


Figure 3 – Process flow for Phase II, Section A RosettaNet and MERCI

6.1 Queries (Use case queries) both MERCI and ECALS

ECALS and RN members suggested queries for five use cases based on actual business needs. These were:

Use case 1: Find products

Use case 2: Get more information

Use case 3: Get specific detailed information

Use case 4: Find replacement parts

Use case 5: Update product information

The use cases queries were applied to 16 classes out of the 32.

- XJA020 (Varistor)
- XJA091 (Filter – Signal Line – Piezo Electric Ceramic)
- XJA101 (Filter – EMI/EMC – Common Mode Choke Coils)
- XJA143 (Switch – Mechanical – Signal Selector – Tactile Feedback Push type)
- XJA629 (Micro controller)
- XJA644 (DRAM)
- XJA648 (EEPROM)
- XJA667 (ASSP for Power)
- XJA683 (OP amp)
- XJA706 (Power Bipolar Transistor)
- XJA709 (Power MOSFET)
- XJA716 (Zener diode)
- XJA744 (Fixed ceramic capacitor for temp-comp)
- XJA676 (CMOS Standard Logic)
- XJA104 (Filter – EMI/EMC – Network Circuits)
- XJA642 (Digital Signal Processors)

The following are examples of the RosettaNet to ECALS queries

Use case 1: Find products

Example for the class XJA020 (Varistor)

Conditional search message using following conditions:
Specify class and basic specifications
ClassCode = "XJA020"
MountType = "SurfaceMount"
V_dc-Max >= 5 V
V_Clamp <= 30 V
Part Availability Status = "Mass production"

Use case 3: Get specific detailed information

Example for XJA091 (Filter – Signal Line – Piezo Electric Ceramic)

Get information about following conditions:
Specify a part number and a manufacturer name
Manufacturer = "Murata Manufacturing"
ClassCode = "XJA091"
PartNumber = "CFWS455HT"
Requested property is
Outline Dimension Set data file

Use case 4: Find replacement parts

Example for XJA744 (Fixed ceramic capacitor for temp-comp)

Conditional search message using following conditions:
Specify class and more detailed specifications
ClassCode = "XJA744"
MountType = "SurfaceMount"
Rated Capacitance = 47 pF
Rated voltage >= 100 V
Temperature Coefficient of Cap = 0
Part Availability Status = "Mass production"

Use case 5: Update product information

Example for XJA709 (Power MOSFET)

Get all available information for product with the following conditions:
Specify a part number and a manufacturer name
Manufacturer = "Toshiba Corporation"
ClassCode = "XJA709"
PartNumber = "2SK3443"
Last Revised Date >= "2002-03-01"

6.2 Queries (3-level queries)

The 3-level queries set no condition for returned parts. They only requested a set of property values. Each level query had its own set of returned properties. These were:

Level 1: essential three properties;

Level 2: common properties including Level 1;

Level 3: all properties including class specific properties.

The 3 level queries were applied to the following 16 classes.

- XJA015(POTENTIOMETER – ROTARY – TRIMMER)
- XJA024(COIL – FIXED – RF-FREQUENCY)
- XJA051(TRANSFORMER – SIGNAL – FIXED – LOWER FREQUENCY)
- XJA177(SWITCH – THERMOSTATIC – BIMETAL TYPE)
- XJA183(CONNECTOR – BOARD TO BOARD)
- XJA359(SENSOR – ELECTRO-MAGNETIC – ELECTRIC FIELD)
- XJA384(SENSOR – MECHANICAL – PRESSURE)
- XJA570(DIGITAL AUDIO TUNERS)
- XJA636(MICROPROCESSORS)
- XJA645(MEMORY – STATIC RAM (SRAM))
- XJA650(MEMORY – FLASH MEMORY)
- XJA678(STANDARD LOGIC – TTL)
- XJA697(Laser diode)
- XJA684(STD-LINEAR – COMPARATORS)
- XJA698(OPTO-ELECTRONICS – LIGHT EMITTING DIODES (LED))
- XJA705(TRANSISTOR – BIPOLAR – SMALL SIGNAL)

Table 3 shows a partial example of the results of the three level query.

Table 3 – Example of 3 level query

XJA177	SWITCH – THERMOSTATIC – BIMETAL TYPE		
Query_Level	**Property_Code**	**Property_Name**	**Qry_Value**
1,2,3	QBC001	RosettaNet Class	XJA177-2
1,2,3	RNP211	Manufacturer Name	
1,2,3	XJE010	Part Number	
2,3	XJE015	Application Scope	
2,3	XJE002	Data Revision Number	
2,3	XJE001	Data Version Number	
2,3	RNP145	Disclaimer	
2,3	XJE014	General Description	
2,3	XJE133	Industry Standards	
2,3	RNP307	Is Generic	
2,3	RNP139	Key Text	
2,3	RNP1293	Last Product Characteristic Change Date	
2,3	RNP210	Manufacturer DUNS	
2,3	XJE136	Mass	
2,3	RNP528	Operating Range	
2,3	XJE219	Operating Temperature	
2,3	XJE016	Package	
3	XJG748	Height	
3	XJG746	Length	
3	RNP215	Lifecycle: Date	
3	RNP212	Lifecycle: Stage	

6.3 Output files (created by ECALS)

Four files were created by ECALS and posted to the mailing list. ECALS mapped RN properties to ECALS properties and the equivalent search condition was entered into the ECALS search system. ECALS queries were then extracted from the log of the ECALS search system. The ECALS search system sent its response. ECALS converted the ECALS response back into RN response mainly by hand. The flow diagram in Figure 4 shows the ECALS response process. Table 4 shows the details of the results.

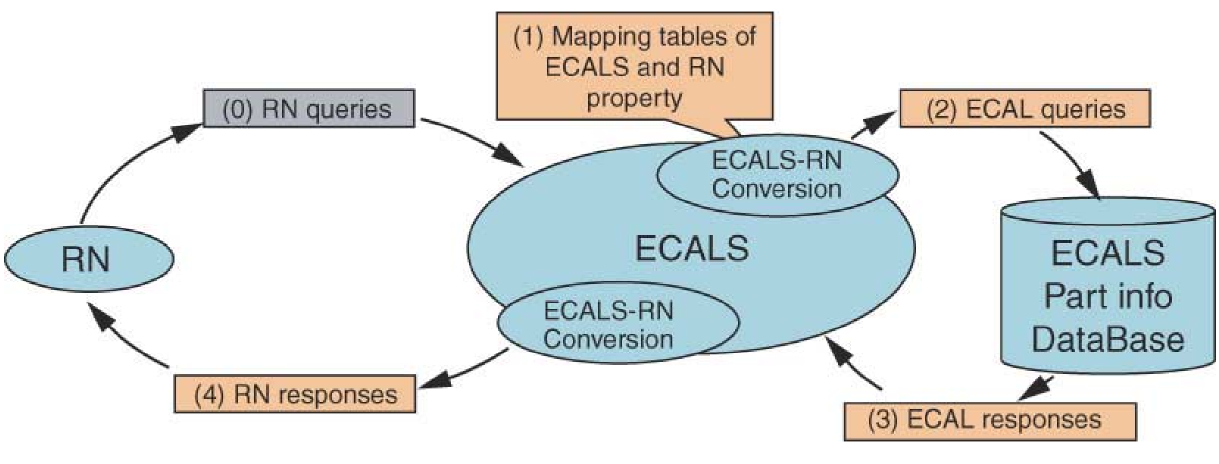


Figure 4 – ECALS response process

Table 4 – Example of detailed results of ECALS response

XJA177	SWITCH – THERMOSTATIC – BIMETAL TYPE			ECALS			
Query_Level	**Property_Code**	**Property_Name**	**Qry_Value**	**Property_Code**	**Data_type**	**Level**	**Query**
1,2,3	QBC001	RosettaNet Class	XJA177-2	XJE005	String		=XJA177
1,2,3	RNP211	Manufacturer Name		XJE011	String		
1,2,3	XJE010	Part Number		XJE010	String		
2,3	XJE015	Application Scope		XJE015	String		
2,3	XJE002	Data Revision Number		XJE002	String		
2,3	XJE001	Data Version Number		XJE001	String		
2,3	RNP145	Disclaimer		XJE018	File		
2,3	XJE014	General Description		XJE014	String		
2,3	XJE133	Industry Standards		XJE133	String		
2,3	RNP307	Is Generic					
2,3	RNP139	Key Text		XJE132	String		
2,3	RNP1293	Last Product Characteristic Change Date		XJE004	Date		
2,3	RNP210	Manufacturer DUNS		XJE012	String		
2,3	XJE136	Mass		XJE136	RealM	Nom	
2,3	RNP528	Operating Range					
2,3	XJE219	Operating Temperature		XJF864	RealM	Min, Max	
2,3	XJE016	Package		XJE016	String		
3	XJG748	Height					
3	XJG746	Length					
3	RNP215	Lifecycle: Date					
3	RNP212	Lifecycle: Stage		XJE013	Enum		
3	RNP214	Lifecycle: Years In Stage					

6.4 RosettaNet to MERCI (IEC) queries

The MERCI team reviewed the selected classes and compared them to the IEC equivalents. Only certain classes were identified as being populated in the MERCI database. Table 5 shows the relationship between the RosettaNet queries and the ability to respond by the MERCI tools. Figure 5 shows the MERCI response process. Table 5 shows the details of the results.

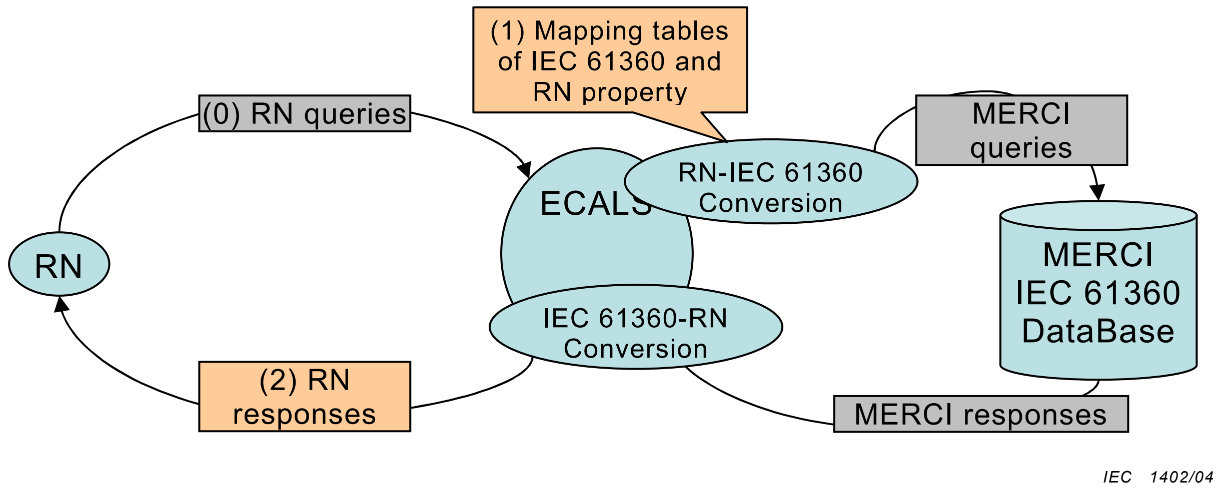


Figure 5 – MERCI response process

a) MERCI mapped RN classes and properties to IEC 61360 classes and properties and the equivalent search conditions were entered into the MERCI query system.
b) The MERCI system performed the query and generated an RN response automatically.

Table 5 – Selected classes populated in the MERCI database

IEC ID		**IEC class name**	**RNTD ID**	**RNTD class name**	**Query type**
AAA108		Pressure Sensors	XJA384	SENSOR – MECHANICAL – PRESSURE	3 level
AAA068		Memories (DRAMs)	XJA644	MEMORY – DYNAMIC RAM (DRAM)	UC
AAA082		Laserdiodes	XJA697	OPTO-ELECTRONICS – LASER DIODES	3 level
AAA080		Light Emitting Diodes	XJA698	OPTO-ELECTRONICS – LIGHT EMITTING DIODES	3 level
AAA123		AF Bipolar Multiple Signal Transistors	XJA705	TRANSISTOR – BIPOLAR – SMALL SIGNAL	3 level
AAA127		Smart SIPMOS	XJA709	TRANSISTOR – FET – POWER MOS	UC

According to the information in Table 5, only queries for these classes have been run against the MERCI DB, and the mappings have been given only for these classes. There were no matching properties between classes XJA384 from RN and AAA108 from IEC – as such, no queries or responses could be performed.

6.4.1 Specific mappings

There are two specific mappings of properties:

- the property Part Number has been mapped to a specific property in the MERCI DB which corresponds to the Part Number;
- the property manufacturer name has been mapped to the supplier of the dictionary which is Infineon in the MERCIMERCI database. As such, this is not a mapping from one property to another one but from one RosettaNet property to an element of the PLIB structure which underlies the MERCIMERCI database.

The class XJA697 was by accident called XJA679 in many Excel tables and also in the classes listed on the Web. Accordingly, no example queries were provided for XJA697. Therefore in the Section A experiment only a response was performed using Q1 against XJA697.

6.4.2 Identification of missing values

In the result files, it is possible to identify the reason for missing values as follows:

- if for a RN-property, no mapping is defined to an IEC property, the value is "mapping.not.available";
- if a mapping exists, but the database does not contain a value for that property, then the value is "not.available";
- some of the RN properties are not in the version of the RN dictionary. In this case, the value of the property is "not.in.dictionary".

Many of the Use Case queries do not generate a result because they ask for a specific component which is not part of the MERCIMERCI database. Examples are XJA644_UC3, XJA709_UC2,3,5.

6.4.3 Qualification properties without mapping

A problem occurs in the Use Case queries if qualification properties do not have a mapping.

MERCI team members decided to neglect these properties (i.e. in the logical qualification expression their value is "true"), i.e. only the other properties are used for the qualification. This is the case in XJA644_UC1, where their does not exist a mapping for the Lifecycle stage, but for the other properties "Storage Capacity" and "Word Size".

There are other cases, where all qualification properties do not have a mapping – then the result is empty because MERCI does not have any qualification which is fulfilled. Examples are XJA709_UC1 und XJA709_UC4.

6.4.4 Result presentation

In the resulting XML files submitted to the experiment by the MERCI team, only the pure query result part is shown. The RosettaNet envelope has been dropped.

Table 6 shows an example of a section of the mapping table for the class XJA644.

Table 6 – Example of MERCI mapping table for

RN classes: XJA644

Property DET	Prop Vers	Preferred name	Preferred symbol	Notes	IEC DET
RNP1292	-002	Latch-Up	<<Latch-Up>>	3,5	
RNP139	-001	Key Text			
RNP140	-003	Mounting		11	AAF343
RNP145	-008	Disclaimer			
RNP146	-005	Moisture Sensitivity		6	
RNP163	-003	Form Factor			
RNP165	-002	Standards Adoption		5,11	AAE012/AAF045
RNP170	-002	Auto-Precharge			
RNP171	-002	Auto-Refresh			
RNP172	-003	Self-Refresh			
RNP173	-003	CBR Refresh			
RNP174	-003	Number Of Memory Rows	<<Memory Rows>>	3	
RNP175	-003	Number Of Memory Columns	<<Memory Columns>>	3	
RNP176	-003	Low-Power Mode			
RNP177	-002	Burst Lengths			

RN classes: XJA644

Property DET	Prop Vers	Preferred name	Preferred symbol	Notes	IEC DET
RNP178	-002	Soft-Error MTBF	<<FIT>>		
RNP179	-002	Hard-Error MTBF	<<Hard-Error MTBF>>		
RNP180	-005	Failure In Time Rate	<<FIT>>		
RNP204	-002	Pin Count	<<Pin Count>>	3	AAE754
RNP210	-004	Manufacturer DUNS	<<Manufacturer DU>>	7	
RNP211	-001	Manufacturer Name			
RNP212	-001	Lifecycle: Stage		6	
RNP214	-001	Lifecycle: Years In Stage	<<Lifecycle: Year>>		
RNP215	-003	Lifecycle: Date			
RNP216	-003	ESD: CDM Withstand		8	
RNP217	-004	ESD: Internal Pin	<<ESD: Internal P>>	8	
RNP218	-003	ESD: HBM Minimum	<<ESD: HBM Minimum>>	8	
RNP219	-001	Package: Specific Features		8	
RNP220	-001	Package: Body Material		8	
RNP221	-001	Package: Terminal Position		8	
RNP222	-001	Package: Outline Style		8	
RNP223	-001	Package: Lead Form		8	
RNP224	-001	Fabrication Technology		11	AAE686
RNP290	-001	Product Version Number			
RNP291	-001	Product Revision Number			
RNP307	-002	Is Generic			
RNP528	-002	Operating Range		5	
RNP546	-003	Memory Organization			
RNP547	-004	Clock To Output	<<tCO>>		
RNP887	-002	Polymer Mass	<<Polymer Mass>>	5	
RNP889	-001	Needle Flame Test			
RNP891	-001	Oxygen Index		8	

The following refer to the Notes column in the spreadsheet files comparing IEC and RN properties.

1. Property not relevant in this class
2. Conditions missing
3. Error in letter symbol – either incorrect symbol or missing _ to indicate subscript
4. Wrong preferred name
5. Inadequate or incorrect definition
6. Value list not explicit
7. Incompatible format and data value
8. No reference to international standards – only local (JEDEC) referenced
9. IEC and RN properties close but not semantically identical
10. Classifying DET – to be ignored
11. Partially equivalent

6.4.5 Mapping problems

Dictionary mapping IEC <-> RNTD and ECALS

1. Missing properties in RNTD and ECALS – for example no V_CBO or h_fe in RNTD for the class of small-signal transistors, both vital characteristic properties
2. Irrelevant properties in RNTD – for example most semiconductor classes include properties covering flammability of fibre-optic cables
3. Missing properties in IEC – for example IEC dictionary does not contain thermal resistances for ICs, nor any ESD data, nor any data on hazardous substances nor any life-cycle properties
4. Irrelevant properties in IEC – many properties inherited from higher classes may not actually be applicable when creating an instance for any particular class
5. Incompatible unit descriptions – the IEC and ECALS dictionaries use unit symbols whilst the RN dictionary uses unit names
6. Units in the RNTD are sometimes wrong – for example all the classes of mechanical sensors have a sensitivity property with units of V/Cel irrespective of the quantity being sensed
7. The RNTD contains no conditions which may be used to qualify the values assigned to properties
8. Mapping is sometimes not possible or is doubtful because of the differing or poor definitions in the dictionaries – for example the definitions for AAE141 ‘Resistance law’ in IEC differs from that of XJF752 ‘Resistance taper’ in RNTD and ECALS
9. For properties with associated value lists a mapping is required not just between the properties themselves but also between the individual items in the respective lists – for example there is no obvious mapping between the value lists of AAE141 in IEC and XJF752 in RNTD and ECALS
10. The RNTD and ECALS dictionaries frequently refer to local standards (JIS or JEDEC) which may or may not be compatible with full international usage – for example the definition of XJF752 refers to JIS

Instance mapping IEC <-> RNTD and ECALS

Some issues:

1. It is probably not acceptable to return a URL as value, since the link may not be permanent and the information may not be accessible when required
2. The RNTD does not state what the DUNS number is. Any deficiencies of this sort should be resolvable by using look-up tables
3. The IEC position is quite clear that units are not part of the instance
4. The issue of using multipliers is a complex one and is probably system-dependent. There is a need for external representations to use the forms which are most familiar to engineers but internal representations can be of any form since conversion between numeric forms is fairly straightforward. For data exchange, it is probably safest to use a pure numeric form expressed in the units of the dictionary definition without multipliers.
5. Numeric formats should comply with international standards, for example 300E-6

6.5 Evaluation of RosettaNet to ECALS exchange

The following were the preliminary evaluations of the Section A experiment. It includes:

a) Transport, Routing, Packaging (TRP) issues;

b) Query-Response rule differences;

c) Mapping issues

- Query mapping (RN->ECALS),
- Reply mapping (ECALS – >RN);

d) Database content issues.

6.5.1 TRP (transport, routing, packaging) issues

The Query-Response rule for the three systems are very different. These differences are:

- RN, ECALS, and MERCI use completely different TRP methods;
- RN <-> ECALS interface differences at the TRP level can be resolved in software solutions;
- ECALS predefines which properties are to be used as extraction conditions and which are additionally available to be sent in response; if a non-queriable item is queried, the whole query is rejected as an error even if everything else is correct. This caused some RN queries to be rejected;
- RN does not predefine anything; all properties are potentially subject to be extraction conditions and response content; furthermore specific response content requests can be ignored while non-requested information can be sent.

6.5.2 Mapping issues (RN->ECALS)

- About 50 % of the properties could be easily mapped (same code or same or similar name).
- About 50 % of the properties could not be mapped at all:
  - no similar property in ECALS (for example RNP216-218 ESD; RNP219-223 Package);
  - similar properties exist with different expression (for example RNP212 Lifecycle Stage);
  - 1 RN property maps to 2 ECALS properties (for example XJE417 Supply voltage of OP amp maps to either XJH245 single supply voltage or XJH244 dual supply voltage).
- Content not expressible in ECALS (Queries contain unqueriable conditions):
  - (for example XJH196 Recommended input voltage, XJE016 Package type are not queriable in ECALS).

6.5.3 Query-Response rule differences

- ECALS predefines which properties are to be used as extraction conditions and which are additionally available to be sent in response; if a non-queriable item is queried, the whole query is rejected as an error even if everything else is correct. This caused some RN queries to be rejected.
- RN does not predefine anything; all properties are potentially subject to be extraction conditions and response content; furthermore, specific response content requests can be ignored while non-requested information can be sent.

6.5.4 Mapping issues (RN->ECALS)

- About 50 % of the properties could be easily mapped (same code or same or similar name).
- About 50 % of the properties could not be mapped at all:
  - no similar property in ECALS (e.g. RNP216-218 ESD; RNP219-223 Package);
  - similar properties exist with different expression (e.g. RNP212 Lifecycle Stage);
  - 1 RN property maps to 2 ECALS properties (e.g. XJE417 Supply voltage of OP amp maps to either XJH245 single supply voltage or XJH244 dual supply voltage).
- Content not expressible in ECALS (Queries contain unqueriable conditions):
  - (e.g. XJH196 Recommended input voltage, XJE016 Package type are not queriable in ECALS).

6.5.5 Mapping issues (ECALS – >RN) Preliminary

1 A string type property is returned as URL of the string.

```
<element dicRef="RNP145-001">
<name>Disclaimer</name>
<value>http://www5.alps.co.jp/cgi-bin/sendref.cgi?POTCAUT_EN.PDF</value>
</element>
```

2 Manufacturer ID is not converted to DUNS number.

```
<element dicRef="RNP210-001">
<name>Manufacturer DUNS</name>
<value>0147101010H0000100</value>
</element>
```

6.5.6 Mapping issues (ECALS – >RN) Preliminary

6.5.6.1 The 3 Value description format is different

3-1 “ %” or “MIPS” is not needed.
These are defined in the RNTD and should not be written in the contents.

```
<element dicRef="XJF713-001">
<name>Resistance Tolerance</name>
<value type="Nom">25 %</value>
</element>

<element dicRef="XJG507-001">
<name>CPU Performance</name>
<value type="Nom">157MIPS</value>
</element>
```

6.5.6.2 Multiplier postfixes

Multiplier postfixes (m, K, M, G, T,,,) cannot be written in the contents. RNTD defines the unit and uses exponentiation.

```
<element dicRef="XJF743-001">
<name>Nominal Total Resistance</name>
<value type="Nom">1k</value>
</element>
```

6.5.6.3 Value code not defined in RNTD

”Through.Hole”, ”Surface.Mount”, ”Bare.Die”, ”Chip.and.Wire”, ”Compression”, ”Embedded. Copper.on.PCB”, ”Hardware”, ”Socket” are the codes which are defined in RNTD

```
<element dicRef="RNP140-001">
<name>Mounting</name>
<value>FALSE</value>
</element>
```

6.5.6.4 The value format of “-300*10**-6” does not comply with IEC 61360-1.

```
<element dicRef="XJF718-001">
<name>Temperature Coefficient</name>
<value type="Min">-300*10**-6</value>
<value type="Nom">0*10**-6</value>
<value type="Max">300*10**-6</value>
</element>
```

6.5.6.5 Database content issues

We only achieved a 20 % match across all product databases for random samples on dictionary classes (much less on properties).

7 Procedure used for Section B experiment (ECALS to RosettaNet and MERCI)

The overall procedure for Section B of the experiment between ECALS and RosettaNet took place as follows:

a) ECALS sent out ECALS-style queries, contents of which were agreed on in tele-conferences. These queries were manually received by RN members;
b) the RN members converted the queries into the RN(PIP2A9) format;
c) the RN part information for the ECALS queries were responded by the RN servers in RN-style;
d) the RN-style responses were converted back into ECALS format with semi-automatic tool.

Figure 6 shows a graphic representation of the process flow between ECALS and RosettaNet.

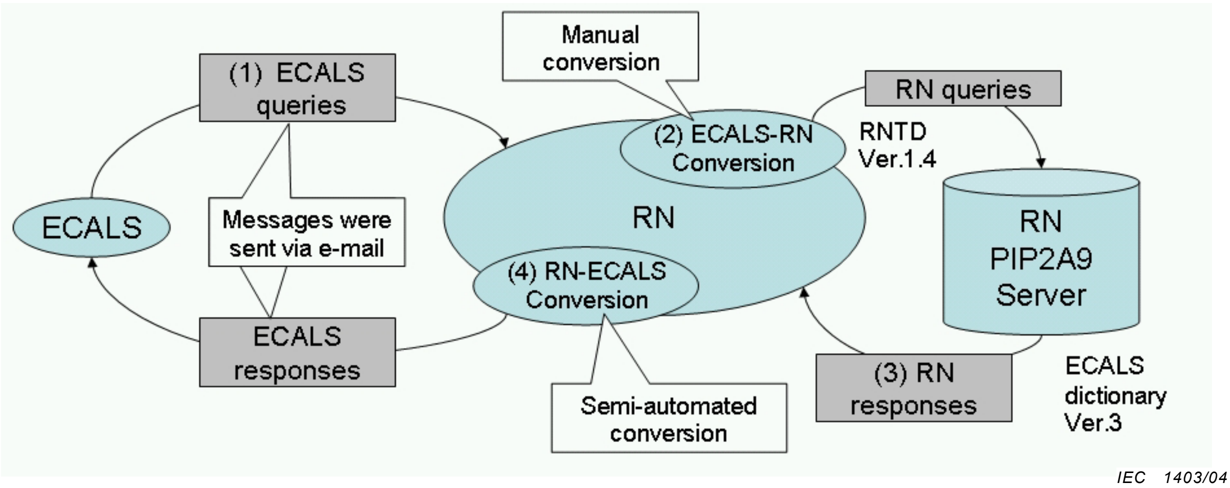


Figure 6 – Process flow for Phase II Section B ECALS to RosettaNet

The overall procedure for Section B of the experiment between ECALS and MERCI took place as follows:

a) ECALS sent out ECALS-style queries, contents of which were agreed on in tele-conferences. These queries were manually received by MERCI members:
b) for the query execution, the Mediator system of Semaino Technologies GmbH was used which automatically creates a local database query from the ECALS query against the IEC schema and produces a result in ECALS format according to the ECALS dictionary;
c) this ECALS result was sent back to ECALS.

Actually, the Mediator is available via the Web, so that further experiments with different mappings are possible.

Figure 7 shows a graphic representation of the process flow between ECALS and MERCI. The mapping between the classes and properties drive the actual query generation for a given ECALS query and is used for transforming the result to the ECALS dictionary.

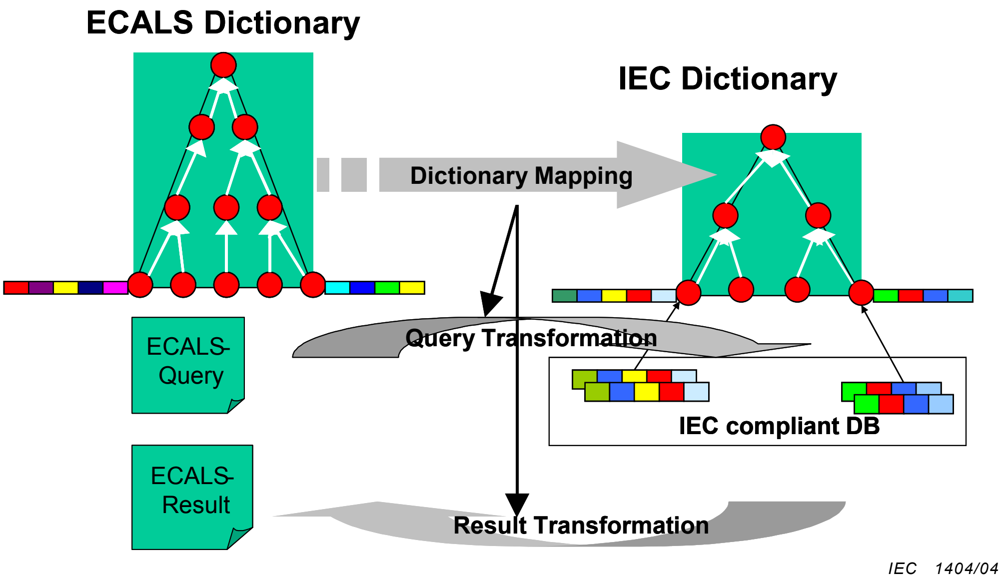


Figure 7 – Process flow for Phase II Section B ECALS to MERCI

7.1 Queries (Use case queries, both RosettaNet and MERCI)

All use cases are the same as in Section A (see 6.1).

7.2 Queries (3-level queries)

The 3-level queries are the same as in Section A. (see 6.2).

7.3 Output files (created by RosettaNet)

Four files were created by ECALS and posted to the mailing list. RosettaNet mapped ECALS properties to RN properties. RosettaNet created an RN (PIP2A9) query messages which had the equivalent search condition as the ECALS queries supported by the mapping table of 1. RosettaNet part information was retrieved from RN databases along with the queries of 2. RosettaNet converted the RN responses back into ECALS response assisted by the semi-automated conversion tool.

The flow diagram in Figure 8 shows the RosettaNet response process. Table 8 shows the details of the results.

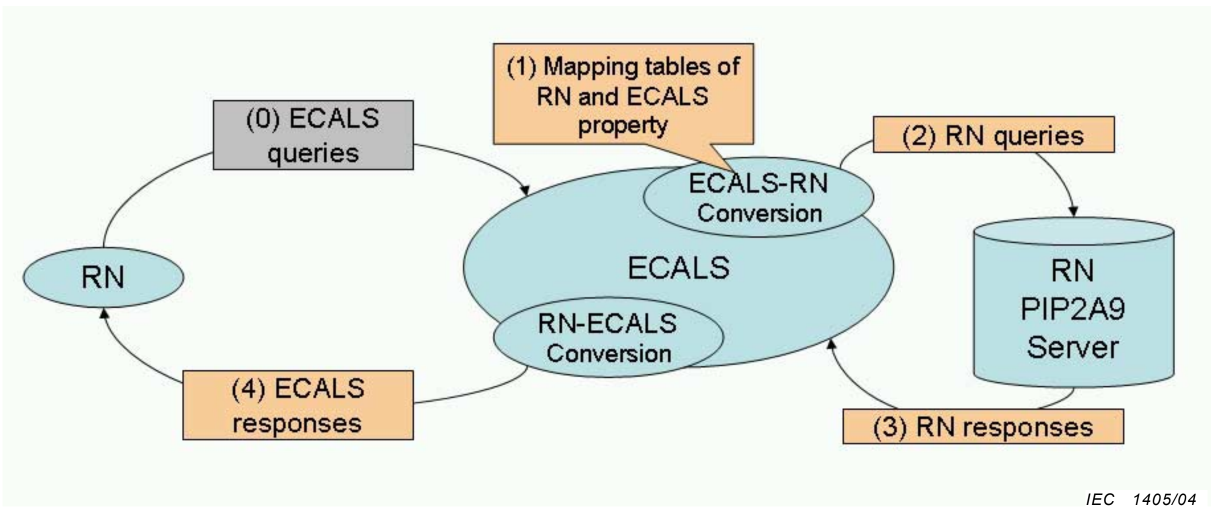


Figure 8 – RosettaNet response process

Table 8 – Mapping of properties completed by ECALS

XJA177	SWITCH – THERMOSTATIC – BIMETAL TYPE			ECALS			
Query_Level	**Property_Code**	**Property_Name**	**Qry_Value**	**Property_Code**	**Data_type**	**Level**	**Query**
1,2,3	QBC001	RosettaNet Class	XJA177-2	XJE005	String		=XJA177
1,2,3	RNP211	Manufacturer Name		XJE011	String		
1,2,3	XJE010	Part Number		XJE010	String		
2,3	XJE015	Application Scope		XJE015	String		
2,3	XJE002	Data Revision Number		XJE002	String		
2,3	XJE001	Data Version Number		XJE001	String		
2,3	RNP145	Disclaimer		XJE018	File		
2,3	XJE014	General Description		XJE014	String		
2,3	XJE133	Industry Standards		XJE133	String		
2,3	RNP307	Is Generic					
2,3	RNP139	Key Text		XJE132	String		
2,3	RNP1293	Last Product Characteristic Change Date		XJE004	Date		
2,3	RNP210	Manufacturer DUNS		XJE012	String		
2,3	XJE136	Mass		XJE136	RealM	Nom	
2,3	RNP528	Operating Range					
2,3	XJE219	Operating Temperature		XJF864	RealM	Min, Max	
2,3	XJE016	Package		XJE016	String		
3	XJG748	Height					
3	XJG746	Length					
3	RNP215	Lifecycle: Date					
3	RNP212	Lifecycle: Stage		XJE013	Enum		
3	RNP214	Lifecycle: Years In Stage					

7.4 ECALS to MERCI (IEC Queries)

7.4.1 Procedure used for Section B experiment (ECALS to MERCI)

The Section B work on the MERCI side was basically done by the University of Hagen with support from the company Semaino which provided a software tool called *Mediator*. This tool allows:

- to capture the mappings between dictionaries;
- to query an IEC database by means of an ECALS query and transform the result again into an ECALS format.

Mappings can be defined between classes and properties, and there exist further means to specify the mapping more precisely, for example by adding combination functions if several properties are mapped to a single target or transformation functions which transform different units.

Then the dictionaries can be used as views into the database – i.e. a catalogue can be viewed through different dictionaries controlled by the mappings. This was exploited by invoking queries against the ECALS dictionary and performing them on a database based on the IEC dictionary. The Mediator understands the ECALS XML query syntax and generates results in the ECALS result syntax.

Based on the Mediator, the Section B work of the experiment between ECALS and MERCI took place as follows:

a) the mapping from IEC to ECALS which has been produced by Donald Radley was captured in the Mediator;

b) ECALS sent out ECALS-style queries, contents of which were agreed on in tele-conferences. These queries were manually received by MERCI members;

c) the ECALS queries were invoked in the Mediator. The Mediator automatically generates the requested result in ECALS format based on the internal IEC compliant database;

d) due to this automatic and interactive approach, it is possible to redo the experiment, for example with changed mappings. An experimental access to the tool is available under http://mediator.semaino.de/Mediator_IEC_TC93.

Figure 9 shows a graphic representation of the process flow between ECALS and MERCI.

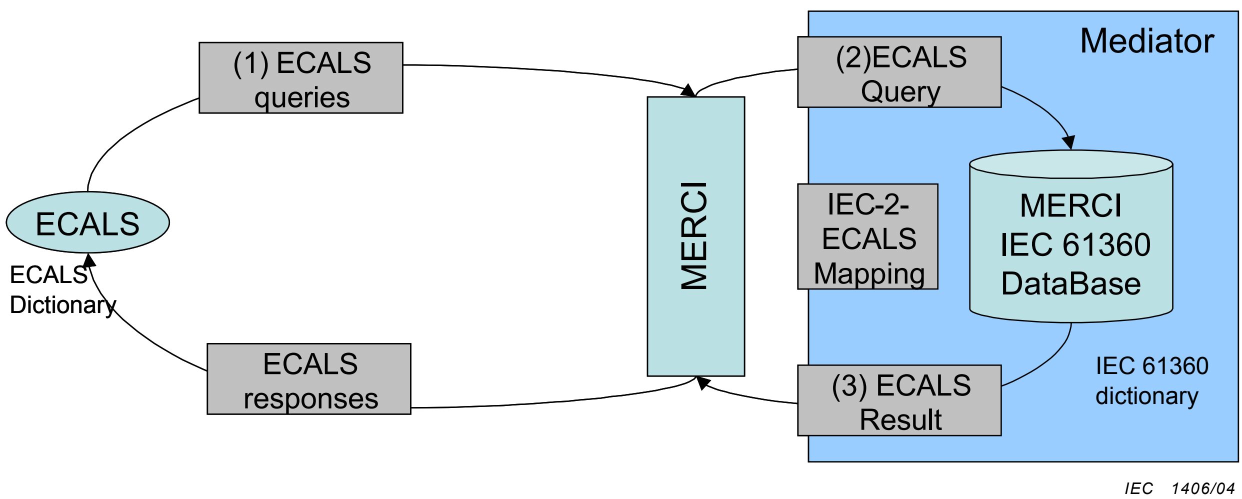


Figure 9 – Process flow for Phase II Section B ECALS to MERCI

7.5 Output files (created by MERCI)

Three files were created by MERCI and posted to the mailing list:

- ECALS properties were mapped to IEC properties. An extract of the Excel table can be found in Table 9;
- the set of result files were generated by the Mediator. In case of improvements of the mappings, the results can also be improved;
- a handbook describes briefly how the Mediator can be used on the Web.

Table 9 – Mapping of properties completed by MERCI (Class XJA644, Dynamic RAMs)

Class	Property	Version ?	Preferred name	Symbol	Notes	IEC DET
XJA001	XJE001	6	Version Number			
			…..			
XJA001	XJE008	6	Product Name			
XJA001	XJE009	6	Family or Series Name		11	AAH548
XJA001	XJE010	6	Part Number			AAH547
XJA001	XJE014	6	General Description			AAE834
XJA001	XJE015	6	Application Scope			
XJA001	XJE016	7	Package Type			AAE838
XJA001	XJE017	6	Mounting Method Flag		11	AAF343
XJA001	XJE018	6	Caution Document File			
XJA001	XJE133	6	Reference Standards		5,11	AAE012/ AAF045
XJA001	XJE134	6	Appropriate Safety Class		11	AAE149
XJA001	XJE135	6	Caution Flag			
XJA001	XJE136	6	Weight		11,12	AAE752
XJA001	XJE137	7	Price in Dollars	Price by USD		
XJA643	XJG005	8	Operating ambient temperature	T_a	5,9	AAE891
XJA643	XJG006	8	Storage temperature	T_stg	5	AAE841
XJA644	XJG001	7	Access time from RAS	t_RAC		AAJ095
XJA644	XJG002	6	Clock frequency	f_CLK		AAJ096
XJA644	XJG003	7	Refresh period	t_REF	11	AAF331
XJA644	XJG004	8	Supply voltage limit	V_CC-lim		
XJA644	XJG007	8	Average power supply current	I_CC1	11	AAE691
XJA644	XJG008	7	Input/output interface		11	AAF323
XJA644	XJG015	8	Short-circuit output current	I_O-SHORT	11	AAE218
XJA644	XJG016	8	Input voltage limit	V_IN-lim	11	AAE210
XJA644	XJG017	8	Output voltage limit	V_O-lim		
XJA644	XJG018	8	High-level input voltage	V_IH		AAE718
XJA644	XJG019	8	Low-level input voltage	V_IL		AAE719
XJA644	XJG023	7	Access time from CAS	t_CAC		AAE721
XJA644	XJG024	7	Access time from address	t_AA		AAJ091
XJA644	XJG025	6	Access time from clock	t_AC		AAJ092
XJA644	XJG026	7	Burst mode cycle time	t_CK		AAJ093
XJA644	XJG027	7	Random read/write cycle time	t_RC		AAJ094
XJA644	XJG028	7	Supply voltage	V_CC	11	AAE690

Comparison notes

NOTE 1 Property not relevant in this class.
NOTE 2 Conditions missing.
NOTE 3 Error in letter symbol – either incorrect symbol or missing _ to indicate subscript.
NOTE 4 Wrong preferred name.
NOTE 5 Inadequate or incorrect definition.
NOTE 6 Value list not explicit.
NOTE 7 Incompatible format and data value
NOTE 8 No reference to international standards – only local (JEDEC) referenced.
NOTE 9 IEC and RN properties close but not semantically identical.
NOTE 10 Classifying DET – to be ignored.
NOTE 11 Partially equivalent.
NOTE 12 'Weight' is wrong – it should be 'mass'.

Some comments on the result files:

- the files are quite big even if they do not contain very many filled properties. The reason is that for each property the database gives information about why no data was available: Either there is no mapping existing ("value equals no_mapping_available") or there is a mapping but the database does not contain a value for property (value equals "null");
- the generation of the ECALS format was not based on a formal definition but on examples. Thus, there will be formal errors in the format.

7.6 Evaluation techniques (ECALS to RosettaNet)

7.6.1 Mapping issues (ECALS to RosettaNet)

The following mapping issues occurred between the ECALS to RosettaNet queries:

Out of 45 common properties for all part classes (level 1 and 2 of 3-level queries), only 13 properties are mapped without a problem and the rest of the properties had some problems.

- No corresponding property (29 properties).
- 6 ECALS properties are exchanged as attached files in RN.
- ECALS properties are for ECALS specific mechanism “template”.
- Some of ECALS properties such as “Price in Yen”, “Delivery”, “Minimum Sales Size” are in the Business Dictionary in RN.
- Definition of enumerated values are different (2 properties).
- Because of the difference of breakdown method for each value, even manual mapping is difficult.
- Ex. “Part Availability Status”, “Mounting Method Flag”.
- Other (1 property).
- ECALS defines “Component Class Name” as a property. RN property also has its name in RNTD, but it is not defined as a property or referenced from PIP2A9 messages.

7.6.2 Message translation issues (ECALS to RosettaNet)

Some properties need value conversion after simple property mapping.

- Different code systems are adopted for corresponding properties.

  Example “Company Code”

- Unit of the value is different between two dictionaries.

7.6.3 Maintenance of mapping tables (ECALS to RosettaNet)

- An ECALS property is basically defined for a specific part class. Even if a property of a specific class is similar to another property of another class, it is maintained as independent property until it is confirmed as perfectly identical property. Properties referenced by multiple classes are only properties of common parent class (non-leaf class in the ECALS class hierarchy) which can be referenced by leaf classes.
- On the other hand, in RNTD, similar properties are consolidated into one and it can be referenced from any class.
- This causes difficulty in property mapping. Even between almost the same properties of ECALS and RN, including RNTD properties introduced from ECALS, you are often not able to have one to one correspondence.

- Mapping work needs expert knowledge and is an arduous task. But maintenance of mapping tables will also be arduous, if two dictionaries are maintained independently hereafter.

7.6.4 Contents are not provided enough (ECALS to RosettaNet)

- 16 classes are populated by RN out of 32 common target classes for this experiment.
- 6 out of 15 retrievals hit no parts in this experiment.

7.6.5 Additional comments (ECALS to RosettaNet)

Ideally, class and property definition should be referenced among dictionaries in the world. This may be very difficult in practice but this will reduce most problems above.

Possible ideas are:

- RN asks ECALS to maintain the contents of RNTD while RN maintains only the framework of RNTD;
- RNTD directly refer (not introduce as copy) to as many ECALS definitions as possible;
- ECALS and RN maintain each dictionary respecting each other and mapping issues.

7.7 Evaluation technique (ECALS to MERCI)

The following mapping issues occurred in the mapping from IEC to ECALS:

Out of 45 common ECALS properties for all part classes (level 1 and 2 of 3-level queries), only 7 properties could be mapped. This shows probably, that the IEC dictionary is not concerned with overall business properties but focuses on the technical properties.

Some observations:

- ECALS defines “Component Class Name” as a property. In the IEC context, the component class is not a property itself;
- in the IEC dictionary, the manufacturer name does not exist as a property even if it is contained in the database as the supplier identification;
- for properties with associated value lists, a mapping is required not just between the properties themselves but also between the individual items in the respective lists – for example there is no obvious mapping between the value lists of AAE141 in IEC and XJF752 in RNTD and ECALS;
- the RNTD and ECALS dictionaries frequently refer to local standards (JIS or JEDEC) which may or may not be compatible with full international usage – for example the definition of XJF752 refers to JIS;
- the format attribute is missing from the ECALS dictionary;
- several remarks for the mapping between IEC and RNTD (Phase A) apply also to the mapping between IEC and ECALS.

8 Procedure used for Section C experiment

RosettaNet personnel have sent the queries for Section C to Texas Instruments and Tyco International for a response. Table 10 shows the query and the mapping between RosettaNet and MERCI (IEC).

Table 10 – Section C mapping between RosettaNet and MERCI (IEC)

IEC ID	IEC class name	Query note	RNTD ID	RNTD class name
AAA516	Preset potentiometers	3L-1	XJA015	Potentiometer-Rotary-Trimmer
AAA099	Voltage-dependent resistors	UC-1	XJA020	Varistor (Mov)
AAA227	Coils	3L-2	XJA024	Coil – Fixed – RF Frequency
AAA116	Fixed signal transformers	3L-2	XJA051	Transformer-Signal-Fixed-Lower-Freq.
AAA056	Filters	UC-2	XJA091	Filter-Signal line-Piezoelectric Ceramic
AAA056	Filters	UC-2	XJA101	Filter-EMI/EMC-Common M choke coils
AAA093	Linear resistor networks	3L-4	XJA104	Network Circuits
AAA174	Mechanical switches	UC-2	XJA143	Switch-Mechanical – Signal selector-Tactile feedback – push type
AAA175	Thermostatic switches	3L-2	XJA177	Switch-Mechanical –Bimetal Type
AAA520	PCB connectors	3L-4	XJA183	Connector – Board to Board
		3L-5	XJA359	Sensor – Electro-magnet-Electric Field
AAA108	Pressure Sensors	3L-1	XJA384	Sensor – Mechanical – Pressure
AAA146	Tuners	3L-2	XJA570	Digital Audio Tuners
AAA061	Microcontrollers	UC-1	XJA629	Microcontrollers
AAA062	Microcomputers	3L-1	XJA636	Microprocessors
		3L-5	XJA642	Digital Signal Processors
AAA068	Dynamic RAM ICs	UC-1	XJA644	Memory – dynamic ram (dram)
AAA069	Static RAM ICs	3L-1	XJA645	Memory – static ram (sram)
AAA070	Read-0nly memory ICs	UC-2	XJA648	Memory – electrically erasable prom (eeprom)
AAA070	Read-0nly memory ICs	3L-2	XJA650	Memory – flash memory
		UC-5	XJA667	Assp – for power supplies
AAA060	Combinational/sequential/interface	3L-4	XJA676	CMOS
AAA060	Combinational/sequential/interface	3L-4	XJA678	TTL
AAA060	Combinational/sequential/interface	3L-4	XJA679	Standard Logic – ECL
AAA058	Analogue signal functions	UC-2	XJA683	Std-linear – Operational Amplifiers (op-amp)
AAA058	Analogue signal functions	3L-2	XJA684	Std-linear – Comparators
AAA082	Lasers	3L-1	XJA697	Optoelectronics – Laser Diodes
AAA080	Light Emitting Diodes	3L-1	XJA698	Optoelectronics – light emitting Diodes
AAA124	Bipolar small-signal lf transistors	3L-3	XJA705	Transistor – bipolar – small signal
AAA121	Bipolar lf power transistors	UC-3	XJA706	Transistor – bipolar – power
AAA128	FET lf power transistors	UC-3	XJA709	Transistor – fet – power mos
AAA051	Voltage regulator diodes	UC-1	XJA716	Diodes – Zener
AAA024	Fxd Cl1 ceramic dielectric capacitors	UC-1	XJA744	Capacitor – fixed – Ceramic – temp-comp

NOTE 1 IEC class is an exact or almost an exact match.

NOTE 2 IEC class is a higher level.

NOTE 3 IEC class is a lower level – this is probably the best match.

NOTE 4 IEC classification is different – this is probably the best match.

NOTE 5 No IEC class available.

9 Phase III evaluations

Phase III of the test plan will be executed at a time when the national comities have had a chance to review the present state of the art and based on an industry need to accomplish this effort.

10 Conclusions

Based on the two phases of the test plan the team learned many excellent lessons regarding interoperability and the characteristics of the different domains within a global community. It became very apparent during the halfway portion of this test plan that consortia driven efforts will continue to evolve and continue to be directed by the participants in the domain the goals that they are trying to achieve. Recognizing this reality the team working on this test plan felt reasonably comfortable moving to the next phase and making several recommendations that a global industry could address and adopt based on the experimental data determined in Phase II. The following conclusions are based on the expertise and the lessons learned by the members of this experiment.

Electric component dictionaries are the most essential architecture in forming the basis for shared understanding that makes product information exchanges possible. At the time of this report there are three major Dictionaries that describe electric components being used through out the global electronics industry. These dictionaries are supported by either IEC standard bodies or groups of consortia formed to address the global needs of their supply chain members. It should be understood that there are several conditions for the data dictionary to be useful to trading partner transaction which are:

- the dictionary descriptions must be clear and unambiguous;
- the dictionary shall have the possibility to be linked to a transport mechanism that must be available to create, send and match responses to queries to libraries and/or dictionaries;
- the dictionary development must be flexible for quick update and approval of new characteristics of products. The dictionary itself does normally not contain products information;
- the implementation of the library/catalogue must have been populated by industry supply chain members or the dictionary may also be populated by other organisations/persons;
- a group must be responsible for the development, maintenance and update;
- mapping software between different descriptions must be available;
- data dictionaries must be available on-line in an electronic format;
- there must be a depth of coverage that is aimed at completeness of the user needs.

10.1 Cooperative spirit statement

Any harmonization must be accomplished in the spirit of cooperation between the participants. Achieving consensus is the key to making everyone who works on a harmonization effort feel that their needs have been addressed. As the desire for trading partners increases toward a global market, the effort to map or harmonize dictionaries moves from a desire to a critical issue.

10.2 Lessons learned

10.2.1 Dictionaries vs. Libraries

- Each dictionary in the experiment is clear and unambiguous in its own domain.
- The effort in the query exchanges was not able to show that the domain users of a dictionary were satisfied that a particular dictionary met their individual needs. Every query and response in the IEC test plan experiment required a lot of manual manipulation.

- Another item that made the plan less robust was the limited parts that were availability based on dictionaries classes.
- Any mapping, where human identified equivalence is involved, needs to be accomplished using independent and non-biased domain expertise validation.

10.2.2 Discontinuity in class structures

There was a certain amount of discontinuity in the class structure between the different dictionaries. This was expected and the team that established agreement on what classes needed to be evaluated did as good a job as possible in order to achieve a maximum success rate in the queries and response. The point of the plan was to show the capability of interoperating not to highlight where one dictionary was less descriptive than another. It took a certain amount of time to structure the test plan so that any query did not get responses that indicated the target dictionary had no equivalency. Never-the-less even though the plan was tailored to achieve a certain amount of response to query success, there were still instances that the team felt could have resulted in a better scenario.

10.2.3 Product complexity (viewpoints)

Some of the complexity granularity in the experiment was a problem in realizing complete inter-operability. The conditions that need to be improved in any harmonization strategy include:

- physical characteristics and tolerances of individual components;
- standardization of mechanical outlines;
- description of electrical properties;
- electrical tolerance base for each component;
- environmental performance capabilities;
- thermal management requirements;
- cost (discount requirements) especially for large quantity purchases;
- availability (multiple sources of supply) of parts and equivalency;
- noise levels included in the dictionary (example is Dun and Bradstreet number).

10.2.4 Transportation mechanisms (software tools)

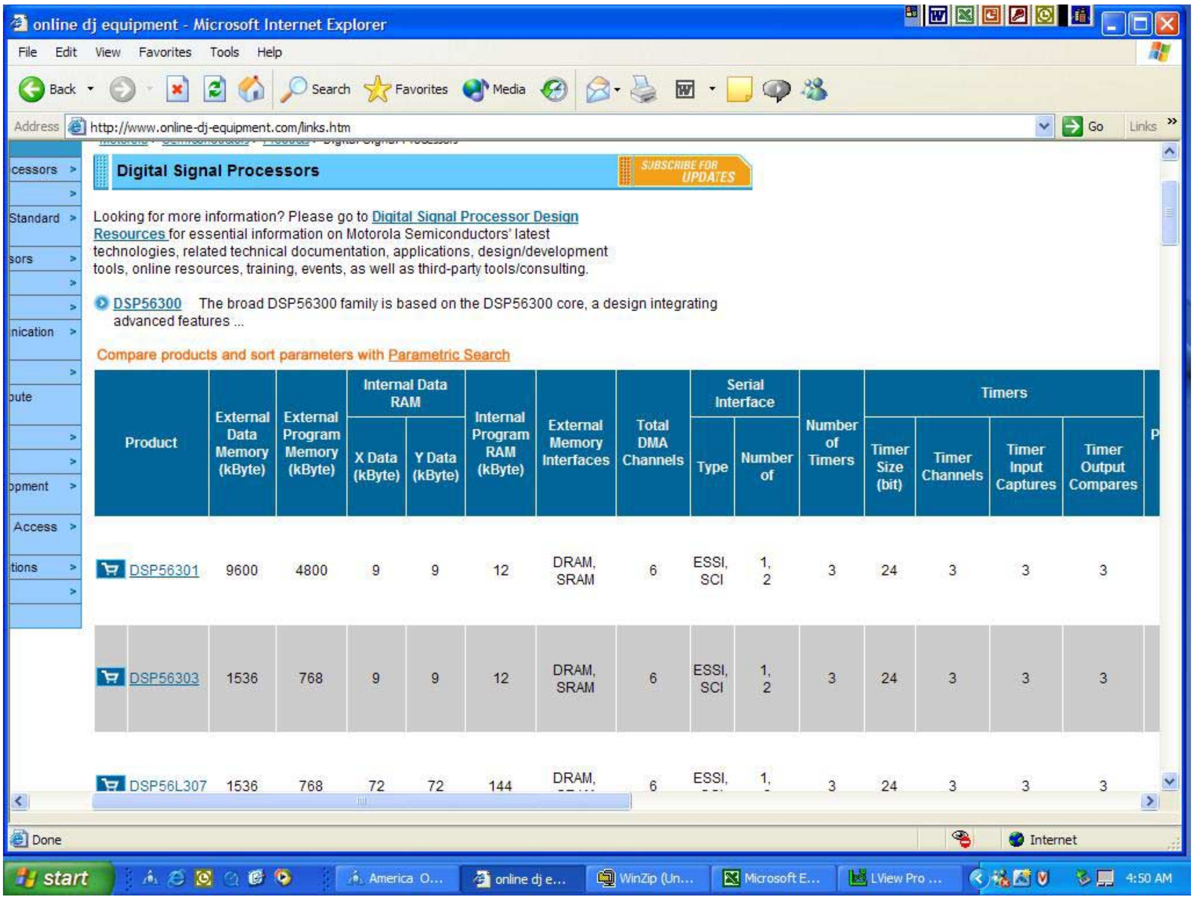
It is apparent that the software needed to assist interoperability between dictionaries must be very efficient. There are already examples of this on the Internet which highlight the conditions desired by the customer base of any dictionary within its own domain. Going to any home page the characteristics of a website are usually very robust otherwise the customer would soon be frustrated in not being able to find a description of an element (electrical, mechanical, electromechanical etc.) that matched their needs. So within a domain the dictionary owners are challenged to meet the requests of their supporters, and do so, otherwise they would not exist for long.

Another element that enters into the equation is the language of the domain community. There is no doubt that English has been chosen as a universally accepted transfer language, however, domain users in other hemispheres, where English is not the native tongue prefer to see the software tools exhibit the language of their choice. The IEC does an adequate job in converting the agreed to English format using French for the bilingual equivalent. It should be noted however that the spoken language and the technical equivalent can be very different. Many IEC committees who are responsible for a particular product domain are very distressed when someone provides another language to attempt a representation that is grammatically equivalent but is not the preferred jargon of the domain product group. This is especially important as some products have their own pet acronyms and even go so far as to override an IEC description published in the IEV not available on the IEC home page. Their answer to a challenge is usually that they are the domain experts and the term is one that is in common usage in their industry.

A typical example of software techniques operating in the public domain on the Internet is that of airline ticket acquisition. A task that was originally only able to be handled by the airline itself or a licensed travel agent is now done by the customer. Consider the individual airlines as being individual dictionaries. They are all trying to meet their customers' needs and also reduce the effort that requires manual intervention. They all have a class structure such as "Round Trip", "One way", "Multiple Stops". A user can move quickly from one airline to another looking for the best match of those conditions using the airline agreed to airport codes in order to find the flight for which they are looking. Imagine the chaos if each airline chose to call the airport by another name. This is the same dilemma that the Dictionary experts face in trying to describe the components needed by the industry. Since each airline tries to outdo its' competitors there is a continual update to make the airline domain as useful the domain customers as possible. The idea of special flights or having more than one stop to a destination go hand in hand with a domain component dictionary consortia needing a Dunn and Bradstreet number.

10.2.5 Search engine capabilities

The IEC test plan also showed up the need for more automated search engines outside of each individual domain. The customers of a dictionary have an internal search engine and this helped the plan where a query was sent to a customer of another domain who had already built a tool that would work well. In the open market, there are search engines that provide a global search that can be useful, however it takes a lot of time in order to get to the information required by the user. Figure 10 is an example of a search looking for a Digital Signal Processor. It took several attempts looking at the 150 hits provided by the public domain search engine to find a supplier that at least in someway provided a description that came close to the user's expectations.



IEC 1407/04

Figure 10 – Example of a Google search engine finding a microprocessor supplier

Going back to the airline example one can move between airlines or airline brokers and usually find all sorts of compatible descriptions that provide information about the trip and location as well as travel time and other pertinent information. Some domains allow seat selection for preferred clients and the users of these search engines although not professional travel agents are able to navigate from one site to another looking for the best solution to their travel problem. The test plan was also intended to find the best solution to looking for the component acquisition exercise.

10.3 Importance of interoperability

The importance of interoperability has become less of an issue as is the harmonization between dictionaries. Just as there is no desire by any of the airlines to take over other airline home pages or search engines there will never be a demand for an ECALS dictionary to absorb a RosettaNet dictionary tool. Even when airlines buy other airlines, if the name of the domain exists the search engine and capabilities are maintained. It is possible, however, to get competing information on one airline website about those flights that are compatible but may fly at a different time.

It is in the industries best interest to have a similar situation occur. By making the terms and descriptions in those dictionaries that have participated in this test plan and other dictionaries that are emerging use the same class structure or a group of main attributes in each class, it will go a long way to enhance the industries use of the dictionary concepts and allow each domain to enhance their granularity to those attributes needed by their constituents. This includes in some hemispheres a local jargon or language understood by that community only.

11 Recommendations

It is clear from the interoperability test plan that harmonization is required between dictionaries. Creating the mapping will not be easy as new dictionaries seem to be springing up as new groups find they have different requirements and existing dictionaries do not meet their needs. It is important to recognize that dictionary owners have to satisfy their membership and as the members of dictionary consortia want new elements created their need must be satisfied. Thus modifications to dictionaries are a moving target, which makes dictionary harmonization more difficult, and any strategy for moving forward can not get in the way of a dictionary's ability to add new elements.

The characteristics of a good solution revolve around a willingness of participants to work together. If a project is needed to foster a solution that addresses to dictionary differences defined in this IEC experiment their needs to be a willingness of the participants to work together. The mechanism should be as simple as possible and if there is any work that needs to be done it should be evenly distributed.

In any plan to move forward, every dictionary should be treated equally and allow each dictionary organization to be an expert in its own domain and to satisfy its own customers. Dictionary developers must be able to leverage there work and the work of other existing dictionaries. This requires that dictionary descriptions are freely available in electronic form so that they can be built into the search engines and automated tools of all dictionary developers existing today or planning implementations for tomorrow.

Each dictionary organization should participate in the spirit of a cooperative plan. The maintenance of the dictionary falls on the domain organization. That organization should keep a log of the changes and make that information freely available to other participants, or new domain entry into the dictionary description effort. The format of the log should be XML and should be posted for download and review and comment from the community. Both IEC and ISO should encourage their technical committees to participate in the descriptive process of those domains that are added to the conglomerate of dictionaries.

Other items that need attention are:

- work should be done to reduce class/name confusion between dictionaries;
- allow each class/element/attribute to be tracked back to its source dictionary;
- avoid duplication where possible;
- a core set of attributes for every class should be identified where part suppliers will ensure those values are populated;
- the source for the core attributes should be as centrally located as possible (recommend the IEC and ISO);
- TC93, SC3D, and ISO TC184 should work with industry to establish the core sets of attributes for any set of class submitted;
- there must be a guaranteed fixed turn around time for identification of the core set;
- the limit of core characteristics should be 10;
- ensure the use of the synonyms in the Dictionaries to represent equivalence;
- dictionary owners can provide a registry system for version control for added value;
- GUI systems are optional, but can be used to enhance the view of the dictionary descriptions;
- recommend that each dictionary organization maintains an easily accessible website that contains all the class structure and core elements;
- OIDDI should become an ISO/IEC sector board.

12 Epilogue

The groups involved in this experiment, have also begun in late 2003 to move further down the road of promulgating and implementing the conclusions listed in Clause 11 above. A loose organization called OIDDI (Open, Interoperable Domain Dictionaries Initiative) has come together to be the vehicle for going forward with these conclusions. An originating meeting was held in Poitiers, France in October 2003. Along with the participants from this experiment, members from almost a dozen other dictionary groups attended. The way forward is being discussed and planned even as this report is being finalized.

Annex A of this report shows some of the actions that have taken place to date. Additionally other items to be taken into consideration during these initiative discussions are:

- software tools such as Si2/RosettaNet/NIST QuickData PIP2A9 Implementation software;
- cooperative initiative (OIDDI) and participation by all the dictionary proponents
- IEC and ISO encouragement to download and exploit any IEC or ISO standard Dictionary description.

Annex A
(informative)

Open and interoperable domain dictionaries initiative

"From overlapping competing and proprietary domain dictionaries to open, extensible and compatible ones"

The goal of this initiative is:

- *to promote the emergence of* ***compatible*** *and* ***complementary dictionaries*** *that would progressively cover the whole technical and business domain, and*
- *to ensure* ***orthogonality*** *between domain* ***dictionaries*** *and business* ***processes****: any dictionary should be usable for any business process.*

Rationale

The development of computer-supported engineering, procurement, B2B e-commerce and product life cycle support systems need the availability of computer-sensible domain dictionaries (also called domain ontologies) defining unambiguously and in a consensual manner the various classes of existing products and services, and their characteristic properties.

Such dictionaries should:

a) provide **globally unique identifier** (GUI) allowing unambiguous computer reference to any product class or property whoever defined it and in whichever context it is used (e.g., B2B business processes, electronic catalogues, Web services, market places, corporate databases, reference from other dictionaries, etc.);

b) be available in a computer-interpretable format;

c) be **freely downloadable** on the Web to allow any reference by means of a GUI to be resolved by any receiver.

To address these needs, a number of organizations did or do develop domain dictionaries:

- defining specific structures for identifiers of product classes and of property data types;
- using specific information models;
- developing specific exchange formats;
- linking their dictionary with specific application-oriented infrastructures, and
- often restricting access to their dictionary content.

After years of effort, the result must be recognized:

- most market places failed, at least for e-cataloguing applications;
- no organization succeeded in developing or imposing their dictionaries and/or infrastructure is any industrial sector; and
- even some standard dictionaries missed their potential users by lack of vision of standardization organizations that restricted use of standard dictionaries through copyright rules poorly adapted with computer implementation.

It also become clearer and clearer that building domain dictionaries is a huge technical task that can hardly be made profitable, and that may only result from a worldwide cooperation of numerous organizations that agree to make their work results **interoperable**.

It is the goal of this initiative to gather all the persons, organizations and software houses who want to promote **openness and interoperability of domain dictionaries.**

Interoperability requirements

Interoperability of domain dictionaries would require the following:

a) **global unicity** of product class and property identifiers across all organizations to allow:
   - unambiguous **reference** between dictionaries,
   - **importation** without duplication of any number of pre-existing dictionary entries from one dictionary to another dictionary, and
   - use of a dictionary in **any kind of applications** ;

b) possibility to model any dictionary content using a **uniform information model**;

c) availability of every dictionary content in the **same publishing format**, and

d) the right to **download freely** any dictionary content to use it in any implementation, in any exchange between computers, and in instruction booklets or technical publications.

Open and interoperable domain dictionaries initiative (OIDDI)

These requirements were already discussed during two workshops jointly organized by ISO TC184/SC4/WG2, IEC SC3D and NIST respectively in San Francisco (June 14/15, 2001) and in Myrtle Beach (February 27/28, 2002).

The goal of the **OIDDI** initiative is to formalize the results of these two workshops by

- defining precisely how these requirements might be fulfilled on a fair, open and standard basis (**OIDDI prescriptions**) , and
- identifying which people, dictionary-making organizations and software houses commit to support this initiative (**OIDDI sponsors**).

Supporting this initiative means:

- for individual persons, to promote its content within whichever organization they belong;
- for dictionary-making organizations, to comply with OIDDI prescriptions for the dictionary(ies) they develop, and
- for software house, to ensure that the dictionary of any domain-dictionary-based software may be customized by the software user just by reading automatically any dictionary respecting the OIDDI prescriptions.

OIDDI prescriptions

a) Any dictionary-making organization shall specify its own identification as a source of information using ISO 13584-26:2000.

   NOTE 1 Any organization identifier compliant with ISO/IEC 6523-1 may be used for that purpose.

b) The identifier of each entry of a dictionary (product or service class, or property data element type) shall be a GUI defined according to ISO 13584-42/IEC 61360-2.

   NOTE 2 The only constraints are the following:

   - each dictionary entry GUI must contain the source organization identifier as part of the entry GUI;
   - the code of each class must be less that 14 characters; this code must be unique for the source organization; the version number of each class must be less than 9 digits and the class GUI must consist of the class code, the class version and the source organization identifier;
   - the code of each property must be less that 14 characters; its version number must be less than 9 digits; the property GUI must consist of its code, of its version, and of the GUI of the class that constitute the context of its definition; moreover the property code must be unique within this class.

c) It shall be possible to describe the content of a dictionary according to the common ISO/IEC information model, also known as the PLIB model, specified in ISO 13584-25 and IEC 61360-5.

NOTE 3 This model extends the model defined in ISO 13584-42 and IEC 61360-2 and it supports in particular collection data type, feature class and external file.

NOTE 4 Most known dictionary information models (including, e. g., ECALS, RosettaNet, UNSPSC) are based on subsets of the PLIB model.

d) The content of each dictionary shall be published in a common publishing format agreed between all participants of the OIDDI initiative.

NOTE 5 This exchange format that remains to be agreed upon will probably be an XML document instance compliant with a XML DTD allowing to publish as simply as possible any piece of information compliant with the PLIB model .

NOTE 6 This publishing format is not requested to be identical to the internal format used either for dictionary development, or by any domain-dictionary-based software or infrastructure.

e) Each dictionary shall be freely downloadable globally in the above format, at the minimum with textual descriptions in the English language, the conditions of the use of its content are that no modifications are made to the dictionary definitions, that reproduction is not permitted for dictionaries, or similar publication if it is offered for sale, that the source is referenced, and that no value-added services so that translation or update subscription is offered for sale without permission in writing form of the dictionary source organization.

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The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

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A Prioritaire

RÉPONSE PAYÉE

SUISSE

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Q1 Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: *(e.g. 60601-1-1)*

....

Q2 Please tell us in what capacity(ies) you bought the standard *(tick all that apply).* I am the/a:

- purchasing agent ❑
- librarian ❑
- researcher ❑
- design engineer ❑
- safety engineer ❑
- testing engineer ❑
- marketing specialist ❑
- other...

Q3 I work for/in/as a: *(tick all that apply)*

- manufacturing ❑
- consultant ❑
- government ❑
- test/certification facility ❑
- public utility ❑
- education ❑
- military ❑
- other...

Q4 This standard will be used for: *(tick all that apply)*

- general reference ❑
- product research ❑
- product design/development ❑
- specifications ❑
- tenders ❑
- quality assessment ❑
- certification ❑
- technical documentation ❑
- thesis ❑
- manufacturing ❑
- other...

Q5 This standard meets my needs: *(tick one)*

- not at all ❑
- nearly ❑
- fairly well ❑
- exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

- standard is out of date ❑
- standard is incomplete ❑
- standard is too academic ❑
- standard is too superficial ❑
- title is misleading ❑
- I made the wrong choice ❑
- other ....

Q7 Please assess the standard in the following categories, using the numbers:
(1) unacceptable,
(2) below average,
(3) average,
(4) above average,
(5) exceptional,
(6) not applicable

- timeliness ....
- quality of writing....................................
- technical contents...................................
- logic of arrangement of contents ....
- tables, charts, graphs, figures...............
- other ....

Q8 I read/use the: *(tick one)*

- French text only ❑
- English text only ❑
- both English and French texts ❑

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

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