EURODATA COUNCIL

Report on continued standardization of Barcode & RFID

ISO/IEC JTC 1/SC 31 PLENARY
Automatic identification & data collection
June 2009, Sydney (AU)

18 of 32 Nations attended the ISO/IEC/JTC 1/SC 31 Plenary Meeting

Australia	Austria	Belgium	China	Canada	Switzerland	Germany	Finland	France
Japan	Singapor	S. Africa	S.Korea	Sweden	NL	Russia	UK	USA

and contributing institutions

AIM	CEN TC225	DOD	EDC	ETSI	GS1	IATA	HIBC	ISO TC122	ISO SC17	ITU-R	UPU

(and others such as IEEE)

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and liaisons

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Report on the committee meetings ISO/IEC JTC 1/SC 31 June, 2009 Continued standardization activities for Barcode & RFID

Introduction

ISO/IEC JTC 1/SC 31 is the responsible organization for worldwide standardization of automatic identification and data capture techniques (AIDC). Optical Readable Media with Barcode and Radio Frequency Identification (RFID) are key AIDC techniques. The first plenary meeting took place in 1996. In the meantime all of the key standards for Barcode, RFID and data structures for Automatic Data Capture have been published by this committee. The business plan shows new projects as updates of current projects and maintenance of existing standards. All parties interested in worldwide standards for item management are invited to bring in new requirements and to work on common specifications for cross country applications. Every year another country has the chance to host the meetings. This year, it was STANDARDS AUSTRALIA. For 2010, China has already provided an invitation for the meeting in Beijing. Future potential meeting places are Austria 2011, USA 2012. The ISO/IEC JTC 1/SC 31 committee maintains 6 working groups (Table 1). The work of Work Group (WG) 3 on Conformance for Optically Readable Media (ORM) was consolidated into Work Group 1 this year. Each group is responsible for carrying out the projects and to develop the standard specifications for submission and final approval by the voting members. After passing the votes the standards are available by every national associate of ISO getting the support from the national standards committee world wide.

Table 1: Structure of ISO/IEC JTC 1/SC 31

International Standardization Organization, **ISO**	**IEC**, International Electrical Commission					
Joint Technical Committee of ISO & IEC (**ISO/IEC JTC 1**) formed Subcommittee 31 on Automatic Identification & Data Capture (AIDC)						
ISO/IEC JTC 1/SC 31 Automatic Identification and Data Capture Techniques						
WG 1	WG 2	WG 3	WG 4	WG 5	WG 6	WG 7 (new)
Optically Readable Media (ORM)	Data Structures for Item Management	Conformance for ORM	RFID for Item Management	RTLS Real Time Locating Systems	Mobile Item Identification & Management (MIIM)	Security on Item Management
Symbol specifications, Conformance e.g. Code 128, Data Matrix, QR	Application- & Data Identifiers, Syntax	moved to WG 1	RFID Air Interface, Application Interface Protocols, Conformance, legal aspects		ORM & RFID with mobile telephony as well as sensor specifications	

Due to increasing cross border trade, the value of the standards for AIDC is increasing as well. As part of Information Technology, AIDC techniques enable error free communication, specifically when dedicated to Item and Supply Chain Management (SCM). Modern tracking and tracing systems would not work in an efficient manner without having the ISO/IEC standards of SC 31 available for global use.

Flexible numbering schemes for open systems:

The major goal for the work on an ISO specification is to include global requirements so that all partners involved are satisfied (of course, just those who comply with ISO standards). Acceptance for the data structures was achieved by the openness and flexibility of the ISO processes. There is no pressure under the scope of ISO to limit to fixed length or numeric numbers just for use with automatic identification technologies. The situation is just the opposite. Interoperability is achieved by standardization for cross-business and cross-country logistics by using different numbering schemes necessary for tracking and tracing products and services back to component levels. Industry has used variable license plates for a long time, achieving the process stability. The same applies for Health Care as a customer area

for industry and consumers products as well. Specifically, transportation can benefit from using customers unique numbering schemes avoiding re-labeling or renumbering. The WG 2 meeting discussed keeping the current flexibility of possible numbering schemes and confirmed that this limitation is not an issue for open systems.

Mission for the delegation

The report was written by the delegate of the national body DIN. The focus of the delegation was that it represents the interest of DIN NA 043-01-31 AIDC, specifically supported by AIM-Germany, CEFIC, EDIFICE, EHIBCC, EDC and liaison members:

Source: Kazuo Kobashi, JEITA, JP

- Maintaining the current flexibility of the structure for unique ID numbers (License Plates) for items, returnable units, transport units, groups of items.
- Representation of the interests for open specifications for cross-sectorial functionality avoiding license fees wherever possible.
- Contribution to key standards for unique marking, such as to "ISO/IEC 15459 Unique identification"
- Contribution to application guidelines on how to use data structures with AIDC media (Bar Code & RFID)
- Learning from the other experts, delegates from the national bodies around the world who represent their interests
- Bringing back the information to the user groups for implementation of the standards.

ISO/IEC JTC 1/SC 31 committee meetings - subject of this report

The plenary meeting has more aspects than being just a formal standards meeting for developing technical specifications. This year, 18 national standardization institutes send more than 60 delegates to the meetings. Getting so many outstanding experts to one place demonstrates the importance of it. It is a unique chance for experts to come together and share experiences. Critical issues can be discussed outside of the meeting where some consensus might be achieved easier than in a full forum. There is no preference or dominance to specific user groups on this international level. The goals are to get standards useful for all parties and to avoid "monopoly" in terms of technical or marketing issues. Nevertheless the work is not free of lobbying and defending specific interests but this has to finally lead to consensus supported by the voting rules.

Critical issues of competition

The discussions within the meeting of the "head of delegation" group touched critical issues as well e.g., a competition issue between Issuing Agencies (IAC's) for unique company ID codes with other IAC's. Issuing Agencies register unique company codes according to ISO/IEC 15459.
Various arguments are heard in the marketplace for IAC's, such as:

"my number is better than another number"
I (personally) believe that standards bodies and guideline groups (like EDIFICE and the ATIS AIDC committee) should allow any accepted IAC. I do not think that the revenue from selling IAC's is very big. The uniqueness of the code is set by ISO/IEC 15459. It is not a very valid argument that "my number is more unique than yours."

This sounds like a selling point for company codes. It was brought up that it would not be in line with the ethics of the committee if one member or the secretariat would fight against other members or its membership with arguments like that. The group felt that it is not appropriate behavior in committee meetings. However, if this happens in the marketplace,

then it is a matter of the marketing of such a party and its ethical understanding. Under the view of the International Standards Committee, a product number of one party cannot be better than the number of another party, specifically if specified in the same ISO standard. In fact the standards for unique identification are designed for interoperability of any unique number.

Acceptance of the ISO/IEC rules for unique numbers.

....in the meeting

It was reported that large organizations, such as the World Customs Organization, the World Consignment Organization, the US Department of Defense and most associations of industries, distribution and trade, accept the scope of interoperable standards and use it successfully in any participating industry association.
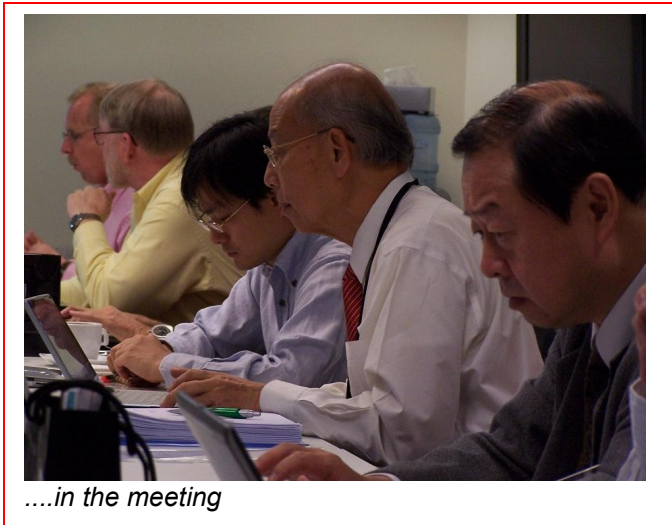
There was no indication seen with one of the work items, that one numbering scheme only will get any preference within the standards where uniqueness is specified by the global rules of ISO/IEC 15459 Unique Identification. It is true, that major Point of Sales (POS) applications continue to require a fixed length solution for product numbers but this is an exception looking in the scenario of global markets. In other areas with global tracking and tracing characteristics, the variable numbering schemes are dominant. The work on the ISO standards for Barcode and RFID are covering cover both.

The meeting schedule

The full week of meetings covered the actual work and summed up with the full plenary meeting the end of week.

June-08	June-09	June-10	June-11	June-12
SC 31/WG 4/SG 5	SC 31/WG 7	SC 31/WG 4-RFID	SC 31/WG 2	SC 31 Plenary
RFID Implementation Guidelines	Security on Item Management (new group)	RFID Air Interface, Application Interface Protocols, Conformance	Data Structures for automatic identification and item management	Full Plenary meeting national bodies, liaisons, convenors
25 participants	30	50	40	60

Table 2: Committee meetings

Table 2 shows the meetings that have taken place and the attendance of delegates. Again the attendance was good, even if not every member country sent delegates. Some countries sent a group of delegates (e.g., China, Japan, Korea, USA). Other countries sent one delegate (e.g., Austria, Finland, Sweden, Germany).

Topics of specific interest

- New structure for the standard for Unique Identification
- Optical Readable Media and Performance, merging Work Groups 1 & 3
- Progress of the work on updating the RFID standards with WG 4
- Security on Item Management, new Work Group 7 (WG 7)
- Anti-counterfeiting tools
- News on the RFID Emblem: ISO/IEC 29160
- New steering committee for "Data constructs"
- Progress on guidelines for using AIDC media (BC & RFID)
- Mobile Item Identification & Management

ISO/IEC RFID Emblem, generic (Source: AIM-D)
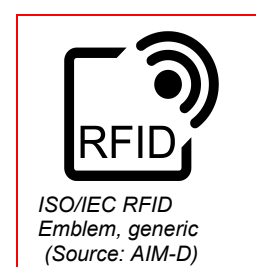
New structure for the standard for Unique Identification

Unique Identification is a pre-requisite for any tracking and tracing system. Therefore this topic has got special considerations within the responsible committee SC 31/WG 2 Data Structures. According to the task of last year, an ad hoc committee reviewed the documents and proposed a restructuring and update of ISO/IEC 15459 under the leadership of Mikael Hjalmarson (Sweden). New applications required adding features like „Unique Groups of Items" and „Unique Groups of Transport Units".

The proposed structure was to stick to 6 parts only, instead of 8 covering all the features: ISO/IEC 15459 Information technology — Automatic identification and data capture techniques — Unique identification — Part 1: Individual transport units, Part 2: Registration procedures, Part 3: Common rules, Part 4: Individual products and product packages, Part 5: Individual returnable transport items (RTI's), Part 6:Groupings.

Parts 1, 4 and 5 specify unique data strings for the different levels from item to product package and up to returnable transport units. Part 6 takes care of uniqueness of groups of items (groupings). Data strings build according to ISO/IEC 15459 are media independent by structure and valid both for unique Barcode as well as RFID tags.

By following the ISO/IEC 15459 structure,, each item specified in a system is capable of being uniquely identified anywhere in the world. Every system, and with it any supporting organization, is enjoying the same protection by a specification on highest level possible, i.e., on an ISO referenced document. The system identifiers listed are valid with linear and 2D Barcode and get an adequate translation for RFID applications. The function is easily processed by the application: If a „+" appears as first character, then the system recognizes it as a HIBC structure, if a „-„ appears, as a German Pharma Code, if a „FNC1" appears, as a GS1 structure, etc. Any of such a marked number can be interoperable with each other. The ASC Data Identifier are unique as a default value of a standard data string in Barcode, such as the „License Plate" for Transport Units or uniquely embedded with the Syntax ISO/IEC 15434 where even Bit structures or encrypted data can get an unique ID. Protection issues for unique codes under the rules of ISO are included in Appendix 1 of this document:, "Protection of data structures".

From aside the meetings

- **Success of the IUID-project**

The representative of the Department of Defence (DoD), Robert Leibrandt, reported about the success of its project "Item Unique Identification – IUID". Any item of specified categories entering any military entity shall have a unique number for the life of the item. It covers parts of aircraft as well as health care products, as well as any other type of equipment and spare parts. The item serial number must be unique in accordance with ISO/IEC 15459 and the newly upgraded Part 4: Unique identification - Individual products and product packages. It was reported that last month 300.000 products were entered into their system, all being marked with this unique serial number. This is a constantly growing number of unique entries, soon to reach the millions. Most of the unique marks are Data Matrix codes. About 99% of the Data Matrix codes carry unique data applied using either Data Identifiers (DI's) or Text Element Identifiers (TEI's) embedded in the 2D symbol per the syntax specified in ISO/IEC 15434. About 1% are reported to carry GS1 syntax. As a reason for the preferred use of the Data Identifier (DI) structure instead of GS1 Application Identifiers (AI), it was found that the DI structure accepts existing alphanumeric numbering schemes of the manufacturer, where the GS1 structure limits the data length, specifically for product codes, e.g., max 3, 4 or 5 digits. Any of the entries gets documented in a central data base. The data are used for item based inventory control, for tracking and tracing purposes and maintenance control. This is the today's largest data base project in the world, where individual item codes get captured by means of Auto ID. Uniqueness is guaranteed and protected by ISO standards for Item and Supply Chain Management.

Note: *DIN developed the standard "DIN V66401 Unique Identification Mark – UIM", published 2005 which is fully compatible with the requirements of the IUID project. It is used in the areas of Industry and Healthcare specifically for unique parts marking. In Healthcare UIM is used primarily for identification of surgical instruments and cryo's for unambiguous process control.*

Optical Readable Media (ORM) and Conformance, merging WG 1 and WG 3

The ORM WG 1 has a long experience in standardization all of the Barcode and 2D symbols appearing in the market today. Since performance and quality test specifications are closely associated with the symbol specifications WG 3 on Conformance was merged with WG 1 as an administrative move. One work area of the group is the maintenance of the existing standards and their update, if needed. The Code 128 standard was reported to be getting some minor editorial corrections, but non technical. The problems of DATABAR did not appear with WG 1 yet because the AIM Global Technical Committee is preparing a report on potential reading errors first.

New work items are looming. The problem of „counterfeiting" reached this group as well and the need for specifying tools for protection. One potential future project named by the convenor, Sprague Ackley, was **„Automatic Readable Hologram".**

Progress of the work of WG 4 on updating the RFID standards

Work Group 4 of SC 31 is responsible for RFID for item management. This work group has special attendance because key RFID standards have passed the second update round already and new projects get in. The responsibility of WG 4 – RFID covers the RFID Air Interfaces, Application Interface Protocols, Conformance, including legal aspects. Facing the previous hype of RFID and the „call for immediate RFID standards", the Work Group did a good job by publishing the standards for all of the RFID Air Interfaces with frequencies from <135KHz up to 2,4 GHz. Due to the late contribution of GS 1 Global and patent holders, the specification of ISO/IEC 18000-Part 6, version C could not be finished in time but the spec. is in the final phase prior to publishing.

Security on Item Management – establishment of SC 31/WG 7

In order to address the increasing interest in security issues a new working group was established at the meeting, the "SC 31/WG 7 Security for Item Management". Mr. Dan Kimball is the convenor. The work is addressing the increasing interest in the issue of RFID security. It will require coordination with the other groups within ISO addressing security issues as well, but also external groups as potential liaisons, such as ITU-R and ITU-T, IEEE, CEN TC 225 and others. Relevant papers from other groups are the following new draft recommendations: ITU-T X.1171, Threats and requirements for protection of personally identifiable information in applications using tag-based identification (SG7_200905_023), the EU recommendations on Privacy (2009/387 EC) and Authenticated Encryption. One of the first projects is ISO/IEC 29167, Air Interface for file management and security services for RFID. This international standard defines file management and security for the ISO/IEC 18000 Air interface standards for RFID devices. Its purpose is to provide a common technical specification for file management and security for RFID devices that may be used by ISO committees developing RFID application standards. It specifies file management for user memory, security access methods for user memory and protection of Unique Item Identifiers (UII) against unauthorized reading of RFID tags. Additional security aspects will be handled by WG 4 and sub groups.
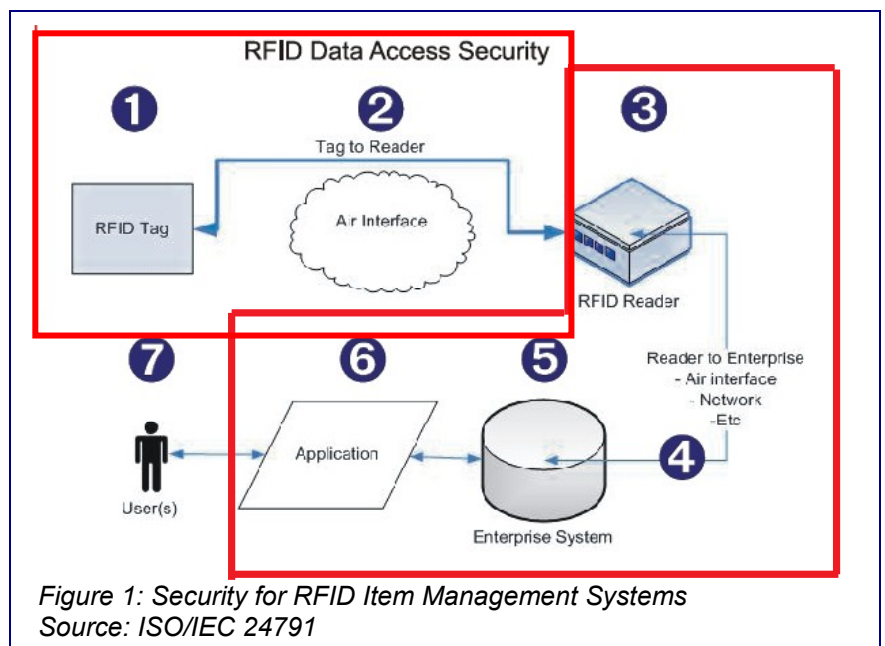

Figure 1: Security for RFID Item Management Systems
Source: ISO/IEC 24791

RFID Implementation Guidelines and TAG security

The project „ISO/IEC TR 24729 Radio frequency identification for item management — Implementation guidelines" was initiated in order to supply more guidance on the technique for installation of RFID in open environment. This is the responsibility of WG4/SC5. The specifications in process are divided into 4 parts:

Part 1: RFID-enabled labels and packaging supporting ISO/IEC 18000-6C, Part 2: Recycling and RF tags, Part 3: Implementation and operation of UHF RFID Interrogator systems in logistics applications. Part 4 RFID guideline on tag data security". Part 4 covers area 1 and 2 of Figure 1, which includes RFID tag and its air interface.

RFID Software System Infrastructure and security

Project ISO/IEC 24791 parts 1 to 6 - Software System Infrastructure - covers system operations between business applications and RFID interrogators. Part 6 is addressing the security aspects. Scope of ISO/IEC 24791 part 6 is to define Software System Infrastructure security threats that enable RFID systems to operate in a more secure method between business partners and applications, including RFID readers (interrogators), databases, software and hardware. It covers areas 3 to 6 of Figure 1 but not the user public area. Security issues of other areas where RFID is used, such as Smart Cards or Passports are not the subject of SC 31 and its working groups for „Item Management".

Anti-Counterfeiting

Barcode & RFID can be used as tools for Anti-Counterfeiting as well, if supplied with a unique serial number. Potential new work items, such as "Automatic Readable Hologram" underline this direction. Therefore, SC 31 agreed to a liaison relationship establishment with ISO PC 246 "Anti-counterfeiting tools". Under leadership of AFNOR (France), the project „**Performance requirements for purpose-built anti-counterfeiting tools"** has been opened, which attracted many interested parties from all kind of industries. The issue of protecting manufactures, brands, as well as end users becomes highly important as the number of copied products is increasing in the open market. National bodies like AFNOR and DIN contribute directly to the project as well.

News on the RFID Emblem ISO/IEC 29160

Where an RFID tag is included on a label, the RFID Emblem shall be displayed on that label. The problem of many different emblems for RFID is solved with ISO/IEC 29160. The key emblem in it is the emblem developed by AIM Global. In the final phase of the project, EPCglobal asked to consider the EPC emblem as well, as an option. The NFC emblem of the Near Field Communication forum with mobile phone

ISO RFID-Emblem A0
(Source: AIM-D)

manufacturers might be the third option, if this community has interest in it. Nevertheless, the key logo contains optional characters indicating the kind of tag and the purpose. The picture shows the emblem with A0, which stands for a 433MHz tag. A UHF tag for transport units would carry an emblem with "B3" inserted. The specification is available at: www.aimglobal.org/standards/RFIDEmblem. When the ISO/IEC standard has reached Final

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Healthcare experts meeting outside the plenary

Since many experts from all parts of the world met in "Down Under", also experts from the Healthcare Council Australia, Europe and US met in Sydney as well, in order to co-ordinate their activities. The as "HIBC" known solution for labeling medical devices is part of ISO 22742, Packaging-Linear and 2-dimensional symbols for product packaging, where ASC and GS1 identifiers are included as well. HIBC has provided an update recently for the capacity for product references from 13 to 18 alphanumeric characters. The similarity to the DoD experience is that the alphanumeric code has obtained great acceptance in the healthcare community because it avoids any second product reference. For medical devices there is no need to label with a code, such as GS1, which has to fit in a POS system, but original supplier codes are appreciated even if the number is 18 characters long. The reason for the upgrade of HIBC from 13 to 18 characters was the demand for longer references such as for 18 digit ISO numbers for rotating instruments.
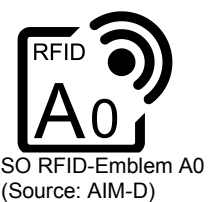
Committee Draft (FCD) status, AIM is encouraging the use of the RFID emblem wherever possible right now. The emblems are part of the RFID application standards for supply chain management ISO 17364 to 67 already.

Electromagnetic Interference (EMI) from RFID interrogators on active implantable medical devices

At the WG4/SC 5 meeting Prof. Dr. Njoma, Japan delegation, reported on the background of the project: "Experimental evaluation method for impact distance and mitigation method of Electromagnetic Interference (EMI) from RFID interrogators on active implantable medical devices". It was initiated as a result of reports from around the world (e. g. Amsterdam report) about problems of interference. He reported about measured influence of pacemakers set to maximum sensitivity: LF 17cm, HF 22,5cm, UHF 75cm. The issue has been accepted as an ISO/IEC project. The German input was, when developing the standard, to please take into consideration existing European standards dealing with this subject already (i.e., EN 50371, EN 50392, EN 50364 and EN 50357).

RFID performance and conformance

A new sub-group WG 4/SG 6 was created as a result of the SC31 decision to move the work on RFID performance and conformance from WG 3 to WG 4. Chairman is Josef Preishuber-Pflügl, Austria.

Source: Kazuo Kobashi, JEITA, JP

New steering committee "Data constructs"

Specific RFID applications using ISO standards use an "Application Family Identifier – AFI" for quick identification of the content of an RFID tag. The AFI is positioned prior to the "Unique Identifier – UII" in an RFID tag. Typical AFI's are for Item ID's, Transport ID's, Returnable ID's etc, but also for Library applications and book id's. In order to allow for new entries of AFI's and for maintenance purposes, a steering committee on "data constructs" was established. It is the goal of this committee to develop an application form for AFI's. Interested parties shall be able to apply for an AFI according to the rules for the registration criteria set by the steering committee. The steering committee comprises of delegates from the US, UK, NL and Germany.

Mobile Item Identification & Management (MIIM)

The scope of WG 6, responsible for MIIM, is „Standardization of automatic identification and data collection techniques that are anticipated to be connected to wired or wireless networks, including sensor specifications, combining RFID with mobile telephony, and combining optically readable media with mobile telephony. The convenor of Work Group 6, Craig Harmon, reported on the rapid progress of the 9 specifications ISO/IEC 29143 and ISO/IEC 29172 to 29179 for the modules of Mobile Item Identification & Management systems. It covers the interface between integrated Barcode and RFID readers to Mobile phone devices including specifications related to applications and service brokers. Since the solution will be specifically attractive for use in the public, it also contains security aspects within ISO/IEC 29176, Information technology — Automatic identification and data capture techniques — Mobile item identification and management — Consumer privacy-protection protocol for Mobile RFID services. One of the drivers for the standard is the national standardization institute of Korea focussing on the use of RFID by the public. The input from Japan concentrates to interoperable use of ORM based on the outstanding experiences with QR code for public use.

Progress on "Guidelines for using AIDC Media (BC & RFID)"

How to carry data either with Barcode, 2D or with RFID is the project ISO/PDTR 29162 of WG 2 Data Structures. The idea that RFID would need new structures for data information turned out to be a costly and unnecessary solution. In the meantime, users learned that it would be much easier to use the infrastructure of Barcode for RFID as well. This would reduce the implementation to handling the technology specific features at front end where the ERP system may not even see the different between Barcode data and data carried by RFID. Experts from Japan, USA and Germany prepared the base for the specification, which will be a technical report. It will include solutions for simplified data storage of data in a tag, required by the Joint Automotive Industries (Europe, Japan, US). It will supply recommendations how to use the features of the Syntax for High Capacity Media standard, ISO/IEC 15434, originally developed for 2D symbols but useful for RFID as well.

Interoperability between Barcode and RFID

For applications where a Barcode infrastructure is available, the same data can be carried by Bar Code or RFID. The ISO & IEC specifications enable such interoperability. It often is the path for migration from one technology to the other as from Barcode to RFID. Interoperability enables back up systems by using Bar Code or 2D for RFID.
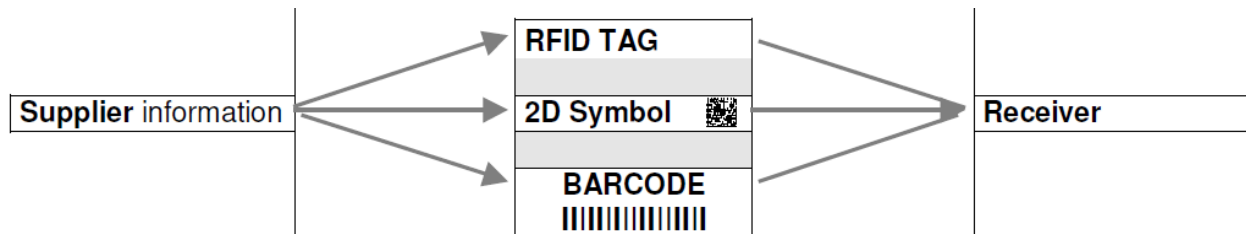

Figure 2: Interoperability between the AIDC Media: Same information – different carrier.

ISO & IEC standards provide the means for interoperability between different data carrier and ease the migration from one technology to the other
Some features cannot be supported by Barcode as read & writing or sensors and data logging. This has to be implemented as an add on feature dedicated to the solution.
For more contributions to the guidelines, see the appendices.

Coverage of the report

This report is covering key information about the progress of work of SC31 on AIDC. Nevertheless there may be other issues related to specific areas such as "Real Time Location Systems –RTLS" with new developments like the "CHIRP technology". Those being interested in more details may contact the editor for specific issues of interest.

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Enclosures
Appendices 1 to 3

Informative Appendices

Appendix 1 Protection of data structures

How does ISO protect the functionality of Barcode. That is a question risen from time to time in the context of „which Barcode is more protected, than another?".

Protection is a matter of standardization and how to use the standards. The term „Unique Identification" and how it works might be an approach how to answer questions to „protection", because those which understand how uniqueness works may understand how protection of functionality can be interpreted in an open environment. System Identifiers can identify and protect at the same time. "System Identifiers (SI's)" mark data structures

+E23519030/

Sample of a protected code: The data string begins with the system Identifier „+" uniquely identifying it as a HIBC code.

uniquely, so any computer software can interpret it safely and in an interoperable manner. By "SI's" multiple data constructs of different systems can be processed easily with one system.
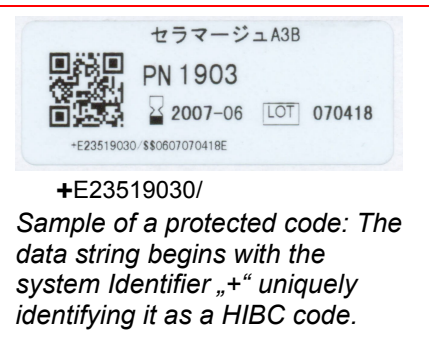
System Identifiers are a SC 31/WG 2 responsibility

WG 2 charged the ASC MH 10 Data Identifier Maintenance Committee with the responsibility for maintenance of ISO/IEC 15418 Data Identifiers per ANS MH 10.8.2. The committee followed the advise of DIN V66403 and added the System Identifiers to the standard under category 0 and with Annex K. See Table 3 below)

Table 3: System Identifiers (source: Annex K of ANS MH 10.8.2.)

System Identifier		Data Structure Usage
+	Plus sign	Health Industry Business Communications Council (HIBCC)
&	Ampersand	American Association of Blood Banks (AABB)
=	Equal sign	International Society for Blood Transfusion (ISBT)
FNC1	Function Code 1	Appears in the first position following the symbology start character of a Code 128, Code 49, or Code 16K Symbol to signify a GS1-controlled symbol
[)>^{R}s	Left square bracket, right parenthesis, greater than sign, record separator	Data structure compliant to ISO/IEC 15434, *Information technology — Automatic Identification and Data Capture Techniques — Syntax for High Capacity ADC Media*
-	Hyphen – Minus	Pharmaceutical Central Number (PZN), controlled by IFA-ABDATA, Germany
!	Exclamation mark	Eurocode-IBLS - International. Blood Labeling System

In practical terms, a HIBC code can be used in same environment as a GS1 or PZN code, because of clean specification within the standards. This is state of the art and common practice in global supply chain and item management systems supported by the International Standards Organization, its members and liaisons.

Appendix 2 "Guidelines for using data structures in AIDC media"

The guidelines will ease the understanding of how data fits into both Barcodes and RFID tags in a compatible manner. The basis is the understanding how „uniqueness" works in an open supply chain environment. Below there are some chapters supplied as contribution to the working draft.

The hierarchy of unique codes

Item and supply chain management applications require unique structures and unique codes. Where the structures are supplied by ISO/IEC, the responsibility for uniqueness has been assigned to a hierarchical scheme for any unique item identifier (UII). The hierarchical structure has been specified within the ISO/IEC 15459 set of standards for Unique Identifiers as follows:

ISO/IEC and CEN (A) authorizes (B) NEN, Delft (The Netherlands) to register Issuing Agency Codes for organizations (C) with interest in it. A registered Issuing Agency (IAC) is entitled to issue Company Codes according to a specified scheme. Companies as labelers (D) having received a registered company code are in the position to mark it's items (E) with their own unique codes without the danger of overlapping with any other companies codes.
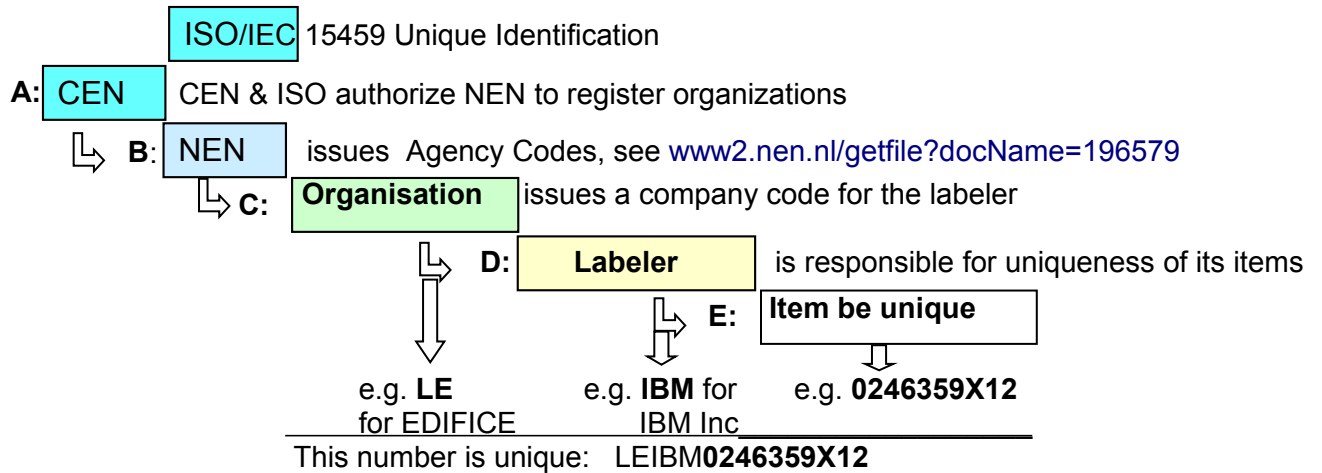
ISO/IEC 15459 Unique Identification

A: CEN   CEN & ISO authorize NEN to register organizations

↳ **B**: NEN   issues Agency Codes, see www2.nen.nl/getfile?docName=196579

↳ **C:** Organisation   issues a company code for the labeler

↳ **D:**   Labeler   is responsible for uniqueness of its items

E: Item be unique

e.g. **LE**   e.g. **IBM** for   e.g. **0246359X12**
for EDIFICE   IBM Inc

This number is unique: LEIBM**0246359X12**

Figure 2: Hierarchy of uniqueness for Automatic Identification

How a unique number becomes meaningful: By a Data Identifier
The unique number applied with a ASC Data Identifier, e.g. (25S) for a unique items
it becomes a unique Serial Number: → (25**S**)LEIBM**0246359X12**
or applied with a (25P) it becomes unique product code: → (25**P**)LEIBM**0246359X12**,
or applied with a (J) it becomes a unique Transport code: → (**J**)LEIBM**0246359X12,** etc.
Note: Parentheses are just for ease of human interpretation but not represented in the encoded code.

The full list of Data Identifiers is referenced by ISO/IEC 15418 ASC Data Identifiers in ANS MH10.8.2. The same principles are relevant if a GS1 Issuing Agency and company code is used, but in this case Application Identifiers (AI's) apply.

The section below, "Issuing Agencies (IACs)," illustrates that different IACs support different data constructs, but all of them are unique if build according to ISO/IEC 15459 rules.

Issuing Agencies
supply the rules for Company ID and the following data information
Each Issuing Agency specifies it's own rules for the structure of company codes and for the data structures which ensure uniqueness. Table 4 shows a selection of IAC's and it's rules for data elements to be encoded with AIDC media.

Table 4: Issuing Agencies and assigned Issuing Agency Codes (IAC's)

Selection of Issuing Agencies for company codes	Agency ID	Assigned CIN	Typical CIN's, e.g.	Supported data structure
CEFIC Chemical Industries Association	QC	4an	CPRO	ASC
DUN Dun & Bradstreet	UN	9n	123456789	ASC
GS1 and EPC Global	0-9	3-7	1212345	GS1, EPC
EDIFICE European Electronic Industries	LE	3an	IBM	ASC
EHIBCC European Health Industries Association	LH	4an	MEDX	ASC, HIBC
ODETTE European Automotive Industry	OD	4an	A2B3	ASC
UPU Universal Postal Union	J	6an	D00001	ASC
etc.				

Note: For a complete list of Issuing Agencies and it's codes see: www2.nen.nl/getfile?docName=196579

Selection of an applicable data structure for the application

There are different data constructs in use specifically for item and supply chain management. The standards are capable of handling the most common data constructs, from fixed length numeric to variable length alphanumeric.

Data structure for encoding product references for use with AIDC Media

Product codes do not have unified length cross industry. To keep the original structure of a product reference the table below will assist in finding the appropriate data structure for the product to be marked. ISO 22742 recognizes the different data length by including numeric and alpha numeric data elements.

PRODUCT REFERENCE				
Reference →	*Numeric up to 6*	*alphanumeric up to 18*	*alphanumeric more than 18*	
Structure → ISO/IEC 15418	Part Application Identifiers (AI's)	Part Data Identifiers/System Identifiers	Part Data Identifiers	
Sub set →	GS1 (bar code) EPC (RFID)	HIBC Health Care Bar Code	ASC Accredited Standards Committee	
Capacity →	**1 to 6 n, depending on country**	**1 to 18 an**	**1 to 50**	
core market sectors	POS and consumer business	Health care	Industry & distribution	

*Table 5: **Capacity** of ISO/IEC sub structures for product data according to ISO 22742*

Table 6 illustrates how to select a data structure depending on the length of a unique product including the information about the Issuing Agency Code (IAC) and the Company Identification Code located prior to the product reference.

Standard	ISO 22742, ISO/IEC 15418		
Product ref. e.g.	5 digit (n)	13 an	20 an
sample	**12345**	**1234567890MED**	**12345678AB12345678DE**

The arrow points to a structure the reference fits in:

ISO/IEC 15418 structure	GS1 & EPC (GTIN)	HIBC	ASC
Full code	13 digits numeric, fix length	variable length, sample 20 characters	Variable length sample 28 characters
sample	1234567**890123**	+ELMI**1234567890MED**1C	25PLECOM**12345678AB12345678DE**
Carrier	**ISO/IEC Barcode, 2D symbols & RFID**		

Table 6: Selection of data structures for unique product codes applied with IAC and CIN

Data structure for encoding references to transport units

Transport references do not have unified length cross industry. Table 7 below shows the capacity of the options of a unique "License Plate" for transport labels according to ISO/IEC 15459, part 1. The application standard ISO 15394 supports the different data length by including numeric and alpha numeric data elements as options.

TRANSPORT UNIT		
Reference →	Numeric 9 digit fixed length	Alpha numeric up to 35 characters
Structure → ISO/IEC 15418	Part Application Identifiers (AI's)	Part Data Identifiers (DI's)
Sub set →	GS1 AI's (bar code) GS1 EPC (RFID)	ASC DI's
Capacity →	**9 digit n**	**1 to 35 an**
Typical market sector	transportation	Transportation

Table 7: Data capacity for transport codes depending on use of AI's or DI's

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Appendix 3

Technical documents of the actual committee work

Documents of ISO/IEC JTC 1/SC 31/WG 2 Data Structure"
ISO/IEC 15418 GS1 Application Identifiers and ASC Data Identifiers
ISO/IEC 15434 Syntax for High Capacity Media
ISO/IEC 15459 Unique Identification, Part 1 to 6
ISO/IEC 29162 Guidelines for using ADC Media (Barcode & RFID)
Documents of ISO/IEC JTC 1/SC 31/WG 4 RFID for Item Management
ISO/IEC 18000-1 REV 1 (including Battery Assistants, Sensor functions)
ISO/IEC 18000-2 AMD 1 (including Battery Assistants, Sensor functions)
ISO/IEC 18000-6 REV1 (including Battery Assistants, Sensor functions)
ISO/IEC 18000-7 REV 1 (including Battery Assistants, Sensor functions)
ISO/IEC 15963 Tag ID: applied with the list of IC manufacturer ID's
ISO/IEC 29160 RFID Emblem
Documents of ISO/IEC JTC 1/SC 31WG 4/SG 1 RFID Data Protocol
24791-Part 1 to 6 Software System Infrastructure (SSI)
ISO/IEC 24791-1: Architecture
ISO/IEC 24791-2: Data Management
ISO/IEC 24791-3: Device Management (incl. reader configuration commands)
ISO/IEC 24791-4: Abstracted Application interfaces (open)
ISO/IEC 24791-5: Device interface
ISO/IEC 24791-6: Security (based on pre-work of AIM Global)
ISO/IEC 24753: RFID & *Sensors with reference to* IEEE 1451.7
ISO/IEC 15961 and 15962: RFID Data protocol – Update
ISO/IEC 15961-4: Sensor commands (NP)
Documents of ISO/IEC JTC 1/SC 31WG 7 Security on Item Management
ISO/IEC 29167 Air Interface for file management and security services for RFID.

Note: For more information contact the editor or the national standards institute.