EURODATA COUNCIL

ISO/IEC JTC 1/SC 31
Automatic identification & data collection
Report on continued standardization of Bar Code & RFID

Fig.1) „Austrian Standards Institute“ hosting the JTC 1/SC 31 plenary meeting 2011

Delegates of Nations and liaison of all parts of the world are contributing to standardization of AutoID techniques

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

and contributing organizations:

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

(and others such as IATA, IEEE , NATO)

Editor
Heinrich Oehlmann
E.D.C TC

in co-operation with AIM, DIN, EDIFICE, EHIBCC and Liaisons
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AutoID standardization on highest level

Fig. 2) Austria as host: Kerstin Zimmermann, Ministry of Transportation, Innovation & Technology welcomes the guests from all over the world.

Introduction

Automatic Identification stands for error-free data collection and consequently also for error-free data processing. The technical term is „AIDC“ (Automatic Identification & Data Capture“ or „AutoID“ as a generic term. There is a distinction between Optical Readable Media – ORM, which includes Bar code & OCR, and Radio Frequency Identification technology (RFID). Thus, where the technologies are available globally, standardization is necessary. **AutoID, using either "ORM" or "RFID", is a standardized technology area.** After the first industry sectors and national standards of the early 80's followed the standardization at European level by creation of the CEN TC 225 AutoID committee. However, with regard to globalization and global trade, it has been found that global standardization is also necessary for worldwide effectiveness. Therefore, in 1996, the Committee, "ISO / IEC JTC 1/SC 31 - Automatic Identification and Data Capture Techniques" was founded. The responsibility for AIDC was assigned by the joint consortium of ISO and IEC for Information Technology, the Joint Technology Committee 1 (JTC 1) to Subcommittee 31. The delegates of the national standardization bodies, composed of liaison organizations work together under that umbrella. The initial work of JTC 1/SC 31 was developed from standards transferred from existing CEN and other national bodies, followed by the new projects.

All stakeholders with interest in global standards for AutoID for Item & Supply Chain Management are invited to submit their requirements to the working groups, or better yet, even to collaborate directly, creating globally effective specifications. The prerequisite is participation in one of the National bodies of the own country. The pragmatic rule for working new standardization projects is that at least 5 other countries are in favor. Each country has a single vote. If voting was successful, the project will be assigned to a working group or a new WG will be established, if necessary. The final standards are available via the national bodies or from ISO. The standardization work for new projects also involves the regular update of existing standards in a 5-year maintenance cycle. The working groups are organised into specific subject areas (Table 1). Once a year, all sub-committee's meet in the "Plenary Meeting" to report on the results and take on new projects.

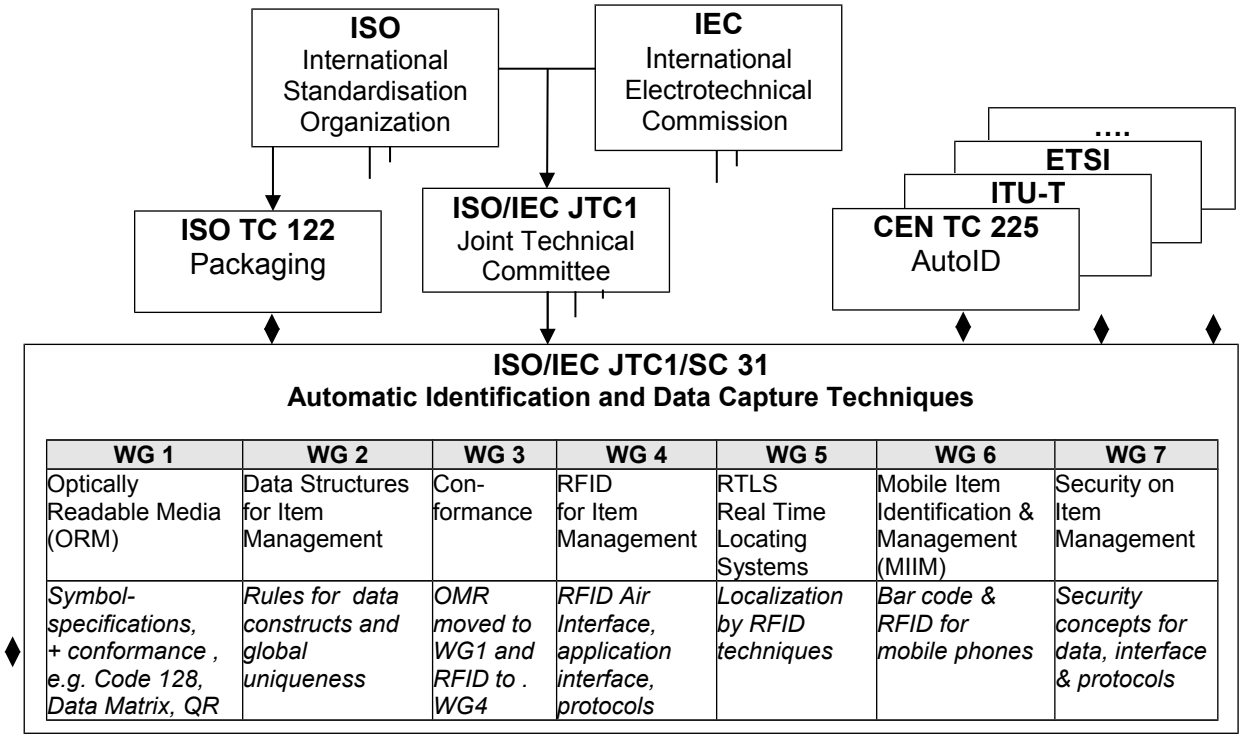
Following China 2010, the Austria Standards Institute invited JTC 1/SC 31 committee and sub-groups to come to Vienna in 2011 for the JTC 1/SC 31 plenary committee and sub-groups meetings. The Austrian host, Mrs Kerstin Zimmermann (Fig. 2), the representative of the Ministry of Transportation, Innovation and Technology, welcomed the guests and reported on extensive support for projects of "Intelligent Transportation Systems". The delegation from Japan had to mention the recent tsunami and the associated problems and to extend thanks for the support and concern that Japan has received from all over.

Fig. 3) AutoID experts in discussion

The current slogan of the now 90-year institute Austrian Standards is:

"Setting Standards. Creating Value". Under this banner the sessions were held and in a most constructive and harmonious atmosphere.

Table 1) ISO/IEC JTC 1/SC 31 and its working groups on AutoID



WG 1	WG 2	WG 3	WG 4	WG 5	WG 6	WG 7
Optically Readable Media (ORM)	Data Structures for Item Management	Con-formance	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	*Rules for data constructs and global uniqueness*	*OMR moved to WG1 and RFID to . WG4*	*RFID Air Interface, application interface, protocols*	*Localization by RFID techniques*	*Bar code & RFID for mobile phones*	*Security concepts for data, interface & protocols*

Topics of specific interest

Because of the variety of individual topics, not every detail can be included in this report. Those that should be highlighted which are of specific interest for user areas of industry, healthcare and distribution include:

- The national delegations report
- The ISO / IEC JTC 1/SC 31 committee meetings
- Key standard for uniqueness "ISO / IEC 15459 Unique Identification" completed and applied with the feature for unique "Returnable Packaging - RTP"
- Upgrade of RFID standards and integration of security techniques
- Update of RFID standards and integration of security mechanisms
- Open access to the standing document with listed "RFID Application Family Identifiers (AFI)"
- Access to the "Internet of Things (IoT)"
- Progress to the "Guidelines for using AIDC media (BC & RFID)
- Standardization project for bar code & RFID for mobile phones
- Update bar code & RFID application standards for "Returnable Packaging"
- Exchange of experiences in addition to the meetings

The national delegations report

With Resolution 1998 in Rio de Janeiro, the national report was introduced in order to keep the committee informed about regional situation and trend to be considered for the work to be done. The national reports are submitted prior to the conference but comments are provided during the meeting. Below are some excerpts from it to get an impression.

Special report from Japan

The head of delegation of the Japanese Industrial Standards Committee (JISC) Akira Shibata presented an impressive report about the problems surrounding the earthquake and tsunami underlined by a live video. Japan is one of the leading countries for the development and manufacturing of Auto-ID products.

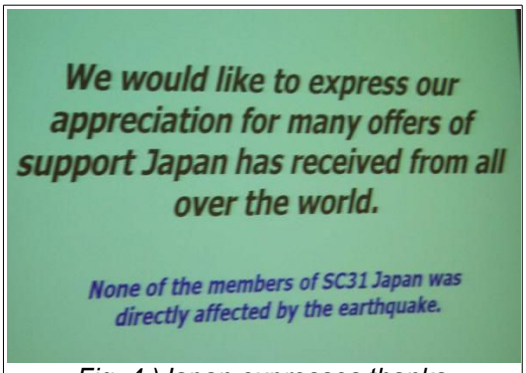


Fig. 4)Japan expresses thanks

Fig. 5) Nations report each other

The Japan market is estimated at 220.7 billion yen, of which 14 million are bar code scanners worth 44.3 billion yen. Now, he said, we have to deal with the problems and compensate for any shortages. He thanked, on behalf of Japan's Committee for the sympathy and support that Japan has received. But he reported as well, that the tsunami did not effect the standards committee and its active work. Japan is extremely engaged with the standardization on AIDC. This is specifically visible in the public where QR code is seen in newspapers and on fliers to be scanned by mobil phones linking to information sources like public transportation, cinemas shops, etc. With the help of a mobile phone, even tickets can be booked via QR code. For the good reason of his deep expertise, Toshihiro Yoshioka was confirmed at the plenary as chairman of the working group WG 2 - data structures.

Country specifics

With a view to open trade, it is the ambition of the committee to synchronize the methods where Auto-ID can be used as part of the IT concepts unrestricted and globally.
For this, it is interesting to highlight some of the contributions coming from different countries.

- China: The People's Republic of China sent delegates from the two metropolitan areas Shandong and Beijing. The reported highlighted the development of the Chinese 2D-symbology, the "Han Xing Code ". The specification is being prepared for normalization by AIM China and AIM Global. China takes part actively with the JTC 1/SC 31 work and related voting, joining the efforts for global harmonization.
- Korea: In Korea, the ministry is highly interested in setting standards for RFID applications in conjunction with mobile phones, providing the secretariat for the project "Mobile Item Identification and Management" assigned to WG 6.
- USA: The U.S. seems to be the most active group in the SC 31 supplying the Secretariat of JTC 1/SC 31 and the chairmen for the working groups WG1 and WG 5, 6 & 7. In addition, AIM-USA provides a registry for the "RFID Emblem" and for the "Application Family Identifiers (AFI) for RFID. In terms of traceability, a project of particular interest might be the "UID" project of the US Department of Defense , which has global implications and impact on optimization of logistics, which includes NATO. The project "Unique Identification (UID)" has been set up to trace equipment, key parts and spare parts by the use of a powerful central data storage. The base for "Item Unique Identification" is its serialization encoded in a DATA MATRIX symbol. The successful project makes use of ISO standards for data carrier and data structure completely. Experts appreciate that "ASC Data Identifiers DI's" making suppliers original codification schemes globally unique. The UID's encoded in DATA MATRIX enable realization of the challenging tasks tracking and tracing items for lifetime for control of inventory, maintenance cycles and locations where the items are available. Accordingly, a new market for direct part marking (Direct Part Marking - DPM) is obvious. The US reported that RFID will move from standard applications to new area's with sensors and battery assistance opening much higher market potential by standardization. Moreover, the United States invites you to the 2012 plenary meeting in Pittsburgh.
- Germany: The delegation said that Germany is not an island but part of global developments. In addition to engagement with ISO, DIN is active with CEN TC 225 and with EU projects on RFID. From a national view, it is still a fact that optical identification

techniques are dominant, where the trend to 2D symbols like DATA MATRIX per ISO/IEC 16022 are in the foreground. RFID applications for open supply chain management solutions migrate slow as in other countries, but is gaining increasing ground for special applications that bar code cannot handle. Certainly there are national peculiarities, as in healthcare, such as the application of Data Matrix on delivery notes and for sets of products. The project, "PaperEDI" promoted by the Healthcare Bar Code Council (EHIBCC), is enabling laboratories, hospitals and doctors to enter in the EDI world with the aid of DATA MATRIX as data carrier. The service is already offered by suppliers and distributors in the commercial health sector, so that even dentists can scan delivery documents error free and quickly using DATA MATRIX. Using it, legal requirements for documentation received and used material can be fulfilled easily by optimizing simultaneous handling of internal processes of inventory management, ordering, etc. This as an example how ISO standards can provide benefits within any area but specifically by cross business applications, such as from industry and distribution to health care.

- United Kingdom and France: UK and France also reported on additional activities resulting from activities in the European Union. Specific efforts are to participate with the *"EU RFID Mandate M/436 - Information Technologies and applied to radio frequency identification (RFID) and Systems".* "Privacy" for RFID is of high interest within the European Commission, specifically in connection with the developments for the "Internet of Things (IOT). The AutoID experts are asking for a contribution to establish the balance between fulfilling the public requirements on the one hand, but on the other hand to promote the development on RFID.

The ISO/IEC JTC 1/SC 31 committee meetings

A meeting on the international committee of IT experts, offers far more than the formal aspects work on standardization. Here is the opportunity to exchange experience in practices, trends and specific solutions. Especially interesting, China is looking for an opportunity to gain entry in international affairs. The participation of about 50 experts who meet at a common location, shows the great importance which is given to the ISO standards.
This year, Ms. Karen Higginbottom (Chairman), the representative of the parent Joint Committee 1 (ISO / IEC JTC 1), also participated and provided valuable information on the procedures of ISO administration.

Table 2) The committee meetings

SC 31/WG 5	SC 31/WG 4-RFID	SC 31/WG 2	HoD	SC 31 Plenary
Chair Marsha Harmon RFID Realtime Localization	Chair Henri Barthel RFID Air Interface, Application Interface Protocols, Conformance	Chair Toshihiro Yoshioka Data Structures for automatic identification and item management	Chair Ray Delnicki meeting „Head of National Delegations“ & Convenor	Chair Chuck Biss Full Plenary Meeting Voting Members, National Bodies, Liaisons, Convenors

Table 2 shows the working sessions and the plenary summary on the last day. All other committee's meetings were scheduled separately at different meeting places, such as WG1 "ORM" in May in Stockholm, others in Korea and the UK or were held by telephone conference.

The Mission of the DIN delegation

The order of the 3-member delegation was to represent the interests of the German community for interoperable standards and balanced solutions, e.g.:

- Maintaining the flexibility and capacity for unique ID numbers (license plates) for products, packaging, transport units, containers, etc.
- Focus on the ISO specifications for cross-industry functionality and to avoid licenses wherever possible.

Fig. 6) Josef Schürmann, DIN NIA 31 reports

- Update of the key standards for unique labeling and extensions for "ISO / IEC 15459 Unique Identification" in the "WG 2 Data Structures (for BC & RFID).
- Completion of the "Application Guidelines" with shared data structures for bar code & RFID.
- Compliance with new requirements for control of emission and security but avoiding restrictions for practical applications in supply chain management.
- Lobbying for new solutions to close gaps, such as for "Set labels" and identifying a product set's content in a single scan (see annex).

The preparatory work for the delegation was the job of DIN-043-NA 01-31 AIDC and its members from industry, health and the consumers area, supported by specific associations such as AIM-Germany, CEFIC, EDIFICE, EHIBCC, EDC and liaison partners.

Key standard for BC & RFID " ISO/IEC 15459 Unique Identification"

The topic "unique identification" by ISO/IEC 15459 has the highest priority within WG2, because this standard is a prerequisite for unique marking, whether with barcode or RFID. ISO/IEC 15459 enables fulfilling the requirements for unique identification for tracking & tracing in open supply chain systems. It has been updated and the current draft consists of 6 parts covering the levels from individual items up to Returnable Transport Items (RTIs). The specifications are provided with the identifiers for use in bar code and with object identifiers (OID's) for RFID.

Table 3) The parts of the key standard ISO/IEC 15459 for unambiguous identification

ISO/IEC 15459 Information technology - AutoId and data capture techniques - Unique identification					
Part 1	Part 2	Part 3	Part 4	Part 5	Part 6
Individual Transport Units	Registration Procedures (Registration Authority is NEN)	Common Rules	Individual Products and Product packages	Individual Returnable Transport Items (RTI) & Returnable Packaging (RTP)	Groupings

Parts 1 – 6 totally completes ISO/IEC 15459 for application at every logistical level. With the help of the standardized structure now any product, item or object can be marked uniquely, no matter where the marking or identification takes place in the world.

Upgrade of RFID Standards, integration of techniques for security

WG 4, within JTC 1/SC 31, is responsible for addressing "RFID for Item Management". This WG enjoys very high popularity in the context of development international standards. WG 4 covers the whole range of RFID technologies: RFID Air Interfaces, Application Interface Protocols, Conformance, as well as legal aspects of patents. Any RFID standards for item management passes through that team of experts. The specifications for RFID air interfaces for the frequencies <135KHz up to 2.4 GHz are published and available from national sources and ISO. Facing the availability of the RFID standards today, it has to be recognized that the group and affiliated national bodies did a good job. Now it is the responsibility of the users to derive the benefit from these specifications.

Table 3)
New structure for RFID UHF standard

ISO/IEC ▼	UHF ▼
18000-6	general
18000-61	Type A
18000-62	Type B
18000-63	Type C
18000-64	Type D

Upgrades: Upgrades and expansions are already in work with most RFID standards after the first edition. ISO/IEC 18000-6 incorporated major extensions for sensors and battery assistance. It became so large, that it has been restructured and split 5 into parts (see table 3). In response to the "**Security & Privacy**" discussion in EU bodies and in the public, privacy techniques should be included in the next updates, specifically for the UHF RFID standard ISO / IEC 18000-63. The modules for it are in preparation already with working group „SC31/WG 7 Security on Item Management" under convenor-ship of Dan Kimball (USA). The project title is: "ISO/IEC 29167 Air Interface for file management and security services for RFID".

Optical labelling for RFID tagged products and systems is another requirement addressed by the EC. The Standard ISO/IEC 29160 RFID Emblem meets that requirement. It specifies for optical recognition:
"***Where RFID is in - RFID shall be seen".*** The concept of the ISO RFID Emblem had already received acceptance from the CEN and EC committees in 2010. The graphics of the emblem are available via internet under: www.aimglobal.org/standards/RFIDEmblem.

Fig. 7) ISO RFID-Emblem, source:AIM

Public availability of the listed „RFID Application Family Identifiers (AFI)"
The Application Family Identifiers are, as the name implies, to identify specific applications and their data structures. The list of "AFI's" started with the introduction of RFID technology for smart cards. AFI's consist of registered bit sequences and identify the class of the data information which follows them in a RFID tag, e.g. there are SFI's for Product ID, Packaging ID, Transport ID, etc. These are part of the specific RFID application standards of the ISO TC 122 Packaging committee which has produced the series of standards, ISO 17364 to ISO 17367 for Freight Containers down to item identification. The list of AFI's was included „ISO/IEC 15961 RFID Data Protocol", but the committee felt that the list should be made available to the public on the Internet pages of JTC 1/SC 31 for direct access by users. The plenary agreed and instructed the secretariat to implement this. AIM US declared that they were prepared to serve as a Registration Agency for new AFI's, handling applications for any new AFI's. The latest AFI's have been assigned to the library community to uniquely identify books. The move to more public information shall assist system integrators to ease the implementation of ISO conforming RFID systems, which results in compatibility of equipment and interoperability of tags in conjunction with necessary security features.

Unused bit structures in RFID memory chips

In connection with the publication of the AFI list, the bit structure of the UHF RFID tag memory was discussed because of the need to use it for new applications. The structure of the RFID chip memories is standardized. Segments are reserved for functional control, for the key data element, the "Unique Item Identifier - UII" for the items to be tagged and a separate segment is designated as the user area where the user can store its individual data information. Experts know that one BIT (BIT 17) identifies that either the encoded data is using the EPC structure (BIT 17=0) or using AFI's (BIT 17=1), implementing specific application or item level. In discussion, it was felt that RFID tags would offer much more features if BIT 17 would opened for other usage than only for EPC and AFI features. The discussion was stimulated by reports out of ITU-T groups for adding an additional "bit level" for similar purposes. Experts felt that opening the current bit structure would enable ITU-T to develop new ideas without changing the current standard specification. Changes to the current RFID specification would not be agreed to by JTC 1/SC 31. Experts are asked to supply proposals for updating the definitions in the current RFID memory specifications in order to fulfill new application requirements like those from ITU.

Additional bands for RFID applications still open

JTC 1/SC 31 applied for usage of frequencies to be made available after shutting down of analog frequency bands of radio & television. Nevertheless there are other applicants in competition for these bands, such as satellite radio. It requires much more detailed negotiations by experts like Josef Schürmann (DIN) and Josef Preishuber-Flügl (AN) to get it settled. It is about the use of 4 channels (916,3; 917,5; 919,7 and 920,9 MHz). The result is not foreseeable yet.

Fig. 8) The China delegation

Fig. 9) Josef Preishuber-Flügl, Graz, Austria

"Internet of Things - IoT": RFID support for ITU-T X.500/LDAP"

The Working Group of the International Telecommunication Union - ITU-T/SG 17 - developed a solution that takes into account a unique item identification (UII) of an RFID chip as a reference pointer for access to directories on the net. This is similar to the solution for access by an EPC code, but, as an open system for all participants that have received a unique Company Identification Number (CIN) from one of the 30 Issuing Agencies in accordance with ISO/IEC 15459-2. The actual ITU specification uses the SC-31 definitions for UII's, converting the ID to the X.500 structure, making it compatible. The Ad-Hoc Committee will coordinate with the ITU subcommittee to harmonize the definition. With the help of the ITU, the door for further access to the Internet of things will be opened (Fig. 10). The approach of the WG 6 project „MIIM" is an exmaple, not to restrict access to the network to only RFID but to enable it via Bar code & RFID ID's. WG6 standards help to enable capturing the data by mobile phones. There is still a long way before the "Internet of Things" is complete, since there are groups interested in IoT that are proposing different scopes.

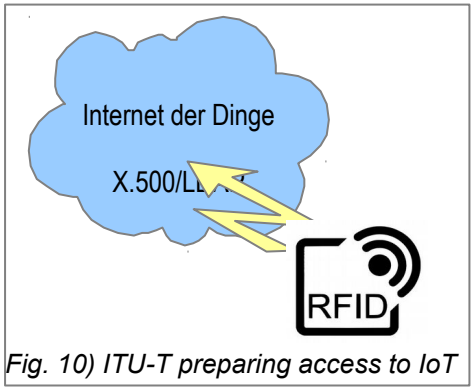


Fig. 10) ITU-T preparing access to IoT

"Guidelines for using AIDC media (Bar code & RFID)"

The project "ISO / PDTR 29162 Guidelines for using data structures in AIDC media" has been assigned to WG 2. The focus is on interoperability and will illustrate how data information is embedded within either Bar Code, 2D or RFID in a fully compatible manner. Implementations where new data sets had to be developed just for RFID applications have proven to be expensive and partly impractical. Moreover, there is no necessity for different data sets between Bar Code and RFID tags applied to same item since "ISO/IEC 15459 Unique Identification" specifies one ID only regardless of AIDC media. This applies to products such as transport units and returnable items, which have separate parts within ISO/IEC 15459 (i.e., part 1 and part 5). In essence, the standards provide the most efficient choice for implementing RFID in existing systems – which is just to use the Bar Code infrastructure instead of generating new references to tagged items. Using the existing references reduces the investments in front end installations where the ERP system may even ignore how the data is being captured from Bar Code or RFID data carriers. Experts from Japan, USA and DE put together principles and facts resulting in the guideline to be published as a Technical Report. It describes how this method can be implemented most easily for efficient systems. In addition to providing guidance for interoperability, it will include solutions on how data can be stored in an RFID chip most compactly to save space and to accelerate reading speed. These will meet the requirements from user groups, such as the "Joint Automotive Industries (Europe, Japan, US)" and many others where a bar code infrastructure is in place but RFID is integrated. Integration of Bar Code & RFID implements a migration path from one technology to the other, but also supplies a back-up using hybrid solutions. Thus, the optical code is used on the ID card as the key to the information in the RFID chip.

The mobile phone as data collection device

Fig. 11) MIIM &QR in Japan, Source: Akira Shibata, Japan

The project “MIIM”, being attractive for applications in many areas, as well as for the public, was assigned to SC31/WG 6. The scope of the project reads: *“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 term “Optically readable media” categorizes the reading of linear Bar Code as well as 2D symbols, like Data Matrix and QR Code. The convener of WG 6 is Craig Harmon (USA). He reported at the plenary on the rapid development of the current nine specifications, which are the modules for MIIM systems: ISO/IEC 29143 and ISO/IEC 29172 to 29179 (Fig. 12). The specifications cover the integration of Bar Code and RFID readers into 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 and supported by the national government is the standardization institute of Korea focusing on the use of RFID by the public. The input from Japan concentrates on interoperable use of ORM, based on their outstanding experience with QR code for public use, e.g. for reservation of cinema tickets by scanning advertisements via mobile phone.

Even in Germany, there is already QR code on advertising media. For example, QR Code is used on posters and at bus stops, for linking the scanning of the QR Code to an internet connection for specific information ("routing"). In order to implement global solutions, of course, international standardization is a prerequisite so that this can be used everywhere.

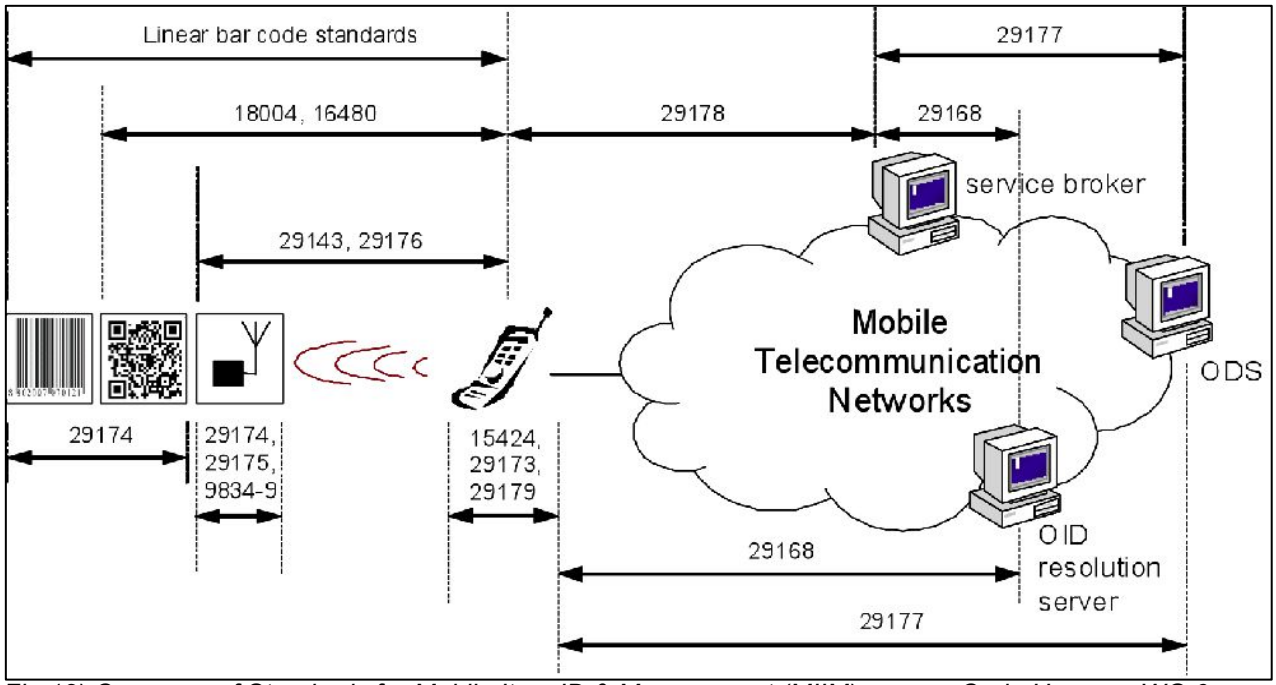


Fig.12) Coverage of Standards for Mobile Item ID & Management (MIIM), source Craig Harmon, WG 6

Bar code quality specifications for mobile phone use

The increasing usage of bar code scanning features of mobile phones is resulting in increasing requirements for quality and test specifications. Mobile phone applications provide the functionality of a bar code scanner and displays become media containing symbols to be scanned. Airliners like Lufthansa and DELTA offer this feature for check in, where the mobile phone display of the 2D symbol will be scanned at the airport.

Existing quality test specifications ISO/IEC 15415, 15416 do not cover this application exactly because the devices use a back lighted display performing totally different than a printed label. SC 31/WG 1 has been charged with the new project titled „*Reading and display of ORM by mobile devices"* (ORM stands for Optical Readable Media).

Quality & test specification for Optical Character Recognition - OCR
This new project has been initiated in cooperation with the committee for smart card technologies JTC 1/SC 17. Convenor is Sprague Ackley, Intermec USA. The project is of special interest to users responsible for passport printing, such as the federal Printing services for the German passports. The OCR text is used as a key to access the data in the embedded RFID chip of the new identity cards. If the OCR characters are not readable, there is no access to the data information. Quality test specifications being used for bar code for some time have been missing for OCR and are now being written, incorporating what has been learned from bar code usage.

Report on the update of global bar code & RFID application standards for Returnable Packaging

Whereas technical specifications are the subject of SC 31, application standards for AutoID are developed by ISO TC 122, WG 10. The chairman, Craig Harmon, reported to the Plenary on the status for both the application standards for Bar Code and RFID and how these standards cover the whole range of supply chain applications.

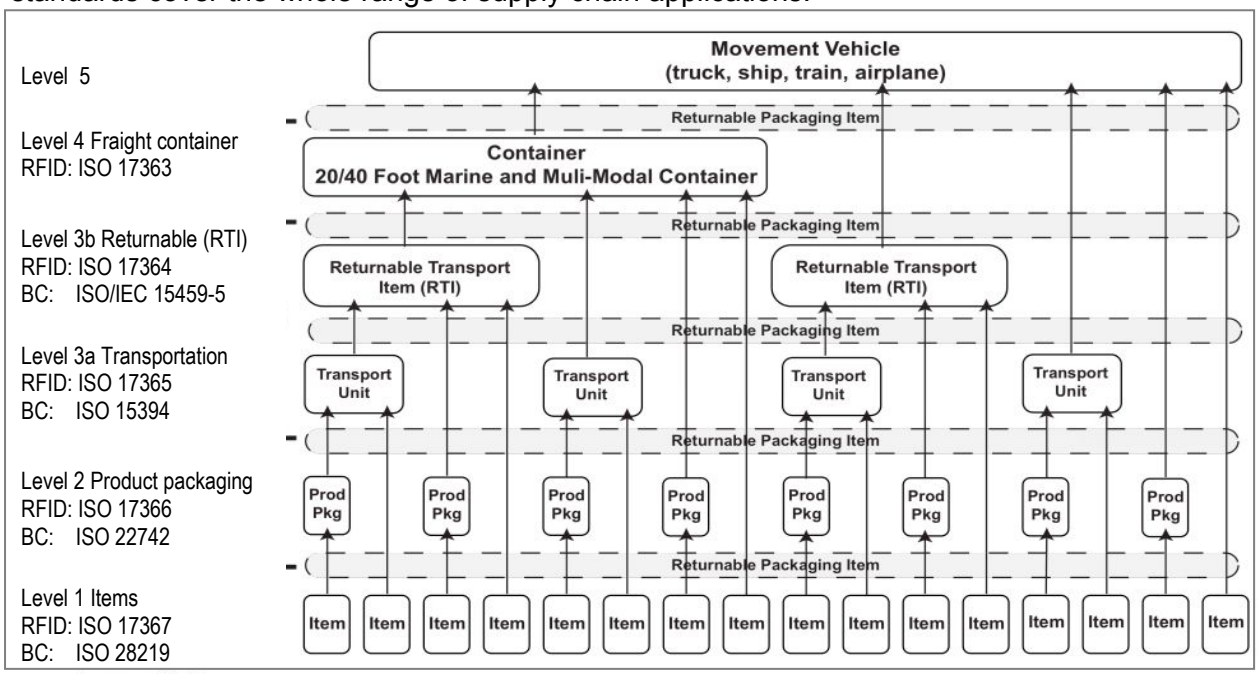


Fig 13) Chart Bar Code & RFID ISO-Standards covering the levels for supply chain applications

Figure 13 shows the layers from item to container, where each layer has one standard for Bar Code and equivalently one for RFID. During the update, an additional layer was introduced, the "Returnable Packaging ID (RPI)". In conjunction with this development, the need for a new Data Identifier crystallized for this specific layer. Immediately after the meetings, the application for that new DI was passed to the ASC DI Maintenance Committee. It took just a few day's to get the new DI registered, the ASC DI 55B for a "Globally Unique Returnable Packaging Item – RPI" (see info box). The application standards use the technical specification for data and carrier, and bundle it in accordance with the implementation. Both ISO 15394 "Bar Code for Transport Units" and ISO 17365 "RFID for Transport Units" use the same unique ID as the mandatory data element, the "License Plate" according to ISO/IEC 15459-1 of SC 31/WG 2. Technology, which depends on the Data Identifier "J", is used for Bar Code in a 1:1 ratio, but for RFID, it is translated into a Bit structure according to the RFID data protocol. A similar principle applies if the AI "00" is chosen for a License Plate. It is translated to an EPC code in this case. In both cases, the ISO conforming decoders and interrogators are

programmed to automatically interpret any combination correctly. The revisions of the RFID application standards, ISO 1736x, contain a harmonized Bit structure of 6 bit's over all layers and link to Bar Code and are interoperable with it. Furthermore, it contains the RFID Emblem ISO/IEC 29160 for visualization of invisible RFID tags for users. The state of standardization constitutes a comfortable situation across industries and countries. It answers the call for more standards but it minimizes it to “one standard only” per layer and technology. Together, these standards provide the necessary flexibility for meeting the requirements of open supply chain processes and offer the capacity for individual numbering schemes of variable length for unique identification wherever needed.

Registration new ASC Data Identifier (DI`s) with the „Maintenance Committee“

The Accredited Standards Committee “ASC” being charged with maintenance of the Data Identifiers ISO/IEC 15418, part ASC DI's, consists of members from ASIA, Europe & USA. One task is the inclusion of new DI's listed within the document, ANS MH10.8.2. Requests for new DI's can come from any user area but require justification for global usage.

Data Identifier „(55B) Global Unique Returnable Packaging Item (RPI)“
The demand for a new DI for RPI's was originated by ISO TC 122, WG 10 in conjunction with updating ISO 17364 RTI. The committee checked the demand and confirmed registration of DI „55B“ for RPI's.

Data Identifier „(25P) Global Unique Personal ID“
Another application for a new DI was accepted that was received from the European Health Industry Business Council (EHIBCC). The new DI "25P" has the definition for unambiguous identification of Patients and Personnel.
Both DI's are available for use with bar code and RFID.

Exchange of experiences in addition to the meetings and individual AutoID solutions

The meeting of experts from all over the world allows enough room for additional issues of individual interest and exchange of experiences. Four members of the ANS MH10.8.2 Maintenance Committee“ for ASC Data Identifiers (DI's) were present, providing a chance for many participants to share information related to specific issues of global uniqueness and trends. Examples are "Paper EDI" with DATA MATRIX on delivery sheets (see report Germany) and "set-label" for identifying all components of a set by a single scan. Both were built from the modules of the ISO standards strictly (see Appendix "set-label"). Even new upcoming requests have been touched by the experts, such as for specific identification solutions for automotive, health care and pharmaceutical areas. Definitely it was not only about "see - and be seen" but more like "listen - communicate & contribute". Committee participation is an ideal chance for not only direct influence on projects but also for taking home new insights.

Coverage under this report

This report has been written to provide an overview of the current standardization work at ISO/IEC JTC 1/SC 31 for AIDC, where some selected detailed information has been added for those with specific technical interest. Certainly not every project of potential interest of specific user groups could be touched on, such as the project ”Real Time Location Systems (RTLS)”, the subject area of WG 5. Nevertheless, there are new developments progressing, such as a standard for the so called ”CHIRP” technology, a localization principle similar to Radar. Even this example shows the wide range of AIDC usage. Those who may not find the desired information or need specific details may contact either the author or www.DIN.de.


Fig. 14) The JTC 1/SC 31 Secretariat

Author:
Heinrich Oehlmann
Chair DIN NA 043-01-31
www.Eurodatacouncil.org
phone: +49(0)3445 78116 0
hotline@eurodatacouncil.org

Tutor for the English version:
Robert Fox, www.Telecordia.com
email: rfox@telcordia.com

Encl.: Appendix 1 to 4

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Annex 1 to:
”Guidelines for using data structures in AIDC media”

The project “Guidelines” shall provide information for understanding how the same data information can be carried by either Bar Code or RFID, that is printed or loaded into a chip. Basic information will include how data elements will be constructed for guaranteed uniqueness within open supply chain systems. Below are some excerpts of contributions to the guidelines.

Target „Unambiguity" and registered Company ID and Issuing agencies for it

Companies can only supply unique codes to partners if the structure has worldwide agreement. The highest level possible for obtaining this agreement is ISO. One group alone can never guarantee that numbering schemes will not overlap with others, but ISO can by its power over the global network. The specification for supplying unique codes is developed by WG 2 and named ”ISO/IEC 15459 Unique Identification”. It defines the rules for how unique codes shall be constructed. The base hierarchical distribution of responsibilities goes to multiple partners. Where the responsibility for the number itself (product code, serial number, Lot, etc.) remains with the labeler. The labeler gets protection from the next higher level, the Issuing Agency, by assignment of a unique Company Identification Number (CIN) just assigned exclusively to him. The Issuing Agency gets its authority from the Netherlands Standards Institute (NEN) on behalf of CEN & ISO. A unique code always consists of the elements “What is it - Who is responsible - What are the data”. The information “What is it” is provided by the proper Identifier defining a product or transport unit or returnable container or just a LOT or a Serial number. “Who is responsible” is defined by the combination of an Issuing Agency Code (IAC) with an assigned Company Identification Number (CIN). Finally the data follows. In conjunction with the prefix Identifier, IAC-CIN, that data is unique regardless of what media will be used. A common term for a unique data element, which is serialized, is the “License Plate” or, in the case of RFID, it is called the ”Unique Item Identifier” (UII) for same thing. To ease understanding of the hierarchy in Figure 15), I will illustrate the structure:
(A) ISO/IEC and CEN authorize **(B)** NEN, Delft (Netherlands) to register ”Issuing Agency Codes (IAC’s)” for **(C)** organizations qualifying for it. Such a registered Issuing Agency (IA) is entitled to register Company Identification Codes. **(D)** A company, having received such a “CIN” is in the position to issuing any internal numbers **(E)** globally unique. Simply, the labeling company puts the CIN with IAC and prefixing identifier in front of their own references and the number gets distinguished from any other companies number in the world, even if it is the same reference value. The prefixing identifier, either an AI or DI. provides for identification of the category of the item, such as serial number or product, Transport Unit, etc.

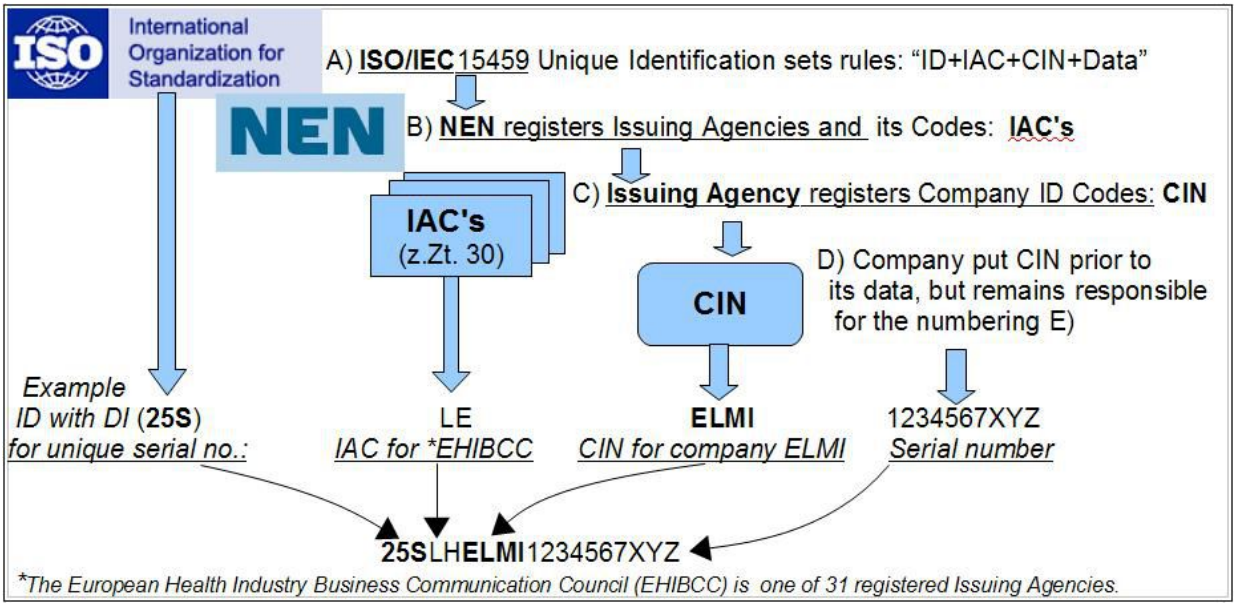

Fig. 15) Hierarchy of distinctiveness for unique Automatic Identification & Data Collection (AIDC)codes

For illustration purposes, Fig. 15 shows a unique data element, with its proceeding data identifier (25S) for globally unique serial numbers. By means of this simple ISO/IEC 15459 method, internal serial numbers will become globally unambiguous even for cross sectorial use. The following chapter will show the relation between Issuing Agency Codes, supported data structures and their capacities.

Annex 2

Company ID Codes and code capacity defined by Issuing Agency

Each Issuing Agency (IA) specifies their own formats for Company ID Codes and defines the data structure to be used for embedding a company's data. The Issuing Agency, GS1, requires the use of GS1 Application identifiers when used with trading partners using the GS1 system, while the other 29 Issuing Agencies use ASC Data Identifiers. This is just a definition by the Issuing Agencies but does not affect the interoperability of the different coding schemes. Companies can choose any Issuing Agency. The choice by a company can be determined by whether their internal coding schemes fit - and which do not - to the structure of the Issuing Agency's code. To make such a decision, it is helpful to know the data capacity of data structures supported by Issuing Agencies prior to the choice. Table 5 shows a selection of IA's and supported CIN structure. It shows the data structure type and specifically for key data elements for products and transport units.

Table 5: Issuing Agencies, IAC's and support of data structures

Excerpt of the list of Issuing Agencies for Company ID's (CIN) ▼	***IAC*** ▼	***Length of a CIN*** ▼	***typical CIN, e.g.*** ▼	***[1]Support for structure & code capacity***		
				Data structure ▼	***Product code 2-20an*** ▼ ***(max. 50)***	***Transport code 2-20an*** ▼ ***(max. 35)***
Eurodata Council (EDC) cross industries	QC	4an	CPRO	ASC	YES	YES
DUN Dun & Bradstreet	UN	9n	123456789	ASC	YES	YES
GS1 and EPC Global	0-9	3-7	1212345	GS1 (EPC)	3-5n	9n
EDIFICE European Electronic Industries Association	LE	3an	IBM	ASC	YES	YES
EHIBCC European Health Industries Assoc.	LH	4an	ELMI	ASC, HIBC	18	YES
ODETTE European Automotive Industry	OD	4an	A2B3	ASC	YES	YES
TELCORDIA ANSI ATIS-0300220 Telecom. Equipment	LB	4an	CSCO	ASC	YES	YES
UPU Universal Postal Union, etc.	J	6an	D00001	ASC	YES	YES

Note: The complete list of registered Issuing Agencies and its codes can be seen in "ISO/IEC 15459

Register for Issuing Agencies" accessible under link:
http://www.nen.nl/Normontwikkeling/Certificatieschemas-en-keurmerken/Schemabeheer/ISOIEC-15459.htm

[1] to "YES" for 2-20 characters: This is the general recommendation but the maximum length is 50 for product codes and 35 for Transport ID codes. Exceptions are the shorter codes of the GS1 structure.

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Annex 3 Identifiers give the code its significance

Examples for 6 categories

A "unique code" must be named as such in order to be identified. This is achieved in machine-readable symbols by leading Application Identifiers (AI's) or Data Identifiers (DI's) conforming to ISO/IEC 15418. GS1 Application Identifiers are always relevant if a GS1 CIN is used, but ASC Data Identifiers are used with any of the other CIN's *(see Table 5)* or when using alphanumeric product or transport codes. Table 6) shows AI's & DI's for 6 selected categories and data capacities involved. The complete set of "ASC Data Identifiers" available today is listed and described in detail in the document, ANS MH10.8.2. The ISO reference is ISO/IEC 15418. In addition to Application & Data Identifiers, it contains the System Identifiers (SI) for inter operable sub-structures, such as the Health Industry Bar Code (HIBC), where the distinct SI is the character "Plus (+)". In addition to showing DI/AI-applications in Table 6, Figure 16 illustrates sequences for unique data elements applied with sample data. For illustration purposes, the same data reference "**0246359X12"** is used for all of the categories below, in order to show how the identifiers distinguish themselves and also make them interoperable.

Table 6) ID categories and related DI's & AI's and

ID for ?	***DI / capacity ?***	***?***	***AI/capacity ?***	***?***
Unique serial no.	25S	2-20(50)	8004	2-22
Unique product code	25P	2-20(50)	01	3-5n
Unique transport code	J	2-20(35)	00	9n
Unique RTI code	25B	2-20(35)	8003	14n+16
Unique Returnable Package Code (RPI)	55B	2-20(47)	-	-
Partner location code	25L	2-20(35)	414	13
Option 3d location code	11L	Lati- +Longi- +Altitude		

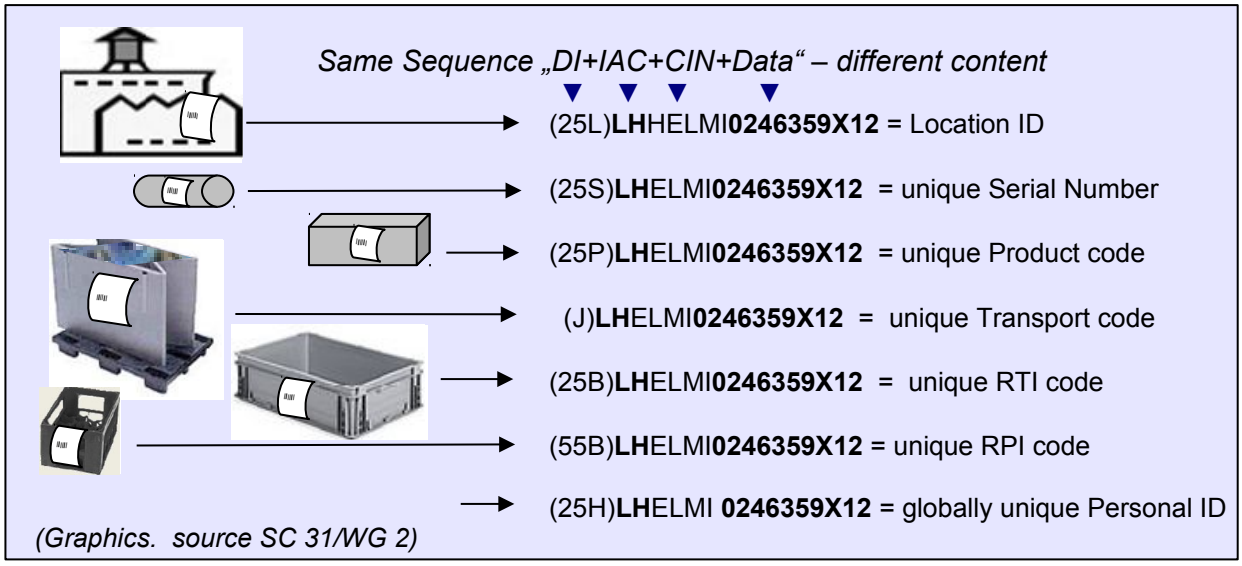

Fig. 16) Examples of how Data Identifiers (DI's) apply the meaning of a data element

Addressing returnable processes, table 8 shows applicable identifiers of the AI/DI list as an excerpt just for identifying returnable items.

Table 7) AI's/DI's for multiple processes

Returnable-	***Process***	***Owner***	***AI***	***DI***	*ISO/IEC 15459*
-Container (RTI)	Return	1	8003	25B	part 5
-Container	Reuse	undetermined	8004	25S	part 4
-Package	Reuse	1		55B	*
Recycling	New provision		8004	25S	part 4

*see ISO 17364 RFID for Returnable Transport Items - RTI

The newly defined ASC DI (55B) "Global Unique Returnable Packaging Item - RPI" was added in conjunction with updating the RFID application standard "ISO 17364 RTI".

Annex 4 Example of consequent use of ISO/IEC standards, the new solution „Set-Label“

Products are generally provided with a single product code, even if a product package contains several sub-products or components as a "Set". This was the case for products in the electronic industry until now. The European association of the Electronic Industry - EDIFICE - took the requirement for a solution to get the whole set content by one scan. The ADC committee of EDIFICE learned from the experience with the "PaperEDI" solution, where the whole content of a shipping container was placed in a code on a transport label. So why not put the content of a "Set" in a product master code? The group found the solution by using ISO/IEC standard modules and parts of the PaperEDI standard from the liaison partners EHIBCC and Eurodata Council and adjusted it to meet the actual requirements for scanning product set's. The first step is to assign a high-level reference code to the bundle of products and components. Then the sub-products and components will be put in a hierarchical structure using the ASC Data Identifier "F" defined for creating hierarchical levels. As data carrier, DATA MATRIX has been the choice for now but there is no reason not to allow QR Code or any other 2D symbol fulfilling the task of high capacity encoding. As an overall syntax, ISO/IEC 15434 has been chosen.

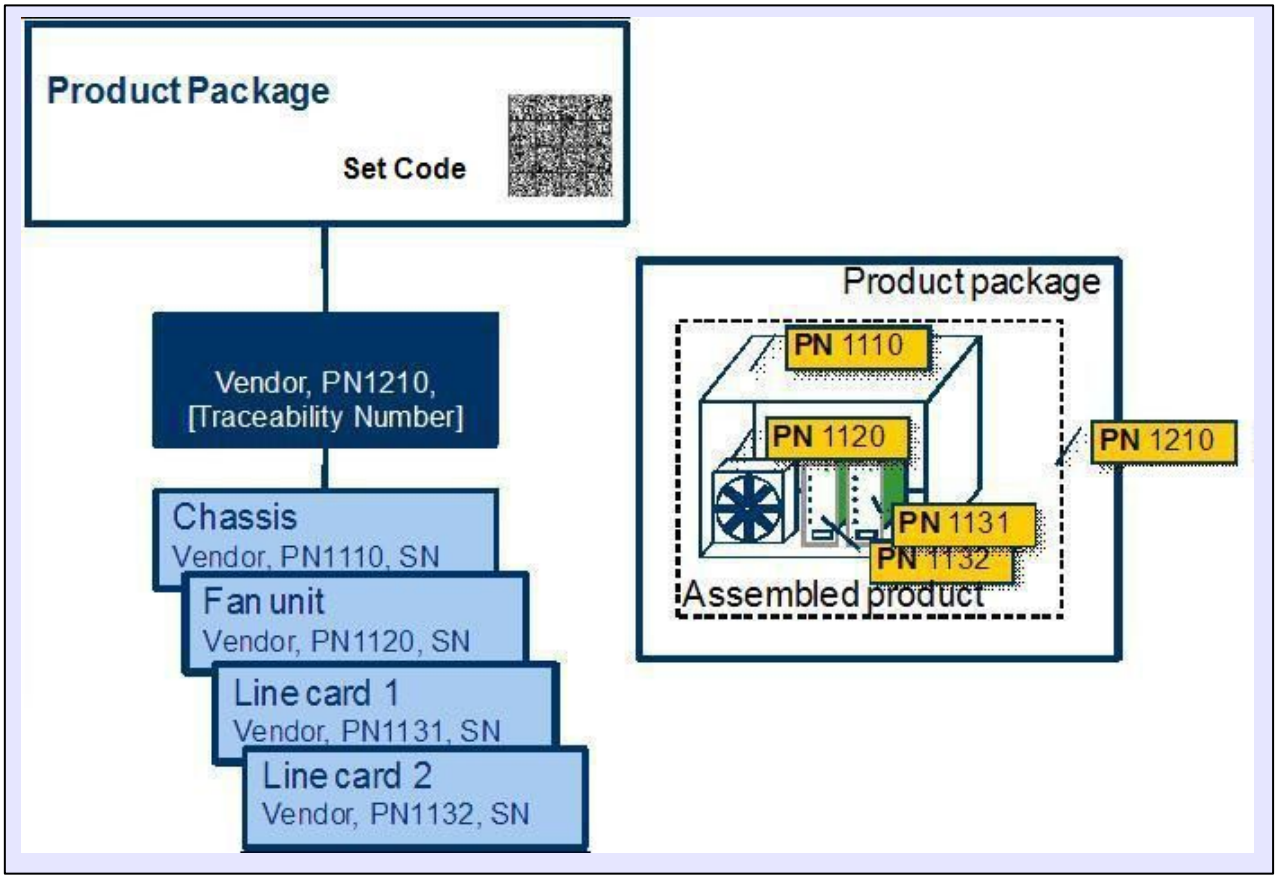

Fig. 17) Set-Label: DATAMATRIX carries product reference and embedded unique components (source: www.EDIFICE.org, Set-Label 2011, fig. 4)

Scanning the "Set Code" the data will be reconstructed after transmission and shown in the original context. This can be done by using a mobile device or with an ERP system. Practical applications are marking electronic equipment, such as computers, where the built-in components become visible without opening boxes just by scanning the set label. Look-up in data bases can be avoided. This is one example of consequent use of ISO/IEC standards for optimizing handling and processes and an example of co-operation between industry associations and its results.

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Annex 5 Selection of AutoID Standards

Documents of ISO/IEC JTC 1/SC 31/WG 2 Data Structure“
ISO/IEC 15418 GS1 Application Identifiers and ASC Data Identifiers
ISO/IEC 15459 Unique Identification, Part 1 to 6
ISO/IEC 29162 Guidelines for using ADC Media (Bar code & RFID)
Documents of 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, part 61 bis 64 REV1 (incl. 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 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, 15962: RFID Data protocol – Update
ISO/IEC 15961-4: Sensor commands (NP)
Documents of SC 31WG 5 MIIM
ISO/IEC 29172-19179 Mobile item identification and management
ISO/IEC 29143 Air Interface Specification for Mobile Interrogators
Documents of SC 31WG 7 Security Item Management
ISO/IEC 29167 Air Interface for file management and security services for RFID
Documents of the liaison for BC&RFID -application standards: ISO TC122/WG 10
ISO 22742 Linear bar code and two-dimensional symbols for product packaging
ISO 28219 Labeling and direct product marking with linear bar code and 2d- symbols
ISO 15394 Bar code and 2d- symbols for shipping, transport and receiving labels
ISO 17363 Supply chain applications of RFID – Freight containers
ISO 17364 Supply chain applications of RFID – Returnable transport items
ISO 17365 Supply chain applications of RFID – Transport units
ISO 17366 Supply chain applications of RFID – Product packaging, and
ISO 17367 Supply chain applications of RFID – Product tagging
DIN standards
DIN 66401 Unique Identification Mark – UIM
DIN 66401 System Identifiers
Additional application standards
Global Transport Label V3, www.odette.org
Global Guideline for Returnable Transport Item Identification
GS1 Global Specifications, www.gs1.com
HIBC Health Care Bar Code standard, www.hibc.de
PaperEDI standard, www.eurodatacouncil.org
Set Label standard, www.edifice.org (release announced for Juni2011)

Note 1: ISO-, CEN- and DIN-Standards are available from www.DIN.de
or from any other national Normalization Institute like ANSI, AFNOR, BSI, etc.
Note 2: For further information, contact the author <heinrich.oehlmann@eurodatacouncil.org>
or DIN NA 043-01-31 or any national standards institute

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