ISO Report AIDC 2015

Automatic Identification & Data Capture

Report on continued standardization of Bar Code, RFID & Data Communication

Fig. 1) Attendees at ISO/IEC JTC 1/SC 31 Meeting 2015, host: CANADA

Flags of member Nations of ISO/IEC/JTC 1/SC 31 (partial)

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

.. and contributing organizations like

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

and other contributors and liaisons such as JTC1/SWG10, IEEE, etc.

Editor Heinrich Oehlmann
chair DIN NIA 043-01-31 AIDC
in cooperation with AIM, DIN, EDIFICE, EHIBCC and liaisons

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AIDC - Automatic Identification & Data Capture

Report on the continued standardization of Bar Code, RFID & Data structures

This report focusses on the 21st ISO/IEC JTC 1/ SC 31 plenary meeting in Montreal, Canada but will include highlights of AIDC technologies and applications as subject of the meetings or discussions and exchanges outside the sessions as noted by the author.

- AIDC links the digital world with the Internet
- Digital Agendas, Internet of Things, INDUSTRY 4.0
- The 21th SC 31 meetings June 1 to 5, 2015
- Extracts from reports of the working groups
- Contributions from the National Institutes on AIDC
- Security for RFID & Digital Signature to secure 2D & RFID
- New developments: Han Xing Code, Rectangular Data Matrix
- AIDC driven Immediate Internet of Things solution
- Attachments with a quick guide, list of Issuing Agencies and selection of AIDC Standards

AIDC links the digital world with the Internet - Strategic aspects of standards

Governments seek for market development of markets by technology. IT and communication are seen as horses to develop new business by Digital Agendas. Internet of Things (IoT), Machine to Machine (M2M) communication, INDUSTRY 4.0 (I4.0) are terms standing for such horses supported by governments and driven by industries. An initiative of DIN was accepted by the ISO Technical Board to open a I4-0 steering committee with participation of countries like China, France, UK, Japan, Germany and others like JTC 1/WG 10 IoT, ISO/TC 108 Automation and IEC/SG 8 Smart Manufacturing.
Europe started a special program to develop the "digital market". With document, Bruxelles, 6.5.2015 COM(2015) 192 final, **Jean-Claude Juncker** stated: *"Enhancing the use of digital technologies and online services should become a horizontal policy, covering all sectors of the economy and of the public sector"* and under *"1. INTRODUCTION: WHY WE NEED A DIGITAL SINGLE MARKET: The global economy is rapidly becoming digital. Information and Communication Technology (ICT) is no longer a specific sector but the foundation of all modern innovative economic systems. The Internet and digital technologies are transforming the lives we lead, the way we work – as individuals, in business, and in our communities as they become more integrated across all sectors of our economy and society."*
Standardization is a key to make it happen and to set local systems for world wide connectivity e. g. via the Internet. IoT and M2M communication are seen as technology driven tools for linking objects and systems. Concepts like "Industry 4.0" of the German Government take it as modules for consequent digital automation as part of the Digital Agenda.

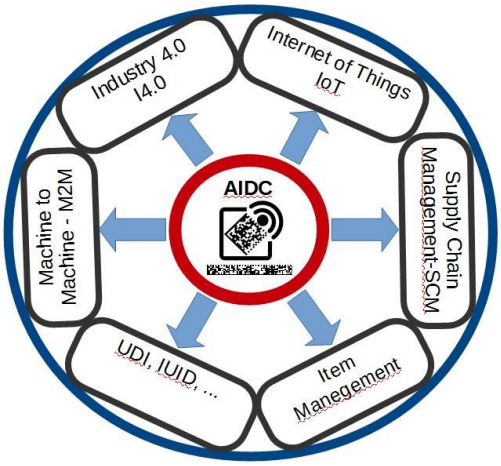


Fig. 2) The key role: AIDC supplies true data real time and safe

AUTOMATIC IDENTIFICATION & DATA CAPTURE (AIDC) play's a key role as "the module" for communication between THINGS and MACHINES supplying true data real time and safe (Fig. 2)
In Healthcare regulators like the International Medical Device Regulators Forum (IMDRF) discovered that AIDC can contribute to traceability and patient safety and started the international project UNIQUE DEVICE IDENTIFICATION (UDI). UDI includes AIDC for product labeling and corresponding data in central data bases. US put UDI to law already and any Medical Device entering in the US market is subject of the legal requirements. It includes UDI conforming labeling and storing UDI data in the Global UDI Data Base (GUDID). The project is proceeding in Europe as well, where anything is in preparation by the European Parliament and specifically by the European Commission preparing the legal requirements in detail. UDI is expected to start in Europe 2016 following Turkey and US. The change is, that unique labelling, by AIDC is not a voluntary matter anymore but a legal requirement.

I**SO/IEC JTC 1/SC31 is delivering the key standards for unique identification** of items, products, transport unit, any handling unit and even for locations and process related objects and attributes. This report will supply an insight in the processes of standardization of AIDC as a small spot of the complex scenery of technology and its application.

AIDC standardization

AIDC has got a key role where ever data are to be captured automatically, quick and safe avoiding manual entry and errors. AIDC includes optical codes and RFID technologies but also the data structures for the computer communication. ISO standardization enables cross company, cross country and worldwide use of AIDC technologies for common benefit.

Fig. 3) Claude Tetelin & Gérard Dessenne

Since publication of the first bar code standards, e. g. Code 39 in 1981 by AIM, the committee ISO/IEC JTC 1/SC 31 (in short "SC31") became appointed 1996 to take the responsibility for AIDC technologies in general. Above the technologies other ISO committees and industry groups take the technology standards forming applications with it, like ISO TC 122 developed the application standards for bar code and RFID applications for the logistical levels in the supply chains. The founder member CEN TC 225 is now liaison committee maintaining the European 3-language versions of AIDC standards.

Claude Tetelin, chairman of CEN TC 225 represented the European standardization Committee joined by Gérard Dessenne, both delegates from France (Fig. 3). Still there are European Standards (EN) in development for specific projects not having reached the ISO level yet, e. g. the EN for the "Electronic Identification Plate". Nevertheless the ISO level is the highest level possible to get standards published worldwide. National standardization institutes send experts from industry and healthcare to the meetings for moving the projects forward. The ISO standards are referenced in branch standards and become part of other standards where elements from ISO are inserted into application standards as in the Global Transport Label (GTL) of the Automotive Industries, the Serial Shipping Container Code (SSCC) of GS1 and the "Set Label" of the Electronic Industry (EDIFICE) just to mention some of many examples. Even governmental entities like Food & Drug Administration (FDA-US) recognize the key role of the ISO standards by referencing to ISO/IEC 15459 Unique Identification, like seen with the project "Unique Device Identification (UDI).

The structure of ISO/IEC JTC 1/SC 31

SC 31 gets supervision from the Joint Technical Committee JTC1 of ISO with secretariat in Geneva. The current Chairman is Mr. Dan Kimball (Fig. 4), Central ISO Secretary contact in Geneva is Maho Takahashi. Between 1996 and now 113 AIDC standards have been published. Some are already in the review process and new projects are also in the pipeline. The work is undertaken by expert delegates from national standardization institutes and liaison organizations. The projects are dedicated to responsible working groups (see table 1) being open for delegates of the national institutes. For taking new work items a simple rule applies: 5 nations shall name one expert for active contribution to a project requested by a member.

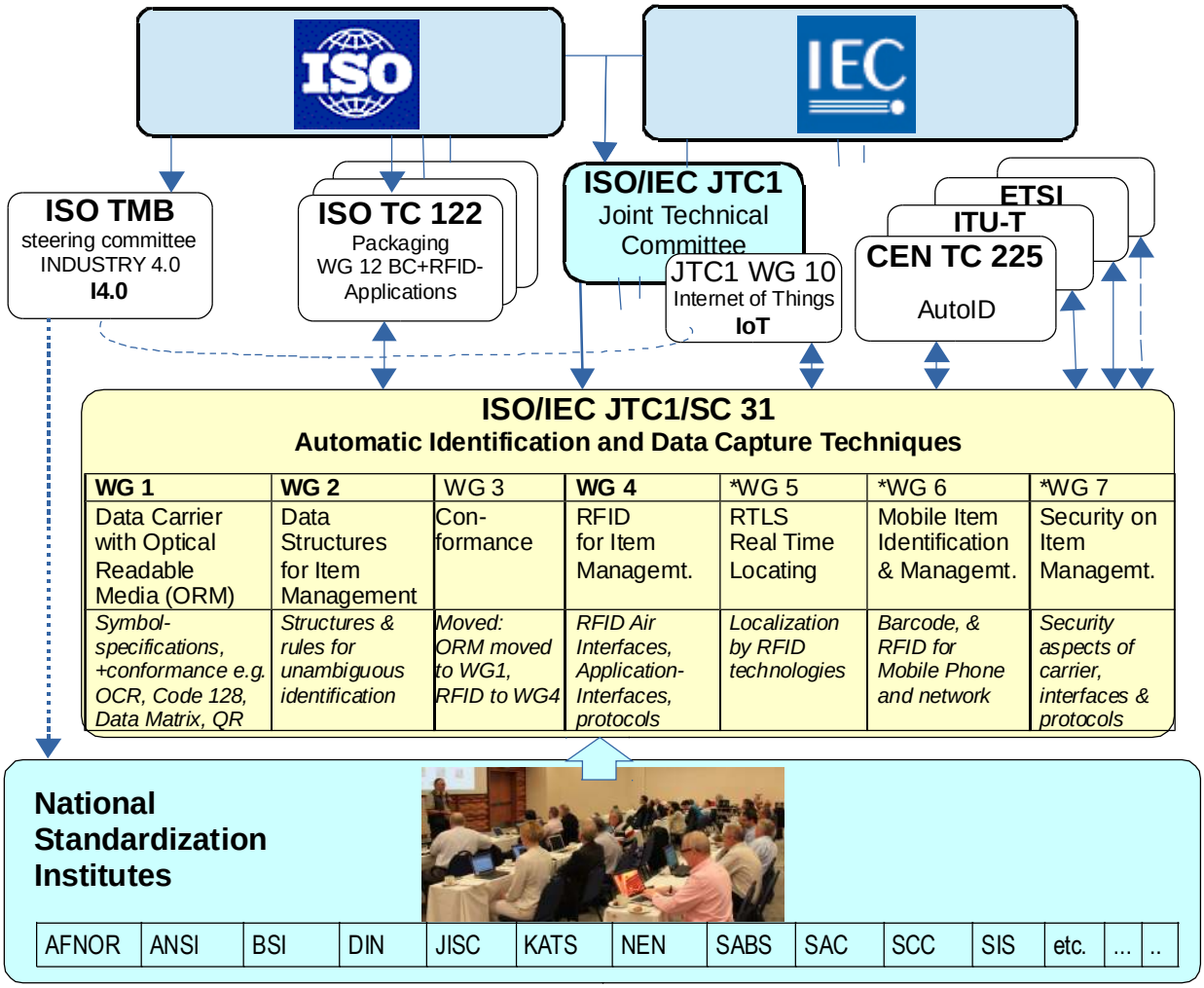
Fig. 4) Dan Kimball, Chair SC31

The 21th SC 31 meeting sequence June 1 to 5, 2015 on AIDC standardization

Prior to the Plenary Meeting, other meetings took place same week taking advantage of the presence of the experts. This year, meetings of the following groups took place: WG4/SG6 RFID Performance (34 participants of 12 countries), WG 2 Data Structures (39 participants, 12 countries), WG 7 Security (46 participants, 23 countries), WG 4 RFID (51 participants, 13 countries), Head of Delegation (HoD) meeting (23 participants, 12 countries) and ISO training session for editors. The SC 31 full Plenary Meeting (51 participants,16 countries) finalized the meeting sequence. The full plenary meeting was chaired by Dan Kimball. Conveners of the Working groups reported about the success of the projects, liaison officers about co-operational issues and national delegates about national highlights on AIDC. Printing the resolutions SC 31 does not produce any meeting report. The report you are now reading has been written from the prospective of the author with the intention to allow insight into discussion points, actual AIDC issues and further developments.

Next plenaries:
2016 June 6-10. Saporo
2017 Glasgow, Scotland
2018 Americas or South Africa
2019 Asia/Pacific

Table 1) ISO/IEC JTC 1/SC 31 AIDC links and working groups (WGs)



**Note: Optimization process of SC 31 includes that WG 5, WG 6 and WG 7 are in move to merge into WG 4.*

Working Group 1 – Data Carrier, Convener Sprague Ackley, USA (Fig. 5)

Fig. 5) Sprague Ackley

WG1 is the responsible working group for Optical Readable Media (OMR) including linear symbols, 2-d symbols, OCR and quality measurement specs. All major bar codes and 2d-symbols are under management of WG1, e. g. ISO/IEC 16388 Code 39, ISO/IEC 15417 Code 128, ISO/IEC 16022 Data Matrix, ISO/IEC 18004 QR Code. As a result of the joined project with SC 17/WG 3 (Card technologies) "ISO/IEC 3116 OCR B Quality" is nearing publication required by applications like passports and ID Cards. Sprague Ackley reported about the progress of Direct part marking quality guidelines ISO/IEC 29158, Mobile phone bar code quality ISO/IEC 16480, ISO/IEC 15438 PDF bar code and finally on Han Xing Code being on the work programm as well (see below). He expects some new projects in the near future like rectangular Data Matrix.

Han Xin Code becoming ISO/IEC standard

Wang Yi, delegate of the Chinese delegation (Fig. 6), highlighted on Hang Xin with his national report. Han Xin Code is Chinese Standard and AIM Standard. The code is capable for Unicode CJKV character set Chinese native version and includes printing opportunities for labeling and DPM being resistant to dot failures. He reported about latest applications for "financial bills" and in Hospitals for Patient registration processes and Blood testing laboratories. Han Xin Code has been accepted project **69321** by voting for becoming ISO/IEC 20830 standard within 48 month. He reported on RFID becoming popular mentioning specific projects like RFID for equipment management, "e-seal" for containers and smart RFID Tags for Electronic Toll Collection (ETC) for waterways.

Fig. 6) China Delegation
+ delegate of Taiwan (yellow stripes)

Rectangular Data Matrix size extensions for items of very small height

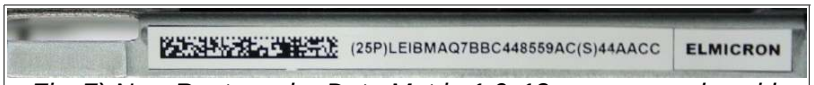


Fig. 7) New Rectangular Data Matrix 1.6x13mm on an edge side

Data Matrix can do more. The consortium of AIM, IFA, EHIBCC, EDC and DIN took the initiative to investigate how to get more rectangular sizes of Data Matrix to increase the capacity for codes of small hight. Items of smallest height like electronic components, medicinal products, medical devices, etc. are waiting for a code carrying the required data volume for traceability information. The solution found was the design of 12 additional rectangular matrix formats that match to the immediate demand. Fig. 7) shows that the new format 8x64 dots for 48 numerics (n) or 34 alpha numeric characters (an) will amount to just 1.6x13mm with dot size 0.2mm (8mil).
The technical specification has been published already by AIM DACH as "Data Matrix Rectangular Extension (DMRE) 1.01" April 23, 2015 and adopted as DIN project. DMRE will be published as DIN 16587. DIN has been asked to prepare the specification for SC 31 to process it there. It is proposed to call the specification "Rectangular Data Matrix" in order to differentiate to regular Data Matrix.
Software engineers from Code Corp., REA Electronic and other suppliers of printing and reading equipment confirmed to have managed upgrades for existing equipment within hours meaning between half a day and a day inclusively testing.
The solution has been presented in Montreal with the German National Report. The Chairman of WG1 underlined his interest waiting for submission of the new project. Experts like Mr. Wang YI (Chinese National Delegation) and Steyn Geldenhuys (South Africa Delegation) declared immediate interest for becoming member of the project team. Meanwhile applications for Rectangular Data Matrix are in preparation like Traceability Codes on small medicinal product packages (Fig. 8) and Health Industry Bar Codes (HIBC) for medical devices.

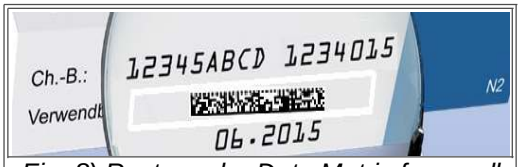


Fig. 8) Rectangular Data Matrix for small medicinal product packages

Working Group 2: Data Communication & Data Structures

Convener Toshihiro Yoshioka, Japan

All key standards for ensuring the uniqueness of Barcode & RFID are under the responsibility of WG 2. At the top of the projects stands "ISO/IEC 15459 Unique Identification" with specific parts for uniquely identifying items, transport units, returnable containers. Notable is that the standard defines the hierarchy of unambiguity by shared responsibility for the parties involved: ISO, Registration Authority (RA), Issuing Agency and Labeler (see Annex 1, Fig. 19). Other base standards under WG 2 are ISO/IEC 15418, 15434 and 29161 (see below). Appointed editor is Mikael Hjalmarson, ERICSSON, HoD Swedish Standards Institute (SIS) and Chair EDIFICE (Fig.9). One more project has been assigned to WG 2, the Digital Signature meta structure ISO/IEC WD 20248 (see separate chapter below)

The standard ISO/IEC 15418 is a base document for AIDC applications. It refers to the maintenance committees each for the ASC Data Identifiers and for the GS1 Application Identifiers. The standard has been put under revision in order to update address and link to the Material Handling Institute having taken over the maintenance for the ASC Data Identifiers (see box "New DIMC Chairman).

ISO/IEC 15459 Unique Identification

This is the key standard for achieving uniqueness cross company, cross industries and world wide.
The ISO/IEC 15459 parts:

- Part 1: Individual transport units
- Part 2: Registration procedures
- Part 3: Common rules
- Part 4: Individual products & product packages
- Part 5: Individual returnable transport items (RTI)
- Part 6: Groupings

Bill Hoffmann, new DIMC Chairman for ASC Data Identifiers and new link to list of ISO/IEC 15418 GS1 Application Identifiers and ASC MH10 Data Identifiers
The ASC DI Maintenance Committee (DIMC) had to get a successor for Craig Harmon who led the committee since 1992 up to July 3, 2014. The DIMC is consisting of experts of different industries and nations across the world. Bill Hoffman's, HOFFMAN SYSTEMS LLC. first act was it to process open ASC DI requests through the committee. Meanwhile a number of DIs have been approved requested by industries and health care:
13E 13E, MSL Class – Moisture sensitivity level
27Q to 31Q for monetary values, discounts tax
27B Globally unique asset identifier of a Large Load Carrier (LLC)
28B Globally unique asset identifier of a Small Load Carrier (SLC)
29B Globally Unique Returnable Packaging Item (RPI)
52P Color of an item
The link to the „Standard under Continuous Maintenance ANS MH10.8.2", which contains the list of DIs + AIs is now hosted by Material Handling Institute (MHI) Charlotte, NC, USA at his URL: http://www.mhi.org/standards/di

ISO/IEC 15459 Unique Identification (continued)

Due to the move of the maintenance of the ISO/IEC15459 Issuing Agency Registry from NEN to AIM°Global the part 2 of ISO/IEC 15459 had to be updated by the new contact address with the link to the list with 36 registered Issuing Agency Codes. The latest document
REGISTER of ISSUING AGENCY CODES for ISO/IEC 15459 (see Annex 4), is accessible through the link: → *www.aimglobal.org/?Reg_Authority15459*

Project ISO/IEC 29161 Data structure - Unique identification for IoT

Mikael Hjalmarson (Ericsson) HoD Sweden (Fig. 9) was appointed as convener for the project ISO/IEC 29161 at the plenary meeting. It addresses unambiguous identification for IoT using SC31 standards but also numbering schemes coming from other technologies like sensors. Following the very efficient scheme of ISO/IEC 15459 and its registry of Issuing Agency Codes (IAC) the 29161 developed a list of "BINARY IACs – BIAC" in digital interpretation. The representative of AIM, Chuck Evanhoe, declared prepared to check whether AIM could take the registry as an addendum to the ISO/IEC 15459 IAC Registry.

Fig. 9) Sara Norman (SIS) and Mikael Hjalmarsson (ERICSSON)

Working Group 4, RFID

Convener Henri Barthel, Belgium

Fig. 10) RFID Emblem for UHF devices

WG 4 is responsible for the technological ISO/IEC standards for RFID. The RFID standards of the ISO/IEC 18000-xx series are building the base for implementing RFID technology in the markets. This includes the standards for Air Interfaces Low Frequency (LF), High Frequency (HF), Ultra High Density (UHF, Fig. 10) and Microwave jointly with the relevant standards for conformance and data protocols. In the course of optimizing SC 31, the projects of the WGs 5, 6 and 7 will now be included in WG4 with Crypto suites ISO/IEC 29167-X (10 to 22), Crypto suite conformance ISO/IEC 19823-X, Air interface conformance ISO/IEC 18047-X and test methods for RTLS ISO/IEC 24769. The Data Constructs Steering Committee of WG 4 is responsible for handling registration of Application Family Identifiers (AFI). *AFIs identify application relevant categories (families) of RFID Tags data content, e. g. application of RFID for products or transport units conforming to the RFID application standards ISO 17363 to 17367. Other AFIs indicate application of card technology, RFID on Air baggage and containers (IATA), library books (EDItEUR) or on Blood products (ISBT). The registered AFI values being under the responsibility of SC 31 are listed in the standing document ISO/IEC 15961-2 Data Construct Register accessible via the SC 31 internet page.

**Note: Application Family Identifiers (AFIs) as specific bytes in an ISO/IEC 18000-63 tag permit to separate tags among themselves in a given application so that the interrogator only talks to those tags having the correct AFI being requested, hence allowing a quicker data capture. AFIs are also used for "filtering" specific RFID tagged objects like filtering just baggage to pass a specific RFID gate and to stop any other objects at this gate like product packages or other tagged items.*

Security for RFID

Convener Josef Preishuber-Pflügl, Austria

The architecture of RFID Security and file management for RFID air interfaces series ISO/IEC 18000 has been assigned to WG7, right now moved back to WG 4. Target is not to develop new encryption methods but to identify common encryption schemes suitable for adoption with AIDC applications specifically with for RFID.
"ISO/IEC 29167-1 Automatic identification and data capture techniques -- Part 1: Air interface for security services and file management for RFID architecture" was the base standard for the parts defining different cryptography methods like "Part 15: Crypto suite XOR" and "Part 19: Crypto suite RAMON", to name two of the options. Encryption will surely be useful for securing user segments of RFID Tags. Most relevant options will be adopted by specific applications and parties interested in encryption of data specifically in the user memory. However, for simple Tag IDs, encryption might be too havy (or too excessive) where Unique Item Identifiers (UII) might remain as they are as purely a UII for open access and general use. If encryption might be required for single data elements in RFID or non RFID carriers of small capacity, then the solution below might be appropriate.

Digital Signature Meta Structure to secure codes ISO/IEC WD20248

Fig. 11) Bertus Pretorius presenting DigSig for securing codes

The delegates Bertus Pretorius (Fig 11) and Steyn Geldenhuys presented the standard “SANS1368 - Digital Signature Meta Structure” (ISBN 978-0-626-30059-3) for securing bar codes and/or RFID content having passed to SC 31 for publication as ISO/IEC 20248. Under http://en.wikipedia.org it is already to read:
"ISO/IEC_20248 Digital Signature Meta Structure specifies a method whereby data stored within a barcode and/or RFID tag is structured and digitally signed. The purpose of the standard is to provide an open and interoperable method, between services and data carriers, to verify data originality and data integrity in an offline use case. The ISO/IEC 20248 data structure, in short "DigSig", refers to a small, in bit count, digital signature.”
The ISO/IEC 20248 data structure is also called a "DigSig" which refers to a small, in bit count, digital signature. ISO/IEC 20248 also provides an effective and interoperable method to exchange data messages in the Internet of Things [IoT] and machine to machine [M2M] services allowing intelligent agents in such services to authenticate data messages and detect data tampering".

Fig. 12) Secured Code scanned by smart phone

The functionality was demonstrated live by means of the Australian sample licence plate applied with a secured QR and RFID tag. The QR Code and RFID can be read and checked with a smart phone. This standard provides inter technology (within AIDC) and inter domain (data owners) interoperability. The project performs to become ISO/IEC standard. The project has been assigned to WG 2 – Data Structures becoming ISO/IEC 20248.

Internet of Things (IoT)

Fig. 13) Detlef Tenhagen (Germany), member of JTC1/WG10 IoT

The concept of IoT includes many facets. There are many different groups working on IoT projects. These groups include organizations working on Machine to Machine (M2M) connection and Smart Grid. On ISO/IEC level the Joint Technology Committee 1 (JTC 1) established the committee ISO/IEC JTC 1/WG 10 IoT in order to bring transparency in the jungle of different interpretations and views on IoT but not necessarily to develop IoT standards. An adhoc is investigating IoT drivers and market requirements for Internet of Things. SC 31 is contributing by liaison, the appointed liaison officer is Gérard Dessenne.

IoT and AIDC

IoT and AIDC are closely linked where AIDC provides the unique IDs of the THINGS. The US association “RAIN” under lead of Steve Halliday estimates major growth of UHF RFID due to IoT developments but there are not many qualified mark points where AIDC is a recognized part of IoT systems yet. In order to proceed in position AIDC in IoT systems in a standardized manner the ISO TC 122 WG12 started 4 projects already in 2012 addressing IoT in the Supply Chain which have to be completed:

- NP 18574 Internet of Things (IoT) in the Supply Chain – Containerized Cargo
- NP 18575 Internet of Things (IoT) in the supply chain -- Products & product packages
- NP 18576 Internet of Things (IoT) in the supply chain -- Returnable transport items (RTIs)
- NP 18577 Internet of Things (IoT) in the supply chain -- Transport units.

The 4 projects fit in the multiple level scheme of ISO 17363 to 17367 for AIDC applications with Barcode and RFID adding the IoT connectivity for
Products & Packages, Transport Units, Returnable Transport Units, Containers.

SC 31 is delivering the technology modules for TC 122 e.g. the key standard for unambiguity of item IDs which is ISO/IEC 15459 Unique Identification but also the new work project ISO/IEC 29161 Data structure - Unique identification for IoT. Discussions are ongoing to move the IoT relevant AIDC series of standards to SC 31 completely. One reason is that active work of TC 122 WG12 is delayed after Craig Harmon's passing away.

Immediate IoT solution
by Pointer to Process (P2P) and Product-to-Internet communication

QR Code shows how easy it is to get access to information stored somewhere in the net. On the other hand an Internet link in a QR does not allow unique identification nor tracking & tracing nor secured functionality. The [1]Joint AIDC Experts Group of Industries and Healthcare took the initiative to develop a "light IoT" system not by replacing a unique item code by a URL (as done in regular QR) but by combining item data with a portal URL. That URL shall allow "pointing to a process" for immediate internet response dedicated to a specific item. The response can enable automatic access to Material Safety Data Sheets (MSDS) to maintenance instructions and it could even link to a dialog for a specific process like maintenance. On the request the ASC DI Maintenance Committee (DIMC) registered two ISO/IEC 15418 ASC DIs for the purpose, the URL DI "33L" just for adding a URL to a unique item code and as second the **Pointer to Process (P2P) DI** "34L". DI "34L" includes a process after scanning for generating a "Target URL" out of the item data and the connected P2P URL. The after scan generated URL will point to the intended process e. g. linking straight to information e. g. dedicated to a specific serial number of a product.

Fig. 14 – Smart phone for "Product code-to-Internet-communication" per Data Matrix and P2P-App

P2P applications

can be built by any labeller on its own as "IoT Light" system without any assistance of service providers in the net. The application can be designed and run in house for servicing customer by opening information sources or dialogs by help of the item data anyhow needed for traceability. DIN found the P2P concept (Fig. 14) interesting enough to apply for sponsoring a project with the help of the German Ministry of Economy and Technology. Meanwhile *Elmicron.de* got charged with developing the pilot system as a base for a potential application standard for individual "Light IoT" applications. Tools and P2P Demo Kit are freely available for parties interested in immediate application. Immediate P2P IoT can be implemented as an add to any control and traceability code build in ASC MH 10 Data Identifier structure (e.g. fig. 15) and ISO/IEC 15434 Syntax, format "06".

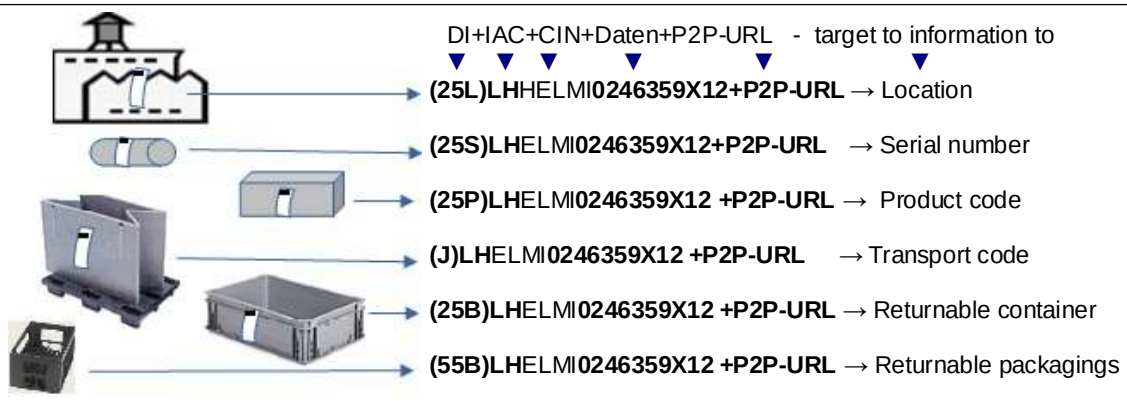


Fig. 15) P2P extension for 6 levels of Codes *(Graphics source SC 31/WG 2)*

Already the P2P solution has been adopted by DIN 66277 Electronic Name Plate completing the 2d + RFID hybrid solution with a link to Internet sources for object relevant information as by the committee for "IEC 62090 PRODUCT PACKAGE LABELS FOR ELECTRONIC COMPONENTS USING BAR CODE AND TWO-DIMENSIONAL SYMBOLOGIES".

[1]Joint AIDC Experts Group of AIM DACH, EDC, EDIFICE, EHIBCC

Product verification & identification – report on the IFA Coding System

The national report of Germany included information about the IFA Coding System combining two functions with a product traceability code: Unique identification for logistical handling and secondly verification for anti- counterfeiting purposes. The IFA Coding System is using modules of SC 31 purely like ISO/IEC 16022 Data Matrix (Fig. 16), ISO/IEC 15434 Syntax and ISO/IEC 15418 Data Identifiers. The core is the "Pharma Product Number (PPN)" having got the assigned individual ASC Data Identifier "9N". The PPN offers capacity for any National Trade Identification Number (NTIN) by use of a globally unique flag. Each variable data element is flagged by an ASC Data Identifier like "S" for Serial Number and "1T" for the LOT, etc. Verification is enabled by a central data base where the manufacturer stores the (randomized) serial numbers for packages being sent to the market. The Pharmacy verifies the package as authentic by scanning and automatic look up into the data base. If the serial numbers (SN) is present, then the package can be sold (green light) and the SN will be deleted out of the data bank. If the same or another Pharmacy were to get a package with that SN again they would get "red light". Since medicinal product packages can be very small IFA is seeking for extension of Data Matrix for small height codes (see DMRE). The IFA Coding System serves to be a sample for an international concept for product identification and verification in one. *(see: http://www.ifaffm.de/en/ifa-codingsystem.html)*

IFA CODINGSYSTEM

Fig. 16) Data Matrix in the IFA Logo

Creative discussions and synergy effects during and aside the meetings

Fig. 17) Gérard Dessenne (right) and Joo-Sang Park (left) in deep discussions

Face to face meetings ease the work on complex projects like AIDC standards where the human factor of learning and understanding each other is an important element. Even social events or joined dinners look like amusement at the first look but in real fact they enable synergy effects and open creativity. Fig. 17) shows the Gérard Dessenne, at the planery appointed SC31 liaison to WG10, in deep discussion with Joo-Sang Park, Head of delegation of Korea. Both look very interested to learn from each other and to explain personal positions. Delegates may forget technical details but never personal experiences and group dynamics.

Appreciation to Host and Support Staff
of the 21st ISO/IEC/JTC 1/SC 31 Plenary Meeting, Montreal, Quebec, Canada

Appreciation "A" of the meeting resolutions directed special thanks to Don Ferguson (Fig. 18), Lyngsoe Systems Ltd.,Ca:

"ISO/IEC/JTC 1/SC 31 expresses its sincere appreciation to Mr. Don Ferguson on behalf the National Body of Canada for arranging and hosting the 21st Plenary Meeting of ISO/IEC/JTC 1/SC 31 in Montreal, Quebec, Canada."

Fig. 18) Chairman Dan Kimball (left) thanked Don Ferguson

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Enclosures:
Annex 1) Global unambiguity for items
Annex 2) How to get to globally unambiguous product codes and quick guide
Annex 3) Issuing Agencies support different data formats
Annex 4) List of available Issuing Agencies with their IACs
Annex 5) Selection of AIDC Standards

Annex 1) Global unambiguity for items

ISO/IEC 15459 sets the commonly agreed hierarchy for generating unambiguous codes under the lead of WG 2 Data Structures (chart see fig. 19). The hierarchy was taken by ISO from CEN EN 1572 but extended from transport units to validity for all levels of items. The rules are rather simple; ISO accredits a Registration Authority (A) to interested institutions B) assigning unique Company Identification Codes (C) on request. Companies having got a CIN are in the position to label any item globally unambiguously like products, packages, transport units, containers, but also as papers, equipment, locations and even persons identified by unique wrist bands or ID Cards.

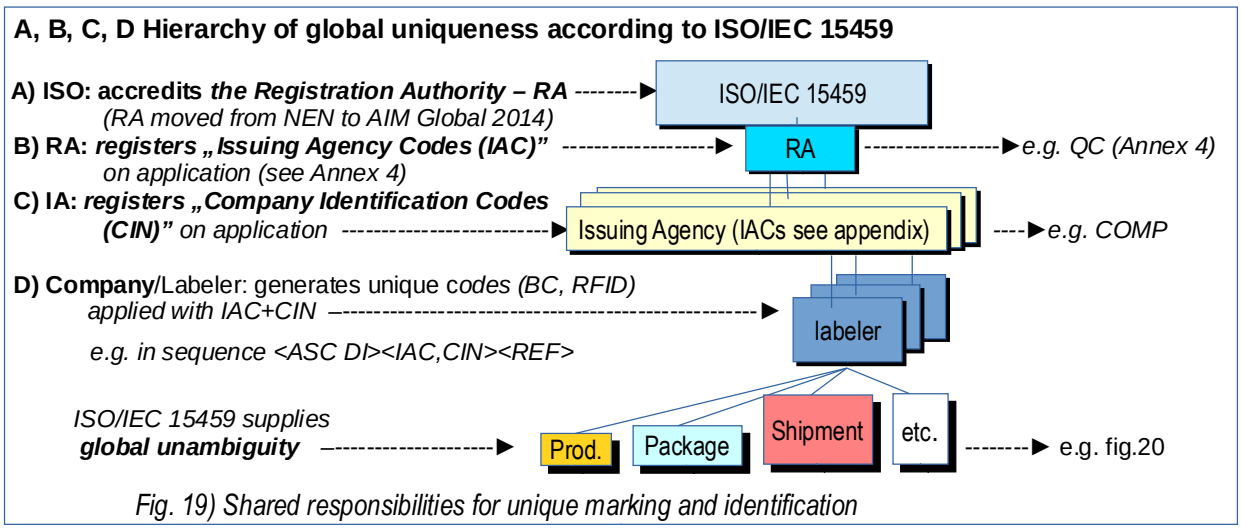

Fig. 19) Shared responsibilities for unique marking and identification

Annex 2) How to get to globally unambiguous product codes

The prerequisite for labeling an item unambiguously is the availability of a registered CIN from one of the Issuing Agencies. As next the characteristic of the item number to be encoded uniquely determines the syntax to be used. E. g. the ISO/IEC 15418 ASC DIs are for alphanumeric product reference used on average for 10 characters or up to 20 where the ISO/IEC 15418 GS1 Application Identifiers define a product reference as a Global Trade Item Number (GTIN) with typical 3, 4, or 5 digits max. and country related . The Health Care Bar Code system sets a max. of 18 alpha numeric characters.

A quick guide for labellers how to get a globally unique product code
e.g. for the product reference REF **M4215R73**:

I) Check the format of your product number (e.g. for **M4215R73**) for choosing one of the ISO/IEC 15418 formats as syntax for the code
→ a) if numeric 5 digit max – go for ISO/IEC 15418 ASC Data Identifiers or GS1 Application Identifiers or HIBC (depending of the customer areas)
→ b) if more than 5 digits or alphanumeric – go for ASC Data Identifiers including HIBC, IFA-PPN

II) Decide for the most convenient format, e.g. ASC Data Identifiers for REF **M4215R73**:

III) Decide for an Issuing Agency supporting to encode **M4215R73** by ASC DI, than
→ a) apply for a CIN, e. g. "COMP" from E.D.C. (IAC "QC")
→ b) chose the appropriate DI "25P" for the unique sequence <DI><IAC><CIN><REF>
→ c) build a sample sequence for your product reference **M4215R73**:
<25P><QC><COMP><**M4215R73**> for encodation as: 25PQCCOMP**M4215R73**
→ d) in case of a serialized product add SN 1234567 headed by DI "S": <S><1234567>
for encodation as: 25PQCCOMP**M4215R73**+S**1234567**
→ e) if required add other data elements like LOT (DI "1T", Expiry Date "D", etc) and use Syntax ISO/IEC 15434 (not illustrated with Fig. 20) for 2D symbols or RFID

IV) chose a symbology depending on data volume, available size and customer area, e.g. Code 128 (if enough place) or Data Matrix or go for RFID (Fig 20).

That's it -->

Fig. 20) Uniquely serialized product code in Data Matrix and RFID

Note: Some regulations may accredit specific Issuing Agencies only as a choice for generating unique codes, e. g. the FDA US accredited the Issuing Agencies GS1, HIBC and ICCBBA for the Unique Device Identifier (UDI) system. In this case the code structures of that agencies apply for the application.

Annex 3) Issuing Agencies support different data formats for codes

ISO/IEC 15459-2 accredited Issuing Agencies do supply not only a unique Company Identification Code (CIN) but with it they determine the AIDC data structure as well which has effect to data elements specifically for product and transport unit codes. In consequence the choice of an Issuing Agency it is also a choice for the structure of key codes.
Table 2) shows a selection of typical Issuing Agencies of industry and healthcare areas supporting the data structures for either alpha numeric or numeric only product codes and transport codes.

Table 2 Issuing Agencies, there AC's and supported data structures and data capacity

Excerpt of the list of Issuing Agencies for Company ID's (CIN) ▼	***IAC*** ▼	***Length of a CIN*** ▼	***typical CIN, e.g.*** ▼	***[2]Support for structure & code capacity***		
				Data structure ▼	***Product code 2-20an*** ▼ ***(max. 50)***	***Transport code 2-20an*** ▼ ***(max. 35)***
Eurodata Council	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 see Annex 4

Table 2 illustrates that the majority of Issuing Agencies is supporting a data structure for alpha numeric codes for products and transport units whereas only one Agency restricts users to numeric reference codes. Support of data structures might be one decisive selection criteria for choosing a specific Agency.

[2] 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.

EURODATA Council

Annex 4) List of available Issuing Agencies with their IACs

REGISTER of ISSUING AGENCY CODES for ISO/IEC 15459
Source: AIM Global, revision 2015-04-06

	Excerpt Register ordered by Issuing Agency Name	IAC
1	ABOL SOFTWARE INC. 413 Creekstone Ridge, Woodstock GA 30188, USA	LN
2	Bosch und Siemens Hausgeräte GmbH, Carls-Wery-Strasse 34, D-81739 MUNCHEN, DE	VBS
3	Ghana Revenue Authority, PMB, TUC Post Office, Accra, GHANA	GH
4	DALO, Danish Defence Acquisition & Logistics Organization, Box 220, Arsenalvej 55, 9800 Hjorring, DK	KDK
5	DHL Express Benelux Terminalweg 36 3821 AJ AMERSFOORT, NL	VGL
6	DHL Freight GmbH, c/o Deutsche Post AG, Finance Operations, SSC Accounting, 44113 Dortmund, DE	ND
7	DOD-DLIS, Department of Defense - Defence Logistics Information Service, 74 Washington Avenue N 7 BATTLE CREEK, MI 49037-3054 USA	LD
8	Dun & Bradstreet 103 JFK Parkway Short Hills, NJ 07078, USA	UN
9	Federal State Unitary Enterprise “NIISU”, Sokolnichesky Val str. 37/10, 107113 Moscow, RUSSIA	VDS
10	GS1 AISBL, Avenue Louise 326, bte 10, BE 1050 Brussels, BELGIUM	0-9
11	ECRI Institute, 5200 Butler Pike Plymouth Meeting PA 19462-1298, USA	VEC
12	EDIFICE, Electronic Data Interchange for Companies with Interest in Computing and Electronics, Tiensestraat 2/12, B-3320 Hoegaarden, BELGIUM	LE
13	EHIBCC, Jozef Israelsplein 8, 2596 AS DEN HAAG, NL	LH
14	Eurodata Council, Koesener Str. 85, 06618 Naumburg, DE	QC
15	FIATA, International Federation of Freight Forwarders Ass. Schaffhauserstr. 104, 8152 Glattbrugg, CH	LF
16	Försvarets Materielverk (Swedish Defence Materiel Administration), Myndighetsuppgifter / MS 520, Försvarsstandardisering, 11588 Stockholm, SE	KSE
17	GTF, Group of Terrestrial Freight Forwarders, 50, rue de Châteaudun, 75009 PARIS, FRANCE	VGT
18	Health Industry Business Communications Council 2525 East Arizona Biltmore, Phoenix, AZ 85016 USA	RH
19	IBM Deutschland Management & Business Support GmbH Wilhelm-Fay-Str. 32, D-65936 Frankfurt, DE	VIB
20	ICCBBA, International Council for Commonality in Blood Bank Automation Inc. P.O. Box 11309, San Bernandino, CA, 92423-1309, USA	LI
21	IEEE, 445 Hoes Lane, Piscataway, NJ 08854 USA	VIE
22	IFA, Informationsstelle für Arzneimittel GmbH, Hamburger Allee 26-28, 60486 Frankfurt am Main, DE	PP
23	JIPDEC, Japan Information processing Development Corporation / Electronic Commerce Promotion Center, Roppongi First Building 9-9 Roppongi 1-chome, Minato-ku TOKYO, 106-0032, JAPAN	LA
24	KIDL, Korea Institute of Distribution and Logistics, 17F KCCI Bldg. 45 Namdaemunno 4-Ga Jung-Gu SEOUL 100-743, KOREA	KKR
25	Ministerie van Defensie, Commando Diensten Centra IVENT Dienstverlening Postbus 90004, 3509 AA UTRECHT, NL	KNL
26	NSPA (Nato Support Agency), 11, Rue de La Gare L-8302 CAPELLEN G.D., LUXEMBOURG	D
27	Odette International Limited, 71 Great Peter Street LONDON SW1P 2BN, UK	OD
28	Post NL, Prinses Beatrixlaan 23 2595 AK 's-GRAVENHAGE, NL	NL
29	Namsa, 11, Rue de la Gare, 8302 Capellen, G.D., LUXEMBOURG	VNA
30	SIEMENS AG, Industry Automation Division I IA IT D SR, Gleiwitzer Str. 555, 90475 Nürnberg, DE	SI
31	Siemens Enterprise Communications GmbH & Co. KG, Hofmannstr. 51, 81379 MUNCHEN, DE	VEG
32	TCJ5/4-I, United States Transportation Command, 508 Scott Drive, Scott AFB IL 62225-5357, USA	KUS
33	Telcordia Technologies, Inc. 1 Telcordia Drive RRC-6C137 PISCATAWAY, NJ 08854-4151, USA	LB
34	Telefonaktiebolaget LM Ericsson Torshamnsgatan 23 Kista SE-16483 STOCKHOLM, SWEDEN	LM
35	Universal Postal Union, Case Postale, 3000 BERNE 15, SWITZERLAND	J
36	Xifrat Daten AG Poststrasse 6 6300 ZUG, SWITZERLAND	RG

Link to the latest revision of “Register for Issuing Agencies”:
http://c.ymcdn.com/sites/aimglobal.site-ym.com/resource/resmgr/Registration_Authority/Register-IAC-Def_2015_%28Updat.pdf

Annex 5) Selection of AIDC Standards

ISO/IEC 19762 Harmonized Vocabulary (5 languages)

Documents of ISO/IEC JTC 1/SC 31/WG 1 Data Carrier (ORM)

ISO/IEC 15417 Code 128
ISO/IEC 15438 PDF 417
ISO/IEC 16022 Data Matrix
ISO/IEC 18004 QR Code
ISO/IEC 15415 Bar code symbol print quality test specification-Two-dimensional symbols
ISO/IEC 15416 Bar code symbol print quality test specification-Linear symbols
ISO/IEC 16480Reading and display of ORM by mobile devices
ISO/IEC CD 30116 OCR Quality Testing

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 ADC Media
ISO/IEC 15459 Unique Identification, Part 1 to 6
ISO/IEC 29162 Guidelines for using ADC Media (Barcode & RFID)
ISO/IEC 29161 Unique Identification for IoT
ISO/IEC WD 20248 Digital Signature meta structure

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, part 61 to 64, rev. 2 (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 ISO/IEC JTC 1/SC 31WG 4/SG 1 RFID Data Protocol

24791-Part 1 to 6 Software System Infrastructure (SSI)
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 ISO/IEC JTC 1/SC 31WG 5 MIIM

ISO/IEC 29172-19179 Mobile item identification and management
ISO/IEC 29143 Air Interface Specification for Mobile Interrogators

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
ISO/IEC 29167 part 10-19 crypto suites with ISO/IEC 19823-X Conformance test methods

Documents of the Liaison ISO TC122/WG 10 for BC&RFID applications

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 + NP 18574 IoT
ISO 17364 Supply chain applications of RFID – Returnable transport items + NP 18576 IoT
ISO 17365 Supply chain applications of RFID – Transport units + NP 18577 IoT
ISO 17366 Supply chain applications of RFID – Product packaging + NP 18575 IoT
ISO 17367 Supply chain applications of RFID – Product tagging

Documents of the Liaison ISO/IEC JTC 1/WG 7 Sensor Networks (under work)

ISO/IEC CD 29182 Sensor Network Reference Architecture (SNRA), 7 parts
ISO/IEC WD 30101 Sensor Network and its Interfaces for Smart Grid System
ISO/IEC WD 30128 Generic Sensor Network Application Interface

DIN standards

DIN 66401 Unique Identification Mark – UIM
DIN 66401 System Identifiers
DIN 66277 Identification plate with RFID tag and/or 2D barcode

Other standards, application related

IEC 62090 Product Package Labels for Electronic Components using Bar Code & 2-d Symbologies
Global Transport Label V3, www.odette.org
Global Guideline for Returnable Transport Item Identification, www.aiag.org
GS1 Global Specifications, www.gs1.com
HIBC Health Industry Bar Code, www.hibc.de
PaperEDI Standard, www.eurodatacouncil.org
Set Label Standard, www.edifice.org (June 2011)

Note 1: ISO, CEN and DIN standards are available directly or via national bodies, e.g. www.din.de
Note 2: For more information please contact the author or DIN NA 043-01-31

ISO/IEC JTC 1/SC 31: Cooperation on highest level of standardization for AIDC

Fig. 21) A snapshot of the ISO/IEC JTC1/SC 31 meeting in Montreal: Wang Yi, China Delegation, is reporting about developments in China

Liaison associations of industries and healthcare:
AIM DACH – AIM Germany, Austria, Switzerland, www.AIM-de.de
EDIFICE – Electronic Industries, Europe, USA, Asia, www.edifice.org
EHIBCC – European Health Industry Business Communication Council, www.ehibcc.com
DIN NA 043-01-31 – Normalization Institute Germany, www.din.de
JTCH AIDC – Joined Technical Committee Healthcare AIDC, www.vddi.de

Logos of cooperation partners and contributors to the standardization activities

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