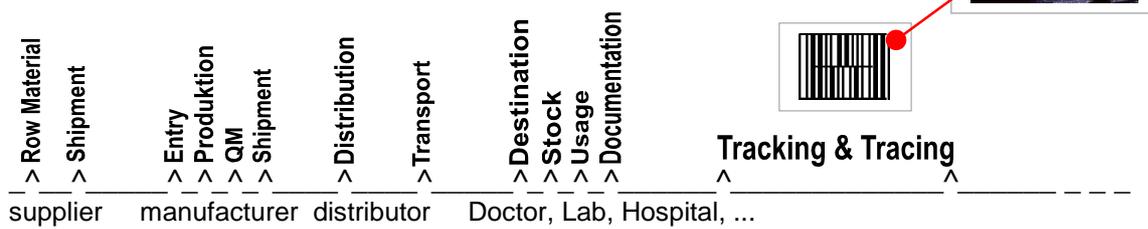


EHIBC Barcode & ISO

best solution for supply chain management



1 Foreword

by Heinrich Oehlmann, EHIBCC TC

Why the HIBC system is the best Barcoding system could be explained very short and clear, but it might be interesting as well to learn, what the benefits might be in the different application sectors. HIBC Bar Code was developed 1984 as a solution for world wide product tracking. That time Code 39 was the best symbology available for carrying alpha numeric data. It was easily recognized that automatic data capture by Barcode avoids errors and speeds up logistical processes. Light pens have been used for scanning the code, but the moment where Laser beam scanners have been developed, very fast Barcode entered in new dimensions of wide spread use. CCD-scanners and powerful thermo printers supported the growth of HIBC solutions. Now in the century 2001 not only Barcode is in use, but other innovative technologies are available, such as 2-dimensional symbologies and RFID as well. The good news is, that HIBC as a safe data structure is very capable in using such new data carrier without any change of the structure itself. Best experienced data Carrier became ISO standards in the meantime such as Code 39, but also new developments as Code 128 and Matrixcodes for smallest labels. HIBC adopted such ISO standards fully as carrier for the standardized HIBC data. With it, HIBC meets meet all requirements of modern tracking & tracing applications for all kinds of products but specially for Health Care products, which is Uniqueness, Compactness, Safety, Compatibility. Today HIBC seems to experience a phase of a second spring being refreshed by innovative features, such a small label solutions for all kinds identification tasks in a supply chain management system. Unique transport labeling is solved as well under the same scope of unique company identity as for the products, using the relevant ISO standards. It is a pleasure to see, that HIBC labels are not only attached to medical devices, pharmaceutical products, X-ray films, chemicals, dental products, documents, gold and silver plates, but also to items of electronic industries and on many other industries items. Please take the services of EHIBCC and its supporting associations for use of the HIBC system for supply chain management solutions. With today's HIBC solutions you will full fill the legal requirements of tracking and tracing and documentation for all relevant data from manufacturing up to the point of use. This brief approach includes elements out of the HIBC Application Guidelines.

2 Why is HIBC the best system

2.1 Which systems exist

There are different way's to write an information by help of Barcode fonts, but the best solution is to use standards for building tracking and tracing systems in open supply chains. Fortunately the ISO teams developed only one standard for relevant data syntax for marking products and loads. This is ISO 15418 where the practiced syntax fit in, the ANSI/FACT, ANSI/HIBC and UCC/EAN data structures. The ISO standards make them compatible by rules of maintenance for the specifications. Off course there are some differences in features of each syntax, which is the reason for the existence of each. Where EAN supports just a 5 digit product code, HIBC supports it variable and alpha numeric. FACT DI's help to build internal uniqueness, all 3 are systems with specific features. It is very much appropriate to compare them, before choosing one or the other, where any combination would work as well.

2.2 HIBC: The Best.

Comparison HIBC, FACT, EAN

The table below shall high light the outstanding features of HIBC by comparison between features of its associated global FACT structure, EAN structure and a "no standard structure"

Standard	HIBC 1	FACT 2	EAN 3	without a standard
unique	+	+	(+)	-
compatible with each other	+	+	+	-
carries tracking data	+	+	+	
product code alpha/num., variable	+	+	-	
Data Carrier independent	+	+		
compressed, space saving & save	+	-	-	

The HIBC system is optimized for unique product identification as a part of the ANSI/FACT Data Identifier Standard.

Key outstanding features are:

1. World wide unique since 1987
2. Compressed data structure for unique product identification
3. Symbology independent, capable for standard Barcode, 2D and RFID
4. Capable for users product alpha numeric codes up to 13 characters
5. Maintained by EHIBCC Technical Committee and its industries members
6. Used in several market segments such as Health Care, Precision Mechanics & Optical Industries, Chemical Industry, Electronic Industry, etc.

For manufacturers and labellers it is of vital importance for implementing a tracking system to use the existing numbering scheme rather than to change product codes which would need changes at the marketing side as well as with the customers. The best system is the system which is easiest and cheapest to implement. Implementation of Barcode shall not course costs but shall be a tool for optimisation gaining benefit. The HIBC system is designed not to change a numbering system but just as a medium to carry information for safe automatic data capture.

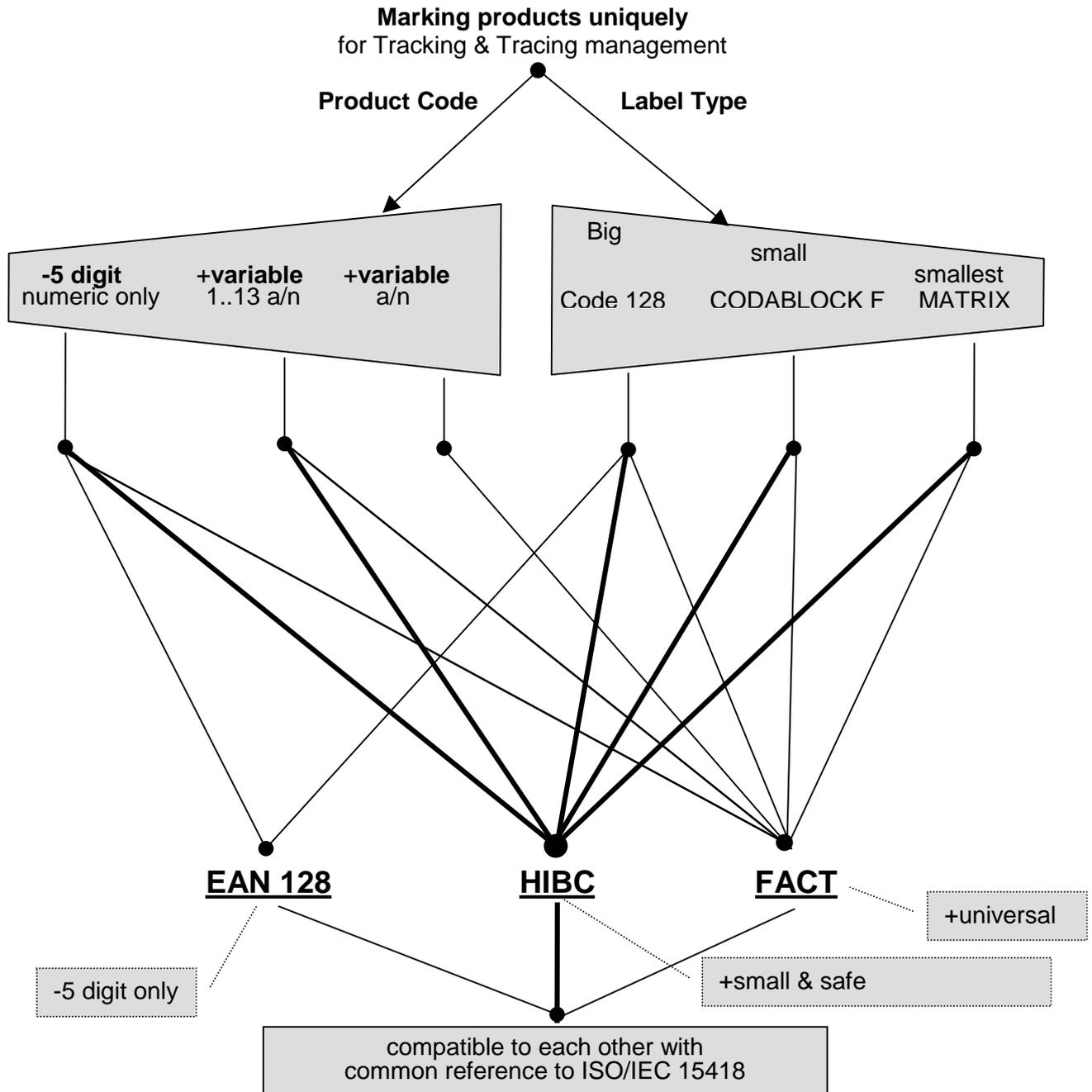
2.3 Who supports HIBC solutions

Selection of organizations supporting HIBC bar code

ANSI	American Normalization Institute
ADDE/BVD	Association for Dental Trade, Europe
DIN	German Normalization Institute
EHIBCC	European Health Industry Business Communication Council
EUCOMED	European Association Medical Devices
EUROM	European Association for Precision Mechanics & Optics
FIDE	Association of Dental Industries, Europe
F+O	Association for Precision Mechanics & Optics, Germany
HIBCC	Health Industry Business Communication Council, USA
HIDA	Health Industry Distributors Association, USA
HOPE	Hospitals of Europe Association
VDDI	Association of Dental Industries Germany
VDZI	Association of Dental Laboratories, Germany
etc.	

2.4 Decision chart for finding the most suitable system

The use of "no standard" in terms of no global data syntax, will never enable uniqueness of anything in open supply systems. So, first decision going global should be to go with a standard rather than to stick to non identified numbers. Next decision should be, whether to stick to a "5-digit only" product code for all of the products. If this is the case, the EAN structure would do it as HIBC or FACT would do it. But if not, the EAN system would fall out of the choices.



If product codes are not 5 digit but variable or alpha numeric, than the FACT and HIBC system applies. But FACT data elements are discrete elements and need some space for the code. Optimization is offered by HIBC only with its compressed representation of the data. **This is the real reason, that HIBC is the best system for unique product marking.** Furthermore 2-dimensional symbologies are recommended for HIBC for small or smallest labels. Even electronic RFID labels for invisible labeling are capable to carry HIBC product data.

3 HIBC Barcode for product manufacturers and labelers

Selection criteria for product manufacturers for the HIBC are easy to define. The key issue is, that nor manufacturer nor distributor nor user has to change the numbering scheme just for using Barcode. No mapping is necessary to another numbering sequence as it is the case with the EAN-System. HIBC is just a carrier, which keeps a product code as it is. The HIBC system compresses the data to keep the code as short as possible. Furthermore HIBC is proved for the traditional Barcodes as for small inventions of 2-dimensinal symbologies.

The outstanding advantages for the manufacturer to choose HIBC against EAN system are:

- Easy integration: Manufacturer keep its original product code which can be numeric or alpha numeric and up to 13 characters.
- Cost saving and customer friendly: Manufacturer nor customer don't need to map to a second alternative number, because product code and product number in the Barcode keeps the same.
- The Code is kept small due to HIBC data compression.
- HIBC for big to smallest products: Manufacturer can adjust the Code to the given product or label size under the scheme: As big as possible, but as small as necessary.

Some samples of product codes for tracking & tracing purposes where the HIBC Barcode is adjusted to the given product and its label size.

Source: VITA, Bad Säckingen



Source: Ethicon Europe



Source: Heraeus-Kulzer Europe



4 HIBC for Transportation

Securing identification of goods during external transportation is one of the features of the HIBC concept.

When manufacturer products are packed into transport units, the product labeling is no longer visible. It is therefore necessary to mark the transport units uniquely as well.

Since the transport units can contain different products, it is necessary to have one clear and superior mark for the dispatch unit.

The HIBC code of the manufacturer can not only be used on the product but also on the Transport unit. This is embedded within the specifications of the European Multi Industry Transport Label EN 1572 (MITL).

The construction of a Unique Identification Number for a Transport Unit (License Plate) by use of the HIBC Labeler Identification Code (LIC):

The technical basis of a Unique Identification Number for a Transport Unit is the Norm EN 1572 referring to the Data Structure according to EN 1571, where the appropriate Data Identifiers are listed. The Data Identifier for a License Plate is a „J“. According to the specification of EN 1572 it is followed by the Issuing Agency ID, followed by the individual serial number issued by the labeler. In addition to it 4 optional categories of packing levels are considered as with or without reference to an EDI message. This hierarchical structure enables uniqueness, it shall be illustrated in brief as follows:

„J“ is the protected Identifier for a License Plate,

options 1 to 4 are specified to mark different categories of units

1J: lowest packaging level (unbreakable unit)

2J: highest packaging level, consisting of more than one sub packages (1J's)

3J: as 1J, but referencing to an existing EDI message for more information

4J: as 2J, but with reference to an EDI message

JC100 is the Identifier for License Plates using EAN ID's, as an additional option for building fixed length License Plates, based on EAN Location Codes.

Illustration of the hierarchical structure of a License Plate:

A	B	C	D
Identifier for a License Plate according to EN1571	Organisations Code, registered with NNI, e.g.:		
1J lowest packing level 2J highest packaging level 3J lowest l., associated with EDI 4J highest l., ass. with EDI JC100 ID for a EAN LP number	LH: Health Care LE: Electronic Ind. LF: Transportation QC: Chemical Ind. 0-9: EAN members	Registered ID number of the Labeller issued by the organisation B	Serial No. of the Unit, issued by Labeller, add by labeller C

4.1 Example of constructing a „License Plate“ for a Health Care supplier.

First step is the selection of „1J“ identifies for an unbreakable shipment units without relation to an EDI message (versus „3J“ ID for relation to EDI). The following Issuing Agency Code “LH” specifies the organization, which is EHIBCC in this case, “E999” is a Label Issuer Code, registered with EHIBCC. Now it follows the serial number of the transport unit, where the labeler is responsible for finally.

Illustration:

Data Identifier	Organization	Labeler	Serial number of Transport Unit
1J	LH	E999	123456X

Interpretation of the Unique Number of a Transport Unit in Barcode, where the HIBC Labeler Identification Code (LIC) is used:



A „License Plate“

with relation to an EDI message would read:

3JLHE999123456X

Example of a full Multi Industry Transport Label (MITL)

The License Plate is the mandatory data element of a multi industry transport label. It takes care for unique identity, making it unambiguous among others.

But there are additional segments necessary for functionality’s required, which is human readable information, destination code and optional code for the content of the transport unit. All of the elements are specified with the Norm ISO 15394. The example shows the different sectors of the label, where the License Plate sector is clearly separated. Another optional sector shows informative data safely encoded in the 2-dimensional option of Code 128, CODABLOCK. Optional routing information for the transporter is shown in the upper sector of the label where Quick Response Matrix Code (QR Code) is used for fast scanning in automatic processes.

<p>SHIP FROM:</p> <p>BCL</p> <p>Best Health Products Co 90 Megahertz Lane CHIPTOWN SN3 1RJ</p> <p><u>Note to Receiver:</u> This is a sample of a shipment label for a (3J) transport unit. (Lowest level Packaging)</p> <p>(Q) Quantity: 250</p> <p>(P) Part Number: AJ4327891234</p> <p>(K) Order Number: 210197013B</p> <p><i>Detailed information</i> Content related, encoded optionally as Code128-2D CODABLOCK : PAJ4327891234+Q250+K21019701B+3Q17</p> <p>3J Licence Plate -</p>	<p>SHIP TO:</p> <p>Fine Medicine Ltd.</p> <p>512 Megabyte Drive GRAPHTOWN 7R3 BY1 UK</p> <p>ROUTING CODE -</p> <p>(3Q)Gross Weight 17 kg</p> <p></p> <p></p> <p></p>
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Illustration of a Multi Industry Label applied with all elements necessary for international business and communication: A) The License Plate for Unique ID, human readable text for users information, optional 2D Barcode for shipment data and optional routing code for the carrier.

The example above shows, how the HIBC codification scheme fits in global solution for open supply chain management. The HIBC Labeler Identification Code is uniquely embedded in FACT Data Identifier structure forming the License Plate and carrying the complete data content of the shipment. The sample shows how the „3J“ Code specifies a License Plate of a lowest transport package, where a EDI message exists related to it. A transport unit build of several sub „3J“ units would be marked with a „4J“ identifying highest packaging level. In addition to it further information is encoded using specific identifiers for the appropriate data elements as „Q“ for a Quantity element, „3Q“ specifying weight, „P“ part number and „K“ customer reference. The 2-dimensional stacking rules of Code 128 allow concatenating of complete messages to safe space. Another optional symbology for this purpose is PDF 417. Also the forwarder may need specific information for routing the units. Adequate symbologies are needed for automated processes of fast sorting. The example shows the squared QR-Matrix Code being designed for fast scanning. Another option would be the symbology MaxiCode. Those options require agreement between the shipment partners involved in the process to achieve full functionality, but the mandatory information, the License Plate alone, takes care for the uniqueness required.

5 HIBC Barcode for distribution and trade

While for the industries marking of individual products and tracing of the packing units is the most important aspect, distributors and dealers will have to cope with an extremely flexible concept. Here, the main emphasis is on the movement of the goods, i.e. the delivery from industry to dealer as well as the material flow within the company, from storage to dispatch to the consumer. What adds to the aspect of flexibility is the fact that the products do not necessarily originate exclusively from the local industries, which already decided in favor of the HIBC code, but from all over the world including different market sectors like the pharmaceutical, electronic, chemical industries and others.

Automatic identification of

- product
- packaging unit
- handling unit consisting of different, sometimes individually marked products
- dispatch unit

will in future be of vital importance for all, for distributors as dealers which have to guarantee trouble-free order processing (and possible complaints).

Therefore, it would make sense for the dental dealers to start examining the possible symbologies and data structures of the barcode early.

The common goal is a consistent optimization of all administrative and logistic relations between all parties involved to make the decisive step to cost-saving processes. The information flow accompanying the goods along the logistic chain of the dealers will sooner or later need to be connected to an industry-wide information exchange system, like the EDI project (Electronic Data Interchange).

Prerequisites for a safe system are:

The barcode accompanying the goods

- is clearly readable
- can be processed error-free on an electronic basis
- works without bilateral agreements
- works without manual intervention
- works across company borders

The interest of distributors and includes:

- scanner-based control of incoming goods, making it possible to automatically compare the incoming goods to the corresponding dispatch notes which could be transferred via EDI, for example.
- Integration of the external transport system (carriers...).
- The precise and automatic inventory control including control of expiry dates
- The precise and automatic commissioning of customer orders and possible delayed shipments

HIBC also offers valuable support in building up a quality management system. Since dental dealers are becoming more interested in systematic quality management systems, the corresponding goals will be easier to reach with an automatic marking system.

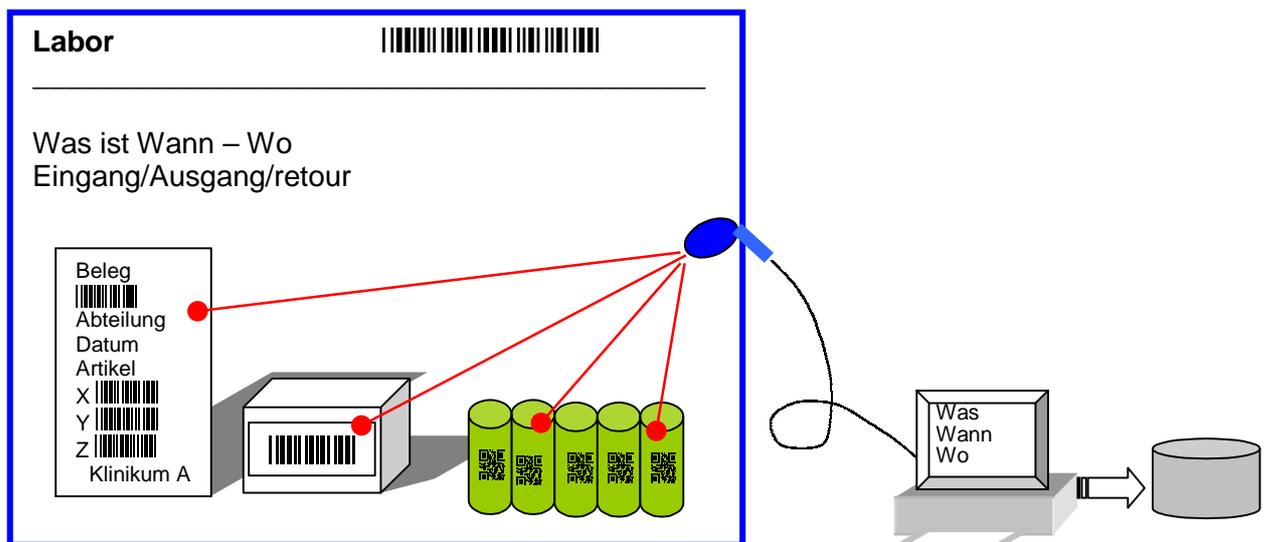
Main goals for optimization of distribution processes are:

- Increasing the reliability of deliveries
- reducing transport and delivery times
- eliminating mistakes
- high transparency of current status of goods
- fast processing of complaints

The HIBC offers important prerequisites to guarantee a complete information flow along the logistic chain.

6 HIBC for Laboratories

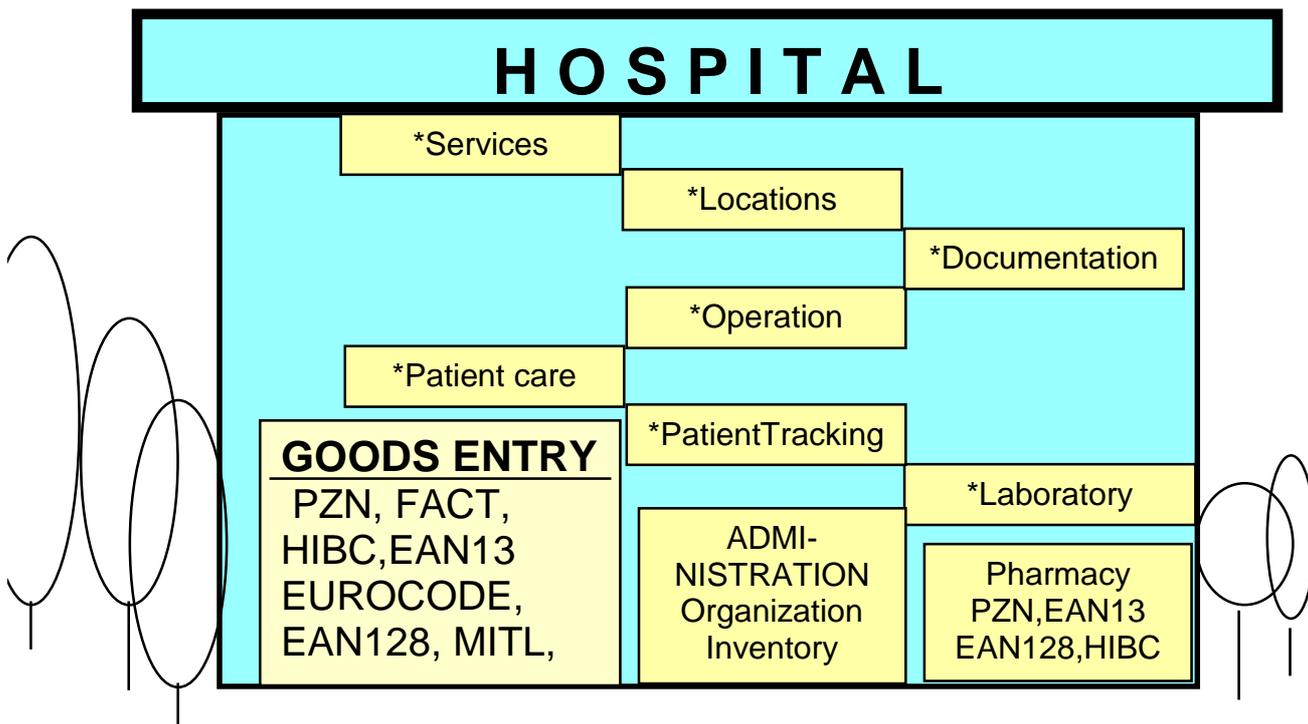
It is of vital importance for a laboratories that the right result is associated with the right probe, errors are prohibit. This works perfectly with Barcode, specially if probes will be supplied from different areas. By help of the unique data structure of HIBC with associated FACT DI's, all processes can be managed in a unambiguous and safe way.



For probes, linear Barcode easily becomes to big, but 2D solutions help to carry the data even on smallest surfaces: Code 128 – if enough space if given, CODABLOCK F if smaller, but Matrix Code for smallest items.

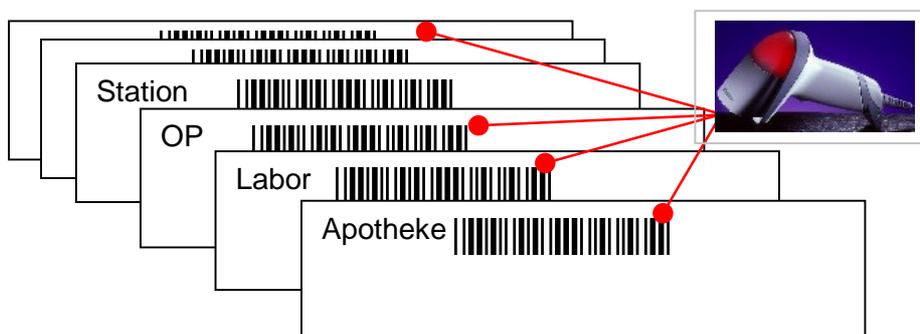
7 HIBC Barcode for the Hospital

The HIBC Barcode concept includes product identification, which is mostly the responsibility of the supplier, Transport identification, but also Barcode for the internal processes of a Hospital. This is patient tracking, archiving, material management, probe tracking and any kind of automatic identification applied with documentation and control. The HIBC concept considers the situation as well, that it never will happen, that only one Barcode system will cover everything, the variety of already installed systems are too much. Therefore the HIBC concept integrates in existing systems taking care for uniqueness and identity in those areas where already installed systems are not sufficient enough. The HIBC Provider Standard is dedicated for the internal processes of hospitals, but due to the fact, that HIBC co-operates with the FACT Data Identifier concept, any solution could be realised to build tracking and tracing concepts under supply chain management aspects. This would include blood banks as laboratories, which have special requirements in each area.



The chart may illustrate the variety of codes appearing in a Hospital in addition to internal codes. The HIBC concept includes them all as long as each code is autodiscriminating, which means uniquely identified. A Tracking and Tracing system just needs to link the data content to each other, which is done in a data base any way and not in the Barcode.

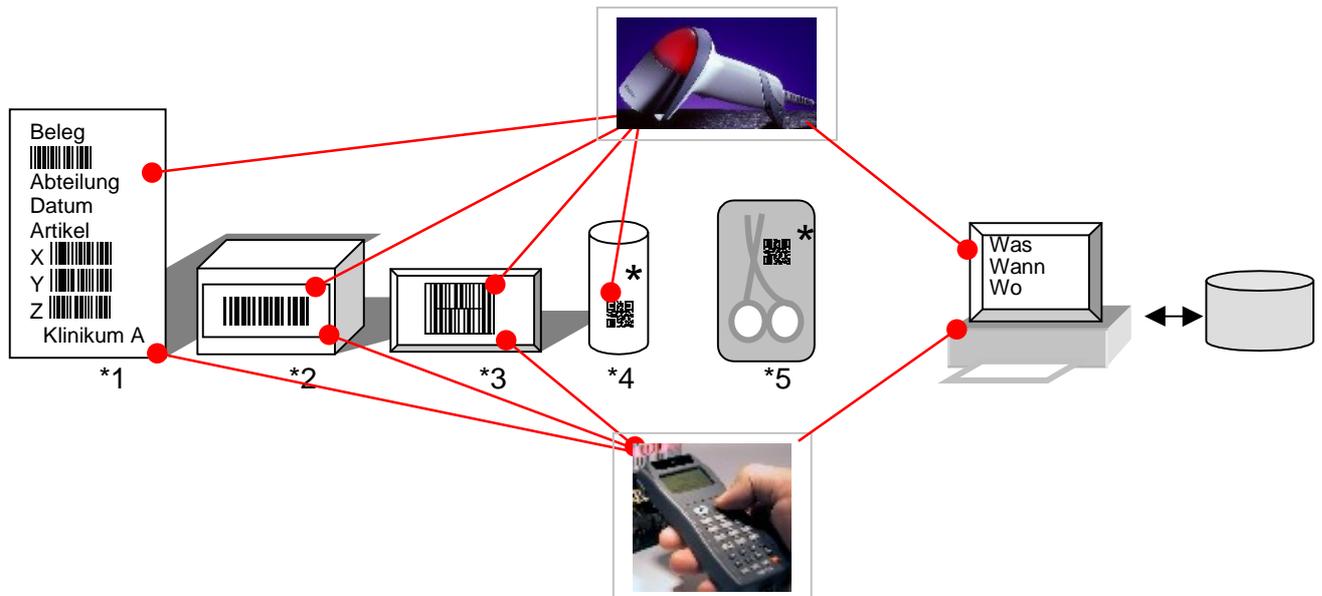
Barcode is appropriate at all points where product data, movements, services, results, etc. need to be captured safely in order to transmit the data to a computer. This is from goods entry to patients or even operation room.



8 HIBC Barcode for the internal processes

prepared to be carried by appropriate standard symbologies

By HIBC Barcode Supplier and Provider Standard in conjunction with updated Data Identifiers supports all internal processes. Automatic Identification via HIBC takes care for data safety and accuracy through out the whole system. It enables to identify the proper item at the proper time at the correct location, as the task for to days systems. Compatible symbologies are available, which fit to the individual items.



The selection of the proper code might follow an easy guideline: As large as possible, but as small as necessary for labelling document, product, probe, instrument and even person & location.

*1, *2) linear Barcode (Code 39, 128, EAN) for standard items for scanning with standard scanners



*3) stacked Code 128 2D for increased density (CODABLOCK F) for scanning with standard scanners and portable devices



*4, *5) Matrixcodes (DATAMATRIX, QR-Matrix) for scanning with High Tech equipment.

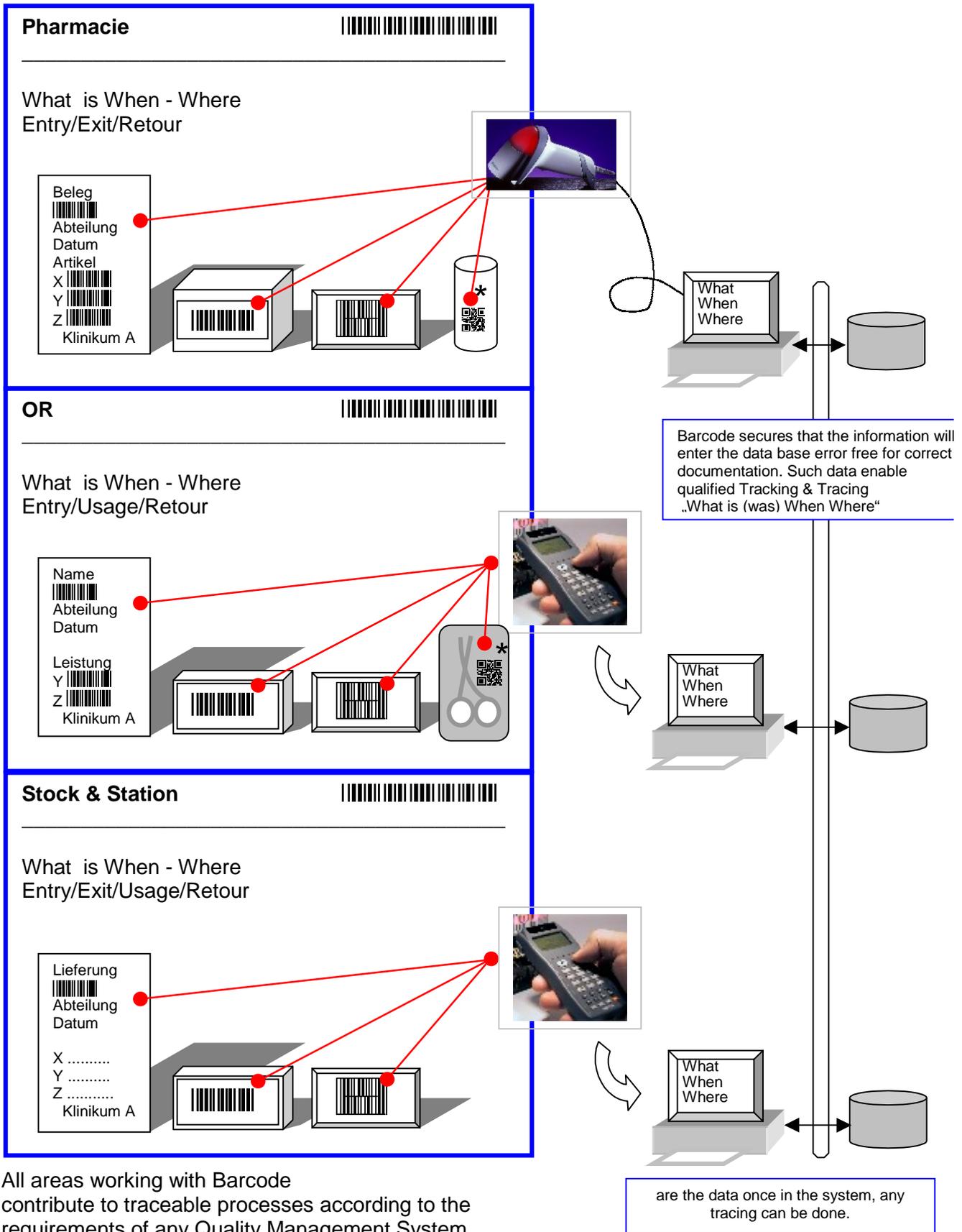


Linear and stacked symbologies are still the most used symbologies due to best price/performance relation and best availability. But Matrixcodes will come in step by step, specially for smallest items, where is no solution for the above.

Just the data structure is the key to make items unique, such as the optimised HIBC structure. Other structures as EAN, PZN, EUROCODE are compatible to it, applied to specific.

Radio Frequent Identification (RFID) technology might be mentioned as well, as an optional data carrier for HIBC data. This applies to all applications, where normal labels do not fit, as with implants or other items. The choice might be made according to application.

Scanning instead of manual data entry in all areas:



All areas working with Barcode contribute to traceable processes according to the requirements of any Quality Management System.

9 Barcode for supply chain management

Logistics is steered by information. The more precise and error-free this information is available, as correct and safe are the processes steered by it. A barcode-marked product can be identified quickly and clearly anytime and anywhere. Identification works via electronic devices and thus excludes human errors.

What can be clearly identified any time can also be traced back along the logistic chain anytime. This process is called tracking and tracing and describes all advantages an automatic identification system for steering and tracing can offer. Barcode is presently the optimal solution for the constant availability of data all along the logistic chain.

Barcode meets all marking requirements resulting from legal regulations in the health sector, including expiry dates. The integration of quantity details permits the steering of individual articles as well as complete batches or transport units. Finally, by using barcode, it is possible to integrate further information like batch or serial numbers in the product marking. This leads to advantages during the control of incoming and outgoing material, as well as for the correct steering of return shipments.

Advantages for the complete logistic chain through the use of automatic identification are:

1. correct and error-free data recording
2. direct communication between electronic unit and physical unit (product, receipt,...)
3. real time reaction
4. batch steering
5. steering of transport units
6. control of expiry dates
7. easier control of incoming and outgoing materials
8. steering of return shipments

The barcode marking can start at any point within the logistic chain. To reach the optimum output of the system it is necessary to start as early as possible in the material flow. Ideally this would be the automatically readable marking of the raw materials. When entering the production plant a product can be marked with a barcode which identifies it during the process from storage to dispatch.

Examples for successful use of barcode can be found in the pharmaceutical, electronic, car and chemical industries as well as the consumer goods industry. Here, the use of barcode is limited to manufacturer and part numbers, since this industry uses EAN as a barcode system.

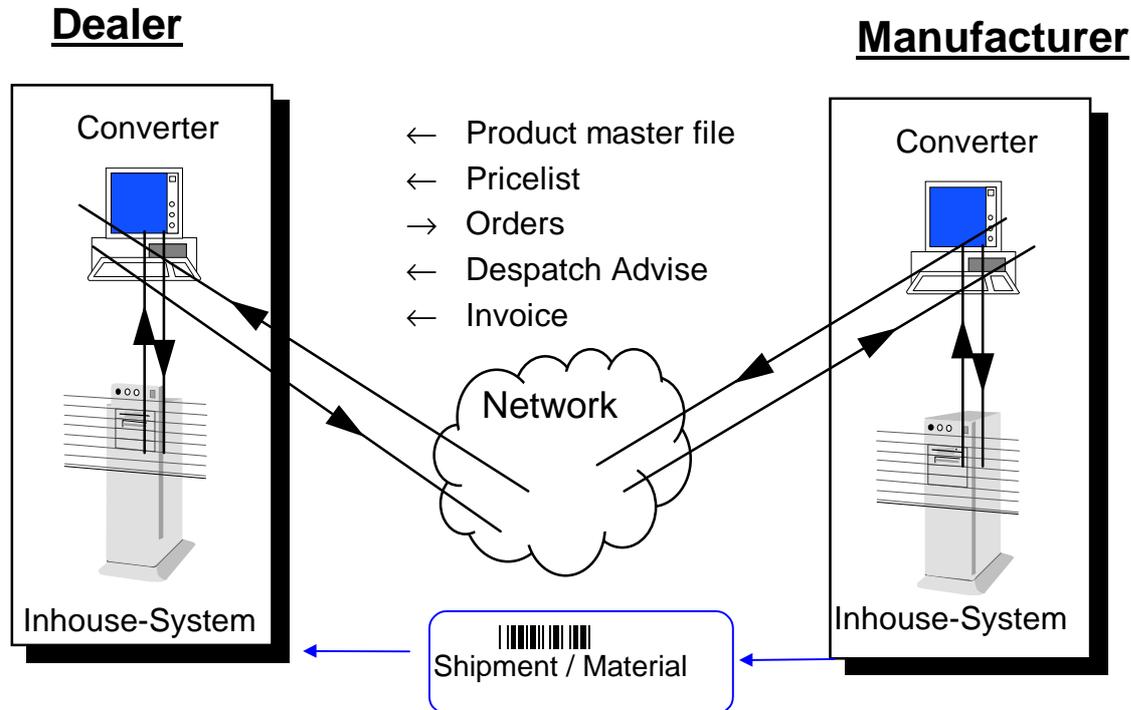
10 EDI within the logistic chain

There is a direct connection between Barcode and EDI if messages refer to logistical processes, they can support each other. Therefore the EDI-system is described briefly in this brochure.

EDI is the abbreviation for Electronic Data Interchange and stands for the electronic interchange of messages and information of any kind. An international standard called UN/EDIFACT (Electronic Data Interchange For Administration Commerce and Transport) is available for structured and recurrent business transactions like orders, order confirmations, dispatch notes, invoices and many more. The objective of using EDIFACT is the direct transfer of messages between the operating IT-systems of customers and suppliers without any manual handling of data and without using paper in between the process. The messages are available immediately for further data processing and the possibility of mistakes in information transfer is reduced dramatically.

XML will be a complementary solution to EDIFACT for transmitting the information to partners electronic mail boxes.

Avoidance or at least automation of non value adding activities in the supply chain leads to cost savings and to better ratios in the administration of processes.



Components of EDI

As mentioned above EDI and barcode complement one another as shown in the following example:

An order is transferred electronically to the supplier and starts the order processing. An order confirmation is resent to the customer in order to make a first electronic order-check possible. Only exceptions have to be handled.

The shipment of the order is advised electronically. This enables the customer to check the details again, to plan the receiving capacities, and to organise the warehouse. The dispatch advise ideally contains detailed information about lot numbers, expiration dates of the shipped products and detailed packing information.

The Barcodes on the boxes and on the products themselves make the information about the physical shipment easily electronically available. The connection of both - barcode and EDI information guarantees highly automated degree of the receiving process at the customer's. The transaction is finished by the electronic invoice what makes another automation step possible to avoid manual work.

The reference between such a EDI message and shipment is the so called „License Plate“ as the Unique Identity of a Transport Unit (see chapter 16, Multi Industry Transport Label). The unique reference to a product is a Product Code, build according the HIBC rules and consisting of manufacturer ID and article number. Both „License Plate“ and Product Code get a data element identifier for transmission via EDI. The Bar coded data element being scanned and transferred to the EDI interface acknowledges the physical transaction for quality data processing.

11 Appendix

The approach “HIBC Barcode is the Best” is worked out on the basis of the Guidelines for Barcode in Health Care, available from the associations having contributed to. Some excerpts of it are included as the “Decision chart for finding the most suitable system” and the section 10) EDI within the logistic chain and other key elements of the approach. In order to illustrate the topic “Supply Chain Management (SCM)”, elements out of current standardisation efforts on ISO level have been inserted by the author.

11.1 Contributing institutions and firms:

Association of Precision Mechanics & Optics, F+O, Cologne
Association of Dental Manufacturers, VDDI, Cologne
Associations of Dental Dealers, BVD, Cologne
Eurodata Council Stichting, Naumburg
European Health Industry Business Communication Council, EHIBCC, The Hague
ELMICRON, System House for Automatic Data Communication, Naumburg
HIBC Working Group Barcode & EDI

11.2 Glossary

Barcode	Computer readable symbology, consisting of black & white bars
Code 39	Alpha Numeric Barcode Standard
Code 128	Alpha Numeric Barcode Standard with numeric compression
CODABLOCK F	Stacked Code 128 for space optimisation and increased capacity
Data Identifier	Data Identifier flag the data content of a Barcode for multi sectorial use
EHIBCC	Health Industry Business Communication Council, issuer for unique labeller identification Code under ISO, maintains the HIBC Guidelines.
EAN	European Article Numbering Association, issuer for the EAN- Labeller Identification Codes under ISO, maintains the EAN code.
EAN 13	Article Numbering Code, based on a 5 digit only product code
EAN 128	Code 128 system, where the EAN 13 is embedded
EDI	Electronic Data Interchange for intra business communication
EUROCODE	Barcode structure for Blood products
FACT	Data Identifier Standard for Barcode & RFID, where the “+” is the Code referring to HIBC in conjunction with the list of Data & Application ID´s
HIBC	Health Care Bare Code, a unique structure to carry product data safely
HIBC Provider	Standard for Hospital internal use
HIBC Supplier	Standard for unique product labelling
License Plate	Unique Identification of Transport Units under ISO rules (ISO/IEC15459)
Matrix Codes	Computer readable symbologies, build out of a dot matrix
MITL	Multi Industry Transport Label Standard, ISO/IEC 15394
RFID	Radio Frequency Identification, micro chip based labelling technology

11.3 HIBC Hotline and source for Information

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EHIBCC-TC, Kösener Str. 85, D-06618 Naumburg, +49 3445 78114 0, fx. +49 3445 770161