



The Global Language of Business

The Management of Loan Stock using GS1 Standards

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1. About this document

1.1. Background

This document was commissioned by the Health and Social Care Information Centre in order to show how GS1 standards could be used to improve the management of Loan Stock within the NHS. It explains the use of automatic Identification and data capture technology to improve data accuracy, to reduce administration time and provide better management control. In addition the document shows how GS1 standards can help trusts to meet the challenge of a paperless NHS by 2018 as set by Lord Hunt.

1.2. Scope

BSI PAS 55-1 defines asset management as the

systematic and coordinated activities and practices through which an organization optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its organizational strategic plan.

It then categorises these activities using the Plan-Do-Check-Act (PDCA) framework.

The scope of this paper is limited to the use of GS1 standards in the Do-Check activities and processes and in particular in the establishment of asset information management systems and the monitoring and measuring of results against the asset management policy and strategies. The document covers all items covered within the Local Store operations of Integrated Community Equipment Service (ICES) and available for issue by practitioners and prescribers.

The scope of the paper does not include recommendations regarding the contractual basis of the management of Loan Stock.

1.3. Purpose

This document is designed to assist and advise ICES's, and their solution partners, in using GS1 Standards to ensure Loan Stock operations are run in the most effective and efficient way, ensuring value for money while at the sametime delivering best possible service for the patient.

2. Executive Summary

2.1. Recommendations

- GS1 identifiers and bar codes should be used to identify Loan Stock equipment, physical locations, organisational entities, staff, patients and products.
- If appropriate, RFID tags can be considered, particularly for high value items such as specialist beds.
- Where possible paper records should be replaced by automated bar code or RFID reading devices which are able to update asset databases without the need for rekeying information.
- All events associated with a Loan Stock asset such as repairs and maintenance, issuing and collection to patient should be tracked using bar code or RFID readers in order to build up an accurate audit trail and enable effective and efficient management of maintenance schedules for areas such as PAT and Load testing etc.
- Tracking all events that affect an asset through barcode or RFID readers ensures accurate information collected regarding all aspects of the process such as practitioner issuing, patient receiving, person installing etc and enables asset management policies and processes to be improved.
- New bar code scanners procured by ICES's should be capable of reading 2 dimensional bar codes such as the GS1 DataMatrix as agreed by the GS1 Healthcare User

Group http://www.gs1.org/docs/healthcare/GS1_HUG_ps_Camera_Based_Scanners.pdf. This will ensure that the ICES has built in future proofing for further development of solutions for Loan Stock operations.

3. Benefits

The use of automated data collection through barcode and RFID readers, combined with, GS1 standards can provide the following benefits

- Reduction in time spent maintaining asset databases and registers
- Reduction in use of paper forms through data entering the system automatically via barcode or RFID scanning.
- Reduction in time spent by practitioners or prescribers on administration activities allowing more patient focussed approach.
- More comprehensive and accurate information about the use of Loan Stock leading to better procurement decisions based on total cost of ownership
- Improved ability to allocate equipment maintenance and repair costs
- Improved patient safety by recording what equipment has been used on patients.
- Improved visibility regarding location of Loan Stock, enabling more efficient and accurate product withdrawal/recall if required.
- Improved utilisation of assets through increased visibility enabling a reduction in the amount of new equipment purchased.
- The adoption of Global identifiers enables cross ICES visibility of assets, particularly specials and higher value items would enable pooling options, reducing the inventory requirement for these items.
- Simplification of transfer process when Loan Stock assets move between ICES contract areas through use of global identifier.
- Supplier assignment of globally unique identifier and attachment of barcode or RFID tag as part of manufacturing process, simplifies product receipt and data management within ICES data base and operation. In addition, if the supplier attaches the barcode label as part of manufacture process, it is guaranteed to be attached and will be more resilient to the usage requirements e.g. survive multiple wash cycles.

Through looking at existing processes within ICES's and considering how these could be impacted with the adoption and deployment of GS1 Standards and automating data collection procedures through the use of barcode and RFID scanners, the following potential benefits could be achieved.

- Practitioner and prescriber time spent on administration functions reduced by 12.5%, equivalent to 1 FTE in a department of 8 people.
- Adherence to required maintenance schedules at 99%.
- Inventory of specials across multiple ICES's could be reduced by 25%, potentially releasing £30,000 capital per ICES.
- Releasing 1 minute per item at point of receipt through removing need to commission items and assign new identifiers, apply labels etc. This equates to 21 days of effort for every 10,000 items received into the ICES inventory.
- If the supplier applies the label there would be a reduction in barcodes "falling off" during use, reducing need for process to re-apply labels. Currently 10% to 15% of assets require a re-label during their life. The added benefit is that the audit trail is not broken.
- Having one globally unique identifier, simplifies process when assets transfer between ICES's. This could save up to 20 hours data management time plus re-labelling costs per change of ICES contract.
- Studies show that typically, operations that operate a no-fee loan operation, will lose up to 30% of those assets on average across the estate. More accurate collection of data for each

event associated with an asset, particularly around events that lead to the asset going off-site will enable more timely and accurate recovery, driving up utilisation, reducing inventory requirements and need to purchase additional equipment, releasing capital back into the ICES.

4. Loan Stock Management

Loan Stock is a generic term used to describe a pool of equipment for use within the community. It covers a broad range of equipment types from low value risers through to high value, advanced pieces such as hospital beds and hoists. The equipment can be broadly described as any piece that enables a patient to be at home (either personal or a facility such as a care home) rather than in hospital.

Practise is now for ICES's to contract this activity out to third parties who take on responsibility for issuing, collecting, cleaning, maintaining, storing etc. There are two main routes for equipment to be given to a service user (patient) :

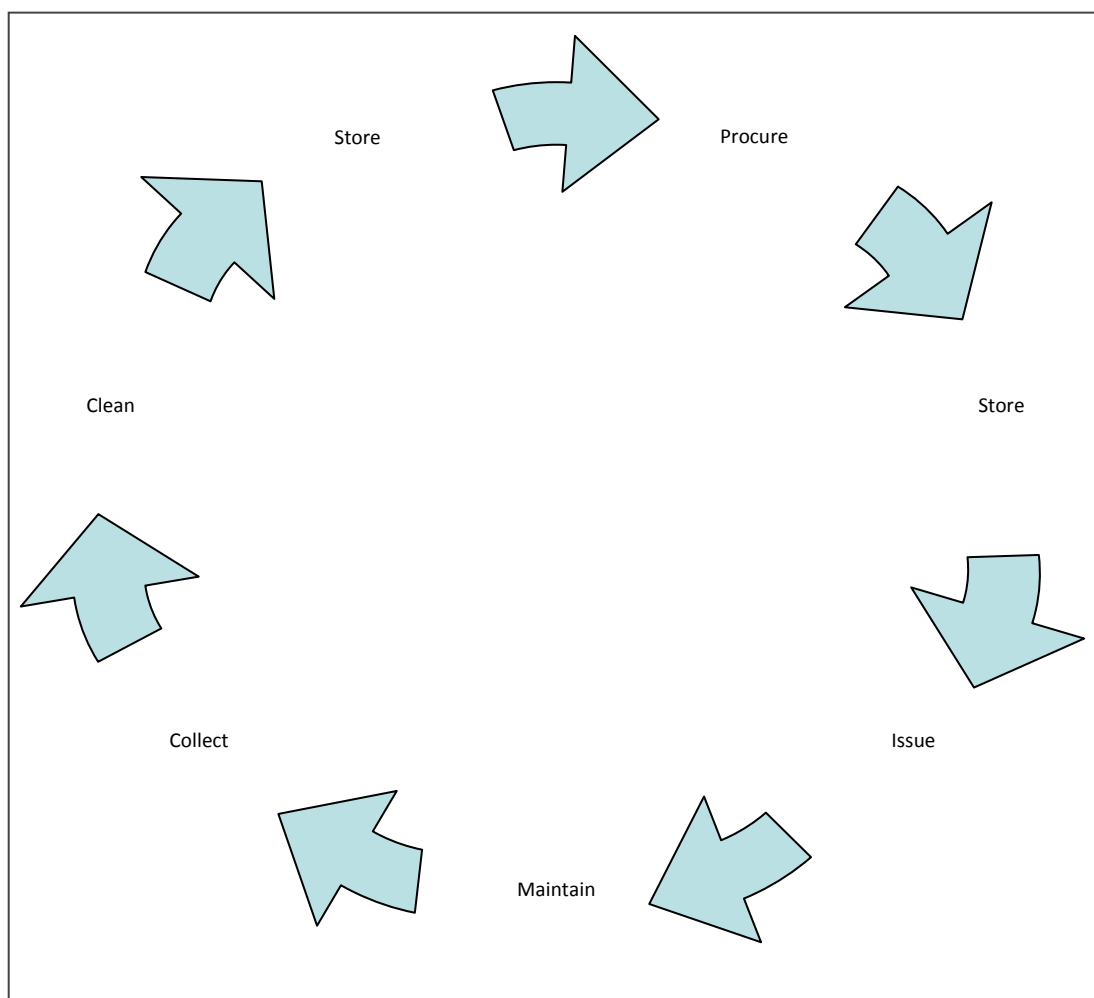
- Order through the third party management company who deliver and install at the users residence
- Issue from hospital from a peripheral store containing a small range of regularly used pieces such as crutches, toilet seat risers.

ICES's will enter into contracts with third party service supplies in different ways :

- Stock ownership :
 - ICES maintains ownership
 - Service provider takes ownership
- Service provision
 - Payment made per activity
 - Annual service charge

In all cases the contract will clearly state what is included and what activities will incur additional costs. In addition, the contract will define the core stock items that the third party provider is expected to ensure an agreed level of availability. Items outside of this core list are still available to order by practitioners and prescribers but are classed as specials and are ordered on an as required basis for specific service users.

In all cases a typical cycle will follow the flow shown below:



A subset of the Loan Stock is through a peripheral store, located in the hospital. This acts as a local store for use by the hospital and stocks a small, commonly used range of equipment. The equipment is usually given to the service user when they leave the hospital although the practitioner or prescriber may be required to go to the users home to install and demonstrate usage.

The breadth of equipment under the scope of Loan Stock, the increase in number of service users and the value of some of the items is driving a requirement for improved management information about the location, status and utilisation of assets. While the service providers have invested in systems and software and developed operational processes to capture relevant data, there are challenges within the overall process that impact the quality, consistency and accuracy of this data. While some elements of the chain use AIDC technologies (barcodes and handheld barcode readers) to record activities, the collection and maintenance of data at other points in the process involves manual processes and paper records which keyed into asset databases.

Overall a good level of performance is achieved, however, the nature of the operation does create a number of challenges that can result in issues.

Current issues facing the Loan Stock operation include

- There are significant parts of the chain that rely on the manual capture and keying of data which opens the system to errors occurring. This is particularly relevant in the issue of items from the peripheral stock. The patient is often on the ward or in a clinical area, away from the store resulting in both a physical and time gap between the patient assessment

and assignment of required items and the actual issuing of the items from the store. This can result in a number of issues :

- Issued items not recorded resulting in not removed from peripheral stock and therefore not re-ordered, leading to shortages and possible issues with patient discharges.
- Items issued but incorrect ID numbers recorded resulting in break in audit trail.
- Items recorded against the wrong patient again impacting the integrity of the audit trail.
- A high administration element which is time that could be spent on patient care.
- At certain points in the chain, there is physical separation between two key pieces of data that need to be captured – the patient and the item to be issued. This can lead to the data chain not being completed or being completed inaccurately.
- Significant costs are incurred across the chain through the use of bespoke item identification methodologies which leads to a number of issues :
 - All products that enter the system have to be manually processed to give them an ID for that contract. This adds considerable time to the goods in process as well building in opportunities for errors to occur :
 - Labels may not be attached at point of receipt but applied when issued for use. This opens the opportunity for the label not to be applied leaving the item unidentified. When it re-enters the service provider it has to be re-labelled with a new ID, which adds time and breaks the audit trail for that item.
 - Labels applied not as part of a manufacturer's process often do not have the same resilience as those applied during manufacture. This is particularly true for items that are washed regularly where they frequently fall off. These then have to be relabelled and this again adds in time and breaks the audit trail for the item.
 - Because many people are involved in the labelling of products, there is inconsistency in the placement. As such items may potentially be relabelled unnecessarily creating two records for the same item, affecting traceability and the audit trail.
 - When a contract is won, the winning service provider has to relabel all the items that come over with the contract with their own ID numbers. This is obviously time consuming and opens the risk for the audit trail to be broken. In addition, items already out on loan to service users may take time to come back through the process to be relabelled so special journeys have to be made out to do the relabeling or they are left and the contract has multiple ID numbers running. This creates complexity in the management of the visibility of items across a contract.
 - Because the ID numbers are only unique for the contract, any specials ordered and returned back into stock are only visible too, and therefore orderable within that contract. This results in every contract area running a returned specials pool which creates duplication of products. A unique global identifier applied to each item would enable a regional or even national pool of returned specials to be operated, reducing the number of duplicated items held. The use of a globally unique Identifier will enable the audit trail to be passed easily between service providers ensuring the integrity of the trail is maintained.
- Significant time spent by practitioners and prescribers on administrative activities recording and entering data into the management system, particularly within peripheral stores. Manual recording is both timeconsuming and prone to errors.
- Locating equipment for planned maintenance due to errors in data recording. Can drive multiple journeys to locations to complete maintenance which drives cost into the operation.
- Mismatch of actual location v system location leading to inaccurate inventory levels and potentially impacting availability if showing as being in stock when actually already out on loan.
- Lack of equipment utilisation data and other management information e.g. cost of use comparisons to aid decisions on type of equipment to issue to different types of patient.
- Management of outsourced contracts

- Paper documents and rekeying in an attempt to keep asset databases up to date.
- Inconsistent approaches to management in different departments. If a department manages on a batch basis, entering into system daily or weekly, visible stock position maybe inaccurate leading to issues of availability.
- Inaccurate stock visibility to ensure right stock available – patients cannot go home if correct equipment is not available for them resulting in bed blocking.
- The breaks in the audit trail for individual items creates issues around maintaining accurate records for every piece of equipment around a number of key areas :
 - Maintaining the integrity of the Unique Device Identification to the required standard
 - Ensuring all required PAT, Load Test activities are completed to the required schedule.
- Inconsistencies in the management and identification of parts. Where a system consists of a number of parts e.g. raisers and spreaders could be 4 pieces to make the whole, in some instances the whole has one label but in others each element is labelled. Where they are handled as a whole, it is unlikely the individual elements will remain together always and as such the integrity of the audit trail is compromised as at any one time, the individual elements maybe different ages and have undergone different usage and stress levels.

5. Stake Holders and Requirements

Loan Stock involves a number of areas of patient care. Equipment moves around and may need to be registered and tracked for audit purposes, procurement for purchase decisions etc.

Table 1 Requirements below shows what various stake holders require of any Loan Stock system.

Table 1 Requirements

Clinical	Have access to the correct equipment, in serviceable condition in the correct location when required.
Finance	Have accurate, auditable information about capitalised assets in an asset register showing equipment location and ownership Ability to allocate asset costs to relevant budget holders
Technical Maintenance	Have accurate information about when planned maintenance is required, about any occasions when planned maintenance has not been carried out through an accurate asset database showing which assets require maintenance and where the assets can be found.
Management	Information to ensure that assets are managed efficiently and according to the ICES's asset management plans and policies. Systems and processes to minimise the opportunities for equipment to be stolen, damaged or used without authorisation, and to identify who is responsible. Understand the total cost of ownership of equipment and any impact on clinical outcomes Knowledge of all out sourced contracts and the supplier performance against those contracts.

5.1. Regulatory Influences

There are a number of regulatory elements that have an influence and bearing on the management of Loan Stock. A common theme throughout the following is that they drive a requirement to create a unique identification for the item(s) and link an associated audit trail. It is also important that this audit trail is unbroken through the lifetime of the product.

5.1.1. Portable Appliance Testing

Pat testing or portable appliance testing is an important part of any health & safety policy. The Health & Safety Executive states that 25% of all reportable electrical accidents involve portable appliances. The Electricity at Work Regulations place a legal responsibility on employers, employees

and self-employed persons to comply with the provisions of the regulations and take reasonably practicable steps to ensure that no danger results from the use of such equipment. This in effect requires the implementation of a systematic and regular program of maintenance, inspection and testing. The Health & Safety at Work Act (1974) places such an obligation in the following circumstances:

- Where appliances are used by employees.
- Where the public may use appliances in establishments such as hospitals, schools, hotels, shops etc.
- Where appliances are supplied or hired.
- Where appliances are repaired or serviced.

The level of inspection and testing required is dependant upon the risk of the appliance becoming faulty, which is in turn dependant upon the type of appliance, the nature of its use and the environment in which it is used.

Loan Stock service providers are expected to follow the necessary regulation and guidelines such as The Institution of Engineering and Technology (The IET) "Code of Practice for In-service Inspection and Testing of Electrical Equipment" (ISBN: 978-1849196260). This guide forms the basis for portable appliance testing in the U.K.

There is no legal requirement to label equipment that has been inspected or tested, nor is there a requirement to keep records of these activities. However, a record and / or labelling can be a useful management tool for monitoring and reviewing the effectiveness of the maintenance scheme – and to demonstrate that a scheme exists.

The guidelines strongly recommend that equipment suppliers formally inspect and test the equipment before each hire, in order to ensure it is safe to use. The person hiring the equipment should also take appropriate steps to ensure it remains safe to use throughout the hire period.

5.1.2. Lifting Operations and Lifting Equipment Regulations

The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) describes what you need to do.

Lifting equipment includes any equipment used at work for lifting or lowering loads, including attachments used for anchoring, fixing or supporting it. The Regulations cover a wide range of equipment including, cranes, forklift trucks, lifts, hoists, mobile elevating work platforms, and vehicle inspection platform hoists. The definition also includes lifting accessories such as chains, slings, eyebolts etc. LOLER does not apply to escalators, which are covered more specifically by the Workplace (Health, Safety and Welfare) Regulations 1992.

If you are an employer or self-employed person providing lifting equipment for use at work, or you have control of the use of lifting equipment, then the Regulations will apply to you.

A key area covered is around Equipment maintenance. Additional hazards can occur when equipment becomes unreliable and develops faults. Maintenance allows these faults to be diagnosed early and corrected to manage any risks. However, maintenance needs to be correctly planned and carried out. Unsafe maintenance has caused many fatalities and serious injuries either during the maintenance or to those using the badly or wrongly maintained/repared equipment.

An effective maintenance programme will make equipment more reliable. Fewer breakdowns will mean less dangerous contact with equipment is required, as well as having the cost benefits of better productivity and efficiency. LOLER requires lifting equipment to be maintained so that it remains safe and that maintenance is carried out safely.

Best Practise Guidelines recommend that it is important to have an established a planned maintenance programme and a reporting procedure for workers who may notice problems while working on machinery. Some items of equipment may have safety-critical features where deterioration would cause a risk. You must have arrangements in place to make sure the necessary inspections take place.

5.1.3. Unique Device Identification

The EU Commission issued a paper on 5th April 2013 covering the Commission's Recommendations on a common framework for a unique device identification system of medical devices in the Union.

The Unique Device Identification (UDI) is a unique number pertaining to a medical device that enables the identification of different types of devices, and the access to useful and relevant information stored in a UDI database. Due to the UDI's specificity, it can make traceability of devices more efficient, allow easier recall of devices, fight against counterfeiting, and improve patient safety.

The Unique Device Identifier (UDI) is a system used to mark and identify medical devices within the healthcare supply chain. The system recommends that :

- a unique device identifier number should be assigned by the device manufacturer to each version or model of a device
- the unique device identifier be both in human readable format and in AutoID format. By default, this information will be applied on the label of each device uniquely identified.

UDI should be applied to all medical devices available on the market. The implementation of UDI is designed to enhance patient safety and improve efficiency in the healthcare supply chain. The system is expected to unambiguously identify medical devices allowing for more accurate reports of adverse events, manage recalls more effectively, reduce medical errors and provide for a secure global distribution chain.

The requirement for UDI is currently limited to specific categories of medical device, however, it is anticipated that its requirements will be extended to wider devices in due course.

6. Definition of Loan Stock Equipment

Loan Stock covers equipment in the following categories :

- Bathing aids
- Bariatric
- Bedroom
- Care and Maintenance
- General Household
- Kitchen Aids
- Medical
- Mobility Aids
- Moving and Handling
- Personal Care
- Pressure Care
- Rails and Ramps
- Scooter and Wheelchair
- Accessories
- Seating
- Telecare
- Toileting

7. GS1 Standards

7.1. Identifiers

The Department of Health recommends GS1 standards in “Coding for Success” NHS England and the HSCIC also strongly recommends GS1 standards. ISB 1077 and ISB 0108 define the use of GS1 standards and how they should be used by the NHS and its suppliers. for identifying products, patients, locations and assets and for the use of bar codes and RFID. The benefits of using GS1 standards include

- GS1 identifiers are unique, they do not need to be changed when trusts separate or merge and they can be used by suppliers and contractors without requiring the maintenance of complex look up tables.
- Readers can recognise and select GS1 bar codes and RFID tags through ISO standard features
- Data in GS1 bar codes and RFID tags has a well-defined structure that can be understood by any relevant application

GS1 strongly recommends that the identifiers are not used to encode information since such schemes are rarely flexible enough for the long term. It is normally better to use the identifier purely as a key to look up information in a database.

7.2. Bar codes and RFID Tags

GS1 linear or one dimensional bar codes (GS1-128) may be too large to fit on some items. GS1 two dimensional bar codes (GS1 DataMatrix or GS1 QR Code) can be much smaller and can be read more reliably, they are also likely to be common on pharmaceutical and other products purchased by the trust. For these reasons it is recommended that any deployment should develop a roadmap that leads to two dimensional bar codes. However, two dimensional codes may not be readable by some legacy bar code readers in the trust.

Fundamentally using GS1 standards provide an infrastructure of identifiers, bar codes and RFID tags that can be used by any application in any organisation. GS1 standards enable integration of systems within the trust and allow information from external providers systems to be incorporated easily into the ICES's and service provider's information management and control systems.

These benefits are particularly applicable to loan stock management where the outsourcing of asset ownership, repair and maintenance is increasingly common.

8. Best Practice Identifiers for Asset Management

This section reviews where GS1 standards apply to the information which BSI PAS 55 2 Guidelines state should be considered for inclusion in an asset information management system.

8.1. Asset Identification

Each asset should be identified by GS1 Global Individual Asset Identifier (GIAI). GIAIs are unique and can therefore continue to be used when the contract transfers between service providers due to contract renewal or trusts separating or merging. In addition rented assets, such as specialist mattresses, can be given an asset identifier by an external contractor knowing that this identifier will not clash with any other hospital assets or any other supplier assets. Ideally the manufacturer will assign and apply the GIAI in the form of a barcode or RFID tag. However, it needs to be recognised that the service provider or ICES may have to assign GIAI's and apply barcodes for some items, particularly during the period while manufacturers implement at their end.

8.2. Asset Labelling

A label containing the GIAI in both human readable format and in a GS1 bar code and/or GS1 RFID tag should be attached to each asset. This will ensure that applications, including those of external contractors can use the bar codes directly within their systems. Application by the manufacturer is preferred as they applied barcode can be more resilient to the usage it may undergo e.g. repeated washing etc.

8.3. Physical Location Identification

Where possible, each relevant location should be identified by a GS1 Global Location Number (GLN). Relevant locations will include those within the hospital itself and also those of external organisations providing storage, delivery and services such as decontamination repair and maintenance. This will enable suppliers to use the hospital delivery location identifiers without having to maintain complex internal cross reference tables. See also the paper "Identifying Locations in NHS Hospitals".

Postcodes remain the best way of handling service user locations.

The GS1 UK web site provides a Numberbank function where GLNs and their description can be created. This ensures that GLNs are formed correctly including the necessary check digit. A bulk up and download facility is available making it straightforward to integrate GLNs into the service provider and hospital internal systems. For more information email healthcare@gs1uk.org or phone 0808 1728390.

It is important to ensure each relevant location is identified by one and only one GLN. Estates will probably already have a database of hospital locations to which a field for the GLN can be added. As the layout of the hospital changes estates can add new GLNs as necessary. (See GS1 UK paper "Recommendations on the use of GLNs in trusts")

It is suggested that the estates function takes the lead in managing and maintaining an internal database of GS1 GLN physical location identifiers and the installation of the associated GLN bar code labels. A similar process to that for labelling assets can be used for labelling physical locations.

8.4. Organisational Identifiers

Budget holders, departments and service providers should also be identified by a GS1 GLN. In addition to their use in asset management the GLN can be used to provide a unique reference for supplier orders and invoices. The use of GLNs will be mandated as part of the NHS procurement strategy.

The GS1 GLN Numberbank as described in Section 8.3 can be used to create GLNs for budget holders, departments and service providers.

For both hospitals and service providers, it is suggested that finance or ICT should take the lead in creating and maintain a database of GLNs to identify departments and budget holders. The GLNs can be created sequentially and entered into a field in the relevant finance database. The existing budget codes can continue to be used internally but the GLN will be used when communicating outside of the hospital.

GLNs are expected to be an important part of the NHS eProcurement strategy due to be published in Q2 2014.

8.5. Location Labelling

A label containing the GLN in both human readable format and in a GS1 bar code and/or GS1 RFID tag should be attached to each location. This will enable applications, including those of the service provider, to use the bar codes and RFID tags directly within their systems. For example delivery services or other outsourced services will be able to use the location bar code to record where they have delivered to, or where they have picked up from.

8.6. Asset Ownership/Budget Holder Identification

The asset's owner or budget holder should be identified by a GS1 Global Location Number (GLN). This will enable external service providers to use this identifier in their internal systems and in their electronic invoices and other communications without having to maintain complex internal cross reference tables.

8.7. External Service Provider Identification

External supplier of products and services should be identified by their own unique GLN. This will enable the trust to use this identifier in their internal systems and in their electronic orders without having to maintain complex internal cross reference tables.

The recently announced NHS eProcurement strategy mandates that all suppliers to the NHS must use a GS1 GLN to identify themselves.

8.8. Patients

In order to identify which service user has been issued with a piece of equipment, the GIAI of the item should be linked to the NHS number.

In order to record which staff operated or serviced equipment, or to record which staff have issued items from a store, staff should be identified by Global Service Relationship Number (GSRN) using the trust's GS1 Company Prefix. Service provider staff should be identified by a GSRN provided either by the trust or the service provider itself as is most convenient.

The GSRN can be encoded in a GS1 Bar Code or RFID tag and carried.

Using the GSRN enables internal and external staff that move between hospitals and trusts to keep the same identity and avoids proliferation of access or identify cards.

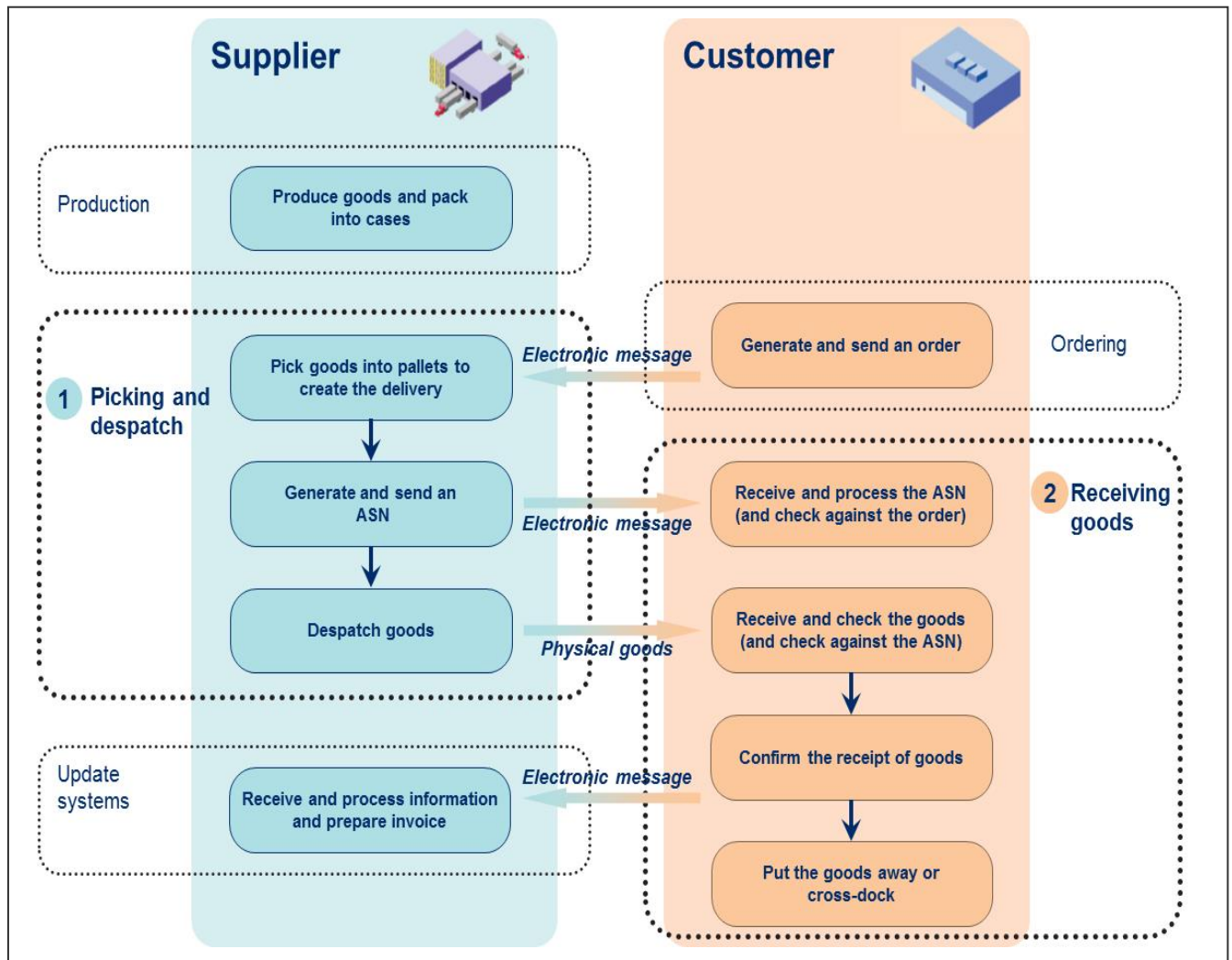
9. Best Practice Processes

9.1. Identification

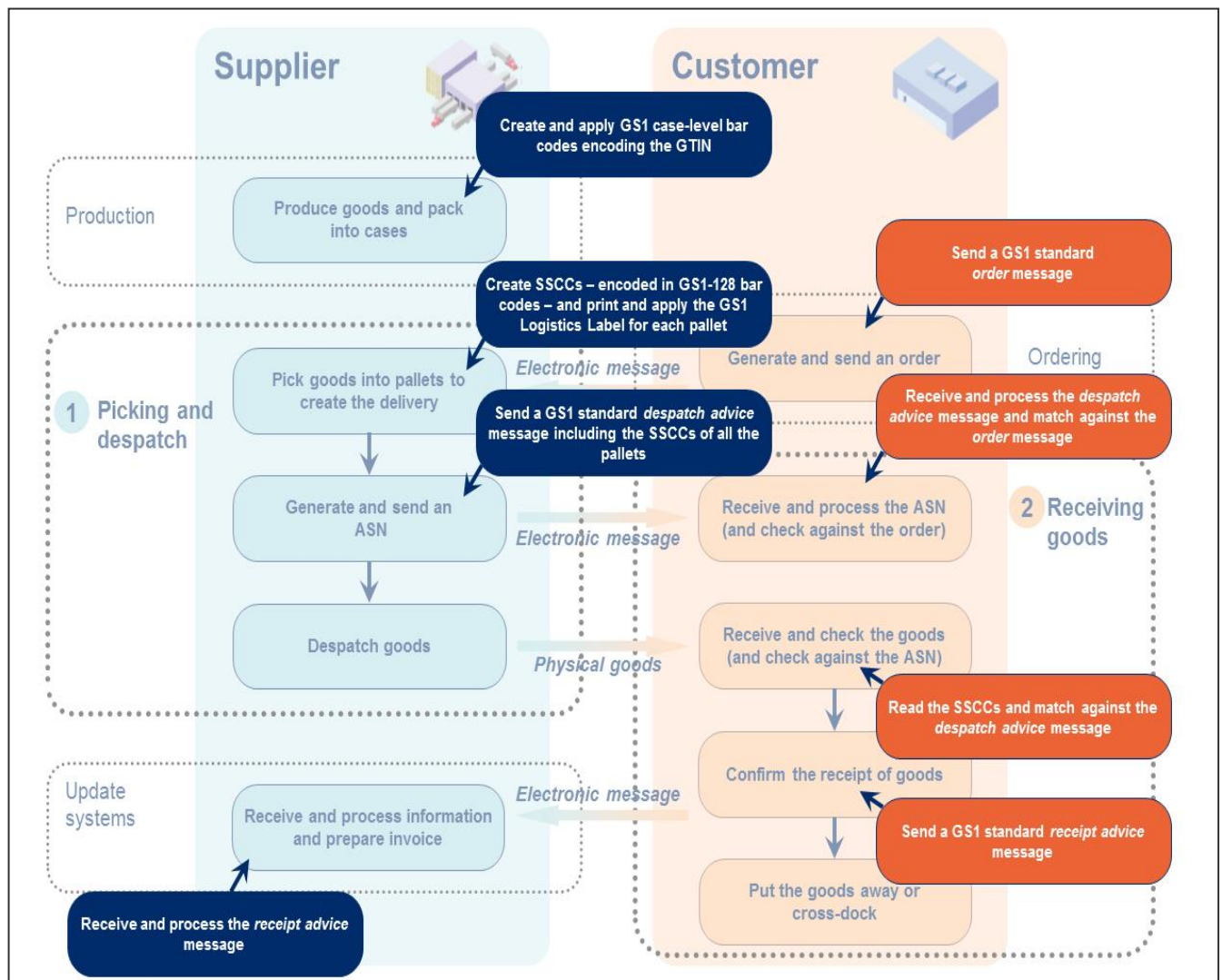
Manufacturers and suppliers of loan stock equipment should be encouraged to identify each item with a globally unique identifier. Given that there is a requirement to track individual items for the same type of product, it is recommended that this is carried out using GIAI's. In addition, consideration should be given to include batch information within the barcode in order to aid with recalls etc. By doing this, a number of advantages will be achieved:

- The barcodes will be a more integrated part of the product and therefore less likely to fall off in use, enabling the integrity of the audit trail to be maintained.
- The manufacturer will be able to use AIDC technologies as part of the pick and despatch process in order to enable a more efficient goods receipt process at the service provider through the use of ASN's etc.

The diagram below shows a typical supplier/user process for picking, despatching and receiving goods.



The diagram below shows how the use of GS1 standards within the process operate in order to increase the level of automation and from there increase the level of efficiency and accuracy throughout the whole loan stock operation.



9.2. Receiving none compliant items

Although ensuring all manufacturers assign globally unique identifiers for each item at source, it has to be recognised that items may enter the system that are not identified with relevant globally unique numbers. In these cases the service provider will need the ability to assign numbers, print barcodes and apply to the item. This is already done but with contract specific numbers so the system will need to be upgraded to manage the GS1 compliant identifiers.

Newly acquired assets should be given a GIAI. Typically this will be generated automatically by the asset database which will also print out a properly formatted bar code label to be attached to the asset.

Often the supplier's product code, serial number, batch number and expiry date will all have to be written to the asset register. Increasingly this information will be available as a GS1 product bar code on the product itself which can be scanned directly into the asset database without the need for rekeying.

The location of the asset will be updated directly into the register by scanning the GIAI and the GLN bar code of its current location at the receiving site.

Additional information such as any date for planned maintenance will need to be entered into the asset database using drop down menus where appropriate.

If the asset is capitalised it may be necessary to update a separate financial asset registry. This should ideally be handled by an automated feed without the need for any rekeying.

9.3. Delivery to Service User

1. Order Placement

In order to initiate the delivery, the practitioner or prescriber should scan the patients Patient ID number and confirm the details. The practitioner or prescriber should also enter their unique ID number, ideally by scanning using a barcode on their ID badge. In the event of a new patient, the record will need to be created. If the requirement is for a replacement of an existing item, the practitioner or prescriber can scan the existing items barcode, the system will detect the item GIAI and present the details of the item for confirmation of re-order. Practitioner or prescriber confirms the requirement and the order is placed via any authorisation required.

If the requirement is for a new item, the practitioner or prescriber selects the item from the catalogue. If the item required is a special, the practitioner or prescriber searches the returned specials pool to check if the required item is available. If none are available, order for a special placed.

2. Order Delivery

For delivery to the service user, the items unique ID should be captured by scanning the barcode and linking to the patient ID, setting the location to in-transit and creating the job details. A check can be made at this stage to ensure that a service or test is not imminent. When the delivery takes place the driver will scan the patient ID barcode (if available) or confirm manually. The items to be delivered are then scanned, service user confirms receipt on handheld and the items unique ID numbers now assigned to that service user.

9.4. Collection from Service User

A collection or return of loan stock equipment may occur in a number of ways:

9.4.1. System generated trigger

Triggered at the end of a service users prescribed use. In this instance the service provider will schedule a job, go to the service users location, scan the items for collection and confirm correct items, remove and return to depot for cleaning and return to inventory. The item will be scanned as it moves through the relevant cleaning and decontamination phases to create the audit trail.

9.4.2. Un-scheduled

This is where the collection is triggered because the service user no longer needs the equipment e.g. moved away to another area, died etc, equipment is damaged. In this instance the practitioner, prescriber or in some cases the patient or a relative will notify the service provider of the change in circumstances and request a collection. Service provider will follow the process outlined above in 9.4.1.

9.4.3. Returned to Hospital

In some instances, equipment is returned directly to a hospital. The hospital will be able to scan the assets returned, automatically removing them from the patients location. The assets can then be put aside for collection by the service provider. Upon collection the service provider will follow the process in 9.4.1.

In some instances, assets may be returned to a hospital that did not issue the asset and is not within the service providers coverage. In this instance the receiving hospital would be able to scan the barcode and receive the items and issue the patient or relative with an appropriate receipt. The service provider for the receiving trust can be requested to collect and process as per 9.4.1 and place in a holding area.

When the patient or relative is contacted by the issuing hospital, they can pass on the details of where they returned the items from the receipt. The service provider can then arrange to collect from the holding service provider.

Ultimately, the aim should be to have a communication network between neighbouring trusts to enable these types of returns to be handled efficiently.

9.5. Issuing equipment from Peripheral Store

In order to overcome the challenge of the equipment decision requirements and the actual issuing being separate both in terms of time and location, the use of barcode scanning can be used to overcome the issues this gap causes. Using a handheld the practitioner or prescriber creates a job in the same way as in 9.3.1 above. This job, instead of being sent to the Service Provider for implementation, goes to the stockman in charge of the peripheral store. The stockman selects the items from the store, scans the barcodes containing the unique identifiers and these are then assigned in the system against the patient ID. This removes the need for manual recording and re-keying. Upon confirmation of the order, a re-order is automatically placed on the service provider.

Bar codes and scanning will ensure that

- the correct equipment has been allocated to the patient or that the equipment is not overdue for a service
- that the equipment has been properly cleaned and serviced between patients
- Record which assets have been used on which patients – for identifying affected patients where equipment is subsequently found to have been faulty or contaminated
- Record asset utilisation - to ensure even use and correct maintenance and to provide management information for purchase decisions

To achieve this hand held scanners could be used to

- Scan the asset bar code, healthcare professional ID and the patient's GS1-compliant barcoded patient wristband (or barcode on notes), when allocating equipment to the patient and again when removing the equipment, and update the asset database.
- Scan the asset bar code and operative ID when carrying out cleaning/servicing and update the asset database.

9.6. Loan Stock Equipment Maintenance

Assets requiring planned maintenance will be selected by the asset database together with their current location. This information will be used to create a job and sent to the handheld device carried by the maintenance person. On arrival at the job, the maintenance person will scan the asset to confirm it is the correct item and that the maintenance has taken place and to confirm the assets physical location. Again this information will be uploaded into the asset database.

Where in situ maintenance is not possible the handheld will scan and record the location from which the asset was collected and its location in the repair facility. As the asset moves through the maintenance process its location and status will be recorded using bar code scans. Finally it will be delivered back and the asset Id and location scanned to update the asset database

9.7. Disposal

9.7.1. End of contract

At the end of the contract, the use of global identifiers will enable the assets to be easily transferred over to the new service provider, together with the audit history and current location history. This will remove the current requirement for the assets to be re-numbered with a contract specific number, re-barcoded and the audit history mapped over the new number.

9.7.2. End of life

When an asset that has been agreed for end of life disposal the asset bar code is scanned and the relevant record updated.

When the asset finally leaves the operational environment it should again be scanned and the asset database updated. In addition if the asset is capitalised it will be necessary to update a separate financial asset registry. This should ideally be handled by an automated feed without the need for any rekeying.

9.8. Financial audit

The use of barcodes and scanning will ensure that the audit trail is maintained with greater accuracy than with manual, paper-based solutions. This improved accuracy will deliver benefits in terms of reduced time on audit activities.

An accurate audit trail of items will enable potential issues to be highlighted proactively e.g. overdue items and followed up on. This will ensure stock is utilised to an optimum level.

10. Deployment

As part of the deployment of the e-procurement strategy for the NHS, to be issued Q2 2014, manufacturers, service providers and ICES's will be required to adopt GS1 standards throughout the operation and processes. The e-procurement strategy will set out a clear timeframe for adoption together with appropriate support materials. These will outline detailed advice to support deployment.

11. Creating GS1 Identifiers and Labels.

The successful deployment of the system requires that there is no duplication in the creation of GS1 identifiers. This will require that all parties in the loan stock system put in place a governance process for the creation of GS1 identifiers.

The example bar code sizes shown below are the minimum size specified by GS1 standards and this should ensure that they can be read in the widest possible situations. Actual readability will depend on the quality of the printer, the capability of the scanner and the light conditions. Modern scanners in well lighted environments may successfully read smaller bar codes than those specified in the GS1 standards.

GS1 DataMatrix bar codes can be very small depending on the level of error correction required and the size of data to be encoded. This makes them suitable for marking small assets, although the human readable information on the asset label may limit how small the label can be. Note however that camera based scanners are required to scan GS1 DataMatrix bar codes.

Care should be taken to ensure that any asset labels meet the requirements of infection control.

11.1. Asset Identifiers and labels

As outlined above, ideally, and as part of the e-procurement strategy, manufacturers and suppliers will assign and implement GIAI's before shipment to the service provider. However, there will be instances when the service provider has to assign and apply the GIAI upon receipt, or as part of a relabel of existing assets, in which case the following advice should be followed.

GIAIs can be up to 30 characters long. The example bar code below is for a GIAI made up of an 8 digit company prefix of 50123450 and a 5 digit asset number of 00008. The 8004 is the application identifier showing that the following digits represent a GIAI. (Note the brackets are for human readability only and are not encoded in the bar code)

The first step is to agree the layout of the labels. See below for an example layout which provides a clear human readable number which will normally be sufficient for manual processes.

00008



(8004)5012345000008

Label suppliers can provide pre-printed labels with sequential GIAI bar codes, optionally with an integrated GS1 passive UHF RFID tag. These tags can be attached to new assets as part of the receipt process. The bar code label can then be scanned to create the record in the asset database. Other information about the asset can then be entered.

For relabeling existing assets the pre-printed GIAI label should be attached to the asset. The GIAI should then be scanned and the old asset ID entered (via another scan if this is bar coded). The association between the new GIAI and the old asset ID can then be uploaded into the asset database.

It is suggested that existing assets are relabelled as they are repaired or serviced. The remaining assets can be relabelled as part of an asset audit required by the finance department.

If a suitable bar code label printer is available then labels can also be printed on demand.

11.2. Physical Location Identifiers and Labels

GS1 GLNs consist of 13 numeric digits including a check digit. Assuming that the trust has been allocated an 8 digit GS1 company prefix this allows for 10,000 unique locations to be identified. If necessary a 7 digit company prefix can be allocated giving 100,000 locations. In either case GS1 can allocate additional company prefixes if more locations are required.

Alternatively GS1 standards also support a 20 character alpha numeric GLN extension component which substantially increases the number of locations that can be identified with a single GS1 prefix. However the use of the GLN extension is not common and it is recommended that it is not used unless there are special reasons for doing so.

It is recommended to use a GLN for each physical location unless there are special reasons for using an SGLN.

The GLN bar code label can include a human readable description of the location if required as shown in the example below. However in many cases the location will already have a name label.

Ward 10



(414)5012345000008

Ward 10



(414)5012345000008

The GS1 UK web site provides a Numberbank function where GLNs can be created and linked to a description. This ensures that GLNs are formed correctly including the necessary check digit. A bulk up and download facility is available making it easy to integrate GLNs into the trust's internal systems. For more information email healthcare@gs1uk.org or phone 0808 1728390.

The GS1 GLN in Healthcare Implementation Guide (http://www.gs1.org/docs/gsmpr/healthcare/GLN_Healthcare_Imp_Guide.pdf) and the GLN Allocation Rules (<http://www.gs1.org/1/glnrules/>) provides more information about the use of GLNs.

11.3. Asset database and GS1 Identifiers

It should be recognised that some manufacturers to service providers and subsequently onto ICES's may use a GTIN (application identifier 01) or a GRAI (application identifier 8003) with serial number or a GIAI (application identifier 8004) to identify their assets. For this reason it is recommended that the application identifier should be included in the asset identifier field in the asset database. For example an asset with GIAI of 50123450 should be held in the database as 800450123450.

The asset database should be able to hold the largest asset identifier that the GS1 standards allow which is 36 alphanumeric characters as shown below.

GIAI is a maximum of 30 characters; the GIAI AI 8004 is 4 characters making a total of 34

GRAI plus serial number has a maximum of 30 characters, the GRAI AI 8003 is 4 characters making a total of 34

GTIN plus serial number has a maximum length of 14+20, the GTIN AI 01 is 2 characters making a total of 36

12. KPIs and Reporting

As part of the contract, built in reporting and KPI measures should be included. These should focus on ensuring the contract is running efficiently and shows clear value for money to the trust.

The KPIs need to be linked to the loan stock objectives set by the trust but will include areas such as :

- Number of assets is optimised for the throughput e.g. stock levels maintained around a level correct for the rate of usage.
- Ensuring assets are used optimally – e.g. assets are used equally to avoid premature failure
- Make sure assets are maintained according to required schedule in order to avoid failures, damage or accidents while in use with a service user.
- Make sure assets are used – assets sat in storerooms or depots that are not used could potentially be classed as excess stock and removed
- Make sure assets are repaired quickly and efficiently to ensure stock on the books is available for use and prevent unnecessary ordering of replacements to fill a temporary shortfall.

Any reporting structure should aim to regularly report on the following :

- % of assets not seen for more than 6 months – with actions to follow up if required
- % of assets due for maintenance not found – some assets such as hoists or electrical equipment have to undergo tests as a legal requirement.

- Ave time to repair from initial request to available for use – the more efficiently equipment is back in service the fewer replacement items have to be brought in.
- Log number of times asset is used and number of days in use to provide asset utilisation figures to give an indication on whether stock levels are too high or low.
- Number of repairs carried out in order to calculate the cost of use of each asset in order to support decisions on choosing between asset options for a service user.
- % of items not found first time for planned maintenance gives an indication of how accurately service providers are following the laid down processes of recording asset use.

13. Getting Started

Ideally, any move towards deploying GS1 standards within the loan stock area would be done in conjunction with the manufacturers and suppliers to the service providers and ICES. However, it has to be recognised that given the number of manufacturers and suppliers, there will be an elapse time before the e-procurement strategy begins to deliver supplier compliance. Therefore it is recommended that initially, the service provider and ICES work together on applying GS1 standards to existing stock while developing a roll out programme for the manufacturers and suppliers in line with the e-procurement strategy timeframe.

This would provide some benefits in managing maintenance, location and utilisation processes within the loan stock area.

- Find out more about GS1 standards and who else is implementing them both within your trust and in other loan stock areas by contacting GS1 on 0808 1728390 or healthcare@gs1uk.org
- Visit other trusts who have implemented improved systems
- Assess current performance
 - % of planned maintenance carried out on time
 - % of stock held in inventory compared to level of issues
- Build a business case based on the benefits
- Agree a phased implementation plan with the service provider concentrating on designing and implementing scanning within peripheral stores to prove technology and systems
- Assess and update or replace existing asset database to ensure support for GS1 identifiers
- Identify a suitable solution partner with experience of GS1 standards to source printers, labels and scanners
- Agree GLN labelling of physical locations with estates
- Agree ownership of creating and maintaining a GLN database for entities

14. Appendix 1 – GS1 Standards

GS1 keys identify items related to processes in a wide variety of industry sectors including healthcare. These keys all start with a sequence of numeric digits, called the GS1 Company Prefix (GCP), which GS1 allocates to individual companies. Subsequent digits or characters are added to the prefix to create unique identifiers for specific items.

When a key is encoded in a GS1 bar code it is prefixed by an Application Identifier (AI) number which identifies the key. The information in a GS1 bar code is also printed in human readable form adjacent to the bar code. The Application Identifier is enclosed in parentheses in the human readable form but the brackets are not encoded in the bar code itself.

More detailed information on all GS1 keys and bar codes is available at http://www.gs1.org/barcodes/technical/id_keys.

The complete GS1 identification and bar code standards are documented in the GS1 General Specifications available at <http://www.gs1.org/genspecs>.

14.1. GS1 Keys for Asset Management

The most common keys are summarised below.

14.1.1. GIAI – Global Individual Asset Identifier

The GIAI can be used to identify any asset including such things as, computers, vehicles, surgical instruments, pumps and specimens.

14.1.2. GLN – Global Location Number

The GLN can be used to identify physical locations and organisation entities where is a need to retrieve pre-defined information to improve the efficiency of communication with the supply-chain. Global Location Numbers are a prerequisite for GS1 eCom message.

GLNs can have an additional extension component to identify sub locations.

14.1.3. GSRN – Global Service Relation Number

The Global Service Relation Number (GSRN) can be used to identify the relationship between an organisation offering services and the recipient of services. In the NHS the GSRN is used on the patient wrist band to identify patients and may also be used to identify healthcare professionals.

14.1.4. SSCC – Serial Shipping Container Code

The SSCC can be used to identify an item of any composition established for transport and/or storage which needs to be managed through the supply chain. The SSCC is assigned for the life time of the transport item and is a mandatory element on the GS1 Logistic Label. SSCCs are used to identify the payload on a pallet, in a roll cage or in a package.

14.1.5. GTIN – Global Trade Item Number

The GTIN is the GS1 Identification Key for any item (product or service) that may be priced, or ordered, or invoiced at any point in any supply chain. The GTIN is then used to retrieve pre-defined information about the item. The key benefit is that information about the item can be retrieved about the product from the GTIN whether it is read in a GS1 bar code symbol, exchanged via a GS1 eCom message or accessed from the Global Data Synchronisation Network.

14.1.6. Global Returnable Asset Identifier - GRAI

The GRAI is used to identify returnable items such as pallet bases, roll cages, plastic containers or gas cylinder which are used in the movement of goods. The goods themselves are identified by a GTIN or an SSCC.

14.1.7. GDTI – Global Document Type Identifier

The GDTI is the Identification Key for a document type, for example a form, a certificate or a warranty. It can be combined with an optional, alpha-numeric serial number to identify specific instances of a form or warranty.

14.2. GS1 Bar Codes

When GS1 keys and attributes are encoded into GS1 bar codes they are preceded by codes, known as Application Identifiers. For example GIAIs are preceded by AI 8004 while a GLN for a physical location is preceded by AI 414. The standard for GS1 bar codes is that the data encoded in the bar code should also be shown in human readable form. For readability AIs are enclosed in brackets in the human readable text although the brackets are not contained in the bar code itself.

The bar codes likely to be used in asset management are either GS1 128 or GS1 DataMatrix. Examples are shown below.

14.2.1. GS1 128

This bar code can be read by virtually any bar code scanning device including the laser scanners in use at HPA Colindale. The data structure in the bar code is defined to enable batch numbers, expiration dates and a wide range of other information to be included.

GS1 128 bar code is a relatively large image the size of which varies with the information it contains. The example shows a GS1 128 bar code containing a GIAI.



14.2.2. GS1 DataMatrix

The GS1 DataMatrix bar code can carry more information than the GS1 128 bar code in a much smaller image; it can also be read even when the bar code image has been damaged in some way assuming that the optional error correction capability has been used. However GS1 DataMatrix requires a camera scanner, such as those in mobile phones. GS1 DataMatrix cannot be read by the laser scanners which may already be deployed in some departments.

Again the size of a GS1 DataMatrix bar code will vary with the information it contains and also what level of error correction is required. The example shows a GS1 DataMatrix containing a GIAI.



15. References

PAS 55-1:2008 Asset Management

Specification for then optimised management of physical assets

PAS 55-2:2008

Guidelines for the application of PAS 55-1

GS1 Company Prefix Governance Paper

GS1 GLN paper