START
your Scan4Safety journey

THE COMPLETE GUIDE TO THE MAJOR WORK PACKAGES
REQUIRED TO DELIVER THE EFFICIENT HOSPITAL DATA SET,
SCAN4SAFETY AND MDIS REPORTING

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# Table of Contents

1. Introduction

UK Example, Global Relevance

This document is written using United Kingdom regulatory framework and NHS Acute Hospitals as the example market. However, the need for healthcare efficiency through robust data to empower clinical, financial and operational decision making is a global requirement. As you will discover, the data required is more than inventory and encompasses clinical data points captured in high-cost procedure areas.

As will be seen, the data required by individual UK programs and reporting regulations varies depending on their objectives. The key point to note however is that the efficient hospital data set should cover most, if not all, regulatory frameworks. The result of this approach will ease the reporting burden and cost for hospitals.

Most hospitals today will be capturing the clinical data points in some shape or form. The Efficient Hospital requires these data points to be captured accurately, every time and at a low cost. After reading the last sentence many hospital managers may be thinking; "We are ok, all clinical data is in the electronic patient record." Most hospitals voice similar opinions in early meetings. The section on Clinical Data Completeness in Chapter 3 was devised specifically to highlight and communicate to management teams the reality of current data capture and the delta from the required level.

If further encouragement is required to strive for a broad hospital efficiency project rather than a narrower inventory management system implementation, the greater annual savings and return on investment opportunities should be evaluated as part of the business case development.
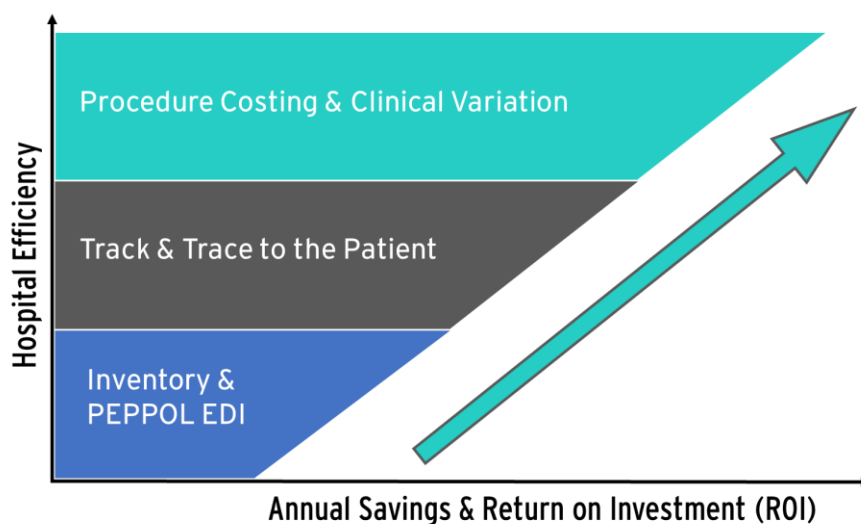
At the end of this document, you should have an overview of the major work packages required to deliver the Efficient Hospital Data Set, Scan4Safety and MDIS reporting. Request the budgeting spreadsheet and Signetor will provide a complementary budget and roll out plan for your project planning.

UK NHS – 3 Programs

Within NHS England there are 3 programs that combined create the platform for continuous improvement in patient treatment and safety, supporting improvement through clinical evidence and financial efficiency. These programs are Scan4Safety, MDIS and GIRFT.

Scan4Safety

Scan4Safety is a pioneering initiative led by NHSX. Its purpose is to enable the better delivery of patient care, improved clinical productivity and supply chain efficiency within healthcare providers.

The aim of Scan4Safety is expressed in the four 'P's – People, Product, Place, Process. Scan4Safety allows healthcare providers to identify every patient, product and place within the healthcare setting using global standards. This means that each of the identifiers used for patients, products and places are globally unique.

When combined with efficient, best-practice processes this approach provides the NHS with visibility into what care is administered to a patient, when and by whom. The benefits include improved patient care and experience, reduction in errors, (including some 'never-events',) significant operational efficiencies, (including an ability to plan to meet patient demand more effectively) and more efficient clinical product supply chain.

There are two sets of standards that underpin this unique identification of people, products and places and efficient processes. These are GS1 standards (Patient, Staff, Surgical Trays, Locations) and PEPPOL (Pan-European Public Procurement Online).

Medical Device Information System (MDIS)

The Medicines and Medical Devices Act passed in February 2021 laid the groundwork for NHS Digital to develop the Medical Device Information System (MDIS). This will allow performance monitoring of medical devices as well as patient outcomes. Its long-term goal is to prevent harm to patients. Healthcare workers can flag concerns with devices to mitigate risk to UK patients as well as to drive regulatory changes where required.

Hospital staff need to collect clinical records and implant information to load into MDIS when it launches. It's a multi-disciplinary procedure registry that builds on the structure and success of the National Joint Registry. You can read the current specification, which is still in development on the NHS website.

Getting It Right First Time

GIRFT, Getting It Right First Time, is a national programme. Its purpose is to improve patient treatment and care using in-depth reviews of services, creating benchmarks and presenting a data-driven evidence base to support change. GIRFT aligns with other programmes within NHS England and NHS Improvement using data driven results. Backed by health

professionals and the health system, GIRFT works in partnership with the Model Health System portal. Its data provides the evidence hospitals need to use as a reference point to compare performance with the expected standards of efficiency and service.

Table 1 A simplified view of the data required for the MDIS, Scan4Safety and Hospital Efficiency Data

	MDIS	Scan4Safety	Hospital Efficiency Programme
Patient ID	☑	☑	☑
Facility / Date & Time	☑	☑	☑
Timing Points			☑
Activity (Actual not planned OPCS / SNOMED)	☑		☑
Co-Morbidities	☑		☑
Risk Factors: Smoking, Patient Height / Weight	☑		☑
Surgeon / Lead Consultant	☑	☑	☑
Remaining Staff in Procedure: Anaesthetist, ODP, HCA, Students,Company Reps		☑	☑
Clinical Implants	☑	☑	☑
Procedure consumables (Non-Implants)		☑	☑
Surgical Trays		☑	☑
Late Reasons			☑
Procedure Outcome	☑		☑
GS1 Identifiers: Patient, Staff, SSD, GLN	Patient ID Only	☑	☑
PEPPOL - EDI for, Purchase Orders and Invoices.		☑	☑

A Practical Approach

The two national analytics programs (MDIS and GIRFT) will provide better outputs when the data available in hospitals is completer and more accurate. Similarly, hospitals internal efficiency and safety programmes would improve at a greater pace if the information used for decisions is standardised, complete and accurate.

This document takes a practical approach. It aims to help hospital management teams ensure their organisations are efficient and meet the national reporting requirements. The purpose is to demonstrate the value of these national programmes and look at how organisations can efficiently integrate them into business as usual hospital activity.

Focusing on a hospital efficiency programme gives you the greatest return on investment (ROI). Implementing Scan4Safety in the foundation of your efficiency programme provides a robust standards-based platform hospitals can build on with confidence.

To create a business case with a high-level design and a successful implementation an interdisciplinary team from clinical, finance, procurement and IT need to discuss and agree the following topics covered in this document:

> Essential Staff Involvement
> Project Ownership & Culture
> Mapping what and how clinical data is currently captured
> Quantify the product data gaps
> Mapping current supply chain processes and agreeing on a recommended approach that can easily be mapped to the proposed Inventory Management Systems (IMS) functionality
> Understanding the costs and opportunities of adopting and implementing GS1 standards
> Information Technology considerations, such as how much space is in theatres for the system hardware, what is Wi-Fi coverage like in "back-office" locations such as goods-in and stores
> Timeframes, how long does it take to plan and implement the different elements
> Staff Resources, who will project manage the implementation, who will be responsible for running the system when it becomes business as usual

2. Essential Staff Involvement

A diverse mix of skills and seniority is required to deliver this project. The table below shows the main reasons for involvement of each individual or department. The 'More Detail' section highlights where you can look up greater detail on where each team or individual will have the greatest contribution.

Table 2 Staff required for successful project delivery

Team	Reasons For Involvement	More Detail
Clinical Lead	• Ensuring the project will meet the needs of clinical management. • Ensuring the supporting data captured in clinical systems is of a quality that will allow procedure costing and clinical variation to be achieved.	**Section 3** **Section 4**
Clinical Operations	• Ensuring the solution will meet clinical operations requirements. • Ensuring clinical operational staff understand the requirement for the system and positively engage with training and roll out. Driving staff compliance in system usage. • Devising KPI Reports based on new data sets	**Section 3** **Section 4**
Finance	• Project Finance • Reworking SFI ordering processes. Exchanging 1 or 2 stage approval process for scanned use in a procedure. • Planning the removal of non-sterile orthopaedic products • Quick evaluation & decisions on efficiency opportunities that arise during the project.	**Section 5** **Section 6**
Procurement / Supply Chain	• Catalogue data enhancement and cleanse. • Optimising supply chain processes in line with IMS system • Possible revision of staff contracts	**Section 5** **Section 6** **Section 8**
IT / Informatics	• Connectivity: WiFi, Ethernet, Internet, Firewalls • Integration of systems, on premise & SaaS cloud based • Facilitate all clinical data into the data warehouse • New hardware provision & testing • Report Creation & Operational KPI metrics	**Section 4** **Section 7** **Section 8**
Estates & Security	• GS1 – Global Location Numbers • GS1 – Staff Identification	**Section 7**
Sterile Services	• GS1- SSD Trays, Supplemental's and Scopes • Calculate cost tray / item clean, enter for data export	**Section 7** **Section 8**
Workforce / HR	• GS1 – Staff Identification, ESR export for integration with staff id creation software. • Possible revision of staff contracts	**Section 6** **Section 7**
Project Manager / Scan4Safety Lead	• Day to Day lead of the project • Operational running of the data and systems post go-live • Driving the reports into the organisation when operational.	**All Sections**

3. Project Ownership & Culture

The smallest section but possibly the most important...

This is a Clinical Project.

The project needs to be seen as a clinical project that finance, procurement and IT are supporting. When operational, the data captured will be clinical data that finance and procurement will use to support clinical teams optimise costs and efficiencies.

Warning: If the project is seen as a procurement or IT project a successful outcome will be difficult to achieve and maintain. This has been discovered through hard experience.

Moving forward together

Project culture is essential to its success. As you delve deeper into affecting change, you will learn things about how your organisation operates along the way. Often it will be difficult to believe that this is how things operate. Sometimes it will be the way things have always been done.

This is where a good organisational culture comes in. A culture that says, 'How do **we** fix this' instead of asking 'Why do **you** do this?' encourages people to be open. By asking this, people will make additional suggestions allowing the organisation to move forward faster by working together for a safer, more efficient future.

4. Point-of-Care Data Capture

Electronic Health Record (EHR) systems play an important role in healthcare. But they can have limitations. For example, the configuration of the system and the way it's used have a negative impact on delivering hospital efficiencies and on accurate reporting. To achieve your goals, it is important to understand the capabilities of your systems, how they are implemented as well as the current quality of data entry.

Normally, an EHR system is only part of the clinical system infrastructure in high-cost procedure areas with different departments using their own specific solutions, examples of which are shown in Table 3.

Table 3 examples of departments specific solutions

Department	Example Systems
Main Theatres / Day Case	Theatre Manager – TheatreMan
Cath Labs	Axiom Sensis, CIVIS
Interventional Radiology	Soliton
Maternity	BadgerNet
Ophthalmology	Medisoft

Where department systems capture important data, it needs to be transferred to a single data repository to standardise hospital reporting. Transferring the data into your EHR system is costly and complex if you want more than a simple read only file (PDF or HTML). For analytic quality data, you will, most likely, need to source it from the data warehouse.

Other data capture methods departments may use are Microsoft Excel and pen & paper based recording. All Microsoft Excel and pen & paper data capture methodologies will need transferring into an electronic system that links to the data warehouse.

Data Quality

It is vital to check the information quality each department captures as it affects the accuracy and quality of your reports; for example:

- **Are the activity codes actual or planned activity?** The purpose is to ensure all activity is captured at the point-of-care to assist the coding team. This increases the coding depth which improves a hospital's safety score (UK is based on coding depth / mortality rate,) assists clinical directors in identifying equivalent procedures and may increase a departments income.

- **Capturing all staff who are part of a procedure** (rather than just the surgeon, anaesthetist and scrub nurse.) This provides a more accurate procedure cost and helps identify the skills mix required for each case. A good test is to take the number of nursing staff working in a department during each session for a week (Operating Department Practice (ODP) and Health Care Assistant (HCA)) and see what percentage of their work is recorded in the data warehouse for the same period.

- **Are timing points standard across hospital departments?** Is it possible to identify anaesthetic times, theatre set up, surgery, close and time into recovery?

Scanning Barcodes and External Data Sources

EHR systems are promoted as a single source of truth for patient records and most have functionality that suggests they have the capacity to scan products, surgical trays, and staff. So it makes sense for the clinical and/or IT team to suggest the EHR becomes the core of the MDIS or Scan4Safety project. For the EHR to be the core system, the following common issues found in major EHR's need resolving:

1. EHR systems typically cannot <u>decode</u> product barcodes. This means that implants with a barcode containing (01) GTIN product identifier, (17) expiry date, and (10) lot number cannot be broken down into the three distinct elements of product, expiry and lot number. The same issue occurs for Health Industry Barcodes (HIBC.)

Example GS1-128 Barcode

This causes 3 major problems:

- Track and trace failure. Patient safety is compromised and reporting to MDIS will require significant manual intervention costing time, money and inevitably accuracy.

- Consignment stock reordering requires the lot or serial number used to be put on the purchase order form. This will either be missing or require manual intervention costing time, money and inevitably accuracy.

- From a data management perspective, every delivery with a different lot number and expiry date will be seen as a "new product" by the EHR system. This will need to be set up so it can be scanned in theatre costing time and more money.

2. They have no product barcode data within the system, which means this must be manually created and maintained costing time and money.

3. The inventory management functions of receipting stock, managing stock in wards and outpatients as well as an organisation wide stock position is limited or non-existent.

4. EHR systems cannot accept surgical tray information from third-party systems, so these cannot be scanned unless manually maintained in the same way as product

information. The GS1 standard for surgical trays is structured like a product (GS1-128) so decoding barcode information is required (see point 1 in this list).

5. Staff record information must be maintained manually within the system which results in the following major problems:

    o Information on staff is frequently out-of-date;

        ▪ The system is full of people who have left.

        ▪ Increased seniority is not reflected in long serving staff records.

    o The staff number created by the EHR bears no relation to the staff payroll number, which produces inaccurate procedure costing.

    o Staff data cannot be imported from third-party systems such as the UK NHS Electronic Staff Record (ESR) or staff identification badge creation systems so external identification such as GS1 (GSRN) staff identification cannot be used.

Systems Required

If the EHR system implemented has the restrictions listed, for a hospital to deliver a total MDIS, Scan4Safety and Hospital Efficiency Programme it will require a combination of the EHR, department systems and an inventory management system (IMS) capable of scanning and decoding barcodes including:

GS1 GDSM	Patient wristbands, Staff Identification
GS1 GLN	Location Identification (Global Location Numbers)
GS1 & HIBC	Products, Implants & General
GS1-128	Surgical Trays.

All the information captured must end up in the data warehouse.

Clinical Data Completeness

Capturing what and how data is captured today is a vital stage as it provides a clear overview of where your organisation is today. During most projects the initial sentiment expressed is that 'everything is recorded in the patient record on the EHR'. Time and time again experience has proven this statement incorrect and only when the reality of the current situation is presented in a simple table format (again see Figure 1 below) can remedial plans be devised and put into action.

It is important to discover the reality of the clinical data captured and its availability within the data warehouse for analysis early in the design stage. The alternative is to be surprised and disappointed after the project completes that procedure costing and clinical variation is not possible.

Any changes required are likely to take clear communication from Medical and Clinical Directors to ensure successful compliance. This will take time and monitoring to ensure the new practices are embedded.

Actions

Action: Understand how each department currently captures the required data. It is important to question how each data element is recorded.

Action: Take an extract from the data warehouse team for the same data elements.

Action: Identify gaps in department processes and the data captured that needs addressing to provide a full data set for each department.

Action: Receive agreement from Medical and Clinical Directors about how and in what timeframe they will ensure any data quality issues are resolved.

Action: Review data warehouse data monthly until resolved.

Figure 1 Extract from Signetor Report following departmental interviews. The green cells are good. The pink cells require work by clinical teams to improve data quality.

		Main Theatres	Day Surgery	Maternity / Obstetrics	Cath Labs	Interventional Radiology
Locations		Theatres 1-10	4 Theatres	2 theatres	Lab 1&2	1 Lab
GS1 - GLN		No	No	No	No	No
Scheduling System		Cerner Millennium	Cerner Millennium	Cerner Millennium	CIVIS	Cerner Millennium
Other Systems		No	No	No	Cerner Millennium	Soliton
Non-Product Data						
GS1 - Patient Wrist Band		Patient wrist band has 2 Barcodes plus Human readable data: Name, DOB, NHS#	Patient wrist band has 2 Barcodes plus Human readable data: Name, DOB, NHS#	Patient wrist band has 2 Barcodes plus Human readable data: Name, DOB, NHS#	Patient wrist band has 2 Barcodes plus Human readable data: Name, DOB, NHS#	Patient wrist band has 2 Barcodes plus Human readable data: Name, DOB, NHS#
Patient wrist band check		Visual	Visual	Visual	Visual	Visual
Timers		Cerner Real Time	Cerner Real Time	Planned Cerner/ Emergency Paper	CIVIS	Cerner
Procedure codes	OPCS	No Codes only description	No Codes only description	No Codes only description	No	No Codes only description
	Comorbidities	Peri Operative captured in Cerner	Peri Operative captured in Cerner	Peri Operative captured in Cerner	Not sure - Possibly just booklet	No Codes only description
Late Reasons		Captured in spreadsheet	Captured in spreadsheet	Only long delays captured	No	None
Procedure Outcome		Cerner	Cerner	Planned Surginet / Emergency Paper	CIVIS	Cerner

5. Stock and Catalogues

Overview of Stock Types

Stock   The fast-moving clinical consumables used throughout the hospital. They are owned by the hospital and purchased in advance of use. Examples include gloves, syringes, sutures, and aprons.

Non-stock   Department specific stock purchased by the hospital in the normal way. Examples include lower cost stents and orthopaedic screws.

Consignment Stock   Items the supplier puts into hospital stores. They remain the property of the supplier until (i) they are used in a procedure or (ii) they reach expiry or 6 months before their expiry date depending on contract. When used in a procedure, the hospital purchases them from the supplier with a "Pay and Replace" purchase order. Consignment stock is the most expensive stock per unit and includes orthopaedic joints, pacemakers and metal stents.

Loan Kits   Specialist supplies used too infrequently to be kept in stock. They are normally shipped in a flight case with surgical tools and all the possible consumables required to perform a procedure. A loan kit is ordered from a supplier and will have a daily rental charge plus the cost of any consumables used.

Sale-or-Return   Items such as specialist breast implants where the exact size required is unknown before the procedure starts. A supplier will usually supply three sizes as specified by the consultant. All items will be owned by the supplier when they arrive at the hospital. During the procedure the consultant decides which size is most appropriate and returns the unused items after the procedure. A purchase order is then raised for the product used.

Data Catalogue

In most cases the procurement product catalogue will drive the inventory management system scanning capability. To achieve this the procurement catalogue requires information on all stock types including loan kits and sale-or-return items. In addition to the current data held the catalogue will most likely need all the relevant barcodes for each product and for each product packaging variant.

To enhance the catalogue a major piece of work is required to remove old product data, including missing products and ensuring all product barcodes are included. The challenge is to know what items are missing from the catalogue. The quickest way to find the missing items is to conduct a full stock audit of all stock, non-stock and consignment stock where the manufacturers barcode is scanned. This can then be matched to the current catalogue.

Actions

Action: Undertake a full barcode stocktake covering stock, non-stock, and consignment in the selected high-cost areas.

Action: Review the expired stock and stock due to expire in 0 – 3months, including consignment stock. For the business case, suggest a prudent two to three times the 0 – 3 months value of goods due to expire as an expected saving.

Action: Match the stocktake with catalogue and purchase order data to identify:

1. Product missing from the catalogue.

2. Obsolete stock on the shelf.

3. Obsolete stock in the catalogue.

Action: Identify all the Loan and Sale-or Return suppliers in each department and ensure all the possible product data is in the catalogue.

Barcode Maintenance

Once you complete the data cleanse, it's important to determine who will maintain the catalogue and source the barcodes as suppliers update their products. All products need to be entered into the catalogue before arriving in the theatre. This ensures the data is in the IMS, and allows products to be scanned, tracked and reordered

Some IMS and catalogue providers currently provide this service, but not all do. It is important to ensure that one takes responsibility for maintaining an accurate, up to date product and barcode database that the hospital can draw down from.

A percentage of stock will be available by June 2022 in the new UK Medical Devices Register. The quality and completeness of this data will determine if it can fully support catalogue and IMS scanning.

Action

Action: Ensure the catalogue or IMS provider takes ownership for maintaining a complete barcode database.

Orthopaedic Screws and Plates (Sterile/Non-sterile)

Orthopaedic screws and plates come in two formats — pre-sterilised (sterile) and unsterilised (non-sterile). Non-sterile stock is placed in surgical trays and sent to the Surgical Sterilisation Department (SSD) for sterilisation. All implants placed in a patient are sterilised at the point-of-use. The issue with non-sterile screws and plates is they are removed from their packaging when placed into the tray for cleaning and sterilisation. This means they cannot be scanned or traced to the patient. For both MDIS and Scan4Safety, non-sterile orthopaedic products need to be removed prior to project go-live. The sooner non-sterile items are reduced and phased out of stock the smaller the financial implication will be.

Potential Balance Sheet Impact

Many hospitals suggest it is the older (more experienced) surgeons who use non-sterile components, so they see demand dropping year on year as the surgeons retire. The financial consideration comes from the unconsumed hospital owned non-sterile screws and plates. During stocktakes we have seen asset values of between £0.5 – £1.5 million tied up in this stock type with little change from year to year. As this stock becomes obsolete, auditors may eventually require removal of these items from the balance sheet.

Actions

Action: Find out how much non-sterile orthopaedic stock that is not yet in surgical trays from the barcode stocktake.

Action: Determine the annual consumption and number of years you have been holding this stock.

Action: Plan how to reduce, sell, swap, donate or accelerate consumption to minimise the eventual balance sheet impact.

6. Supply Chain Processes

Major reconfiguration of processes, team structure and responsibilities are possible when moving from multiple manual process' to an integrated inventory management system (IMS) with point-of-care scanning in high-cost areas.

Typically, the current stock replenishment process is manually intensive requiring three or more teams (goods in, materials management and clinical) to operate. There are two main supply chain processes in hospital high-cost areas:

- **Materials Management** for items used in multiple departments that generally have a lower unit cost and high usage (shown with red arrows in Figure 2). The "trigger to order" is the weekly, or more frequent, count by the material management team. For each item the levels of stock are counted and the amount required to top up to the max level are entered into the NHS Supply Chain eDC system.

- **Department Stock** for specialist items typically used by a single department (shown with blue arrows). The "trigger to order" is a daily process of reordering from the implants book or a manual check of physical stock levels. The physical order is typed into the procurement system by the clinical staff or stock manager for the department. This is then approved by up to two authorisers dependent upon value and the organisations standing financial instructions (SFI.)

Figure 2 Example of hospital department supply chain processes
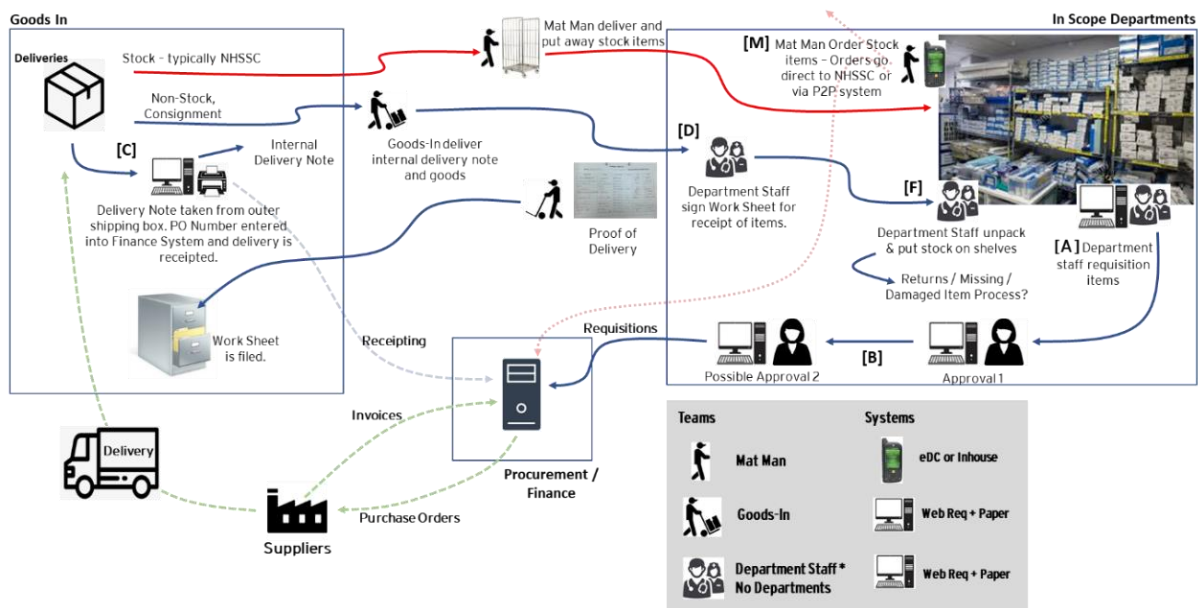
Important Processes shown in the Diagram

[A] Department stock ordered by clinical staff.
[B] Standing Financial Instructions (SFI) 1 or 2 stage manager approval.
[C] Goods-in receipting and delivery.
[D] Proof of delivery to the department.
[F] Putting the goods on the shelves.
[M] Materials Management Process.

Point-of-Care Scanning

Point-of-Care scanning is when product identification occurs at the point of consumption in the patient procedure. This has several benefits:

- If the item has expired this can be flagged immediately, giving the clinical team the opportunity to replace the product or surgical tray.
- If the product is opened but not used due to incorrect size issue or being dropped making it unsterile, this can be recorded ensuring only the actual products implanted are reported to MDIS.
- All patients affected by product recall notifications can be identified within minutes.
- The "trigger to order" happens immediately without further intervention, subject to the reordering rules set for the product. This shortens the replenishment timeframes reducing stockouts and possibly the stock holding required.

The supply chain transformation offered by point-of-care scanning frees up clinical staff from ordering non-stock and consignment consumables. Once this is understood, you can look at how you receipt and put away specific department products to see what parts of the process can be done by a dedicated stock team.

Action

Action: Draw up a table (see) with who is responsible for each action currently and the recommended approach when point-of-care scanning is in place.

Figure 3 Example of drawing up a table

	'Common' Clinical Products			Department Specific Products		
	Stock / NHSSC			Non-Stock, Consignment, Loan Stock, Sale-or-Return		
	Order	Receipt	Put Away	Order	Receipt	Put Away
Today	Materials Management	None	Materials Management	Department Staff	Goods In or Department Staff	Department Staff
Point-of-Care Scan	Materials Management or Theatre Scan	Goods In	Materials Management	Theatre Staff Scan Product to Patient Procedure	Goods In	Materials Management or Department Staff

Single Team Opportunity — Goods In and Materials Management

When looking further at supply chain process opportunities, it makes sense to question if goods-in and materials management could become a single team with one contract and set of working conditions. This would increase resilience of the team for holiday and sickness cover.

Actions

Action: Map the current supply chain process for common and department specific products.

Action. Organise a meeting to review efficiency opportunities between procurement, goods in, material management and clinical department heads.

Action. Agree on the recommended process

Action. Ensure the same recommended process is used across all high-cost departments to simplify system implementation, staff training and increase staff deployment flexibility.

Action. Understand any contract and team structure changes required to support the recommended process.

Action. Engage HR early in the process to effect these changes.

Financial Team Considerations
Standing Financial Instructions (SFI) — Procurement Approval

Today hospital financial controls for goods procurement can require one or two manager approvals depending on the value of the order. When goods are delivered and receipted, they could be requisitioned again immediately and, if approved, ordered from the supplier. The current SFI provides limited protection against incorrect ordering which generally increases stock levels.

Scanning the patient wrist band barcode and all items used during a procedure provides a robust consumption audit trail. Limiting ordering to paid for activity provides much greater protection against unnecessary spending. The recommendation is that once the IMS is integrated into the existing system, that SFIs requiring manager approval is removed. This will shorten the consumption to delivery time and reduce the chance of stock outs and/or allow lower stock holding levels.

7. GS1 Adoption

In May 2014, under the auspices of the NHS Procurement Development programme and the NHS eProcurement strategy, the UK government mandated using GS1 standards in the NHS Supply Chain. The Scan4Safety programme developed this further with GS1 enabling technologies for location identifiers and sterile services. The four GS1 barcode applications to be implemented are patient wristbands, global location numbers, staff identification badges, and SSD trays. This will provide a global identification language to efficiently connect patient, care provider, location, and equipment together. The GS1 standards should simplify IT system procurement and integration allowing all systems to work with the same globally unique barcodes rather than each system requiring proprietary identification systems.

The investment required to implement GS1 standards is approximately circa £50K per hospital and is broken down under budget costs below. This will increase accuracy and save time capturing data for MDIS reporting. It also provides common enablers to make significant efficiencies in areas such as materials management, asset management, asset and building maintenance, outpatient & ward patient activity tracking, bloods and pathology services. The Return on investment (ROI) for GS1 implementation can be realised within Scan4Safety program and will provide a free resource for all future digitisation programmes within the hospital.

Warning: To minimise costs the roll out of GS1 programs needs to start as soon as possible. For example, staff identification badges are typically replaced every 3 years and SSD items are sterile for 12 months. Starting early will get the GS1 barcodes in place for your Hospital Efficiency programs under business as usual (BAU) expense rather than additional one off charges.

Patient Wristband

There is an existing NHS directive for an NHS patient number to be encoded on every patient wristband. In many cases, the patient wristband will have additional non-GS1 barcodes such as the local hospital number. The IMS should be configured to only accept the GS1 barcode and staff will need training to identify the correct barcode where more than one exists.

It is important to check that all patients undergoing surgery have a wristband. Emergency maternity patients and day-case patients, for example, will not have wristbands where the existing process only allows wristbands for hospital inpatients.

Budget Costs

If the GS1 barcode on the patient wrist band is not in place, it will most likely require an EHR system upgrade. Cost: POA.

Timeframes

In line with EHR upgrade cycle

Action: As GS1 members, NHS hospitals can have their patient wristbands tested free of charge. Send a sample patient wrist band to GS1 for verification testing.

Global Location Numbers

The IMS needs to know where stock is located. The NHS specifies using a GS1 Global Location Number (GLN) to identify locations. When the goods in team deliver a product to a department, they can scan the GLN barcode on the wall at the department entrance. The IMS will then connect the GLN, delivery person, date and time to create proof of delivery.

The GLN is a unique number used across the world to identify a specific location. This unique number ensures that no other organisation issues the same number. You can also use GLN location numbers for asset tracking and maintenance schedule systems. The GLN master record is maintained by the Estates team in either their CAD or facilities management system.

Budget Costs

Label Software	£800
Thermal Transfer Printer	£500
Labels and Ribbons	£300
Software Training	£800
Staff costs* per 300 labels	£4,500
Total	£6,900

*Staff Costs: This is an allowance of 30 minutes per label to plan and affix them to a wall at £30 p/h overtime – 300 labels should cover all high-cost areas, stock rooms, goods in, wards and outpatients.

Timeframes

- Planning   3 months
- First GS1 barcode until complete   6-9 months

Staff Badges

Recording GS1 staff badges will connect all care givers with each patient. The GS1 staff barcode (GSRN) can work across all your systems from the core EHR to department specific applications. Scanning the GS1 staff badge barcode quickly and accurately identifies all the staff involved in every procedure or care-giving episode. This enhances patient safety by providing a complete list of the clinical staff involved in each procedure. It also allows for accurate procedure costing and provides clinical managers with the data for in depth understanding into the optimum mix of skills (surgeon, anaesthetist, ODP/HCA) required to undertake each procedure type. Where a hospital is a teaching hospital, scanning all staff identifies the procedures that have students taking part so the extra procedure time can be allocated to training costs. For all staff recorded in activities it is possible to maintain an electronic training record for each student and staff member.

The current UK GS1 standard for staff identification embeds the NHS Electronic Staff Record (ESR) number as part of the GSRN. This ties exact staff costs to each procedure. What it does not currently cover is agency staff, students, volunteers, outsourced staff, in other words anyone who is not a full-time salaried NHS employee. This will hopefully be addressed in the next 6-9 months.

Budget Costs

Software: module)	£650 – 1000 per location (dependent upon door control
Printer & Web Cam:	£1100 per location
Set Up & Training:	£500 per location
Annual Maintenance	£250
Staff Badge Blanks (1000)	£70 – £2000 (depending on door control requirements)
Total (based on 4000 staff)	£3-£11K (assume one location)

More information and potential solutions are available here.

Timeframes

- Planning   3 – 6 months
- First GS1 barcode until complete*   36 months

*Assuming all Staff IDs are replaced every 3 years.

Interfacing Electronic Staff Records to a Staff ID System

Interfacing the NHS ESR system to the staff identification badge system can be done in two ways (see).

1) The first is via the Active Directory (AD) system. The interface between ESR and AD is typically via a system called Directory Manager from BDS Solutions. The cost to implement depends on an organisation's size and is typically £20K to set up and £5 –7K per annum to maintain. Other solutions could be available.The advantage of this approach is the data can be used by the Active Directory for multiple functions, including automatically provisioning new staff system permissions, controlling access to systems, and deleting staff who leave from all IT systems. Implementing Directory Manager is a major IT project and if not included in the IT work plan, it will be difficult to source the resources for implementation at short notice.

2) The second way is to create an 'SQL view' from an HR database that contains staff ESR data. This is very quick to implement but is a single purpose export. Cost to implement is IT team time only, typically 1 day. The disadvantage of this approach is it will only deliver the data into the Staff ID Badge system, none of the IT department efficiencies will be possible.

Figure 4 Two ways to interface to the NHS ESR system

© Signetor Limited
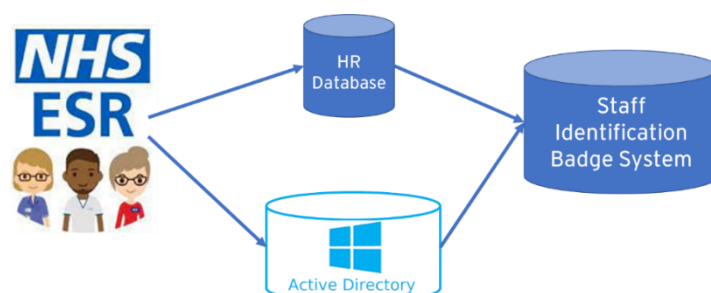
Surgical Sterilisation Department Trays

Migration to a GS1 barcode for the external tray label enhances the current tray identification to increase patient safety in two ways:

1. The GS1 standard provides a globally unique number for each tray.

2. The GS1 standard includes a tray sterile expiry date. When scanning the tray barcode, the IMS alerts clinical staff the tray is no longer certified sterile.

The IMS will need to cope with the existing SSD barcode and the proposed GS1 barcode structure as barcode migration will take a minimum of 12 months. It takes 12 months to change over because trays are only converted when they are cleaned. The trays slowest to turn over may only convert to GS1 when they reach the end of the 12-month sterile period.

Note: Only the external tray label changes to a GS1 barcode. The identification labels not visible until the tray is unwrapped will not change (the tray identifier and instrument identification).

Budget Costs

- Internal Team with SSD owned software   £10 – 25K
- Managed service provider   £No Additional Cost

Timeframes

- Planning   3 months
- From first GS1 barcode to completion   12 months

8. Inventory Management System Considerations

The proposed solution is based on an 'open system', which describes any software-based solution, e.g., the stock is open. What it does not cover are 'closed systems', which describes vending machine solutions that enclose stock. When receipting items at goods in and scanning products to the patient, the value of closed systems increases staff workload which increases costs. The increased capital costs of closed systems and the increased staff workload negatively impacts the ROI of the project.

There are three elements to any open inventory system (see).

1. **Theatre Scanning.** Uses either a mobile computer with scanning capability, e.g., Zebra scanners or a laptop with a USB scanner attached. When looking at a laptop and USB scanner systems, check if there is sufficient space and power for the additional hardware in the theatre areas. If the laptop is shared with other applications, you need to ascertain whether these will be in use at the same time as the scanner and whether this will cause conflict and delay staff entering information.

2. **Inventory Scanning.** E.g., receipting goods in and checking stock levels are best suited to a mobile computer that allows staff to carry the system in their pocket. Budget for one scanner per person ensuring responsibility for each scanner is with one individual.

3. **Inventory Management Server.** The inventory management server is the core database that updates records and interfaces with other systems such as finance and the data warehouse.

Figure 5 Possible open inventory system physical set ups
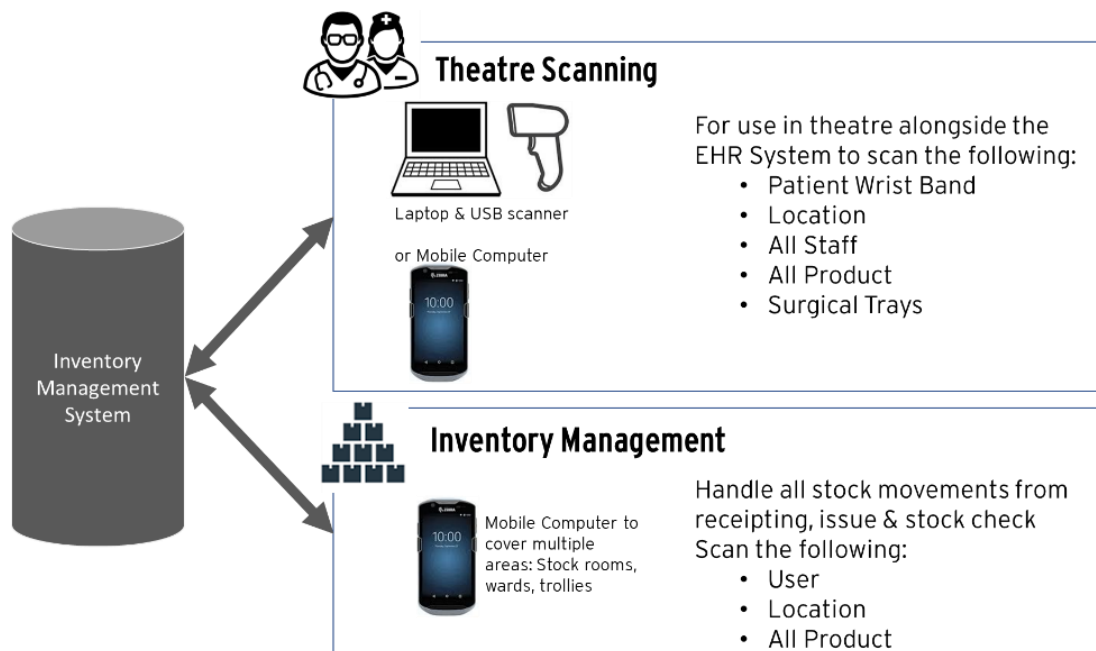
Hardware Costs

Theatres: Allow for one device per theatre at approx. £50 per month (pm) lease costs (PC or mobile computer).

Inventory: Allow for one device per staff member at approx. £50pm lease costs. And allow for two to three spares per hospital (£50pm lease costs).

Inventory Management System: If provided as Software-as-a-Service there will be no hardware costs. If on premises, hardware and IT support costs need to be factored in. The IMS vendor will provide the exact specifications.

Software Licencing

The software licences typically follow three IMS elements, for example:

- Theatre scanning a typical budget is £150 – 200pm per theatre.

- Mobile workers (goods in/materials management) it is £30 – £50pm per scanner.

- Inventory Management Core is £750 – £1500pm per hospital.

Wi-Fi – Theatres and Stock Areas

For the IMS to function it may require a Wi-Fi internet connection to be available 24/7 between the scanners and the server. If Wi-Fi is not available in all areas (including remote stock locations), this will need to be addressed prior to go live or select a system that does not rely on always on Wi-Fi connectivity. Where Wi-Fi cannot be implemented, it may be possible to fit the scanner with a 4G mobile SIM card for access.

Interfaces/Integration

The interfaces will require IT input to project manage their delivery. The interfaces themselves are not complex, but careful design is required if the IMS resides in the cloud and the other systems are on hospital infrastructure. The interface costs do not include the costs the IMS provider may charge for the other half of each interface. When procuring the IMS these should be part of the procurement exercise.

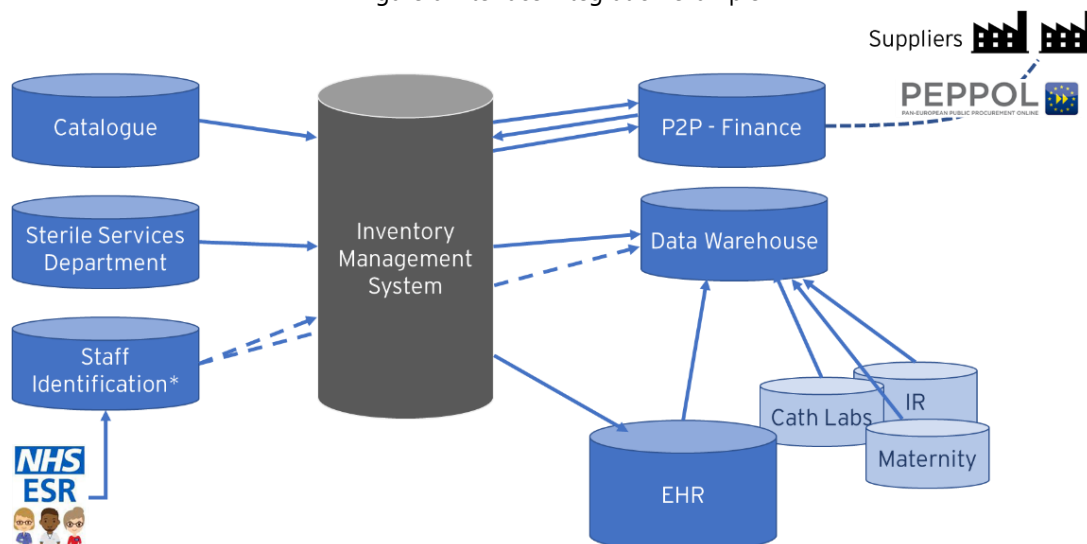Figure 6 Interface integration example

Table 4 Budgeting interface costs

System	Directions	Description	Interface Cost
Catalogue	One Way Send	Full catalogue of information must be supplied to the IMS to function.	£3 – 5K
Sterile Services Department	One Way Send	A full list of items within the SSD database. Will require current and GS1 barcodes. Should include the price to clean for procedure costing.	£Free for managed services providers £10 – 25K for software providers (includes GS1 conversion)
ESR > Staff Identification	One Way Send	BDS Solutions (MS Active Directory) Or via HR database – SQL View	£25K IT labour cost only
Staff Identification	One Way Send	*Subject to data governance approval to send staff data into an off-premises system. Data can be manipulated in the Data Warehouse if not permitted in IMS.	IT labour cost only
P2P Finance	Two Way	Three communications. 1. IMS sends the requisition. 2. Finance system converts requisition into a purchase order (PO) and sends the requisition with the PO number back to the IMS. 3. When receipted, the IMS sends the goods received information to the finance system.	£10K
PEPPOL	Two Way	Finance system to PEPPOL provider.	£3-5K
Data Warehouse	One Way Receive	All systems need to send data to the data warehouse (IMS, EHR and department clinical systems).	POA depending on the number of exports/ imports required.
EHR	One Way	Typically formatting the IMS data as a PDF with a file name comprising the patient number and the date of the procedure. The data will not be searchable but will allow a single patient record to be maintained.	POA – Depending on the system.

9. Available Signetor Assistance

Next Steps

If you would like to discuss how to align this document to your organisation's structure or would like input on budget planning please take advantage of the following on us, free of charge:

1) Two 30-minute consultations about topics raised in this document or any subject related to point-of-care scanning and systems.
2) For those developing a budget please request the S4S_Efficiency_Project.xlsx spreadsheet. Once you have filled in the answers we'll extrapolate your answers into an initial planning budget, realistic project timeframe and suggested project team resource.

To book your consultation, request the spreadsheet or any other questions please contact gary.adams@signetor.com

Additional Services

We offer pick-and-mix options to support your hospital efficiency program.

Planning Stage

➢ High level design, IMS requirements, project plan and refined budget
➢ Current point-of-care clinical data capture & data warehouse completeness
➢ Supply chain processes recommendations

Build Stage

➢ Subject matter expert, supporting your project team
➢ Stocktake and catalogues data cleanse & upgrade
➢ GS1 implementation & rollout

Roll Out

➢ Project & clinical team support during training and go live
➢ Pre-Go-Live stocktake

About Signetor

Signetor is passionate about healthcare efficiency. As well as supporting Scan4Safety implementations we have developed a range of tools to help organisations better understand their stock, cleanse and upgrade catalogue data and create powerful reporting dashboards. These tools help organisations transform quicker at a lower cost. Signetor are agnostic with regards to the inventory management system selection allowing us to support your organisations Scan4Safety journey regardless of system preference.

Our Scan4Safety experience has been developed through multiple implementations, starting with Derby & Burton Hospitals in 2013 and recently included working with four hospitals

simultaneously in the South West London Acute Provider Collaborative (St Georges, Epsom & St Helier, Croydon, Kingston.)

Based on our Scan4Safety experience we have written extensively on GS1 related to healthcare which has been republished by trade bodies and GS1.

Tools

Our tools and services help healthcare finance and procurement staff effect cost savings through better inventory and asset management.

- **Master Catalogue Data** – 2.5 million clinical consumable products with 3.5 million barcodes. For stocktakes and customer catalogue enhancement.
- **Stocktake System** – Based on Zebra scanners that report all data back to secure Azure data centres for matching and reporting.
- **Data Matching Software** – Match your disparate financial and catalogue data with stocktake outputs to create a data cube.
- **Reporting Suite** – Get powerful insights into your data with a suite of graphical reports tailored to your organisation.

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