Presentation 2

Unique identification of Products, People, Places in UK health systems: approaches to implementation, learnings, benefits and new risks

Dr Valentina Lichtner



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- Background in human-computer interaction, and two decades of human factors' patient safety research on the implementation of technology in healthcare.
- Led and carried out the first independent study of the Scan4Safety programme in the UK.
- Member of Leeds Teaching Hospitals NHS Trust Scan4Safety Board.
- Part of NHS England Scan4Safety Improvement Guide group.

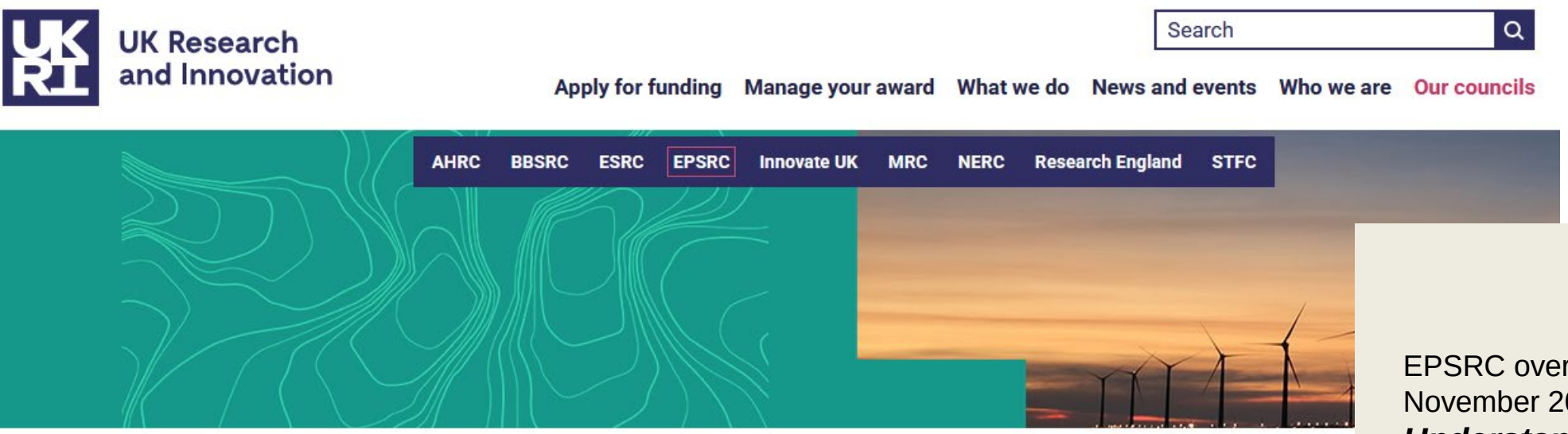
The University of Manchester

Unique identification of Products, People, Places in UK health systems: approaches to implementation, learnings, benefits and new risks

TGA, UDI in healthcare information session, 10 September 2026

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EPSRC overseas travel grant, November 2023: responsive mode

Understanding NSW SmartChain: laying the groundwork for a UK/AUS research collaboration on digital transformation

With the support of

NSW Health, Clinical Excellence Commission
Medical Device Governance, Patient Safety Directorate
GS1 Australia
The University of Sydney
The University of Leeds

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Open access Original research

BMJ Health & Care Informatics

Complexities and capabilities of Scan4Safety in NHS hospitals: a qualitative study of a national demonstrator site

Valentina Lichtner ,[1,2] Aleksandra Irnazarow ,[2] Stephen Bush ,[3] Dawn Dowding ,[1] Philip Elphick ,[3] Bryony Dean Franklin ,[4,5] Yogini H Jani ,[4,6] Mark Songhurst[3]

Lichtner V, Irnazarow A, Bush S, Dowding D, Elphick P, Franklin BD, Jany Y, Songhurst M. Complexities and capabilities of Scan4Safety in NHS hospitals: a qualitative study of a national demonstrator site. BMJ Health & Care Informatics. **2026**;33:e101366. https://doi.org/10.1136/bmjhci-2024-101366

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Study methods

Interviews

Within the Trust

	Number of participants
Scan4Safety Team - Programme and project management	5
Procurement and inventory – Senior roles	4
New digital hospital team	1
Data science	1
Surgeons	2
Nurses	2

External

NHS Supply Chains – engagement management	1
Other demonstrator site – programme management	1
GS1 UK – engagement management	2

Document analysis

1. What is Scan4Safety?

2. Benefits, experienced and anticipated

3. Approaches to implementation and support networks

4. Sociotechnical learnings

Q&A

What is Scan4Safety?

GS1 and PEPPOL Adoption Programme

2016-2019 Department of Health & Social Care demonstrator programme

Six demonstrator sites

1. Derby Teaching Hospitals NHS Foundation Trust
2. Leeds Teaching Hospitals NHS Trust
3. North Tees and Hartlepool NHS Foundation Trust
4. Salisbury NHS Foundation Trust
5. Royal Cornwall Hospitals NHS Trust
6. University Hospitals Plymouth NHS Trust.

Hull University Teaching Hospitals NHS Trust also independently implemented Scan4Safety at the same time

PEPPOL = Pan-European Public Procurement Online; a set of specifications for electronic procurement and invoicing; governed by OpenPeppol, a non-profit international association based in Belgium (https://peppol.org/).

PIP Breast Implant identified as dangerous[1]	2011
DoH (now DHSC) **e-procurement strategy**[2]	2014
GS1 & PEPPOL Demonstration Programme launched: 6 demonstrator sites awarded funding	2015
Programme renamed Scan4Safety **Lord Carter Review**[3]	2016
Demonstrator sites implementation work	
EU medical device regulation[4]	2018
DHSC audit of demonstrator sites –benefits confirmed - awarding of GS1 certifications	2019
Cumberlege review on harm of devices and medications – launched 2018, published 2020[5] – recommends register of implantable devices	

Lichtner et al Appendix 3

NHS Supply Chain: implementation of inventory systems in 19 NHS Trusts

NHS Supply Chain

Go to Pilot Catalogue

IMS Home | Scan4Safety (IMS Direct Framework Agreement)

In-Trust Inventory Management Systems (IMS)

How we are deploying inventory management capability into acute hospitals.

Where we are

The first phase of our IMS partnership with NHS trusts has seen 19 trusts go live across 83 locations (with this number still growing). Key benefits include reducing stock wastage, obsolescence and overstock alongside improvements in patient safety, working efficiencies and service quality.

Pilot trusts have managed to save £15.3 million so far (April 2026 figures), alongside other benefits that support our aims of improving quality, safety, effectiveness and experience across the NHS:

- 700 hours clinical time saved per trust so far (April 2026).
- One trust reported a reduction from several cancelled operations per month (due to lack of stock) to just one operation cancelled in seven months.
- Another trust reported being able to return a full-time nurse back to clinical duties, who previously was administrating stock.

April 2026 update

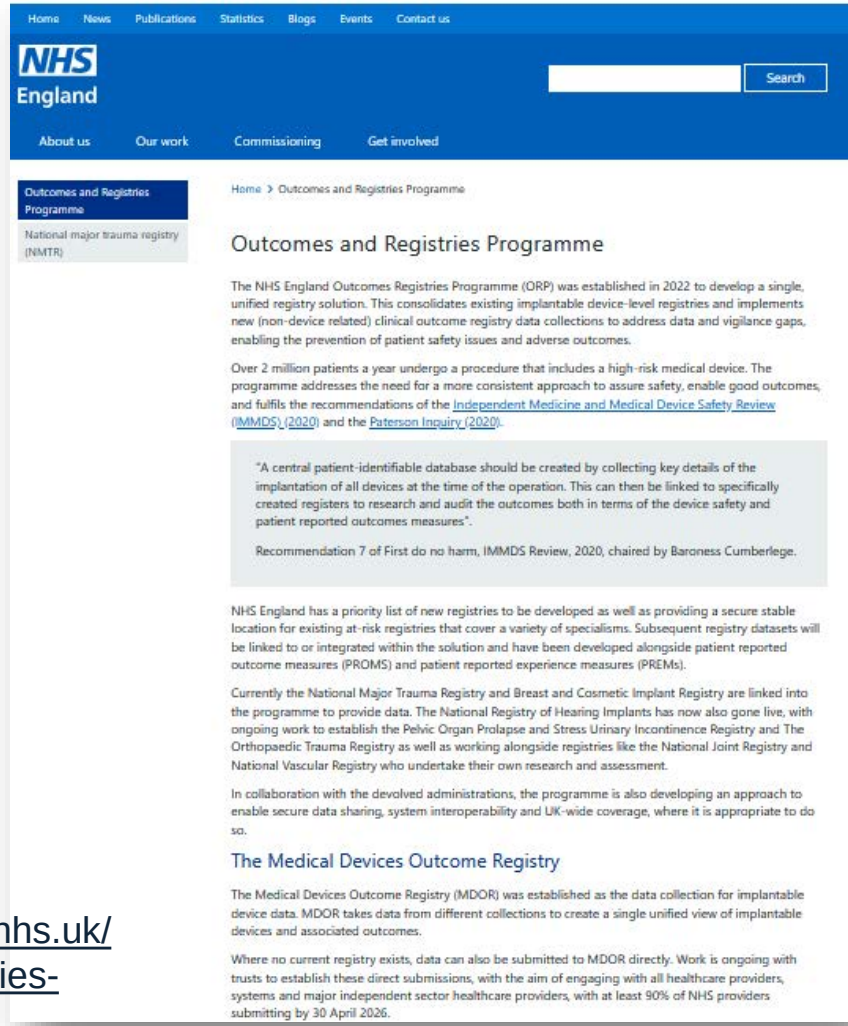
We have seen key benefits around reduction in waste and obsolescence; reduction in clinical time

https://www.supplychain.nhs.uk/programmes/in-trust-inventory-management-systems-ims/

NHS England Outcomes and Registries Programme

MDOR
The Medical Devices Outcome Registry

2022-



https://www.england.nhs.uk/outcomes-and-registries-programme/

NHS SCAN4SAFETY
Patient. Product. Place. Process.

Search

Home | Why Scan4Safety? | Effective Implementation | Scan4Safety in Practice | Resources



Scan4Safety

Proven to improve patient safety, traceability, operational productivity and supply chain efficiency

https://scan4safety.nhs.uk/

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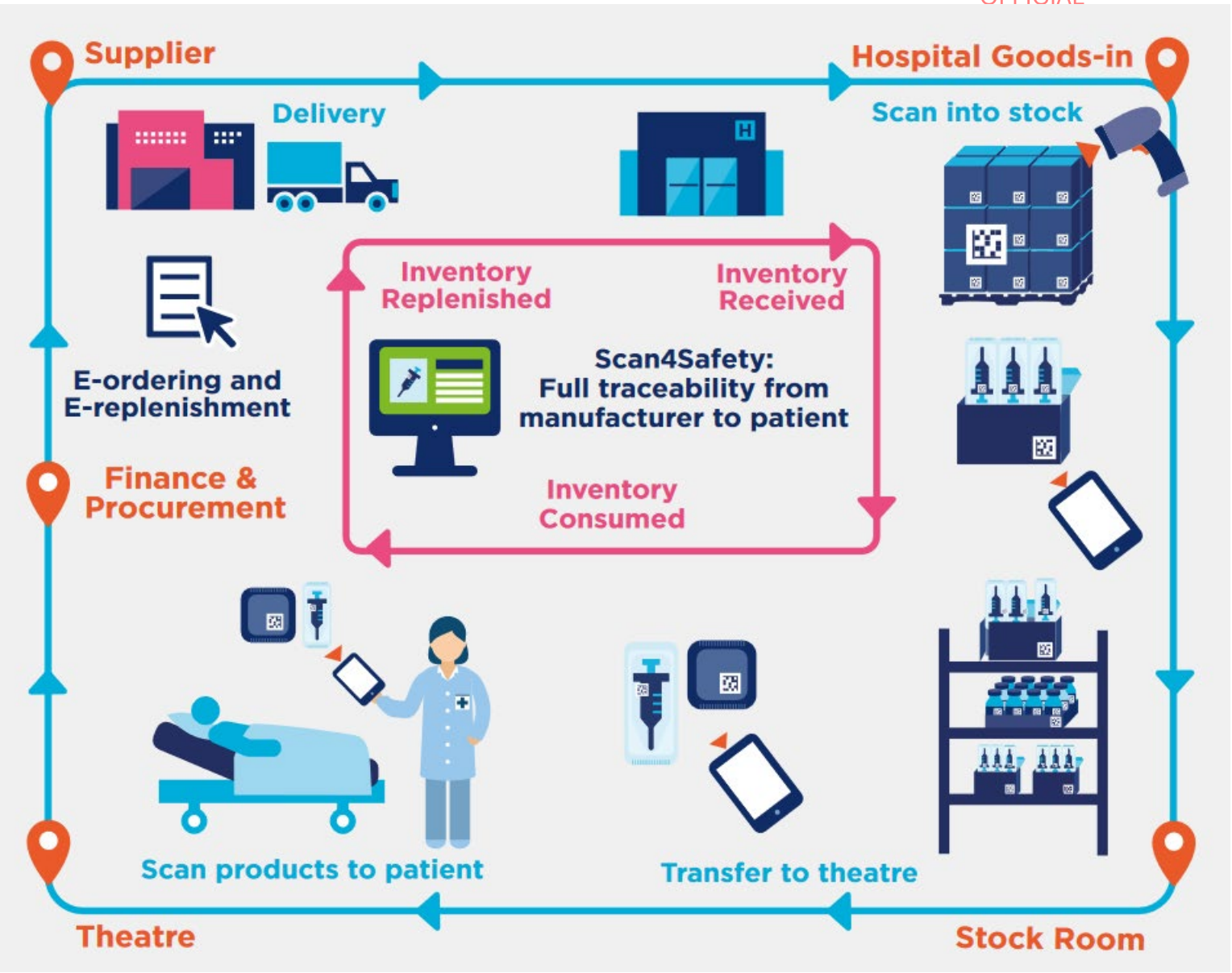


Image source: GS1 https://www.gs1.org/

NHS SCAN4SAFETY
Patient. Product. Place. Process.

Scan4Safety is an NHS initiative that encourages hospitals to implement and use GS1 data standards and barcoding technologies to track and trace people, products, and places (and procedures) by scanning them into hospital records.

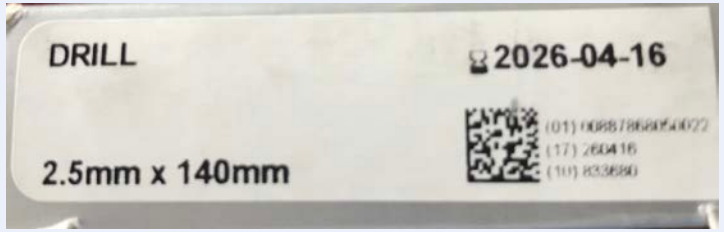
Four Scan for Safety initiatives in the UK - in **England**, Scotland, Wales, and Northen Ireland

https://scan4safety.nhs.uk/

GS1 data standards

UDI (GTINs)

Unique Device Identifier (Global Trade Item Number)



GSRN

Global Service Relationship Number



GLN

Global Location Number





Image: Courtesy of LTHT

The programme is system agnostic

… we didn’t have to use a particular inventory solution, we didn’t have to use a particular barcode wristband, we just had to end up with [being GS1 compliant] — [had to be GS1 barcodes], it had to be a global trade item number, it had to be a global location number. How will we do that was up to ourselves as an organisation.

[…] some of it came as we went.

[Interview transcript, ID4]

Adapting and linking systems

…the idea was that we adapted our systems, if possible, […]

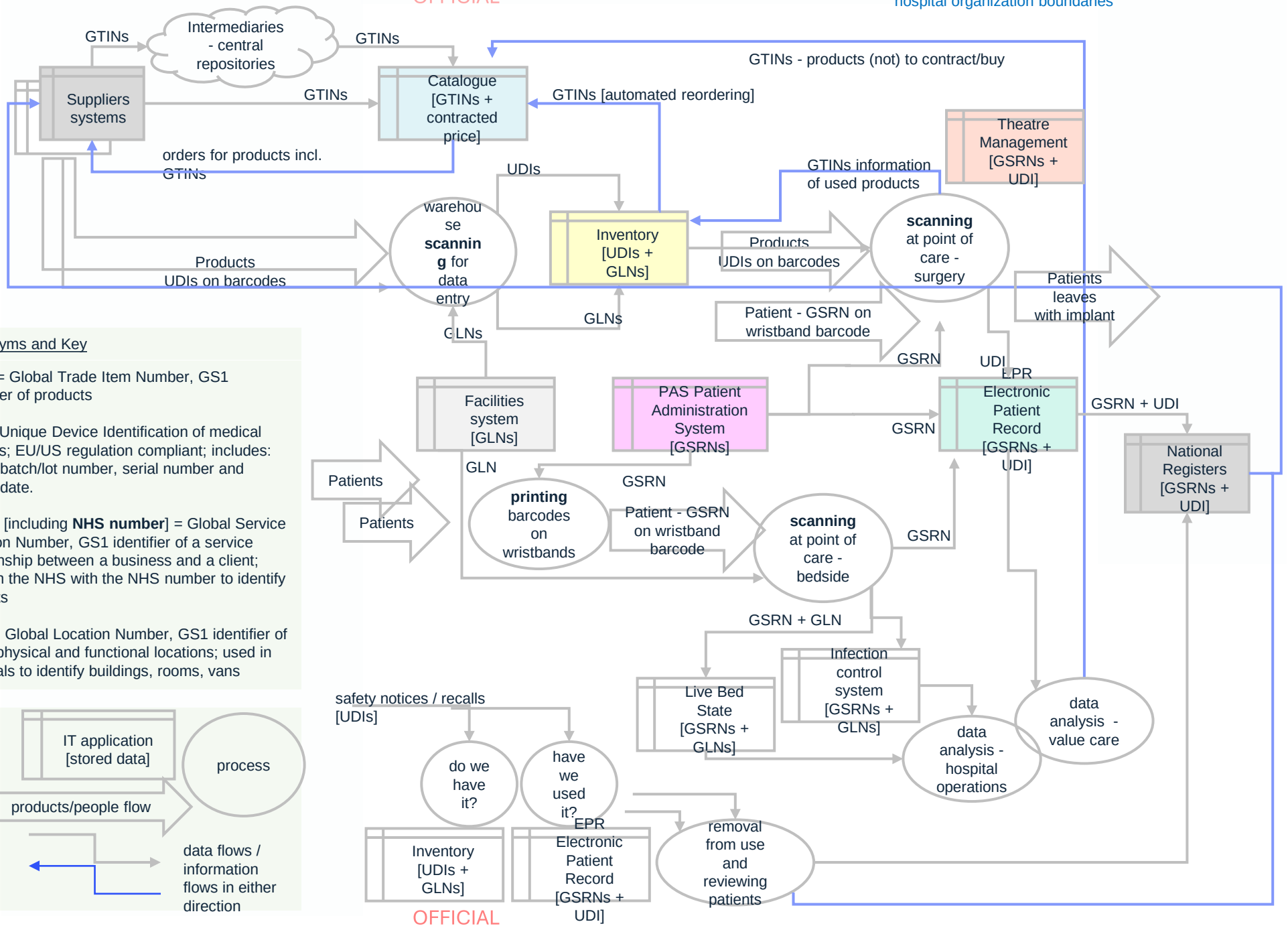
So, for global location numbers […] we adapted the software that we use for property management so that it included the […] global location, […].
We adapted our inventory management solution and our catalogue solution to be able to hold the barcodes.
And we adapted our patient administration system to be able to produce barcodes from the wristbands. Lots of it was adapting systems.
Some of it was new technology so we needed new scanners, we needed new wristband printers, …

[Interview transcript, ID4]

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Data flow diagram

Example of IT systems, GS1 identifiers and main processes involved



Acronyms and Key

GTIN = Global Trade Item Number, GS1 identifier of products

UDI = Unique Device Identification of medical devices; EU/US regulation compliant; includes: **GTIN**, batch/lot number, serial number and expiry date.

GSRN [including **NHS number**] = Global Service Relation Number, GS1 identifier of a service relationship between a business and a client; used in the NHS with the NHS number to identify patients

GLN = Global Location Number, GS1 identifier of legal, physical and functional locations; used in hospitals to identify buildings, rooms, vans

Lichtner et al 2026,BMJ HCI. 33:e101366. doi:10.1136/bmjhci-2024-101366

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‘An umbrella term’ (1)

Implemented over a variety of use cases

- Inventory management
- Traceability of devices
- Medications
- Pathology
- Blood products
- Beds (patients flows)
- Infection control
- Mortuary
- Asset management
- Patients’ valuables
- …

[by barcoding a patients’ valuables] … *we will then see that grandad’s bags were left in a locker back on two wards ago*

[Interview transcript, ID6]

(1) NHS England, GS1 UK Scan4Safety and UDI Forum, July 2024, https://www.gs1uk.org/sites/default/files/Scan4Safety_and_UDI_forum_slides_July24.pdf [last accessed August 2026]

‘An umbrella term’

Scan4Safety covers every department, every building, every process within a Trust … [interview transcript, ID10]

Well within a hospital [it] effectively covers everything. […] ***the moving parts*** *within a hospital environment, whether that’s implantable products, consumable products, whether it’s the patients themselves, the staff, the equipment that is used on them, things like blood, .. breast milk, technologies like RFID, RTLS [Real-time Location Systems] barcoding etcetera. So,* ***the scope broadened quite significantly.*** *…*

[interview transcript, ID2]

Misconceptions

A lot of people think Scan4Safety is a single system.
A lot of people think it is an inventory management system.
[…] People just assume it is going to be too big and too difficult to do

[Interview transcript, ID1]

… inventory management is –
I mean, it's in procurement for starters […] [not seen as a priority]
– or is not seen as directly patient related...

[Interview transcript, ID17x]

A methodology and way of thinking

a methodology
a set of principles
a way of thinking

it's a way of thinking more than anything.

It's thinking about, […] from the patients' point of view first, what benefits does this give to them? Does this give them a better outcome? Does this reduce the risk for them, or actually does it allow us to release more time for patient care in whatever those processes are that we are doing? And then how do we use the data [unique identification] *and technology to support and try and continue to improve that?* [Interview transcript, ID1]

Benefits, experienced and anticipated

Affordances*

Speed of information retrieval afforded by digital systems

Digital data can be more quickly and easily searched than paper records

Computation. Data can be combined, computed, automated, …

Accessibility across time and place



* In the information systems field, an affordance is *an action possibility offered by technology to it users*. Derived from ecological psychology, where an affordance is an action potential offered by the environment to an animal, as per Gibson, J. J. (1979). *The ecological approach to visual perception*. Houghton Mifflin

Traceable digital data, ability to identify patients concerned by recalls, and doing so quickly

…part of the rationale for introducing Scan4Safety ...

… came from the fact that there was the PIP breast scandal a number of years ago, where we had [in the NHS] *potentially half a million patients with implants that we couldn't identify.*

[interview transcript, ID1]



Image: Example of barcodes and data on paper records. Courtesy of LTHT

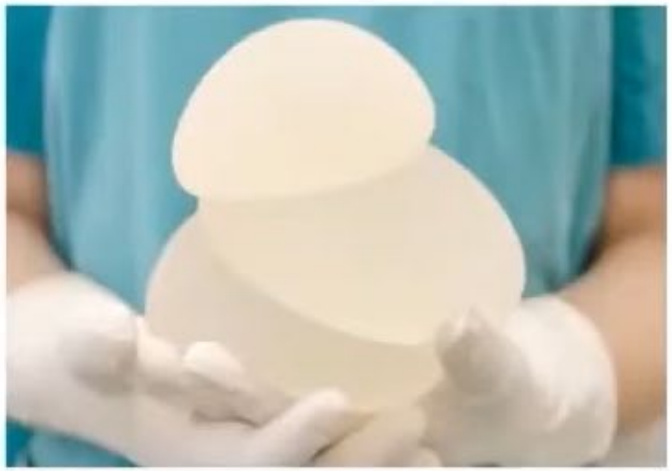
Traceable digital data, not spending days going through paper records

… we released 601 clinical hours as a benefit and it took us 55 minutes to do, a no-brainer

[interview transcript, ID6x]

Product recall







10:15 – MHRA Notification Confirmed in Trust

10:28 – Confirmed we have the product in the Trust and that there will be no use of these products in the coming days

11:42 – Confirmation to Medical Director – Operations that all respective products have been removed from the clinical area and are under the control of the appropriate Inventory Manager.

Recall in Figures

839 Product lines across

62 Product ranges

124 items removed from St. James's site

34 items removed from LGI Site

zoom SCAN4SAFETY

GS1 UK. 2021. UDI Forum. How GS1 and PEPPOL standards enable traceability in clinical settings. Link to video: How GS1 and PEPPOL standards enable traceability in

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Automated alerts, preventing safety incidents

…I think there's been so many examples of where it's worked well.

We had an example […] of a clinician who wasn't keen at all, the product was scanned, and it was found to have expired. And so, from that moment on, the clinician was completely converted, because the data was telling him, 'oh, I don't want to put that implant in there, because I know it's expired', and that had been missed in the manual […] checks.

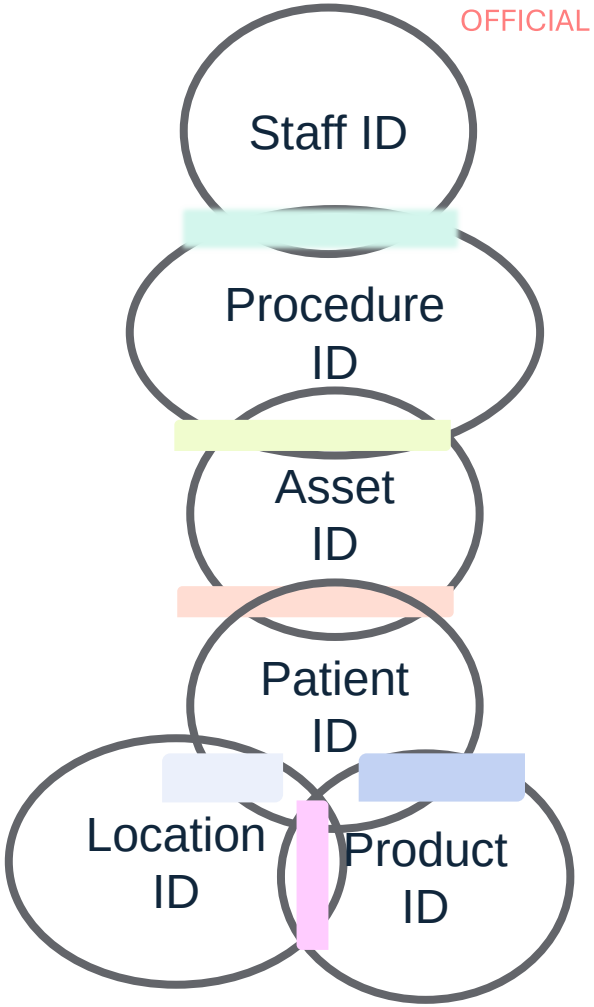
[interview transcript, ID17x]

Visibility, awareness, time saving

…for the products that are scanned, the safety to the patient and the visibility and awareness of what's being used where, is brilliant and timesaving

[interview transcript, ID12]

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Never events

Infection control

Inventory management

Accountability

Asset management

Patient recall

Product recall

Scheduling

Patient level costing

Value-based procurement

Supply chain resilience

Environmental sustainability

(1) Adapted from NHS Supply Chain presentation, GS1 UK Scan4Safety and UDI Forum, July 2024, https://www.gs1uk.org/sites/default/files/Scan4Safety_and_UDI_forum_slides_July24.pdf [last accessed August 2026]

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Anticipated benefits from Scan4Safety at the study site

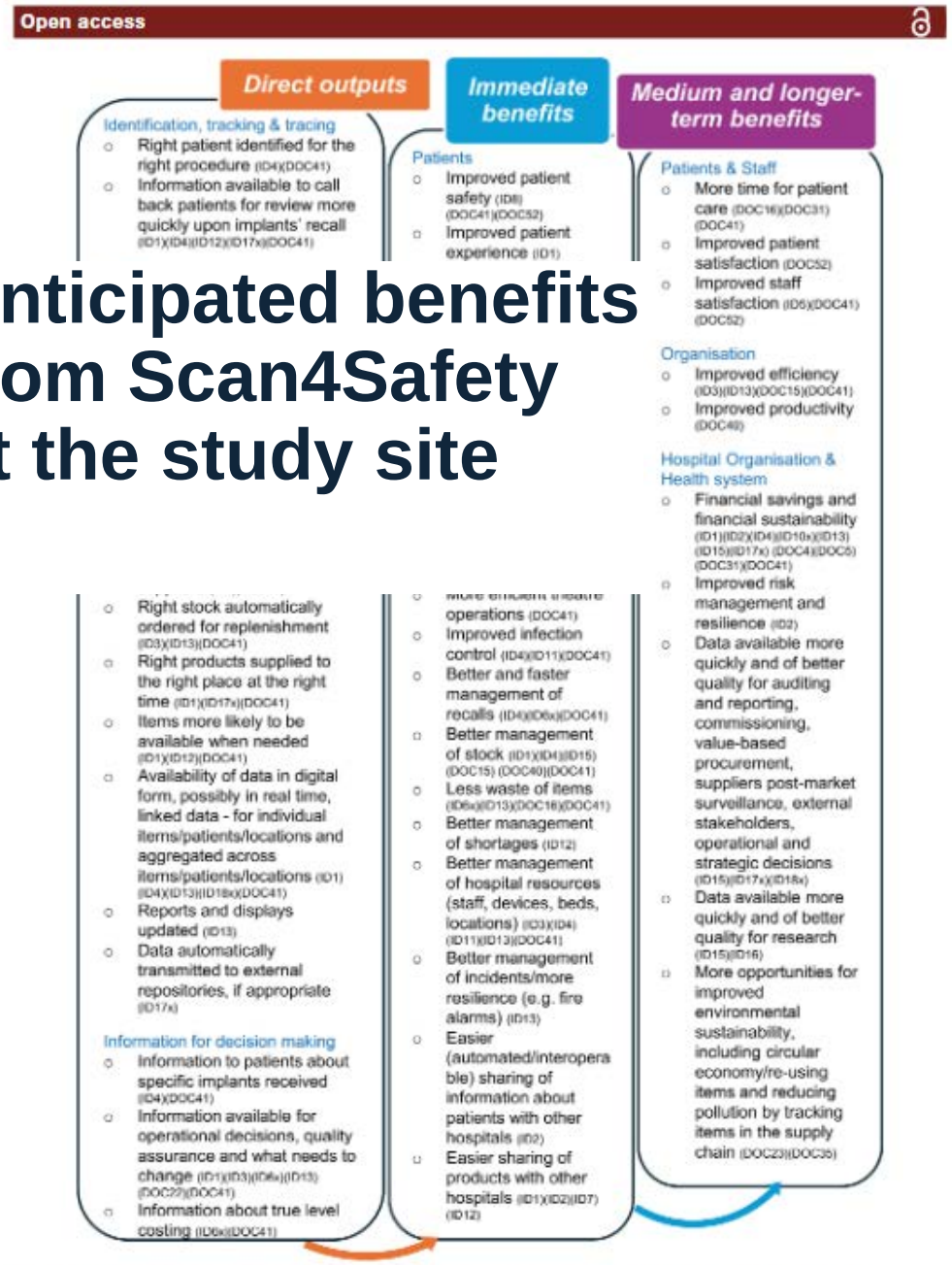


Figure 1 Direct outputs and anticipated benefits of Scan4Safety (IDn indicates interview transcripts; DOCn indicates documents reviewed).

Outputs and benefits (outcomes)

immediate
mid-term
long-term

- Improved patient safety, quality of care, patient experience
- More efficiency, less waste, opportunities for sustainability
- Better data quality for operational, strategic and policy decisions

+ Learning through the implementation process

Lichtner et al 2026 BMJ HCI
https://informatics.bmj.com/content/33/1/e101366

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Direct outputs

Identification, tracking & tracing

- Right patient identified for the right procedure (ID4)(DOC41)
- Information available to call back patients for review more quickly upon implants' recall (ID1)(ID4)(ID12)(ID17x)(DOC41)

Alerts

- Alerts for unintended patient-product combination (DOC41)
- Alerts for expired or recalled products (ID1)(ID17x)(DOC41)
- Alerts for incompatible products (e.g. left/right implants) (DOC41)
- Errors identified before they get to the patient/cause harm (DOC41)

Electronic data linkages & automation

Immediate benefits

Patients

- Improved patient safety (ID8) (DOC41)(DOC52)
- Improved patient experience (ID1)
- Easier sharing of patient information with patients/family and GPs (ID4)

Staff

- Protecting staff from making errors with patients (ID10x)
- Improved operational staff experience (ID5) (DOC41)

Hospital Organisation

Medium and longer-term benefits

Patients & Staff

- More time for patient care (DOC16)(DOC31) (DOC41)
- Improved patient satisfaction (DOC52)
- Improved staff satisfaction (ID5)(DOC41) (DOC52)

Organisation

- Improved efficiency (ID3)(ID13)(DOC15)(DOC41)
- Improved productivity (DOC40)

Hospital Organisation & Health system

- Financial savings and financial sustainability

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- Errors identified before they get to the patient/cause harm (DOC41)

Electronic data linkages & automation

- Automated reordering and automated payments to suppliers (ID7)(DOC41)
- Right stock automatically ordered for replenishment (ID3)(ID13)(DOC41)
- Right products supplied to the right place at the right time (ID1)(ID17x)(DOC41)
- Items more likely to be available when needed (ID1)(ID12)(DOC41)
- Availability of data in digital form, possibly in real time, linked data - for individual items/patients/locations and aggregated across items/patients/locations (ID1)(ID4)(ID13)(ID18x)(DOC41)

patients (ID10x)

- Improved operational staff experience (ID5)(DOC41)

Hospital Organisation

- Improved auditability & accountability (ID7)(ID8)(DOC41)
- More efficient theatre operations (DOC41)
- Improved infection control (ID4)(ID11)(DOC41)
- Better and faster management of recalls (ID4)(ID6x)(DOC41)
- Better management of stock (ID1)(ID4)(ID15)(DOC15)(DOC40)(DOC41)
- Less waste of items (ID6x)(ID13)(DOC16)(DOC41)
- Better management of shortages (ID12)
- Better management of hospital resources (staff, devices, beds

Hospital Organisation & Health system

- Financial savings and financial sustainability (ID1)(ID2)(ID4)(ID10x)(ID13)(ID15)(ID17x) (DOC4)(DOC5)(DOC31)(DOC41)
- Improved risk management and resilience (ID2)
- Data available more quickly and of better quality for auditing and reporting, commissioning, value-based procurement, suppliers post-market surveillance, external stakeholders, operational and strategic decisions (ID15)(ID17x)(ID18x)
- Data available more

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items/patients/locations (ID1) (ID4)(ID13)(ID18x)(DOC41)
- Reports and displays updated (ID13)
- Data automatically transmitted to external repositories, if appropriate (ID17x)

Information for decision making

- Information to patients about specific implants received (ID4)(DOC41)
- Information available for operational decisions, quality assurance and what needs to change (ID1)(ID3)(ID6x)(ID13) (DOC22)(DOC41)
- Information about true level costing (ID6x)(DOC41)

- Better management of hospital resources (staff, devices, beds, locations) (ID3)(ID4) (ID11)(ID13)(DOC41)
- Better management of incidents/more resilience (e.g. fire alarms) (ID13)
- Easier (automated/interoperable) sharing of information about patients with other hospitals (ID2)
- Easier sharing of products with other hospitals (ID1)(ID2)(ID7) (ID12)

strategic decisions (ID15)(ID17x)(ID18x)
- Data available more quickly and of better quality for research (ID15)(ID16)
- More opportunities for improved environmental sustainability, including circular economy/re-using items and reducing pollution by tracking items in the supply chain (DOC23)(DOC35)

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Data-driven culture

I think […] getting an understanding of what we're doing [by capturing data] is important

…there's a value in making sure people understand what they're doing and even that process of going, 'I am recording what I have done' is enforcing that culture piece [about being data-driven] about 'how can I now think about what I have done'.

[interview transcript, ID8]

From data infrastructure to RFID and future ‘smart’ hospitals

“Imagine a big storeroom, and there are all kinds of little [sterile] trays . . . and they all look the same,” she says.

The trust now uses Radio Frequency Identification (RFID) technology software from Zebra Technologies to track more than 70,000 assets, including syringe pumps, nebulisers and machine centrifuges. Staff can see the location of equipment and check inventory using a handheld device and a “wand” for scanning medical items.

The trust estimates that, across 2,500 staff, the new system saves about 35 hours per employee each year in tracking equipment.

Medical centres compete to achieve ‘smart hospital’ status. Financial Times, March 2025. https://www.ft.com/content/2805edfd-36db-4a58-b93f-411a18c6e003

Reducing environme impact

United Kingdom

Reducing the global impact of environmentally harmful anaesthetic gases using a medical device

Challenge

95% of anaesthetic gases used in an operation are not metabolised by the patient so a significant proportion is released into the atmosphere.

The release of anaesthetic gases into the atmosphere means that operating theatres contribute to 15–20% of a hospital theatre's carbon footprint.

Approach

SageTech Medical developed a solution to capture waste anaesthetic inside a reusable canister, known as a 'SID-Can', to reduce the volume of gas released into the atmosphere.

Anaesthetic agents are recycled by SageTech Medical for redistribution into hospitals to reduce the impact on the NHS's wider carbon footprint.

70-90%
of delivered gases and
99.9%
of exhaust gases are captured by the SageTech device

Reduces the carbon footprint for theatres by
15–20%
for each operation

Introduction

It is estimated that anaesthetic gases account for around 100,000 tonnes of carbon dioxide per year across NHS and private hospitals across the UK (covering England, Scotland, Wales and Northern Ireland). These highly volatile gases make up 2% of the National Health Service's (NHS) total carbon footprint and 15-20% of a theatre's carbon footprint for each operation in England alone.

SageTech Medical's circular economy solution safely captures available volatile anaesthetic agents in a reusable capture canister (SID-Can). The agents are then recovered, processed and recycled back into a usable drug form to minimise the environmental impact.

The scale of the problem

Each time a patient is put to sleep for an operation, 95% of the anaesthetic gases used are wasted as the patient's body does not metabolise them. A significant proportion of this is released into the atmosphere via the anaesthetic gas scavenging system.

3 MILLION TONNES OF CO_2 EQUIVALENT EMISSIONS ARE RELEASED FROM ANAESTHETIC GASES EVERY YEAR



Play video

Not only are these gases highly volatile with an impact hundreds of times more than carbon dioxide, but they also make up 2% of the National Health Service's (NHS) total carbon footprint and 15-20% of a theatre's carbon footprint for each operation.

According to 2013 data, more than 10 million operations were estimated to have taken place each year in England in just over 3,000 operating theatres, with each theatre covering on average, more than 1,200 procedures during this time[1]. Accounting for operations in Wales, Scotland and Northern Ireland included for the UK, it is estimated that anaesthetic gases account for around 100,000 tonnes of carbon dioxide per year across NHS and private hospitals, with a projected global impact of 3,000,000 tonnes.

The solution

In an effort to reduce the NHS's carbon footprint, the NHS became the "first health system to embed net zero into legislation, through the Health and Care Act 2022"[2]. The Act "places duties on NHS England, and all [NHS] trusts, foundation trusts, and integrated care boards, to contribute towards statutory emissions and environmental targets"[2].

VOLATILE ANAESTHETICS CONTRIBUTE OVER ONE FIFTH OF THE CARBON FOOTPRINT OF SURGICAL PROCEDURES



Play video

NHS England have since released a strategy – Delivering a 'Net Zero' National Health Service[3] – for healthcare organisations in England required to collectively support targets in line for 2040.

SageTech Medical set out to develop a solution to capture waste anaesthetic onto a carbon filter contained inside a reusable canister, known as a 'SID-Can', to reduce the volume of highly volatile gases released into the atmosphere.



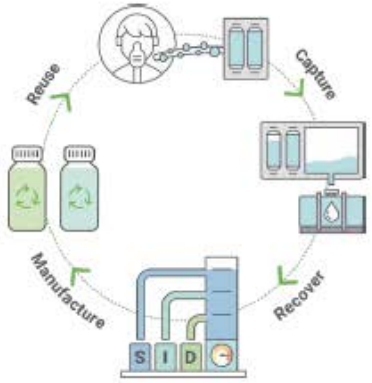
Once captured, the anaesthetic agents are recycled by SageTech Medical for redistribution into hospitals, creating a circular economy for inhalation anaesthesia and reducing the impact on the NHS's wider carbon footprint.

SageTech Medical developed a class I medical device as a solution to capture the unused gases directly at the point of use in theatres, and in 2023, the device was launched to NHS and private sector organisations in the UK.

An end-to-end recycling process

Anaesthetic drugs are originally produced in liquid form which is converted to a gas by an anaesthetic machine in the operating room where it is then delivered to the patient.

SageTech Medical's circular economy solution safely captures available volatile anaesthetic agents (sevoflurane, isoflurane, desflurane) onto a reusable capture canister (SID-Can) which is then recovered, processed and recycled back into a usable drug form. In real world clinical practice, not all waste anaesthetic is available for capture. Independent published studies demonstrate that 70-90% of waste anaesthetic is available for capture with SageTech's solution, which is in part determined by anaesthetic practice and the individual patient.



How it works in practice:

1. The medical device fits universally into the hospital's existing anaesthetic equipment without the need for adaptation
2. The SID-Dock houses two SID-Can filters and is connected at the 'exhaust' of the anaesthetic machine to intercept waste anaesthetic breathed out by the patient, preventing its release into the atmosphere

https://www.gs1.org/insights-events/case-studies/reducing-global-impact-environmentally-harmful-anaesthetic-gases-using-medical

Approaches to implementation and support networks

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Different NHS hospitals have rolled-out/are implementing Scan4Safety for traceability differently

Some commonalities and recommended steps:

1. Establish data and linked systems
2. Make sure the technology is reliable
3. Decide the implementation approach – where to start and its scope
4. Scale up – phased implementation

Wide stakeholder involvement

The foundations

… how it works in adopting standards for a specific individual Trust is they really need to have those three things embedded, so people, product and place […] Those are like the foundations […] to embed before you look at your particular use cases…

[Interview transcript, ID10x]

An ‘all theatres’ approach

… what they did, they went, neurosurgery, then they went maternity, then they went here, then they went orthopaedics, then they went trauma …

[Interview transcript, ID6x]

A patient pathway approach

…down the line following the patient.

For a cardiac surgery pathway

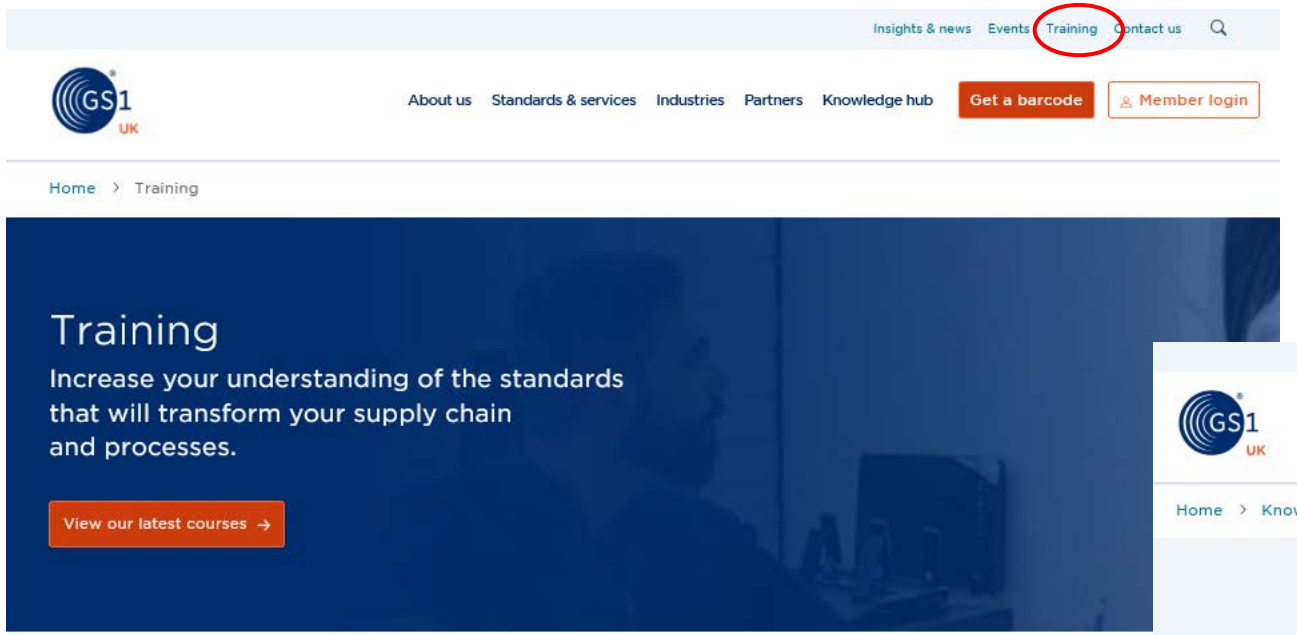
So we went live in sterile services, we went live in anaesthetics, we went live in cardiac surgery, […] in recovery, […] in ICU, […] in mortuary; because that's a pathway. […] for discharge for a ward …

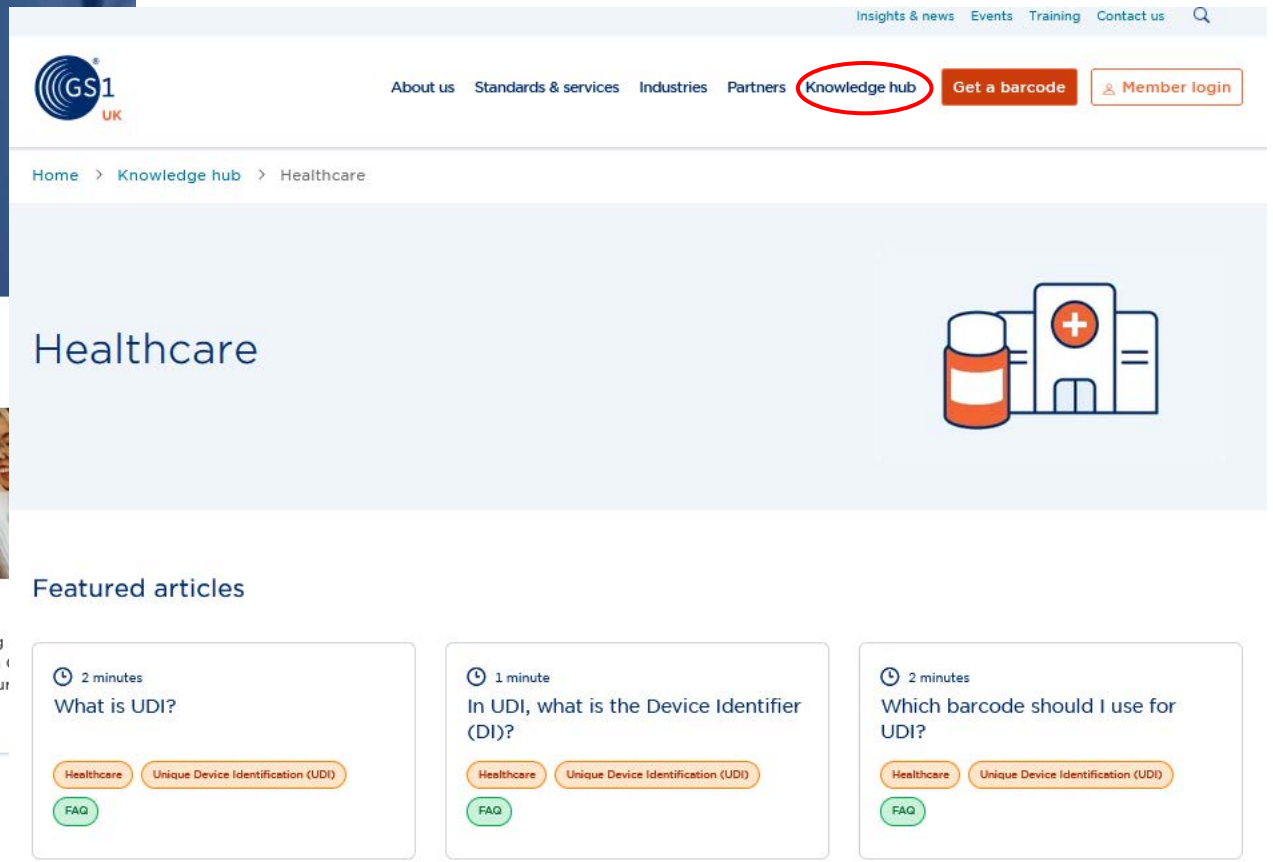
[Interview transcript, ID6x]

Focus on the outcome & empower stakeholders

for me, my plan is the what, my plan is not the how.
… *we can digitally scan a patient wristband. How we do that is not really for me to decide, how is to have discussions with digital internally, discussions with our chief nurse, discussions with nursing staff on a ward, and then we come to the conclusion and take that back to the board and say, 'are you happy to implement based on this as the outcome, […], based on these discussions with these collaborators, this is how we are going to' - so the what—*

[Interview transcript, ID6x]





https://www.gs1uk.org/knowledge-hub/healthcare

Support networks

we recognised that a lot of people, kind of didn't have anywhere to talk about it

… 'how do you make that work, how does that work, where do you get that from'

[…] it might be [someone] just saying, 'how do you get your product data to stay up to date, we're really struggling with that'...

… So, I decided […] let's share the information […] we talked about it and we formed the NHS Northern Group for Trusts.

[interview transcript, ID6x]

Support networks

- a community of practice
- *‘a meeting of minds’*, no formal agreement
- quarterly meetings, alternating between in person and online
- closed to non-Trusts (no suppliers, no researchers, …)
- a safe space, *‘leave the blame at the door, solve the problem’*

‘where people come along and talk about their challenges and let other people talk about how they can help’.

[interview transcript, ID2]

… people kind of leave, kind of geed up and encouraged on most of it, and actually that’s really powerful.

[interview transcript, ID6x]

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Sociotechnical learnings

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unintended consequences and new risks

Automation bias – believing the computer is right even when it's not

1. **assuming data available in the system about medical devices are accurate and complete, when they are not**
   inconsistent scanning of medical devices at the point of care, may lead to patients not being called for review if/when devices are recalled for safety
2. **assuming barcodes identifying patients are correct, when they are not**, may lead to treatment to unintended patients

Goddard K, Roudsari A, Wyatt JC, Automation bias: a systematic review of frequency, effect mediators, and mitigators, *Journal of the American Medical Informatics Association*, Volume 19, Issue 1, January 2012, Pages 121–127, https://doi.org/10.1136/amiajnl-2011-000089

1. risk of missing patients for review

Recall of implants – have we identified all patients?

- ❑ **Awareness that data may be incomplete**
- ❑ **Cross check across systems**

… If you don’t scan it then actually if somebody then says, ‘we never use those, look you can look on the records’. Yes […] because we’ve never scanned it, it doesn’t mean we don’t use it.

[Interview transcript ID6x]

2. risk of patient misidentification

Patient treatment – have we identified the patient?

- ❑ **Awareness the wristband may not be correct**
- ❑ **Always confirm the patient's identity**
- ❑ **The message must be that scanning barcodes on wristbands is not positive patient identification**

… a really key thing that you read a lot of the national literature and it'll say, 'you can use it to identify your patients' - no you can't because that wristband might be wrong.

[Interview transcript, ID4]

technology doesn’t always work as imagined

Wi-fi coverage

Availability of barcode scanners

Interoperability problems

- Legacy systems
- Proprietary systems
- …

It could be the tools that you’ve got that you don’t have enough of …
[Interview transcript ID11]

…a very old room that has been well made 100 years ago, and actually getting a signal into or out of there can be very difficult
[Interview transcript ID1]

The Wi-Fi isn’t up to a standard that can accurately measure where things are [Interview transcript ID5]

- ***Work as done*** will be different from ***work as imagined*** – e.g. exceptions to workflows, products not in inventory, workarounds…
- ***Data as done*** will be different from ***data as imagined*** – e.g. unique identifiers for products may change
- There will be a need for ***data work*** – curating the data, making it fit for purpose – e.g. to keep the inventory up to date, for transmission to outcomes registries, …

Shorrock S. (2020) Proxies for work-as-done: 1. work-as-imagined. humanistic systems: understanding and improving work and life. https://humanisticsystems.com/2020/10/28/proxies-for-work-as-done-1-work-as-imagined/

data as done - identifiers in practice

…those [GTINs] change […] constantly ….

And we had a mix of state of GTINs [for a product] […] [we have] the original product on the shelf, we've got the new product coming in, and at one point we had four different GTINs for the same product on our shelf…

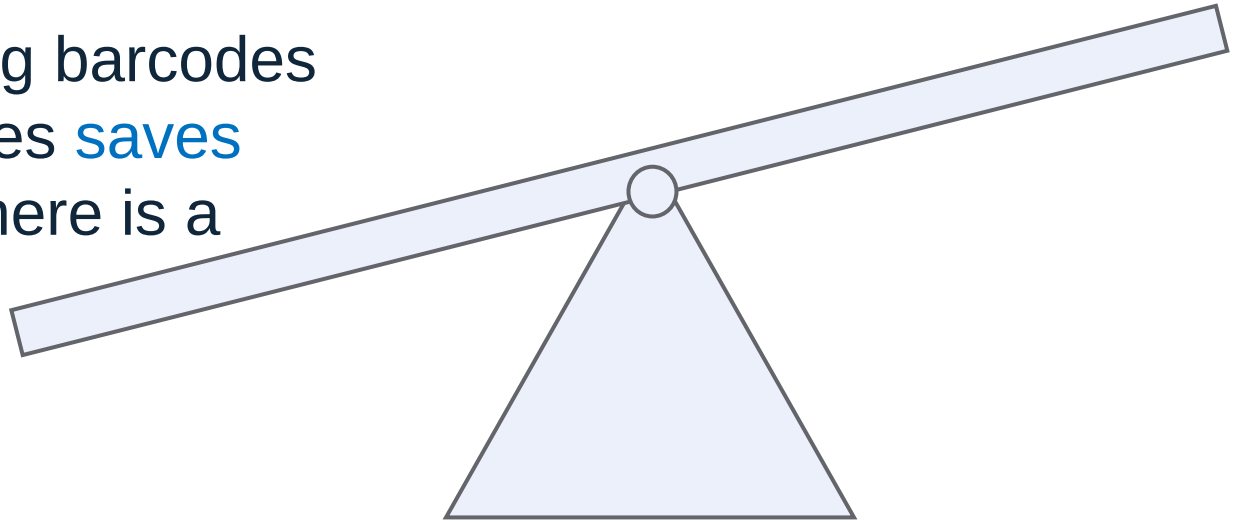
[Interview transcript, ID7]

benefits not equally distributed

The staff who scan the barcodes (track items)
are not responsible for tracing those items in case of recalls

Scanning barcodes of devices takes time

Scanning barcodes of devices saves time if there is a recall



measuring what can be measured

What to measure - metrics

- for implementation progress
- for compliance
- for benefits realisation

How to assess data quality (completeness, consistency across all patients/products)

Computerization brings *"a deeper level of transparency to activities that had been either partially or completely opaque"* (Zuboff, 1988:172)

"it's always a challenge in a complex environment because the computer makes things invisible" (Ash, 2007:419)

Lichtner, V., & Cornford, T. (2017). The Value of Data and the Value of Questions: Achieving Improvement in Hospital Pharmacy and Medication Safety. *Studies in Health Technology and Informatics*, *245*, 1080-1084.

‘generativity’ of information infrastructures

Scan4Safety data standards and linked systems = an information infrastructure

Generative of innovation

Table 1 – Standardization and generativity as complementary qualities of information infrastructures.

Information infrastructures		Standardization	Generativity
Enable action	By being relational and working in between groups	Allows universal coordination	Allows local fit
Create connections	By supporting ecologies of actions, tools and context	Allows stabilization of relationships	Allows evolution of the connections’ grid
Attain durability	By cultivation of the installed base	Allows the exploitation of pre-existing arrangements	Allows the exploration of new configurations

Grisot, M. and P. Vassilakopoulou, *Infrastructures in healthcare: The interplay between generativity and standardization.* International Journal of Medical Informatics, 2013. **82**(5): e170-e179

"What we can do with Scan4Safety is only limited by our imagination."

Chris Tulloch, consultant orthopaedic surgeon at North Tees and Hartlepool Hospital NHS Trust

GS1 UK. Improving patient safety and saving money using point-of-care scanning in the NHS. A scan of the benefits: the scan4safety evidence report. 2020

Thank you

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