Department of Health

NHS

GS1 and PEPPOL Adoption

Case Study: Master Data Exchange

Demonstration of Technology

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Introduction

The NHS eProcurement Strategy[1] was published by the Department of Health in May 2014 and compliance with the strategy, to implement GS1 and PEPPOL[2] standards, was mandated on NHS Trusts as a requirement of the NHS Standard Contract.

In August 2014 the NHS Terms and Conditions for the Supply of Goods and the Provision of Services were amended to include a requirement on suppliers to place master product data in a GS1 datapool.

In January 2017, these conditions were further amended[3] to require compliance with Department of Health published Supplier Compliance Timelines[4]. To facilitate Master Data Exchange (MDE), these Supplier Compliance Timelines include a requirement on suppliers' data to place master product data in any GS1 certified datapool in the GS1 Global Data Synchronisation Network (GDSN).

The Department of Health has decided to exchange only master *product* data via GDSN in the medium term, leaving suppliers to exchange price data with their NHS customers by other means. This decision was based on an assessment that, under GDSN Release 3.0, the exchange of largely static product data is a mature process, whereas the exchange of largely dynamic price data is not yet mature.

Master data exchange in the NHS

Suppliers trading with the English NHS have to respond to multiple requests for master product data in different formats. This results in duplication of effort, adds cost in the supply chain and compromises data quality. This inefficiency in the way the market currently works means that the number of requests for master product data detracts from the need to focus on quality, consistency and automation.

The primary purpose and advantage of deploying MDE within the NHS and its supplier's base is to enable the machine-to-machine exchange of data between suppliers and their NHS customers, utilising a single data source to a consistent set of standards, thereby improving data accuracy across multiple computer systems.

Establishing access to a repository of master product data that is quality assured and comprehensive is fundamental to the successful implementation of GS1 and PEPPOL standards across the English NHS and its supplier base. Master product data is required that includes all relevant attributes populated with values in accordance with business rules defined within Data Dictionaries published by the Department of Health, together with supporting Supplier Manuals[4].

As well as the burden on suppliers, significant effort is required to maintain master product data within trusts. The quality of data that they do have within electronic systems can be significantly improved at source, making it easier to simply identify a product using the barcode printed on its packaging.

All stakeholders face numerous challenges in sourcing, sharing and utilising data throughout the supply chain from manufacturer to patient. Establishing sustainable processes to ensure high quality data can be exchanged across systems is essential.

Demonstration of Technology

As part of its GS1 and PEPPOL standards adoption programme the Department of Health undertook a MDE Demonstration of Technology (DoT) to show how GDSN can meet the requirements of the NHS.

The aim of the DoT was to use GDSN in a live environment, to show the capacity and capability of the market to automate and seamlessly provide master product data, compliant with GS1 standards, from suppliers through to end users within a trust, via multiple systems, whilst maintaining the integrity of data quality.

Figure 1 (overleaf) diagrammatically shows the architecture of the DoT with the various participants involved.

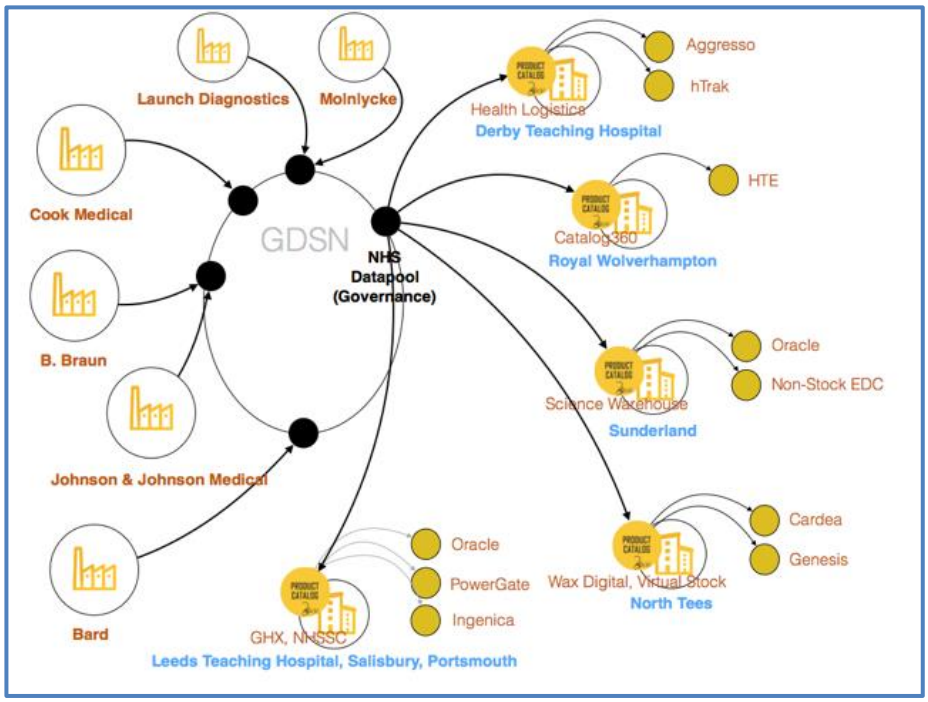

Figure 1

The DoT was designed to look at the exchange of master product data between a number of Medical and/or In-Vitro Diagnostic Device (MIVD) suppliers and NHS trusts using an integrated network of technology providers, which included at least two GS1 datapools within GDSN, and a distributed network of catalogue service providers (CSPs) that were already working with trusts.

Participants

Working with a number of suppliers, technology providers and NHS Trusts, the DoT was led by the Department of Health, supported by GS1 UK and 1WorldSync.

About GS1 UK

GS1 UK is the UK member organisation of the global GS1 not-for-profit standards organisation, which enables the globally unique identification of people, products and places, providing a foundation for improved patient care. GS1 UK supported suppliers in loading their data into GDSN and undertaking validation of that data against the relevant GS1 standards.

About 1WorldSync

1WorldSync (1WS) provided access to its GDSN certified[5] datapool to participating NHS organisations and MIVD suppliers, either directly, or through the GS1 UK GDSN datapool, or through the GS1 Ireland GDSN datapool. 1WS provided its expertise during workshops organised by the Department of Health and ran a specific workshop for all DoT participants to show how to efficiently apply GDSN standards for the DoT.

The following organisations participated in the DoT:

NHS Organisations

- All six Scan4Safety NHS Demonstrator Sites
- NEP Shared System Group
- NHS Business Services Authority
- NHS Supply Chain
- South of England Procurement Services

Medical & In-Vitro Diagnostic Suppliers

- Bard Ltd
- B. Braun Medical Ltd
- Cook Medical
- Johnson & Johnson Medical Ltd
- Launch Diagnostics
- Mölnlycke Health Care

Catalogue Service Providers

- Catalog360
- GHX
- Healthlogistics
- Science Warehouse Ltd
- Virtualstock
- Wax Digital Ltd

DoT required outcomes

It was anticipated that the DoT would show that the sharing of master product data could be automated and that the information could be accessed by scanning a barcode on a product, with the improved accuracy and quality of the information leveraged to improve patient safety. The following outcomes were defined:

a. Interoperability

Demonstrate that suppliers can publish master product data once to GDSN and NHS trusts can pull this data into their host systems without a need for manual intervention.

b. Quality assurance

Identify the controls needed to protect the integrity of master product data entering the NHS, and understand how master product data governance could be delivered.

c. Process

Evaluate and understand the GDSN subscription, data validation and operating processes required to support the exchange of master product data between suppliers and trusts, based upon a common data dictionary.

d. Scalability

Understand how to scale up from the DoT to an NHS-wide implementation by learning from other industry sectors, while considering the burden that would be placed on both the NHS and suppliers.

Methodology

The DoT followed the following methodology:

1. Create the product data dictionary

The Department of Health worked with GS1 UK to create a master product data dictionary suitable for the English NHS. 1WS checked the dictionary for consistency with anticipated European Union (EU) regulations. This product data dictionary was

based on the GS1 Global Data Dictionary (GDD) and aligned to best practice in other healthcare markets, such as the US Food and Drug Administration (FDA) Global Unique Device Identification Database.

2. Sourcing of product data by suppliers

The Department of Health presented the product data dictionary and planned test scenarios to the participating MIVD suppliers, asking each of them to provide master product data for 20 products. The suppliers selected the 20 products that met the planned test scenarios from across their range of product categories and risk classes and assessed how to source the master product data from their existing internal systems.

3. Loading of product data by suppliers to a GDSN datapool of their choice

A workshop with all participants was organised to review the principles of GDSN, and to provide guidance in the context of the DoT. Depending on their datapool service agreement, suppliers either used machine-to-machine processing tools to load the product data or a simple datapool portal user interface to key the data into GDSN.

4. Publish/Subscribe

The 20 products per supplier, for which master product data was to be published, were agreed between the Department of Health and each supplier to ensure a range of categories and risk classes were represented. Once each supplier had loaded the master product data to GDSN, with the UK as the target market, the Department of Health used each supplier's GS1 Global Location Number (GLN) to subscribe to those 20 products. This master product data was then published to a datapool nominated by the Department of Health.

5. Validation

This step was introduced to simulate the data governance processes that might be needed to manage the integrity of master product data entering the NHS. The functionality of certified GDSN datapools include some elements of data validation, which is automatically applied when suppliers upload their data, but it was

determined that additional validation was required to ensure the data was comprehensiveness and semantically accurate. GS1 UK provided the initial validation support. Following conclusion of this step, a workshop was held to inform the next version of the product data dictionary to be published in early 2017.

6. Maintenance updates

To test different update scenarios, each supplier was asked to undertake maintenance to their master product data at two different levels of packaging hierarchy, covering:

- a change to the product dimensions as an error correction;
- discontinuation of a product.

7. Pricing

Due to the complexity and sensitivity of price data, the Department of Health held an essential pre-activity workshop to explain the price synchronisation process and the required price data attributes to be delivered by each supplier to the Department of Health. Pricing data was not transmitted through GDSN but instead supplied using a standard worksheet template, sent as a GS1 formatted XML file directly to CSPs.

8. Catalogue service provider integration

The Department of Health provided output from master product data and pricing files to CSPs for feedback. This feedback was captured through a workshop hosted by the Department of Health (see Results & Lessons Learnt).

Results

Master Data Exchange (MDE) is achievable in the English healthcare sector using the GS1 Global Data Synchronisation Network (GDSN) with supporting services and processes, resulting in a more efficient and effective NHS that will benefit all stakeholders and ultimately improve patient safety.

Demonstration of Technology – outcome results			
Interoperability	Quality assurance	Process	Scalability
✓	✓	✓	✓

a. Interoperability

Master product data was successfully loaded to different GDSN certified datapools by all of the participating MIVD suppliers and successfully published across the network, received into an NHS-nominated datapool (1WorldSync DSE) and, via the CSPs, published to local trust catalogue management systems.

The DoT confirmed that managing master product data in a single place enhances data quality and simplifies data management and distribution for suppliers.

As the master product data maintained its integrity throughout, the DoT showed that machine-to-machine communication enables high data quality, as there is no manual intervention, minimising errors caused by re-keying data into different formats.

Interoperability between all stakeholders was seen as key to accuracy and scalability and the DoT showed that it is appropriate to ask suppliers to populate a GDSN certified datapool to leverage validation and to promote a single point of connection.

"The project demonstrated how the concept of up to date master product data could be realised; by working through each process step both internally and with other stakeholders, we increased our understanding of the benefits and challenges we and other suppliers face". **Johnson & Johnson Medical Ltd**

The DoT showed that implementation of MDE utilising GDSN could eliminate the large number of requests for master product data from the NHS.

"It was great to demonstrate that we only needed to supply the data one time for multiple participants that all use different local systems. Publishing the same master product data once, to several trusts ensures higher data quality through consistency". **B. Braun Medical Ltd**

b. Quality assurance

The need for consistency in how NHS trusts request, validate and use master product data was a key driver for undertaking the DoT and consulting industry experts[6]. Consistency would not only improve efficiency and effectiveness, saving time and money, but would also provide suppliers with a single point of connection with all of their NHS customers. Comprehensive, accurate master product data should be a key focus for all stakeholders.

Following the DoT, all participants understood that comprehensive, quality and accurate master product data is fundamental to MDE success and agreed that the DoT demonstrated that this is achievable.

> *"...The standardisation of the master product data management processes will drive master product data consistency and improve the quality of transactional data we receive".* **Cook Medical**

> "Improvements in master product data quality will help both the supplier and their customer to reduce the number of administrative errors that result from poor master product data". **Bard Ltd**

c. Process

To facilitate full implementation and scalability, the DoT helped all stakeholders to identify improvements that could be made to their operational processes, such as:

- a supplier process to match existing product codes to their assigned GTINs;
- a supplier process to assign data attribute ownership to appropriate resource, particularly within a multi-national organisational structure;
- a trust process to ensure frequency of maintenance updates is balanced.

As well as identifying gaps in and/or changes to computer systems. For example:

- adding missing attribute fields defined in the data dictionary
- amending attribute fields to be GSI compliant.

"The project demonstrated how the concept of up to date master product data could be realised; by working through each process step both internally and with other stakeholders, we increased our understanding of the benefits and challenges we and other suppliers face". **Cook Medical**

"Engagement from suppliers, discussion about real value and direction of travel, shared core set of attributes – all tested the concept". **Salisbury NHS Trust**

d. Scalability

Although the number of master product data attributes requested, for the 20 products from each supplier required to facilitate the test scenarios, was less than the number of data attributes in the published data dictionary, it was clear that this volume of products and data attributes was sufficient to uncover the challenges that would be encountered by all stakeholders, particularly SMEs, during wide-scale MDE implementation. Despite the challenges, the DoT participants recognised the significant benefits to their organisations and the English NHS.

"Trying to allocate the workload for an SME is a difficult task as resources are scarce". **Launch Diagnostics Ltd**

"The only challenge I foresee would be getting all suppliers to supply the data to GDSN and have the complete data set. For some small local suppliers this may mean that we have to carry on with our current procedure". **Derby NHS Trust**

Overall, the DoT was critical in enhancing all stakeholders' understanding of the Department of Health requirements. Participants welcomed the opportunity to participate in the DoT and thought the level of engagement was critical to demonstrate the value of GS1 standards and proposed that this level of engagement should be continued.

Lessons learnt

A benefit of the DoT was the opportunity to reassess the product data dictionary requirements issued in 2016. This in turn led to a revised version, to be published in early 2017, which is more in line with trusts' requirements and the reality of their day-to-day business. The key lessons learnt are categorised below.

Interoperability

1. Multiple options exist for how suppliers can load their data into GDSN and the option chosen by the supplier should fit their business needs. Having multiple options was a requirement of the DoT to meet the differing needs of the participating suppliers (SMEs and large multinationals).
2. GDSN resolves the problem of multiple requests for master product data from trusts. Suppliers would be able to reuse master product data that's already being maintained for other purposes and provide it once.
3. Near term use via GDSN of the different price agreement types currently included in the price data dictionary should be avoided. Local systems do not typically support different price types; instead they expect and use a single price.

Quality assurance

4. Suppliers need absolute clarity on how master product data attributes should be populated and an understanding of which attributes are considered mandatory. Knowing the context that makes an attribute mandatory is helpful to make data requests relevant and accepted.
5. CSPs support the prioritisation of master product data attributes and agree that the attributes marked as mandatory represent a minimum requirement.
6. The product data dictionary should evolve as part of on-going governance through a process of feedback from trusts and suppliers.
7. Standardisation of master product data management processes will drive master product data consistency and improve the quality of transactional data used in the supply chain, making it more cost effective for the NHS to trade with suppliers that are compliant with the NHS eProcurement Strategy.

8. A ‘one-to-many’ publication of master product data will allow resources time to refocus their efforts on master product data quality improvements. The investment is considered to be a real opportunity for suppliers to gain competitive advantage.

9. Access to a single source of master product data will drive consistency and centralised validation will remove duplicated effort and improve data accuracy.

10. Improvements in master product data quality will help both the supplier and their customers to reduce the number of administrative errors that result from poor master product data.

11. Patient safety will benefit from accurate master product data that can be correctly accessed or recorded using a barcode. It will be possible to systematically match product information that resides electronically in different systems.

12. The CSPs support the adoption of NHS eClass as the preferred taxonomy for their customers, but suggest the management of the change control and coverage could be improved.

Process

13. The Department of Health is asked to finalise the master product data dictionary change management process. It should be simple and common for all stakeholders.

14. Both customers and suppliers will benefit from efficiency gains related to a reduction in administrative errors and the ability to scan barcodes at different stages of the supply chain. This is an enabler for auto replenishment, as seen in the retail supply chain.

15. Within the scope of the DoT, collaboration between all parties was greatly helped by the shared workspace that provided a good forum for sharing information, providing answers to questions and for encouraging collaborative working. A continuation of this collaborative approach is recommended to support rollout to the wider NHS and supplier communities.

Scalability

16. The adoption of GS1 standards can be leveraged to both influence and learn from other countries. Stakeholder investment and future benefits extend beyond the UK.

17. There is an opportunity to leverage the work undertaken to support the timelines published by the US FDA and the forthcoming EU UDI regulations.

18. The Department of Health is urged to continue the harmonisation work instigated to support the DoT. The adoption of standards and the development of a globalised approach for healthcare are needed to effect change on the scale required to automate master product data updates.

19. There is recognition that supply chain master product data can be collected more quickly by the suppliers than regulatory and safety data. This may result in a “dual” approach, where there is early mass adoption for supply chain data and a phased approach for the full master product data dictionary (including safety/regulatory requirements) over a period of years.

20. The support needed for the maintenance and automated delivery of updates for a complete product range will require a significant investment of time and money for large multinational suppliers. In order for industry to be able to support the initiative, it is important for there to be a phased approach.

21. Supplier’s internal systems will benefit from a drive to source and improve master product data quality and the result will be a reduction in the amount of time spent on the administrative tasks supporting the processing of poor master product data.

22. Fewer ad hoc requests for master product data will be received by suppliers and this will allow greater focus on improving data and automating data maintenance updates.

23. The approach demonstrated would have a significant time saving on existing manual catalogue management processes as well as many other processes that are dependent on master product data.

24. It is important to continue to make the case and demonstrate the benefits of this MDE process. This will help unlock the necessary supplier investment.

25. There is a dependency on technology service providers to deliver system updates. This would likely require internal process pan-European / Global

harmonisation and prioritisation of these changes/update requests. This level of investment is dependent on continued engagement and benefits realisation evidence from trusts. The investment needed to establish new processes that support the automation of on-going updates should not be underestimated.

26. Changes to the technology and infrastructure maturity needed to fully implement GS1 standards will take time. A dependency on commercially motivated CSPs and the length of time it takes them to upgrade their systems may impact efficiency gains targeted by suppliers.

Recommendations

1. An NHS datapool should be established and managed centrally, as close as possible to the data source, i.e. suppliers. This service should include:

- hosting
- governance
- data stewardship
- product subscription management
- taxonomy management
- integration
- setup and support

2. A permanent governance group should be established, with representation from all key stakeholder groups, to manage change control and harmonisation of the Department of Health published data dictionaries.

3. The NHS datapool should integrate with a distributed network of CSPs leveraging the integrations with existing systems to drive trust adoption.

4. The reconciliation of trust specific product data with master product data sourced from an NHS datapool and the integration with local computer systems should be managed locally using a CSP.

5. The Department of Health should continue to evaluate the feasibility of using GDSN to support the transmission and validation of pricing data.

6. In 2017, align the GDSN implementation project of the NHS, through GS1 UK, with the European Collaboration of Healthcare Organisations (ECHO) project managed by leading European GS1 MO's and 1WorldSync. This would help in promoting one standard way to implement GDSN for healthcare across Europe, based on a common European data dictionary (which would cover all the Department of Health requirements) and one supporting technology.

Next Steps

The Demonstration of Technology successfully showed that there is great value, in terms of patient safety and operational efficiency benefits, in bringing to fruition a technology infrastructure that supports master data exchange. The Department of Health Scan4Safety programme will continue to drive towards adoption by the NHS and will seek to establish an infrastructure for the efficient and effective transfer of master data from suppliers to end users in NHS trusts.

Acknowledgement

"Through collaboration with international and local suppliers, trusts and catalogue service providers, GS1 UK and 1WorldSync, the DoT has demonstrated MDE is achievable and that the benefits to all stakeholders will outweigh the challenges.

I would like to extend my thanks to all those that committed their valuable time and effort by participating in this Demonstration of Technology".

Steve Graham, eProcurement Lead, Department of Health

References

1. NHS eProcurement Strategy
2. Pan-European Public Procurement On-Line (PEPPOL) refers to a set of specifications and governance model that focuses on the critical eProcurement components to solve interoperability issues in Europe. In some cases it may also refer to the OpenPEPPOL association
3. NHS Standard Terms and Conditions of Contract for the Purchase of and Supply of Services
4. All Department of Health published documents related to the adoption of and PEPPOL standards are available on the Supplier Workspace. To access the workspace, please email eProcurement@dh.gsi.gov.uk. The Department of Health data dictionary for MIVD Suppliers is available here
5. Drummond Group certifies datapools against the GS1 GDSN Standard**.**
6. A separate document will be published in early 2017 on the consultation with industry.