FHIR Transforms

Options Paper

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1. Introduction

With the implementation of systems using the FHIR messaging standard, there is a growing need for seamless message transfer between systems regardless of the FHIR version. Existing systems using the older Care Connect standard (FHIR version STU3) are currently looking to implement new requirements and are considering using the latest UK Core profiles which have been produced using the FHIR version R4.

Originally an implementation of a newer version of the FHIR standard would involve upgrading the whole ecosystem for the functionality. This is to ensure that the sending system is on the same version as the receiving system. This wholesome change would require a lot of planning and resources, and this could result in affecting direct patient care. There is an increasing need for a transformation capability to transform the FHIR messages between systems.

This document will highlight some possible options of how a service can be used to transform messages between endpoints and future steps to proceed with the initiative.

Please note: The remit of this document is to focus on the transformation of messages using the FHIR standard only.

2. Problem Statement

Healthcare messages using the FHIR standard should be exchanged seamlessly, without being restricted due to the version of the standard.

The introduction of the UK Core Profiles, and derivative profiles, based on the Release 4 version of FHIR, has raised questions by implementers who have already implemented services based on the Care Connect profiles based on the Standard for Trial Use 3 version of how interactions between different versions of FHIR should be managed.
Going forward, it is understood that there will be a mixed economy of versions of FHIR and steps are needed to allow seamless interoperability.

The base FHIR standard provides mappings to map between the different versions of FHIR but this doesn’t address the issue of how to handle differences introduced in profiles such as extensions and changes to value sets etc.

Existing APIs, open-source libraries would also need to be considered that could perform the transformation to avoid duplication of effort.

Efforts will be made to assist suppliers and vendors to develop solutions that allow seamless message exchange. Whether this is using mapping files, APIs or using the guidance materials to assist them on producing their own transformation method.

3. Options

3.1 Mapping files

To develop a transform service at either a central NHS level or at a local system level, there is a need to produce core files that specify the rules for the transformations.

One method is the use of mapping files which have been published by HL7 for the FHIR base resources for converting between STU3 and R4. The mapping files have been developed using the FHIR Mapping language, but other options can be evaluated.

It is envisaged that a mapping file would need to be created for each profile in use. These files would also need to be updated and published each time a profile is amended.

There are many questions regarding the mapping files:

- Who will create the mapping files?
- Who will monitor/maintain the mapping files?
- What format is to be used for the mapping files?

Pros:

- Simple and low cost - depending on the format used, the mapping files would be produced using a simple text editor.
- Low maintenance – the mapping files would be published in a central location for suppliers to download.
- Suppliers are given freedom on developing on their own system – using their own codebase without having to expose any APIs to integrate external libraries.

Cons:

- Many mapping files would need to be produced for existing Care Connect profiles.

- Additional guidance required for producing/reading mapping files created using the FHIR mapping language
- May not develop due to clinical risk – care would need to be sought for elements that may have been deprecated in a later version
- Dependent on individual suppliers own assurance and testing
- Cannot build an enforceable deprecation strategy

3.2 Open Transform code published

Tested and assured code to be made available hosted on an open location (e.g GitHub). The code could be developed by either using existing APIs or developed from scratch.

The codebase can then be used by the suppliers to integrate into their own development. The supplier community would also be encouraged to contribute to the codebase.

Pros:

- Simple and relatively cost – as it would be developed and maintained by a central body (for instance, NHS Digital)
- Codebase assured and tested centrally
- Allows community contribution – software changes through pull requests and working groups to decide the strategy.

Cons:

- Suppliers must build into their development plans – this could either be simple or resource extensive.
- May have to build multiple transforms in their system – for each service they provide.
- Very difficult to build an enforceable deprecation strategy

3.3 Central Translation service

An NHS Digital service that converts the message upon receipt or prior to sending. It is important to understand that a central translation service would need to support messages from all countries in the UK (England, Scotland, Wales and N.Ireland).

Pros:

- Removes supplier development – although there is some development required to use the service.
- Enables an enforceable deprecation strategy
- Central capability that can be replicated for other domains
- All messages would be the same

Cons:

- Potentially higher cost option – may need to develop a load balancing functionality to accept the potential of high volume of traffic.
- Single point of failure - In the event of the central service to suffer downtime, this would affect all messages from being sent.
- Restrict modernisation - Systems may not be updated to later versions or newer technologies if a service continues to perform the transform.

3.4 Guidance

A team to provide guidance to vendors/suppliers who lack the experience and knowledge in the healthcare interoperability sector.

This option would suit suppliers who wish to develop their own transformation service but require some direction with regards to the mapping files or the FHIR standard.

Pros:

- Highlights any blockers with suppliers or new vendors in the interoperability space.
- Suppliers to take ownership of the transform

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4. Next Steps

Initial steps have been taken to develop a private beta transformation capability for the Interoperable Medicines programme. The initial use case would be to support the transfer of medicine information between primary and secondary care settings. This piece of work would be undertaken by NHS Digital and would form the base for future developments on this initiative.

Supplier engagement will be sought through working groups to get their views on how a mixed economy of versions could be managed. Whether they would consider using the options provided above or whether they would prefer to manage using a different method would need to be discussed.