

FHIR in the UK NHS

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The UK National Health Service (NHS)

- Set up in 1948 to provide healthcare for all UK citizens (now 60 million people)
- Provision based on need, not the ability to pay
 - *Free* at the point of delivery (you don't pay for treatment)
 - Paid for by government (you pay from tax)
- Now the largest organisation in Europe:
 - over 1.7m employees
 - costs more than **£100 billion** per year to run
 - (€110, \$130 billion)

In a typical week for the NHS...

1,400,000 people will receive NHS help in their home

800,000+ will be treated in outpatient clinic (visit to hospital, but don't stay in a bed)

10,000 babies delivered.

700,000 will visit a dentist (part of NHS)

8,500,000 medication items dispensed by pharmacies with NHS prescriptions

“The NHS”?

Actually, a whole collection of organizations. And the UK is in fact several countries.



NHS IT History – pre 2000

GPs fully computerised, by the 1990s (world leading)

GP = General Practice (Family Doctor)

Hospitals less so, some IT, lots of paper

Integration:

- Hospital/vendor initiatives, but not centralised.
- Success: the Kettering XML discharge summary
- Success: use of HL7 Version 2 within the hospital – in all hospitals
- Success: laboratory results messages from labs to GPs (central programme)

History - UK IT Successes - GP Systems

- Since 90s all GPs have sophisticated IT systems
- GPs are actually independent organisations, but funded by NHS (existed before NHS formed)
- Small, so relatively good at adopting IT
(1 to ~15 doctors, ~2000 to ~30000 patients)
- UK patients all have full structured and clinically coded medical histories (for over 20 years)
- By 2000, electronic messaging fully implemented for:
 - Lab results from labs to GP
 - National registration of patients at each practice
(neither in HL7 – EDIFACT)

The National IT Programme (2002-2011)

In 2002 a programme was set up.

Major aims, interoperability:

- Create a national central patient health record
- Link GPs to hospitals, pharmacies and to each other
- **HL7 version 3 chosen** (later some CDA)
- Also involved creation of new infrastructure
- Other aims around central purchasing contracts

National Interop Projects Planned

- Patient Demographics Service – identify patients (name, address, national health number)
- “Choose and Book” – online booking of hospital appointments by GPs (electronic “referrals”)
- Electronic Prescriptions Service
 - GP to Pharmacy
- The centralised patient health record
 - Detailed EHR information on each patient
- GP to GP EHR record transfer service

Successes - Secure Network

The NHS “N3” network

Private Secure Network

51,000 connections

20,000km fibre optic cable

All network equipment in secure locations

Confidential information must not be sent on public broadband network

Plus – the “Spine”:

A messaging backbone (bus) that routes XML traffic between the national systems



Successes - GP to GP record transfer

- GP EHR records of high quality
- But lack of compatibility meant printouts used when patients moved. Mailed and typed in again at new practice (or just attached PDF).
- Destroyed quality of curated record
- Now records are transferred losslessly from one system to another (and from one manufacturer to another)
- Now nearly 1 million records sent every year.

Success - Electronic Prescriptions Service

- UK Pharmacies are funded for NHS drugs, prescribed by GPs
- Pharmacies have to claim each one from the central organisation
- All GP prescriptions now electronic
- Admin simpler
- Major cost savings
- HL7 V3 messages
- Medium complexity
- 1 billion per year
- (2000 per minute!)

Pharmacy Stamp

Age: 29 yrs
D.o.B: 15/10/1980

Title, Forename, Surname & Address
Miss Minnie Mouse
Mouse House Mouse Road
Bow
Devon
EX31 6EG

Please don't stamp over age box
Number of days' treatment
N.B. Ensure dose is stated

NHS Number:

Endorsements
Paracetamol Capsules 500 mg
take two 4 times/day
Quant : 64 cap

Current Prescription

Repeat Prescription

Signature of Prescriber

Date: 16/09/2010

For dispenser
No. of Prescrip.
on form

North & East Devon H.A
Dr. Andrew Bower
Bow Medical Practice
Godfrey's Gardens
Bow
Devon EX17 6HT

NHS

FP10SS0608

Other results

Successes:

Personal Demographics Service

“Choose and Book” (though not popular)

Not so successful:

Central patient record

Was very late, and only implements a fraction of what was planned.

Slowed by **privacy and consent concerns and fears of centralised data**

Not a technology issue (mostly)

<http://systems.digital.nhs.uk/scr/patients>

Post Programme: New technology direction

HL7 V3 worked (for a National Programme)

and still works, at great scale

but has proved hard to maintain

and it was *very unpopular* with suppliers

There was a backlash against HL7 V3 and interoperability projects in general

Some CDA adopted, but slow

However by 2014, the wheel had turned (at HL7, and at NHS).

FHIR was emerging and NHS Digital started a newer more agile approach. Less mandate, more leading.

See developer.nhs.uk

(more) Consultation

One of perceived weaknesses of National Programme:

Lack of engagement with users (Clinicians, Patients)

The **Professional Records Standards Body** (PRSB) is creating content standards for medical data (standardised headings and sections for communications etc.)

FHIR provides a way to send structured data

PRSB decides by agreement what should be sent

<http://theprsb.org/>

NHS FHIR

NHS has been quick to adopt FHIR

The need for connecting systems never went away, and after a slowdown, was ever greater.

Now some National Programme HL7 V3 interfaces being redeveloped in FHIR.

Newer interfaces now being specified in FHIR by default.

Vendors are enthusiastic (for the first time in a while!)

NHS FHIR - live

A lot of FHIR is in development at national level (England)

Started with first national level FHIR project:

- **National Risk Indication System**

Reference registry of people at risk of certain things (Child Protection)

<http://data.developer.nhs.uk/fhir/fgm/>

- **FHIR messaging (not REST)**
- **(very) simple data set**
- **read only**
- **DSTU1**

NHS FHIR - live

But also several “local” FHIR projects live:

- Central London Community Hospital
Numerous messaging (not REST) flows around the maternity pathways
- KHP Online (Kings Health Partnership)
Portal to View Patient Data from the 3 Hospitals, live **October 2014**
By June 2015, 50,000 requests to view patient records
<http://www.kingshealthpartners.org/resources/case-studies/133-khp-online>
This is thought to be the worlds first live FHIR implementation
(unless someone knows another one...?)
Self started - no training, no engagement with HL7 at national or international level.

NHS FHIR - in progress

At least 8 national level FHIR **REST** projects underway

- GP Connect API (including a proxy to allow all the different end points to be addressed by REST)
- CareConnect API
- Visitors & Migrants API
- eRS API (redevelopment of V3 Choose and Book)
- National Record Locator API
- PDS API 4 (redevelopment of V3)
- ODS API
- National Opt Out API

Mix of DSTU2 and STU3 (many started before STU3)

NHS FHIR - in progress

At least 4 national level FHIR **messaging** projects underway

- Digital Child Health
- Social Care ADW
- Diagnostic Results Reporting
- Genome Sequencing Request/Results

These all announced, but some at early stages.

More details of these and previous:

http://www.hl7.org.uk/doc_store/IO_Forums/200617/RKavanagh.pdf

NHS FHIR - in progress

Transfer of Care documents

One CDA project, that was partially implemented, but not widely rolled out, has switched to FHIR documents.

Stakeholders (overall) backed the change, even though some had started implementing in FHIR

NHS FHIR - Live



GPConnect

Building on successful GP systems

- Add a standardised FHIR interface to all patient records

For remote access

developer.nhs.uk/downloads-data/fhir-resource-definitions-library/

This is now live (mid 2017) with one of the major GP suppliers (with over 50% of England, so for over 25 million patients)

Currently only for booking appointments at the GP, from out of hours centres.

FHIR Implementation Lessons

Projects

FHIR ≠ REST

- FHIR is new
- REST is new
- The combination may be too much
- Reuse what you have and what you know
- Messaging or documents may be right for you
- Consider redeveloping an existing interface

Implementation Tips

Use the FHIR “ecosystem”

- The first UK FHIR project was self starting
- But FHIR has a big community, online and face to face
- Large set of (free) tools and resources
- FHIR is technically different, but this is **the biggest difference** to old standards

FHIR Ecosystem

The code

- FHIR has free working code, for the most popular languages
- (google “open source fhir”)
- and free working code for creating servers
- Try *not* to write your own code (as fun as that is...)
- But, if you are not “greenfield” it can be hard to adopt and integrate a new codebase or library
- Usually still possible to use this code to create prototypes and test harnesses etc.

FHIR Ecosystem

Profiling

- The process of creating specialised versions of FHIR for specific uses, regions, organizations
- Document your specific requirements, and turn them into automatic tests
- Powerful, but still complex. Continually getting simpler
- (Heretical :-) don't get too side-tracked into profiling, keep it agile. FHIR ≠ Profiling

FHIR Ecosystem

The servers

- (google “open fhir servers”)
- Use them to play, when learning
- Ideally, use the code and you have a server (but this is hard when not greenfield)
- *Keep using them* even when you have your own system
- Even when you think your code is correct, see if other servers think so...
- Otherwise risk a “working” (self consistent) but incorrect implementation, limits your use of the ecosystem

FHIR Ecosystem

The testing resources

- Connectathons, networking in both senses
- Use \$validate on other servers
- Test your tests, on other servers
- As well as fixing your bugs, this is *your way into the ecosystem*
- If your FHIR can talk not just to your own servers but to others, it opens the door for using tools such as Aegis, ClinFHIR etc.
- These multiply your efforts

Ευχαριστώ
Thanks!
Questions?



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