

NHS Improvement QIPP Case Study Template

This form should be used to capture any case studies which demonstrate improvement across a service area and/or patient care pathway and in particular how NHS Improvement has aided this.

Organisation / SHA / PCT/ Consortia: Musgrove Park Hospital, Taunton and Somerset NHS Foundation Trust

Lead contact: Dr Fred Mayall

Email: Fred.Mayall@tst.nhs.uk

Date form completed: 11/8/11

QIPP Area *(please tick those that apply)*

Quality

Innovation

Productivity

Prevention

Pathway *(please tick those that apply)*

Primary Care

Referral

Diagnosis

Treatment

After Care

End of Life Care

Other – please specify

1) Title

Please give a title for your best practice example

Home Grown Open Source Software for Improved Reporting of Histopathology Specimens Across Multiple Sites

2) Summary

Please give a clear, concise summary for your best practice example in no more than 100 words

Many histopathology laboratories in the UK are using antiquated reporting software. Upgrading to a more modern system is expensive. Even the more modern systems often lack the technology needed for pathologists to efficiently report complex cases. They are often difficult to use across multiple sites. We have developed web based reporting software that overcomes these difficulties. This has been trialled by 15 staff at two sites to report over 4000 cases; many complex tumour cases requiring key data element capture. We intend to share this open source software with other NHS Labs, and internationally.

3) Context and Background

The reason for change, why was it needed?

In 2008 the [Carter Report](#) (*Report of the Second Phase of the Review of NHS Pathology Services in England*) promoted "the rapid adoption of innovative new technology and new approaches to the delivery of pathology service" as being key to pathology reform in the UK. Many histopathology laboratories are using antiquated reporting software (Figure 1) and this delays the reporting of the specimens and hence diagnosis and treatment. In addition there is an increasing requirement for key data elements to be captured during reporting for export to other databases, but most existing software can not do this. Pathology networks are being developed but current software can be difficult to use across multiple sites, making it difficult to share work. Upgrading to a more modern system is expensive; typically £70,000 for a small lab and several hundred thousand pounds for a large lab.

4) How was the change made?

4a) Methodology - *what did you do?*

We have developed web based histopathology reporting software (Figure 2) that overcomes some of the the difficulties described in Section 3. This has been trialled by 15 staff at two sites to report over 4000 cases; many complex tumour cases requiring key data capture. We used Lean principles to enhance work flow and improve accuracy. These include:

- Colour coded visual workflow control
- "One-click" extra-work requests with order tracking
- User defined template reporting
- Reporting of complex cases using benchmark profomas; for example RCPATH profomas and Breast Screening Programme profomas.
- Exportable data-sets using Open Database Connectivity (ODBC is a standard software interface for accessing database management systems)
- Easy local customisation and enhancement by the user

The software can be used on any computer with a web browser and access to the server, and there can be almost limitless simultaneous users. Consequently the costs of installing and running the database are low.

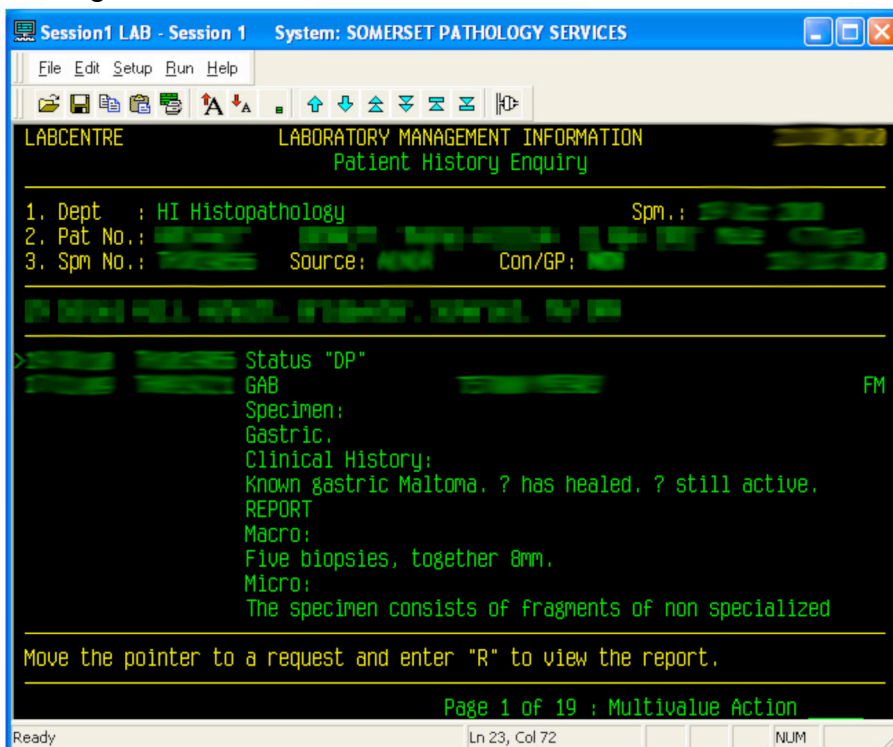


Figure 1: A screen shot from the old process.

Figure 2: A screen shot from the new process (see also Figure 4)

4b) What resources/ investment were needed?

The programming was undertaken by Histopathology Department volunteers. No salaried time was used. No capital was required. We were able to use local NHS servers but if the software were to be installed for 100 simultaneous web-based users in a commercial Filemaker Pro Server environment the set up cost would be £50 and then a monthly fee £19 (www.filemaker.co.uk Rapidshare hosting; prices July 2011).

5) Results

5a) Overall impact and benefits of the change, how this benefits histopathology reporting

The software was used to report more than 4000 histopathology specimens at two histopathology laboratories. Many of these cases were complex cancer resection cases.

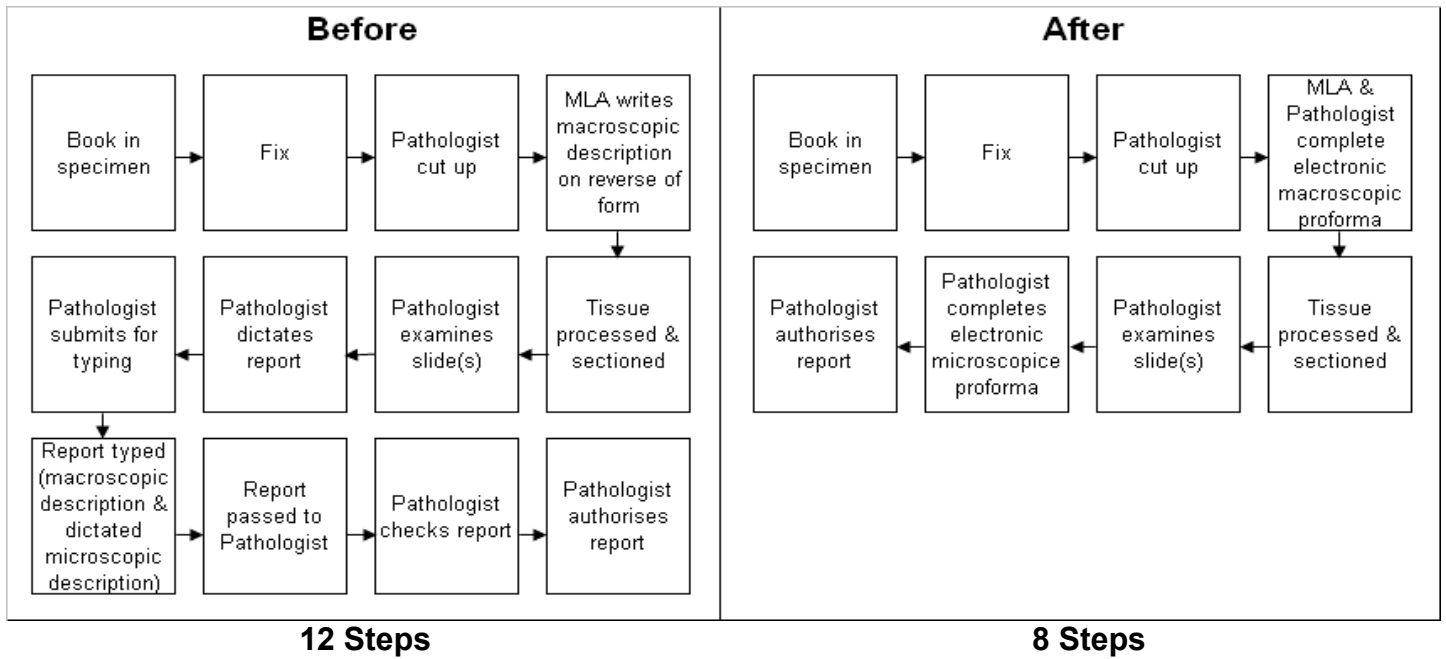
Improvements were seen in:

Quality – Proforma reporting enabled key data elements to be recorded for complex cancer cases. For breast cancers up to 57 separate elements were recorded for each specimen. Before we started using this software pathologists had to fill out Breast Screening data forms by hand. Pathologists were often slow returning these documents. Now Breast Screening Programme staff can generate an electronic document themselves from the software.

Waste – Using Lean methodology, the elimination of waste is considered under the following headings:

- **Transport** – The software encourages a reporting process with fewer steps and hence less transport of request forms and electronic information between steps; an example is set out below:

Figure 3: Previous and new process sequence for complex cancer case:















- Inventory / Back-log – The software decreases inventory. For example the pathologist completes and authorises the report without waiting for the report to be typed. Thus the total lead time is reduced.
- Motion – The new reporting sequence using proformas (Figure 4), templates and direct typed text requires less motion of staff and request forms as there are fewer steps in the process sequence. The same is also true of “one click” extra-work requesting that replaces the previous hand written paper slip method. We calculated that electronic ordering of extra-work would save the pathologists in our department 207 kms of walking a year.
- Automation – Failure to use automation can be wasteful. With the new software, text entry is automated with templates, proformas, drop-down menus and there is paperless reporting and paperless data-sharing.
- Waiting – The software reduces waiting by removing some waiting steps. In the process sequence example above there is no longer any waiting for typing or authorising. The software also promotes single piece flow. A case can be authorised the moment that it is completed instead of being authorised when a batch of reports return from the typing.
- Over production – We do not believe that the software makes any difference to overproduction as overproduction was not an important feature of the previous process.
- Over processing – This was not an important feature of the previous process. However, it could be a problem when using proforma reporting with the new software. At one point we noticed that we were collecting data-elements with the breast cancer proforma that were apparently not needed by anybody. Consequently we removed these from the proforma.
- Defects – As set out under “Quality” above:
 - Proforma reporting ensures that the required data is captured. Before the improved process was in place, no individual data-elements were captured. If they were needed they had to be lifted from the text of the report.

- Profoma reporting also reduced typing errors.
 - The software sequences the unreported cases in chronological order, promoting “first in, first out” reporting and the “right result at the right time”.
 - One-click extra work requests automatically enters the patient identifiers, into extra work requests. The previous hand written paper slip method invited illegibility or missing identifiers.
 - One consideration is the availability of automatic spell checking. This depends on the web-browser that is being used. The current version of Internet Explorer (the most commonly used web-browser) does not support spell-checking, while Safari and Firefox do. There are spell check plug-ins for Internet Explorer but they are not widely used.
- Skills – Underutilising capabilities. Before using the new software MLAs were “spectators” for much of the cut-up of complex cancer cases. They wrote the macroscopic description in pencil on the back of the request form but otherwise were underutilized. They are now able to take on a more enhanced role during cut-up, filling in macroscopic electronic proformas under the pathologist’s direction. Some data elements, such as weight, can be entered into the proforma before the pathologist arrives for cut up.

User survey: the internal and external histopathology staff using the software were surveyed to obtain feedback on their experience of using the software. The responses are set out below:

What are the main advantages of using the database (select multiple if required):

		Response Percent	Response Count
The Web browser access made it easy to start using the database; no software to install		73.3%	11
No financial expenditure was needed		60.0%	9
No specialist IT expertise was needed		73.3%	11
The visual workflow management that sorts unauthorised reports by age urgency		20.0%	3
The "Quick Find" button that searches name, number and text on one click		60.0%	9
The customisable report templates		60.0%	9
The specialist reporting proformas for complex cases		33.3%	5
Exportable data fields from specialist reporting proformas		6.7%	1
The "one click" extra work ordering		33.3%	5
The colour visual workflow management of the extra work requests		26.7%	4
The "click button navigation" was easy to learn and use		46.7%	7
The database could be accessed from multiple sites simultaneously by an almost limitless number of users		60.0%	9
	Other (please specify)		2
answered question			15

What are the disadvantages of using it?

		Response Percent	Response Count
Difficult to access		15.4%	2
Difficult to use		7.7%	1
Navigation was slow		23.1%	3
Navigation was difficult to learn		23.1%	3
Operator errors were common		7.7%	1
The lay out was annoying (explain below in "Other" field)		15.4%	2
The colours of the fields, buttons and back grounds were unpleasant		7.7%	1
The text was too small		23.1%	3
The movement between layouts was too slow		7.7%	1
The server would frequently quit for no reason		15.4%	2
The forced logout after 30 minutes inactivity was annoying		15.4%	2
The specialist reporting proformas were difficult to use		0.0%	0
There are too few specialist reporting proformas		0.0%	0
The drop down lists did not include all the values that were needed		23.1%	3
	Other (please specify)		3
answered question			13

5b) Potential / actual cost savings

The cost savings include:

- The software is free (but there would be some implementation costs for a new user)
- The software makes reporting easier and has the potential to reduce turn around times, although this was not measured specifically. Reduced turn around times reduce downstream costs in the patient pathway.
- Reduced salaried time “result hunting” as the key data fields can be exported electronically
- Reduced salaried typing time as the reports are mainly generated by templates and proformas.

6) Sustainability

6a) Current position of the good practice – where is the service today?

- The main development and testing phase of this project is complete.
- The software has been in use for almost three years at Musgrove Park Hospital.
- Further expansion of the use of this software beyond the test sites depends on the level of external interest from potential users and support from agencies such as the Breast Screening Programme, The Bowel Screening Programme and the Department of Health.

7) Lessons learnt

What ideas were successful / unsuccessful, what you would have done differently.

Successful:

- Develop database with multiple Plan, Do, Study, Act (PDSA) cycles
 - Start with a small idea
 - Plan to grow the idea in small steps
 - Do; program small enhancements incrementally
 - Study; check results with users
 - Act; ask for feed back on changes and make required alterations
- Ask users for more ideas for enhancements
- Recruit others into the project by allowing them to use the software and experience its benefits
- Standardise new reporting process by achieving agreement between users
- Design a project that requires minimal investment

Unsuccessful:

- Funding; we avoided the need for funding as we anticipated that it would be difficult to obtain.

8) Future plans

What are your next steps?

- Respond to user feed back. Comments from our user survey indicate that users want:
 - a more professional feel
 - enhanced display of template report options
 - more drop down value lists
 - more user friendly features; auto text, spell checker on browser
 - better network connections, more speed

- We wish to refine the software for general distribution. We first need to:
 - Annotate the programming scripts so that they can be fully understood by other software developers working in this field; implement appropriate naming conventions and script standards.
 - Partner with a commercial software consultancy that can offer assistance to labs wishing to implement the software and customise it for their own environment. We have reached a support agreement with Linear Blue Ltd (www.linearblue.com), a large UK based software consultancy. They have experience of developing and supporting a large cancer research database in the UK using a similar software model to ours.
 - Develop more reporting proformas
 - Share the software nationally and internationally; the software can be downloaded from The Free Diagnostic Pathology project's website www.FreeDP.org as open source software.
- Explore ways in which similar “home grown” software can be developed and distributed in the NHS.