# Principia Medicinae Digitalis Sotoniensis

## A History of Healthcare Computing and Advances in Clinical Information Productivity in Southampton, 1980 -2024

## Essay 7: The Challenges of Acquisition and Integration of an Enterprise Document Management System in Southampton, 2013-2024

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**Key words**
Electronic Document Management System; Hyland OnBase, University Hospital Southampton, Electronic Patient Record; eDocs document management system; NHS paperless strategy.

**Contents**

**Definitions**

The following definitions will help the reader to follow the narrative in this essay:

**Electronic Document Management System (EDMS)**; This is a general term for a system which help an organisation to manage its document flows by electronic means, including the document capture as electronic images, labelling, filing and retrieval tools. EDM systems are widely used in commerce, industry, law and public bodies, which have traditionally generated and processed large volumes of paper in the course of these systems. Where these systems include financial management tools, they are commonly referred to as "**Enterprise Document Management Systems**".

**eDocs**: This is a bespoke document Management and Word Processing system which was written specifically for the Southampton Hospitals Clinical Data Environment by Alan Hales. It has been fully integrated with other Southampton Electronic Patient Record (EPR) tools within the bespoke local CHARTS EPR wrapper

**CHARTS**: This is the bespoke "single sign-on" EPR system, which was locally developed and which evolved from the Hospital Integrated Clinical Support System (HICSS) as previously described in Essay 4. CHARTS went live at SGH in 2016. It comprises a range of software tools of daily importance to clinical teams, including eDocs, eQuest, UHS Lifelines, Surgical Ops, Sectra PACS (Radiology) and CHIE (GP records).

**OnBase** is the commercial EDMS which was chosen for the digitisation of the vast quantity of historic and ongoing paper documents which had not already been or were being generated and processed using EDocs. OnBase was built by Hyland Inc of Westlake, Cleveland, Ohio, which designated a support team to adapt OnBase to theSouthampton requirements. OnBase went through three version evolutions, V15, V16 and V18 from the initial contract.

**Abstract**

In 2010, in recognition of the continuing failings and overruns of government directed IT programmes, which included the NHS National Programme for Information Technology (NPfIT), the Government Digital Service was created to bring coherence to IT strategy in Government Departments and to its internet projection.

This initiative created Gov.UK around a series of 25 exemplar projects, and a series of powerful design principles which focussed upon in house development, agile and iterative development, and a relentless focus and testing of the actual needs of the true end users of any system. This would make any such a system "Digital by Default" meaning so good that the user would choose no alternative way of working.

In 2013, the then Secretary of State for Health Jeremy Hunt followed NPfIT with the "Go Paperless" strategy for the NHS, which was still heavily dependent upon paper records with their resulting costs and inefficiencies.

The "Go paperless" mandate prompted an urgent plan at University Hospital Southampton (UHS) to undertake two major projects in parallel: the digitisation of archival paper records, and the acquisition of a commercial enterprise grade Electronic Document Management System (EDMS). The EDMS in turn was intended to serve as the primary EDMS for the Trust, and to replace the locally developed UHS Electronic Patient Record (EPR).

This project proved to be more complex than intended, with modified outcomes. Old lessons were relearned about the evolution of complex software projects which are mandated by political imperatives rather than operational needs and technical maturity.

In the previous essay in this series, I described the digital scanning programme at UHS from 2013 – 2018 and the attempts to create a workable classification scheme for the diverse documentation that comprises a typical medical record. In this essay, I describe and reflect upon the lessons and outcomes of the acquisition and implementation programme for the Hyland OnBase EDMS at UHS between 2014 and 2024.

**Introduction**

Through the 2010s, pressure was building on the NHS to accelerate the move from paper to digital systems for clinical information storage and management. Following the termination of the NHS National Programme for Information Technology (NPfIT) in September 2011, hospitals were broadly left to their own devices to digitise their local information systems. The solutions generally involved the purchase of bespoke commercial Electronic Patent Record (EPR) and hospital management systems. The quality and impact of these systems varied considerably, as did the level of digital maturity from one secondary health care provider to another.

Concurrently, from 2010 onwards, the UK Government Digital Service (GDS) was created to bring coherence to IT strategy in Government Departments across more than 300 websites. This led to the unifying GOV.UK web platform, and a series of principles to optimise complex software design for many different IT systems across the Government Information Estate and across the many Departments of State, Quasi-Autonomous Non-Governmental Organisations (Quangos) and Statutory Bodies.

The GDS mandate recognised that commercial systems were failing and at hugely inflated costs, not least because the developers lacked sufficient insight into the true needs of the users. They lacked sufficient recognition of the complexity of many large scale projects, including healthcare projects. The net result was that commercial suppliers were overpromising and under-delivering to digitally and commercially naive public sector organisations and purchasers. To address this problem, the GDS design principles stated that:

1. That the software developer started with rigorous research into the true needs of the end user, and that the user input continued throughout the life cycle of the system. This research required close and frequent proximity between the developer and the end user;

2. That the software development was Iterative and Agile. Projects would be broken down into a series of short Sprints, such that errors and wrong directions of travel could be recognised at an early point and corrected with least cost and wasted effort. The key

principal of efficient software development was to Fail Early and Fail Fast, so that development resources could be rapidly redirected to more successful strategies.

3. Such was the concern about inflated costs of software development and the poor design practices, that the GDS also recommended that projects be brought "in house" within Government Departments wherever possible. This would be undertaken in conjunction with new civil service career streams of digital researchers and developers, and through service wide digital training programmes.

In the absence of such skills, most UK hospitals and health providers purchased commercial EPR systems, many of which were from US companies, and many were digitally immature. In stark contrast, UHS had been developing its own EPR since the early 1990s through an agile and iterative process which latterly closely mirrored the GDS philosophy. This approach benefitted specifically from a close working and long term relationships between the healthcare and software professionals in the Trust, as I have described in previous essays in this series.

**The Origins of the UHS EDMS project in 2013**

In January 2013, then Secretary of State for Health Jeremy Hunt launched the NHS "GO PAPERLESS" challenge, noting that:

*"The NHS cannot be the last man standing as the rest of the economy embraces the technology revolution. It is crazy that paramedics cannot access a full medical history of someone they are picking up in an emergency - and that GPs and hospitals still struggle to share digital records....We need to avoid the pitfalls of a hugely complex, centrally specified approach. Only with world class information systems will the NHS deliver world class care."*

By 2013, the component systems of the UHS EPR were largely complete and proven, but they were yet to be unified in the bespoke UHS EPR wrapper, CHARTS, which went live in 2016 and under a single login. By 2013, we had also developed the intuitive UHS Lifelines interface for the UHS EPR, which I describe in later essays in this series. Our work on this system informed my expectations throughout the EDMS acquisition process.

My thinking about the EDMS project was also strongly influenced by my training as an Army Staff Officer of the military operational planning process known as The Conduct of the Estimate. In this process, the commander's (or senior politician's) overall intent is clearly articulated at the outset in a Warning Order or Outline Plan.

. The operational staff then examine the order and translate it into a workable plan through a rigorous and structured process of critical thinking which considers all of the relevant factors and their consequences. The Estimate is founded in seven key questions:

- What is the situation & how does it affect me?
- What have I been told to do and why?
- What effects do I need to achieve and what direction must I give to develop my plan?
- Where can I best accomplish each action/effect?
- What resources do I need to accomplish each action/effect?
- When and where do the actions take place in relation to each other?
- What control measures do I need to impose?

The repetitive asking "So what?" or "what if?" of every possible factor of relevance to the order is intended to tease out all of the credible risks to the successful execution of the final plan, and to develop mitigating strategies to minimise the risks. The Estimate Process is enacted at all levels in the operational chain, and the findings are fed back up the system to ensure optimisation or adjustment of the original outline plan.

This process can be applied to a wide range of strategic questions, including the NHS "commander's intent" in 2013 to "go paperless" by 2018. Each constituent element and institution within the NHS was effectively invited to formulate its own subsidiary plan and by implication to conduct a formal evaluation process of its options.

In March 2013, the UHS Trust Executive Committee (TEC) approved an Outline Business Case (OBC) for the procurement and implementation of an Electronic Document Management System (EDMS) for UHS, in partnership with the Solent and Southern Health NHS Foundation Trusts. They managed a series of community hospitals and other NHS

facilities in the area. The management structure for the EDMS project was established as shown in Figure 1. The project was placed under the clinical direction of Dr Derek Waller, Consultant Physician, and under the technical direction of Mr Toby Cave from the Information Management and Technology team.

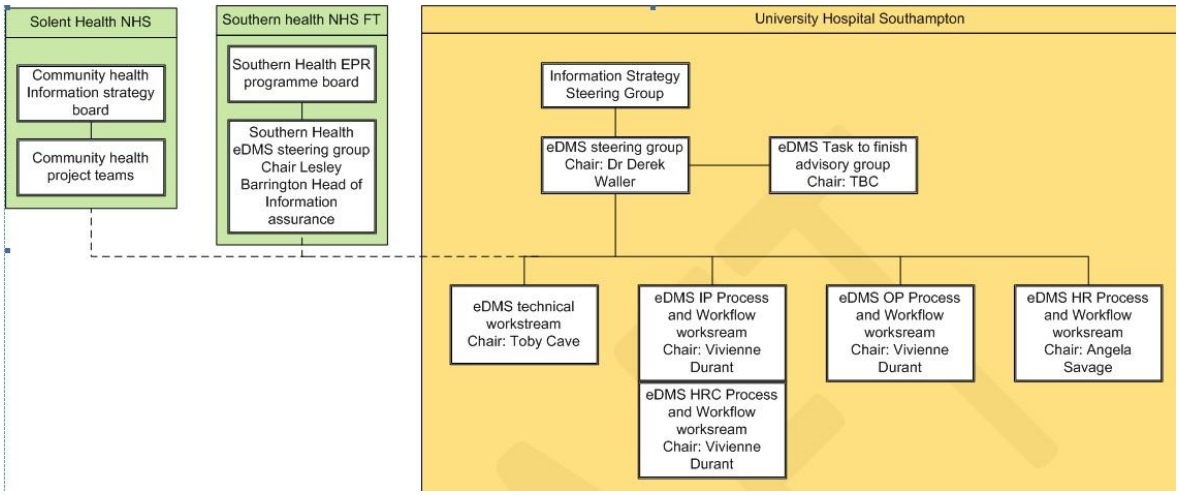



Figure 1: Diagram of The EDMS Project Governance Plan (Figure courtesy of Toby Cave)

An early decision was made by the Trust Board to acquire a commercial EDM system for the capture and storage of the huge volume of documents that would need to be processed, rather than to develop the existing eDocs document management system at UHS. It is not clear what planning or "Estimate" process led to this decision, or by whom and with what considerations, as the policy documents and minutes are not in the public domain.

**Development of the EDMS Project through 2014**

On 26th February 2014, Derek Waller announced the plan to recruit an EDMS Steering Group (EDMS SG) of clinicians, IT and clinical records specialists to oversee the process, stating that:

*"UHS will procure an electronic document management system (EDMS) this year, which will be at the heart of a future fully Electronic Patient Record (EPR). ...*

*The EDMS will sit alongside eDocs as a repository for all future clinical records;*

*Past records will be scanned in at the time of a new patient encounter, and new records will be scanned after the encounter;*

*All future patient contacts will then use the EPR in place of paper notes, which will no longer be available;*
*The way in which clinicians search for and view records through the EDMS, and how they are catalogued and displayed to the user will be a crucial part of the development, as it will determine how the full EPR will be accessed in future years".*

On 8th May 2014, Toby Cave sent out a Trust-wide invitation to clinicians to help with Procurement, Quality Assurance and Process of the EDMS project; and to act as Local champions to raise awareness of the programme; and to help manage it with the following remit for the EDMS SG. Specifically:

- It would report to the Trust Information Strategy Steering Group (ISSG).
- It would oversee the strategic direction and delivery of the EDMS.
- It would oversee value for money and alignment to the UHS IM&T strategy.
- It would be responsible for the implementation of the project;
- It would be responsible for compliance with Information and Communications Technology (ICT) policies and standards, and for the clinical safety of the system;
- It would manage any issues and risks to the EDMS project to clinical services.
- It was also empowered to create "task to finish groups" on an ad hoc basis.

Meetings would be held monthly and the proceedings would be minuted. A board of digitally enthused colleagues was recruited to develop the programme.

Early on, we raised the question as to whether there were alternatives to external procurement of an EDM system, and as to whether expansion and development of the existing UHS EPR and eDocs systems would be as (or more) operationally effective and sustainable at a lower cost than an external purchase.

We also considered whether the Trust should entertain bids from suppliers with proprietary, "closed" systems, or with open source software systems that we could more easily adapt. UHS then went to market and held a competition between EDMS providers to find a system which met the technical requirements of document capture at pace and volume.

**The Process of Choosing the EDMS Supplier**

On 11th November 2014, Derek Waller informed the EDMS Steering Group that:

*"We have now carried out four site visits to view our shortlisted systems in action... It is clear that we will need to have a single interface for accessing all our records. The chosen system will probably replace eDocs for all functions except creation of letters and discharge summaries. The optimal system will include:*

*- Rapid access to all documents, subject to indexing and to the scanning strategy;*

*- A timeline for quick identification of episodes of care;*

*- Creation of workflows e.g. of clinical letters for checking and electronic sign-off;*

*- The ability to create electronic forms for digital data entry;*

*- Functionality for iPads and other mobile devices;*

*- Remote access to records for outreach clinics and peripatetic services;*

The competition between the four short-listed candidate suppliers was conducted at UHS through November 2014, and scored by members of the IT Department and EDMS SGs. Each bidder was offered a three hour slot to present their data management solutions for four clinical and scanning scenarios. Each Supplier offered an EPR in various stages of development, and a document scanning and collation system.

I attended all four of the presentations. Each supplier was offering a complex package which included both an EPR in various stages of development, and a document scanning and collation system. I shared the collective view that the presentation by the Hyland Corporation of Cleveland Ohio on their OnBase Enterprise Document Management System was the most persuasive of those systems on show.

On 25th November 2014, I submitted a paper to the EDMS SG at the invitation of Toby Cave to record my observations on the proposed project. I noted that that UHS had a rich resource of clinical data and clinical intelligence within the existing UHS Clinical Data Estate (CDE), but that the current generation of clinician and user-facing interfaces were in need of further development.

I highlighted the work of the GDS and the principles of the National Digital Government Strategy. I argued that any future commercial supplier should be prepared to commit resources, including human resources, on site at UHS, to ensure a continual and incremental improvement of the UHS CDE based upon Sprint principles.

I was particularly concerned *that "The savings to be realised from ending the shunting of paper records around the County are well understood. However, these savings will be dwarfed by the additional costs of 500+ consultant clinicians and 5000+ other staff wasting expensive and precious time on systems that do not work as billed, that crash, or that cause interminable delays in the booting up of computers and in the functioning of software".*

I emphasised that the history of the NHS and of IT in Wessex was replete with failed clinical software systems which promised much and which under-delivered. An incremental approach was essential if past errors were not to be re-run. I therefore asked:
1. Whether the Trust really needed to acquire a new EPR interface. I proposed that the existing UHS EPR systems might secure a more powerful system with further in house development.

2. Whether the worst solution would be to have both our existing EPR and the New Supplier interfaces working in parallel.

3. Whether there was any purpose in major scanning of historic documents into a new system, when incremental improvements to and a move to an alternative paper document warehouse might render this unnecessary;.

I urged a rethink of the premises upon which the EDMS programme was structured".
Overall, I noted that:
a. None of the providers had demonstrated an EPR interface which was as powerful as that which we already enjoyed or which we knew to be achievable within the UHS CDE;
b. All of the new provider systems would require a considerable amount of work in interface improvement and user training before they were likely to deliver efficiency gains;

c. Improvements would be conditional upon improving the legacy hardware throughout the hospital, with sufficient reliable and fast devices in all places, for all users and at all reasonable times, whether at fixed terminals and/or through iPad based solutions.

d. We needed to be considering future system requirements, where information flows much more freely between primary and secondary care, between patients and health providers, and within the Social Care space as well as the Health space. In this context, I asked whether early operational integration with the Hampshire Health Record of existing historic digital records in primary care would obviate the need for scanning many of the historic UHS records.

I concluded that "an accelerated, incremental evolutionary approach to improving our existing clinical data systems might well be significantly less disruptive and less costly than a wholesale change to a new and under-developed system; which would in any case will inevitably need further work".

Consultant Anaesthetist Michael Celinski reminded the EDMS SG that:

- *The primary aim of the project is document scanning;*
- *The EPR function may be an added benefit, but we have other solutions;*
- *Some basic e-Forms would make life easier but should not be seen as an entire EPR;*
- *How and what we scan is a point of debate – its risks, costs and benefits;*
- *There are other ward based EPR solutions which would slot into any EDMS.*

We could agree that the ship of strategy had now sailed to the commercial EDMS port. Our collective energies on the EDMS SG would therefore be best directed towards optimising the transition process, both in terms of the scanning programme (as described in the previous essay in this series) and in the design and operability of the EPR with OnBase.

**The Choice of the Hyland OnBase EDMS**

On 25th November 2014, Toby Cave confirmed the contract with "Hyland Software of Cleveland Ohio to supply the OnBase EDMS. He noted that:

- *Hyland scored well in the OBS (Output Based Specification) for all core elements;*
- *They offered innovations which would sit well with the UHS EPR, and:*
- *Their proposal was strongly supported by clinicians;*
- *The proposal is to scan the records in the Health Records Centre (HRC);*
- *The project is aligned to the HRC lease expiry in May 2017.*
- *It will remove the requirement for storage of paper health records,*
- *It will allow UHS and partner Trusts to function in a paper light environment;*
- *It will enable eForms on a tablet or mobile device;*
- *UHS and partner trusts have agreed to collaborate on the project.*

In matters of practical integration with our existing systems, Derek Waller noted that:

- *We must improve the availability and reliability of our computer hardware;*
- *The stability and refresh speed of our software is critical;*
- *The scanning strategy will be intelligent and selective.*

**Development of the OnBase EDMS Plan through 2015:**

Negotiations, contract specifications and project planning proceeded with the Hyland team through 2015 around their OnBase Version 16 Enterprise Management System. OnBase was a generic document management system of considerable technical virtuosity but it had been optimised for generic business applications. It had yet to be optimised for the design challenges of the EPR. OnBase was described on the UK Government Digital Marketplace database as follows:

"OnBase is a single enterprise information platform which centralises content in a secure location, from which it can be accessed on demand. It can be used:

- To capture documents and other information at source, regardless of format;
- To organise data and documents in single searchable system;
- To provide Mobile access to content;
- To create personalised user interfaces;

- To enforce access control lists and to provide full audit trails;
- To configure workflows and add E-signatures;
- To provide analyses of processes, records and system health;
- To store, protects and destroy information in accordance with regulations;
- To minimise error-prone manual data entry;
- To manage content across multiple systems and locations**.**

During 2015, the back scanning project for stored clinical records began at the Nursling site, as I have described in the previous essay in this series. Hyland and UHS set up project teams to develop workflows for documentation migration and scanning, and for workforce Communications and Engagement. The success of the EDMS project now hinged upon critical dependencies which included:

- The expiry of the lease on the Nursling Warehouse;
- The interoperability of the OnBase EDMS and the CHARTS EPR;
- Infrastructure investment in computer terminals around the Trust;
- The willingness and ability of staff to use the new digital systems;
- The adequacy of the selective scanning strategy.

In July 2015, Toby Cave reported that the specification of the server hardware was complete. Two industrial scanners had been set up at the Nursling Hospital Records Centre (HRC) and configured for UHS case notes. A workstream had been set up, with the initial scanning of 15000 records.

By the end of 2015, Toby was able to report that contracts had been signed with Hyland and that work to procure storage for residual records in rented space in remote warehouses was under way. The closure of the HRC had been put back to 24th December 2018.

The story was reported in the Digital Health newsletter in December 2015. See: *https://www.digitalhealth.net/2015/12/southampton-plans-three-site-edm-project/*

**Progress in the UHS EDMS Project through 2016**

On 2nd February 2016, Toby Cave reported that "We aim to replace eDocs with OnBase in September 2016". Technical discovery with OnBase was complete by March 2016, and the OnBase software was installed on UHS Servers. In April 2016, Hyland Global Services published their Specification for the UHS EDMS Integration Programme.

Through 2016, work on the programme intensified in anticipation of the Live Launch of OnBase in early 2017, with regular meetings of the EDMS SG. Regular monthly Highlight Reports were produced and a series of discovery workshops were held with the subject matter experts to identify and iron out problems. Hyland issued a series of documents which set out the specifications of the system and the design solutions.

The EDMS report for June 2016 recognised the problems, and revised the plan, so as:

- To replace the eDocs Clinical Viewer with the OnBase Patient Window by December 2016;
- to advance the Scanning in Outpatients of Bar coded notes;
- to create of an Inpatient Record Folder for scanning on the patient's discharge from hospital, as many inpatient activities were still based upon paper records;
- To Back Scan the records of "frequent attenders";
- To develop e-forms, for Patient consent and Pre-assessment by March 2017;
- To roll out of a digital referral management system by May 2017.

The target dates for the transition still appeared to be very ambitious , given the considerable amount of work that would be needed to integrate the systems, to educate the workforce; and even to get the system up and running in a test format.

The ambitious plan for completion of the migration of all electronic documents from the CHARTS eDocs EPR to the OnBase EDMS by October 2017 concerned me in the absence of any evidence of a workable EPR in OnBase Version 16, as illustrated in Figures 2 and 3.

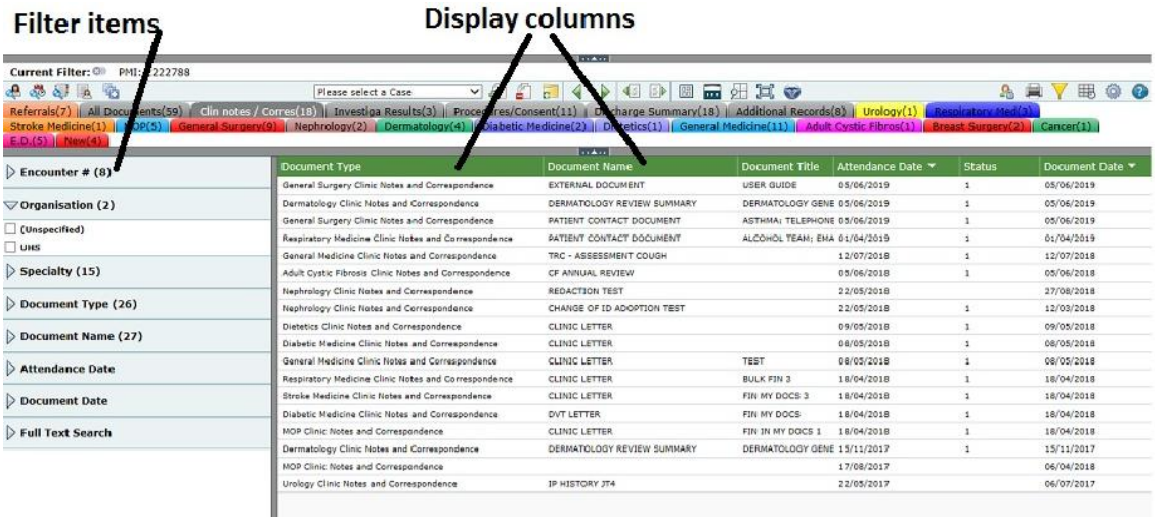



Figure 2. This screenshot of the OnBase Version 16 Interface illustrates the complexity and impractical usability of the design. It comprises a series of e-folders (the coloured Tans running across the upper screen), along with a smorgasbord of multiple menus, icons and lists of documents.

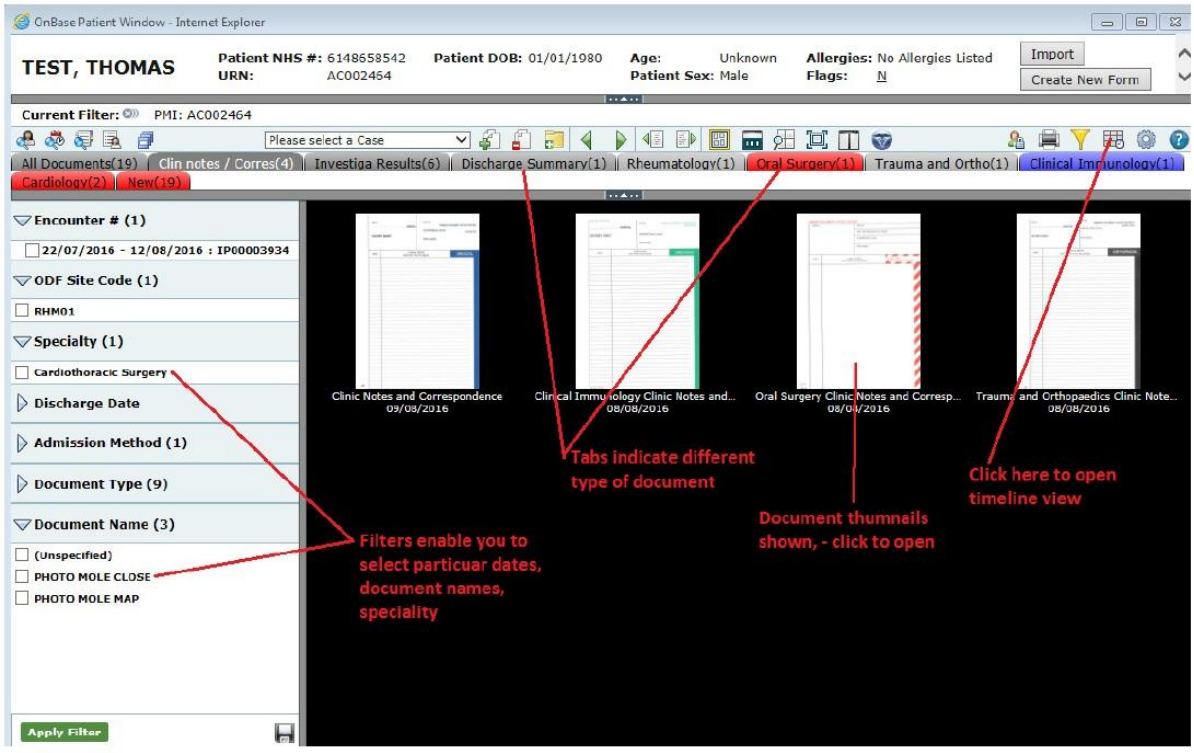



Figure 3. This screenshot of the test interface for OnBase v16 illustrates the substitution of the document lists by thumbnails of the scanned documents. This did not improve the practical communicability of the content as the thumbnails could not easily be assembled into collections that told the clinical story, and they were virtually unreadable in any case.

Meanwhile, the locally developed UHS CHARTS EPR interface was launched in 2016. It collated a series of familiar and proven systems at UHS into a unitary interface with a very clean design. Among other features, it provided:

- Single sign on functionality;
- An interactive user dashboard recording all outstanding tasks for the user;
- Integration of all components of the EPR through Tabs and Application Tiles
- Fast functionality through a common code base for the major elements of the EPR

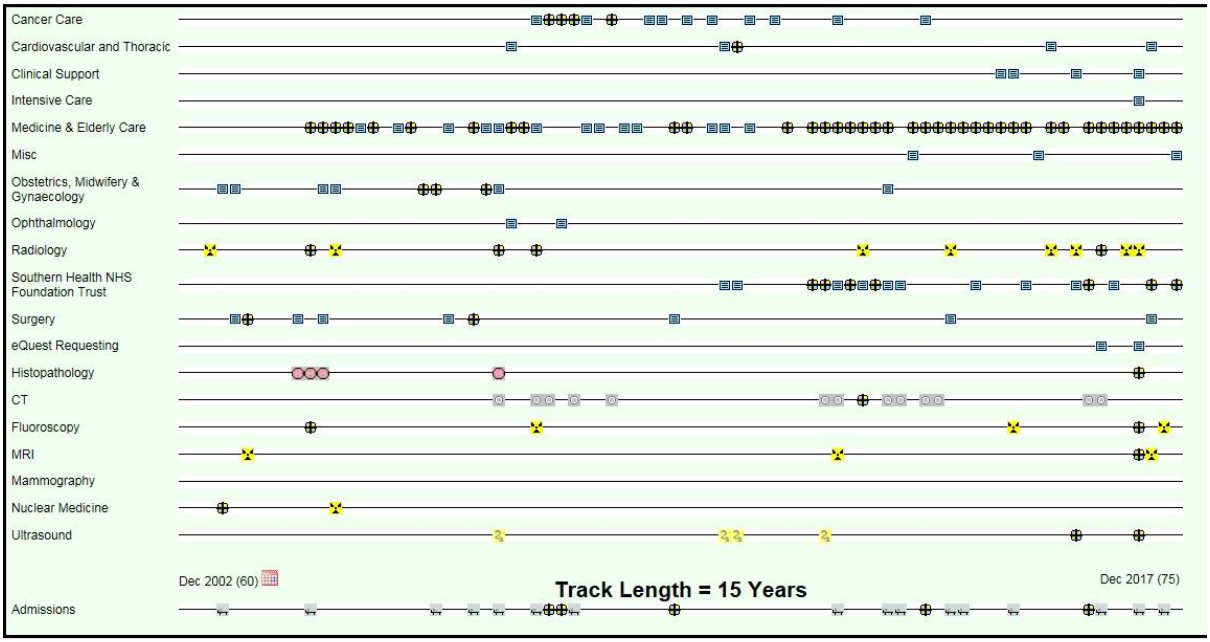





Figure 4. An exemplar screenshot of the intuitive UHS Lifelines interface in CHARTS, in which every icon represents a document or event. The history and functionality of this interface is described in detail in later essays in this series.

**My Direct Engagement with the Hyland OnBase Development Team**

From the outset of the EDMS project, I was deeply concerned at the possibility of the loss of much of the development work that had already gone into the creation of the UHS EPR over the past three decades. In particular, I was keen that if OnBase were to replace the UHS system as the primary EPR, then it should incorporate the transformative development work that we had done on interface design and usability in CHARTS, and in particular our work on the intuitive and integrative UHS Lifelines interface (Figure 4).

I had had a brief introductory and exploratory discussion with the Hyland OnBase team in Southampton in November 2014 about EPR interface design following their presentation, when it had become apparent that their idea for an EPR within OnBase was rudimentary. I continued discussions with Steve Rudland of Hyland on the design features of OnBase pending finalisation of the contract with UHS.

In December 2015, Toby Cave noted that *"The contract that we hold with OnBase is around the implementation of a mature product set (all be it widely configurable), rather than a software development project. I will work on the implementation of OnBase 15, but Ilook forward to implementing any updates and enhancements which arise from your discussions with Hyland".*

**My visit to Cleveland Ohio on August 2016**

In early February 2016, I received an invitation from Lorna Green of Hyland to join their International Clinician Advisory Board to help shape the evolution of their healthcare informatics programme, and to attend a board meeting in Cleveland in August 2016? Adrian Byrne, our Chief Information Officer at UHS, was invited to attend Hyland's Chief Information Officer Advisory Board for a parallel meeting.

Adrian and I visited the Hyland Headquarters in Westlake, Cleveland, Ohio on 23rd August 2016. The Hyland Advisory Clinical, Nursing and Chief Information Officer Boards primarily comprised invitees from the Hyland customer base of major healthcare providers in the USA. Dr Johannes Waktare from the Liverpool Heart and Chest Hospital and I were co-opted to the Clinician Board from the UK.

The Hyland Westlake campus is built in rolling parkland in a converted sports centre and an adjacent modern purpose built open plan building. The site is a short walk from the southern shore of Lake Erie. The large open plan buildings were clearly conducive to collaborative software development. They contrasted dramatically with the cramped and dispersed facilities for the IT team in and around the Old Nurses Home on the Southampton General Hospital site, around which our own development work was done.

I was also impressed by the welcome afforded to us by the Hyland team, and by the depth and breadth of clinical informatics expertise on the Clinician Advisory Board from major US Health Providers, including representation from the local Cleveland Clinic.

I was particularly keen to discuss the design and functional features of the nascent OnBase EPR in Southampton, using our UHS Lifelines interface as a template. I therefore spent time with the OnBase developers in Westlake in discussions about the functional and visual integration of CHARTS, eDocs and OnBase. It was clear that there was much work to be done to improve the OnBase interface, and we made useful progress in the discussions.

I suggested to Adrian in October 2016 that we might explore a joint Clinical Software Development Centre in Southampton between UHS and Hyland, who did not as then have a significant presence in the UK Health Informatics Market. It was clear to me that the Hyland development team had had little opportunity to engage with the clinical end users of their intended informatics systems in practical workplace settings.

A partnership between Hyland and UHS Southampton that extended beyond a supplier-customer relationship might therefore provide an opportunity to catalyse a productive development sandbox for information technology at UHS. The proposal gained no real traction.

**Developments with the EDMS Programme in 2017**

Work at UHS continued through 2017 on the scanning programme, to integraten the upgraded OnBase Version 16 to the UHS Clinical Data Estate. However, our efforts to adapt a usable subject taxonomy to a suitable interface design were proving to be much more challenging than had been anticipated.

Toby Cave noted that “the OnBase test system contained 405 permutations of document types, eight file formats and 11 methods of document ingestion. The mapping of the documents from eDocs, eDocs attachments, the Hospital Integrated Clinical Support System (HICSS) and the eDocs archive of 15 Million historic documents, along with the newly bar-coded and scanned documents was proving to be very challenging.

In consequence, there were now legitimate concerns about how the interfaces in the OnBase EDMS would look and feel to the end user, when compared with those with which users were familiar in eDocs, and how this would impact upon safe and efficient working. I noted that:

- Robust, agile end user research was still not built into the design of the new system;
- The OnBase interface did not provide a satisfactory overview of the system content;
- The 2017 timetable for completion of the transition was far too ambitious.

I recognised that pressing the case with the EDMS SG for delay and reconsideration might well prove unpopular in certain circles when so much effort, resource and expectation had already been invested in OnBase. However, I was convinced that a constructive counter-proposal was the correct approach.

By the 16th March 2017, it was clear from trials with the Hyland OnBase v16 test interface that the early plan to merge eDocs into to the OnBase platform would not work as intended. The OnBase clinical interface was so suboptimal in terms of design and end-usability that it created a significant threat to efficient clinical service delivery at UHS. It was also clear that these design constraints would take considerable time, commitment, intelligent and possibly costly programming to address.

The data model which I had drawn up for Toby Cave (Figure 5) had increasing appeal. In this model, the OnBase EDMS would be subservient to the CHARTS EPR interface, which would remain primacy by virtue of the evolved utility of its component systems. e-Docs was a mature clinical tool. It displayed critical documents (letters, discharge summaries, operation notes) but it did not needlessly capture or display the mass of "transient" documentation which has little clinical value from soon after its creation and usually after the discharge of the patient from hospital.

In any clinical record system, documents of "transient value" (eg fluid and stool CHARTS) soon outnumber "critical" documents by a ratio of up to 10-20:1. Any attempt to display all such documents in real time systems would flood the user with trivia and impose a massive time penalty on the clinical user.

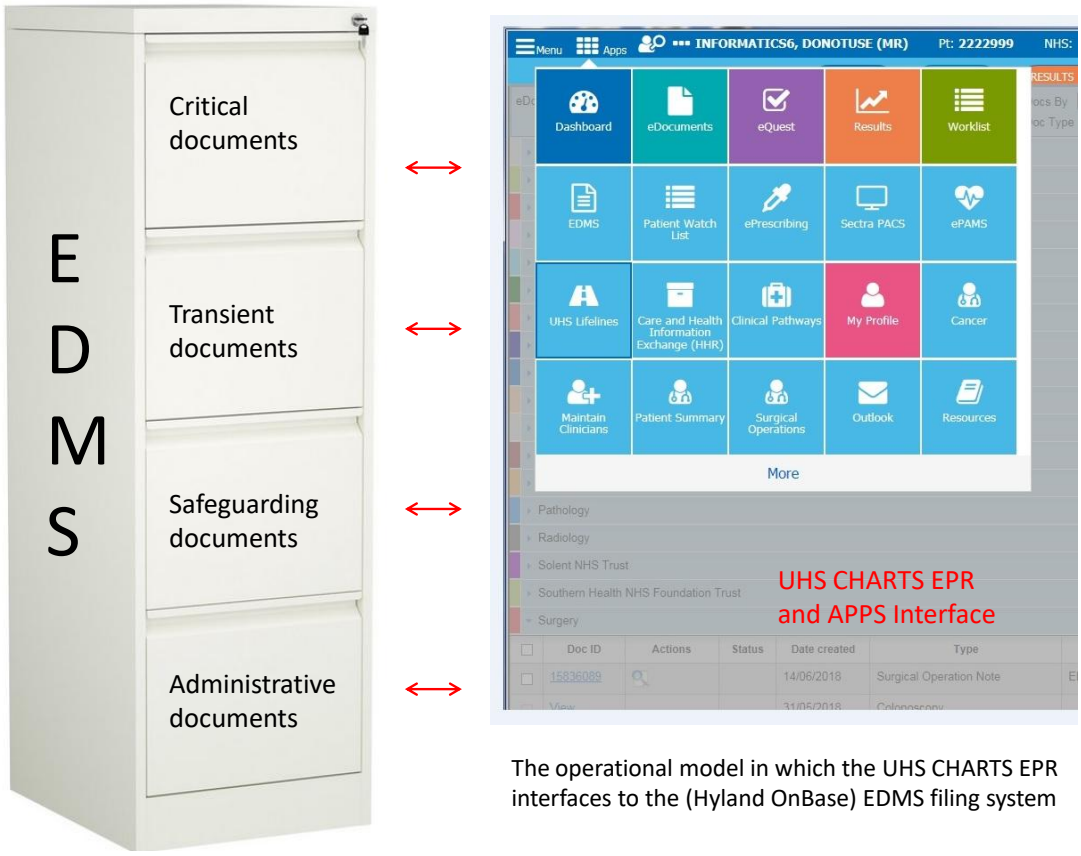



Figure 5: A simple utility-based classification of documents for filing in an EDMS, and its relationship to the primary CHARTS UHS EPR Interface (image: the author)

The timetable for scanning and for the migration of eDocs content into OnBase was already slipping. The process was also generating separate document collections for any one patient from those in eDocs. This created additional clinical risks and delays. Derek Waller noted that *"once data migration is complete, we need to ensure that important clinical information that is only held in EDMS is readily accessible to all."*

In October 2017, the problem with severe electronic delays (latency) in importing documents into eDocs from OnBase crystallised for me during a Breast Multidisciplinary Team meeting, when I tried to open a set of documents from OnBase. It took 20-30 seconds to open each document, thus seriously impeding the progress of the meeting.

A hyperlink icon had been placed in the CHARTS interface to access the OnBase documents, but the link was very slow and the user was then faced with a complex search in OnBase, which had a different interface design from the OnBase Patient Window (OPW).

There were problems with the eight local web servers at UHS and an intermittent speed issue in opening OPW from CHARTS. This problem was difficult to isolate and fix, and the solution would involve OnBase, UHS software, network and server issues.

Separately, Michael Kraft of Hyland, with whose team I had spent time a year previously in Westlake, advised me of improvements to the OnBase interface design. He informed me of a re-design of the OPW, in which his team had adopted the software package vis.js for its Timeline View. Vis.js is an open source, community developed, browser based visualisation library. However, it still did not offer the functionality of UHS Lifelines, and it had no design commonality with the CHARTS EPR elements.

Regrettably, even the modest proposal to repurpose OnBase as a document storage system without an endogenous EPR was stymied by the difficulties in recalling documents from OnBase into CHARTS. OnBase was still not able synchronously to open documents or to display the patterns of documents in clinically usable and safe formats . In test runs, it was still taking many seconds to open OnBase documents (if at all) during clinics and in other use cases. This was seemingly in consequence of challenges with proprietary coding, document exchange, authentication and security protocols.

In late November 2017, colleagues highlighted problems in logging in to EDMS from CHARTS, and the slow speed of EDMS. One notted that *"I tried to search for anaesthetic CHARTS in the section in which I expected to find them in – and nothing came up."*
Another colleague noted that:

- *OnBase is too slow... For some reason accessing server 16.0.0.20 takes ages...*
- *Is it running a script that is slowing things down, or is it a server issue?*
- *This occurs whether CHARTS or EDMS Auto login is used.*
- *It does not feel like a network issue but I cannot be sure.*
- *The loading of the thumbnails for patient XY took about 30 seconds!*
- *This happens repeatedly when refreshing or changing views.*
- *The thumbnails are unreadable, even on a widescreen 24 inch monitor.*
- *The "Full Text Search" returns an error"*

In late 2017, I noted with relief that other clinical colleagues were also articulating the view in EDMS meetings that eDocs should continue to be used, with OnBase developing in parallel as the "filing cabinet". In this revised model, the scanning process via OnBase would directly feed the "critical" documents into the familiar subject specific tabs in eDocs, while the "transient documents" (TPR, fluid, stool CHARTS and so on) would be retained but retrievable from OnBase for occasional uses such as medico-legal or research purposes.

Derek Waller reported on 23rd November 2017 that *"The roll out of our new EDMS has begun with the Maternity and Women's Health Care Group at the Princess Anne Hospital. To date we have scanned over 90,000 records and are scanning several hundred new records each week. ...*
*The business case for the EDMS depends on closing the records library at the end of 2018....eDocs will continue to display letters, discharge summaries and similar documents; Scanned records are visible in the EDMS and eDocs, but the EDMS will not be a complete record until all data is migrated from eDocs".*

Nevertheless, new problems became apparent with the EDMS/CHARTS interface. CHARTS itself was now running very slowly, with document load times of up to a minute. Key documents in EDMS were not being flagged up in eDocs/CHARTS. If and when such files were found, there was no easy way to link the document to eDocs other than to print the document out in EDMS, which wholly defeated the purpose of the system.

The case for slowing or pausing the EDMS roll out programme while these critical issues were sorted out was becoming compelling, and Adrian Byrne temporarily suspended the integration element of the project in December 2017.

**A Second Visit to Hyland Headquarters in Ohio in January 2018**

In January 2018, Adrian Byrne and I were invited back to Cleveland for a further meeting of the Hyland Advisory Boards. On 22nd January, we visited the Metro Health Public and Emergency Care Hospital for North East Ohio at the invitation of Dr. Jonathan Siff, Associate CMIO, at the hospital. We discussed the challenges of clinical informatics at length. We

visited the Emergency room and talked to junior doctors who were using the commercial EPIC software system (Epic Systems, Wisconsin) in their duties.

At the Hyland Advisory Board Meeting on Wednesday 24th January 2018, during a discussion about optimising EPR interface design, the Chief Clinical Information Officer of the Cleveland Clinic memorably observed that:
*"On average, my clinicians have seven minutes per outpatient consultation. I estimate that they spend five of those seven minutes chasing up and collating key clinical information*."

I also held further productive technical discussions In Cleveland with the OnBase development team, with whom on line discussions subsequently continued. We were visited in Southampton on Friday 25th May 2018 by Mike Ullinger and Jason Wissman from the OnBase development team, during which we took the opportunity to demonstrate the CHARTS, eDocs and Lifelines systems in vivo.

On Monday 17th September 2018, Jason contacted me with a series of images of design updates to OnBase Version 18. He noted that "The timeline is updated with smooth and interactive panning / zooming, and the visual design of the control has changed to represent documents as points along lines (similar to Lifelines)". He forwarded some screenshots and a presentation to illustrate the User Interface changes in OnBase v18, examples of which are shown in Figures 6 and 7.

The OPW interface was much improved and simplified. Jason noted that the biggest remaining differences between UHS Lifelines and OPW 18 are:

- The ability to use icons to represent content on the timeline in Lifelines;
- Grouping documents with distinct icons rather than numbers in Lifelines;
- Opening documents directly from the timeline in Lifelines.

However, the fundamental difference lay in the ability of UHS Lifelines to map out the relationships between documents at a very granular level by days and hours rather than months, and to navigate around the interface ad lib. It appeared that there were persisting technical constraints to integrating the systems which I still did not fully understand.

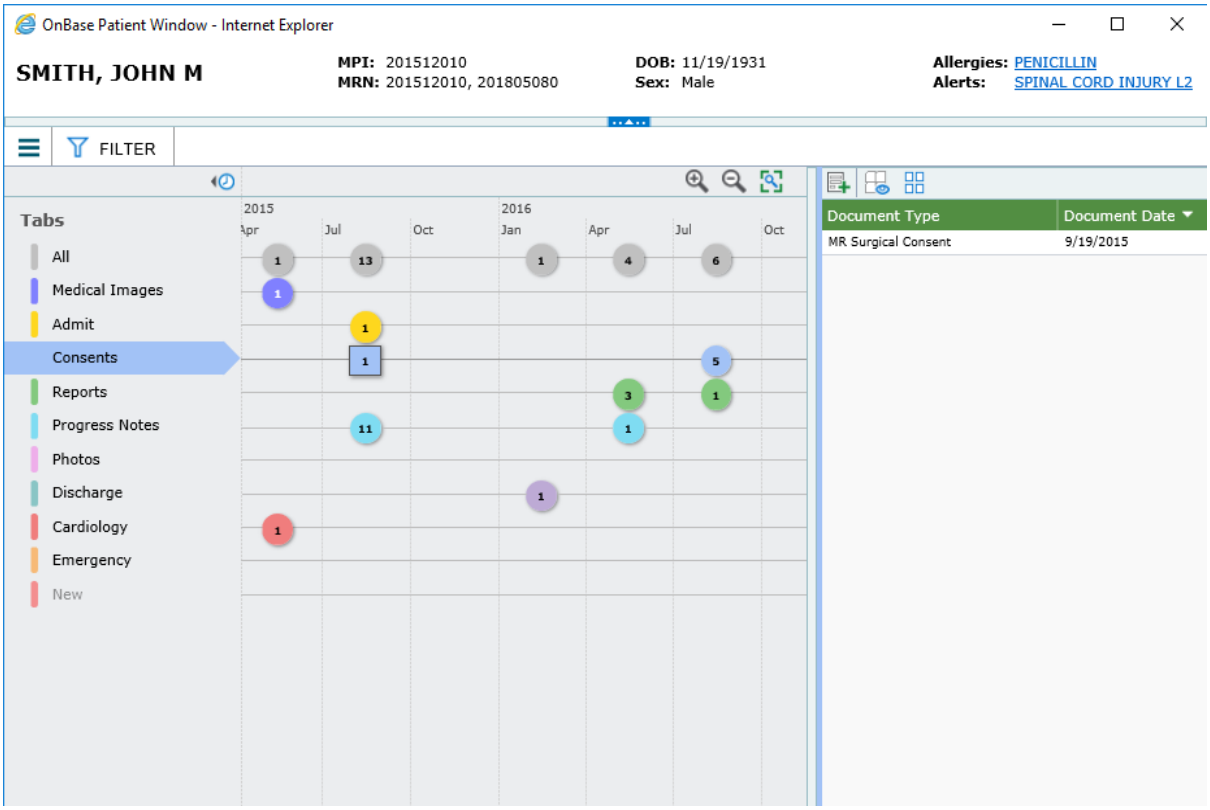



Figure 6: a test screenshot of the Timeline view in OnBase 18, September 2018

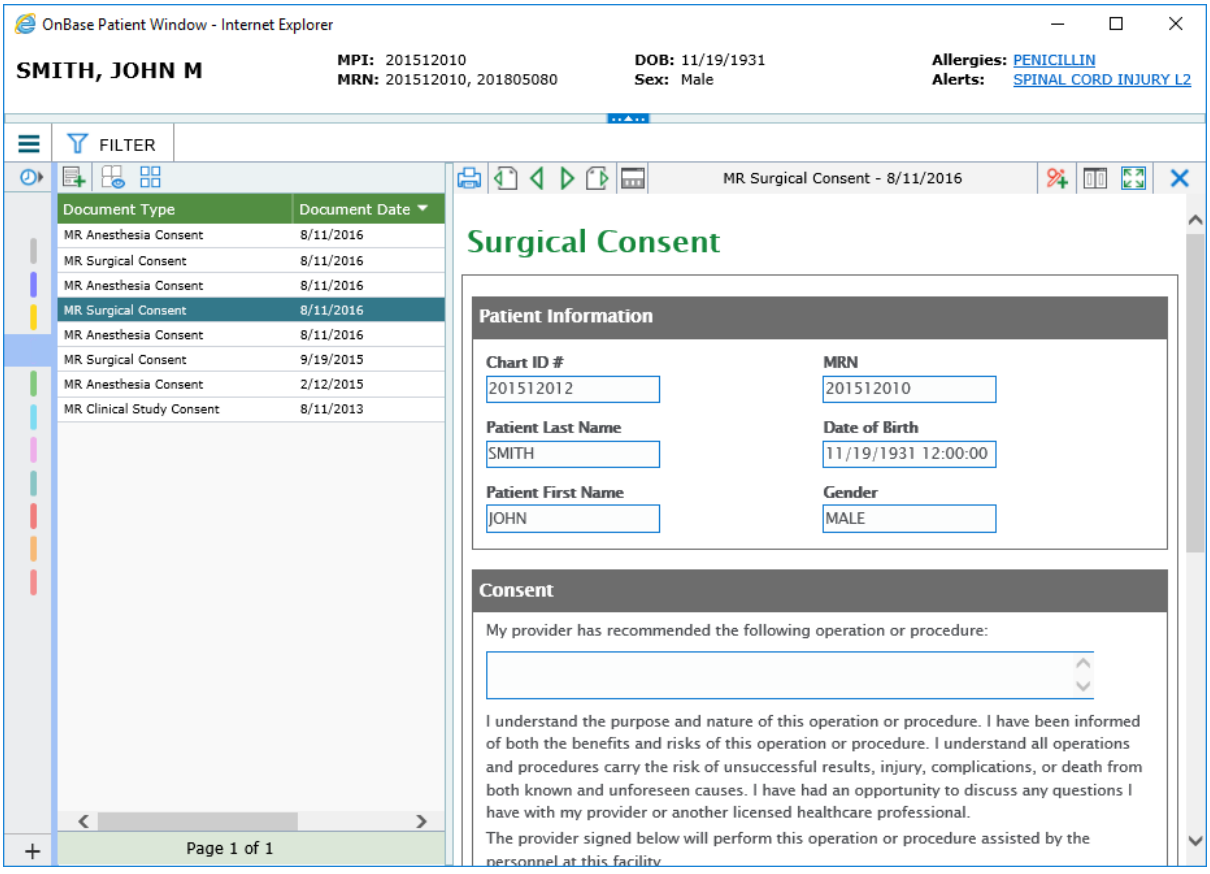



Figure 7: a test screenshot of the Document view in OnBase 18 September 2018

**Developments with the EDMS project at UHS through 2018**

In 2015, the expected demand for prospective scanning of all new clinical paper output for In- and Out-patients for UHS had been 23,000 documents daily. However, by 2018 the daily volumes of demand were closer to 30 000 sheets of paper. Plans were developed to address the growing backlog of scanning work, by:

- Reducing the duplicates in paper sent for scanning;
- Speeding up scanning through better document organisation;
- Better indexing of documents by function (eg admissions, history and theatre sheets);
- Outsourcing the work to additional specialist providers.

The problems which had been accumulating during 2017 with the launch of the EDMS were causing front line clinicians increasing concern. I summarised my own concerns about the strategy in an email of 13th January 2018 to members of the EDMS SG, as follows:

*"... Three months of increasingly challenging testing of the OnBase launch on the clinical front line at the PAH have highlighted the need for strategic clarity, clinical safety, service efficiency and common sense around the EDMS programme, as it affects the true end users. It is clear that some of the basic assumptions that we made about the integration process now need to be wholly reassessed.*

*From the clinical user perspective, it is essential to have one trustworthy, absolutely reliable data interface as the master (EPR) reference system for all documents and records in a busy clinical service. In simple terms, the system is presently too risky and costly to permit continued use without a radical rethink. (I suggest that) CHARTS remains the only game in town for this purpose for the foreseeable future.*

*In contrast, Hyland are new to this particular requirement, their expertise being in document e-filing and emphatically not in clinical interfaces. We were mistaken to assume that the EDMS programme would produce a seamless transition from CHARTS to a new interface and operating system, which is being built by IT specialists with different expertise. At the Princess Anne Hospital, we are now required to work off two interfaces (CHARTS & OnBase) which are storing different sets of documents; where the links are so slow in practice to*

*make the system unusable; and where the subject taxonomies are not harmonised. Moreover, the dependence upon a scanning team of image capture technicians means that real world delays and filing errors are creeping in. Documents are not being made available either in paper or electronically when needed in a fast moving clinical service.*

*In the CHARTS-dominant model, all documents which we have classified as critical in clinical operational terms (outpatient letters, discharge summaries, surgical and anaesthetic notes etc) will be made available in e-Docs rather than as OnBase documents. This eliminates the need either to access the OnBase documents via additional e-permissions during busy clinics, or to bypass the inaccessible documents completely.*

*I understand from a discussion with senior IM and T staff that such a solution is possible without loss or wastage of work already done. Using this model, the EDMS programme will continue to act as the e-filing cabinet (e-Nursling if you like) for the transient documents which will rarely need to be looked at again, but which can be when the need arises.*

*In order to maintain record integrity, eDocs can be back-loaded into EDMS "off line". This may produce some duplication of documents in the EDMS master file, but such minor impurities should be an acceptable price to allow clinicians to do their day job safely and efficiently. If we get this right, we can still end up with a national exemplar system, but the Facts on the Ground have now changed, and so, I suggest, should the Plan".*

On 16 January 2018, a colleague on the EDMS SG observed that:
*"If you are looking for a particular document, and it has been scanned with the correct description, the system works well and quickly. ... However in one case an (important) chart appears not to have been scanned in, so i decided to search for it in the documents. This aspect proved impossible and this is where the limitations of the system appear.*

*I also note that there is no chronological list of documents. The documents are labelled and tagged in small sections under one date, so these sections cannot be reconstructed to one chronological overview.*

*Therefore, getting useful information from an inpatient episode is laborious and would probably entail printing out 10-15 different subsections and trying to piece them together. This is not how I envisaged a paper-light system. In the matter of small sections or clusters of records, even the inpatient medical notes were split up into multiple sections because patient was seen by multiple teams from different specialties. You therefore have to open up each section separately for 1-2 pages (and usually in wrong order) to understand what is going on.*

*Moreover, we have not properly prepared the printing of bar-coded headers on hospital documents. Importantly, Anaesthetic CHARTS are not currently bar-coded, so there is a significant chance that they will not be scanned into the correct hierarchy.*

*Sadly, I do not believe any retrospective (old notes) scanning will ever result in adequate ability to search for relevant documents. On some patients I also struggle to find information in eDocs when there is a pile of clinic appointment letters and useless information with 100 documents under one specialty. I can imagine it will become quite unwieldy with even more. I am not therefore convinced that your suggestion of using eDocs as the solution will solve the problem, because most of it is a scanning issue on top of the limitations of OnBase".*

**The EDMS Project Review of February 2018**

Such concerns from various quarters led Jane Hayward, the UHS Director of Transformation to request a review of the EDMS project in February 2018. Jane noted that the feedback which had been more widely noted with the EDMS Project included such comments as:

"Delays in the scanning process"

"Delays in immediate access to case notes"

"It is not easy to find things in the system ..."

"The 3 page cardiology admission assessments are being scanned onto the system in the wrong order. This creates a serious medico legal risk"

"Drawings from surgery need to be scanned into eDocs rather than straight into the EDMS"

"The (slow) speed of the system impacts on the cognitive flow of the consultant".

"List view is more useful and quicker than viewing document thumbnail images"

"Improvements needed to document management in the Pre-assessment process"

"Procedures are needed for the disposal of paper records post scanning"

"The Steering Group currently does not have adequate oversight of the project"

"Improved communications and user feedback are needed"

The outcome of Jane Hayward's Review and the Action Plan was reported to the EDMS SG on the 27th February 2018. She recommended a return to scanning clinic notes directly into eDocs until the information flow issues between OnBase and eDocs had been resolved,

**The Conclusion of the First Phase of the UHS EDMS Project in December 2018**

On 31st December 2018, Toby Cave thanked the EDMS SG team for their support throughout this major transformation in his final "Highlight" report for the first phase of the project. He noted that the EDMS team would continue to work with Care Groups to help optimise their use of the EDMS and then move on to develop the EDMS functionality.

The EDMS implementation team were pleased to be able to report that the first phase of the EDMS project from 2014 to 2018 had achieved the following:

- The Health Records Centre at Nursling had been closed;
- The Hospital Scan Bureau was now scanning 30 000 sheets of paper each day;
- All UHS care groups were live with the EDMS;
- Un-scanned case notes for inert records had been moved to offsite storage.
- By 2019, 150,130 historic case notes had been scanned
- 1,036,443 case notes remained in offsite storage.

**Developments in 2019: Phase 2 of the OnBase EDMS Project**

The programme brief was released for Phase 2 of the EDMS Project in January 2019,. The Strategic Vision remained the comprehensive digitisation of healthcare at UHS. Information would be recorded in real time during clinical contact with patients or soon after. Electronic workflows would streamline the patient journey, improve information sharing and improve the experience of patients and staff, but the optimisation of the OnBase EDMS was still incomplete.

There were a number of processes which did not easily transfer to the new EDMS standard operating procedures. These included:

- Anaesthetics - Anaesthetic record availability;
- Maternity Record Scans and Maternity liaison forms;
- Child Health Records;
- Migration of historic Emergency Medicine Casualty Cards to EDMS;
- Linkage of newly acquired software systems to the EDMS, including;
- The MetaVision® Patient Data Management System from IMDsoft for Critical Care;
- Nursing Observation recording in e-PAMS;
- The electronic Patient Acuity Management System from IMDSoft;
- Metavision Safetrack for the electronic collection of nursing observations.

Phase 2 of the OnBase EDMS project was intended to achieve the following:

- A single point of access (via CHARTS) to all of the documents relating to patient care.
- Electronic forms to reduce duplication of data entry to the EPR.
- To improve clinical decision making and efficiency.
- An e-Referral pathway with consent and pre-assessment for clinical procedures.
- Improved theatre and bedside documentation.
- Improved management of Subject Access Requests for solicitors and claimants.
- Better links to GPs and to the Hampshire Health & Care Information Exchange CHIE.
- The development of a common dataset based on SNOMED CT, be used with eForms.
- The launch of an eForm from the Outpatient worklist in CHARTS.
- The re-use of data items that were captured in nursing care plans.
- The digitisation of physical therapy services at UHS.
- Improved information management for local Mental Health Services.
- A Fractured Neck of Femur (FNOF) pathway.
- The recording of Clinical Genetics data at the Family level with a “family ID”.
- Closure of the medical photography department.
- Management of the upgrade to V18 of the OnBase system.
- Training in house UHS staff to build applications within OnBase.
- Non clinical uses of the EDMS (eg Human Resources) remained Out of Scope.

**Significant risks to the programme in early 2019 were perceived to include:**

- Insufficient devices (tablets, desktop PCs) for full digitisation;
- Imperfect alignment of the functionality between the EDMS and EPR;
- Management of the changes among hospital staff;
- Supplier costs of the EDMS;
- Excessive complexity of the project;
- Process complexity in specialist fields such as Clinical Genetics;
- Authentication errors and speed problems.

In March 2019, Toby reported that: "we still have some serious work to do to make the EDMS work for clinicians. Specifically, we need to address the delays in forward scanning: We have also identified five separate technical areas where problems exist. These include:

- OnBase Patient Window OPW error functions when trying to open it from CHARTS;
- The slow speed of opening OPW from CHARTS;
- Authentication issues (ie the EDMS does not log you in);
- Inability of eDocs to load OnBase documents;
- OPW is opening PNG image file formats slowly;
- The eCamis clinical viewer displays a catastrophic error message;

We are working with suppliers EMIS, Hyland and Microsoft to recreate the issues on a test bed where we can record diagnostics and error logs".

On 5th July 2019, Toby sought clinical advice on which document filter items and display columns should be used in the new version of OnBase. The OnBase Version 18 interface had been simplified and "de-tabbed", as I had discussed with the Cleveland team, and it was now looking somewhat more coherent. However, we still had to aim for a single user interface which was based around CHARTS, such that OnBase 18 would become:

- Invisible in general use;
- Synchronised in document subject taxonomy with eDocs/CHARTS;
- Harmonised for seamless movement between the systems;.

However, It appeared to me that Hyland was still locked into the single document retrieval process, rather than embracing the the **patterns** and the **temporal relationships** in the

documents which are critically important to the user experience and efficient interaction with the EPR. Collective agreement on the design and operational principles which would guide future development work on the common EPR had now become urgent.

On Monday, November 18, 2019, Michael Celinski generously wrote to me in his new role as joint Chief Clinical Information Officer to say that:
“As you are aware, there are plans to go paperless on the wards by December 2020. It is do-able, but we must get the interface right... glad you are still involved to discuss”.

I replied that “... there is much to discuss at a strategic level and a lot of innovation work still to be done... we now need to move on and look robustly at a range of issues, including:
a. process optimisation in the generation of clinical data across the Trust: what is needed, what is not needed, and what is duplicated across multiple systems and thus suitable for an "enter once, use more often" approach

b. Simplification of all pathways and processes in the use of Trust systems

c. Standardisation of the document and data taxonomies, and the look, feel and inter-operability of all systems across the Trust with open design standards.

d. Integration of other Trust systems including the Aria and Mosaic cancer care systems.”

**A summary of the programme through 2019**

Through 2019, it had become clear that the ambition to use the Hyland OnBase EDMS as a complete solution for the UHS Electronic Patient Record had been unrealistic. A series of practical concerns about the capabilities of the OnBase EDMS crystallised in the realisation that OnBase was not going to be able to deliver on the initial ambition to replace the existing eDocs document management system or the CHARTS EPR. However, by the end of 2019, the OnBase EDMS was sufficiently well embedded at UHS as a document storage solution to justify the expenditure to date.

Meanwhile, the bespoke UHS CHARTS system had gone from strength to strength as a prime EPR system. The trust thus ended up with a hybrid and suboptimal document management solution comprising two bespoke systems with different design philosophies rather than a truly unitary system as experienced by the end user, but the primacy of CHARTS had been preserved.

Derek Waller retired, and Toby Cave's skills were redirected to other projects. The EDMS Steering Group was disbanded. Hyland reorganised the Clinician Advisory Board on a Regional basis in 2019, with a London based EMEA (Europe, Middle East and Africa) Board for Chief Information Officers which was primarily focussed on imaging solutions and technical issues which fell outside my expertise. I was invited to join the new Board but I did not feel that I could usefully contribute time and expertise to it.

Soon afterwards, the Covid pandemic redirected the attention of the IT Teams to more immediate challenges. The dispersal of the members of the IT department to home and online working disrupted the face to face engagement which has proved so powerful in the development of the UHS EPR.

**The state of the "Go Paperless" strategy in the NHS in 2020**

By 2020, national progress to Jeremy Hunt's "Go Paperless" target of 2013 was still very patchy. Our own experience in Southampton was a microcosm of the national picture.

In November 2020, The UK House of Commons Public Accounts Committee reported on the state of digital transformation in the NHS. It concluded that:

*"Digital transformation of the NHS is a huge challenge due to the vast array of IT systems, many of which are out-of-date legacy systems that cannot easily interact with each other.*

*The Department's previous attempt to reform how the NHS uses IT, running between 2002 and 2011, was both expensive and largely unsuccessful. We are therefore alarmed at how little progress has been made against current ambitions.... The Department published its digital strategy in 2014 and in 2016 it set up the Digital Transformation Portfolio to deliver the strategy....*

*Improving digital services is at the heart of delivering the NHS Long-Term Plan but remains a huge challenge to deliver.... The Department did not achieve a 'paperless NHS' by 2018, and this target has now been watered-down and moved to 2024.*

*We are far from convinced that the Department and NHS bodies have learned the lessons from previous IT programmes. Without this, they risk repeating the mistakes that led to those programmes failing to deliver and taxpayers' money being wasted.*

*Successful delivery of the digital ambition for the NHS will require effective governance, realistic and detailed plans, sufficient investment nationally and locally, and clear accountability...*

*Despite publishing its Vision for digital, data and technology in 2018, the Department still does not have an implementation plan for how this will be delivered in practice. Current governance and accountability arrangements are both overly complex and insufficiently defined".*

**Clinical Reflections on the Hyland OnBase System from 2020 to 2024**

Between 2020 and 2024, the OnBase project yielded a number of incremental improvements to document management at UHS, and the digital transformation programme was significantly advanced. However, the alignment of the eDocs/CHARTS and OnBase systems remained fundamentally dissimilar, and it did not ultimately prove possible to secure a seamless and "invisible" solution to information exchange.

Moreover, for reasons which were lost in the technical thicket of authentication rules, it did not prove possible over this period to achieve real time recall of documents which were stored in OnBase into the UHS EPR. Delays of 20 seconds per document were commonplace, as were loading error messages.

In June 2024, I reviewed the project with colleagues who had been closely involved with the EDMS SG from the outset and who remained involved with the UHS digital programme in the summer of 2024. Feedback included the general observation that:

*"The system has never really worked as hoped".*

*"It over-promised and under-delivered."*

*"Clinicians really disliked it because it was easy to put data in but difficult to get data out"*

*"We thought the metadata methodology would work but it did not"*

*"The search function was awful"*

*"We identified the need for Optimal Character Recognition (OCR) early in the development process, but it was never implemented"*

*"An excellent repository of data in theory but in practice, anaesthetists could not readily find anaesthetic CHARTS records, despite their importance to clinical practice*

*"Toby Cave helpfully built some filters but data retrieval never fully improved"*

*"OnBase took too long to load, and the OnBase e-Forms were overly complex"*

*"Conversations with Hyland have continued, but we have never fully or satisfactorily resolved the issues".*

**Adrian Byrne's reflections on the Southampton EDMS project in May 2024**

Adrian retired as Chief Information Officer at UHS following a career at the helm of the UHS digital programme for some 20 years. His career spanned the entirety of the EDMS project. He and I had enjoyed many debates and exchanges over it. Many lessons on IT contracting, project management, system development and software specification were learned, relearned or reinforced. Adrian kindly contributed the following reflections on the project in his unique style:

*"This account will need some cross referencing with the thoughts of other colleagues...*

*- The plan for the Hyland OnBase EDMS has certainly changed since its inception. We had thought that the OnBase document folders would be used more than they have been.*

*- We thought we would use the software clients (of which there are many) but we ended up using the direct interfacing that was developed by Alan Hales for UHS Lifelines.*

*- I have learned is that it probably doesn't matter what specifications that you put in a plan at the outset: it is a bit like buying a toy for a cat. You end up throwing the toy away because the cat preferred the cardboard box that it came in.*

*- All software products suffer from a range of mutually exclusive options. In a specification (for a commercial software system purchase) you ask if it can do this and that and the answer is always yes. Then you make a choice about a set up (a system configuration) that prevents you from doing something desirable.*

*- Supplier project teams don't seem to understand this problem and they let you fall into traps. We expected to use the Hyland OnBase Forms tool much more, but there are things in the software set up and operation that meant we kept running into trouble.*

*- The list of such problems is extensive: Workflow, triggers, things that need signing and then need signing again, partial and final data collection, database items versus text items, things that are already collected elsewhere...*

*- In Hyland OnBase, we deliberately bought a product that is mostly used behind an Electronic Medical Record (EMR) such as the commercial EPIC system. I advise many NHS IT people not to attempt an EDMS project unless you're already largely paperless, especially in outpatients. Otherwise you end up running a costly scan and print service. The EDMS alone does not take you paperless.*

*- The end of the contract with Hyland for OnBase is now not too far away; I believe that the next iteration of an EDMS needs to bring in regional partners which could include Hampshire Hospitals Foundation Trust (Winchester and Basingstoke, HHFT), Portsmouth University Hospitals and the Isle of Wight. This would (hopefully) justify the new business case.*

*- Money also dictates strategy as it continues to be targeted at specific targets. This is a general problem and you are constantly diverted by funding imperatives".*

Adrian also provided this diagram to summarise his thinking about the problems of funding a digital strategy for a hospital. He has plotted the available funds against essential system maintenance and desirable enhancements, while accounting for cost drift from new technical developments and the need to maintain momentum with a programme.

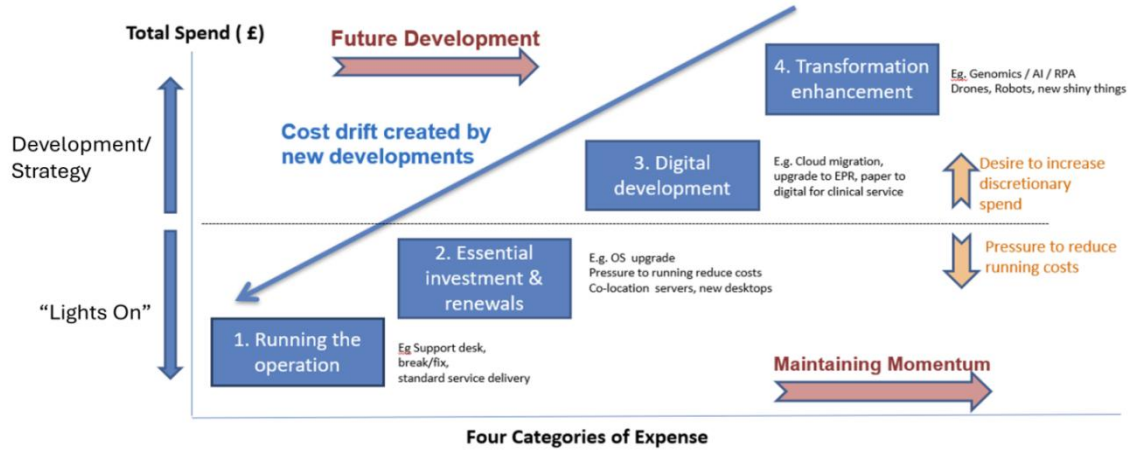



Figure 8. The cost of the digital strategy (Image courtesy of Adrian Byrne: see text)

**A Media Perspective on the NHS "Go Paperless" Mandate in 2024**

On 11th March 2024, Sarah Dawood, wrote in the New Statesman periodical, that: "*The government is running before it can walk on NHS digital transformation",* and she asked *"why is the Chancellor focusing on artificial intelligence when doctors can barely log into their computers".... the government has promised this grand transformation before, yet the NHS remains woefully behind on its digital proficiency.*

*Ten years ago, when Mr Hunt was health secretary, he promised to make the NHS paperless by 2018. This target was missed, and Sajid Javid, in his tenure as health secretary, then set a new target of 2025. In July 2023 this was declared unachievable by the government's Infrastructure and Projects Authority.*

*Today (in 2024), 71 per cent of NHS trusts still use paper records to some degree, with patient notes and drug charts being particularly analogue. Four per cent of trusts are completely paper-based, meaning they have no electronic patient-record system....*

*Doctors and nurses have told me of the infuriating technological hurdles they face, and how these woefully inadequate systems hinder them from being able to do their jobs properly. This includes being unable to log on to a staff computer for 40 minutes; struggling to share patient notes between teams; squinting to read other doctors' scrawls on blood sample labels because their department doesn't have a working printer; and sifting through chaotic, bedraggled stacks of patient notes with no semblance of order or organisation".*

**My Reflections on the UHS EDMS Project, 2013-2024**

I was privileged to have a ringside view of this project. I have sought in this Essay to capture the key lessons and experiences of those involved in order to assist others in healthcare who may yet go down this route in future. The UK Government strategy had worthy ambitions in radical digital transformation of the UK Healthcare System, but once again it failed to reflect the complexities of clinical records and the deep embedding of health records in paper for all UK citizens who were born in the 20th century and for many who have since been born.

UHS was obliged to follow the funding money and to accommodate central government directives. Given the history of in house innovation and adaptation in IT matters, it was reasonable to hope that UHS would be able to make a good fist of the mandate.

OnBase was adopted by UHS as an established enterprise document management system for commercial applications, but it proved very difficult to align it to the successful UHS EPR strategy, or to the proven document and reports management and visualisation tools in CHARTS, eDocs, eQuest and UHS Lifelines.

When the Hyland team pitched for the UHS contract in 2014, all parties to the contract under-estimated the complexity of a project with complex practical needs. Critically, safe clinical decision making derives from the patterns in the information over time and across multiple body systems and interventions, rather than by individual documents and reports.

The design and real time functionality of the OnBase user interface was therefore as important as were the technical specifications for the labelling, authentication and speed of recall of individual documents in the database.

It became clear from the early in the project that OnBase in its various versions would not display documents in a format that was simple and logical to navigate, and the overly detailed classification was impractical to use. However, we had already solved this problem of EPR design during the development of the UHS Lifelines system from 2010 onwards, as described in the following essays in this series.

Despite our collective best efforts, the vision of seamless interoperability between OnBase and the UHS CHARTS systems through a common interface design, and through integration and functionality between both systems was never fully realised.

There were nevertheless many positives to draw from the programme. From the human resource perspective, the creation of an informed, robust and eclectic project steering group at the outset of the programme secured a diverse range of skills and insights, and there was a willingness to engage with constructive and evidence based criticism in the identification and adaptation to major risks, problems and avoidable costs.

This ensured that the key operational objectives were met in terminating the Nursling Records Warehouse; in developing a robust digitisation and transition plan for paper to digital records; in protecting the substantial investment in the commercial Enterprise Document Management System; and in preserving and further developing the unique UHS CHARTS EPR.

The Hyland team also proved to be accommodating and collegiate within the formal constraints imposed by cost and contract. The opportunity for Adrian and me to visit and work with them in Cleveland was generous and pragmatic , while we made contacts in the informatics environment of US Healthcare.

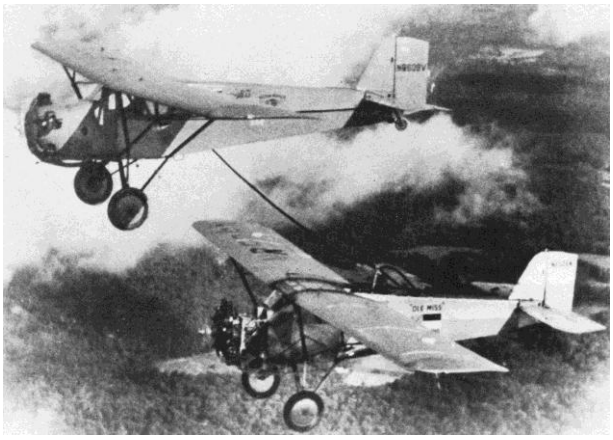
**Paper and the Law of Unintended Consequences in NHS Digitisation**

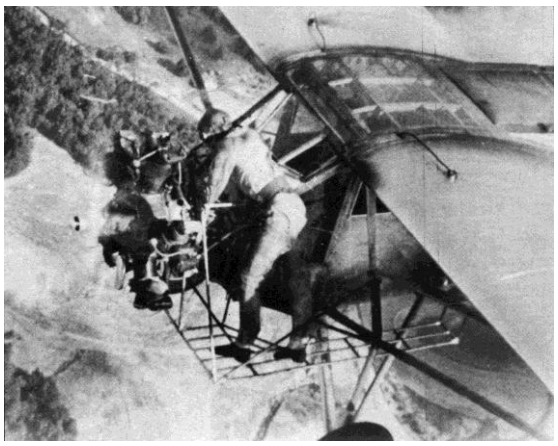
The enduring lesson for Corporate IT developers in Healthcare is never to underestimate the complexities of Coding for Health, or to underestimate the importance of relentless engagement with the true end users of  systems from the outset of any such project.

Those who were around and following the early computerisation of society in the 1970s and 1980s will recall the earnest expectation that the digital office would eliminate paper. While this nirvana may have been reached in the best managed businesses and organisations, unstructured document proliferation has generally been allowed to run riot across UK health systems over generations. The effective digitisation of healthcare systems therefore remains elusive and a work in progress in the mid 2020s. Equilibrium may well yet be

reached in health information systems where paper finds a continuing role in “paper-light” rather than “paperless” solutions.

Regrettably, the design of health informatics systems continues to be markedly suboptimal. Anyone who has ever done a case review or a medico-legal case report will hang their head in despair at the proliferation of pointless print outs and at the unreadability of many computerised hospital records and the information redundancy that defines them.





Figures 8a and b.Early experiments in flight refuelling: the 1934-35 flights of the Curtiss Robin J-1 Deluxe, a small 165-hp airplane “Ole Miss”, images courtesy of the Vintage Aircraft Association https://eaavintage.org/outstanding-flights-ole-miss/

In conclusion, building on my previous analogy of “Building the Aircraft in Flight” in an earlier Essay in this series, I am minded to use the analogy of two development aircraft in the early in-flight refuelling experiments.

In this analogy “UHS Clinical Digital Estate” and “Hyland” were connected by a precarious umbilical cord around which the software engineers would need to clamber to fix the problems that arose from proprietary designs and protocols. This was pioneering stuff, on which our successors and descendants may well look with some bemusement.

We can but hope that the experience at Southampton will mitigate the learning curve around enterprise document management systems for others who travel this path.

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**References**

The following essays in this series have so far been published on the University of Southampton ePrints server:


Rew, DA (2026) *A History of Healthcare Computing and Advances in Clinical Information Productivity in Southampton, 1980 -2024:*
*Essay 1: A Brief History of the Computerisation of Healthcare:* University of Southampton 42pp. https://eprints.soton.ac.uk/510268/

Rew, DA (2026) *A History of Healthcare Computing and Advances in Clinical Information Productivity in Southampton, 1980 -2024:*
*Essay 2: Evolution of the University Hospital Southampton Clinical data Estate from 1990 to 2001* University of Southampton 41pp. https://eprints.soton.ac.uk/510191/

Rew, DA (2026) *A history of healthcare computing and advances in clinical information productivity in Southampton, 1980 -2024:*
*Essay 3: Evolution of the University Hospital Southampton Clinical Data Estate from 2000 to 2010* University of Southampton 48pp. https://eprints.soton.ac.uk/510310/

Rew, DA (2026) *A history of healthcare computing and advances in clinical information productivity in Southampton, 1980 -2024:*
*Essay 4: evolution of the University Hospital Southampton clinical data estate from 2010 to 2021* University of Southampton 49pp. https://eprints.soton.ac.uk/510703/

Waghorn, D and Rew, DA (2026) *A history of healthcare computing and advances in clinical information productivity in Southampton, 1980 -2024:*
*Essay 5: Oracle application express (APEX) and UHS apps, 2011-2024* University of Southampton 46pp. https://eprints.soton.ac.uk/510704/

Rew, DA (2026) *A history of healthcare computing and advances in clinical information productivity in Southampton, 1980 -2024: essay 6: the "Go Paperless" project in Southampton, 2013-2018* University of Southampton 43pp. https://eprints.soton.ac.uk/510702/