Principia Medicinae Digitalis Sotoniensis

Essays on the Evolution of the UHS Clinical Data Estate 1980 -2024

Essay 1:0 Introduction to the Project

Series Author and Editor
David Rew QVRM TD MA MChir (Cambridge) FRCS (London)
Consultant General Surgeon, University Hospital Southampton 1999-2023
7th October 2024

The Publication Plan

This document introduces a collection of more than 30 essays which recount the history and outputs of the University Hospital Southampton (UHS) clinical digital programme over five decades. each will be available on completion as downloadable PDF documents on my website, https://www.wessexsurgical.co.uk for review, comment and as a basis for further contributions. Each will be amended, updated and supplemented as necessary and as any new material becomes available. All colleagues with knowledge and participation in the UHS digital programme are invited and welcome to contribute, by communication with me through dr1@soton.ac.uk.

Once the project is as complete as is achievable with the available contributions, final copies of each of the essays will be submitted to the University of Southampton ePrint server for formal publication.

Copyright

Contents

The Structure of this Collection of Essays

Glossary of Terms

Acknowledgements

- for major contributions to the development of the systems

- for additional technical contributions

- for clinical contributions

The Challenges of the Transformation from Paper to Digital Healthcare

In January 2000, the US multinational company Electronic Data Systems aired a memorable one minute long mockumentary video during the televising of the American Football Superbowl final between the St Louis Rams and the Tennessee Titans.

The creative advertising team of Fallon in Minneapolis "filmed" a team of construction engineers harnessed to and building a large Boeing airliner at altitude and at speed, with a contingent of passengers on board. The narrator tells us that:
"Some people like to climb mountains. I like to build planes. In the air. .. I grew up wanting to be on the wing. Wanting to be up this high. .. Sometimes the temperature at this altitude will reach 60 below. It's brisk. It's refreshing. ..
You never know what you're going to come across up here. Canadian geese. Mallards. Owls. .. These people back here. That's why I come to work. That's why I build airplanes in the sky...We're not just building a plane here. We're building a dream!... I love this job...
We don't get a lot of thanks up here. But when I look over there and see that little kid, the look in his eyes, that's all the thanks I need..." The video concludes with the voiceover:
"In a sense this is what we do. We build your digital business even while you're up and running... and the strapline: "EDS. Managing the complexities of the digital economy".

The senior contributors to this book and to the digital transformation programme at the University Hospital of Southampton were born in late 1950s and early 1960s, when you went to a school with a pencil, a pencil sharpener and an eraser in your satchel; when you were taught off a blackboard with chalk; and you went home to a blurred black and white TV with an unstable signal and the BBC or ITV as your only viewing choices.

Personal computers, hand held video devices, flat screen TVs, and information on demand were unknown except in the imaginations of Gerry and Sylvia Anderson and their puppeteers on the Thunderbirds, Joe 90, Fireball XL5 and Stingray film studio sets.

The digital transformation of the world has been a revolution of previously unknown scale and speed in human history. Technological and social change which once took centuries and millennia has been compressed into months and years, and we have lived right through a tsunami of change which has swept all before it.

The electronic computing era began in the 1940s with the codebreakers of Bletchley Park, and with Alan Turing's theoretical work which defined the universal computing machine. The earliest commercial machines were huge mainframes for government, academic and business purposes. Citizen engagement in the digital revolution began in earnest and gained pace in the 1970s and 1980s, with the earliest personal computers, processing and memory chips, alphanumeric software codes and digital hobby enthusiasts.

The public Internet, the World Wide Web and mobile telephony took shape in the early 1990s, and hand held digital devices evolved in the early 2000s, to the point where most global citizens of all socio-economic classes, cultures and nationalities have access to a "smart phone".

Huge reams of information and imagery are now available in real time at almost any point on the planet, including through constellations of micro-satellites in low earth orbit. In the early 2020s we are now debating the applications of advanced machine learning and "Artificial Intelligence" in daily life and in a wide range of healthcare applications.

Darwinian Processes and Digital Evolution

The Coming of the Computer Age exemplified technological Darwinism in its purest form. The fittest ideas, microchips and code flourished and generated vast wealth for their creators. Nobody wrote a master plan or a road map for the digital revolution, but many brilliant minds and brave entrepreneurs had the visions and developed the transformative products which fuelled an accelerating cycles of progress. In this technological survival of the fittest, this year's state of the art system became next year's dinosaur. Million and Billion dollar businesses rose and fell in the sunshine of Silicon Valley, and governments, Corporations and Citizens struggled to keep pace with the rate of change.

The revolution prompted the human imagination and organisational energies to deliver chips at the nano-scale and to join up the entire world with fibre-optic cables, wireless and satellite links.

Healthcare and the Digital Revolution

The early commercialisation of computers at scale was primarily driven by the needs of large scale businesses and mainframe applications such as payroll, accounting and inventory management. These applications generally had a logical structure and linear processes which leant themselves to computer programming. The mainframe computerisation of healthcare systems took off in the 1980s, but largely in those areas where the needs of health service providers mimicked those of trading companies in core business processes.

The programming of the patient medical record was largely out of scope, because its complexity in describing the cradle-to-grave health needs and consumption of individual patients and whole populations was out of commercial scope. In the UK, individual health professionals experimented on the margins with their BBC Micros, Amstrads, IBM and Apple Personal Computers and databases for particular cohorts of patients and diseases. However, the transition of the medical record from a paper to a digital architecture was still on the far horizon. Ambitions for healthcare computing in the 1980s were handicapped:

- by hardware costs for the purchase and running of mainframe computers and limited data storage capacity on card and magnetic tape;

- by limitations in software, database and document management and design in the pre-word processor era;
- by the lack of adequate systems for digital information transfer prior to and in the early days of the Internet, dial up modems and copper telephone lines;
- by the lack of software engineers, designers and developers with an understanding of the particular challenges and complexities of healthcare information and decision making, and of the processes of building lovable software for the people and for the end users;
- by a lack of understanding across the health system, business managers and politicians, as to the scale and complexity of the challenges of an epochal transition from boring old paper to the transcendental state of digital Nirvana;
- and by a lack of understanding, insight or honesty of the big computer businesses which promised the Earth and delivered Mud to Governments which sought to computerise health systems.

Southampton and the Revolution in Digital Healthcare Systems

The Southampton Poor Law Union Workhouse Infirmary was conceived in 1899. It was established on a 14 acre semi-rural site in Shirley Warren on the then outskirts of Southampton in 1900. It opened in 1902 (https://www.workhouses.org.uk/Southampton). The hospital site has evolved from a collection of elegant Victorian Buildings into a huge modern NHS University Hospital, of which the Old Nursing Home is the principal surviving architectural element of that era.

Following the abolition of the workhouse system in 1930, the hospital continued as the Borough Hospital until its integration into the new NHS in 1948 as Southampton General Hospital. It has subsequently undergone progressive reconstruction as a modern architectural behemoth with a succession of name changes under NHS operational reorganisations as Southampton University Hospitals Trust (SUHT), and more recently as University Hospital Southampton NHS Foundation Trust. This is commonly abbreviated to UHS. This is the convention which I will adopt for consistency in this collection of essays. The hospital is nevertheless founded in local pride and in the public spiritedness and sense of duty of generations of civic leaders and of the local population.

The history of the Shirley Union Infirmary parallels the extraordinary evolution of global technology through the 20th century, from the earliest motor cars and aeroplanes. to computers and space travel. It also parallels huge changes in the knowledge and practice of human health and disease in all disciplines, through the introduction of antibiotics in the 1940s to the discovery of the structure of DNA in the 1950s and so to modern insights into physiology, pharmacology and therapeutics.

The National Health Service (NHS) was conceived and implemented across the UK in the 1940s. This coincided with the dawn of the computer age, which is generally attributed to the conceptual work of Alan Turing and colleagues in the 1940s, and the practical development of electro-mechanical code breaking computers at Bletchley Park during World War 2. Nevertheless, computerisation played no role in the original political vision for the NHS, as its power and potential was still wholly unknown.

By the 1980s, computer technology had evolved sufficiently to prompt experimentation and significant expenditure in the NHS, and the Wessex Region was an early test bed for an ambitious digitisation programme which ended in failure and political opprobrium for the instigators, but with important lessons learned.

This collection of essays aims to capture and document the knowledge and insights in this thus far poorly understood and little known programme while the participants are still active and while memories and relevant information resources are still reasonably fresh.

The Southampton Health System enters the Computer Age

Just as success or failure in life happens to people without prior rhyme or reason, so SUHT/ UHS became a leading digital exemplar hospital in the UK national healthcare transformation programme over 30 years from the early 1990s onwards by happenstance rather than deliberate design. This evolution occurred without any prior plan, but there was a common purpose and sense of direction among the pioneers, such that UHS was formally recognised as one of the first NHS "Global Digital Exemplar" Hospitals in 2016. If those of us of the present era have seen further, it is because we have stood on the shoulders of the local pioneers of healthcare computing systems from the 1980s onwards, and of the culture of innovation and of thinking ahead which is built into the local institutional ethos.

The history of the UHS Clinical Data Estate from its earliest origins has never been properly documented, and many of the key contributors are now approaching their retirement years or have moved on to other posts. I have therefore sought to record and preserve for the historical record the contributions of a series of self driven individuals who have worked effectively with limited resources, determination and common enterprise. They serially ducked, dived, weaved, innovated and tugged on tight purse-strings as the world of technology transformed around them. They successively built a modern and unique Electronic Patient Record (EPR) system to improve the efficiency and productivity of the hospital staff and the effectiveness and safety of their clinical care, which remains an exemplar for global hospital computing systems.

Most UK hospitals have of necessity purchased medical software management systems from commercial suppliers at substantial cost and with limited flexibility or control over the design of these systems. In contrast, UHS has evolved a unique in-house approach to systems development. The key to success has been the close proximity between the system developers and programmers, and with the various health and administrative professionals who are the daily consumers of huge volumes of health data.

The Southampton system has grown organically through a close working relationship between the developers and the clinical and administrative users in physical proximity across the hospital group. As such, it differs considerably from the large and monolithic

"mega-suite" software systems from commercial suppliers of Electronic Patient Record (EPR) systems. Their developers are often remote from the true end users, and they therefore lack the detailed insights and agile responsiveness which are essential to the development of the best software in any healthcare setting.

An understanding of the history of the Southampton Estate is therefore essential if the future local, regional and national potential of the system is to be realised in full for the public benefit by a new generation of developers and managers who are unfamiliar with its foundations and its history, and if the UHS EPR System is not to be sacrificed in expediency to the centralising ambitions of the wider NHS.

In the absence of comprehensive and unitary documentation on this complex history to date, I have therefore set out to capture the story from the personal recollections of key and willing contributors, and from such documentation is it has been possible to discover and retrieve. This is an incremental project, which will never be completed, given the continuing global evolution of digital information systems in healthcare, which we hope that the Southampton programme will usefully and widely inform.

I have therefore divided the history into a series of topic-specific essays, starting with a broad overview of clinical digital informatics from the 1940s to the present, and with particular emphasis on the contextual environment of digital development across the NHS. The project remains open to further contributions from the local subject matter experts on topics which I may have overlooked. I hope to achieve the best possible record of lessons and insights for future developers and users of the Southampton clinical software systems.

My personal involvement with the UHS Digital Programme

My own direct involvement with the development of clinical software systems in Southampton began in earnest around 2009, when I sought to modernise the Southampton Breast Cancer Data System (SBCDS), to which the early co-evolving versions of the UHS Lifelines timeline structured interface were invaluable. SBCDS eventually grew to a live database of more than 20,000 sequential patient records, and the design elements further informed the development of the Enhanced Somerset Cancer Register system, which

surfaced all Trust cancer records in an easily accessible system which transformed the efficiency and productivity of the Cancer multidisciplinary Team process.

In consequence and in parallel with this work, I was closely involved in the acquisition of the Trust's OnBase Electronic Document Management System from Hyland Inc of Cleveland Ohio for 2014 onwards, in the course of which I paid two visits to Cleveland as an invited member of the Hyland Advisory Board. The work also led to other invitations, including a seat on the Strategic Advisory Panel on Healthcare Technologies for the UK Engineering and Physical Sciences Research Panel between 2017 and 2019; a Visiting Professorship at Southampton Solent University from 2017 onwards, while sustaining a full time NHS clinical career in Breast and Endocrine Surgery at UHS.

The Intent of the Project

By 2023, I had freed up sufficient professional clinical commitments to undertake a series of writing projects, of which the UHS Lifelines story and an examination of its future potential was planned to be the first. However, it soon became apparent that the story of UHS Lifelines could not be told in isolation. It required a deeper understanding of the systems on which it was built and to which it was linked across the UHS Clinical Data Estate (CDE), and without a description of the other unique systems with which it was integrated.

It also rapidly became apparent to me that there was no systematic or usable reference base for the digital transformation work at UHS over the past five decades, and much of the knowledge base was held in the recollections, memories, emails, notes and code of the participants in the story.

My original intent has therefore evolved into an expanding collection of 30+ essays, which may distil into a more compact book at a later date. I have drawn on a rich source of my own contemporaneous material, primarily a huge volume of emails which were the principal record of our discussions, along with images and screenshots of the work in progress.

I have also drawn directly on the recollections of the key contributors in personal interviews and invited commentaries. The lessons learned and observations made from this

extraordinary software development programme are nevertheless entirely my own, and I recognise that others may well have a different view of events and circumstances. However, I hope that this will prove to be a constructive and useful review of the entire programme for those who wish to replicate such projects in future.

The intention of this essay collection is also to produce a narrative on the human challenges in developing transformative clinical software systems. Our test-bed has been the complex working environment of a large tertiary University Teaching Hospital with severely constrained resources for Information Technology. We have had no formal contractual arrangements or Board Level executive input. We just did what we felt to be "the Right Thing" when it became apparent to our small group that there were far better incremental ways to organise the mass of valuable information in the UHS Clinical Data Estate than were achievable with legacy software systems

I was particularly concerned that many important lessons and insights would be lost as this generation of digital navigators through uncharted and often turbulent seas were dispersed by life and nature to all points of the compass. A core purpose of this project has therefore been to capture and document the knowledge and insights in this thus far poorly documented and little known programme while the participants are still active and while memories and relevant information resources are still reasonably fresh. The UHS Clinical Data Estate remains vulnerable to the caprices of powerful and under- informed bureaucracies, and it could disappear overnight if not cherished for its strengths.

Excellence in the design and implementation of software systems will be central to the working lives of all health professionals and to the financial solvency of clinical institutions from this generation henceforth and forever more. The communication of the challenges and processes of improvement of clinical digital systems to a wider professional audience is therefore essential.

This narrative is fundamentally about the challenges of clinical software development which will be as unfamiliar to current developers as they were to me 15 years ago. In keeping with the underlying theme of information visualisation, I have sought to make the story as

visually compelling as possible, with the explicit exclusion of computer code. I have also sought to explain references to particular computer systems, suppliers and abbreviations as clearly as possible with the help of Wikipedia and other search engine sources.

The format of publication of each “chapter” in this story as a separate essay is a pragmatic effort to get the material into the public domain, to assess interest and to provide as complete a reference resource to the development sequence as possible.

The Target Audience for the Writing Project

I hope that this collection of essays will find a variety of uses for a diverse readership over time. I recognise that very few who glance through this collection will wish to read the entire volume, which stands primarily as a set of documents of record of the history of one complex and pioneering system of systems in Digital Health.

1. Beyond a personal history and reference collection, I hope that the opus will find particular use for current past, present and future system developers, health, clinical administration and management professionals in Southampton who use the system on a daily basis and who will be interested to understand more about it.

This is particularly important in marshalling a defence of the system when external pressures to compromise on the purchase of one or other commercial systems in the interests commonality with other hospitals and healthcare providers, where other venders offer a less mature, functional and user-focussed system that that which has been carved out at UHS.

2. I hope that this opus will find a wider audience across the entire digital health landscape in the UK and beyond, including commercial providers, as an exemplar of how to optimise the outputs of digital health assets and of the challenges and lessons learned in the process.

3. I hope that this work will also find resonance more widely in both the public and commercial sectors among developers and users who may be dissatisfied with their current systems, and seeking to learn from the experiences of others.

4. I intend that regardless of the wider uses that this set f essays may or may not find in future, collectively or separately, they will stand as a reasonable record on one collective experience of developing a technology and a system of systems which will evolve into the distant future in a wide range of healthcare and other applications.

5. My intent is that once the essay collection is complete and published in series “in draft” on the web, we will reduce it to a more manageable e-book to summarise both the history and the lessons learned from the series of projects, for whose offer of help I am most grateful to Mrs Esther O’Sullivan.

Creating this Essay Collection

The Key Participants and Contributors

Throughout this period, I worked with and was wholly dependent upon the programming skills, systemic insights and selfless and public-spirited commitment of Alan Hales, our self-employed UHS Digital Systems consultant.

The systems which we have built have also benefitted more generally from the serial sense of close and common enterprise between the computer systems developers at UHS, who necessarily work within the constraints of linear and logical software programming; and healthcare professionals who inhabit the world of uncertainty and probabilistic thinking and clinical decision making.

Alan Hales did all of the heavy lifting of programming and system integration around my own conceptual work. Without him, none of the projects which are described in detail in this collection of essays would have reached fruition. He also tutored a number of early career digital students and recent local graduates, notably Alex Mills-Mullet and Matthew Warren, who have made significant contributions

Major contributions were also made by David Cable, who shared, underwrote our evolving vision and smoothed the path from within the Information Management and Technology Directorate at the hospital.

Critical insights were provided by others at various times who I have sought to acknowledge in the relevant essays. Adrian Byrne, Chief Informatics Officer to the Trust throughout this period, also gave us moral support and spiritual cover, and he has also been a generous contributor to this opus.

I have also particularly grateful to other key contributors who have provided their oral histories, written contributions, documents, files and archives. Among these individuals notably were Liz Hawkin, who set the wheels of the UHS Digital Tranformation in motion through the 1990s, and Dave Waghorn, for his contribution on the Oracle APEX system. I have learned much from them in the process.

Looking to the Future of Clinical Computing

The healthcare Information Technology (IT) revolution has yet to run its course. In many aspects of the user experience, the processes of the management of information overload, and the extraction of beneficial intelligence and knowledge from the mass of raw data are still very immature.

Most importantly, many of the challenges which were met and overcome in this story are still as relevant in large organisations and bureaucracies today. This account is therefore both a history of a living digital system, and a contemporaneous guide to addressing the challenges and road bumps to further technological evolution.

As one of my colleagues in this project generously observed:
"This story is significant because it is testimony to the professional courage of a number of IT leaders in Southampton that the Trust determined to plough its own furrow in IT development." Without this courage, the series of powerful new clinical digital systems which we describe in this essay collection would not exist.

Given the scope of the project, I am particularly grateful to the University of Southampton for the facility to use the Internet-facing ePrint Server as a vehicle for incremental publication of the essays as they are completed, thus making the cumulative documents most easily available as a resource for future reference at minimal cost.

The Structure of this Collection of Essays

I have structured this book in five principal sections, with a collection of related essays in each section. The numbering convention is Section: Essay, eg 1:5

Section 1 Essays:

The History of the University Hospital Southampton Clinical Digital Estate 1980 to 2024

In the first collection of essays, I describe the early history of healthcare computing (Essay 1:1), followed by the local influences and the Southampton experiences and enabling projects and programmes from 1990 to the Millenium (Essay 1:2). Much of this work is built upon the recollections of Liz Hawkins, who let the programme through that deacde

By 2000, the direction of travel towards local development of the component systems of the future Electronic Patient Record was well established, and the earliest systems were in development. In Essay 1:3, I address the developments over the decade from 2000 to 2010, during which (inter alia) the Hospital Integrated Clinical Support System (HICSS).

In Essay 1:4, in partnership with Alan Hales, I consider in greater detail the developments of the UHS OrderComms system eQuest; and the document creation and management system eDocs were created and matured.

In Essay 1:5, I divert from the Southampton story to consider the concept and challenges of developing the Perfect Electronic Patient/Health Record.

In Essay 1:6, I describe the developments across the UHS Clinical Digital Estate during the decade from 2010 to 2020, during which the transition from paper to a largely digital working environment accelerated under national direction. UHS acquired a number of external systems, including the JAC e-prescribing system; the Hyland OnBase document management system and the Somerset Cancer Register. The internal process of local development and EPR integration also continued at pace, with new systems, including Digirounds, Whiteboard, UHS Lifelines and its spin off systems, our Enhanced Somerset Registry system, SCR+, which transformed information availability and working practices for the cancer multidisciplinary teams (MDTs); and the Lung Health Check cancer screening

system. All component systems became coordinated within the unitary and bespoke CHARTS EPR wrapper.

Essay 1:7: The Oracle APEX story by Dave Waghorn

Oracle APEX is a powerful backstage system at UHS whose components are rarely seen by the general EPR user. In this essay, Dave Waghorn of the UHS IT team provides the background to the acquisition of the system and its general utility.

Essay 1:8: Document Classification and Clinical Information Capture

The exercise of classifying the huge array of paper document types for e-filing in the build up to the implementation of the OnBase Electronic Document Management System (Essay 9) provided many insights into clinical document classification, which I have sought to capture in this essay.

Essay 1:9: Electronic Document Management Systems and the OnBase story

The Government drive from 2013 onwards to digitise health records across the NHS led for the search for an Electronic Document Management System (EDMS). UHS held an open competition in 2014, resulting in a contract to acquire the OnBase Enterprise Management System from Hyland Inc of Cleveland Ohio. The initial expectation that OnBase would subserve the role of the unified information management system and EPR at UHS could not be realised despite considerable efforts. The UHS CHARTS EPR remains the key system, with OnBase used largely in a subsidiary information storage role, but seamless inter-operability remains elusive in 2024.

Section 2 Essays

The History of UHS Lifelines

From my interest in the systems and techniques of data visualisation, I recognised the potential of the Lifelines concept from the University of Maryland as a solution to the challenges of integration of heterogenous clinical records from multiple sources on a unitary and intuitive interface for the EPR at UHS. The untested Maryland concept led to our practical development of the transformative UHS Lifelines Electronic Patient Record (EPR) interface and its evolution over the next decade. I am proud to have nursed this powerful

EPR Application from the introduction to my UHS IT colleagues to the concept in 2009 to a fully fledged and enterprise hardened Application at the centre of the UHS EPR in 2024. UHS Lifelines transforms the speed and ease of visualisation and navigation around the clinical record from minutes to seconds, with considerable gains in clinical efficiency, productivity and safety gains through the concomitant mitigation of clinical risk.

From the outset of the project in 2009, we recognised the potential of UHS Lifelines as a "Eureka Moment" in the experience of health professionals of using clinical digital systems,. We had built a powerful and functional version of UHS Lifelines by September 2010, but it took a further decade of iteration and frustration before it became accepted a central element of the Trust's EPR, four software iterations later.

Essay 2:1: The Principles of Clinical Data Visualisation

The theme of optimising the presentation and interaction with clinical data for efficient and effective processing by the human brain underpins the essays in the next three sections. In this essay, I explore the history and practical applications of data visualisation techniques, both on paper and in electronic systems, as they influenced our work on UHS Lifelines (Section 2 Essays), The Southampton Beast Cancer Data System (Section 3 Essays) and the Enhanced Somerset Cancer Register (SCR+) System for the discovery and interaction with all clinical cancer data across the Trust **(**Section 4 Essays), as follows.

.

Essay 2:2: UHS Lifelines Version 1 2009-2011

Essay 2:3: UHS Lifelines Version3 2014-2016

Essay 2:4: UHS Lifelines Version 3 2017-2018

Essay 2:5: UHS Lifelines Version 3 2019-2020

Essay 2:6: UHS Lifelines Version 4 2020-2024

Essay 2:7: Reflections and the future of UHS Lifelines

Section 3 Essays.

The Southampton Beast Cancer Data System

The Lifelines project subsequently underwrote a series of further exemplar systems, including the Southampton Breast Cancer Data System (SBCDS) and the enhanced Somerset Cancer Registry (SCR+) Module, which has transformed the visibility and interaction with all cancer records at UHS.

Essay 3:1: The conceptual origins of the Southampton Beast Cancer Data System

Essay 3:2: The beginnings of the Southampton Beast Cancer Data System and the integral Version 2 of UHS Lifelines, 2010 – 2011

Essay 3:3: Lifetrak and the Southampton Beast Cancer Data System 2012

Essay 3:4: the Southampton Beast Cancer Data System 2013-2015

Essay 3:5: The Southampton Beast Cancer Data System 2015

Essay 3:6: The Southampton Beast Cancer Data System 2016 – 2018

Essay 3:7: The Southampton Beast Cancer Data System 2019 – 2024

Section 4 Essays.

The Enhanced Somerset Cancer Register (SCR+) System

Essay 4:1: The origins of the Enhanced Somerset Cancer Register (SCR+) System

Essay 4:2: The Enhanced Somerset Cancer Register (SCR+) System, 2019 – 2022

Essay 4:3: The Enhanced Somerset Cancer Register (SCR+) System, 2022 –

Section 5 Reflections on the Programme

In this section, I consider the wider lessons of this series of projects, including the importance of undergraduate and early career digital graduate contributions to our projects, along with a consideration of clinical digital systems development in the context of Human Factor Analysis, which now plays an important role in clinical risk mitigation.

Essay 5:1: Student contributions to the UHS Lifelines and derivative programmes

Essay 5:2: Human Factor Analysis, UHS Lifelines and derivative programmes

Essay 5:3: Lessons learned from the UHS Lifelines and derivative programmes

Essay 5:4: A Digital Curriculum for Health Professionals

Glossary of Terms and Abbreviations

Places and Healthcare Organisations

PAH: Princess Anne Hospital, Southampton

RSH: Royal South Hants Hospital, Southampton

SGH: Southampton General Hospital

UHS (FT) University Hospitals Southampton NHS Foundation Trust, formerly

SUHT: Southampton University Hospitals NHS Trust (predecessor to UHS FT)

WAHSN: Wessex Academic Health Services Network, now renamed Health Innovation Wessex

Software Systems

The following Abbreviations and Acronyms relate to systems and entities which are commonly referenced throughout the text. Less common acronyms are explained in the relevant text.

APEX: The Oracle software development system, Applications Express

CaMIS: A proprietary Clinical Administration and Management Information System (EMIS Health, Leeds UK)

CDE: Clinical Data Estate, a generic description of the totality of te clinical software systems at any one time

CHARTS

CRIS: A radiology team, variously expanded as: Clinical Record Interactive Search, Common Reporting Information System, Computerised *Radiology* Information Solution

EDMS: Electronic Document Management System

eDocs: The UHS document creation system

EPR: Electronic Patient Record

eQuest: The UHS Order Communications system, subsequently classified by the functions of the Requesting and Reporting of Tests and clinical service

HICSS: Hospital Integrated Clinical Support System (Unique to UHS)

JAC: JAC Ltd, Basildon, Essex, UK: providers of digital prescribing systems

Lifelines: A format for the EPR Interface, originally described by Professor Ben Shneiderman and colleagues at the Human Computer Interaction Laboratory (HCIL), Univ. Maryland

MDT: Multi-Disciplinary Team

OnBase: The UHS Electronic Document Management System, supplied by Hyland Inc.

PACS: Picture Archiving Communications System

PAS: Patient Administration System

PMI: Patient Master Index

SBCDS: Southampton Breast Cancer Data System

SCR: Somerset Cancer Register

SCR+ (Plus): The Enhanced Somerset Cancer Register Model (Unique to UHS)

UHS Lifelines: The UHS EPR Interface

Acknowledgements

Direct contributors to the specific projects described in this book

Adrian Byrne

Alan Hales

David Cable

David Waghorn

Liz Horkin

Dr Michael Celinski

Dr Ashwin Pinto

Other Technical Contributors to the projects described in this book

Ashley Beecham

Steve Kawandawi

Nilesh Patel

Ryan Beegan

Toby Cave

Clinical contributors to the wider development of the programmes at UHS, as described in this book

Ash Monga, Consultant Gynaecologist

Mark Griffiths, Consultant Radiologist

Chris Canning, Consultant Ophthalmologist

Derek Waller, Consultant Physician and Associate Medical Director for IT

Matthew Cordingly, Consultant Anaesthetist, for Digirounds

Iain Simpson, Consultant Cardiologist

Steve Livesey, Consultant Cardiothoracic Surgeon

Brian Leatherdale, Consultant Endocrinologist

Mary Rogerson, Consultant Renal Physician

John Wood (pathology)

Glenn Weavind (pathology)

Please accept my apologies in advance for any other contributors who I may have overlooked in the acknowledgements. Please get in touch, as updates can be made.