Connected Health Cities

End of Project Report

WP4: Workforce Development

Business Informatics Skills Framework (prototype)

CONTENTS

GLOSSARY

Term	Definition	Comment
BI	Business Intelligence	Business Intelligence is preferred to *Information Management* or *Information Services* as this better conveys the sense of an added-value service over-and-above the provision of data and reporting.
BISF	Business Intelligence Skills Framework	A framework for the definition of an accreditation of business intelligence skills and knowledge, designed as an enabler for improving capability and quality.
HI	Health Informatics	An overarching term to describe the various NHS job roles relating to data, information, knowledge and technology. *IM&T* is a more commonly used term.
HICF	Health Informatics Career Framework	A tool to help individuals plan their IM&T career.
IM&T	Information Management and Technology	An overarching term to describe the various NHS job roles relating to data, information, knowledge and technology. A more commonly used term for *Health Informatics*.
PDP	Personal Development Plan	An individual's agreed (with their line manager) plan for personal development; usually reviewed at least annually.

ABSTRACT

The Business Informatics Skills Framework (BISF) Prototype intended to provide an initial tool to create a professional framework to improve the capability of the analytical workforce. The BISF will enable individuals to produce a portfolio of evidence endorsed by managers outlining their competency against an identified skill set for their role assisting them in identifying the relevant skills required to further progress their career within that area.

This accreditation system builds on existing frameworks such as the Health Informatics Career Framework (HICF) and Skills Framework for the Information Age (SFIA). Ultimately, it will facilitate the identification, development and enhancement of the capabilities of the NHS and health and social care analytical workforce.

The purpose of the BISF is to support the professional and personal development of the analytical workforce from entry level through to professional level. It will enable individuals, organisations and health care systems to assess their knowledge base, identify gaps and signpost to learning resources to develop and enhance these skills. It will also support rounded analysts who, in addition to strong technical skills, have well-developed social and interpersonal skills to communicate effectively with clinicians and senior managers, thereby becoming more actively embedded in decision-making both within their organisations and across the wider health economy.

INTRODUCTION

The Connected Health Cities (CHC) Programme puts forward the proposition that the continuous improvement and optimisation of health services requires the evidence produced by those services to be rapidly analysed, service improvements identified and then implemented, and new evidence produced. This cycle is then repeated over and over to create an iterative Learning Healthcare System. The ultimate aim is to shorten the timeframe between data availability, analysis and the creation of impact/benefit. This is only possible if there is a workforce with the informatics skills needed to deliver this continuous improvement.

The North West Coast Connected Health Cities (NWC CHC) consortia collaborated with the North West Skills Development Network to explore the skills needs of analytics and informatics professionals in the NWC region and to develop a strategy for the development of a suitable BISF.

There are already a number of knowledge and skills frameworks currently in existence and this work was clear being additional to what already existed. The HICF is the main framework for the informatics profession which helps individuals to plan their informatics career and assists managers with team and individual staff development. The HICF includes a mapping to other frameworks, notably the National Occupational Standards outlining the standards of performance in the workplace including the underpinning knowledge required and the NHS Knowledge and Skills Framework (KSF) identifying the core skills required for individuals to undertake their role.

However, the frameworks outlined above only identify "what" skills are needed rather than "how" the skills should be acquired and applied. The BISF uses these frameworks to identify and define the required skills and competencies for each role but then takes this information to the next phase, by describing and identifying how these standards and core skills should be developed and assessed.

The BISF is an attempt to define the competencies required by high-performing business intelligence staff and a mechanism for accreditation of these skills and knowledge.

APPROACH

The approach taken to create the framework was very much focused on applied learning and assessment of skills in the context of working within NHS business intelligence. The work sought to:

1. Define (standardise) what good looks like
2. Assess the gap between current and good
3. Provide focused learning and development
4. Assess skills and knowledge acquired

The BISF identifies accredited learning materials and assessments to meet these learning needs. Underpinned by the Kirkpatrick model [1] of evaluation of learning & development[1] the BISF has been designed as an enabler for improving capacity, capability and quality of skills for staff who work within the informatics profession.

1. https://www.kirkpatrickpartners.com/Our-Philosophy/The-Kirkpatrick-Model

The framework focuses on service-specific vocational activities to ensure relevancy of the framework. These vocational skills include the following key areas:

⇒ Business Intelligence/Information Management

⇒ HI education and training

⇒ Health records

⇒ Clinical coding

⇒ ICT

⇒ Knowledge management

FRAMEWORK STRUCTURE

The BISF classifies competencies into three primary categories: core skills, specialist skills and managerial skills. These are classified further at a secondary level as technical skills, business skills and knowledge. *See Appendix 1: Category Summaries.*

Each skill may have up to three levels, corresponding to the seniority or specialism of the role to which they apply.

Job roles are then mapped to the primary skills category/secondary skills level combinations and defined as either mandatory (M) or optional (O) depending on the specific requirements of the role. *See Appendix 2: Skills Definitions.*

SKILLS CATEGORIES

IM&T comprises a number of disciplines, each with its own set of specialist competencies. In addition to these are core competencies (common to all), and, depending on the seniority of the role, managerial competencies.

Managerial skills are addressed through various management development programmes eg: NHS Leadership Academy [2]. Core skills are often employment prerequisites or addressed during induction.

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[2] http://www.leadershipacademy.nhs.uk/

Specialist skills, however, are often ill-defined and there is often considerable variation between organisations. It is the specialist skills within business intelligence, which are the focus of this framework although some may also be applicable to other IM&T disciplines and other professions

SKILLS LEVELS

The framework comprises Levels 1-3 with Level 3 being the highest. The levels loosely correspond to 'Agenda for Change' (AfC)[3] grades commonly found within business intelligence functions, HICF grades and future professional qualifications at Certificate, Diploma and Chartered level. An illustration of the differing levels is provided below:

Level	Role Function	Agenda for Change Grade	HICF Grade	Professional Level
Level 1	Learning and supervised production	Bands 2-4	CF4 Assistant Practitioners CF3 Senior Assistants CF2 Support Workers CF1 Entry Level Jobs	Certificate
Level 2	Autonomous production	Bands 5-6	CF6 Senior Practitioners CF5 Practitioners	Diploma
Level 3	Interpretation and intelligence System development and maintenance	Bands 6-7	CF8 Consultant Practitioners CF7 Advanced Practitioners	Chartered
	Strategy and Operational Management	Band 8A+	CF9 More Senior Staff	

The ultimate intention is for career progression to be intrinsically linked to the attainment of professional qualifications. For example, progression beyond Band 4 would require the attainment of a Certificate; beyond Band 6 a Diploma; beyond Band 7 would require Chartered status. However, until such time as the new professional qualifications are developed, this remains an aspiration, rather than reality.

In the absence of formal professional qualifications, the BISF can be used to inform an individual's Personal Development Plan (PDP). This can thus inform increment progression and promotion, where this is permissible under local remuneration policy.

3. https://www.nhsemployers.org/pay-pensions-and-reward/agenda-for-change/pay-scales/annual

HOW TO USE THE FRAMEWORK[4]

A total of 100 points is required to pass each level comprising mandatory (M) and optional (O) competencies. These are defined in the role/skills mapping. *See Appendix 3*.

1. Map your job to one of the roles detailed in *Appendix 1.*
2. Map your job to a level; this will usually correspond to an AfC band.
3. In addition to the mandatory competencies, pick optional competencies, which best match your job, totalling a minimum of 100 points.
4. Assess current skills against the required level for the role; agree and prioritise with line manager.
5. Document as a PDP.

FUTURE DEVELOPMENT/SUSTAINABILITY

The overall vision for the BISF framework is for national adaptation to support the development of all informatics professionals and to provide full access to current and future NHS informatics professionals. There is widespread support for the BISF from across the informatics community, particularly from the Association of Professional Healthcare Analysts (AphA)[5] which is a key partner in its development. Furthermore, the BISF was well received by BCS and Fed-IP[5].

Whilst the system specification has been fully scoped and a pilot web implementation put in place[4,] further investment is required to fully populate the skills and accreditation levels across the whole of the informatics functions, and is supported by Informatics Professional Bodies (eg. BCS, AphA), NHS Improvement and CHC. Furthermore, there is a broad consensus that professional qualifications are the logical, medium-term aspiration.

Based on the current gap analysis, there is a requirement for funding to support a project manager for 12-18 month at a cost of circa £47k per annum. This dedicated resource would facilitate the full completion of all areas within the ISF. The project manager would work with subject matter experts to develop the remaining areas within the ISF, refining and improving the initial skill specifications and to help develop additional skills and assessments.

This resource will also ensure that the ISF is fully mapped to other relevant frameworks previously mentioned (such as SFIA and HICF) ensuring consistency and transferability.

The ultimate aim is to adapt the framework and create scalability so that it can be applied to meet the learning and development needs of the wider informatics functions outlined above, supported by a transparent governance structure.

The project team has worked with key stakeholders to raise the profile of the Informatics profession through the provision of a framework that will assist in raising professional standards and qualifications, to assist with career progression being linked to evidenced-based attainment.

CONCLUSION

IM&T and, in particular, the informatics profession, is widely, and rightly, perceived as holding the key to delivering transformative healthcare and there has never been a greater demand for professionally recognised skills. The NHS long-term plan[6] has clearly stated that digital technology and digitally enabled care will be central to facilitating health service transformation. The plan also states that secondary care providers become 'fully digitised' by 2024 and NHS organisations will be required to have a chief clinical information officer or chief information officer at board level by 2021/22. To promote interoperability, there is now a commitment to introduce controls during 2019 to ensure that technology suppliers to the NHS comply with agreed standards and from 2019, population health management tools will be rolled out, enabling integrated care systems to identify groups at risk of adverse health outcomes and inequalities and to plan services accordingly. Clearly data and its effective creation, management and utilisation is central to UK Government's view of a transformed health and social care service.

However, all that said, there are currently limited structured approaches to professional development and registration or standardisation in the way that we recruit, develop and assess our informatics staff (however, a number of apprenticeship standards are now being developed).

Furthermore, recent research carried out in partnership with the Connected Health Cities (2018) project has shown that Senior Information Leads see this situation being further

[4]. https://vimeo.com/253769601

[5]. https://www.aphanalysts.org / https://www.bcs.org/membership/get-registered/federation-for-informatics-professionals-fedip/

That view was further supported in findings from a workshop CHC carried out with the North West Skills Development Network's Senior Information Analyst Network Group in October 2018. The group, representing eight CCGs, 21 NHS Trusts and a Clinical Support Unit cited "variable skill-mix and capability within intelligence teams, particularly relating to specialist skills" as their main response to the question of "What are the technical barriers to intelligence dissemination and adoption?"

As noted earlier, the development phase of the framework has already been funded through a partnership between the NW Skills Development Network and CHC (Innovation Agency). However, further non-recurrent investment of a project manager and data input resource is required in order to see this product developed to its full potential and take this work to the next level. The additional capacity would enable the development of a transferable/scalable regional model to implement this framework - including explicit links to other work in this area (HEE, PHE, NHSE etc) and through coordinated cross-sector workforce development and training activities in the area of health and care intelligence.

The analytical workforce requires a wider skills base beyond the expert technical skills required in today's health and social care environment. That needs to include business, leadership skills as well as technical capability, enabling the development of rounded individuals within the profession. Such an analytics community who are able to help senior managers and clinicians understand the value of better analytics will be crucial in helping evolve health and social care provision to a more predictive and data-enabled service.

6. https://www.england.nhs.uk/long-term-plan/

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North West Informatics Skills Development Network Launched on 1st November 2011, this network is designed to bring together activities associated with informatics development, both new and existing. Its purpose is to raise the capacity and capability of all informatics staff in an era where commercial and leadership skills are essential. The emphasis is around workforce development rather than training.

*. Please note this was Gary Young's role at the time of contributing to this report. Gary has since left his position at Bolton NHS Foundation Trust.

Appendix 1: Category Summaries

Category	Description
Managerial Skills	Generic skills required by leaders and managers including: • Attendance management • Delegation • Influencing • Negotiation • Project management • Visioning
Specialist Skills	The specialist skills required by a given IM&T discipline: • Business Intelligence • Clinical Informatics • Education and Training • Health Records • IT • Knowledge Management • Project and Programme Management
Core Skills	These include: • Communication skills • Prioritisation / time management • Team player • Use of Microsoft Office

Appendix 2: Skills Definitions

Where external methods of assessment exist these are incorporated in the framework. Where they do not, there will be a requirement for these to be developed either in-house or in collaboration with a partner.

Skills	Category	Level	Detail	Training	Assessment	Points
Technical Skills						
Data Mining	Specialist	3	• Understand when it may be appropriate and applicable to apply data / text mining techniques to a business situation. • Prepare (eg clean and / or transform) data ready for the mining process. • Select a modelling technique appropriate to the situation. • Build a model within the organisations chosen data / text mining tool. • Evaluate and validate the subsequent model, determining the next steps to be taken. • Implement and use the results from the model • Maintain the model where appropriate			40
Database Administration (SQL Server)	Specialist	3	• Database statistics • Execution plans • Data Control Language • Performance tuning • Schema design • Server management • Database mail • Linked servers • Audit and tracking • Planning and testing		Test	30
	Specialist	2	• Monitoring database efficiency • Indexes • Load failure investigation • Database security • Record locking		Test	30

			• Killing processes • SQL Server Agent • Support for database applications			
Databases (SQL Server)	Specialist	3	• Cursors • Triggers • Scheduling • Query tuning • Pivots / unpivots • Exception handling • Debugging / error trapping • Common table expressions • Looping		Project	30
	Specialist	2	• Data definition language (create, drop, alter) • Stored procedures • User-defined functions • Control of flow logic • Variables • Temporary tables	Querying Microsoft SQL Server 2012/2014 (ISDN)	Test	30
	Specialist	1	• Data manipulation language (select, insert, update, delete) • Joins (inner join, left join, union) • Aggregation (group by) • Filtering (like, in, having) • String functions (left, right, substring etc) • Date / time functions • Mathematical functions • Case statements • Data types (int, varchar, bit etc) • Tools (SSMS, SSIS, SSRS)	Introduction to SQL (ISDN)	Test	30
Reporting Tools (CHKS)	Specialist	2	• Setting peer groups • Saving filters • Mortality queries		Test	10
	Core	1	• CHKS Modules • Exporting results		Test	10

Reporting Tools (QlikView)	Specialist	3	• Automation • Creating complex reports		Test	10
	Specialist	2	• Creating reports • Tabular reports • Applying formatting • Building expressions • Charts • Visualisation (charts, sparklines etc) • Filtering • Drill down / drill through • Deployment options • Security • Parameters		Test	10
	Core	1	• Using reports • Exporting results • Filters and search		Test	10
Reporting Tools (SSRS)	Specialist	3	• Creating complex reports • Subscriptions • Security • Automation		Test	10
	Specialist	2	• Creating reports • Tabular reports • Applying formatting • Building expressions • Charts • Visualisation (charts, sparklines etc) • Filtering • Drill down / drill through • Deployment options • Security • Parameters		Test	10
	Core	1	• Using reports • Applying filters • Exporting results		Test	10
Spreadsheets (Excel)	Specialist	3	• Automating processes using VBA • Using Excel for statistical analysis		Test	10

			• Array formulas • Advanced filters • Advanced lookup functions • Database functions			
	Specialist	2	• IF function • Conditional formatting • Pivot tables • Data connections • Drop down lists • Named ranges • Lookup functions (including nested lookups) • Logical functions (AND, OR, NOT etc) • Using dates and times in formulas		Test	10
	Core	1	• Pivot tables		Test	10
Business Skills						
Business Analysis	Managerial Specialist	3	• Interpretation and insight • Business Analysis tools (SWOT, PESTLE etc)			30
	Managerial Specialist	2	• Storyboarding • Business reports (including Executive Summary)			30
Modelling and Forecasting	Specialist	3	• Choosing the relevant forecasting method • Choosing the relevant smoothing parameter • Time series analysis (including ARMA /ARIMA) • Scenario analysis (what if...)		Test	10
	Specialist	2	• Forecast outturn • Seasonality / phasing • Time series analysis (moving average,		Test	10

			weighted moving average etc)			
Presentation Skills	Managerial Specialist	3	• Presenting to wider audience • Presenting to external audiences • Multimedia			10
	Managerial Core	2	• Presenting to larger groups • Presenting to more senior staff • Presenting different audiences			10
	Managerial Core	1	• What makes a good presentation? • Presenting to small groups			10
Professional Development	Specialist	3	• Development of CPD materials			10
	Specialist	2	• UKCHIP level 2 / 3 or similar		Certificate	10
	Specialist	1	• UKCHIP level 1 or similar • Development portfolio		Certificate Portfolio	10
Project / Programme Management	Managerial Specialist	3	• PRINCE2 Practitioner • MSP Practitioner		Certificate	10
	Managerial Core	2	• PRINCE2 Foundation • MSP Foundation		Certificate	10
	Core	1	• APM Introductory Certificate in Project Management		Certificate	10
Staff Management	Managerial	3	• Addressing capability • Disciplinary procedures • Mentoring			20

	Managerial	2	• 1:1s • Attendance management • Setting objectives			20
Statistics	Specialist	3	• Regression • Standardisation		Test	10
	Specialist	2	• SPC charts • Funnel plots		Test	10
	Core	1	• Mean, mode, median • Standard deviation		Test	10
Knowledge						
Clinical Coding	Specialist	2	• HRGs • Groupers		Test	20
	Specialist	1	• ICD10 • OPCS • SNOMED CT		Test	20
Contracting	Specialist	2	• Schedule 4 • Schedule 6 • DQIP			10
	Specialist	1	• NHS Standard Contracts • PbR • Block • Associates			10
Data Sets	Specialist Core	1	• Commissioning Data Sets (CDS) • NHS Data Dictionary		Test	20
Finance	Specialist	3	• TBC • TBC • TBC			10
	Specialist	2	• Payment by Results • Reference Costs • Tariff			10

	Core	1	• Introduction to Healthcare Finance	Introductory Certificate in Healthcare Finance (HFMA) Introduction to how NHS services are paid for (HFMA)	Certificate	10
Information Governance	Managerial Specialist	3	• IG Toolkit			30
	Managerial Specialist	2	• Standards and guidelines • Information Standards Notices (ISN)		Test	10
	Specialist Core	1	• Caldicott Guidelines • Data protection • De-identification		Test	10
PAS (LE2.2)	Specialist Core	2	• Tracing a patient • Creating a referral • Recording an A&E attendance • Recording an outpatient attendance • Recording an admission		Test	10
	Specialist Core	1	• Navigating the system • Built-in reports • Smart card authentication		Test	10
PAS (Lorenzo)	Specialist Core	2	• Tracing a patient • Creating a referral • Recording an A&E attendance • Recording an outpatient attendance • Recording an admission		Test	10
	Specialist Core	1	• Navigating the system • Built-in reports • Smart card authentication		Test	10
Performance Management	Specialist	2	• Board Reports • Quality Account		Test	10

	Specialist	1	• Körner Returns • Unify		Test	10
Structure of the NHS	Core	1	• Primary Care • Secondary Care • Community Care • Commissioning		Test	10

This list of competencies is not exhaustive and others are requested.

Appendix 3: Role / Skills Mapping

Skills	Role / Level								
	Business Intelligence Analyst			Data Quality Facilitator			Technical Specialist		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Technical Skills									
Data Mining	-	-	O	-	-	O	-	-	O
Database Administration (SQL Server)	-	O	O	-	-	-	-	M	M
Databases (SQL Server)	M	M	M	M	O	O	M	M	M
Reporting Tools (CHKS)	O	O	O	O	O	O	O	O	O
Reporting Tools (QlikView)	O	O	O	O	O	O	O	O	O
Reporting Tools (SSRS)	O	O	O	O	O	O	O	O	O
Spreadsheets (Excel)	M	M	M	M	O	O	M	M	M
Business Skills									
Business analysis	M	M	M	O	O	O	O	O	O
Modelling and forecasting	-	O	O	-	O	O	-	O	O
Presentation skills	M	M	O	M	O	O	M	O	O
Professional development	M	O	O	M	O	O	M	O	O
Project / Programme Management	O	O	O	O	O	O	O	O	O
Staff Management	-	O	O	-	O	O	-	O	O

Statistics	O	O	O	O	O	O	O	O	O
Knowledge									
Clinical Coding	M	O	O	M	O	O	M	O	O
Contracting	O	O	O	O	O	O	O	O	O
Data Sets	M	-	-	M	-	-	M	-	-
Finance	O	O	O	O	O	O	O	O	O
Information Governance	M	O	O	M	O	O	M	O	O
PAS (IPM)	O	O	-	O	O	-	O	O	-
PAS (Lorenzo)	O	O	-	O	O	-	O	O	-
Performance Management	O	-	-	O	-	-	O	-	-
Somerset Cancer Registry	O	O	-	O	O	-	O	O	-

Where equivalent technologies are listed from different suppliers, only one would normally be included in a PDP. For example, an individual could choose either SQL Server or Oracle but not both. There may be certain circumstances, however, where an organisation may require skills in a number of equivalent technologies, eg SSRS and QlikView, in which case both may be included.

The optional competencies give the framework flexibility to accommodate the various technical and analytical roles that are common within business intelligence functions and also individuals' interests and development aspirations.

Appendix 3: Personal Development Plan

Name	Anna Liszt
Job Title	Senior Business Intelligence Analyst
Role / Level	Business Intelligence Analyst / 3
Line Manager	
Date	

Skills	Required Level	Current Level	Comment	Date	Points
Technical Skills					
Benchmarking tools (CHKS)					
Data Mining					
Database Administration (SQL Server)					
Databases (SQL Server)	3	2			30
Reporting tools (QlikView)	3	2			10
Spreadsheets (Excel)	3	2			10
Business Skills					
Business Analysis	3	2			30
Modelling and Forecasting	3	2			10
Presentation Skills					
Professional Development					
Project / Programme Management					
Staff Management					
Statistics	3	2			10
Knowledge					
Clinical Coding					
Contracting					
Data Sets					
Finance					
Information Governance					
PAS (IPM)					
PAS (Lorenzo)					
Performance Management					
Somerset Cancer Registry					
Total					**100**

Appendix 4: The Case for Professional Qualifications

IM&T is widely, and rightly, perceived as holding the key to delivering transformative healthcare and there has never been a greater demand for IM&T skills and yet there is little standardisation in the way that we recruit, develop and assess our staff.

Within business intelligence, there is an acute requirement for highly skilled professional analysts who can combine business knowledge with technical skills to add value to data and reporting. There is currently no systematic approach to staff development and so often these skills are procured at high cost from consultancy firms.

Structured career progression is non-existent for most of our staff with the exception of those on the NHS Graduate Management Training Scheme, and even this is designed to develop *managers* rather than *specialists*.

Most professions are underpinned by professional qualifications which complement and extend academic qualifications. It is usual to study towards professional qualifications whilst employed so that individuals are able to add practical experience to academic grounding.

There are currently no professional IM&T qualifications with the exception of methods (eg. ITIL, PRINCE2) and industry certifications (eg. Microsoft, CISCO). Often we send staff on courses who return with certificates which merely certify course attendance and do not assess Skills.

Ultimately, the ideal outcome would be the development of professional qualifications for IM&T staff similar to those for Finance staff with Chartered, Diploma and Certificate awards, with career progression being linked to their attainment.

We recognise that professional qualifications are a longer-term objective, however, we believe that lack of professional qualifications in IM&T is a major impediment to IM&T being taken seriously as a profession and, therefore, someone needs to take the initiative. The BISF is intended to be a step in the right direction.

It is hoped that the development of professional qualifications will be taken up by bodies such as UKCHIP* probably in partnership with an academic institution, and that these will, in due course, subsume our recommendations.

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*. http://www.ukchip.org/