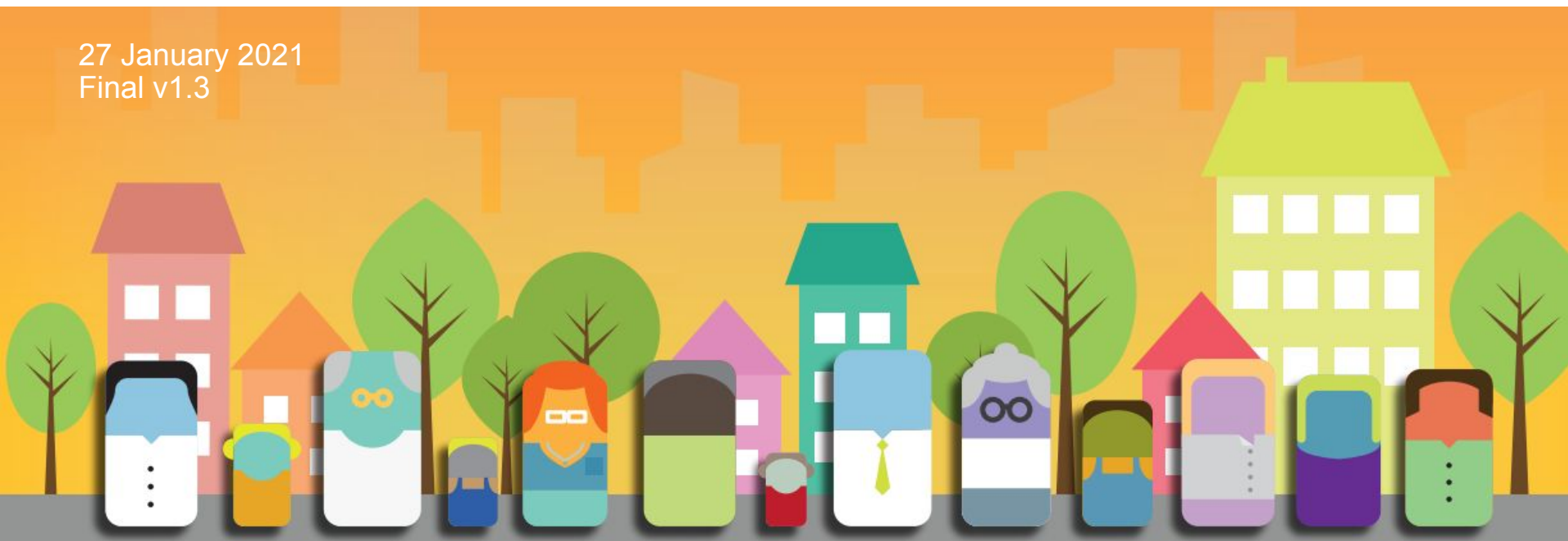# Business Intelligence Strategy and Roadmap

Mid and South Essex Health and Care Partnership

27 January 2021
Final v1.3

Working together for better lives

Contents

Document Sections

Executive summary

Problem, approach and vision statement for BI

Defining the problem - Business Drivers - The Why (Internal and External)

The Mid and South Essex (MSE) Health and Care Partnership (HCP) is moving towards becoming an Integrated Care System (ICS) and requires data and business intelligence capability to support its strategy and to apply a system approach to capturing, analysing and using data to better plan and execute its priorities. At present there are separate data sources, flows, and reporting systems between commissioners and providers, and these remain largely unlinked to wider system partners (e.g. local authorities, community and voluntary sector organisations). There are complexities in data sharing and information governance, and a mixture of internal and external resources that are not aligned around a common set of priorities. There are also separate processes for managing operational performance that are often misaligned.

Our approach

During this 10-week piece of work the first 6-8 weeks were spent gathering information about the as-is BI landscape across the HCP through 22 stakeholder interviews, 3 workshops, 102 questionnaire responses, and 8 BI App Catalogues. Stakeholders from 10 organisations across the HCP were engaged. These findings were then analysed and key themes and challenges were drawn out. A target future state and BI strategy was then designed based on a combination of this analysis and experience from other organisations. A roadmap was then developed detailing activities and timelines required to reach the future state over the next three years. The BI strategy and roadmap was reviewed regularly and fine tuned by the core team.

Vision statement

The following vision statement, as well as a set of supporting design principles, were developed and agreed upon by the core team. The vision statement, alongside the design principles, should act as the anchor point for the BI strategy and set the foundation for accomplishing the HCPs goals. The statement should be reviewed and agreed by the virtual BI hub's strategic board at the beginning of the roadmap journey.

"The Mid and South Essex Health and Care Partnership will use data to provide insight and enable evidence-based decision making with the aim of improving the health and wellbeing of the local population, reducing inequalities and addressing current and future needs."

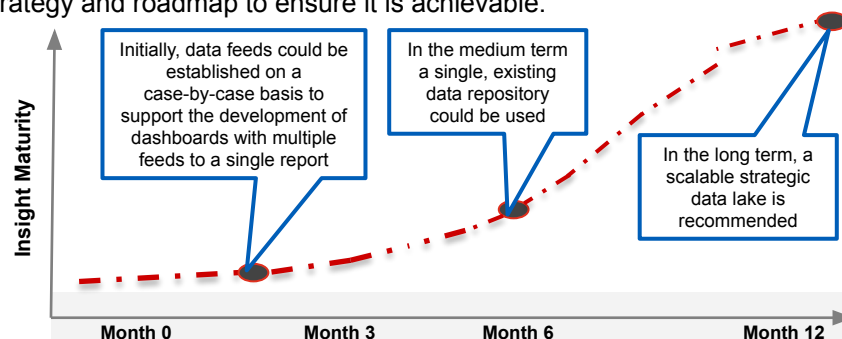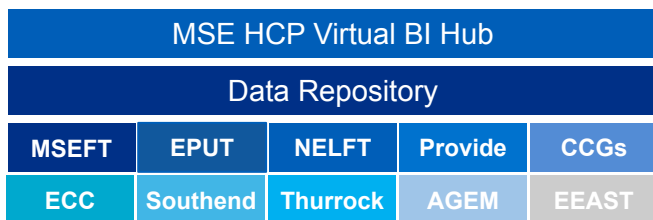# A BI strategy with an achievable scope and approach

Scope of this strategy

The BI Strategy and Roadmap set out in this document is focused on developing a BI capability to support the HCP. This strategy is not designed to transform the internal BAU reporting and BI carried out by each of the organisations that make up the HCP but where BI is required that spans multiple organisations, it will be covered within the remit of this strategy and roadmap.

This strategy proposes the development of a virtual BI hub which will support HCP-wide data and BI initiatives alongside current functions within existing organisations. This virtual BI hub will use a central data repository designed to integrate key datasets from different organisations to be used on HCP level BI services. It is important to note that this BI strategy and roadmap is designed to work independent of the choice of central data repository. The different layers of the future state are depicted in lower left diagram.

Incremental approach

This BI strategy is not recommending a 'big bang' approach to developing a HCP BI capability, as there is simply too much to do for this to work. Instead a pragmatic, incremental approach is outlined. This is best described through the example of the central data repository that will be needed to provide the data for the HCP BI services. There is an ambition to develop a data lake to form this repository, but it will take 12 months or more to develop this so, in the meantime, smaller scale repositories need to be used. Examples are given in the lower right diagram. This incremental approach needs to be applied to all elements of this BI strategy and roadmap to ensure it is achievable.

MSE HCP Virtual BI Hub				
Data Repository				
MSEFT	EPUT	NELFT	Provide	CCGs
ECC	Southend	Thurrock	AGEM	EEAST

Insight Maturity

Initially, data feeds could be established on a case-by-case basis to support the development of dashboards with multiple feeds to a single report

In the medium term a single, existing data repository could be used

In the long term, a scalable strategic data lake is recommended

Month 0   Month 3   Month 6   Month 12

Overview of recommendations

Following extensive engagement, key challenges have been identified across each of the five domains set out below. Based on these challenges, this report makes 29 recommendations to be delivered over a two year period to improve BI provision across the HCP.

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		HCP-level technical design principles
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

Outcomes associated with the recommendations

The recommendations set out in the report have been prioritised into three phases (covering 0-3 months, 4-12 months and 13-24 months), with distinct outcomes targeted at the end of each phase as set out below. Timelines included in this report are indicative at this stage and will be further developed through a Programme Business Case, governed by a BI strategy board.

Phase 1: Delivering 'quick wins' (0-3 months)

Fully developed pilot use case(s):
- Key stakeholder involvement at the start so benefits are aligned with wider HCP goals.
- Tangible benefits for all organisations within HCP.
- Providing early impact that supports better care for the population.

Clear, aligned BI strategy, vision and design principles
- Using the BI Strategy and Roadmap report as a starting point for a Programme Business Case which prioritises areas of focus and contains a detailed plan for implementation of later phases.
- Better aligning reporting requirements and actions to drive improved clinical outcomes.

Established governance structures and communications/engagement plan
- Establishment of a BI strategy board to govern the delivery of the Programme Business Case and the virtual BI hub on an ongoing basis.
- Development of a communication/engagement plan for use across the HCP so all organisations are working towards the same strategic objectives for BI.

Phase 2: Laying the foundations (3-12 months)

Centralised BI function acting as a hub of information:
- Bringing governance, best practice and data sharing agreements into a central location enables easy access for users, reduces variation across the HCP, and improves the quality of reporting.
- This will also help reduce time spent on specific agreements or policies, improving efficiency.

Upskilled, analytics/insight focused BI staff:
- Shift of workforce focus from reactive reporting to forward looking, predictive / proactive reporting.
- A development programme, alongside the recruitment strategy, will help provide a better balance of skills.
- A culture change programme to promote data driven insights, shaping provision of care.

Improved data flows and aligned BI operations across the HCP:
- Investing in the right BI tools and platforms, as well as initiating data improvement programmes will help improve data quality.
- This will reduce variability, as well as drive more accurate reporting, reducing validation time.

Phase 3: Accelerate improvement (13-24 months)

Effective Population Health Management function:
- Integrating data feeds from across the HCP will provide BI teams with access to a broader and richer population dataset which along with the additional analytical skills of the BI Hub team allows more population-level insights to be derived, as well as better monitoring of interventions and their impact.

One source of 'truth' with a self-serve BI platform:
- Data lake will provide a central source of 'truth', reducing the time wasted by organisations trying to interpret data.
- The self-serve BI platform will improve data visualisation and shift the onus onto the end user to understand what exactly they are looking for.

Fully enabled integrated care approach to patient care:
- Better lines of communication and collaboration will support more effective provision of care.
- Central oversight will allow for frequent users of health and care services to be identified up earlier, and organisations can work together to reduce the amount of time these patients spend in care.

A twin track approach for quick wins and sustainability

The size of the challenge facing the HCP in transitioning from the current state to the future state set out in this report can seem overwhelming, especially with each step providing additional challenges. In an industry fraught with failed transformation programmes, it is easy to lose momentum on these large scale projects; it is therefore essential that the HCP get things moving quickly right from the get-go, accelerating the delivery of certain key activities to see some real tangible change early on, leading to some quick wins.

This helps garner support and enthusiasm for the programme, demonstrating the potential of collaborating at the HCP level and crucially, showing people that it's possible to make an impact quickly. This is important for securing buy-in and commitment both for the people directly involved in the programme doing the doing, and for the external stakeholders.

The way to do this is to employ an agile, twin track approach, whereby certain activities are carried out rapidly to produce the equivalent of a minimum viable product to allow certain quick wins. In parallel, longer term activities are carried out in slower time, guided by the learnings from the accelerated activities.

In practice, this means prioritising specific high impact programmes early on, to get widespread stakeholder buy-in; this is why this report emphasises initial activities in the proposed roadmap, to identify and highlight key outputs to expect within 3 months.

Alternative options for accelerating benefits realisation

Whilst this BI Strategy and Roadmap focuses on the aforementioned twin track approach in order to achieve both short term gains and long term foundational change, there is an inherent challenge relating to the time it will take to deliver certain benefits. This inherent challenge stems from having to write a Programme Business Case for buy-in and funding, then having to bring onboard sufficient resource or upskill people before certain work can begin. There is an alternative approach which could allow benefits to be realised faster, though of course this comes with cost implications.

The HCP could opt to reduce the scope of the in-house work to be carried out by the virtual BI hub, and outsource high priority sections of what is needed. For example this BI strategy is designed to address required improvements in both performance reporting and population health management (PHM) across the system. The HCP could instead outsource the PHM aspect of this to a third party who could use their ready-made resources to perform all data cleansing, data manipulation, and dashboard development necessary in a short time frame to provide substantial benefits within weeks.

Some benefits and risks associated with this approach are set out below.
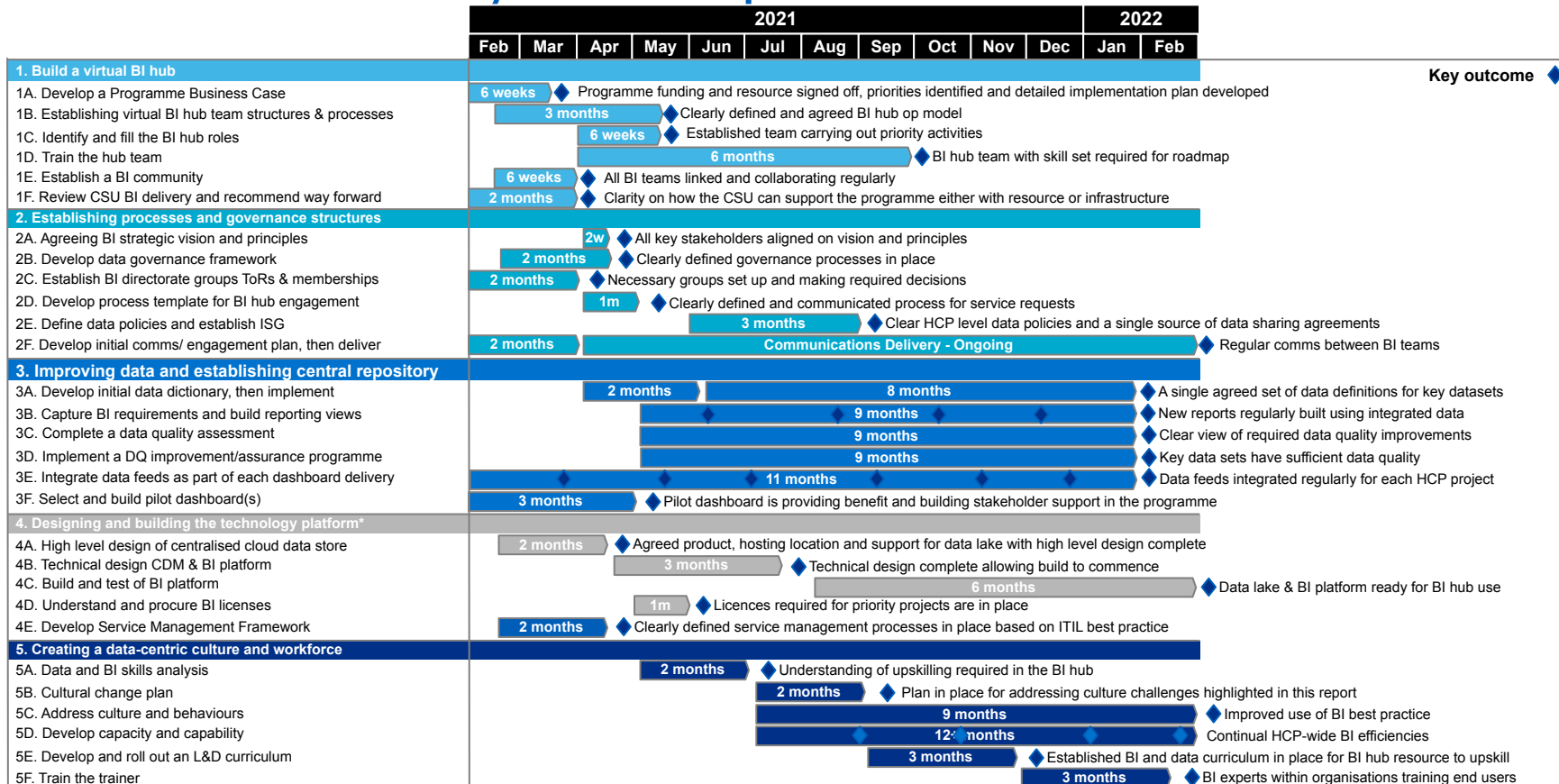
Benefits	Risks
- Rapid realisation of benefits and addressing of immediate high priority problems. - Less up-front investment required. - Significantly reduced remit and workload for the virtual BI hub, lowering the risk of failure of the roadmap BI roadmap. - Spreading of risk. Rather than investing solely on internal development and trusting that it will work, using external resource spreads out the risk.	- Potentially higher cost over the long term. - The investment will lead to short-term benefits, but without the necessary in-house expertise to maintain the developed product longevity will be limited. - Some internal expertise is still required in order to effectively procure and manage outsourced solutions.

While this report is predominantly focused on developing in-house capabilities and solutions, where more detailed design is taking place, outsourced solutions should be considered to identify whether off-the-shelf products can be used in place of larger development projects.

Indicative delivery roadmap over the next 12 months

	2021											2022	
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb

Key outcome ◆

1. Build a virtual BI hub

- 1A. Develop a Programme Business Case — 6 weeks — Programme funding and resource signed off, priorities identified and detailed implementation plan developed
- 1B. Establishing virtual BI hub team structures & processes — 3 months — Clearly defined and agreed BI hub op model
- 1C. Identify and fill the BI hub roles — 6 weeks — Established team carrying out priority activities
- 1D. Train the hub team — 6 months — BI hub team with skill set required for roadmap
- 1E. Establish a BI community — 6 weeks — All BI teams linked and collaborating regularly
- 1F. Review CSU BI delivery and recommend way forward — 2 months — Clarity on how the CSU can support the programme either with resource or infrastructure

2. Establishing processes and governance structures

- 2A. Agreeing BI strategic vision and principles — 2w — All key stakeholders aligned on vision and principles
- 2B. Develop data governance framework — 2 months — Clearly defined governance processes in place
- 2C. Establish BI directorate groups ToRs & memberships — 2 months — Necessary groups set up and making required decisions
- 2D. Develop process template for BI hub engagement — 1m — Clearly defined and communicated process for service requests
- 2E. Define data policies and establish ISG — 3 months — Clear HCP level data policies and a single source of data sharing agreements
- 2F. Develop initial comms/ engagement plan, then deliver — 2 months — Communications Delivery - Ongoing — Regular comms between BI teams

3. Improving data and establishing central repository

- 3A. Develop initial data dictionary, then implement — 2 months / 8 months — A single agreed set of data definitions for key datasets
- 3B. Capture BI requirements and build reporting views — 9 months — New reports regularly built using integrated data
- 3C. Complete a data quality assessment — 9 months — Clear view of required data quality improvements
- 3D. Implement a DQ improvement/assurance programme — 9 months — Key data sets have sufficient data quality
- 3E. Integrate data feeds as part of each dashboard delivery — 11 months — Data feeds integrated regularly for each HCP project
- 3F. Select and build pilot dashboard(s) — 3 months — Pilot dashboard is providing benefit and building stakeholder support in the programme

4. Designing and building the technology platform*

- 4A. High level design of centralised cloud data store — 2 months — Agreed product, hosting location and support for data lake with high level design complete
- 4B. Technical design CDM & BI platform — 3 months — Technical design complete allowing build to commence
- 4C. Build and test of BI platform — 6 months — Data lake & BI platform ready for BI hub use
- 4D. Understand and procure BI licenses — 1m — Licences required for priority projects are in place
- 4E. Develop Service Management Framework — 2 months — Clearly defined service management processes in place based on ITIL best practice

5. Creating a data-centric culture and workforce

- 5A. Data and BI skills analysis — 2 months — Understanding of upskilling required in the BI hub
- 5B. Cultural change plan — 2 months — Plan in place for addressing culture challenges highlighted in this report
- 5C. Address culture and behaviours — 9 months — Improved use of BI best practice
- 5D. Develop capacity and capability — 12 months — Continual HCP-wide BI efficiencies
- 5E. Develop and roll out an L&D curriculum — 3 months — Established BI and data curriculum in place for BI hub resource to upskill
- 5F. Train the trainer — 3 months — BI experts within organisations training end users

* Section 4 includes activities (in grey) that will be governed through through the digital board as part of the strategic data lake work. It is important to note that work is underway to further develop this timeline as part of the strategic data lake business case and therefore it is subject to change.

1 Introduction

Purpose of this document and intended audience

The content outlined through this document is the result of a ten week assessment and strategy project commissioned in light of the need for the Mid and South Essex (MSE) Health and Care Partnership (HCP) to develop a system level Business Intelligence (BI) capability to aide its transition to becoming recognised as an Integrated Care System (ICS).

The purpose of this document is to:

- Reflect the as-is state of BI functions across the HCP (as captured through interviews, questionnaires, workshops and a BI app catalogue);
- Identify the current challenges faced by suppliers and customers of BI;
- Outline the gap between the as-is and the required to-be state; and
- Provide a clear BI strategy and roadmap that will allow the HCP over the next 3 years to establish an effective HCP-level BI function.

This document should be considered as a "working" or "living" document which may change or update as the programme progresses and new decisions or requirements emerge.

Scope of this strategy

The BI Strategy and Roadmap set out in this document is focused on developing a BI capability to support the HCP. This strategy is not designed to transform the internal BAU reporting and BI carried out by each of the organisations that make up the HCP but where BI is required that spans multiple organisations, it will be covered within the remit of this strategy and roadmap.

Intended audience

This document is intended for: members of the MSE HCP board, senior members of organisations across the HCP in roles relating to BI, strategy and performance in healthcare, and BI team leads in each of the organisations making up the HCP.

Background and context

The HCP is a partnership of all the NHS organisations and local authorities that are responsible for health and wellbeing for the 1.2m population in MSE. The MSE HCP is moving towards becoming an Integrated Care System (ICS) and it requires data and business intelligence capability to support its strategy and apply a system approach to capturing, analysing and using data to better plan and execute its priorities.

At present there are separate data sources, flows, and reporting systems between commissioners and providers, and these remain largely unlinked to wider system partners (e.g. local authorities, community and voluntary sector organisations). There are complexities in data sharing, information governance and Data Services for Commissioners Regional Offices (DSCRO) requirements, and a mixture of internal and external resources that are not aligned around a common set of priorities. There are also separate processes for managing operational performance that are often misaligned.

As a result there is no "single version of the truth" to underpin evidence-based decision making and this undermines the HCP's ability to focus on improving services for residents.

The HCP has the ambition to create an integrated BI function across the ICS and commissioned this piece of work to undertake an initial diagnostic that provides a baseline and gap analysis of current information flows, BI tools and workforce capabilities, before then designing a BI strategy and roadmap that presents options for future ICS BI configurations and an implementation plan for delivery.

Why are we changing?

The HCP is moving towards becoming an ICS and it requires integrated data and business intelligence capability to support this transition.

What do the patients/citizens want?
- Data entry once only
- Efficient care and service based on accurate and up to date data
- Safe, transparent and consensual use of personal data

What do the organisations that make up the HCP want?
- HCP-level oversight to identify duplication of effort across organisations and to address this by implementing changes to streamline processes
- To have access to data from other organisations
- Less focus on performance reporting, and more focus on BI that will improve patient/citizen care
- Clear governance and direction at a HCP level to know who to go to for information and access to data
- Clear communication channels which show all initiatives and data analysis out in the organisation

What does the HCP board want?
- To have a data and BI capability to support its strategy and apply a system approach to capturing, analysing and using data to better plan and execute its priorities
- To have a clear future vision of BI which is communicated across the HCP

> " *Across the HCP we are data rich and information poor"*

> " *We need less focus on performance metrics, more focus on improving patient/citizen care"*

> " *My number one frustration is **multiple versions** of data"*

Our approach

During this ten week piece of work the first 6-8 weeks were spent gathering information about the as-is BI landscape across the HCP through a series of interviews, a questionnaire, and a BI app catalogue. The findings were then reviewed and the strategy and roadmap was developed before being reviewed and fine tuned by the core project team.

Conduct stakeholder interviews	Review
Develop & distribute online questionnaire	Review
Distribute BI app catalogue	Review

Strategy & roadmap development

Roadmap prioritisation & handover
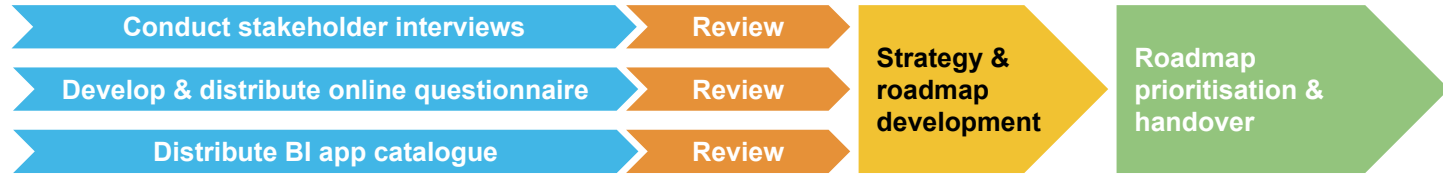
Engagement across MSE HCP in producing this document

This document has been produced with input from a range of individuals from organisations across the MSE HCP. Further details on the stakeholders engaged in the creation of this document can be found in Appendix 1.

| 41 stakeholders interviewed | 10 organisations engaged | 102 questionnaire responses | 8 BI app catalogues collected |

2 Current state analysis

Current state analysis

In this section the findings of the as-is state analysis of the BI capability across the HCP are presented. These findings were gathered using three main methodologies:
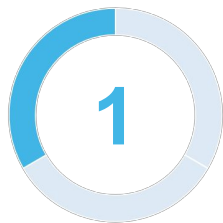
1 **Interviews**

2 **Questionnaire**

3 **BI app catalogue**

The purpose of this section is to explore:

- The approach and methodologies used when gathering information via the interviews, questionnaire, and BI app catalogue.
- The key themes and challenges gathered through the interviews and questionnaire, categorised by the Process, Organisation, People, Information, Technology (POPIT) model areas.
- The organisational structure and expertise breakdown in the HCP, as well as the systems used, based on the BI app catalogue responses.

POPIT model

The POPIT model was used in designing the questions for both the interviews and the questionnaire, and has been used widely throughout this project to provide a holistic approach in both understanding the as-is landscape and designing the future state. **The as-is findings in the subsequent slides are presented categorised by POPIT area.**

The POPIT model is a quick and easy approach used consider all business aspects at the outset and throughout any business change. It provides a framework to derive a comprehensive and integrated approach for understanding the dependencies of the proposed change on the hard and soft aspects within the HCP.
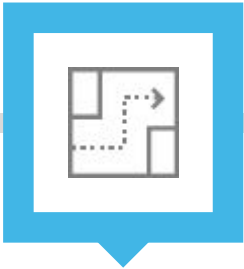
Processes	**Organisation**	**People**	**Information**	**Technology**
This section looks to better understand how processes are designed and implemented across organisations and the wider HCP	This section looks to better understand the governance structures in place across the HCP with specific focus on organisational governance groups established to encourage consistency and strategic oversight	This section looks to better understand the people within your organisation, assessing the skills, capabilities and culture in place across the wider HCP	This section looks to understand how data can be better used in your organisation, identifying any inefficiencies or barriers limiting optimal use of data and information across MSE	This section looks to better understand the technology used across organisations within the wider HCP, particularly looking at the potential uses of advanced technologies

Interview methodology

The aim of the interviews as a whole was to gather an in-depth picture of the as-is BI landscape across the HCP, to get a clear view of the existing challenges, and to gather views on what the future should look like. In order to get sufficient breadth, interviews were held with each of the organisations that make up the MSE HCP (including Arden and GEM Commissioning Support Unit and grouping the five Clinical Commissioning Groups together). Additionally, in order to provide sufficient depth within organisations, two separate interviews were held with each organisation, as described below:

BI team interviews

Interviews with members or leaders of the BI teams in each organisation were held in order to gather in-depth views of the as-is BI tools, processes, skills and the day to day challenges of working in and running the BI team, with a specific focus on interactions with the HCP and other organisations in the area.

Senior interviews

Interviews with senior members of each organisation were also held to gather a more strategic set of views on the current challenges around BI both within their organisation and at a HCP level. These interviews were also used to understand the BI capability of that organisation from an end-user perspective.

Feedback loop approach

Following each interview the key findings were distilled down in terms of the as-is state, key challenges, key opportunities and vision for the future HCP BI capability. The findings of each interview were then used to guide the questions that were asked in future interviews to help increase the amount of useful insight could be captured. Any gaps in the gathered knowledge were then filled by following up with the interviewees with questions and requests for useful documents.

Questionnaire methodology

The interview findings were supplemented with a questionnaire which was used to gather a wider range of views than was possible through the interview process. The questionnaire was filled out by employees from various teams and of different levels of seniority across the ten organisation.

What did the questionnaire cover?

The questionnaire was developed using a process which is explained in Appendix 2. The questions were formed using the health analytics adoption model (HAAM) as a basis; this model is explained initially on page 20 and further in Appendix 3. The questionnaire itself consisted of 39 questions categorised by each of the five POPIT model areas. The questions varied between offering a sliding scale answer (e.g. Strongly Disagree to Strongly Agree), and allowing free text answers when more detail was required or when suggestions & ideas were requested.

Who received the questionnaire?

The questionnaire was distributed to over 100 people across all organisations in the MSE HCP. The recipient list for each organisation was drawn up by the core project team and key stakeholders involved in the project. Recipients ranged from senior leadership positions to teams working on day-to-day BI or operations.

How were the responses interpreted?

The methods for interpreting the questionnaire results were two-fold. Firstly, in a qualitative way, key themes and challenges could be drawn out by reading through the free text responses and by comparing the scores across the various POPIT model areas per organisation. Secondly, the quantitative results were analysed and used to score organisations (and the HCP) on a scale of "Exposed", " Viable" or "Future ready". Finally, the HAAM model and its levels was used to assess the maturity of the organisation as a whole against these defined stages of maturity.

BI app catalogue methodology

The BI App Catalogue is a template for gathering detailed information about systems and team capability.

What information is gathered in the BI app catalogue?

- **Technical information** - This section gathers detailed information about the applications and systems used by a each organisation that could be relevant to the central HCP BI function. This information provides a useful starting point for developing a picture of what data can be held centrally and reported on. The catalogue also gathers information regarding the costs and contracts of the systems to help identify cost saving opportunities through potential cost savings.

- **Team capability information** - This section provides an understanding of the size of the BI teams in each organisation as well as showing the spread of BI skills and experience between management roles, technical development roles, and BI analyst roles.

Who completed the BI app catalogue?

The BI app catalogue template was sent to the BI leads from each of the 10 organisations in the HCP to complete. The majority of organisations provided a response, though in some cases resource was not available to complete the template due to increasing pressures of COVID-19 during winter 2020. This was exacerbated by the fact that information about systems and team sizes was often not readily available.

How has the information captured in the BI app catalogue been used?

A high level summary of the results is presented in this report. The information was used to guide the development of the strategy and roadmap with the technical information guiding the timelines for establishing the strategic data lake, and the team capabilities guiding the approach to resourcing the future HCP BI capability.

Health analytics adoption model (HAAM)

What the HAAM model is

The Healthcare Analytics Adoption Model (HAAM), shown to the right, is a framework that provides a systematic assessment of an organisation's analytics maturity.

Organisations frequently operate at various stages of maturity in each level. In that regard, the model is not necessarily linear in its progression.

How the HAAM model has been used

The full HAAM model criteria (see Appendix 3) were used as a basis for developing the questionnaire so that questions covered a breadth of health analytics topics.

HAAM model

Level	Title	Description
Level 9	Direct-to-Consumer Analytics & Artificial Intelligence	Putting member data, analytics & AI in member's hands so they can own more of their health and healthcare decisions
Level 8	Personalized Medicine & Prescriptive Analytics	Tailoring member care based on population outcomes and genetic data
Level 7	Clinical Risk Intervention & Predictive Analytics	Organisational processes for intervention are supported with predictive risk models
Level 6	Population Health Management & Suggestive Analytics	Tailoring member care based upon population metrics
Level 5	Waste & Care Variability Reduction	Reducing variability in care processes, focusing on internal optimisation and waste reduction
Level 4	Automated External Reporting	Efficient, consistent production of reports & adaptability to changing requirements
Level 3	Automated Internal Reporting	Efficient, consistent production of reports & widespread availability in the organisation
Level 2	Standardized Vocabulary & Patient Registries	Relating and organising the core data content
Level 1	Enterprise Data Operating System	Collecting and integrating the core data content
Level 0	Fragmented Point Solutions	Inefficient, inconsistent versions of the truth; cumbersome internal and external reporting

HCP-wide interview engagement

The spread of people and teams engaged in interviews across the HCP is illustrated below. Overall **22 interviews** were held with **41 stakeholders** across **14 organisations** (although the five CCGs were treated as one for the purposes of engagement).

Provide Community Interest Company
3 people were interviewed covering the Business Intelligence and Contracts team and senior leadership

Mid and South Essex NHS Foundation Trust
4 people interviewed covering the Health Analytics team, Strategy & New care models, and senior leadership

Essex County Council (ECC)
7 people interviewed across ECDA[2], Data Analytics, Population Health Management (PHM), Newton Europe[3] and senior leadership

Thurrock Council
3 people interviewed covering the PHM team, the Public Health Improvement team and the Health Intelligence team

NHS Arden and GEM (AGEM) CSU
4 people interviewed from both the MSE team and the national team.

CCGs
13 people interviewed covering each of the five CCGs[1], senior leadership, and the internal BI team

North East London NHS FT (NELFT)
3 people interviewed covering the BI team and senior leadership

East of England Ambulance Service NHS Trust (EEAST)
One person was interviewed from the EEAST BI team.

Essex Partnership University NHS Foundation Trust (EPUT)
2 people interviewed covering the business analysis and reporting team

Southend-on-Sea Borough Council
4 people were interviewed covering the Operational Performance & Intelligence Team, and senior leadership

[1] The five CCGs that are included within the HCP are Basildon and Brentwood CCG, Castle Point and Rochford CCG, Mid Essex CCG, Thurrock CCG and Southend CCG.
[2] Essex Centre for Data Analytics
[3] Newton Europe were providing data and analytics support to Essex County Council at the time of the project.

Questionnaire self assessment results

Before presenting the detailed qualitative interview and questionnaire findings, below are the average figures for how respondents from across the HCP rated the current maturity levels against the POPIT model. Further details on findings by organisation can be found in Appendix 4 and a more detailed breakdown of findings from free text responses can be found in Appendix 5.

Topic	Questionnaire results	Local leader
Process	2.8	THURROCK COUNCIL
Organisation	3.1	NHS East of England Ambulance Service NHS Trust
People	3.1	NELFT NHS NHS Foundation Trust
Information	3.2	NHS East of England Ambulance Service NHS Trust
Technology	2.2	Provide

Exposed — Viable — Future ready

1 ... 5
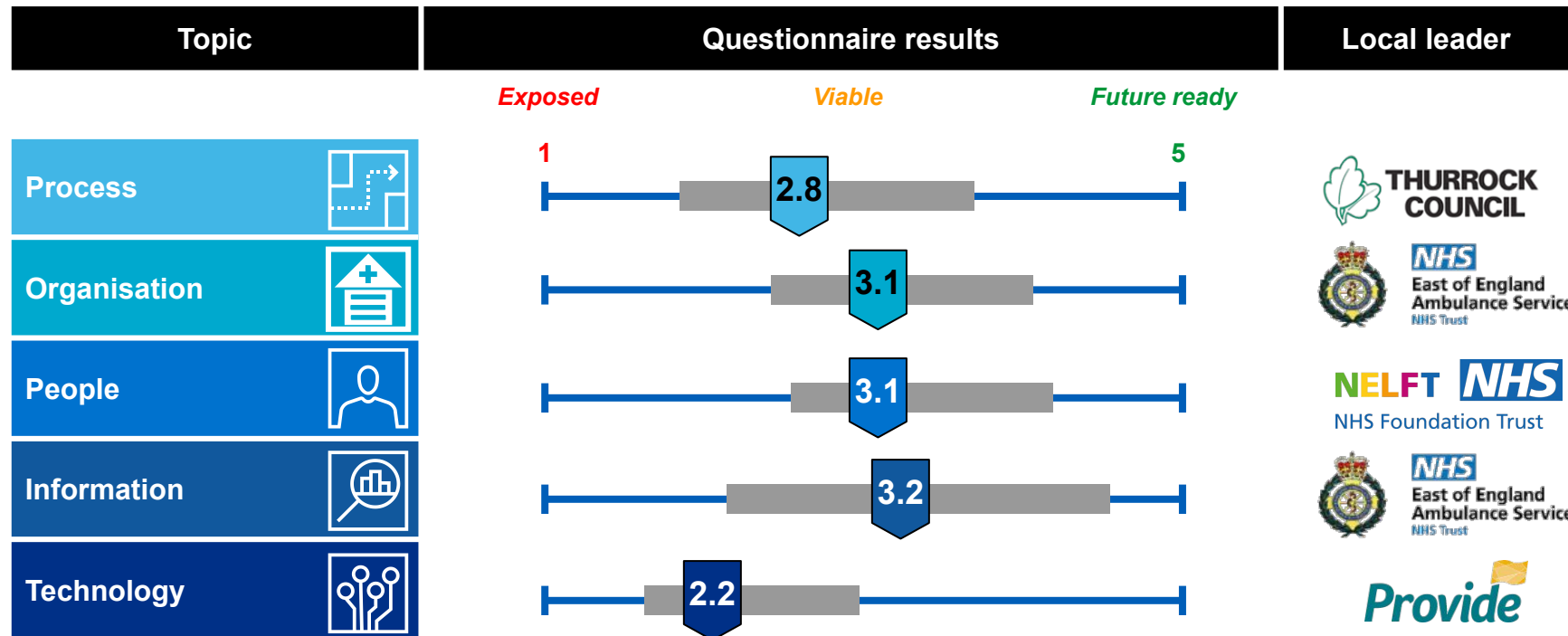
Interview findings - Processes

The below themes were highlighted through interviews as the current challenges faced across the MSE HCP. The quotes on the right are examples comments from the interviews that emphasise the highlighted challenge.

| **Service requests** | The majority of BI teams across the HCP have no formal/structured service request processes in place within their organisation, and rely on ad-hoc processes. |

"Service requests tend to come via phone calls or email, then we'll discuss their requirements with them"

| **Communication** | There are limited processes and forums established linking communications between BI teams across the HCP. Communication and collaboration will need to be addressed to drive progress and HCP BI maturity. |

"There are four or five teams working on some form of population health management in the area, probably with quite a lot of overlap"

| **Duplicative reporting** | There are several examples across the HCP of duplicative and inefficient performance reporting processes, an example of which is the lack of standardisation across the five CCGs which currently have different reporting requirements. |

"Our life would be a lot easier if the five CCGs could align more on the reporting that is required of providers"

Questionnaire results - Processes

The standout figures and key themes from the answers to the process related questionnaire questions are shown below.

Standout figures

87%
Respondents are **unaware of any standardised published processes** detailing how to create new HCP BI reports

3.65
Highest average rating in this section, highlighting over reliance on the knowledge of key individuals within organisations

34%
People **agreed or strongly agreed that data shared** across the HCP is used to **improve patient outcomes**

4%
People believed their organisation was **completely agile or iterative** in their process development

Key themes

Significant amounts of reporting is done via Excel, limiting the amount of automation possible

People are aligned on the fact automation can improve reporting efficiency & accuracy

Some automation already takes place, however is reliant on data quality, consistency, format and manual checks

Level of automation used varies heavily across the HCP

Interview findings - Organisation

The below themes were highlighted through interviews as the current challenges faced across the MSE HCP. The quotes on the right are examples comments from the interviews that emphasise the highlighted challenge.

Central BI oversight	There are several organisations across the HCP with strong internal BI capabilities, which could be better utilised or leveraged for HCP level BI with the right central oversight and direction.

"Each provider tends to provide good BI insights internally but are never asked to provide that externally"

Reporting focus	There is a great deal of focus on arbitrary performance reporting rather than focusing on providing actionable insight to improve the efficiency or quality of care provided.

"We need less focus on performance metrics, and more focus on improving patient/citizen care"

Information governance barriers	Information governance procedures can be viewed as being barriers to sharing data or increasing delays to information sharing.

"98% of GPs use SystmOne but there is still a barrier to using data from it, so simpler data governance around this is needed"

Questionnaire results - Organisation

The standout figures and key themes from the answers to the organisation related questionnaire questions are shown below.

Standout figures

54%
Are aware of some **data governance frameworks, structures, or policies in place** across the HCP

3.40
Highest average rating in this section, highlighting how data governance can enable **data driven decision making**

29%
People **agreed or strongly agreed that information is shared freely and readily** across the HCP

6%
Identified current data policies as **strongly promoting data centric behaviours and encouraging data sharing** across HCP

Key themes

Only around half respondents were aware of HCP wide data governance; those aware highlighted its usefulness

Perspectives on data sharing and how well their organisation shares data varied heavily across the HCP

Many people identified a "single source of truth" dataset as being the key to enriching shared data

Others highlighted system wide policies and sharing agreements as essential to improving data sharing

Interview findings - People

The below themes were highlighted through interviews as the current challenges faced across the MSE HCP. The quotes on the right are examples comments from the interviews that emphasise the highlighted challenge.

End-user culture	The end-users of BI and reporting across the HCP are often reluctant to move away from legacy bespoke reports and may be particularly resistant to self service solutions.

"There is a lack of appetite for a self serve platform; people are used to being spoon fed the same Excel report by analysts every time"

BI resources	Resources are often working at full capacity on their BAU workload, leaving little time to allocate HCP-level work. This has been exacerbated by an increase in ad-hoc work due to the COVID-19 pandemic.

"We have enough problems meeting our internal reporting demands let alone expanding our remit to working at a HCP level"

Technical skills	Whilst there are many generalists or those with data analysts skills across the HCP organisations, there is a lack of deep technical/specialist data skills which will need to be addressed.

"We sometimes find it hard to bring in the deep technical knowledge because it can be very expensive"

Advanced analytics	Very few teams have the tools and/or capabilities to perform advanced predictive analytics on large population data sets

"Advanced analytics resource is very expensive and it's hard to make a business case for it at an organisational level"

Questionnaire results - People

The standout figures and key themes from the answers to the people related questionnaire questions are shown below.

Standout figures

28%

Respondents are **aware of nominated change leaders / champions** which sit across the HCP

88%

People are unaware of any data stewards that sit across the HCP are used to **improve patient outcomes**

44%

Disagreed / strongly disagreed, that they had **sufficient opportunity** to develop their skills and use the latest technologies

3.75

Highest average rating in section, highlighting how data stewards provide an essential service in **reviewing data quality**

Key themes

There is a heavy concentration of Excel and SQL capabilities across the HCP, but limited analytical skills

Only 2 people indicated they had advanced level machine learning and statistical programming skills - no one considered themselves an expert

In addition to technical staff (i.e. analysts), respondents highlighted the need for clinical input as part of delivering a robust, integrated BI capability

The role of data stewards in working with IT and internal BI teams to define what data is needed and review data quality, is seen as an essential service

Interview findings - Information

The below themes were highlighted through interviews as the current challenges faced across the MSE HCP. The quotes on the right are examples comments from the interviews that emphasise the highlighted challenge.

Data access	Organisations can be restricted to limited datasets which they have gathered themselves. The sharing of increased datasets between HCP organisations could provide greater benefits and insight.	*"Unless someone from our organisation made the diagnosis, we won't know if a patient has diabetes or not"*
Data sharing	Organisations can be reticent to share data with other organisations due to complexities in data sharing or lack of clarity around governance. An Information Sharing Protocol will need to established to improve transparency and speed of data sharing.	*"There is a general sense of nervousness across the wider HCP about sharing data, specifically regarding what is permissible to share / distribute"*
Data integrity	Lack of data timeliness and integrity can leave contradicting BI/reports between organisations using the same data sets leading to many hours of manual data manipulation/cleansing.	*"We spend half of our time trying to work out which data we should use"*
Data classification	There is no common data classification approach across the different organisations within the HCP.	*"A consistent data taxonomy and approach to data processing is needed in line with the NHS standards, otherwise merging data will just lead to more work for the organisation BI teams"*
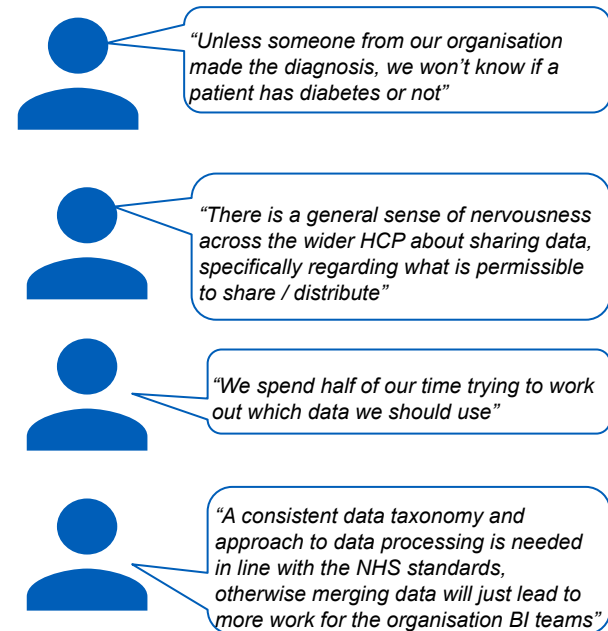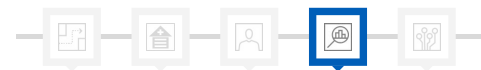
Questionnaire results - Information

The standout figures and key themes from the answers to the information related questionnaire questions are shown below.

Standout figures

43%

Respondents spend at least four hours per week manually reconciling / validating data they receive

3.50

Highest average rating in this section, highlighting that the KPIs in reports produce **useful info that improves patient care**

>16 hrs

11% of respondents spend over 16 hours per week **manually reconciling data** they receive

0

People **strongly agreed** that the data received from other organisations in the HCP has **high data integrity**

Key themes

There are substantial differences in the amount of PHM activity across MSE; in order to drive PHM effectively, input from across the HCP is needed

The key themes around improving data integrity all centred around standardising operations

Standardised templates, processes, taxonomies, data standards are a few of the methods identified

People highlighted the need for KPIs that are outcome focused in order to drive improved patient care

Interview findings - Technology

The below themes were highlighted through interviews as the current challenges faced across the MSE HCP. The quotes on the right are examples comments from the interviews that emphasise the highlighted challenge.

Mis-aligned BI technology	There are a plethora of BI tools and underlying data infrastructure across organisations within the HCP. A more strategic procurement and rationalised approach will be required at the HCP level.	*"It would be helpful for sharing resource if different organisations used the same tools "*
Discrepant systems	Often the same technology has been implemented differently in different organisations. For example SystmOne is used in different ways by different practices.	*"There are hundreds of GPs across MSE using SystmOne but every single one uses it in a different way"*
Lack of advanced BI tools	Very few BI teams across the HCP have the tools, data architecture and skillset to perform advanced analytics such as predictive analytics, AI and scenario modelling.	*"We find it hard to develop advanced BI capabilities because it costs so much and we can't justify it at an organisation level"*
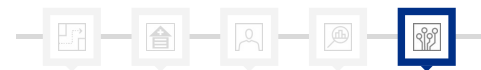
Questionnaire results - Technology

The standout figures and key themes from the answers to the technology related questionnaire questions are shown below.

Standout figures

30%
Respondents identified Microsoft Power BI as their preferred BI and Analytics publishing tool

1.96
Lowest average rating in the questionnaire, highlighting the **limited use of AI / ML** in organisations as of yet

0
People **strongly agreed** that integrations and data flows are **mostly automated with little manual intervention**

2%
People strongly believed there is sufficient investment on improving the integrated BI capabilities across HCP

Key themes

Microsoft Power BI and Excel were by far the most popular choices as people's BI and Analytics publishing tool of choice

The most common cloud based technologies in use across organisations were Microsoft Azure, Power BI, Tableau, Qlikview and SSRS

This section received the lowest scores on average across the questionnaire, highlighting a system weakness

The low score associated with AI / ML uptake highlights the need to improve infrastructure first, in order to enable more advanced uses of the data

BI app catalogue findings - People

The diagram below illustrates the number of resources across each organisation in the HCP in management, technical, and analyst roles. The numbers in each bubble represent the number of FTEs in that organisation in that role, as captured by the BI App Catalogues. Where BI app catalogues were not received or were not fully completed by an organisation, the values have been left blank. Taking into account the partial completion of the BI app catalogue, the relatively low amount of resource supporting technical/development roles across the HCP is stark.

MSE HCP total BI FTEs

Manager / Snr role FTEs - 29.5		Technical / Dev. role FTEs - 20.25		BI / Analyst FTEs - 101.15	
AGEM - 3.5	MSEFT -	AGEM - 0	MSEFT -	AGEM - 8	MSEFT -
CCG - 1	NELFT - 5.5	CCG - 2	NELFT - 3.5	CCG - 2	NELFT - 14.4
ECC - 15	Provide - 0.5	ECC - 10	Provide - 0.75	ECC - 57	Provide - 2.75
EEAST -	Southend - 1	EEAST -	Southend - 1	EEAST -	Southend - 14
EPUT - 3	Thurrock -	EPUT - 3	Thurrock -	EPUT - 3	Thurrock -
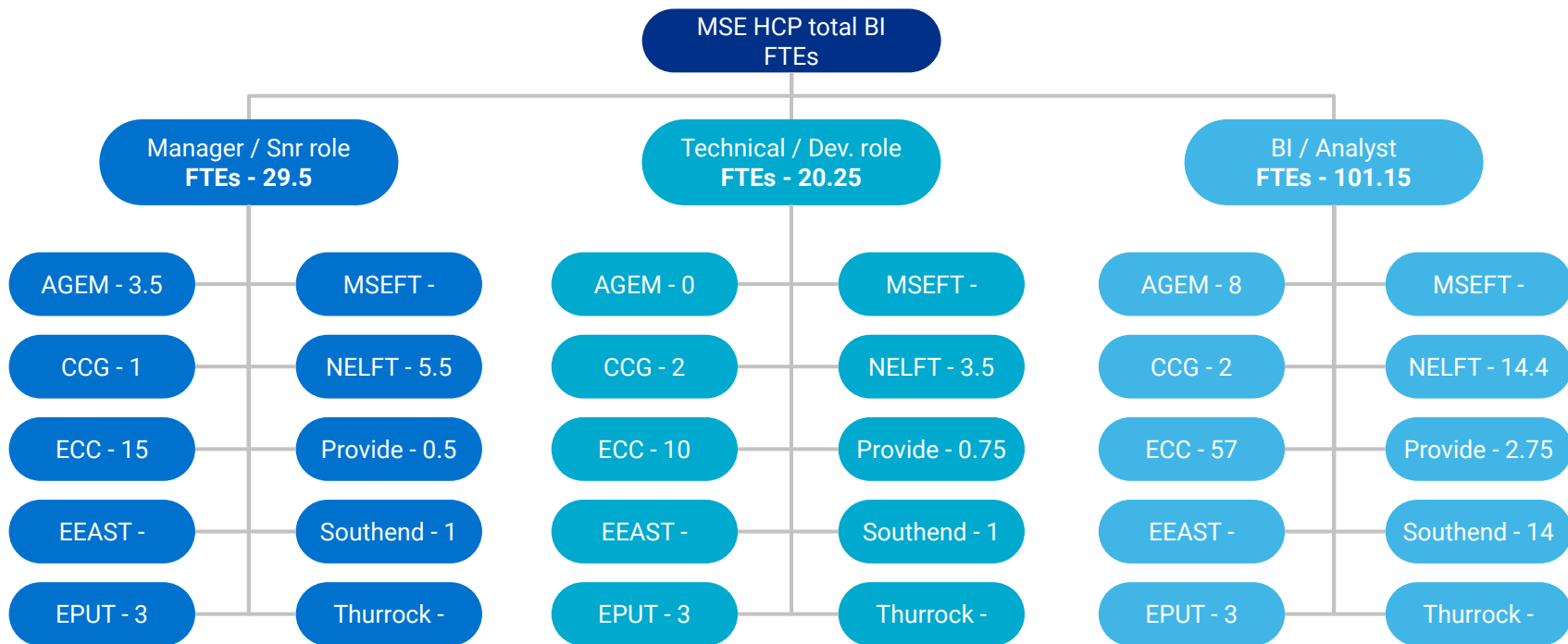
BI app catalogue findings - Systems

A high level summary of the BI app catalogue responses from across the HCP are shown in the table below and on the following slides. Time constraints, partly driven by the Covid-19 response, have meant that not all organisations were able to fill out the app catalogue, and those that did were only able to provide a relatively high level of detail. Further details aggregating full responses to the BI app catalogue have been provided alongside this report.

Organisation	Relevant Applications	System Function	Data
AGEM	Data Management Environment	Centralised data warehouse holding national, local and reference datasets according to appropriate Information Governance standards.	1. NHS Digital Datasets 2. Local data flows 3. Reference Data
	GEMIMA BI Portal	Customer facing BI portal	1. NHS Digital Datasets 2. Local data flows 3. Reference Data
	Palantir Foundry	Big data analytics platform	National Datasets supporting the COVID-19 response
NELFT	Power BI	Deployment of full, in-house BI solution. Automation of reporting procedures.	1. Patient Data 2. Staff Data 3. Incident Data 4. Finance Data 5. PPE data
Southend BC	SQL	Reporting	Unknown
	R	Reporting and data science	Unknown
	ESRI	Geospatial	Unknown
	LiquidLogic	Case management	Client data

BI app catalogue findings - Systems

Organisation	Relevant Applications	System Function	Data
EPUT	Crystal Reports	Operational self service reporting	1. Patient Data 2. Contact Data 3. Activity Data
	SQL Server Reporting Services (SSRS)	Dashboards	1. Patient Data 2. Contact Data 3. Activity Data
ECC	Microsoft Power BI	Centralised reporting	Collated data for reporting
	SQL Server	Datamart	Various databases
	MOSAIC	Adults and children's social care case management	Case management and procurement data
	Capital One	Education and sdditional services	Pupil and schools data
	TCS	Corporate Finance/HR or CSP in which case Oracle Transactional Business Intelligence (OTBI) and Oracle Business Intelligence Publisher (BI Publisher)	Finance & Procurement data

BI app catalogue findings - Systems

Organisation	Relevant Applications	System Function	Data
Provide	SQL Server	Database	Not provided
	Microsoft SQL Server Analysis Services (Cubes)	Analytical processing	Not provided
	SQL server Reporting Services (SSRS)	Dashboards	Not provided
	Microsoft Excel	Analytical processing	Not provided
	Microsoft Access	Database	Not provided
	Power BI	Data visualisation	Not provided
CCGs	SQL warehouse	All three systems are used to produce the Acute Performance Report. Performance reporting of acute constitutional standards and main standards for diagnostics, Cancer and RTT, Ambulance response times and handover delays, ED 4 hour standard, Stroke standards Glasscubes is used for the report distribution.	Acute constitutional standards and main standards for diagnostics, Cancer and RTT, Ambulance response times and handover delays, ED 4 hour standard, Stroke standards
	Excel		
	Glasscubes		

BI app catalogue findings - Systems

Organisation	Relevant Applications	System Function	Data
MSEFT	Hospital Insights	Monitoring tool to explore opportunities for improving utilisation and productivity	Inpatients, Outpatients, Theatres
	Healthcare Evaluation Data (HED)	Benchmarking tool for comparing data and KPIs across different Trusts	Inpatients, outpatients, ED
	QlikView	Data visualisation tool	Multiple datasets from Somerset, Medway and Lorenzo
	SSRS	Data visualisation tool	Multiple datasets from Somerset, Medway and other operational systems
	Power BI	Data visualisation and analysis tool	Multiple datasets from Somerset, Medway and other operational systems

3 MSE HCP's future vision and BI strategy

Future vision and BI strategy

Having established the as-is BI landscape across the HCP, this section covers the development of a strategic vision statement and design principles in order to align the HCP around a single direction for BI.

The key challenges and themes from Section 2 are then built upon and recommended changes are suggested along with their potential benefits. Finally the various recommended changes are prioritised into three phases, and the benefits that will be realised after each phase are highlighted.

The recommended changes are then expanded upon in Section 4 of the report.

The purpose of this section is to explore:

- The agreed BI strategic vision and design principles for the HCP and the benefits of having these.
- The key themes, challenges, opportunities and associated benefits categorised via the POPIT framework
- Which changes to prioritise in phase 1 (0 - 3 months), phase 2 (4 - 12 months) and phase 3 (12 - 24 months) and the high level benefits that could be realised after each phase.

3.1 Strategic vision and design principles

Captured strategic vision statements for BI

A range of views on the HCP's strategic vision for BI have been captured throughout the interviews and during the workshops held during the course of this work. There are a diverse range of views presented from senior management across the HCP organisations. It will be important to agree an overarching vision statement before commencing implementation of the HCP BI Strategy.

*"We need to have **clinical [and operational] buy-in**, they are the ones using it, so we must have clinicians contribute to the shared vision."*

*"The vision statement needs to reflect not only care that we provide but health of residents. It's not always about patients of the system. **We need to think about Population Health**."*

*"We need a flexible, capable team that is looking at **one version of the truth**, that we can buy into; with clear scale & scope."*

*"We need a system that is **flexible** enough to handle the constant changes in both the HCP structure and the technology used across the system."*

*"We need to have the data, infrastructure, and operating model that allows **evidenced based decision making**."*

*"We have a great deal of resource across the HCP, we just need to use it in a more **integrated and efficient** way."*

"Organisational identity needs to come second to overall purpose, and there needs to be commitment from everyone involved"

*"The statement has to be centred around reducing patient harm and **improving patient care** - core to any data usage."*

Emerging vision statements

- Need for clinical input
- Population Health
- Flexibility
- Integrated and efficient use of resource
- Improved patient care
- Joint commitment to a single purpose
- Evidence based decision making
- One version of the truth

Forming the HCP's strategic vision statement for BI

The strategic vision statement below has been agreed by the core team working on the development of the HCP BI Strategy.

The vision statement, alongside the design principles detailed in the following slides, should act as the anchor point for the BI strategy and set the foundation for accomplish the HCP's goals. The statement should be reviewed and agreed by the virtual BI hub's strategic board at the beginning of the roadmap journey.

MSE HCP's Strategic Vision for BI	*The Mid and South Essex Health and Care Partnership will use data to provide insight and enable evidence-based decision making with the aim of improving the health and wellbeing of the local population, reducing inequalities and addressing current and future needs.*

What are the benefits of a strategic vision statement

1. A clear vision statement will act as a **unifying force across the HCP**, and will have a positive impact on organisational effectiveness. When stakeholders understand and buy-in to the vision statement, it brings them together and focuses and aligns efforts so everyone is working towards the same understood goal.

2. A vision statement will act as a **guide for HCP actions and decision making**. If at any point a decision will clearly contradict the vision statement then either the decision should be changed, or the vision statement should be revisited.

3. Finally, a vision statement can be **motivating and inspiring**. When an individual understands and aligns with the core values and vision of the organisation, they are able to readily commit to, and engage in, the organisation's efforts. This will be particularly important for the MSE HCP given the number of different organisations involved.

BI design principles and why they are important

In order for the HCP to develop a well-formed centralised BI capability that meets the fundamental needs of the partnership, a clear and agreed set of design principles are required to guide decision making and direction.

What is a design principle?

A design principle is a rule that is applied consistently to initiatives to provide coherence and alignment in the way things are done.

They should align with and **expand on the strateg**y of the organisation, and the vision for the programme. They provide **fundamental values** which act as the main **parameters or 'guard rails' for the detailed design**, to support delivery in line with the HCP's vision and strategy.

The principles form the criteria to judge the best approach to take in a given situation. It is not always straightforward, even with the principles in place, and at times one principle may need to be favoured over another but the design principles provide the guidance to frame the debate and take a considered approach.

Approach to defining the sets of design principles

The design principles on the following page have been drafted based on information and views gathered through the workshops and interviews that have been held and the questionnaire that has been conducted through this piece of work.

One of the first steps on the roadmap will be to agree and ratify a set of design principles which everyone has bought into which will guide the HCP through it's decision making processes throughout the programme of work.

BI design principles

The BI design principles listed below were developed based on findings from the interviews and questionnaire responses, and ratified by the core project team.

Principle	Rationale
Data should be used as a strategic asset	• Data is a strategic asset that has value to the HCP and must be managed accordingly to deliver effective insight. The HCP should continuously strive to expand the availability and accessibility of data.
Work effectively across the HCP to deliver accurate and timely insight	• BI must be delivered against clearly outlined guidelines and processes so that stakeholders have timely information that supports improved decision making.
Be adaptable to the changing HCP environment	• BI must be flexible and adaptable in light of the continuously evolving technology, tools and services across the different organisations that make up the HCP. Alongside this, knowledge and best practice resulting from new tools and services should be shared across the HCP.
Eliminate duplicative activity	• The HCP must eliminate activity duplication and overlap across organisation members and support efficient and streamlined processes across the system.
Define common data definitions and improve data quality	• Data must be defined consistently throughout the HCP, standardised, understandable and distributed, and there must be a continual improvement in data quality.
Improve decision making and performance of the HCP	• BI should be aligned to a clear business need which supports the realisation of HCP benefits (e.g. improved care, reduced cost or improved performance).
Data should be processed in a secure and authorised manner	• Data should be protected from unauthorised use and disclosure and must be processed in line with relevant legislation and data sharing agreements.

3.2 BI Strategy

Recommended changes across POPIT

This sub-section sets out recommended changes to address the challenges discovered in the as-is data gathering part of this work. Each of the five key POPIT areas is explored one by one, building on key challenges and themes detailed in the current state analysis section and mapping them to recommended changes that will address the challenges.

Processes	Organisation	People	Information	Technology
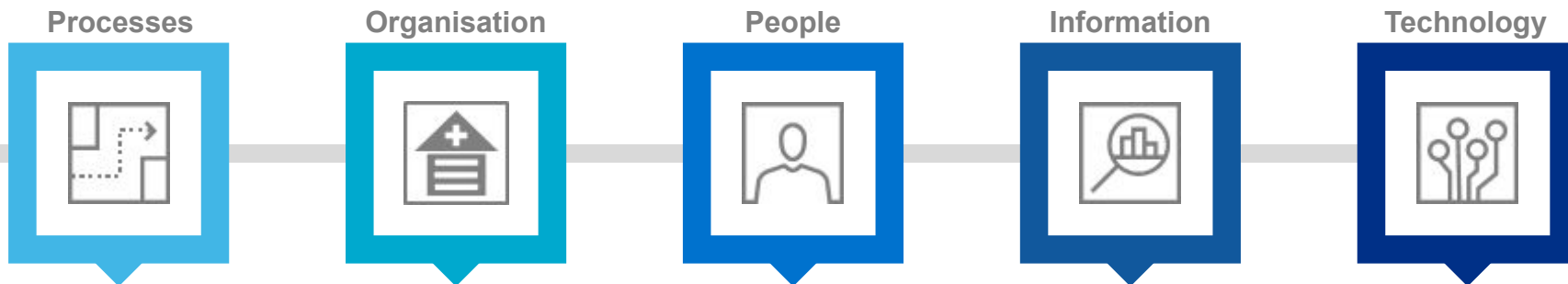
Further details on the recommended changes can be found in Appendix 6 of this report. This includes the key challenges for each POPIT area, categorised into sub themes, and quotes from the interviews or questionnaire, which bring the challenges to life.

The recommended changes required to address each challenge are then shown, and these changes are explained in further detail for each POPIT area on separate slides along with the benefit of the changes, and the suggested priority.

Overview of recommendations by POPIT area

These are all the proposed change plans and programmes, based on the challenges detailed in Appendix 6. These will provide the basis of our approach on how to achieve the desired future state for the HCP.

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		HCP-level technical design principles
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

Prioritisation of changes through a 3 phase approach

A three phase approach is recommended, with the high priority changes (including those that deliver 'quick wins' suggested to start in phase 1, medium priorities in phase 2, and long term priorities in phase 3. Timelines included in this report are indicative at this stage and will be further developed through the Programme Business Case, governed by the BI strategy board.

0 to 3 months

4 to 12 months

12 to 24 months
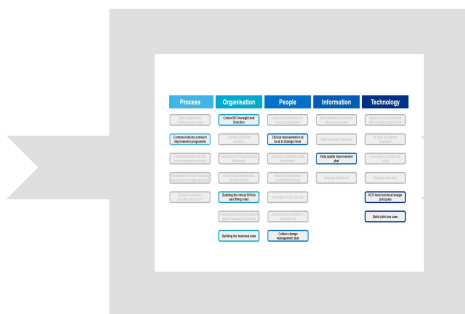
Phase 1
High impact 'quick win' changes are recommended for the first phase, designed to garner support and buy-in for wider transformation of BI across the HCP.
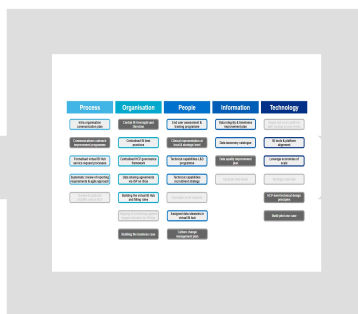
Phase 2
Medium impact changes are recommended over the remainder of the first year of the programme.
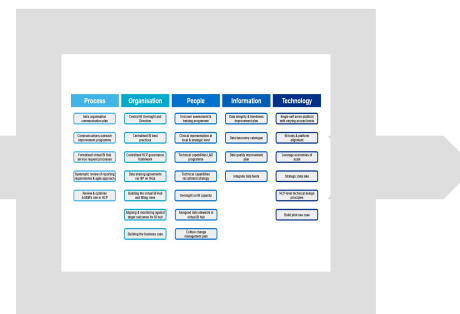
Phase 3
The longer term changes that have a lower initial impact but are fundamental to a sustainable HCP BI capability are recommended in phase 3.

Phase 1: Delivering 'quick wins' (0-3 months)

The highlighted elements below have been identified as priority recommendations to initiate within the first 3 months; they have been selected given the scale of their impact and to drive early buy-in from across the HCP.

| Process	Organisation	People	Information	Technology
Intra-organisation communication plan	**Central BI oversight and direction**	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	**Clinical representation at local & strategic level**	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		**HCP-level technical design principles**
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		**Build pilot use case**
	Develop a Programme Business Case	Culture change management plan		

Headline outcomes and benefits at the end of phase 1

The key headline outcomes expected at the end of the first 3 months (Phase 1) are shown below. These are designed to help highlight the associated benefits of an integrated BI function, as well as drive early stakeholder buy-in and involvement.

Fully developed pilot use case(s)
- Key stakeholder involvement at the start so benefits are aligned with wider HCP goals.
- Tangible benefits for all organisations within HCP.
- Providing early impact that supports better care for the population.

Clear, aligned BI strategy, vision and design principles
- Using the BI Strategy and Roadmap report as a starting point for a Programme Business Case which prioritises areas of focus and contains a detailed plan for implementation of later phases.
- Better aligning reporting requirements and actions to drive improved clinical outcomes.

Established governance structures and communications/engagement plan
- Establishment of a BI strategy board to govern the delivery of the Programme Business Case and the virtual BI hub on an ongoing basis.
- Development of a communication/engagement plan for use across the HCP.

Phase 2: Laying the foundations (3-12 months)

The recommendations below have been highlighted as important foundational plans to initiate within the first 12 months. They have been selected based on aligned HCP priorities, focusing on what is required to establish the foundations for a successful BI capability

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		HCP-level technical design principles
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

Headline outcomes and benefits at the end of phase 2

The key headline outcomes expected at the end of the first 12 months (Phase 2) are as follows. These will help set up the foundations for the future, providing an infrastructure to enable the benefits of an integrated BI function. Successful delivery of the outcomes set out below will be important to achieve the outcomes in Phase 3. For example, all three of these outcomes will support Population Health Management in the HCP.
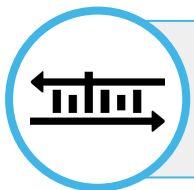
Centralised BI function acting as a hub of information
- Bringing governance, best practice and data sharing agreements into a central location enables easy access for users, reduces variation across the HCP, and improves the quality of reporting.
- This will also help reduce time spent on specific agreements or policies, improving efficiency.

Upskilled, analytics/insight focused BI staff
- Shift of workforce focus from reactive reporting to forward looking, predictive / proactive reporting.
- A development programme, alongside the recruitment strategy, will help provide a better balance of skills.
- A culture change programme to promote data driven insights, shaping healthcare policies and provision of care.
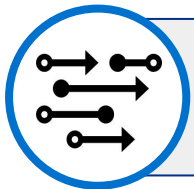
Improved data flows and aligned BI operations across the HCP
- Investing in and aligning on the right BI tools and platforms, as well as initiating data improvement programmes will help improve data quality throughout the process.
- This will reduce variability, as well as drive more accurate reporting, with less time spent on validation activities.

Phase 3: Accelerate improvement (13-24 months)

The recommendations below have been highlighted as essential in driving some of the long term benefits of an integrated BI function, starting after 12 months. They have been selected based on dependencies on the successful implementation of earlier recommendations.

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		HCP-level technical design principles
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

Headline outcomes and benefits at the end of phase 3

The key headline outcomes to expect at the end of the first 24 months (Phase 3) are as follows. At this point, the HCP will be able to realise some of the more impactful benefits of an integrated BI function, driving improved care and outcomes for patients.

Effective Population Health Management function
- Integrating data feeds from across the HCP will provide BI teams with access to a broader and richer population dataset which along with the additional analytical skills of the BI Hub team allows more population-level insights to be derived, as well as better monitoring of interventions and their impact.
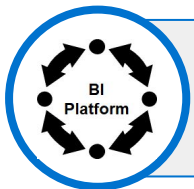
One source of 'truth' with fully implemented self-serve BI platform
- Data lake will provide a central source of 'truth', reducing the time wasted by organisations trying to interpret data.
- The self-serve BI platform will improve data visualisation and shift the onus onto the end user to understand what exactly they are looking for.

Fully enabled integrated care approach to patient care
- Better lines of communication and collaboration across the HCP will support more effective provision of care.
- Central oversight will allow for frequent users of health and care services to be identified up earlier, and organisations can work together to reduce the amount of time these patients spend in care.

4

What does an advancing HCP look like?

What does an advancing HCP look like?

The recommendations in Section 3 have been aligned to five focus areas upon which the HCP will need to deliver in order to advance its BI function:
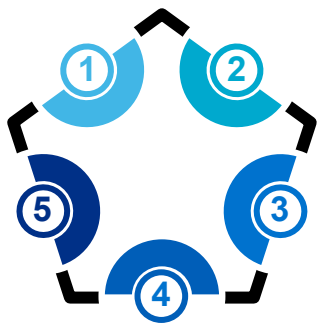
1 **Building a virtual BI hub**

2 **Establishing processes and governance structures**

3 **Improving the data and establishing an agreed central repository**

4 **Designing and building the technology platform**

5 **Creating a data centric culture and workforce**

The change plans outlined in the earlier slides have been mapped onto these 5 key areas, which will act as a structure for the content within each pillar.

The purpose of this section is to explore:

- What an advancing HCP could look like, as well as the associated benefits.
- Specific areas to consider and required changes.
- How the future model will operate and what it will require in terms of support.

4.1

Building a virtual BI hub

Building a virtual BI hub
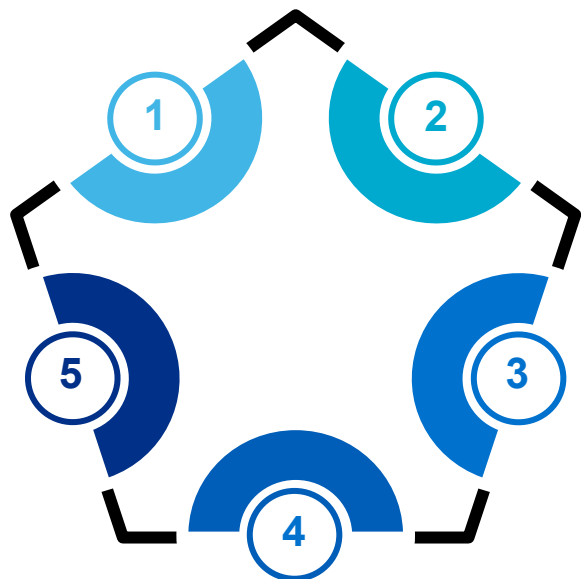
1 **Building a virtual BI hub**

The purpose of this section is to explore:

- What are the challenges associated with the current localised functional model across MSE HCP?
- What are the advantages of a hybrid hub and spoke model?
- How should the virtual BI hub be structured, and how will it interact with the organisations across the HCP?
- What is the remit of the virtual BI hub?
- What roles will be required in the virtual BI hub and how might these be filled?

Mapping recommendations to this focus area
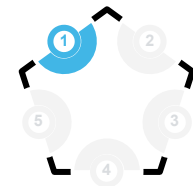
The change plans that map to the building of the virtual BI hub have been highlighted below:

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	**Central BI oversight and direction**	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	**Clinical representation at local & strategic level**	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	**Building the virtual BI Hub and filling roles**	Oversight on BI capacity		**HCP-level technical design principles**
	Aligning & monitoring against target outcomes for BI hub	**Assigned data stewards in virtual BI hub**		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

What is a virtual BI hub and why use it?
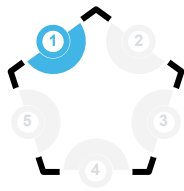
What is a virtual BI hub?

- A virtual BI hub is a centralised function that carries out BI activities using data and input from a range of organisations.
- It is not a physical entity, it is more of a central resource that is widely accessible and provides useful insights.
- As well as optimising data use by generating data driven insights, it also acts as a repository for keeping key information and policies.

Why use a virtual BI hub model over alternative models?

- Virtual BI hubs are highly useful for large areas with multiple organisations with differing data sets, ambitions and competencies.
- This is because they help align organisations, reducing variance and siloes without requiring large, structural change which may be disruptive to BAU processes in implementation
- From research and past experience, alternative models, such as embedded analytics teams tend to work better in more localised scenarios

What are the high level benefits?

- Increased alignment of all aspects of BI.
- Improved output through collaboration.
- The ability to manage a central data repository.
- Central oversight leading to more efficient processes and use of resources.

Use case: Worcester Office of Data Analytics

The Worcester Office of Data and Analytics (WODA)[1] is a virtual hub, where in-house analysts within each applicable agency have supported the delivery of pilots. It was recognised as a high quality virtual hub example in a comprehensive study of Offices of Data Analytics (ODAs) in the UK[2].

The WODA was created in 2017 and, from 2018 onwards, a small team (3.0 FTE) has been recruited to deliver a mix of project management, business analysis, information management and data science skills. Most of the team are part-time and also members of the partner agencies, which helps bring in practical knowledge of working in those organisations. Support from existing in-house individuals or teams is still required for the delivery of some solutions.

[1] Worcester Office of Data and Analytics (WODA), https://www.worcestershire.gov.uk/woda/

[2] State of Offices of Data Analytics (ODA) in the UK, Nesta, December 2018 (https://media.nesta.org.uk/documents/State_of_Offices_of_Data_Analytics_ODA_in_the_UK_WEB_v5.pdf)

Aligning on a virtual BI functional model
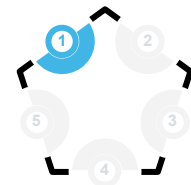
There is focused but limited data sharing between organisations which make up MSE HCP with the majority operating in a data siloed, organisation-specific capacity. In order to support the movement to an Integrated Care System, an equally integrated Business Intelligence function is required.

Current Approach *Fully Localised BI Model*

Description
- Each organisation has their own BI service or equivalent, where it processes organisational specific reports and analysis.
- All decision making on all aspects of BI are driven by the individual function or organisation.
- BI initiatives and goals will be driven based on function or organisation's needs and objectives.
- Some collaboration may exist between organisations although not across the entire HCP.

Future Approach *Hybrid BI Model*

Description
- Each organisation will continue with their business as usual BI/Data and Analytics services processing organisational specific reports and analysis.
- BI teams will be supported by a central virtual BI hub which provides HCP-wide BI, improving consistency and avoiding duplication of effort.
- A centralised virtual BI hub function would set policies, standards and methods, and provide a central point for engagement on BI matters where required.

The pros and cons of current state vs future state
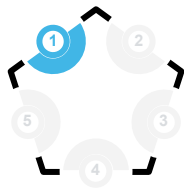
Below are the pros and cons of the current state compared to the future hybrid BI model state.

Current Approach *Fully Localised BI Model*	Future Approach: *Hybrid BI Model*
Strengths 👍	**Strengths** 👍
● Analytical needs aligned to specific organisation and functional areas. ● Team members in BI roles are close to business, issues and customer groups. ● BI resource is on hand to provide immediate tactical inputs for each service provided.	● Standardised processes and methods developed in an system-wide approach. ● Independent and strategic viewpoints shared system-wide. ● Direct reporting to executive sponsor allows for faster, better adoption across the system. ● Functional knowledge and experience accessible through federated structure.
Weaknesses ✖	**Weaknesses** ✖
● Incomplete system-wide view due to focus on organisational issues. ● Limited strategic view of pressures across the wider region. ● Duplication, ad-hoc and not scalable across the system.	● Requirement from organisations to commit BI resources, which are often already in high demand performing business as usual roles. ● Blurred lines of responsibility. ● Culture and working practices can be more difficult to develop than moving to a physical BI hub.

What does the hybrid approach mean?
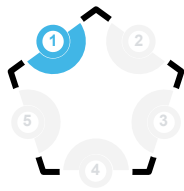
The hybrid approach provides the flexibility to adapt BI services for each organisation which make up the HCP. The strategic drive, management and development should be led centrally, alongside inputs from localised teams which may have personnel sitting across both central and local functions.

Central Function: Core HCP BI services should be delivered from a central function which engages and provides governance to the virtual BI hub, providing guidance and highlighting best practises to deliver high standards of BI and data across the system.

Central Engagement with Local: Central functions engage with local BI teams to advise on best uses of BI technologies and data standards demonstrating best practice and highlighting pockets of excellence to encourage collaboration and knowledge sharing.

Local BI Services: Provide essential analytics and BI services for their organisational and customer needs, whilst providing data and resources towards system-led BI function.
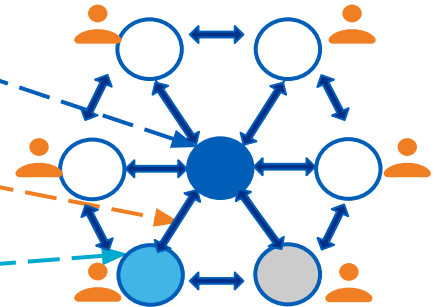
Benefits and value driven from a hybrid approach:
- Provides a **flexible approach** which can be **adapted** for each organisation's capabilities and BI requirements.
- Provides **economies of scale** as core BI services can be delivered centrally.
- Encourages **collaboration** across teams bringing together pockets of excellence to create "communities", and driving innovation rather than disparate pockets of excellence throughout the system. This will lead to more consistency in the data and a reduction of duplicated BI activity as there is a greater understanding of BI analysis which already exists.
- **Citizens and Providers have an improved experience** as more accurate information is provided due to improved consistency in data and BI standards, enabling organisations to make **informed decisions** through data driven insights.
- Meets **HCP needs** while not inhibiting localisation of services across local functions.

Proposed BI hub model
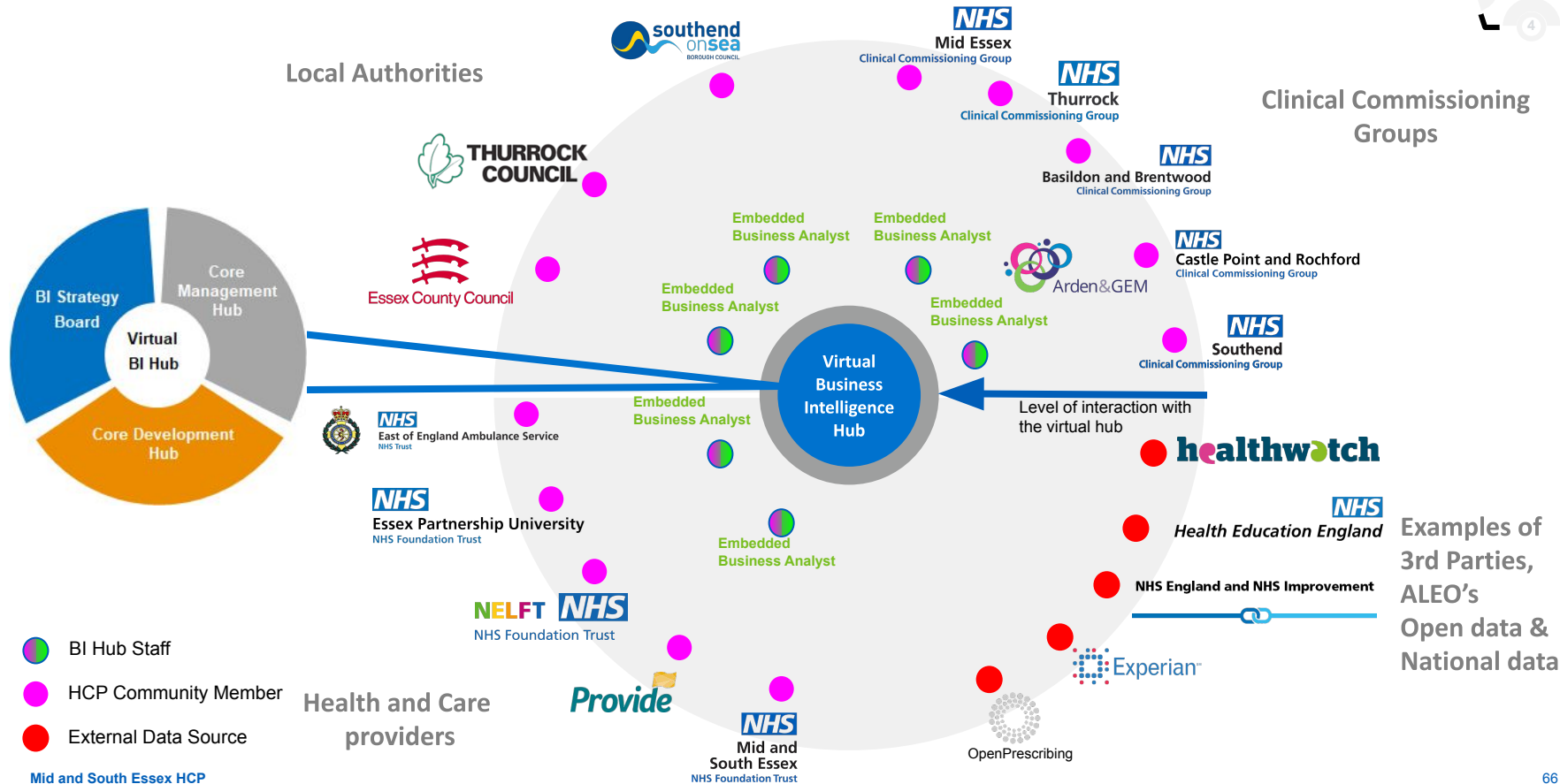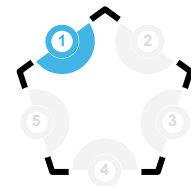
Core functions of the virtual BI hub
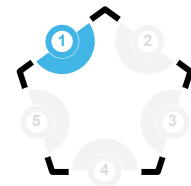
BI strategy board

The BI strategy board will be a strategically driven forum which delivers leadership and direction on virtual BI hub matters. It will provide guidance on policies, standards and practices for each data asset within the functional hub and spoke model approach. It will set the priorities of work for the virtual BI hub. It should be made of representatives from each of the HCP organisations and should drive the direction and ambitions of the partnership. In order to align the outputs of the virtual BI hub to clear clinical outputs, as well as to encourage widespread buy-in, it is essential to have clinical input at the strategic level (i.e. Medical Director or Director of Nursing). The strategic board will responsible for developing and monitoring against target outcomes for the BI hub.

Core management hub

The core management team will operate at the day-to-day, operational level. The core management hub must embed standards within the virtual BI hub with further guidance being delivered through the relationship between the data stewards and local data owners. This group should be made up of representation from across the HCP organisations and is ultimately responsible for BI delivery. It will be comprised of data stewards or data custodians who receive and enact guidance on strategy and policy updates from the BI strategy board. This team will take ownership of data quality management including measuring, benchmarking, and reporting of data quality metrics.
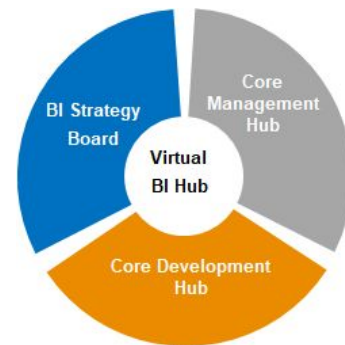
Core development hub

The core development team should consist of technical roles charged with the management, manipulation and processing of all data and BI outputs used at the HCP level. This team should develop requirements and produce BI projects of work as agreed and prioritised by both the BI strategy board and core management team. This team will act as the technical design authorities of these projects. This group should manage the underlying technical infrastructure, making sure security and compliance are adhered to, and provide BI insights against agreed backlog of priority areas. All development work should be completed in agile and iterative development methods and where appropriate should be pushed via a self-service BI model. This group should develop a technical centre of excellence and increase BI and technical competence across all areas of local member organisations.

How responsibilities are divided between BI hub and organisations
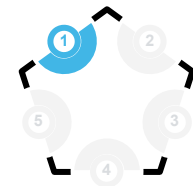
The table below provides a breakdown of how activities related to BI will be distributed across the management and development parts of the BI hub and the wider HCP organisations.

Org specific	**HCP organisation activities**	➔ **Maintain data quality** of inputs to HCP systems. ➔ **Feed** organisational-level **data and information** through agreed HCP pathways. ➔ Responsible for **identifying needs or inputs** around individual organisational level reports and expressing these to the BI hub. ➔ Identify specialist or **bespoke** reporting **requirements** not covered by existing tools, and request that the BI hub produce these insights (these requests will be prioritised alongside other requests across the system).
Virtual BI hub	**Core management hub activities**	➔ **Champion** the HCP wide BI capabilities used to produce reports and dashboards for the HCP. ➔ Use central oversight of BI to **identify common issues and opportunities** across service areas. ➔ **Gather requirements** and verify data from HCP organisations. ➔ Responsible for **strategic-level governance of data management, quality and standards**. ➔ Maintain and update **service management processes and tools**. ➔ **Maintain template**s for common reusable BI reports, to allow self-serve capabilities. ➔ **Signpost existing tools** and resources to organisational staff.
	Core development hub activities	➔ Responsible for all **agreed operational/strategic/public health BI** development across the HCP. ➔ Produce **descriptive and qualitative** analysis for agreed data sets. ➔ Carry out **advanced analytics**, including scenario modelling, predictive and prescriptive analytics. ➔ Create and maintain a set of **standard and agreed BI reports**. ➔ **Coordinate service management** via the use of case management tools and processes. ➔ Create **specialist ad-hoc BI insights** for organisations, when prioritised by the BI strategy board.

Proposed virtual BI hub structure
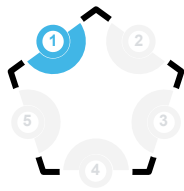
The structure below has been drawn up based on the hybrid Hub and Spoke model design. The virtual BI hub takes its **strategic governance and direction from the BI strategy board.**

Having the correct size of the 'Core Development Hub' team is important in achieve success for the virtual BI hub and it is likely that this size will differ from initial implementation to end state. If a scaled implementation is taken forwards, consideration will need to be given to which of the below roles will be introduced and how many. Due to this, it is important that any proposals are reviewed and refined with the relevant HR business partners and organisational design teams.
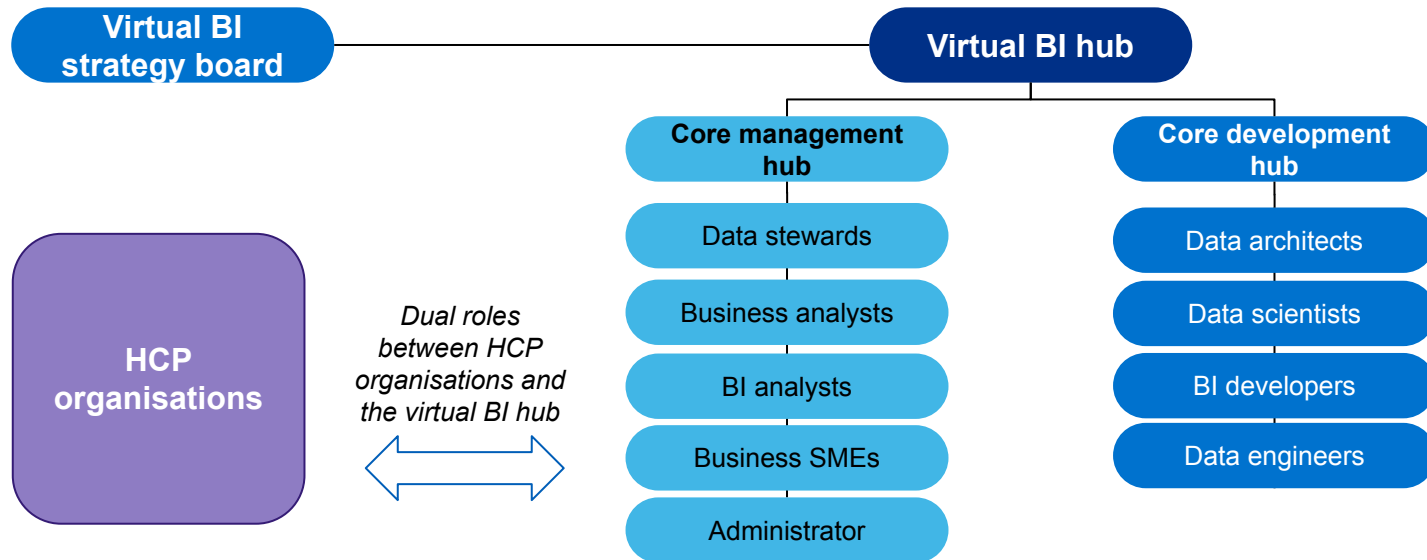
Formation of the BI strategy board
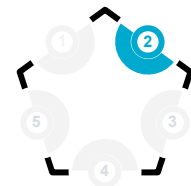
The governance structure for how the Data Analytics and Intelligence Group (DAIG) sits within the wider MSE HCP structure is show on the right.

The DAIG group is made up of around 30 BI leads from the various organisations making up the HCP and is accountable to the Operational Reset Group (ORG). The DAIG is responsible for providing intelligence to specific work stream groups.

It is envisioned that the BI strategy board is formed as an evolution of the DAIG with some more senior membership drawn in from the ORG or the System Leadership Executive Group (SLEG).

It should also be considered whether the BI strategy board should report directly to the SLEG or via other groups such as the ORG.

It is important to note that work is currently underway to review the governance of the HCP's Digital Programme. The exact placement of the BI strategy board within the HCP's governance structure should be considered in light of the results of this review.

Existing Governance Structure

```
                    MSE Health &
                    Care Partnership
                    Board

  PHM              Operational              System
  Steering Group   Reset Group              Oversight &
                                            Assurance Group

  PHM              System data analytics &
  (Data analytics  intelligence group
  group)

                   Infrastructure   Reset planning   System
                                                     performance

        Programme Groups
        (Elective Care Board, Cancer Board, A&E Delivery Board, Mental Health
        transformation Group, Primary Care transformation Group, Ageing Well Board etc.)
```

Identified BI hub roles

Virtual BI hub roles have been defined in line with the capability model and service offering, as well as industry standards. Each role will play an important part in the operation of the virtual BI hub, described in the role summaries below.

Data and BI Lead	**BI Analyst**	**BI Developer**	**Data Scientist**	**Data Architect**	**Data Engineer**	**Administrator**
Responsible for overseeing the BI hub function and its performance, leading the development, management, and ongoing improvement of BI and data capability within the Hub.	*Responsible for collecting, organising and studying data to provide business insight. This role will be HCP focused.*	*Responsible for designing and implementing data, reporting, and dashboard solutions.*	*Responsible for identifying business problems and leveraging data value to address these problems. Likewise this could be a health economist role.*	*Responsible for designing, developing and implementing data models and other data architecture components.*	*Responsible for finding trends in data sets and developing algorithms to help make raw data more useful to the enterprise*	*Responsible for administrative tasks relating to the BI hub such as incident logs, setting up committees, meetings and minutes etc.*

Whilst these are the proposed roles, this is not a comprehensive list and other data and BI-related roles could be considered dependent on the direction the HCP wishes to take the virtual BI hub. Further considerations related to roles include: dependencies for each role (e.g. a data scientist requires high quality data to perform their job), the phasing (at what phase will each role be brought in), feasibility of redeploying/recruiting into these roles, the cost/benefit of each role, whether varying levels of seniority are required (e.g. Junior BI Analyst), and lines of reporting.

Proposed resourcing of the virtual BI hub
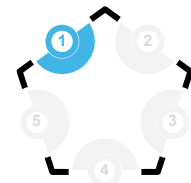
The structure and roles below are proposed as a starting point to resource into the virtual BI hub. They are split between management / business led activities and technical/data focussed activities. The process of how to recruit and fill the roles (either internally across the HCP or with external appointments) and implications on job roles, accountability, contracts, etc, needs to be addressed within the highlighted roadmap activity. **It's proposed that to begin with each organisation provides the equivalent of one FTE, half to a technical role and half to a business role.** There is also scope to explore how to best use AGEM to support the development of the virtual BI hub.

Virtual BI Hub

Core Management Hub

Core Development Hub

Data & BI Lead

Data Stewards (1 per org, 2 hrs per week)

Business Analysts

BI Analysts

Business SMEs (as required from orgs)

Administrator

5.5 x FTE

Data Stewards & SMEs

Technical PM/Lead

Data Engineer

Data Architects

Data Scientist

BI Developers

4 x FTE

Key: = 1 FTE
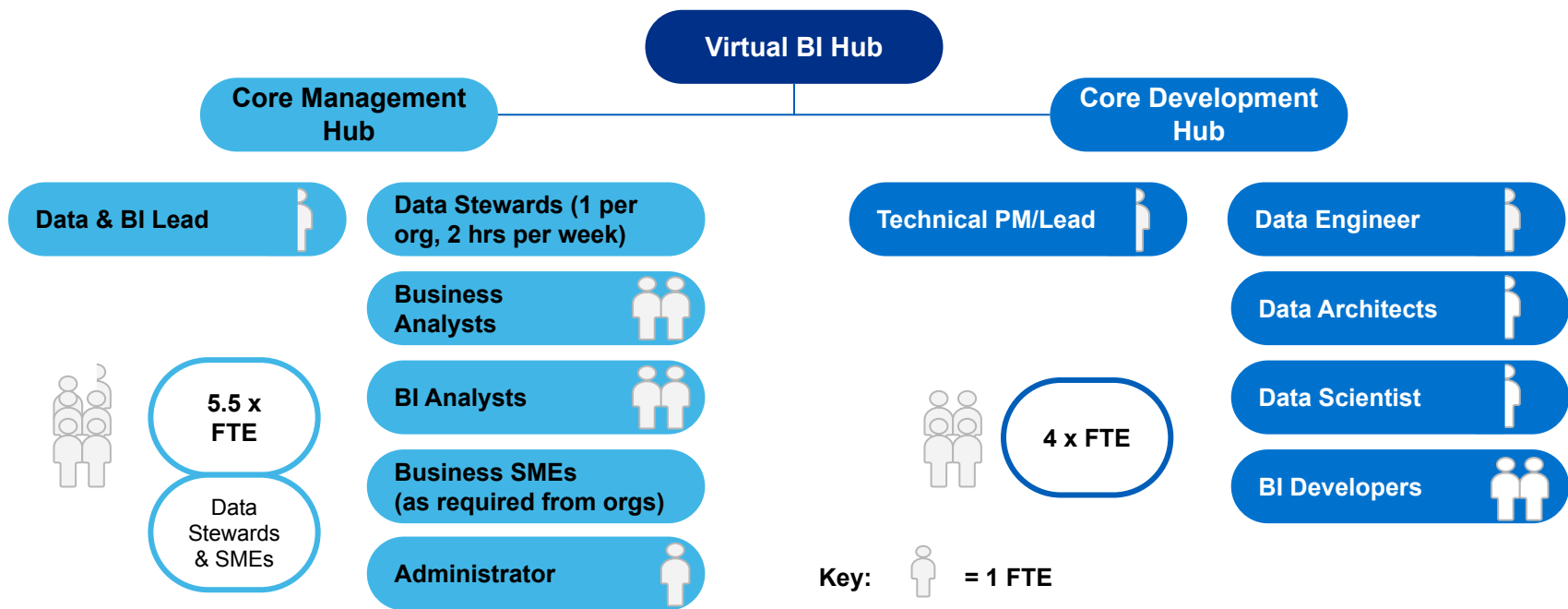
Resourcing approach
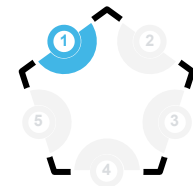
Below are series of activities that ought to be performed by in-house resource, and various activities that may lend themselves to external support, alongside the reasoning behind this categorisation.

Additional long term resources recommended	Internal or external resources for project-based activities
 ● Virtual BI hub data engineer ● Virtual BI hub data architect ● Virtual BI hub data scientist There are a number of roles proposed within the virtual BI hub where the HCP is known to have limited internal resource. For these roles, it may be necessary to explore external recruitment directly to the virtual BI hub in the medium term. Ahead of this, it may be necessary to utilise external resource in the short term.	● Data lake development and implementation ● Integration of data feeds ● Implementation of PHM dashboards ● End user assessment and training programme ● Culture change programme ● Data quality assessment and improvement plan These resources could lend themselves to being resourced externally for one of two reasons; the expertise required to perform the work is highly specialised and therefore would cost a lot to hire as permanent resource or would involve a lot of upskilling of existing HCP resource, or because the piece of work could be relatively self contained and carried out once. When resourcing these activities, they should be considered in parallel with the workload of the virtual BI hub.

How to enable the successful use of BI Hub
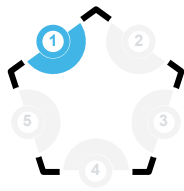
To deliver a successful hybrid model organisations must work closely with both core management and development layers of the virtual BI hub. This interdependency is demonstrated in the diagram to the right, which highlights organisational responsibilities in the outside arrows and BI hub responsibilities in the centre.

Key factors related to the operation of the BI hub are:

➔ **Inputs:** Organisations must provide specific data inputs (alongside external data) that are managed for quality and communicate needs effectively.

➔ **Outputs:** BI hub staff must generate accurate insights and foresight. These outputs will align with agreed HCP vision and BI strategy for the HCP.

➔ **Standardisation:** Staff within the Hub will generate templates and communicate best practice; organisational D&A staff will be encouraged adopt these practices.

➔ **Service specific knowledge and expertise:** Staff within organisations will need to coordinate knowledge transfer to the hub, to increase the accuracy of outputs.

BI hub tasks

Organisation tasks
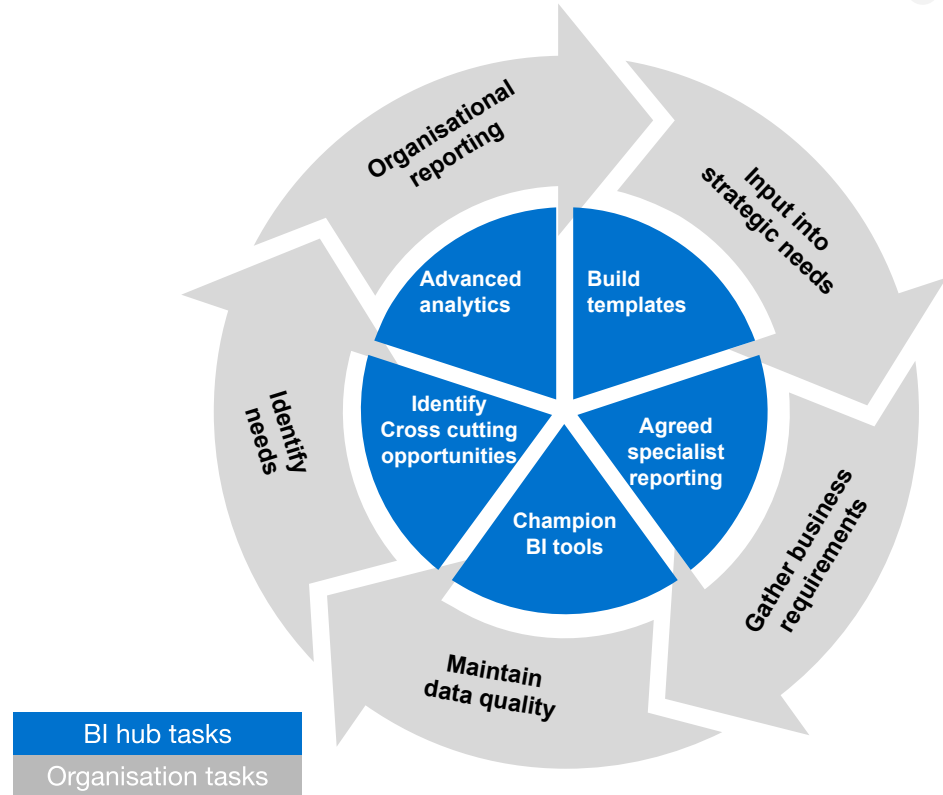
Business case and aligning on vision and principles
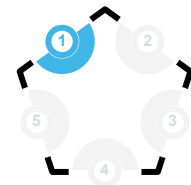
A Programme Business Case may be required early on to secure the appropriate senior buy-in and support

In order to achieve a successful implementation of the BI hub, it's important to get HCP alignment and buy in. In order to secure senior buy-in and support for the resourcing and funding of the virtual BI hub it may be necessary to develop a Programme Business Case. The content of this report can be used as the foundation of the business case. A separate business case is being developed that will cover the funding for the build of strategic data lake.

The strategic vision statement and BI design principles should be agreed by all key stakeholders at the outset

A crucial way to secure early alignment and buy-in is to agree on the strategic BI vision statement for the HCP, which should be backed up by a set of clear design principles. As highlighted earlier in the report, an initial vision statement and set of design principles have been agreed by the core project team, but one of the first steps on the roadmap is to get agreement from all key stakeholders across all of the organisations that make up the HCP.

Principle

Ensure data is used as a strategic asset
Work effectively across the HCP to deliver accurate and timely insight
Be adaptable to the changing HCP environment
Eliminate duplicative activity
Define common data definitions and improve data quality
Improve decision making and performance of the HCP
Ensure data is processed in a secure and authorised manner

MSE HCP's Strategic Vision for BI	*The Mid and South Essex Health and Care Partnership will use data to provide insight and enable evidence-based decision making with the aim of improving the health and wellbeing of the local population, reducing inequalities and addressing current and future needs.*

Next steps framework

Identify	Those in charge of monitoring and running the virtual BI hub should identify key areas to align on to deliver continued success and progression	*e.g. need for HCP wide alignment on vision statement and design principles*
Engage	Once identified, there is a need to engage and align on the way forward with representation (including clinical representation) from across the HCP	*e.g. hold workshops to agree on vision statement and design principles*
Action	Using organisation leaders, as well as a comms programme, to drive changes; recruiting local clinical champions will help drive sustained change from within	*e.g. send out details of aligned vision and principles in HCP wide newsletter*

4.2

Establishing processes and governance structures

Establishing processes and governance structures
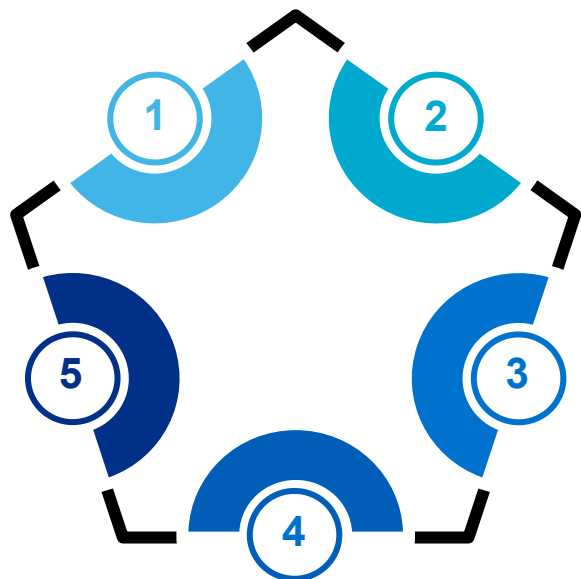
2 **Establishing processes and governance structures**

The purpose of this section is to explore:

- What governance structures currently exist across the HCP?
- What governance structures will need to be in place in the future state and functions will be required?
- What roles will need to be filled?
- How will the virtual hub governance fit in with existing governance structures?
- How could an information sharing gateway be used?

Mapping recommendations to this focus area
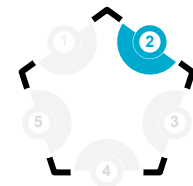
The change plans that map to the establishing processes and governance structures have been highlighted below:

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		HCP-level technical design principles
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

HCP central data governance framework
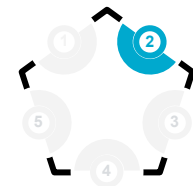
The development of the virtual BI hub lends itself to the development of a central governance framework which will help to address many of the challenges identified in this report regarding governance across the HCP.

The HCP governance framework will define an infrastructure that will support HCP goals and allow it to evolve the direction and the value of BI. The framework will provide clearly defined roles and responsibilities, along with policies that deliver accountability and ownership where needed. This in turn facilitates decision making, compliance, and issue resolution all in line with the HCP's vision and design principles.
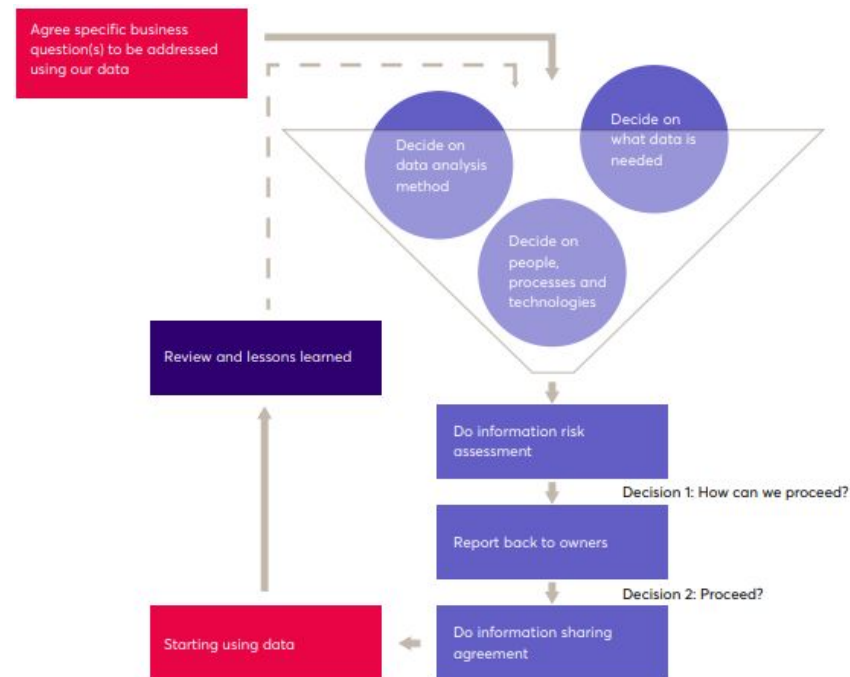
Use case: Suffolk Office of Data and Analytics (SODA)

SODA utilises an Information Sharing Assurance Gateway (ISAG), which describes the set of interconnected processes in eight stages that are required before data is to be shared by partner organisations and utilised for SODA purposes, as well as ongoing actions to maintain the agreed level of security and privacy.

The overarching SODA Data Sharing Charter makes clear that Suffolk partners will safeguard the safety and privacy of people and businesses and comply with all Data Protection legislation. The ISA Gateway is there to make sure that all the commitments in the charter are upheld, including the need to balance public benefit with privacy.

SODA ISAG Flow Diagram

HCP data governance formation
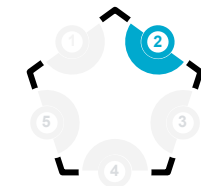
Empowering the right people to look after information is a simple, low cost step that will provide structure and reduce deviation across organisations within the HCP. It can be light touch and seen as an enabler to improving performance across the HCP.

It starts with the right organisation (data literate business people), then defining simple policies around ownership, accountability and standards, before implementing some processes to apply the policies.

This governance formation approach should be the remit of the Data Governance Steering Group which will be responsible for the right integration with existing governance bodies / frameworks across the HCP. Data governance must be considered across 3 key components;

Governance	Process	Data Assets

Establish requirements to govern data and BI effectively

Governance Organisation	Governance Policies	Governance Processes
Sponsorship →	Commitment →	Execution
Structure	Ownership	Decision Making
Roles and Responsibilities	Accountability	Compliance
		User Resolution
Establish →	Define →	Integrate
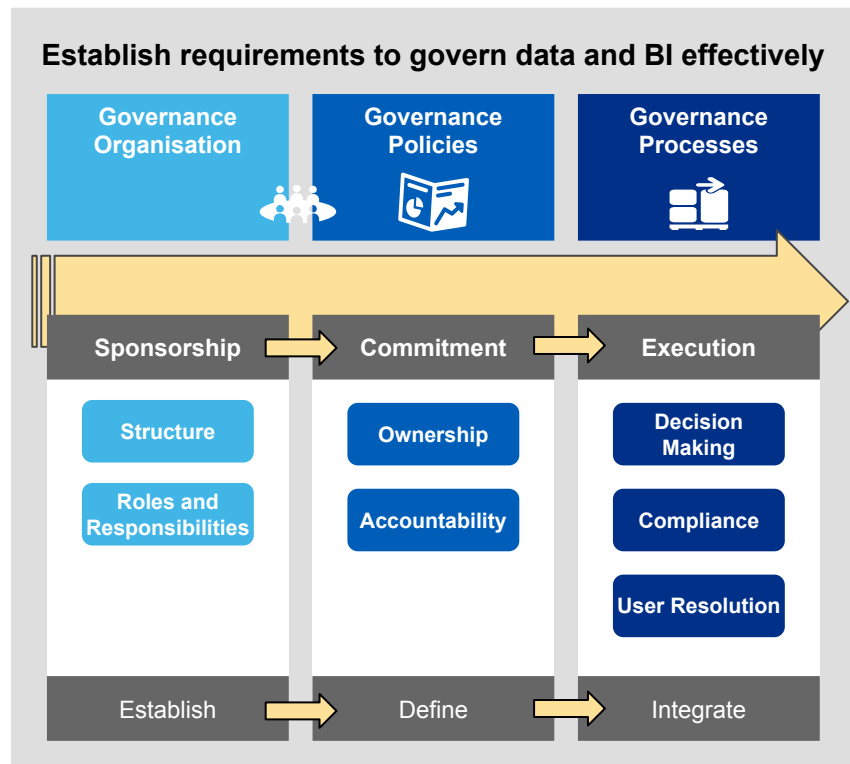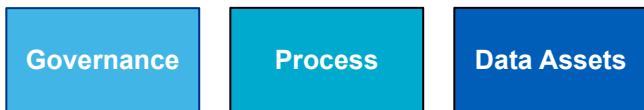
Data governance framework
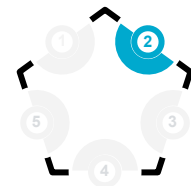
The suggested data governance framework is shown in the diagram below along with descriptions of the functions that make up the framework.

Executive sponsor - A HCP board leadership team member who authorises funding and resources for data governance and management processes, supports the implementation of the data strategy and assists in achieving its business objectives.

Data governance steering group - The steering group is responsible for developing and implementing strategies, policies and standards in relation to data governance and management. Furthermore, the steering group puts measures in place to monitor compliance with the standards. Individuals that make up the group must be knowledgeable in GDPR requirements, data protection laws and HCP's future vision for data governance and management. This group might be part of or be a sub-committee of the virtual BI strategy board. The members of this group will supplement local organisation data governance structures (including Caldicott Guardians) rather than replacing them.

HCP organisations/localised data owners - The localised data owners (within individual HCP organisations) are responsible for defining and providing a specific type of dataset (e.g. patient record), determining the required data quality levels and setting the privacy, retention and security policies. The localised data owners are required to make decisions, design and control the processes surrounding data in order to improve its reusability, accessibility and quality. The relationships these organisations have with 'core management hub data stewards' is key.

Two way flows of communication into all levels of virtual BI hub

Virtual BI directorate

Executive sponsor — HCP board level representative responsible for data quality and data governance

Data governance steering group — Data governance steering group is responsible for developing and implementing policies and standards, and monitoring compliance with those standards across HCP

Updates and decisions pushed to key organisational stakeholders and teams

HCP organisations

Data governance steering group

The data governance steering group is the foundational component of the data governance framework as it defines the scope of data governance, processes, ownership of information assets, policies and standards, and the mechanism to enforce and monitor the policies and standards established by the data governance function.

- **Organisational design**: The data governance steering group should comprise of constituent stakeholder entities across leadership, business functions and data domains. The need to collaboratively structure, manage and execute will facilitate execution with specific functions, roles, responsibilities and shared accountability.

- **Roles and responsibilities**: Various roles exist within the governance steering group which need to be distinctly defined along with responsibilities. Typical roles may include; Chief Data Officer, legal and data protection expertise, business subject matter experts, data stewards, business data owners and data custodians.

- **Decision rights**: Based on roles and responsibilities within the governance steering group, clear guidelines have to established on how decisions will be made and what is the escalation structure based on certain scenarios.

- **Interaction model:** (see next page)

- **Policies and standards:** The primary way through which the data governance steering group manages the HCP's data as an asset is through defining and issuing set of policies, standards and processes that manage the quality, consistency, usability, security, and availability of information across the HCP.

Strategic Data Lake Governance

It should be noted that initially the governance for the development of the strategic data lake will be separate to governance for the virtual BI hub, and will be provided by the digital board. There should be close collaboration between between both governance groups to ensure the data lake is built to provide the necessary business requirements. Once the data lake is up and running, it is recommended that governance should be handed over to the the BI strategy board.

Data governance interaction model
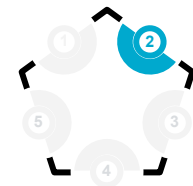
Once governance organisation design and roles and responsibilities are defined, the 'interaction model' needs to be defined as to how the governance organisation will interact with rest of the organisation.

Business users *(Strategy)*

| BI strategy board | HCP senior management | HCP BI managers |

Data governance steering group is responsible for developing and implementing strategies, policies and standards in relation to data governance and management

Business Intelligence hub *(Creating Insights)*

Define **strategic drivers** and business outcomes

Provide **insight and business value** through visual and interactive dashboards and business outcomes

Provide consistent and reliable data sets

Business users *(Operational)*

Internal data providers

HCP organisational reporting and BI systems

External data providers

National systems, population and place data, 3rd party providers

Information Sharing Protocol (ISP)

Key insights

When sharing data among organisations across the HCP, a **common set of rules and conditions should be developed.** This will typically start with the **BI strategy board** outlining its intentions in an information sharing strategy or charter, to which all partners sign up.

Many similar system-led programmes have signed a **data sharing charter** that recognises and respects the underlying principle of **'a duty to share data unless there is a legal or ethical reason that prevents sharing'.** This helps to standardise the information sharing approach upfront and uses it as a starting point for setting up the **Information Sharing Protocol (ISP).**

The mechanism to then share information for any given data initiative will be made more specific and measurable in the form of a data sharing agreement.

Essential elements to be covered in ISP

→	**Purpose of sharing**
→	**Potential recipients and the circumstances in which they will have access**
→	**Exact data to be shared**
→	**Data quality** - Accuracy, relevance, usability, etc
→	**Data security**
→	**Retention of shared data**
→	**Individuals' rights** - Procedures for dealing with access requests, queries and complaints
→	**Review of effectiveness / termination of the sharing agreement**
→	**Sanctions for failure to comply with the agreement or breaches by individual staff**

Information Sharing Gateway (ISG)
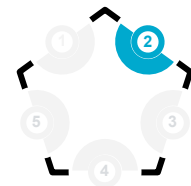
One of the key priorities highlighted from the interview data gathering sessions faced by organisation's is for the HCP to identify a space where all information sharing agreements could be stored, providing information not only for a given dataset (who it is shared with and under what terms), but also for a given organisation (what are the datasets already shared and with whom).

Best practice is to use an Information Sharing Gateway (ISG), an online tool that helps create, manage, sign and store data sharing agreements.

The ISG has legal gateways and privacy screening questions directly built into the tool, meaning that information sharing protocols can be completed and signed off much more rapidly and securely. In addition, it includes a sign-off request option, which allows the sending of information sharing agreements to signatories and includes a system to archive agreements and flag those that need a review.

The HCP should develop an ISG to avoid delays or barriers to sharing data which are often described through information governance obstacles, an example of good practice is WEISF already established in Essex.

Good local practice: Whole Essex Information Sharing Framework

The Whole Essex Information Sharing Framework (WEISF) provides members with access to advice, guidance, good practice, networking and tools to support the development of local information sharing. It is a key foundation for the the **Essex Centre for Data Analytics.** The WEISF provides:

- An overview of all active information sharing protocols submitted to WEISF, allowing practitioners to identify existing sharing, find examples of protocols and provide transparency for citizens
- A list of agencies which are partners in the framework, linking through to their websites.
- Advice and guidance sourced from the ICO as regulators.
- Templates to simplify and standardise the completion of ISPs, flexible enough to meet partners' needs.
- Tools and guidance to assist in increasing data management maturity.

The WEISF interface

This good practice could be built upon for use by the HCP.

Data governance - Process
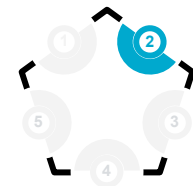
The data governance steering group should define and monitor the processes that operationalise the policies and standards to maintain data quality, consistency, usability, security, and availability of information across the HCP.

- **Data definition and data lineage**: The common understanding of data elements across the various systems of the HCP including business rules and calculations derived certain data elements (data dictionaries). The tractability of each data element from the time it was created, through maintenance/enhancement, until analytics and reporting.

- **Onboarding new data assets**: The processes around data definition, data/process mapping, data quality requirements, change management, and access and security.

- **Issue management**: The process to track issues (or cases) as a result of monitoring of various data governance program effectiveness measures.

- **Change management:** The process of changing any of the components within the governance framework ranging from organisation design, roles and responsibilities to specific policy or standard related to specific data processes or data sets.

- **Compliance monitoring**: The reporting structure to manage compliance with policies and measure overall data governance effectiveness.

- **Data quality**: This is detailed in subsection 3 - Improving the data and establishing an agreed centralised repository

Data governance - Data assets
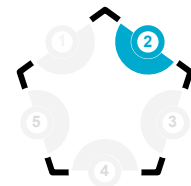
The data asset layer establishes scope of what is under the governance of the HCP and the difference in governance between structured and unstructured data.

Structured data

Information that has pre-defined data model and is organized. Structured data typically can take the shape of 'rows and columns' or is easily interpreted as such.

Transactions: Transactional data is data describing events against a customer account for example, which repeats for single customer account multiple times.

Reference: Reference data is any data that is used as a 'reference' to complete or process another set of data. At times this data can be static such as product or customer data, which changes when a change event happens but it can also be live data such as market data.

Patient/citizen and pathway: Structured patient/citizen and pathway data is at the centre of any data asset held by organisations in the HCP. This can have complex relationships with one person represented across multiple pathways.

External data: All data outside the HCP is considered external data. This can be reference, transactional and at times patient/citizen and pathway data as well.

Unstructured data

Information that does not have a pre-defined data model and is not organised in a pre-defined manner. It may be text heavy and has ambiguous or unpredictable patterns in which data is laid out. Unstructured data typically requires complex tools and techniques to be converted into structured data. Governance around such data is organized by the type of unstructured data, its usability, and its organisation/storage that is easily searchable.

Records: Information regarding other activities sometimes to prove the existence of an activity but not necessarily the activity itself.

Documents: Electronic or manual information that does not follow a specific data model pattern and is stored as a document file rather than a structured data file. For example Microsoft Word files, Powerpoint presentations, Visio, PDFs, etc.

Web Content: Contents of web pages (displayed or hidden) that can be textual, documents, visual, audio, or animations.

Multimedia: All other types of unstructured data such as pictures, audio, videos etc.

Benefits of improved data governance

A robust data governance framework with an executive sponsor encourages the use of data as an asset and provides the following benefits:

Enhanced data quality

Data quality is protected and maintained by teams directly responsible to the executive sponsor. Overall, staff spend less time on data quality activities such as cleansing and verifying data for accuracy and spend more time on analysing and interpreting the data.

Value of data

The value of data is understood culturally and becomes synonymous with HCP objectives. Data is seen as an asset across the HCP, however the real value comes from the analysis and deriving of insights.

Better decision making

A clear governance structure allows better decision making through the enhanced data quality. Well-governed data is also more discoverable, making it easier for the relevant parties to find useful insights. It also means decisions will be based on the right data, providing greater accuracy and trust.

Standardised data/processes

Data governance gives the HCP a way to standardise approaches to data use and to promote consistency across the organisations.

Reviewing reporting requirements/practices
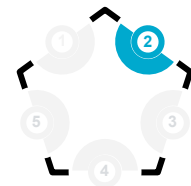
Current situation:
- The majority of BI teams across the HCP do not have a formalised service request processes in place within their organisation, and rely on ad-hoc processes; this leads to a large number of ad-hoc requests, which are time consuming and not prioritised correctly.
- There are a number of duplicative and inefficient reporting processes across the HCP, the most obvious being the lack of standardisation across the five CCGs, which have different reporting requirements; this leads to inefficient duplication of time and effort.
- Finally, there is a lack of drive to identify labour intensive processes and look at possible solutions to reduce their burden on capacity, for example by automating certain processes.

Immediate next steps:
1) Streamline HCP reporting requests through formalised pathway (detailed in subsequent slides).
2) Highlight best practices and recommendations (detailed in subsequent slides) for widespread adoption.

Long term agile strategy:
This should be run in regular intervals (~6 months), with one assigned staff member per organisation responsible for driving this agile approach:

Identify	BI staff dealing with requests should break down all reporting requirements, highlighting timeframes, requestor and bottlenecks/areas for improvement.	*e.g. Bed occupancy report takes ~8 working hours, most of which is spent processing data*
Engage	Workshops should then be run with BI staff, requesters and clinical input, discussing potential solutions (using best practice examples highlighted by the virtual BI hub) to implement going forward.	*e.g. Potentially looking to automate manual parts of the data processing pathway or reducing/refining the size of the report*
Action	These changes should then be implemented on a pilot basis, with a review session scheduled for 3 months to discuss the benefits/challenges faced.	*e.g. 1 hour is saved on the report, however automation attempts did not work successfully*

Standardising BI hub service request process
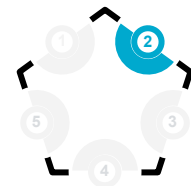
Requirements should come to the virtual BI hub through various means including the front of house function performed by business analysts, standard reporting requirements from the performance and other corporate dashboards and ad-hoc requests. The requirements should all be documented in an information model; a service desk tool used to demonstrate the demand signal for management information (MI) through the business.

As information requirements are captured they should be categorised in order to appropriately prioritise delivery. The key criteria for such categorisation and prioritisation are:

Business need	*What is the priority of the business need and what are the likely benefits?*
Existence	*Is the data currently collected, will new data collection need to be established?*
Availability (access)	*Does the HCP currently have direct access to the data, is it held by a local organisation or is it held by a third party?*
Quality	*What is the quality of the data in terms of integrity, authenticity, and accuracy?*
Confidentiality	*What are the confidentiality requirements associated with the data?*
Customer (external/internal)	*Who is the end customer? Is this a high-profile request?*
Effort	*How much effort will be required to deliver the requirement through the data phase, build phase and test phase?*

Not only will this help streamline ad-hoc requests for the virtual BI hub, it will also act as a best practice template for organisations to adopt for themselves, helping reduce the burden of ad-hoc reporting requests on their BI teams.

BI best practices
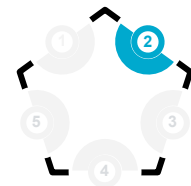
BI best practices will be driven across the HCP in two main ways:

- **Using the virtual BI hub as an exemplar by adopting best practices centrally and providing detailed information and support to help BI staff replicate these in their own organisations**
    - This would entail the virtual BI hub piloting recommended best practices, having looked at other exemplar systems/organisations elsewhere in the UK.
    - Once pilots have been successfully implemented, the BI hub will highlight these as use cases in the regular communications sent out across the HCP, as well as detailing how to implement the same best practices in individual organisations, with direct help and steer from the initial champion/driver within the virtual BI hub.

- **Understanding and highlighting best practices being used across HCP, detailing how they implemented it and how to achieve similar in individual organisations**
    - This would require an initial landscaping of the HCP, with specific people responsible for identifying the organisation (within MSE) with the best practices in certain areas.
    - Once identified, they will be highlighted as being 'local exemplars', and be asked to share the details of their practices. For example the Bristol, North Somerset and South Gloucestershire system does this through a regular newsletter.
    - This will be highlighted in the regular communications, emphasising the benefits this organisation is realising, as well highlighting the local team for the excellent work and processes.
    - Other organisations will be encouraged to adopt similar practices, with local leaders providing steer and teaching to help bring others up to speed.

Examples of best practices areas to share:

- *Data governance policies*
- *Dashboard design*
- *Data capture processes*
- *BI tools and platforms*
- *Data quality improvement*
- *Data cleaning*
- *Learning and development programmes*
- *PHM*

4.3

Improving the data and establishing an agreed centralised repository

Improving the data and establishing an agreed centralised repository
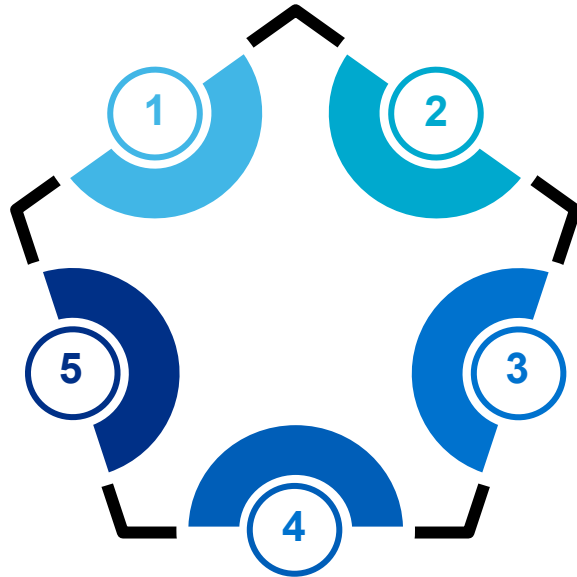
3 **Improving the data and establishing an agreed centralised repository**

The purpose of this section is to explore:

- The need for a data quality assessment.
- The need for a data quality improvement programme.
- How to maintain data quality going forwards.
- Understanding future data flows
- Pilot options

Mapping recommendations to this focus area
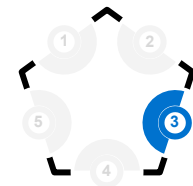
The change plans that map to the improving data and establishing a central repository have been highlighted below:

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	**Data integrity & timeliness improvement plan**	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	**Data taxonomy catalogue**	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	**Data quality improvement plan**	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	**Integrate data feeds**	**Strategic data lake**
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		**HCP-level technical design principles**
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

Improving the data - Data quality
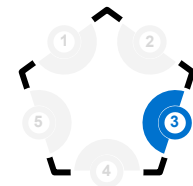
The HCP needs to commence - and sustain - a data improvement programme on all data that will be useful at the HCP level, to deliver high quality data that is available to perform accurate BI and support decision making. This directly meets the data design principle of treating data as a strategic asset.

Data quality can be defined as "*The existence of the right data in the right format at the right place and time to meet the needs of business processes*". Any relevant item of data across the HCP should have a required level of quality associated with it, driven from by the needs of the services that use it. Once the required level is determined, data can be measured to determine whether the right level of quality is being achieved.

A phased approach is required to address and enhance the data across the HCP in order to realise the benefit of using data as an asset. A formalised data quality improvement framework allows formation of a single agile repository which can leverage the power of Azure Data Services and BI visualisation tools.

How to drive improved data quality

1)   Ongoing, proactive data quality management
Embedding a proactive culture and mindset into the staff across the HCP to encourage there is continual, iterative improvement on data quality.

2)   Early risk identification and mitigation
Creating an easy to use risk/issue log, accessible to everyone, to drive earlier mitigation of risks, limiting their impact.

3)   Implementing a data quality improvement framework
Implementing a data quality improvement framework establishes a framework to improve data, allowing the HCP to leverage information and decision making. A continuous data improvement approach should be embedded across the HCP and driven by the data stewards.

Proactively managing data quality
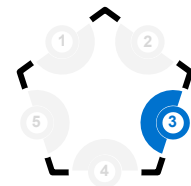
Proactively manage data quality and drive its improvement

Once the HCP understands the data demand and underlying data quality (derived from data quality assessment) it can move towards a proactive and continual data quality improvement process on datasets that are used at the HCP level. All individuals working within the virtual BI hub should have a good working knowledge of data quality principles and apply these whilst completing work. The principles include being more open to displaying pre-adjusted figures from source systems despite poor data quality and challenging post extraction adjustments. Data stewards and data owners should be responsible and held accountable, for fixing these issues. This encourages issues to be raised, tracked and fixed at source. Data can also be certified, once tested, to mark a particular source or dataset as being recognised of set quality and reliability.

What are the data quality principles?

The main two principles for teams to follow are completeness and accuracy. By the automation of reporting processes testing to check that key or flagged fields are complete should always occur. Once this first assessment has taken place, subject matter experts can be engaged to confirm that data contained within those complete records is accurate.

Where should issues be tracked and logged?

Data quality issues should be logged and monitored via a formalised process. All such issues should be tracked in a central place known as a DQIR (Data Quality Issues Register) and be maintained by the virtual BI hub core management team, which allows them to be accessed, prioritised, fixed and monitored. There are two normal entry routes for an issue to appear on the register:

- Business as usual operations find a difference in a report or continuous monitoring, where a figure does not align with to the business rule or check total; or

- A data quality audit makes a finding that requires a fix to be completed.

Ongoing data quality improvement process
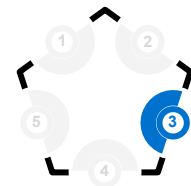
Outlined below is the proposed ongoing iterative data quality process aimed at driving sustained data quality improvement across HCP:

1. Log - Issues must be logged in order to start the data quality process, which could be a simple email or the filling in of a form for the team to pick up. Issues could be formed of bulk findings from a data quality audit that might need splitting into multiple issues.

2. Triage - The issue is assessed to see whether it is a duplication, whether it is a data quality issue and whether there are any very quick fixes required prior to moving on to the next stage. This could simply involve forwarding the request on to the correct person or requesting more information. Triage would also look at evidence from business rules to check whether the issue is genuine or allowed within the policy.

3. Initial prioritisation - The BI development team will assign an issue a first priority based on the information entered into the DQIR. Timelines for a non-priority long term issue will be different to those for an urgent request. Once the issue is formalised it may necessitate a return to the initiator to populate the detailed template. Key metadata such as dates, department raised, detailed description and processes affected will allow for better judgement. Good communication throughout this process will be important on order to agree on matters such as severity, timelines for fix, current impact and to move forwards towards a resolution target date.

4. Root cause analysis - This step is required to check whether the issue raised is a symptom of any greater issue. If someone's age entry was wrong, does this mean that their personal record as a whole is wrong, and is it the data entry process or has a migration and corruption event occurred?

5. Split, merge or continue - Following root cause it may be possible to close issues, merge them with other existing issues or split them up. Genuine new issues will be entered into the DQIR ready for treatment.

Ongoing data quality improvement process
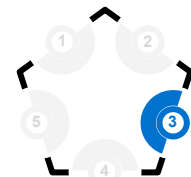
6. Assess and confirm priority - The data quality issues team use the data from the DQIR to balance the costs and benefits of completing the change and will confirm these with the original initiator. Moving to a confirmed status will allow the team to investigate options for fixing.

7. Options for fix - Earlier steps often cause issues to be broken up into parts, or allow them to merge with other issues allowing for different types of remediation. With data quality, it may be a bulk change to a source system following a new survey. Fixes should always aim to be completed with minimal impact to business as usual, and the team manager should liaise with all relevant teams to deliver this outcome .

8. Approval - Once the type of fix has been agreed it is important to gain approval. System changes or limitations will often need an impact assessment in order to understand how any change might affect other users. For small projects within a single project team this should be easy to complete. For larger issues, formal approval will be required by core management hub or BI strategy board.

9. Manage fix (or group to larger fix) - Where the fix itself has become a project, such as a large data cleansing exercise, it is important to carefully manage the process. Communication of the ways in which users will be affected, for example the schedule of work and any down time of services, will be vital.

10. Establish programme of work (e.g. adjust policy / standards) - A fix may require changes to a process, policy or standard for an outside organisation. In this case the team should refer to the data governance steering group.

At the end of the process, the cycle restarts - driving the iterative data quality improvement cycle.

Formalising a data quality improvement framework
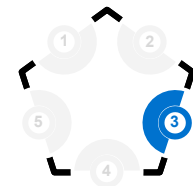
Step 1 - Data Quality Assessment

Systems need to be assessed for data quality. Key factors such as data completeness, integrity, timeliness, etc. will be used to assess the data entities and attributes thresholds to prioritise data sets which require the largest effort to improve quality. This assessment activity will define the scope and volume of effort required to effectively improve data quality across the HCP's IT landscape.

Step 2 - Data Quality Enhancement

The data quality issues identified in the assessment will be documented, and prioritised with recommendations used to inform a data quality improvement plan. This improvement plan will then be executed to enhance data quality across the HCP.

Step 3 - Data Quality Co-ordination

For data quality enhancements, the virtual BI hub should act as a coordination center for resolution and owners of the quality enhancement plan but would not necessarily deliver such resolutions directly.

Similarly, data requirements and quality issues would come to virtual BI hub by various means including central bodies (e.g. NHS England), standard reporting requirements and ad-hoc requests. A prioritisation framework for data quality issues would need to be drafted and agreed in order to support these processes alongside the more strategic framework of data quality improvements across the HCP.

1. Data quality assessment
2. Data quality enhancement
3. Data quality enhancement

Data integrity and timeliness improvement plan
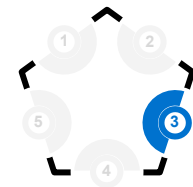
Data integrity plan

There are a number of potential steps that can be taken to improve data integrity throughout the HCP:
- Use a single source of data
- Data entry training and literature
- Data validation processes
- Automating processes
- Standardised data taxonomy
- Remove duplicate data
- Selective access management

Many of these steps will be covered in other areas of the roadmap but can be accelerated if the data integrity is highlighted as a priority.

Data timeliness improvement plan

There are a number of potential steps that can be taken to address poor data timeliness throughout the HCP:
- Single source of truth
- Automating highly manual, time consuming tasks
- Improve data capture tools
- Train clinicians to improve data completeness
- Driving best practices across the HCP
- Complete data cleaning via virtual BI hub

Many of these steps will be covered in other areas of the roadmap but can be accelerated if the data timeliness is highlighted as a priority.

Data flows model

An indicative data flow model for the HCP's central data repository has been set out to the right.

There will be two key data stores: one for individual records for direct care and one for secondary usage (i.e. commissioning/planning).

One and two-way data flows will need to be established from local organisations into and out of these flows. It is recommended that an early prioritisation exercise is undertaken to determine the order in which these data flows are established.
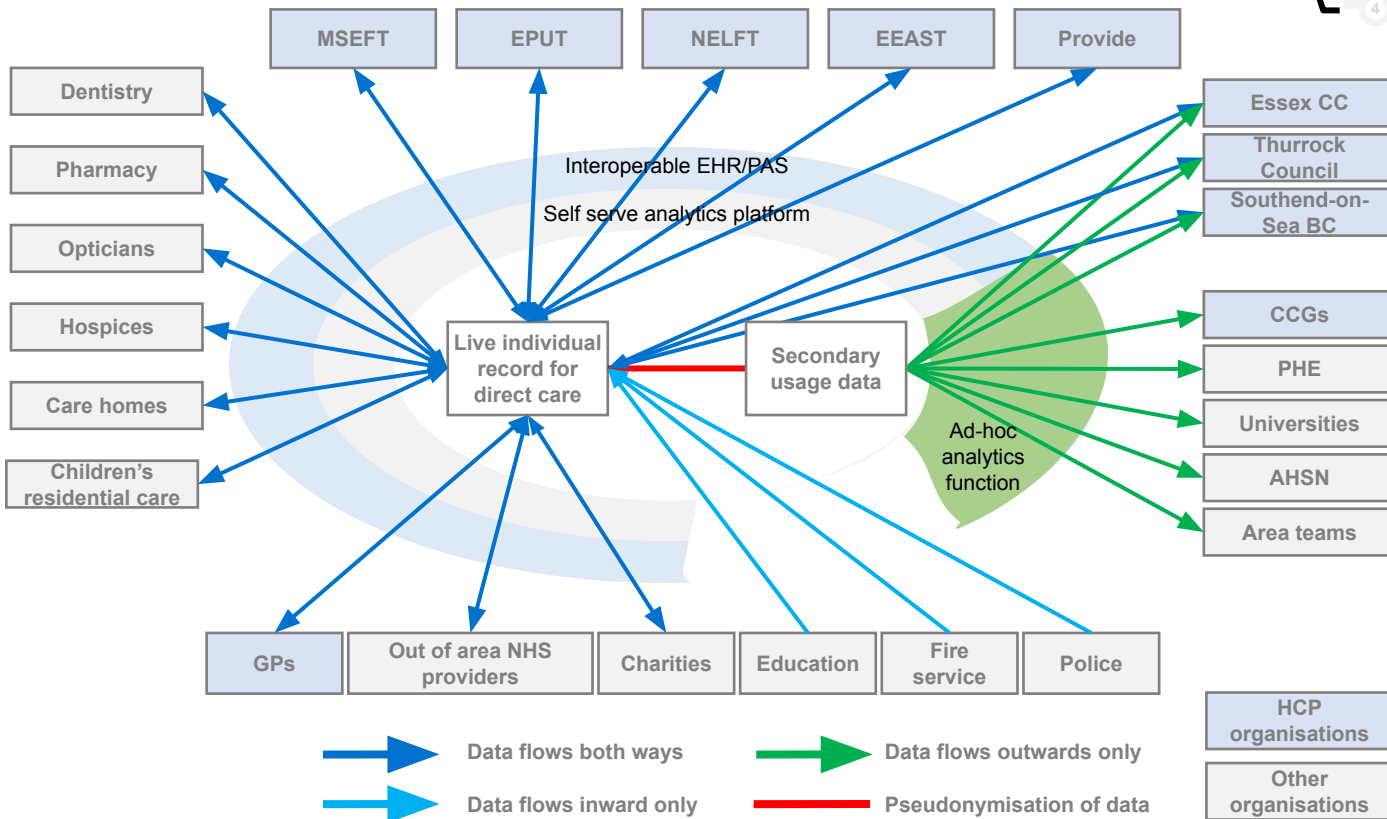
HCP BI architecture and common data model
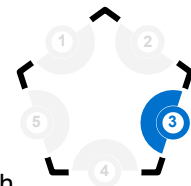
These data flows will be structured within a BI architecture and will have a common data model (CDM). It has been assumed (in line with the Strategic Data Lake work) that this will be a Microsoft Azure environment. However this is by no means the only option and is shown in this report for example purposes only. Further details on the technology to support this are in the next subsection.

Power BI
- *Reports & dashboards*
- *Datasets*
- *Data flows*

For data visualisation and preparation

Azure Data Factory — For data integration

Azure Databricks — For data preparation

Azure SQL DW — For querying curated data

Azure ML — For building & training AI models

Custom LOB — CDM developer resources

CDM folder | CDM folder | CDM folder | CDM folder

Mid and South Essex HCP Azure Data Lake (Storage Gen 2)

Business analysts
Low/no code

Data scientists / Data engineers
Medium to high code

Selecting the correct pilots to generate early buy-in
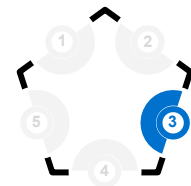
Choosing the right early pilot(s) for dashboard development will be key to establishing support for an integrated BI approach across the HCP, getting the commitment of leadership teams, and securing the time and resource investment needed.

The leadership team should consider how to have the largest possible impact across the HCP, whilst requiring potentially restricted resources. In order to impact the whole HCP, the following broad topic areas (used by the Dorset Intelligence and Insights Service) may be considered:

- **Actionable Insight:** Workforce (e.g. staff absences), capacity (e.g. available beds), patient flow (e.g. admissions/discharges).
- **ICS Intelligence:** Overview, planned care/referrals, unplanned care, mental health, community, workforce.
- **Population Health Intelligence:** Population segmentation, risk stratification, intervention KPIs.

Given that the insights derived from a Population Health Intelligence dashboard are likely to take longer to deliver benefits, it is recommended that two pilot dashboards are developed, including one from the Actionable Insight or ICS Intelligence categories. Through discussions with the Project Group, one potential area for early consideration for this second dashboard is system-wide urgent and emergency care.

Good local practice: Essex Centre of Data Analytics pilot

The initial pilot for the Essex Centre of Data Analytics (ECDA) set out to reduce the threat, risk and harm to potential victims of modern slavery through creating a predictive model using business inspections data. During the discovery phase, it was highlighted that before any predictive algorithm was attempted, a wider problem was the lack of any consistent sharing of business inspections data between agencies.Therefore, the first outcome of the pilot produced a multi-agency picture of business inspections to identify a broader range of risk factors that could improve business practices. This also helped reduce vulnerability further down the line by laying the foundations for building the predictive product originally envisaged, with much higher chances of success.

ECDA website
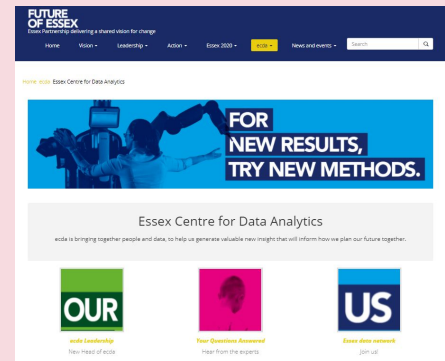
Potential pilot 1: Urgent and emergency care
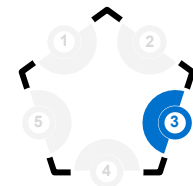
Urgent and emergency care has been suggested as a potential area for development of a pilot dashboard. This has been selected as:

- Urgent and emergency care flow is a **system-wide problem** so the dashboard will provide insight to a large proportion of the organisations within the HCP.
- Due to local pressures associated with the COVID-19 pandemic (in additional to winter pressures), there is an **immediate need** for performance improvement.
- Improved insight can provide **short term benefits**, i.e supporting greater visibility of blockages in patient flow.

Potential metrics for consideration include the following. These are a combination of existing performance metrics, metrics proposed through the Transformation of Urgent and Emergency Care consultation[1] and other system-wide metrics that impact on urgent and emergency care flow. Further COVID-specific metrics (i.e. segmenting the below by COVID/non-COVID patients) may also be useful in the short term.

Existing metrics
- Ambulance category 2 response times
- Percentage of patients spending more than 4 hours in the Emergency Department
- Number and proportion of unoccupied acute beds

**Additional metrics currently under consultation**
- Conveyance rates to Emergency Departments by ambulance
- Proportion of contacts via NHS 111 that receive clinical input
- Percentage of ambulance handovers within 15 minutes
- Percentage of patients receiving an initial assessment in Emergency Departments within 15 minutes

- Mean time in Emergency Departments for non-admitted patients
- Mean time in Emergency Department for admitted patients
- Percentage of patients spending more than 12 hours in the Emergency Department

Other system-wide flow metrics
- Number of stranded/super-stranded patients
- Number of delayed transfers of care by type
- Number and proportion of unoccupied community beds
- Number and proportion of unoccupied care home beds
- Number of people awaiting packages of care at home by current location

[1] Transformation of urgent and emergency care: models of care and measurement, NHS England, https://www.england.nhs.uk/wp-content/uploads/2020/12/Transformation-of-urgent-and-emergency-care_-models-of-care-and-measurement-report_Final.pdf

Potential pilot 2: Population Health Intelligence
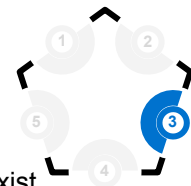
A Population Health Intelligence dashboard could be used as a second pilot as this will build upon the strong foundations that already exist within the HCP when it comes to PHM.

An effective Population Health Intelligence dashboard should help the HCP to:

- **Understand the specific needs of the local population** and to explore gaps in care and unwarranted variation through segmentation.
- **Identify high and emerging risk groups** most amenable to interventions and target them through tools such as risk stratification and impactability models.
- **Size the opportunity** to understand the impact (both on outcomes and finances).

The specific areas of focus within the Population Health Intelligence dashboard should be agreed with the PHM Steering Group but these require a clear understanding of how population need will be identified and the outcome measures that will be used for the defined population. They should also build upon population health needs assessments that have already been undertaken.

The FutureNHS Population Health Management Academy provides a wide range of good practice examples of Population Health Intelligence dashboards: https://future.nhs.uk/populationhealth/grouphome

Good practice example: Behaviour Predictor^{TM}

While Population Health Management tools often focus purely on characteristics of a population, i.e. demographics, disease prevalence, etc to make recommendations of proposed interventions, PwC's Behaviour Predictor is a virtual laboratory of social determinants of health and individual motivators that allows for prediction of behaviours that drive health outcomes.

Through use of a synthetic population that accurately resembles demographics, neighbourhood characteristics, individual motivators and behaviours within target neighbourhoods, Behaviour Predictor generates cohorts to show patterns in preferences, behaviours and the key drivers of the target population. It then predicts population health behaviour in response to interventions and projects, showing the potential impact on outcomes and financial return on investment.

Often these influential social/environmental determinants of health and individual motivators can be key to the effective management of costly chronic conditions.

https://www.pwc.com/us/en/industries/health-industries/library/doublejump/behavior-predictor.html

4.4

Designing and building the technology platform

Designing and building the technology platform
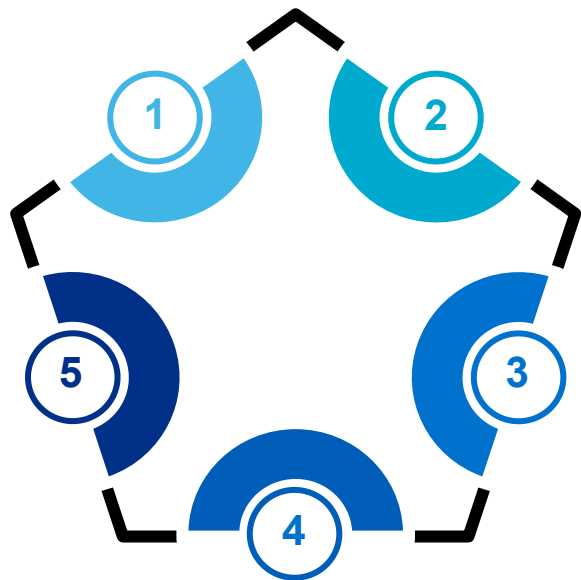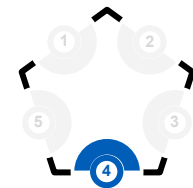
4 **Designing and building the technology platform**

The purpose of this section is to explore:

- The options for hosting the data repository
- HCP data lake principles
- The high-level design of the technology platform
- Details of the analytics tools likely to be required over time

It is important to note that work is underway to further develop this requirement as part of the strategic data lake business case and therefore it is subject to change.

Mapping recommendations to this focus area

The change plans that map to the designing and building the technology platform have been highlighted below:

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		HCP-level technical design principles
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

Data storage and BI tools

Data storage and technology architecture

In order for the virtual BI hub to be able to manipulate the data and link the data flows described earlier in this report, a single data store is required for use across the HCP.

It is recommended that the HCP adopts a cloud based storage model and, based on the previously completed Strategic Data Lake work, it is recommended that a Microsoft Azure architecture is used. This has the advantage over physical storage solutions that it can be more easily scaled up and down as the requirements of the HCP change over time.

Access to the services will take place through cloud computing platforms, through applications that use Application Programming Interfaces (APIs), such as cloud desktop storage, gateway or Web-based content management systems, or through APIs themselves.

BI tools

Alongside the data storage solution, the tools through which users can access this data are equally important, particularly given the finding earlier in this report that the most common tool used within the HCP is Microsoft Excel. Three of the most used tools currently on the market are Qlik, Power BI and Tableau but given the prior recommendation to use an Azure architecture, it is recommended that Microsoft Power BI is used for this purpose.

Further details on the recommended technology architecture and visualisation tool can be found on the following pages.

Establishing an agreed centralised repository
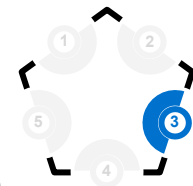
A centralised data repository will be required, bringing together and integrating various data feeds from the organisations making up the HCP. This data, in time will be supplemented with external data sets from other organisations both in and outside of the MSE HCP and with national datasets.

A separate programme of work is being carried out to develop a strategic data lake platform which, in time, should be used as the data repository for the virtual BI hub. The strategic data lake will however take a substantial amount of time to build, and therefore it is proposed that initially the virtual BI hub utilises existing data processing and data storage capabilities such as those provided by AGEM.

In the long run, the HCP will need to agree where the strategic data lake will be hosted and who it will be managed by. This will require a thorough analysis of the options to be reviewed by all key stakeholders before an option can be chosen. Below are several options along with high level pros and cons of each.

| OPTION 1 - Hosted by a shared BI function	OPTION 2 - Hosted by an NHS provider	OPTION 3 - Hosted by a council
Pros ● Best option for equally representing all parties' interests ● Easiest to distribute costs **Cons** ● Requires setting up and resourcing a new team from scratch	**Pros** ● Best placed from a process perspective as NHS providers are closer to more of the data sources **Cons** ● There is a danger this would be seen as an NHS focused project and would lose wider engagement	**Pros** ● Best placed for driving public health **Cons** ● Integrating data from the NHS providers would be a challenge

HCP level data lake general principles
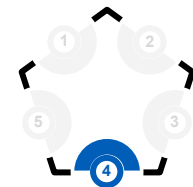
HCP level data lake principles were developed during the piece of work developing the strategy and roadmap for the strategic data lake. These are shown below, and should be used to guide the design and build of the technology platform.

Principle	Rationale
The data lake will support the LHCR and Population Health Management Strategy	• The data lake will need to support the long term strategic aims of the **HCP**, so that ultimately all data can sit within one technical solution.
Data should be accessible 24x7	• Data is required operationally for clinicians and care workers to be able to provide effective care; therefore this data will need to be available 24x7, and there should be failsafe measures in place to avoid downtime during maintenance periods. This raises the total cost of ownership.
Data needs to flow at different rates through the architecture	• Data flows of different rates need to be permitted so that it supports both the Shared Care Record and the population health management requirements, which must include both real time and batch data flows.
Iterative ways of working	• Building data lake components iteratively to build up the data sets and components over time, so that business benefits are realised earlier for both individual organisations and the wider HCP.
The data lake will be a repository, and will not write back	• The Data Lake will be a slave repository where data can only be cleansed, enriched, and merged. It will not write back merged or enriched information into the master data sources. However, it will be possible to use data quality reporting to highlight inconsistencies for correction in master sources and a process will need to be set up to perform this activity.
The data lake will support the BI roadmap	• The data lake will need to support the long term strategic aims of this **BI Strategy and Roadmap**, as well as the **Shared Care Record**, so that ultimately all data can sit within one technical solution. **Data flows once** from the appropriate data sources into the organise component, so data can be extracted as required into the Standardise Data Marts.

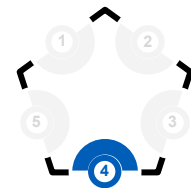# Introducing the components of a data lake
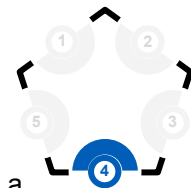
Data lakes and data warehouses are both widely used for storing big data, but they are not interchangeable terms. A data warehouse is a repository for structured, filtered data that has already been processed for a specific purpose, and may have a series of data marts held within it to hold information structured in a specific way for different business functions to access.
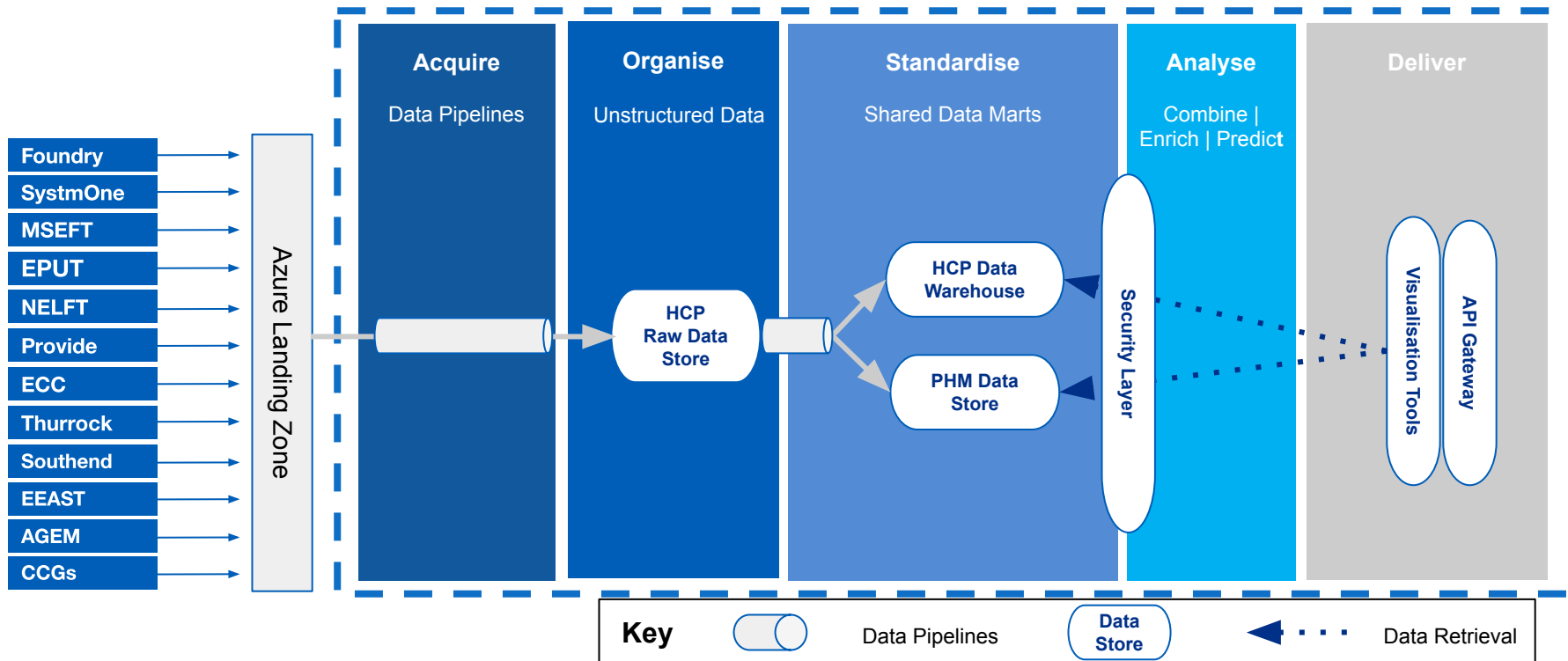
A data lake is a vast pool of raw data, the purpose of which is not yet defined. An enterprise data lake architecture will provide a flexible 'base' architecture, which can be built on with specific components and technology tools to meet current and future needs of the HCP. It will support the different types of analytics, dashboards, population health management, real time alerting, notifications and flexible messaging to provide integrated patient management models that the HCP want to develop. The diagram below shows the core components of an enterprise data lake architecture.

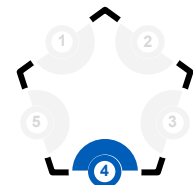| **Data source**	**Acquire**	**Organise**	**Standardise**	**Analyse**	**Deliver**	**Data access**
Source systems contribute target data. These can be both organisational and HCP systems.	Integrating information from the data sources into the data lake.	This stores the raw messages before they are ingested into the data marts.	The ingestion process takes raw messages and populates the appropriate data mart/warehouse.	Uses different tools to combine and enrich the data to allow extraction of maximum insight.	This layer ensures data can be visualised, accessed or transfered to systems.	Users and systems can consume the data and retrieve data sets.

Technology architecture

The diagram below illustrates the key components of the data lake architecture which would enable HCP integrated BI capabilities. This architecture aligns to the recommendations of the Strategic Data Lake work previously undertaken. It is important to note that the blocks on the left of this diagram may represent either existing data warehouses or, in the long term, direct feeds from data collection systems.

Foundry
SystmOne
MSEFT
EPUT
NELFT
Provide
ECC
Thurrock
Southend
EEAST
AGEM
CCGs

Azure Landing Zone

Acquire
Data Pipelines

Organise
Unstructured Data

HCP Raw Data Store

Standardise
Shared Data Marts

HCP Data Warehouse

PHM Data Store

Security Layer

Analyse
Combine | Enrich | Predict

Deliver

Visualisation Tools

API Gateway

Key — Data Pipelines | Data Store | Data Retrieval

Technology architecture in Microsoft Azure

This requirement has then been mapped to the standard building blocks of an Azure architecture in the diagram below.

Source Systems → **Azure Platform** → **Model and Serve** → **BI Platform** → **Users**
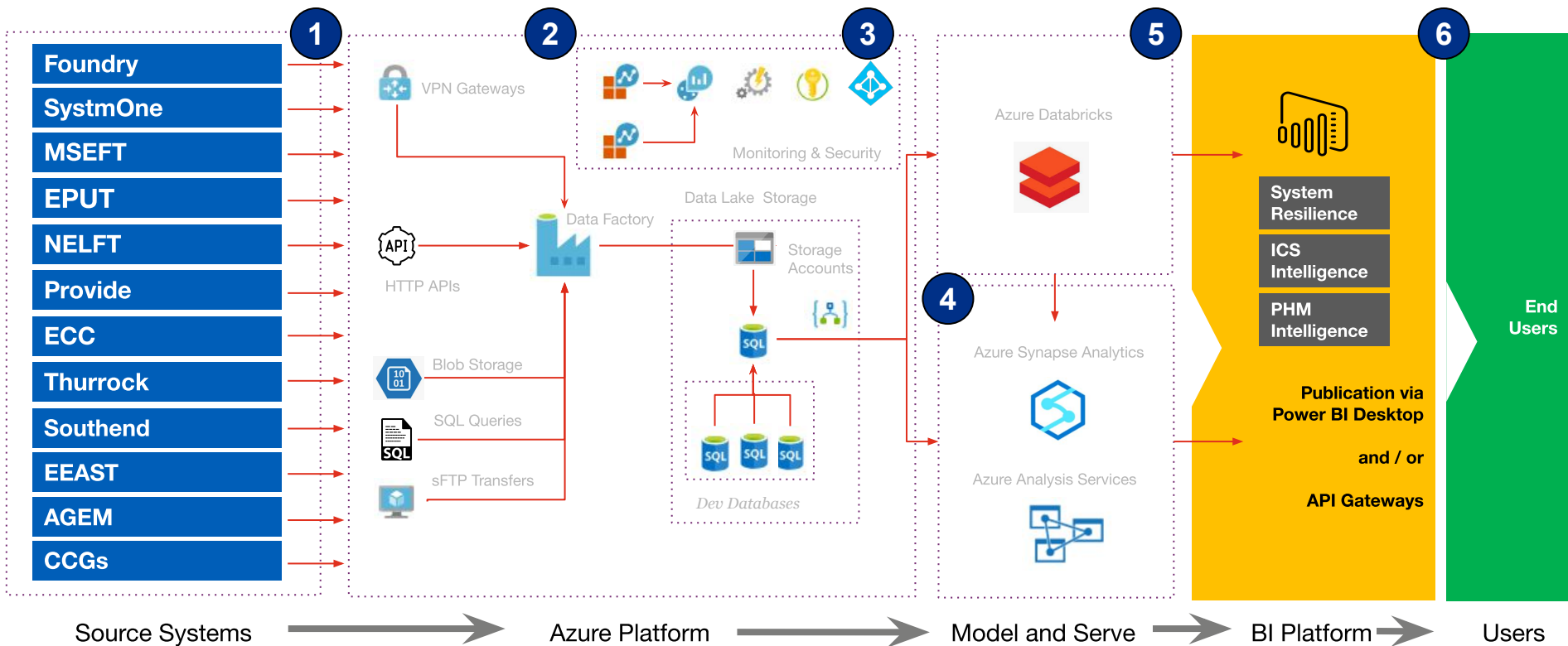
Overview of Power BI dashboards
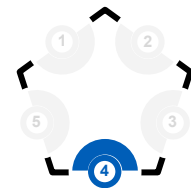
It is recommended that the HCP adopts greater utilisation of visualisation tools such as Microsoft Power BI.

Power BI has a number of features that make it suitable for use within the HCP. Core features that promote usability from a BI developer perspective include:

- A drag-and-drop user interface that allows for the rapid creation of interactive dashboards with real-time feeds of data. This first benefit is critical as the real-time, interactive nature of the dashboards will allow the HCP to move away from the large number of spreadsheet reports that are currently being produced and to a self-serve model for accessing data.
- Support for a wide range of data sources including linking directly to SQL databases, text files (e.g. XML) or existing Excel reports. The latter is particularly useful as a short term solution when creating new dashboards where the formal data flows do not yet exist.
- Links to geospatial tools, such as Esri ArcGIS, which can allow for more advanced map-based representations of data than may currently be possible.
- A simple API for integration with other applications.

Through the Power Query functionality, Power BI additionally has the ability to undertake more complex data preparation and discovery activities (although for published dashboards it may be more computationally efficient to move these earlier in the process, i.e. coding them in SQL).

There are also a wide range of ways that these reports can be consumed by users, including web, desktop and mobile platform support. Integration with Microsoft Azure, as detailed on the previous page, will allow for management of security and accessibility for users across the HCP.

**Example Power BI dashboard:
MSEFT elective performance dashboard**
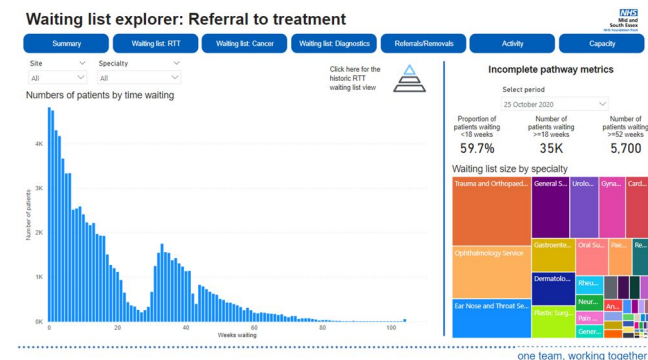
Advanced tools for future analytics
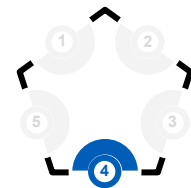
In the short term it is likely that the data lake will supply access to aggregated data either via API gateways or through front end visualisation tools such as Microsoft Power BI. To begin with relatively basic data analytics tools such as PowerBI and Alteryx (which supports data manipulation) will be sufficient to meet demands, but over time as more data is available more powerful tools will be required such as those offered by the cloud providers of the data repository, e.g. Azure. In the longer term there are a number of more advanced and highly flexible tools that could be used by the virtual BI hub in the Azure platform, particularly for population health management.

For some of these tools there exist NHS communities which the virtual hub should utilise. One such example is the NHS R Community (https://nhsrcommunity.com).

The timing of which of these tools will be needed when will depend on the prioritised pipeline of work for the BI hub. It will also depend on the central data repository and the data sitting within it.

Basic tools

Initially the virtual BI hub will rely upon relatively basic data analytics tools capable of data processing and analysis on small to medium sized datasets.

Data lake tools

As the data lake is set up and the amount of data to work with grows, more powerful data analytics tools will be required capable of transforming and exploring massive quantities of data.

Advanced tools

In the long term, and once the available datasets are mature and rich enough, the BI hub are likely to need to use more flexible tools with advanced capabilities, such as AI packages.

Developing a service management framework
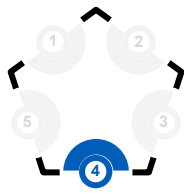
Initially the virtual BI hub will be able to manage service requests and maintenance of the BI services (e.g. dashboards) developed by the hub relatively easily, because the number of services and end-users will be small.

In time however, the number of ongoing BI services will grow into a large portfolio, the maintenance and management of which will become considerable for the BI hub. There may well be large numbers of people across the HCP relying heavily upon services provided by the BI hub. At this point a formal service management framework will be required, defining how and what level of service will be provided.

It is recommended that the virtual BI hub develop a framework based on ITIL (Information Technology Infrastructure Library) best practices. ITIL is a set of detailed practices for IT service management that focuses on aligning IT services with the needs of business. The diagram on the right illustrates the key areas covered by a service management framework.
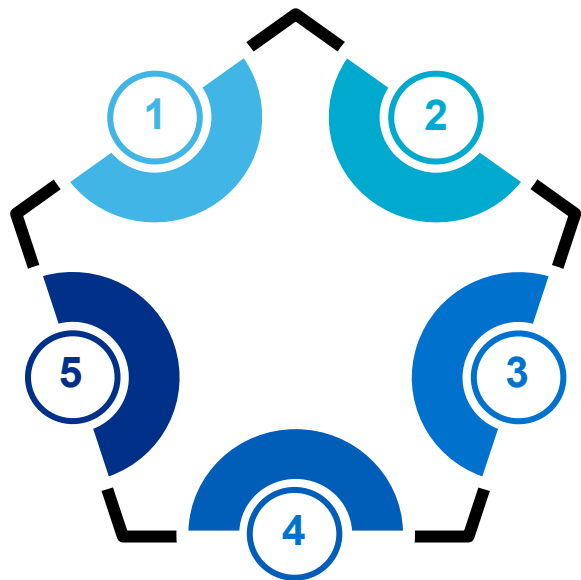
The virtual BI hub may also be able to draw upon good examples of service management already used in organisations in the MSE HCP.
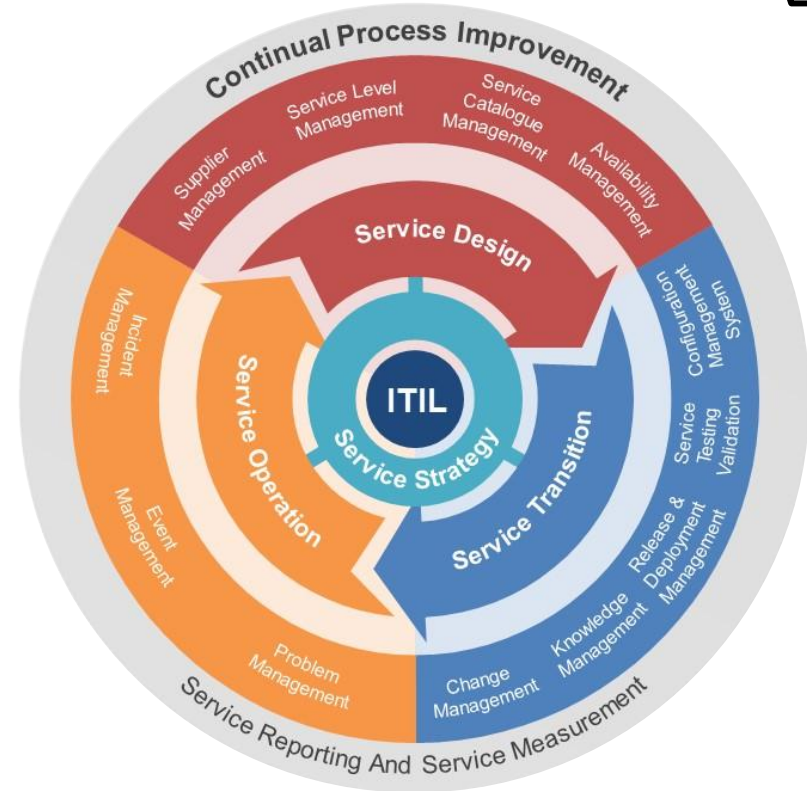
4.5

Creating a data centric culture and workforce

Creating a data centric culture and workforce
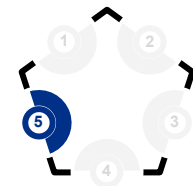
5 **Creating a data centric culture and workforce**

The purpose of this section is to explore:

- Challenges with organisational culture
- Embedding the right culture and behaviours
- Skills gap analysis for the resourcing of the virtual BI hub

Mapping recommendations to this focus area

The change plans that map to the creation of a data centric culture and workforce have been highlighted below:

Process	Organisation	People	Information	Technology
Intra-organisation communication plan	Central BI oversight and direction	End user assessment & training programme	Data integrity & timeliness improvement plan	Single self serve platform with varying access levels
Communications outreach improvement programme	Centralised BI best practices	Clinical representation at local & strategic level	Data taxonomy catalogue	BI tools & platform alignment
Formalised virtual BI Hub service request processes	Centralised HCP governance framework	Technical capabilities L&D programme	Data quality improvement plan	Leverage economies of scale
Review of HCP reporting requirements & agile approach	Data sharing agreements via ISP on ISGs	Technical capabilities recruitment strategy	Integrate data feeds	Strategic data lake
Review the role of the CSU given revised priorities	Building the virtual BI Hub and filling roles	Oversight on BI capacity		HCP-level technical design principles
	Aligning & monitoring against target outcomes for BI hub	Assigned data stewards in virtual BI hub		Build pilot use case
	Develop a Programme Business Case	Culture change management plan		

Organisational culture
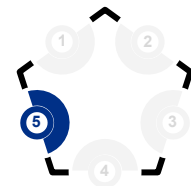
HCP barriers

Although there is often a desire for sharing data amongst services, it can be challenging in reality. Some of the challenges will be deeply rooted in a particular service, its culture and staff, and will take time to change. Other barriers, such as information governance, technology or finance can be more quickly overcome by being well informed and learning from others.

What's the challenge?

Many data leads report having difficulties in even getting into initial conversations about data sharing and analytical capability in their organisation. Partly, this is due to organisational cultures that struggle to keep pace with innovation. In some cases, data and digital capabilities are looked at as desirable options rather than essential and effective investment of resources. It is not always understood at all levels of the organisation how these can be used to achieve better outcomes in decision making and healthcare delivery.

How can this be managed?

Communication is key to this, primarily being able to adapt the information and explanations to different audiences.

One of the qualities of a good data scientist is being able to explain his or her analysis and findings to a non-data literate audience, being able to deliver insights rather than describing statistics. The same principles apply here. For example, using plain English, leaving out the jargon or acronyms can help. If people do not understand it, they will not engage with it, or may feel threatened by it. Explaining it simply, identifying tangible benefits and sharing information in a digestible way is key.

It is not just about having senior executives on board but the support of analytical teams is also crucial. For example, this could be keeping them up to date with policy changes or through regular training. Keeping engagement high with the wider workforce is also important. Explaining the benefits of the approach, how it will make the organisation better and what has worked well elsewhere (perhaps by giving examples of other areas doing it well) will all contribute to adopting a good culture around data sharing.

Embedding the right culture and behaviours
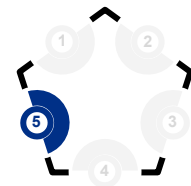
Sustained business value comes from embedding the right culture and behaviours to deliver insight from trusted data.

Often overlooked, data needs to be seen as an asset like any other asset the organisation owns and manages.

Organisations are now including data as an asset on the balance sheet and are building data culture into employee performance management.

However, shifting culture is not a short journey and needs senior sponsorship. When people have been used to doing something in a certain way, it's a challenge that entails a lot of change.

Getting everybody to understand the value of making decisions using data-driven insight rather than gut feel is something most organisations seem to struggle with.

Continual communication and proactive leadership action are required to reinforce and embed culture and behaviours.

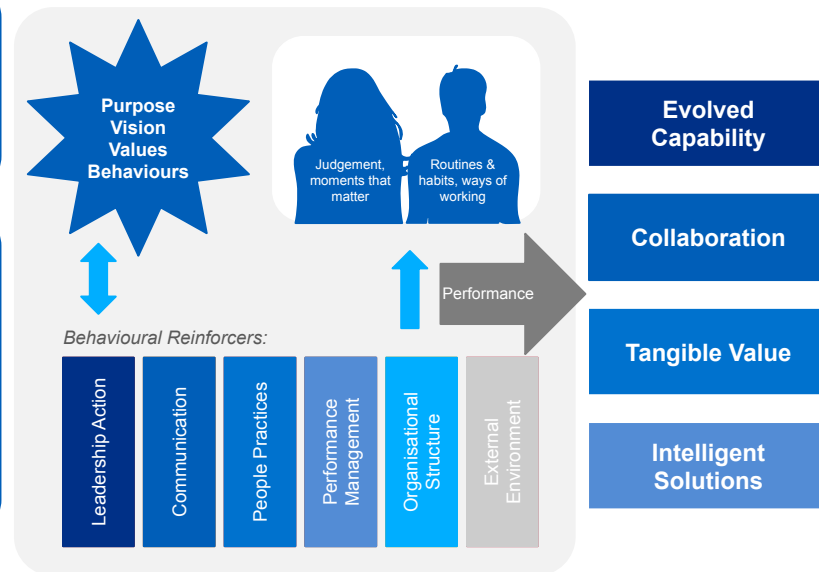- How can I deliver change which is meaningful and consistent across the HCP?
- How do I address traditional ways of working which are now acting as an obstacle?

- How can I empower my workforce with the right data at the right time?
- How do I connect strategy to operations in a way that is meaningful?

- How can I increase 'trust in the source'?
- How can I align the business to consistent principles and policies, for data and reporting?

Purpose Vision Values Behaviours

Judgement, moments that matter

Routines & habits, ways of working

Performance

Behavioural Reinforcers:

| Leadership Action | Communication | People Practices | Performance Management | Organisational Structure | External Environment |

Evolved Capability

Collaboration

Tangible Value

Intelligent Solutions

- Clear milestones delivering capability that is truly sustainable, through an empowered workforce
- Benefit that is felt 'on the ground; Data that is trusted; Faster and more effective decision making
- Change that is understood and bought into by the business; from strategy and leadership, to functions and operations
- Solutions which make a difference and leverage what the HCP already has

Creating a data-centric culture
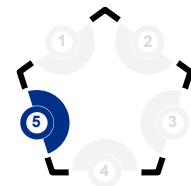
Several key things need to be in place in order to create a data-centric culture and skilled workforce.

Data availability

Data should be available to people who need it, when they need, in a way they can use it in order to improve the services delivered to their patients or citizens. The questionnaire responses collected through this programme identified several instances where people struggle to access data, which in turn creates frustration or inefficiency, particularly in delivery of key front-line services.

Openness to data sharing

The culture of limited data sharing and limited accountability for data improvement needs to change in order for organisations across the HCP to exploit fully the benefits that could come with the development of a central data repository and collaborative HCP BI capability. As a supporting factor, workforce skills and business change initiatives are vitally important.

Alignment to wider communications

Alignment to a wider business change and training needs plan: In order to deliver cultural change a draft proposal should be prepared which outlines staff training on new ways of working, behaviours and responsibilities. The introduction of a HCP-wide handbook could also help outline the vision and the type of organisational behaviours necessary to become the data-centred HCP it aspires to be.

Skills and capability
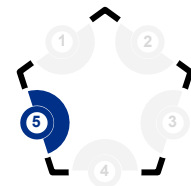
What is the challenge?

In addition to changing the culture, having the right mindset and increasing the appetite for innovative ways of working; having the skills and capability is also a crucial aspect to consider.

Capability may become a barrier due to current organisational structures. Structures may not align to a collaborative BI model, meaning it is difficult to identify who takes the lead and how. It is for the strategic board to decide the details of what that core team should look like; however, effective BI hubs do not just hire a crack team of data experts. Data scientists are key, but it's also vital to have access to the necessary legal, technical, evaluation and comms expertise too.
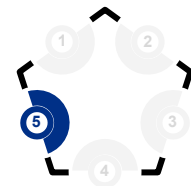
How can this be managed?

For this, the collaborative nature of a virtual BI hub becomes very useful. Partners could include local authorities, public sector bodies, tech firms, data science SMEs, academic institutions, think tanks, civic hacker groups, and so on, all of which could provide bespoke expertise that the HCP would not otherwise have access to. Some of the roles required in setting up and running could also be secured on a voluntary basis (there are plenty of organisations willing to work on projects that could benefit the community), or through simplified procurement frameworks, put in place by the virtual BI hub.

There are a number of opportunities to work with private sector businesses and academic institutions to create attractive opportunities for skilled individuals. Catalyst projects are a good example of collaborations between counties and universities.

There also exist external communities which should be used by the BI hub for building links with wider NHS communities. One such example is the Association of Professional Healthcare Analysts (https://www.aphanalysts.org/).

Change readiness assessment
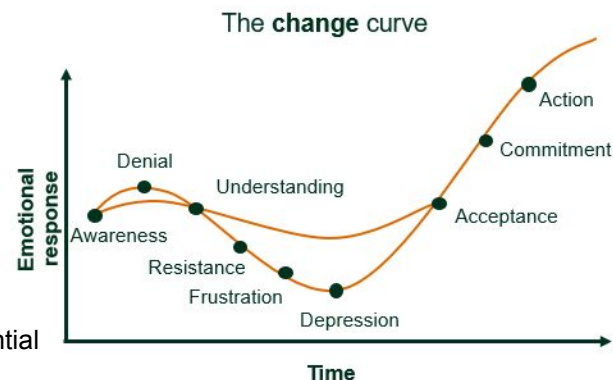
What is a change readiness assessment

Readiness assessments tap into stakeholders' unspoken opinions and attitudes regarding a change – revealing their readiness to adopt the change. It also uncovers business related aspects that need to be in place to support making the change happen. A change readiness assessment is thus a formal process for understanding the organisation's ability to support the desired changes as well as a tool to uncover and manage related people and business risks. The readiness assessment can be conducted through interviews, focus groups and/or surveys based on available time, resources and budget.

Why is it important?

In order to realise expected benefits of a change, we need to uncover and understand stakeholder opinions and attitudes, and to identify and understand the organisations ability to support the change. This decreases the risks associated with the implementation of the change. Given the number of change plans suggested, as well as the commented on change fatigue that some organisations across the HCP are suffering from, it is essential to gauge the appetite and opinions of stakeholders, allowing for more tailored approaches to drive sustained change.

How ready are staff for change?

Typically, stakeholders sit somewhere along the change curve (outlined on the right); it is essential to understand where the organisation sits, to better understand the amount of effort required to drive change.

The **change** curve

Change readiness assessment
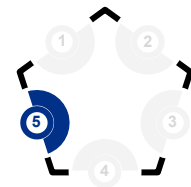
What activities will be key to success

Throughout the cycle of change, activities must address three areas of focus - leadership, engagement, and skills and behaviors - to enable your people to change.

Engagement

People need a positive experience to embrace change. In implementing this strategy, engagement will be required to:
- Connect their role to the vision
- Build a sense of team
- Co-create solutions
- Celebrate successes and learn from their experience

Leadership

People need leaders to set the tone for success. Leaders in the system should:
- Align with and advocate the vision
- Work as a team to make decisions
- Be accountable for their role and actions
- Build capability and role model behaviors

Skills & Behaviours

People need support to change. In implementing the strategy, teams should be supported to:
- Understand the rationale for doing things differently
- Acquire new skills and capabilities
- Experience a positive response to their new behavior
- Overcome obstacles to adoption

Technical skills gap analysis
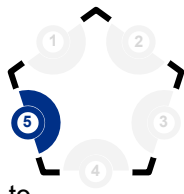
A technical skills gap analysis will identify areas of expertise which are lacking or non-existent across the HCP. An investment in training to address the gaps will be required which will also include training to business users who will self-serve their reporting needs through self-service BI.

The HCP needs to invest in a BI Hub team with people who are skilled and can work closely with the various organisations to identify and develop BI and reporting capabilities, which will ultimately improve the overall BI maturity across the HCP. An initial review conducted as part of the development of this BI Strategy and Roadmap has identified **Data Architect, Data Engineer and Data Scientist** skill sets as being in particularly short supply across the HCP. Therefore these might form an initial area of focus for any investment.

Each organisation should identify a data steward and data architect with the correct skills to help maintain and continually improve data management across the organisations services in line with the principle of using their underlying data as an asset.

For the HCP to build a virtual BI hub team with the correct skills, the following key activities are proposed as part of a future activity in the strategic roadmap. The skills required in the BI Hub and services teams must include the ability to:

01   Identify and manage data quality issues

02   Maintain data models of organisation systems and complete data migration tasks

03   Develop and maintain Azure data services including data warehouse skills

04   Complete data science statistical analysis activities

05   Develop and maintain BI and visualisation reporting technologies such as Power BI
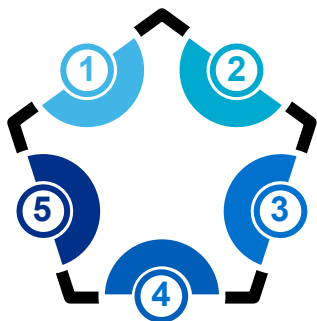
5 Roadmap to Achieving an Integrated BI Capability

Roadmap to achieving an integrated BI capability

This section focuses on providing next steps and associated timeframes, centred around the five key pillars identified in the last chapter, to achieving an integrated BI capability

1 **Building a virtual BI hub**

2 **Establishing processes and governance structures**

3 **Improving the data and establishing an agreed central repository**

4 **Designing and building the technology platform**

5 **Creating a data centric culture and workforce**

The purpose of this section is to explore:

- Detailed next steps to achieving an integrated BI capability in the HCP.
- Associated timeframes and dependencies.
- Effort and impact levels of each activity within the roadmap.

A twin track approach for quick wins and sustainability

The size of the challenge facing the HCP in transitioning from the current state to the future state set out in this report can seem overwhelming, especially with each step providing additional challenges. In an industry fraught with failed transformation programmes, it is easy to lose momentum on these large scale projects; it is therefore essential that the HCP get things moving quickly right from the get-go, accelerating the delivery of certain key activities to see some real tangible change early on, leading to some quick wins.

This helps garner support and enthusiasm for the programme, demonstrating the potential of collaborating at the HCP level and crucially, showing people that it's possible to make an impact quickly. This is important for securing buy-in and commitment both for the people directly involved in the programme doing the doing, and for the external stakeholders.

The way to do this is to employ an agile, twin track approach, whereby certain activities are carried out rapidly to produce the equivalent of a minimum viable product to allow certain quick wins. In parallel, longer term activities are carried out in slower time, guided by the learnings from the accelerated activities.

In practice, this means prioritising specific high impact programmes early on, to get widespread stakeholder buy-in; this is why this report emphasises initial activities in the proposed roadmap, to identify and highlight key outputs to expect within 3 months.

Alternative options for accelerating benefits realisation

Whilst this BI Strategy and Roadmap focuses on the aforementioned twin track approach in order to achieve both short term gains and long term foundational change, there is an inherent challenge relating to the time it will take to deliver certain benefits. This inherent challenge stems from having to write a Programme Business Case for buy-in and funding, then having to bring onboard sufficient resource or upskill people before certain work can begin. There is an alternative approach which could allow benefits to be realised faster, though of course this comes with cost implications.

The HCP could opt to reduce the scope of the in-house work to be carried out by the virtual BI hub, and outsource high priority sections of what is needed. For example this BI strategy is designed to address required improvements in both performance reporting and population health management (PHM) across the system. The HCP could instead outsource the PHM aspect of this to a third party who could use their ready-made resources to perform all data cleansing, data manipulation, and dashboard development necessary in a short time frame to provide substantial benefits within weeks.

Some benefits and risks associated with this approach are set out below.
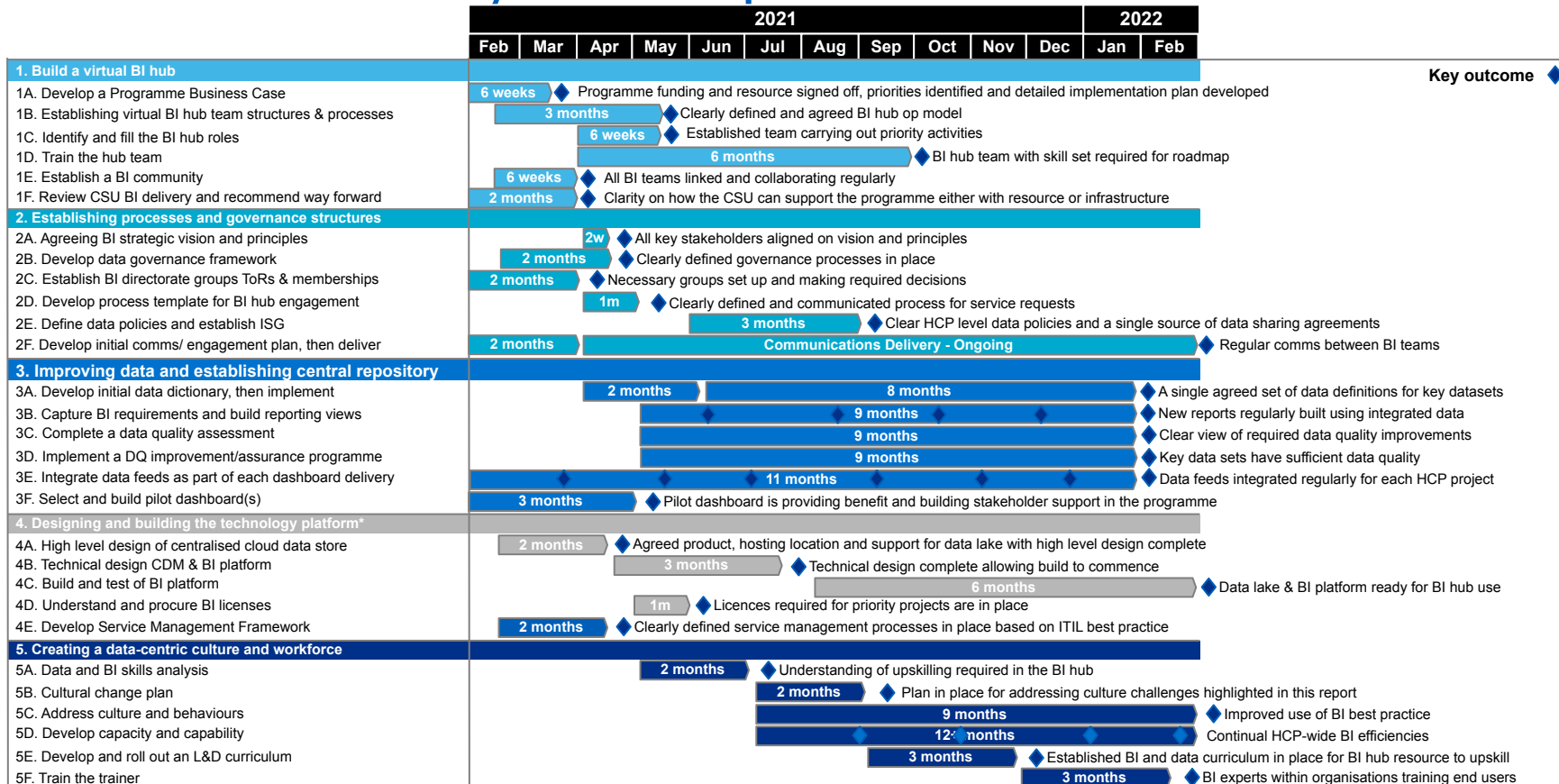
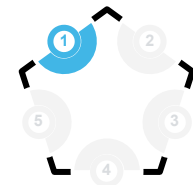| Benefits	Risks
- Rapid realisation of benefits and addressing of immediate high priority problems. - Less up-front investment required. - Significantly reduced remit and workload for the virtual BI hub, lowering the risk of failure of the roadmap BI roadmap. - Spreading of risk. Rather than investing solely on internal development and trusting that it will work, using external resource spreads out the risk.	- Potentially higher cost over the long term. - The investment will lead to short-term benefits, but without the necessary in-house expertise to maintain the developed product longevity will be limited. - Some internal expertise is still required in order to effectively procure and manage outsourced solutions.

While this report is predominantly focused on developing in-house capabilities and solutions, where more detailed design is taking place, outsourced solutions should be considered to identify whether off-the-shelf products can be used in place of larger development projects.

Indicative delivery roadmap over the next 12 months

	2021											2022	
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb

Key outcome ◆

1. Build a virtual BI hub

Activity	Duration	Key outcome
1A. Develop a Programme Business Case	6 weeks	Programme funding and resource signed off, priorities identified and detailed implementation plan developed
1B. Establishing virtual BI hub team structures & processes	3 months	Clearly defined and agreed BI hub op model
1C. Identify and fill the BI hub roles	6 weeks	Established team carrying out priority activities
1D. Train the hub team	6 months	BI hub team with skill set required for roadmap
1E. Establish a BI community	6 weeks	All BI teams linked and collaborating regularly
1F. Review CSU BI delivery and recommend way forward	2 months	Clarity on how the CSU can support the programme either with resource or infrastructure

2. Establishing processes and governance structures

Activity	Duration	Key outcome
2A. Agreeing BI strategic vision and principles	2w	All key stakeholders aligned on vision and principles
2B. Develop data governance framework	2 months	Clearly defined governance processes in place
2C. Establish BI directorate groups ToRs & memberships	2 months	Necessary groups set up and making required decisions
2D. Develop process template for BI hub engagement	1m	Clearly defined and communicated process for service requests
2E. Define data policies and establish ISG	3 months	Clear HCP level data policies and a single source of data sharing agreements
2F. Develop initial comms/ engagement plan, then deliver	2 months / Communications Delivery - Ongoing	Regular comms between BI teams

3. Improving data and establishing central repository

Activity	Duration	Key outcome
3A. Develop initial data dictionary, then implement	2 months / 8 months	A single agreed set of data definitions for key datasets
3B. Capture BI requirements and build reporting views	9 months	New reports regularly built using integrated data
3C. Complete a data quality assessment	9 months	Clear view of required data quality improvements
3D. Implement a DQ improvement/assurance programme	9 months	Key data sets have sufficient data quality
3E. Integrate data feeds as part of each dashboard delivery	11 months	Data feeds integrated regularly for each HCP project
3F. Select and build pilot dashboard(s)	3 months	Pilot dashboard is providing benefit and building stakeholder support in the programme

4. Designing and building the technology platform*

Activity	Duration	Key outcome
4A. High level design of centralised cloud data store	2 months	Agreed product, hosting location and support for data lake with high level design complete
4B. Technical design CDM & BI platform	3 months	Technical design complete allowing build to commence
4C. Build and test of BI platform	6 months	Data lake & BI platform ready for BI hub use
4D. Understand and procure BI licenses	1m	Licences required for priority projects are in place
4E. Develop Service Management Framework	2 months	Clearly defined service management processes in place based on ITIL best practice

5. Creating a data-centric culture and workforce

Activity	Duration	Key outcome
5A. Data and BI skills analysis	2 months	Understanding of upskilling required in the BI hub
5B. Cultural change plan	2 months	Plan in place for addressing culture challenges highlighted in this report
5C. Address culture and behaviours	9 months	Improved use of BI best practice
5D. Develop capacity and capability	12 months	Continual HCP-wide BI efficiencies
5E. Develop and roll out an L&D curriculum	3 months	Established BI and data curriculum in place for BI hub resource to upskill
5F. Train the trainer	3 months	BI experts within organisations training end users

* Section 4 includes activities (in grey) that will be governed through through the digital board as part of the strategic data lake work. It is important to note that work is underway to further develop this timeline as part of the strategic data lake business case and therefore it is subject to change.

Building the virtual BI Hub

1A. Develop a Programme Business Case

A Programme Business Case for the MSE BI Strategy investment implementation may need to be written, reviewed and signed-off. This will be separate to the business case for the development of the strategic data lake.

Effort: Low   Impact: High

1C. Identify and fill the BI hub roles

A project team will need to be assigned to move initial roadmap activities forward, utilising CSU and/or contractor support as required. Over the longer term, HCP organisational staff with appropriate skills will be re-aligned to replace contractors. In a limited number of cases an external recruitment campaign could be used.

Effort: High   Impact: High

1E. Establish a BI community

In order to connect the Business Intelligence community; the identified teams across the organisation should be connected through knowledge-sharing forums and regular communications.

Effort: Low   Impact: Low

1B. Establishing virtual BI hub team structures, processes and ways of working

The key processes and governance structure for the virtual BI hub must be designed and approved, including a quality assurance framework for BI work and a triage process for receiving, prioritising and delivering incoming requests.

Effort: Med   Impact: Med

1D. Train the hub team

The data-centric workforce and culture workstream should be used to establish where the biggest skill gaps exist across the HCP. These gaps, in conjunction with the estimated requirement, would help define the recruitment and training strategy for the virtual BI hub .

Effort: Med   Impact: Med

1F. Review CSU BI delivery

The role of AGEM should be reviewed to understand what contributions they could make to the HCP BI capability, either through resource or infrastructure.

Effort: Med   Impact: Med

Building the virtual BI hub
High level 12 month plan

		2021											2022	
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb

1A — Develop a Programme Business Case
6 weeks — Programme funding and resource signed off, priorities identified and detailed implementation plan developed

1B — Establishing virtual BI hub team structures, processes and ways of working
3 months — Clearly defined and agreed BI hub op model

1C — Identify and fill the BI hub roles
6 weeks — Established team carrying out priority activities

1D — Train the hub team
6 months — BI hub team with skill set required for roadmap

1E — Establish a BI community
6 weeks — All BI teams linked and collaborating regularly

1F — Review CSU BI delivery and recommend way forward
2 months — Clarity on how the CSU can support the programme either with resource or infrastructure

Key outcome ◆

Establishing governance structures and processes
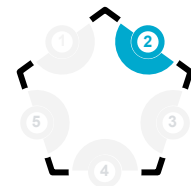
2A. Agreeing BI strategic vision and principles

Building on vision statements/principles captured in BI strategy, the BI strategy board need to ratify and communicate the vision to the wider HCP.

Effort: Low   Impact: Med

2C. Establish BI directorate groups ToRs and memberships

There is a need to align on Terms of Reference (ToR) for the BI directorate and assign membership roles. This will be driven predominantly by the steering group, but also requires BI strategy board input, as well as steer from executive sponsor.

Effort: Low   Impact: Med

2E. Define data policies and establish ISG

The steering group will define data policies to enable better use of reporting, as well as using an Information Sharing Gateway (ISG), an online tool that helps create and manage data sharing agreements.

Effort: High Impact: High
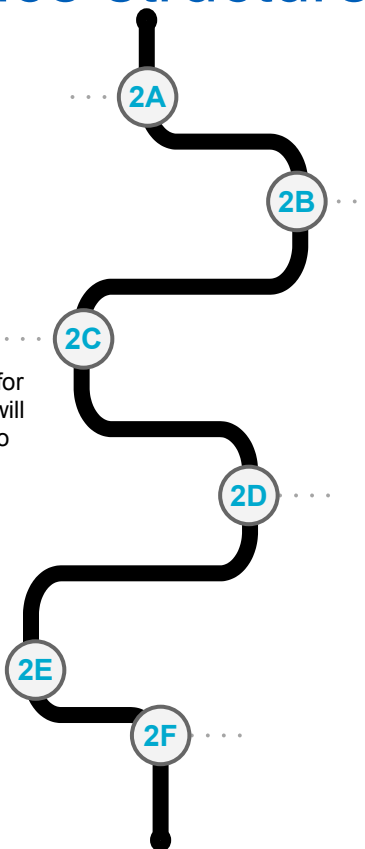
2B. Develop data governance framework

The data governance steering group will review existing data governance policies across organisations, before establishing a set of governance policies, standards and processes that deliver higher consistency across the HCP.

Effort: Med   Impact: Med

2D. Develop process templates for BI hub engagement

Provide standardised routes for communications and request templates to streamline BI hub engagement.

Effort: Low   Impact: Med

2F. Communications plan to wider HCP community

Initial communications should be developed concurrently with a Communications and Engagement Plan designed to improve communication between the different BI teams across the HCP, as well as between BI teams and service users. This plan should then be implemented.

Effort: Low   Impact: Med

2A
2B
2C
2D
2E
2F

Establishing governance structures and processes
High level 12 month plan
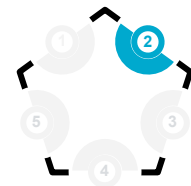
		2021										2022	
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb

2A Agreeing BI strategic vision and principles
— **2W** ◆ All key stakeholders aligned on vision and principles

2B Develop data governance framework
— **2 months** ◆ Clearly defined governance processes in place

2C Establish BI directorate groups ToRs and memberships
— **2 months** ◆ Necessary groups set up and making required decisions

2D Develop process template for BI hub engagement
— **1M** ◆ Clearly defined and communicated process for service requests

2E Define data policies and establish ISG
— **3 months** ◆ Clear HCP data policies and one source of data agreements

2F Develop initial comms/ engagement plan, then deliver
— **2 months** **Ongoing - Communications Delivery** ◆ Regular comms between BI teams

Key outcome ◆

Improving data and establishing agreed central repository
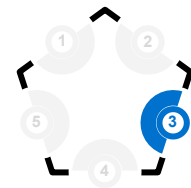
3A. Complete a data quality assessment

Data quality issues across all HCP data sources associated with the BI development pipeline should be measured and documented. This assessment will define scope, volume and root cause of issues.

Effort: Med   Impact: Med

3C. Develop an initial HCP data dictionary, followed by a full implementation

Develop data definitions, business glossaries and taxonomies to profile data, create consistency across the HCP and contribute to the common data model. This work should build upon national standards.

Effort: Med   Impact: High

3E. Capture BI requirements and build reporting views

Identify business use cases and BI requirements across HCP which will be used to design and build front end visualisations and create a BI development pipeline

Effort: High   Impact: High
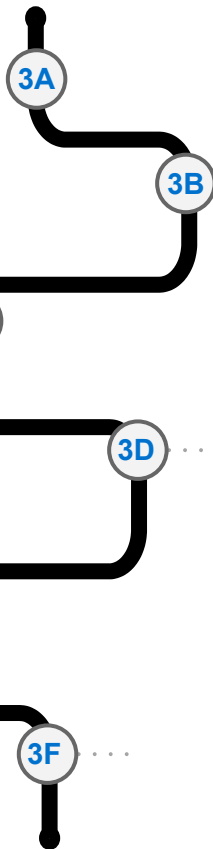
3B. Implement a DQ improvement / assurance programme

Data quality improvement plan should be implemented against assessment outcomes and prioritised in conjunction with BI pipeline.

Effort: High   Impact: High

3D. Integrate data feeds

Complete a data architecture and integration design of key data sources across the HCP's structured and unstructured sources enabling mapping to Azure and Common Data Model.

Effort: High   Impact: High

3F. Select and build pilot dashboard(s)

Prototype dashboard(s) should be piloted as soon as possible to demonstrate value from the BI strategy. These may need to utilise an organisation's existing architecture.

Effort: Low   Impact: High

Improving data and establishing agreed central repository
High level 12 month plan

		2021											2022	
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
3A	Develop initial data dictionary, then implement		2 months		8 months									◆	A single agreed set of data definitions for datasets key to the HCP
3B	Capture BI requirements and build reporting views				9 months									◆	New reports regularly built using integrated data
3C	Complete a data quality assessment				9 months									◆	Clear view of what data quality improvements are needed for initial projects
3D	Implement a DQ improvement / assurance programme				9 months									◆	Key data sets have sufficient data quality for priority projects
3E	Integrate data feeds as part of each dashboard delivery	11 months												◆	Data feeds integrated regularly for each HCP project
3F	Select and build pilot dashboard(s)	3 months			◆ Pilot dashboard is providing benefit and building stakeholder support in the programme										

Key outcome ◆

Designing and building the technology platform
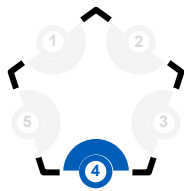
4A. Confirmation of hosting environment
Complete options analysis and confirmation of hosting of data lake infrastructure.

Effort: Low   Impact: Low

4C. Build and test of BI platform
Implementation of technology infrastructure and BI Platform core build and test.

Effort: High   Impact: High

4E. Develop service management framework
Develop clearly defined service management processes based on ITIL best practice.

Effort: Med   Impact: Med

4B. Technical design CDM and BI platform
Technical Design of the BI platform based on the strategic ADLS, Common Data Model and Azure Analytics Services and Power BI data flows.

Effort: Med   Impact: High

4D. Understand and procure BI licenses
Analysis of existing BI user licenses followed by the procurement of licenses to fill any gaps that exist.

Effort: Med   Impact: Med

4A
4B
4C
4D
4E

Designing and building the technology platform
High level 12 month plan*

		2021										2022	
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb

4A — High level design of centralised cloud data store
2 months ◆ Agreed product, hosting location and support for data lake with high level design complete

4B — Technical design CDM and BI platform
3 months ◆ Technical design complete allowing build to commence

4C — Build and test of BI platform
6 months ◆ Data lake & BI platform ready for BI hub use

4D — Understand and procure BI licenses
1M ◆ Licences required for priority projects are in place

4E — Develop service management framework
2 months ◆ Clearly defined service management processes in place based on ITIL best practice

* This section includes activities (in grey) that will be governed through through the digital board as part of the strategic data lake work. It is important to note that work is underway to further develop this timeline as part of the strategic data lake business case and therefore it is subject to change.

Key outcome ◆

Creating a data-centric culture and workforce

5A. Data and BI Skills analysis
Identify capability gaps within the virtual BI hub by comparing the BI and data requirements with the capabilities of the people taking on the BI hub roles.

Effort: Low   Impact: Low

5B. Cultural change plan
Develop a plan for addressing the culture challenges highlighted in this report.

Effort: Med   Impact: Med

5C. Address culture and behaviours
Re-affirm BI Directorate level support and sponsorship around the data and BI agenda. This should be accompanied by a schedule of communications to encourage good practice and direct any activity around BI and data through the correct governance routes.

Effort: Med   Impact: High

5D. Develop capacity and capability
In order to successfully deliver change, HCP should increase capacity by augmenting the current BI development resources from across the partner organisations to create more bandwidth.

Effort: High Impact: High

5E. Build an L&D curriculum
Create a curriculum around BI and data to allow virtual BI hub development resource to upskill and become professionally recognised.

Effort: Med   Impact: Med

5F. Train the trainer
Train-the-trainer should be employed as an approach to embed BI experts within organisations to enable them to train other people.

Effort: Low   Impact: Low

5A
5B
5C
5D
5E
5F

Creating a data-centric culture and workforce
High level 12 month plan

		2021										2022	
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb

5A Data & BI skills analysis — **2 months** ◆ Understanding of upskilling required in the BI hub

5B Cultural change plan — **2 months** ◆ Plan in place for addressing culture challenges highlighted in this report

5C Address culture and behaviours — **9 months** ◆ Senior commitment to BI and improved use of BI best practice

5D Develop capacity and capability — **12+ months** ◆ Continual HCP-wide BI efficiencies

5E Develop & roll out an L&D curriculum — **3 months** ◆ Established BI and data curriculum in place for BI hub resource to upskill

5F Train the trainer — **3 months** ◆ Embedded BI experts within organisations training end users

Key outcome ◆

A

Appendices

1

Appendix 1:

Detailed breakdown of engagement across the HCP

Breakdown of engagement from across the HCP

Thank you to the 52 individuals from across the HCP who engaged with this programme of work through interviews and workshops. These people are listed below and on the following slides. In addition to this, thank you to the 101 people who completed the questionnaire.

Name	Group	Interviewed	Attended Kick-off workshop	Attended strategy workshop	Attended final review workshop
Brian Hughes	AGEM	Yes	Yes	Yes	No
Ayub Bhayat	AGEM	Yes	No	No	No
Gail Savage	AGEM	Yes	No	No	No
Sheila Etcuban	AGEM	Yes	Yes	No	No
Emma Smith	AGEM	Yes	Yes	Yes	No
Laura Browne	AGEM	No	No	Yes	No
Carol Machin	AGEM	No	No	Yes	No
Anthony McKeever	CCGs	Yes	No	No	No
Ashley King	CCGs	Yes	No	No	No
Patricia Dorsi	CCGs	Yes	No	No	No
Rachel Hearn	CCGs	Yes	No	No	No
Jennifer Speller	CCGs	Yes	No	No	No
James Wilson	CCGs	Yes	No	No	No
Dan Doherty	CCGs	Yes	No	No	No
Emma Timpson	CCGs	Yes	Yes	Yes	Yes
Jo Cripps	CCGs	Yes	No	No	Yes
Alison Birch	CCGs	No	No	Yes	No
James Buschor	CCGs	Yes	Yes	Yes	No

Breakdown of engagement from across the HCP

Name	Group	Interviewed	Attended Kick-off workshop	Attended strategy workshop	Attended final review workshop
Sarah Hurst	CCGs	No	Yes	No	No
Peter Fairley	ECC	Yes	No	No	No
Colin Seward	ECC	Yes	Yes	Yes	Yes
Alastair Gordon	ECC	Yes	No	No	No
Nicola Mallet	ECC	Yes	No	No	No
David Caplan	ECC	Yes	No	No	No
Zoe Collis	EEAST	Yes	No	No	No
Paul Scott	EPUT	No	No	No	Yes
Jan Leonard	EPUT	Yes	Yes	No	Yes
Yes	EPUT	Yes	No	No	No
Andrew Pike	MSEFT	Yes	No	No	No
Tom Abell	MSEFT	Yes	No	No	No
Charlotte Williams	MSEFT	Yes	Yes	No	No
Ian Harrison	MSEFT	Yes	Yes	Yes	No
Martin Callingham	MSEFT	No	No	No	Yes
Dawn Scrafield	MSEFT	No	No	No	Yes
Josie Harding	MSEFT	Yes	Yes	No	No
Charlotte Sturges	MSEFT	No	Yes	No	No

Breakdown of engagement from across the HCP

Name	Group	Interviewed	Attended Kick-off workshop	Attended strategy workshop	Attended final review workshop
Brid Johnson	NELFT	Yes	No	No	No
Keith Apperley	NELFT	Yes	No	Yes	No
Barry Plewa	NELFT	Yes	Yes	No	No
David McMullan	Newton	Yes	No	No	No
Frank Wilkinson	Newton	No	Yes	Yes	No
Barry Frostick	NHSE	No	No	No	Yes
Vicky Waldon	Provide	Yes	No	No	No
Andrew Brown	Provide	Yes	No	Yes	Yes
Deepak Pulikkottil	Provide	Yes	No	No	No
Kaiser Chowdhury	Provide	No	Yes	No	No
Tandra Forster	Southend	Yes	No	No	No
Tom Dowler	Southend	Yes	No	No	No
Richard Warren	Southend	Yes	No	No	No
Monica Scrobotovici	Thurrock	Yes	No	Yes	Yes
Emma Sanford	Thurrock	Yes	No	Yes	No
Maria Payne	Thurrock	Yes	No	No	No

2

Appendix 2:

Questionnaire development methodology

Questionnaire development

The process used for developing the questionnaire is illustrated below. In order to ensure the questionnaire was comprehensive, thorough and up-to-date, material from a range of sources was used:

Review checkpoints

Alignment with MSE HCP via kick-off workshop

Internal review by project team

Shared with core MSE leadership team for input / steer

Final version run-through

Understanding the landscape

Past engagements with the NHS, primary research and our SME network enabled us to develop a high level understanding of how organisations are assessed from a BI maturity perspective

Developing question longlist

Separating into 5 core themes, we began compiling questions, tailoring questions from the HAAM model, primary research and previous work

Refining question list

Understanding what exactly we want to know and how to ensure the questions address this; we also shortened the questionnaire at this point to improve accessibility

Iterating on feedback

Based on feedback, we further reduced the length of the questionnaire, standardised answer options and clarified definitions to reduce confusion, as well as using MS Forms to ensure accessibility

Distributing questionnaire

Through designated organisation specific leads, we distributed the questionnaire to the relevant parties

3

Appendix 3:

Detailed healthcare analytics adoption model scoring

Detailed scoring against the HAAM model (1 of 2)

The table below shows the first five levels of the HAAM model and the detailed requirements that need to be met for an organisation to be classed as at that level. Requirements are highlight black where this is not found anywhere in the HCP, orange where it is found in some organisations, and green where it is found across the HCP. The remaining five levels are shown on the next slide.

Level 4	Automated External Reporting	• Analytic motive is focused on consistent, efficient production of reports required for regulatory and accreditation requirements (e.g. CMS, Joint Commission, tumor registry, communicable diseases); payer incentives (e.g. MU, PQRS, VBP, readmission reduction); and specialty society databases (e.g. STS, NRMI, Vermont-Oxford). • Adherence to industry-standard vocabularies is required. • Clinical text data content is available for simple key word searches. • Centralized data governance exists for review and approval of externally released data.
Level 3	Automated Internal Reporting	• Analytic motive is focused on consistent, efficient production of reports supporting basic management and operation of the healthcare organization. • Key performance indicators are easily accessible from the executive level to the front-line manager. • Corporate and business unit data analysts meet regularly to collaborate and steer the EDW. • Data governance expands to raise the data literacy of the organization and develop a data acquisition strategy for Levels 4 and above.
Level 2	Standardized Vocabulary & Patient Registries	• Master vocabulary and reference data identified and standardized across disparate source system content in the data warehouse. • Naming, definition, and data types are consistent with local standards. • Patient registries are defined solely on ICD billing data. • Data governance forms around the definition and evolution of patient registries and master data management.
Level 1	Enterprise Data Operating System	• At a minimum, the following data are co-located in a single data warehouse, locally or hosted: HIMSS EMR Stage 3 data, Revenue Cycle, Financial, Costing, Supply Chain, and Patient Experience. • Searchable metadata repository is available across the enterprise. • Data content includes insurance claims, if possible. • Data warehouse is updated within one month of source system changes. • Data governance is forming around the data quality of source systems. • The EDW reports organizationally to the CIO.
Level 0	Fragmented Point Solutions	• Vendor-based and internally developed applications are used to address specific analytic needs as they arise. • The fragmented point solutions are neither co-located in a data warehouse nor otherwise architecturally integrated with one another. • Overlapping data content leads to multiple versions of analytic truth. • Reports are labor intensive and inconsistent. • Data governance is non-existent.

Detailed scoring against the HAAM model (2 of 2)

Level	Category	Description
Level 9	Direct-to-Consumer Analytics & Artificial Intelligence	• Direct-to-patient analytics and AI are used in a collaborative decision making environment between patients and healthcare providers. • Patients have the ability to port and analyze their complete healthcare data ecosystem, independent of healthcare providers. • Treatment and health maintenance protocols are enabled using AI-based digital twins– "Patients Like This" and "Patients Like Me" pattern recognition.
Level 8	Personalized Medicine & Prescriptive Analytics	• Analytic motive expands to wellness management, physical and behavioral functional health, and mass customization of care. • Analytics expands to include NLP of text, prescriptive analytics, and interventional decision support. • Prescriptive analytics are available at the point of care to improve patient specific outcomes based upon population outcomes. • Data content expands to include 7×24 biometrics data, genomic data and familial data. • The EDW is updated within a few minutes of changes in the source systems.
Level 7	Clinical Risk Intervention & Predictive Analytics	• Analytic motive expands to address diagnosis-based, fixed-fee per capita reimbursement models. • Focus expands from management of cases to collaboration with clinician and payer partners to manage episodes of care, using predictive modeling, forecasting, and risk stratification to support outreach, triage, escalation and referrals. • Physicians, hospitals, employers, payers and members/patients collaborate to share risk and reward (e.g., financial reward to patients for healthy behavior). • Patients are flagged in registries who are unable or unwilling to participate in care protocols. • Data content expands to include home monitoring data, long term care facility data, and protocol-specific patient reported outcomes. • On average, the EDW is updated within one hour or less of source system changes.
Level 6	Population Health Management & Suggestive Analytics	• The "accountable care organization" shares in the financial risk and reward that is tied to clinical outcomes. • At least 50% of acute care cases are managed under bundled payments. • Analytics are available at the point of care to support the Triple Aim of maximizing the quality of individual patient care, population management, and the economics of care. • Data content expands to include bedside devices, home monitoring data, external pharmacy data, and detailed activity based costing. • Data governance plays a major role in the accuracy of metrics supporting quality-based compensation plans for clinicians and executives. • On average, the EDW is updated within one day of source system changes. • The EDW reports organizationally to a C-level executive who is accountable for balancing cost of care and quality of care.
Level 5	Waste & Care Variability Reduction	• Analytic motive is focused on measuring adherence to clinical best practices, minimizing waste, and reducing variability. • Data governance expands to support care management teams that are focused on improving the health of patient populations. • Population-based analytics are used to suggest improvements to individual patient care. • Permanent multidisciplinary teams are in-place that continuously monitor opportunities to improve quality, and reduce risk and cost, across acute care processes, chronic diseases, patient safety scenarios, and internal workflows. • Precision of registries is improved by including data from lab, pharmacy, and clinical observations in the definition of the patient cohorts. • EDW content is organized into evidence-based, standardized data marts that combine clinical and cost data associated with patient registries. • Data content expands to include insurance claims (if not already included) and HIE data feeds. • On average, the EDW is updated within one week of source system changes.

4

Appendix 4:

Organisation specific primary research results

Organisation-level questionnaire results

Key:

- 🟥 1 – 2.5   **Exposed**
- 🟨 2.51 – 3.5   **Viable**
- 🟩 3.51 - 5   **Future Ready**

Organisation	No. respondents	Process	Organisation	People	Information	Technology
AGEM	7	3.43	3.08	3.60	3.07	2.33
CCG	19	2.67	3.04	2.81	2.82	2.05
ECC	6	2.44	2.70	3.57	3.00	2.06
EEAST*	1	2.00	4.00	4.00	4.50	2.33
EPUT	27	2.86	3.38	3.05	3.41	2.49
MSEFT	26	2.67	3.16	2.81	3.21	2.03
Other	1	3.33	3.00	3.00	3.50	3.00
Provide	4	2.75	2.75	3.40	3.13	2.50
Southend BC	3	2.89	3.00	3.33	3.50	2.44
Thurrock	2	3.50	3.43	2.80	3.00	1.83
NELFT	6	3.28	2.71	4.00	3.50	2.44
HCP	**102**	**2.82**	**3.13**	**3.07**	**3.20**	**2.24**

* It should be noted that the East of England Ambulance Service results are based on a single questionnaire response so may not represent the range of opinions collected from other organisations.

MSE FT primary research results

Interview findings

1. End-users often have no time for self service BI

2. It is hard to hire analytics resources at a high enough pay band

3. It is possible to get data from across the HCP but it takes a lot of time and effort

4. Having three PAS systems and three sets of ways of working is a blocker

5. Short notice urgent turnaround requests coming in are never ending

6. MSE are one of the top 10 biggest Trusts in the country which presents its own challenges

Questionnaire results

Process AR:
2.67 - *Viable*

Organisation AR:
3.16 - *Viable*

People AR:
2.81 - *Viable*

Information AR:
3.21 - *Viable*

Technology AR:
2.03 - *Exposed*

BI App Catalogue

People / Team
Total no. people

- Not provided

Applications / Data Sources

- Hospital Insights
- Healthcare Evaluation Data (HED)
- QlikView
- SSRS
- Power BI

EPUT primary research results

NHS
Essex Partnership University
NHS Foundation Trust

Interview findings

1. The team struggle to keep up with BAU reporting and ad-hoc requests, and have no time for BI development

2. EPUT cannot have confidence in their data until 21 days after the end of the month due to data validation

3. EPUT have to produce around 600 KPIs on a regular basis, many of which are not necessary

4. There has been a culture of needing the most up to date data possible, when all that is needed is trend data

5. The technical infrastructure and internal reporting tools are relatively mature

6. It would help EPUT if there was a DSCRO with most of the data in it so others in the HCP could self-serve

Questionnaire results

Process AR:
2.86 - *Viable*

Organisation AR:
3.38 - *Viable*

People AR:
3.05 - *Viable*

Information AR:
3.41 - *Viable*

Technology AR:
2.49 - *Exposed*
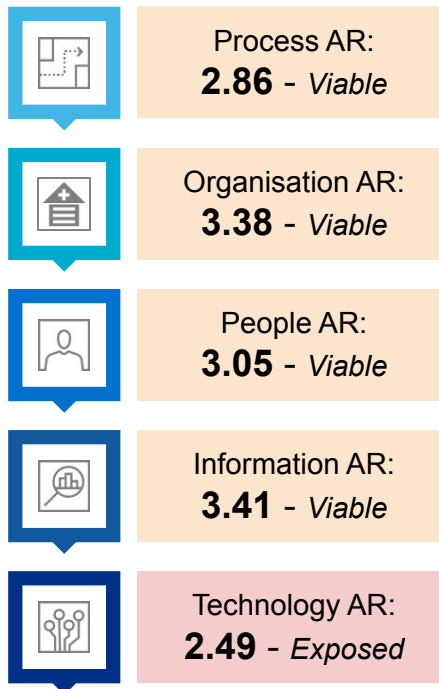
BI App Catalogue

People / Team
Total no. people: 9

- 3 Management staff
- 3 Technical staff
- 3 BI staff

Applications / Data Sources

- Crystal Reports
- SSRS

Essex County Council primary research results

Interview findings

1. ECC has a good level of resources, capability and technology across several teams for reporting and PHM

2. There are cultural challenges to address around appetite for sharing information at a HCP level

3. Greater support is needed on IG and IT as the internal resources are stretched thin

4. Data quality as a result of poor data entry is an issue and a barrier to utilising predictive analytics

5. The future state has to be interoperable with other Essex STPs

6. ECC have the capability to contribute to BI best practices documentation at the HCP level

Questionnaire results

Process AR:
2.44 - *Viable*

Organisation AR:
2.70 - *Viable*

People AR:
3.57 - *Future ready*

Information AR:
3.00 - *Viable*

Technology AR:
2.06 - *Exposed*
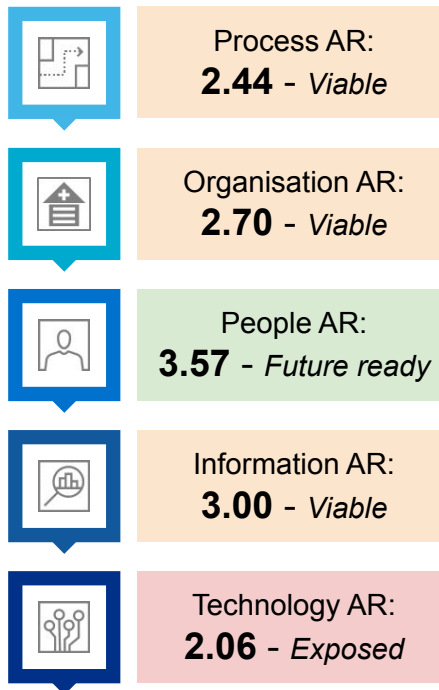
BI App Catalogue

People / Team
Total no. people

- 1 Management staff
- 2 Technical staff
- 2 BI staff

Applications / Data Sources

- Microsoft Power BI
- SQL Server
- MOSAIC
- Capital One
- TCS

Southend-on-Sea BC primary research results

Interview findings

1	The team is stretched working on BAU reporting
2	Data sharing can be an issue, as often the necessary contracts or structure aren not in place
3	There is low priority placed on BI work outside of Southend BC
4	Each LA has their own priorities which can lead to resource problems or political issues
5	Access to integrated healthcare / NHS data would help enormously with both operations and PHM

Questionnaire results

Process AR:
2.89 - *Viable*

Organisation AR:
3.00 - *Viable*

People AR:
3.33 - *Viable*

Information AR:
3.50 - *Viable*

Technology AR:
2.44 - *Exposed*
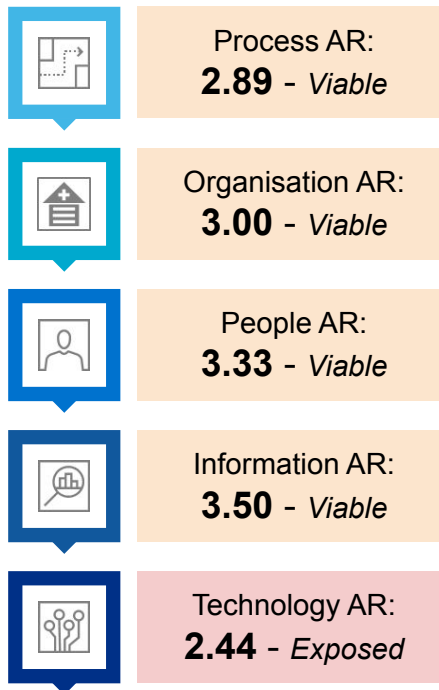
BI App Catalogue

People / Team
Total no. FTE: 14

- 1 Management staff
- 1 Technical staff
- 14 BI staff

Applications / Data Sources

- SQL
- R
- ESRI
- Liquid Logic

Thurrock Council primary research results

THURROCK COUNCIL

Interview findings

1. The Thurrock Integrated Care Partnership is a good example of intra-organisation collaboration

2. Challenges lie in linking what the HCP are doing compared to what Thurrock are doing

3. At times it feels like there is a bit of a barrier around the HCP from a Local Authority perspective

4. Information governance can be a real challenge, both trying to access data within the HCP and externally

5. Thurrock have done lots of good work in PHM and other BI areas but these are Thurrock focused

6. Thurrock have very recently set up a small HCP PHM team funded by the HCP

Questionnaire results
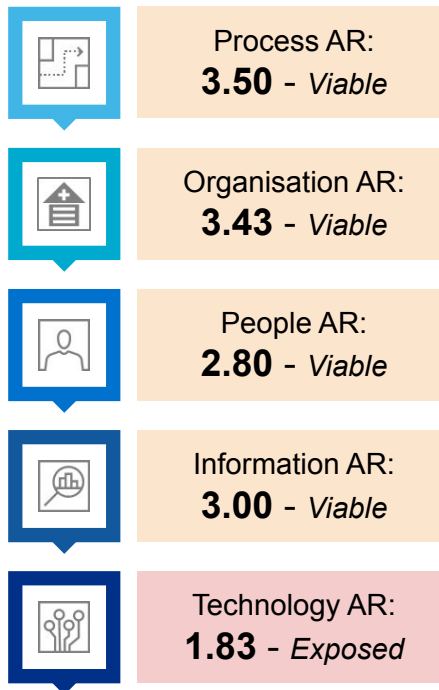
Process AR:
3.50 - *Viable*

Organisation AR:
3.43 - *Viable*

People AR:
2.80 - *Viable*

Information AR:
3.00 - *Viable*

Technology AR:
1.83 - *Exposed*

BI App Catalogue

People / Team
Total no. people

- No BI App Catalogue provided

Applications / Data Sources

- No BI App Catalogue provided

CCG primary research results

Interview findings

1. Sometimes receive different data sets from trusts which contradict each other

2. There is often a disconnect between those sending the data and those receiving it

3. The absence of good data means that people are less invested in developing insights

4. Providers can be very guarded with their data, with significant internal politics around what data is shared

5. There is a culture of reliance on bespoke BI and a resistance to self-service

6. Any future system will need to be interoperable with organisations outside of the HCP

Questionnaire results

Process AR:
2.67 - *Viable*

Organisation AR:
3.04 - *Viable*

People AR:
2.81 - *Viable*

Information AR:
2.82 - *Viable*

Technology AR:
2.05 - *Exposed*

BI App Catalogue

People / Team
Total no. people

- To be completed on receipt of BI app catalogue

Applications / Data Sources

- To be completed on receipt of BI app catalogue

AGEM primary research results

Interview findings

1. AGEM have the capability to provide more BI services required by the CCG

2. There is some duplication between the work AGEM do and the work done by the in-house CCG BI team

3. Data completeness and quality is a major issue

4. There is a high reliance on key individuals in MSE

5. More strategic vision, governance and drive for change at a HCP level will help things

6. Education for end-users on the value of data and analytics will help to foster a collaborative approach

Questionnaire results

Process AR:
3.43 - *Viable*

Organisation AR:
3.08 - *Viable*

People AR:
3.60 - *Future ready*

Information AR:
3.07 - *Viable*

Technology AR:
2.33 - *Exposed*
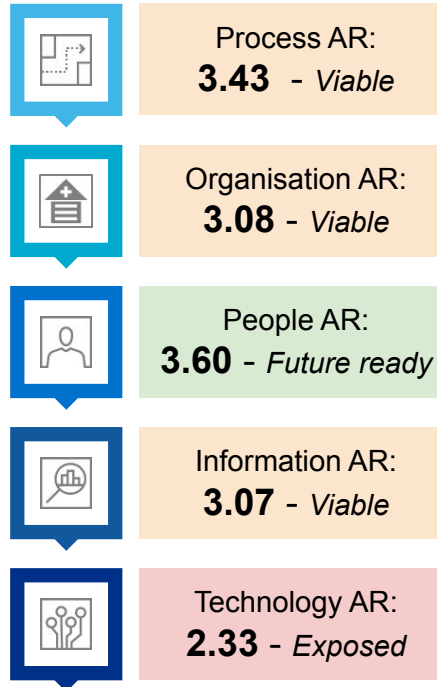
BI App Catalogue

People / Team
Total no. people: 11.5

- 3.5 Management staff
- 0 Technical staff
- 8 BI staff

Applications / Data Sources

- Data management environment
- GEMIMA BI portal
- Palantir foundry

EEAST primary research results

Interview findings

1 EEAST are primarily a data provider to the HCP and do not currently receive any data from the HCP

2 EEAST's technical infrastructure and internal reporting tools are relatively mature

3 A data lake is being developed which in future could link to a HCP data lake

Questionnaire results
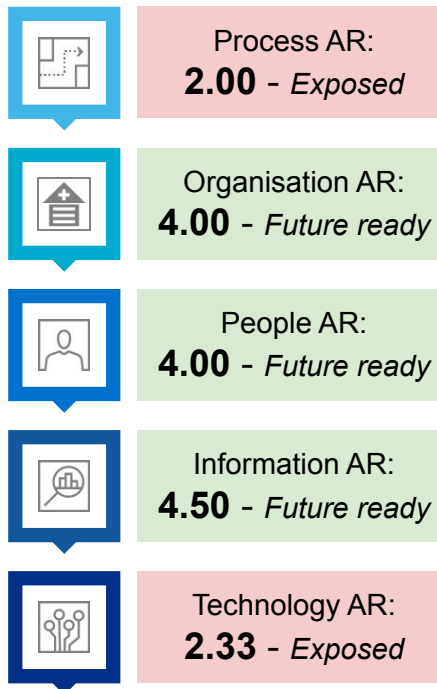
Process AR:
2.00 - *Exposed*

Organisation AR:
4.00 - *Future ready*

People AR:
4.00 - *Future ready*

Information AR:
4.50 - *Future ready*

Technology AR:
2.33 - *Exposed*

BI App Catalogue

People / Team
Total no. people

- No BI App Catalogue provided

Applications / Data Sources

- No BI App Catalogue provided

Provide primary research results

Interview findings

1. Data quality and data availability are two key issues

2. Provide have driven a self-serve BI model but some support for service users is still required

3. A more collaborative and holistic approach to data sharing across the HCP is required

4. Better access to primary care data would be a huge benefit to Provide

5. Risk stratification would be useful for Provide - incorporating aspects of AI to help identify risks earlier on

Questionnaire results

Process AR:
2.75 - *Viable*

Organisation AR:
2.75 - *Viable*

People AR:
3.40 - *Viable*

Information AR:
3.13 - *Viable*

Technology AR:
2.50 - *Exposed*

BI App Catalogue

People / Team
Total no. people: 4

- 0.5 Management staff
- 0.75 Technical staff
- 2.75 BI staff

Applications / Data Sources

- SQL Server (Database)
- Cubes
- SSRS
- Excel
- Microsoft Access database
- Power BI

NELFT primary research results

Interview findings

1. There is a lack of transparency and transferability of data from SystmOne

2. Simpler data governance is needed, particularly regarding SystmOne

3. CCGs focus too much on requesting data in order to meet targets when this is often not the best use of time

4. NELFT have a relatively mature BI team in terms of resource, tools and infrastructure

5. More alignment across the different CCGs is required in terms of required reporting

6. NELFT and other providers will want to continue their own processes and sign off data shared with the HCP

Questionnaire results

Process AR:
3.28 - *Viable*

Organisation AR:
2.71 - *Viable*

People AR:
4.00 - *Future ready*

Information AR:
3.50 - *Exposed*

Technology AR
2.44 - *Exposed*

BI App Catalogue

People / Team
Total no. people: 23.4

- 5.5 Management staff
- 3.5 Technical staff
- 14.4 BI staff

Applications / Data Sources

- Power BI

5

Appendix 5:

Questionnaire findings

Q12 - In your opinion, what are the main ways of improving information sharing or enriching the data shared across the HCP, if any?

Key themes (including frequency of responses)

- Standardised data set across HCP / one source of (verified) truth **x10**
- Change policies / culture / legislation / governance to drive collaborative HCP and encourage data sharing (system wide sharing agreements / structures) **x8**
- Ensuring only collect data that drives insights and decision making **x5**
- Better interoperability across HCP (standardisation of systems) **x5**
- More investment spent (time, money and capacity) improving data quality before sharing **x4**
- Single Sign On platform to access all site systems and permissions to view reporting across HCP **x4**
- Consistent approach / protocol to data management (turning data into insights that drive clinical outcomes) and sharing **x3**
- Clear, transparent communication across the HCP **x3**
- Better data timeliness **x2**
- Central data warehouse that covers all HCP **x2**
- Email updates / newsletters **x2**
- Faster uploading of patient records and pseudonymising of data
- Shared goals across HCP
- Unified patient record across HCP
- More emphasis on working with service users (e.g. doctors and nurses)
- Better documentation of data
- Easy access to key data sets
- Clear direction, steer and input from senior leadership in HCP
- Real time data flows, dashboards and updates
- Allowing the STP/CCG to access our self-service reporting at a summarised level

Q18 - Are there any example processes in your job that would benefit from automation? Please provide examples

Key themes (including frequency of responses)

- Specific examples of use cases **x10**
- Lots of Excel reports can be automated (cultural and technical barriers) – requires centralised reporting platform and data warehouse that can be used by the whole HCP to ensure consistency of info **x3**
- Daily NHSI Sitrep returns **x3**
- One source of the truth (with a understanding of how that source is built) is required to enable automation **x2**
- Automation will reduce intervention time, manual effort and risk of errors **x2**
- Consistent reporting formats from providers required
- Report tracking for failed reports
- Robust data warehouse and risk stratification support is required to drive automation
- Automation can lead to missed data errors / trends; manual checks reduce missed data errors / trends
- Automating process from data extraction to processing (Excel) to reporting (dashboards)
- Automation is likely to require significant investment (time and money) to develop and maintain
- Use Sharepoint instead of email attachments
- Access to the relevant, correct data

Q23 - What role types do you feel are important to sit across the Health and Care Partnership (HCP), to ensure a robust integrated BI capability?

Key themes (including frequency of responses)

- Business / information analyst **x9**
- Information governance (leads) **x8**
- Data quality (leads) **x7**
- Clinical change manager / Clinical information officer **x5**
- Clinical staff champions (that have a good understanding of data & how it can be used to improve patient care) **x5**
- Senior BI strategic lead (ideally with past analyst experience in the Trust) **x5**
- CIO **x4**
- BI developers **x4**
- Data integrity **x2**
- Data scientist **x2**
- Database admins **x2**
- PHM / Public health specialists **x2**
- Data Warehouse management / developer / architect **x2**
- Data security officer
- Reporting Solutions Management
- Analysis & Reporting management
- Request/project coordinator
- Information promoters to operational staff
- Service manager
- Accountable officer
- Self serve platform developers / analysts
- Data visualisation
- Health economists

Q26 - PHM is the critical building block for an integrated care system, describe how your organisation has been involved in any PHM initiatives to date?

Key themes and quotes (including frequency of responses)

- Segmentation tool using PHM; AGEM have produced Segmentation models x2
- Reporting activities at trust level provides commissioners with insight to make wider planning for the local population
- Working with GPs and CCGs to access data
- GEMIMA is being rolled out within the HCP
- The HCP is aligned to public health leads and working with information analysts to build population health management initiatives.
- We have attended many meetings and conferences on PHM. We have also produced reports, showing segmentation of patients.
- PHM has been one of the areas where a lack of focus or understanding has hampered its adoption. A lack of defined approach at both system and organisational level has hindered PHM initiatives.
- We have used Eclipse for population management of conditions and identification of prescribing patterns.
- The CCG has participated in the STP wide PHM group. This has largely been in its developmental stages at this point in time.
- PHM lost its way and became more focused on a needs analysis in line with Council processes (JSNAs). Focus was not on risk stratification at locality level or indeed PCN
- AGEM are developing a tool, it is currently acute data driven. It should include MH data, Primary Care and Community Data
- Dashboards have been built to plot data LSOA information and layering across geographical regions
- PHM work at Anglia University that I know the organisation was looped into in the past.
- ECDA - data sharing to support early identification and prevention of issues before they arise. 1 health project with Basildon hospital predicting unnecessary admissions to A&E.
- The CCG has engaged AGEM to be able to use the GEMIMA system and is currently expressing an interest to be a wave 3 site for the national PHM programme (working with Optum)
- Supply of normal statutory reporting e.g. SUS
- Supply of national audit programmes
- Supply of ad hoc data sets to key partners
- We have established a Population Health Management, PCN service model in South East Essex
- Thurrock Council have been leading this on behalf of MSE

Q28 - Are there any ways of improving the data integrity across the HCP or within organisations?

Key themes (including frequency of responses)

- Standardised templates / formats / approach **x4**
- Aligned, interoperable better systems **x4**
- Compulsory fields in the front end of systems with user training as to the importance of what is recorded **x4**
- Standardised operational processes **x3**
- Consistent data standards across HCP **x3**
- Standardised taxonomy / definitions **x2**
- Sufficient time provided for validation and triangulation of data **x2**
- Centralised database of core data sets **x2**
- Secure file transfer servers with other organisations in HCP so we can automate data coming in & going out
- More priority needs from senior leadership
- Formalised processes for resolving data quality issues
- Data quality teams
- Transparency of metrics with well defined specifications
- Reduce reporting burden for front end service users
- Automatic sharing of records from all parties in the HCP would help
- Employ a data quality ("DQ") officer.
- Daily monitoring of overnight DQ reporting.
- Feedback of errors to data entry personnel.
- Reporting and logging of DQ problems by all staff including information analysts.
- Design all BI data extracts in a way which highlights any DQ errors.
- Greater availability of data to staff within organizations to change and improve practices
- Data assurance and Data Quality rating attached to each report
- A single source of the truth, elimination of duplicative data/monitoring systems
- Data Quality Improvement Plan - a basic principle of a this plan would be that Data Quality Improves through sharing with the person responsible for generating the data for a meaningful purpose.

Q31 - Are there any ways of improving the data or KPIs produced to impact patient / citizen care?

Key themes (including frequency of responses)

- Outcome focused / clear link to patient care outcomes KPIs **x13**
- Reduction / simplification in total number of KPIs requested **x4**
- Monitoring reports and staff responsible - held accountable **x3**
- Automation of our reports and data flows required for KPI reports (enables more time to provide insight and analysis); too much 'handleturning' **x3**
- Focus on quality of care, rather than quantity **x3**
- Definition of data needed behind KPI **x2**
- KPIs developed in line with clinical system capabilities **x2**
- Shouldn't be a tick box exercise **x2**
- KPIs aligned with HCP vision / strategy **x2**
- Dedicated data quality team
- Regular reviews of KPIs
- Consistent presentation of information, with clear explanation of measures, benchmarks and targets
- Data validation
- Standardised report design
- Training for those entering the data
- Clinical input feeding into KPI generation
- Easy access to data for front end service users
- Closer working between commissioners, contract leads and analysts
- Access to validated baseline data
- More accurate and regular reporting makes the wider planning more robust and reliable
- Dashboard for inpatient services where staff will be able to see what paperwork, physical health checks, etc. has been done for the patient from admission to discharge. This will facilitate the staff to identify any gaps and reviews overdue so that they can be addressed promptly. Effective in the community services as well.

Q32 - Does your organisation or team use cloud based technologies? If so, which solutions are used and how are they used

Key themes (including frequency of responses)

- MS Azure **x18**
- PowerBI **x12**
- Tableau **x6** (GEMIMA)
- Qlikview **x5**
- SSRS **x3**
- Sharepoint **x2**
- MS Teams **x2**
- SQL **x2**
- R
- Excel
- PARIS
- OneDrive
- ESRI
- RShiny
- Slam Cloud
- Allocate product suite
- Medeanalytics
- S1

Q37 - Please list any improvement opportunities or ideas on how organisations can collaborate and share data more effectively across the HCP

Key themes (including frequency of responses)

- Integrated central BI team (sharing of skills and resources within HCP) **x6**
- Develop aligned vision, strategy, objectives, priorities and goals that drive the BI capability for the HCP **x5**
- Central self service platform (with one version of truth) that can be accessed (different user access permissions) across HCP **x5**
- Interoperable systems across HCP **x5**
- Agreed upon data sharing agreements across the HCP **x4**
- Strong information governance **x3**
- More training opportunities (and certificates) **x3**
- Better, open communication across HCP **x3**
- Standardise the definitions, taxonomy and standards across the HCP x3
- Standardise processes / protocols (e.g reporting, requesting & prioritising work, necessity for individuals to override the planned workload) **x3**
- Support to help organisations improve data quality before data is shared (e.g. Better data capture systems) **x2**
- Secure file transfers for transfer of data
- Linking clinical systems to EPR systems (Lorenzo and Medway)
- Standardise reporting formats
- Greater focus on analytical skills (to pull insights to guide outcomes)
- Use pilots / use cases to highlight benefits early on
- Better data visualisation (using tools like QlikSense or Tableau)

Q38 - Please share any key challenges faced in your role or teams within your organisation that may limit building integrated BI capability across the HCP

Key themes (including frequency of responses)

- Limited time / capacity / resources (to do extra HCP wide work or support DW, etc) **x14**
- Outdated legacy software (e.g. Excel 2010) and hardware **x9**
- Lack of expertise / experience / knowledge in BI **x5**
- Missing data (No SLAM data from the MSE trust in FY 2020/21, No waiting list data from the MSE Trust) / data sharing **x5**
- Different EPR / systems across HCP **x4**
- Little / no (time for) training (or best practices / protocol) on how to use new systems **x4**
- Data access **x4**
- Data quality **x3**
- Lack of automation **x3**
- Lack of communication between all levels across HCP **x3**
- Lack of roadmap / overall strategy / shared priorities across HCP **x3**
- Misaligned expectations regarding time required for work **x3**
- Different data / reporting formats / styles **x2**
- Culture change required **x2**
- Lack of opportunities to share ideas for improvement
- Data timeliness
- No unique identifiable ID on case management systems, preventing linking
- Lack of investment
- COVID

Q39 - Can you list any use case examples of how your organisation would benefit directly from integrated data sharing HCP

Key themes (including frequency of responses)

- Better PHM driving better health outcomes **x10**
- Better resource allocation / demand / forward planning **x6**
- Better patient care / experience / outcomes **x5**
- Track full patient pathway across systems (identify frequent fliers, intervene earlier) **x5**
- Linking more patient data sets (shared records etc) across org / HCP **x5**
- More efficient patient flows **x4**
- Time saved by reducing duplications (e.g. emails, finding data, etc) and reducing manual work **x3**
- Enables use of predictive analytics / data modelling **x3**
- Data driven decision making **x2**
- Drives more integration with PCNs **x2**
- Best practices are easy to identify and replicate
- Linking waiting list data to primary care to see how patients might be deteriorating due to long waits for elective surgery.
- Aligned / integrated systems (e.g. EPRs) would enable easier sharing of data

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Appendix 6:

Detailed challenges, recommended changes and potential benefits

Processes - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Communications	Lack of established channels between BI teams within HCP	There are limited processes and forums established linking communications between BI teams across the HCP. Communication and collaboration will need to be addressed to drive progress and HCP BI maturity.	*"There are four or five teams working on some form of population health management in the area, probably with quite a lot of overlap"*	**Intra-organisation communication plan**
	Sub-optimal end user report use	There is often a disconnect between the BI teams sending the data/reports and the end-users receiving them, leading to misunderstanding and ineffective use of the developed reports.		**Intra-organisation communication plan**
	Lack of updates from senior leadership	Ground level staff are often left in the dark about board level decisions, with information trickling through slowly across the organisation.		**Communications outreach improvement programme**
	Limited scope to drive change from bottom up	No opportunities to share ideas / advise on the way forward - skilled staff with experience in other areas are not able to contribute to wider policies / discussions.	*"I've been involved in data modelling tasks / Data Warehouse business cases / setting strategic objectives with senior teams, but I would love to be able to contribute to overall strategy"*	**Communications outreach improvement programme**

Processes - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Communications	Lack of awareness of the 'Power of the collective'	Lack of collaborative drive stems from staff within organisations being unaware of the direct benefits a collaborative HCP can provide to their organisation.		**Communications outreach improvement programme**
Service requests and reporting	High volume processes are manual and bespoke	High volume and repeat requests/processes (e.g. freedom of information requests) produce an unnecessary strain on BI teams who are struggling with capacity across their teams. The tracking and reporting of these should be improved, standardised and automated (where possible) through tools and ways of working, thus leading to reduced strain on requests impacting BI and reporting teams.	*"Both manual and automated processes should be reviewed as there is a possibility there may be redundancies. Once streamlined move it into automation."*	**Review of HCP reporting requirements & agile approach**

Processes - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Service requests and reporting	Ad-hoc, unstructured reporting processes leading to inefficiencies and capacity constraints	Many data or reporting requests across the HCP are completed in an ad-hoc manner via unstructured communications. Although at certain times, these tactical requests may be needed, a more strategic and documented process of BI and reporting requests needs to be developed and adhered to within the HCP structure. The sheer diversity of organisations and volume of requests will not be handled efficiently by a centralised virtual team without a robust process and methodology for BI development and publishing.	*"Service requests tend to come via phone calls or email, then we'll discuss their requirements with them"*	**Formalised virtual BI Hub service request processes**
	Duplicative reporting	There are several examples across the HCP of duplicative and inefficient performance reporting processes, the prime example could be the lack of standardisation across the five CCGs which require different reporting requirements.	*"Our life would be a lot easier if the five CCGs could align more on the reporting that is required of providers"*	**Review of HCP reporting requirements & agile approach**
	Sub-optimal use of AGEM	AGEM has strong capabilities, particularly with regards to data processing using the DSCRO, but are not currently used as effectively as possible, as significant amounts of their time is spent dealing with ad-hoc requests.		**Review the role of the CSU given revised priorities**

Processes - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Intra-organisation communication plan	Well defined communication channels between the different BI teams across the HCP, as well as between BI teams and service users, will be set up or improved where certain forums exist. This should be driven by the virtual BI hub.	● Increased opportunities for collaboration ● Better sharing of knowledge and resource ● More effective use of reports ● More service user input into report creation	Phase 1 (Communications)
Communications outreach improvement programme	Regular newsletter highlighting any strategic level changes distributed across the BI teams within the HCP, as well as to clinical champions. In addition, clear routes for suggesting improvements and driving change at the ground level	● Better dissemination of information ● More aligned HCP ● Change being driven from both top and bottom	Phase 1 (Communications)
Formalised virtual BI Hub service request processes	The HCP virtual BI hub should develop a set of standardised processes/templates for organisations across the HCP to request a report creation, amendment, and/or deletion. These processes should be efficient, simple to follow, and compulsory for engagement with the core BI Hub development team. This best practice standardised process could then be adopted by organisations for internal use.	● Greater efficiency in processes ● Reduction in variability of processes across HCP ● Frees up capacity	Phase 1 (Standards & policies)
Review of HCP reporting requirements & agile approach	Understanding the current reporting requirements for the HCP, assessing where duplications lie and identifying opportunities for automation. Going forward, a more iterative and agile approach to BI development will be used to improve existing reports. This approach will be employed by the virtual BI hub and driven as best practice across the HCP organisations.	● Reduced time spent on manual processes or duplications ● Iterative improvement on reporting	Phase 1 (Standards & policies)

Processes - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Review the role of the CSU given revised priorities	Optimising AGEM's role, particularly with regards to data processing using the DSCRO, looking to use them as effectively as possible. Adjusting AGEMs focus from contract management and ad-hoc data requests to supporting the initial formation of the virtual BI hub with data processing and development. Regular reviews of how to proceed with AGEM going forward will help to achieve maximum value.	• Cost effective use of AGEM • Better data processing improves data quality	Phase 1 (Standards & Policies)

Organisation - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Central BI function	Poor central resource allocation	There are several organisations across the HCP with strong internal BI capabilities, which could be better utilised or leveraged for HCP level BI with the right central oversight and direction. Resources could be allocated more efficiently and effectively across the HCP based on need / demand – currently no redistribution.		Central BI oversight and direction
	Low visibility on BI best practices or use cases	There is very little alignment in the approach taken to providing BI, in particular, there is no way of highlighting example use cases across the HCP, or sharing best practices in an effective, easily accessible way.		Centralised BI best practices
Information governance	Lack of governance framework leads to barriers to data sharing	There is currently a lack of an established central governance framework with identified groups, roles and responsibilities and terms of reference. Information governance procedures can be viewed as being barriers to sharing data or increasing delays to information sharing.	*"98% of GPs use SystmOne but there is still a barrier to using data from it, so simpler data governance around this is needed"*	Centralised HCP governance framework

Organisation - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Data sharing agreements	Lack of awareness of data sharing agreements	BI teams across the HCP often do not have a clear and comprehensive view of existing data sharing agreements, which acts as a barrier to expanding inter-organisation data sharing.	*"No SLAM data from the MSE trust in FY 2020/21, No waiting list data from the MSE Trust"*	**Data sharing agreements via ISP on ISGs**
	Limited GP data sharing agreements in place	There is a general lack of access to primary care data across the HCP, driven by limited data sharing agreements. As the holders of the registered list GPs are the only group of contractors that have data on the full population. Without this data the HCP only ever see part of the picture.	*"Linking waiting list data to primary care to see how patients might be deteriorating due to long waits for elective surgery"*	**Data sharing agreements via ISP on ISGs**

Organisation - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Central BI oversight and direction	The virtual BI hub should have a clear big picture view of BI across the HCP, with a holistic understanding of the different BI teams that exist and the work they're doing. With this oversight the hub can direct the various teams in working together on HCP level BI work, identifying common issues and opportunities.	● Better resource allocation ● Greater scope for wide scale impact ● Aligned HCP driving towards common goal ● Opportunity identification	Phase 1 (Performance management)
Centralised BI best practices	The virtual hub should set BI best practices, policies, standards and methods, and provide consultation where required, as well as highlighting use cases and best practices adopted by organisations within the HCP.	● Reduced variability across HCP ● Improved staff morale through identification and promotion of exemplar practices	
Centralised HCP governance framework	A centralised governance framework should be established to drive responsibility and direction for data use at the HCP level. There should be clear and regular communications around governance and data sharing agreements disseminated to all stakeholders.	● Increased visibility on governance ● Easy to access ● Less time spent looking for governance	Phase 1 (Data governance)

Organisation - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Data sharing agreements via ISP on ISGs	Details of data sharing agreements that are either planned or currently in place should be collated and made easily available to BI teams across the HCP, ideally via Information Sharing Protocol (ISP), which can be kept externally on Information Sharing Gateways (ISGs) This can be furthered by the HCP looking to improve or set up new sharing agreements where gaps exist. There is a cultural aspect to this as well, requiring senior buy in to drive improved data sharing culture across HCP.	● Increased visibility on governance ● Easy to access ● Less time spent looking for governance	Phase 2
Building the virtual BI hub and filling roles	A virtual BI hub should be set up and staffed to coordinate and drive HCP level BI. The hub should be responsible for driving the change plans in this report. Further details are set out in section 4 of this report.	● Accountability for driving forward all other change plans	Phase 2
Aligning & monitoring against target outcomes for BI hub	At the outset of this change programme the strategic board of the virtual BI hub should agree a set of measurable target outcomes, progress against which will be reviewed at a regular intervals.	● Maintained focus on tangible outcomes ● Awareness of impact of BI hub ● Constant drive for progress	Phase 3
Develop a Programme Business Case	The Programme Business Case for the MSE BI Strategy implementation needs to be written, reviewed and signed-off. This business case will need to identify initial priorities for future work (i.e. dashboards to be developed) as well as a detailed implementation plan for delivery of Phases 2 and 3.	● Organisations across HCP are aligned and in agreement on what they are aspiring towards ● Allows easy referencing to agreed principles	Phase 1

People - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Culture	End user culture of being opposed to change and not data centric	The end-users of BI and reporting across the HCP are often reluctant to move away from legacy bespoke reports and may be particularly resistant to self service solutions. Staff throughout organisations do not have a cultural focus on data, therefore limiting its uptake / use to drive better practice.	*"There is a lack of appetite for a self serve platform; people are used to being spoon fed the same Excel report by analysts every time"*	**End user assessment & training programme**
	Individual organisation focus rather than wider HCP	There exists a culture in some organisations in the HCP of being guarded with their data, with internal politics often existing around what data can and cannot be shared. This means that when data requests are sent from one organisation to another the data may not be supplied, or if it is it may be incomplete. This fosters a culture across the wider HCP of relying solely upon data collected by that individual organisation and public datasets.		**Communications outreach improvement programme** **Data sharing agreements via ISP on ISGs** **Build pilot use case** **Culture change management plan**
Clinical staff	Lack of buy-in from clinical staff	There is a distinct lack of clinical involvement or buy in across the HCP, limiting the level of input clinical staff have on BI development or refinement. In addition, this low engagement makes it difficult to drive improvement at a ground level (e.g. improving data capture).		**Communications outreach improvement programme** **Clinical representation at local & strategic level**

People - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Technical capabilities	Poor distribution of skill sets across HCP	Whilst there are many generalists or those with data analysts skills across the HCP organisations, there is a lack of deep technical, data scientist or data architecture skills. The data analysts are brought in year on year to deal with the increased BI workload brought about by the ubiquitous increase in data, but these resources are just 'keeping the lights on', whereas more technical resource capable of developing new more efficient BI approaches and data architectures could reduce the BAU workload.		**End user assessment & training programme** / **Technical capabilities L&D programme** / **Technical capabilities recruitment strategy**
	Limited budget to invest in new resources	The hiring process and pay structure of certain organisations can make it difficult to hire staff with sufficient technical experience, as these resources are more costly than general data analysts.	*"We sometimes find it hard to bring in the deep technical knowledge because it can be very expensive"*	**Technical capabilities L&D programme** / **Technical capabilities recruitment strategy**
	Lack of advanced analytics capabilities within HCP	Very few teams have the tools and/or capabilities to perform advanced predictive analytics on large population datasets.	*"Advanced analytics resource is very expensive and it's hard to make a business case for it at an organisational level"*	**Technical capabilities L&D programme** / **Technical capabilities recruitment strategy**

People - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Capacity	Already at full capacity, no room for additional support	Resources are often working at full capacity on their BAU workload, leaving little time to allocate HCP-level work. This has been exacerbated by an increase in ad-hoc work due to the COVID-19 pandemic.	*"We have enough problems meeting our internal reporting demands let alone expanding our remit to working at a HCP level"*	**Technical capabilities recruitment strategy** **Oversight on BI capacity**
	Misaligned expectations from report requestors	Misaligned expectations regarding time required for work leads to delays and over-working.		**Oversight on BI capacity**
Data stewards	Lack of accountability and ownership around data	Across the HCP there is a general lack of accountability and ownership of data, with few data stewards assigned. This can negatively impact data quality, data integrity, and data sharing.		**Assigned data stewards in virtual BI hub**

People - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
End user assessment & training programme	Carry out a skills and culture assessment across the HCP organisations and then design and run a campaign to improve the data literacy and data culture of end users, encouraging them to embrace and get the best out of self service BI technologies. This training should make it as easy as possible for end users to transition to the new way of working, and should emphasise how self-serve BI can make their life easier in the long term. Embed change champions to encourage continued support.	● Better retainment of staff due to upskilling opportunities ● Better use of technologies leads to efficiency savings ● Improved data culture and literacy drives more usable data, improving insights	Phase 2 (L&D)
Clinical representation at local & strategic level	Drive clinical representation by including a clinical lead at a board level (e.g. CMO) to help directly link BI outputs to improving clinical outcomes or patient care. Recruit clinical champions within organisations to improve clinical involvement and buy in, as well as help highlight the use case for BI work	● Improved alignment of BI outputs with better clinical outcomes ● Improved patient care ● Wider buy-in and drive for BI	Phase 2 (Insight & assurance)
Technical capabilities L&D programme	Organisations across the HCP can increase their technical capability by upskilling existing data analysts in data engineering and data architecture. A structured L&D programme should therefore be developed, using input from existing capabilities in the HCP. This will allow BI teams to develop new architectures, tools and processes to achieve efficiency savings and make sure the HCP is 'future ready'. These efficiency savings will to more time to focus on BI rather than standard BAU reporting.	● Improved technical capabilities across HCP ● Enables better use / more focus on BI ● Helps drive data insights, therefore improving patient care / outcomes ● More opportunities for staff to upskill will improve retention rates ● Efficiency savings	Phase 2 (L&D)

People - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Technical capabilities recruitment strategy	Organisations across the HCP can increase their technical capability by recruiting new data analysts in data engineering and data architecture. A detailed recruitment strategy should be developed, with clearly defined specifications, as well funding routes/options. This will help develop new architectures, tools and processes (as well as enabling advanced analytics) to achieve efficiency savings and make sure the HCP is 'future ready'. Efficiency savings enable more time to focus on BI rather than standard BAU reporting.	● Improved technical capabilities across HCP ● Enables better use / more focus on BI ● Helps drive data insights, therefore improving patient care / outcomes ● Efficiency savings	
Oversight on BI capacity	Central oversight on BI capability can be enabled by tying rough timeframes for completion of reports, helping better align expectations. If this information is reported and assessed centrally, it will help drive better allocation of reporting requirements across the HCP, as well as monitoring where significant amounts of time and effort are being spent.	● Improved resource allocation ● Less extra requests overstretching resources ● Better oversight on capacity constraints and time occupying tasks	
Assigned data stewards in virtual BI hub	As part of the setting up of the virtual BI hub, data stewards will be assigned from each organisation who will be responsible and accountable for their organisations data at a HCP level.	● Single point of contact for queries regarding and organisations data ● Improved data quality ● Improved data integrity ● Increased data sharing	

People - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Culture change management plan	An as-is culture assessment should be performed across the organisations in the HCP, with the findings guiding the development and implementation of a culture change management plan. This should address two key culture challenges; firstly the need for a more collaborative HCP-focused culture rather than prioritising individual organisations, secondly the need for a more data centric culture and for everyone to start using data to drive more decisions.	● Increased collaboration across the HCP ● More effective use of data by end-users	Phase 2

Information - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Data access	Lack of access to the right data	Organisations often only have access to data they themselves have collected and publicly available datasets, rather than having useful data feeds from other organisations in the HCP. There is a particular lack of access to primary care data across the HCP.	*"Access is a big issue. I still do not have access to certain servers/BI platforms due to what Site my account is under. Once we all have an MSE account I hope this will fix it"*	**Single self serve platform with varying access levels**
Data sharing	Lack of awareness and clarity over data sharing policies	Organisations can be reticent to share data with other organisations due to complexities in data sharing or lack of clarity around governance. An Information Sharing Protocol will need to established to improve transparency and speed of data sharing.	*"As organisations we need to be clear as to why we would be sharing data, which doesn't need to be all data."*	**Data sharing agreements via ISP on ISGs**
	Concerns over data security limiting data sharing	Organisations, in particular GPs, can be guarded about sharing their data for security reason; this limits data sharing within the HCP and therefore restricts opportunity to drive programmes such as PHM.		**Data sharing agreements via ISP on ISGs** **Centralised HCP governance framework**
Data integrity	Poor data integrity	Lack of data integrity can leave contradicting BI/reports between organisations using the same data sets leading to many hours of manual data manipulation/cleansing.	*"We spend half of our time trying to work out which data we should use"*	**Data integrity & timeliness improvement plan**

Information - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Data taxonomy / classification	Inconsistent definitions across HCP	There is no common data classification approach across the different organisations within the HCP.	*"A consistent data taxonomy and approach to data processing is needed in line with the NHS standards, otherwise merging data will just lead to more work for the organisation BI teams"*	Data taxonomy catalogue
Data quality	Poor data quality	Data quality is an issue throughout most organisations in the HCP and is largely due to poor and untimely data entry by end-users, which is often the result of time pressures and inefficient data entry processes. These data quality issues lead to; barriers to effective and accurate data analysis, difficulties in employee distrust of critical technology, decreases in efficiency and increases in bottlenecks, poor and ineffective operational decisions and ultimately patient frustration and a sub-optimal experience.	*"Organisations need support to improve their data quality before data can be shared."*	End user assessment & training programme Data quality improvement plan
	Lack of consistent patient identifiable data	This limits the amount MSE can track a patient journey and therefore restricts the ability to identify frequent fliers and extract insights from PHM	*"Receiving non identifiable patient information can leave data useless as we're unable to cross reference the info to gain insight into patient pathways."*	Data quality improvement plan Integrate data feeds

Information - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Data timeliness	Inconsistent, late data feeds	There are widespread challenges around data timeliness across the HCP, often due to long periods of data being in a flex status until data entry and data quality issues have been corrected. This means that in many cases data cannot be relied upon until several weeks after an event the data is describing took place. This naturally provides a challenge when BI requires the data to be near-real time. Also, because this flex period is different from one dataset to another, and from one organisation to another, it can be hard to know at what point data is reliable, and therefore good communication about datasets is vital.		**Data integrity & timeliness improvement plan** **End user assessment & training programme** **Assigned data stewards in virtual BI hub**
Data driven insights	Lack of outcomes driven KPIs	KPIs are not driving outcomes; there is too much focus on arbitrary performance reporting, particularly in the CCGs, rather than focusing on actionable insight to improve the level of care provided.	*"We need less focus on performance metrics, and more focus on improving patient/citizen care"*	**Clinical representation at local & strategic level** **Review of HCP reporting requirements & agile approach**

Information - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Data integrity & timeliness improvement plan	There should be a drive by the HCP to improve data integrity through; the development of more standardised operational processes, the creation of the centralised data repository, the assigning of data quality and data integrity officers, service user training and easy error reporting.	● Reduced variation in reporting ● Less time spent accessing data and on other manual tasks ● Better error reporting	
Data taxonomy catalogue	The HCP should develop a data catalogue taxonomy which aligns different data sources and interpretations between organisations in order to help develop a Common Data Model. This will lower the barrier to data aggregation.	● Aligned HCP with opportunity to aggregate and compare data ● Less misunderstandings between organisations	Phase 1 (standards & policies)
Data quality improvement plan	The HCP should carry out a data maturity assessment of the relevant data held across the HCP, details of which have been gathered in the BI App Catalogue, and should follow this up with a data quality improvement programme.	● Improved data quality ● Improved insight development from data set	Phase 1 (Data quality improvement)

Information - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Integrate data feeds	In the shorter term, the virtual BI hub should prioritise and sequentially integrate key datasets from organisations across the HCP in central data repository. In the long term these datasets should be integrated with external datasets. These could be from organisations in surrounding STPs, or other local services such as police forces and fire services. Additionally 3rd party datasets should be incorporated such as data from Healthwatch. This additional data will be particularly useful for population health analysis.	● Enables broader uses of data (i.e. PHM) ● Allows for better central oversight and steer	Phase 1 (data integration)

Technology - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
BI tools	Misaligned BI tools	There is little alignment in the BI and data architecture tools used by organisations across the HCP, with some organisations using Excel and others using Power BI, and some using on premise data repositories and others using cloud based services. This creates barriers to inter-organisational collaboration and sharing of resources.	*"It would be helpful for sharing resource if different organisations used the same tools "*	BI tools & platform alignment Technical capabilities L&D programme
	Basic, limited tools used and favoured	Across the HCP regular reports are often created in Excel and sent via email, when a dashboard in a tool such as Power BI could be made available persistently to end-users.		BI tools & platform alignment Single self serve platform with varying access levels
	Poor data visualisation	Limited reporting tools (e.g. Excel) are unable to provide clear visualisation of data,leading to difficult to interpret info and therefore trends / patterns are difficult to identify.		BI tools & platform alignment
	Lack of advanced analytics tools	Very few BI teams across the HCP have the tools, data architecture and skillset to perform advanced analytics such as predictive analytics, AI and scenario modelling.	*"Data modelling is something sorely lacking. We're constantly looking back, we're never looking ahead."*	BI tools & platform alignment Technical capabilities recruitment strategy Leverage economies of scale

Technology - Why MSE HCP needs to adapt or change?

Sub theme	Challenge	Description	Use case / quote	Recommended changes
Systems	Incompatible , discrepant systems	Often the same technology has been implemented differently in different organisations. For example SystmOne is used in different ways by each GP service, leading to poor data integrity when trying to aggregate the data.	*"It would be helpful for sharing resource if different organisations used the same tools "*	Strategic data lake / HCP-level technical design principles / Leverage economies of scale
	Legacy software and hardware	People are having to use outdated systems and hardware – limiting productivity.	*"I am an analyst running Microsoft Excel 2010 in 2020. Legacy issues with this version are affecting my productivity"*	Strategic data lake / HCP-level technical design principles / Leverage economies of scale
Data storage	Lack of central repository	Each organisation uses separate data sources, with no flows between organisations and very little aggregation of HCP level data. This leads to substantial barriers to any HCP level BI work.		Integrate data feeds / Strategic data lake

Technology - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Single self serve platform with varying access levels	Align on one self serve platform to use, with multiple access levels, to allow for reports to be agile, flexible and dynamic.	● Able to compare data sets from across HCP ● Less time wasted on finding the right data ● Reduces barriers to data sharing	Phase 3 (data storage platform)
BI tools & platform alignment	There is an opportunity in many organisations to transition to using new BI tools that allow more efficient and effective ways of working (e.g. Power BI). It is important to align on the right tools and platforms to enable future growth, rather than limit it.	● Better visualisation of data ● Enables more advanced analytics to be performed ● Improves efficiency	Phase 1 (Data architecture)
Leverage economies of scale	There is an opportunity once the HCP is aligned on BI technologies to leverage economies of scale to reduce costs and duplication.	● Align HCP going forward ● Financial savings to be realised	
Strategic data lake	The HCP needs to develop a strategic data lake to act as a central data repository to feed HCP level BI. The aggregated data in this central repository should then be made available to BI teams across the HCP using role based access.	● Enables central oversight and steer ● Easier to access the right data sets ● Drives PHM and other large scale interventions	Phase 3 (master data management)
HCP-level technical design principles	A set of HCP-level technical design principles and best practices documentation should be agreed to facilitate alignment on open architectures and system interoperability across the HCP.	● Aligned HCP leading to reduced variance ● Better interoperability between organisations driving improved patient care and outcomes	

Technology - Recommended changes & benefits

Recommended change	Description	Benefits	Phase / priority
Build pilot use case	The pilot use case is an extremely important component of the BI strategy, as it will be used to tangibly demonstrate the value associated with an integrated HCP. Using input from key stakeholders, a pilot use case should be selected to have the maximum impact and highlight examples of where it has been done effectively (elsewhere in the UK). The use case needs to show demonstrable benefits to all organisations across the HCP (e.g. PHM).	● Highlights the benefits associated with building a virtual BI hub and having an integrated HCP ● Provides tangible example people can easily refer to ● Use case will benefit all organisations within HCP, improving buy-in and awareness	Phase 1