NHS

Design principles for ICS Intelligence Functions

Midlands
Decision Support
Network

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1. Context

All ICSs and NHS England & Improvement Midlands region have committed to establishing an Intelligence Function (IF) and are taking steps to make this a reality. The central objective of IFs will be to support emerging health systems to take shared and well-informed decisions on matters of strategic importance, such as the allocation of financial and human resources. The Strategy Unit hosts a **development centre** to act as the key link between IFs in the Midlands, with a remit including actively promoting knowledge exchange across the network, supporting IF development through education and training and undertaking large-scale analytical projects on behalf of the network.

The development of IFs will help to place **data analytics** at the centre of decision making for the next generation of health and care organisations. Such work will also require **engagement with the evidence base** to inform the design of analytical questions. Robust **evaluation** should also be considered in some cases to appraise the analytical method and findings to support replication and build confidence in the work carried out. **IFs will require capability across all these areas.**

2. The purpose of this document

This document sets out some of the issues that ICSs and the NHSE/I team mightconsider when establishing their IF. For ease of reference these bodies will be referred to as IF 'hosts' in remainder of this document. It should assist hosts in answering questions such as:

- How might we define the scope or remit of the IF?
- What types of tasks should we ask the IF to perform?
- What outputs might we expect from the IF?
- What should be the size, structure, and grade levels of the analysts in the data analytics function?
- What skills should we expect of an IF's workforce and how might we meet their development needs?
- What infrastructure might an IF require?

3. Applying these principles

This document should not be seen as a blueprint that hosts must follow, but rather a set of design principles to guide local decision making. We recognise that local design decisions must take account of local circumstances. There are, however, some core requirements that must be accommodated within this light-touch framework:

- An analytical team must exist and comprise of a number of named individuals dedicated to the IF;
- The selection of team members must place the IF objectives ahead of local organisational or personnel politics;
- The team must operate within the agreed Decision Support Network principles including IF cooperation and knowledge exchange.

These requirements should lend themselves to the delivery of a set of core IF functions, agreed with Network stakeholders. These are:

- The provision of **analytical insights** for their host in making strategic choices (outside of normal performance/business reporting arrangements)
- Support for **decision-making processes**
- Support for **evidence-informed design** if initiatives
- **Evaluation** of key local initiatives against agreed standards

Additional functions might be agreed locally.

Whilst data analytics, evidence review and evaluation are viewed as critical for effective decision-making – and core components of an IF's analytical function - it is important to acknowledge that other disciplines, such as strategy development, qualitative research, facilitation and public engagement also play an important role. An effective IF will incorporate or have access to these wider set of skills.

4. Design principles for an IF

These principles are organised in the following way:

- Principles that apply across **all analytical functions** of an IF

  - *Designing and managing analytical projects*
  - *Ensuring the appropriate workforce across the IF and supporting their development*
  - *The IF workforce should actively network with their counterparts in other IFs*

- Principles that are specific to the **data analytics** function in an IF
- Principles that are specific to the **evidence review** function in an IF
- Principles that are specific to the **evaluation** function in an IF

4.1 Principles that apply across all analytical functions of an IF

Designing and managing analytical projects

> **Design principle 1: IF project should consider the wider health and care system rather than focus narrowly on NHS provision**

Integration and coordination of health and care services is the central pillar of current health policy. ICSs are key to delivering this policy and it is only appropriate that IFs have a similar outlook. Population health and population health management (PHM) present a significant opportunity to put intelligence at the centre of all health and care decisions and to ensure that these consider the whole population and wider pathways of care. Rather than focus narrowly on NHS services, IF projects should consider the health and care system, including the wider determinants of health, addressing issues relevant to health services, public health

and social care and the interfaces and interactions between these and other public services.

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Design principle 2: All work of the analytical function should take the form of time-limited projects

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A strategic analytical function should have no 'business as usual'. All work should take the form of time-limited projects lasting between a few weeks and several months.

Each project will be unique, but the types and scale of projects can be categorised. Projects are likely to take one of the following forms:

- Descriptive analysis – raising the profile of a service area, disease pathway or patient cohort, highlighting issues of significance, challenging misconceptions, and shifting perspectives;
- Needs assessments - we would advocate the epidemiological approach developed and described by Stevens and Raftery.[1];
- Opportunity analyses and options appraisals to support clinical and business cases for change;
- Modelling and design stage evaluation – i.e. what do we anticipate will be the impact of a planned intervention, innovation or change programme;
- Quantitative (summative) evaluations – i.e. what has been the impact of an intervention, innovation or change programme that has already been piloted or rolled out;
- Qualitative (summative) evaluations;
- Strategic look-back exercises – to understand the factors that have led to some unexpected change (e.g. unexpected changes in patterns of demand / supply, a deterioration in service quality, a change in the level of health outcomes).

We would expect many of these projects to incorporate an evidence review. Colleagues from this function should be included in the design phase of the project.

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Design principle 3: Focus the resources of the IF on a small number of strategically important projects each year

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The number of projects that an IF analytical function is asked to support in a given year should be determined by the business need. However, hosts should be aware that each project carried out by the function will require a detailed response. Given that a host's management capacity is limited, we would suggest that an IF should aim to deliver c. 5-10 projects each year and a small number of short-run projects. Projects should be planned approximately 1 year ahead with a quarterly review to consider changing or emerging priorities.

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[1] Stevens, A et al. 'The epidemiological approach to health care needs assessment.' In Stevens et al. (eds). *Healthcare needs assessment*. 2004.

Design principle 4: All projects should be fully documented and actively shared such that the analysis can be reference and reproduced by others

Whilst the primary objectives of projects carried out by the analytical function will be to influence decision making, all projects should also produce some artefact to record the work completed and facilitate information sharing. Project outputs should take multiple forms. Management reports should set out the problem, its context and history, the analytical conclusions, and implications. Technical supporting documents should contain information about the methods, code and datasets used, such that others could reproduce the analysis if required. Presentation materials should be developed to increase accessibility. Reports may contain inputs from across IFs.

Ensuring the appropriate workforce across the IF and supporting their development

Design principle 5: Aim for good coverage of relevant academic disciplines when recruiting the analytical team

There are several academic disciplines which are relevant to the IF data analytics function including statistics, mathematics, operational research, epidemiology, data science and econometrics. It is unlikely that any individual, or indeed the entire analytical team will have complete coverage of these disciplines. However, an IF should aim to maximise coverage against these disciplines at degree level or higher through its recruitment process. In qualitative functions the IF should look to recruit individuals with an academic background in sociology, psychology, human public health, or human geography.

Given that in most cases, recruitment of analysts to an IF will be from within the NHS or local government, the skills-mapping exercise[2] recently conducted by Public Health England will prove a useful supporting resource.

Design principle 6: Seek a diverse workforce in terms of experience and personal characteristics

Diversity of work and personal experience is also important. Workforce heterogeneity can lead to group thinking and blind spots, constraining imagination, and innovation. An IF should seek to recruit an analytical workforce that is diverse in terms of experience (health, social care, public health etc) as well as personal characteristics (gender, ethnicity, disability etc).

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[2] Available at https://khub.net/group/phe-local-knowledge-and-intelligence-services/group-wiki/-/wiki/Main/Analytical+skills+mapping+-team+level+population+health+skills+mapping+tool (requires registration).

Design principle 7: Consider non-technical as well as technical skills when recruiting into the analytical team

It is also important to recognise the non-technical skills or 'craft' that analysts will require to ensure that their technical skills are appropriately targeted and that their analysis leads to change. We highlight here, two particular forms of skills that we regard as critical for effective analyses:

1. Problem structuring

Problem structuring is the process by which an analyst, working with her/his colleagues or customers, establishes and confirms the nature, context, and complexities of a problem, such that s/he can specify with increased confidence a set of analyses that will appropriately address the problem. Problem structuring is often delivered informally, but several more formulaic methodologies also exist (e.g. soft systems methodology, Strategic Options Development Analysis, the theory of constraints).

2. Communications skills

Communication skills are also critical. Communicating complex analytical concepts in written and spoken form is not straight-forward, but a failure to do so renders an analysis pointless. As with most 'craft' skills, problem structuring, and effective communication techniques are acquired and honed over the course of a career. The IF workforce must therefore either evidence these skills and/or demonstrate an appetite to develop them further. The development centre hosted by the Strategy Unit will actively support the development of these skills.

Design principle 8: Start with a small team and expand it only when it is functioning well

The size of an IF team will depend on the scale of the host, the resources at its disposal and its ambition to leverage the benefits of analysis to improve decision-making.

We would recommend that in the first instance, IFs start with a relatively small team of between 3 and 5 staff (with an output of approximately 5-10 projects per year). This may focus on data analytics in the first instance but should have identified evaluation and evidence review resource it can draw upon who have ring-fenced capacity to support IF activities. A small, fleet, agile team will be able to explore ways of working in these new structures without incurring extensive costs of internal management. Overtime, as the function finds its feet and demonstrates its value, hosts may wish to expand the function.

The team may wish to incorporate apprentices, university placement, students and secondees, but we would recommend that this takes place only after the team is established and its operational practices are well embedded.

Design principle 9: Establish a lead for data analytics, evaluation and evidence in the IF

IF analysts will need appropriate technical and personal supervision. In most cases, we would expect the leads within an IF to offer this support to the other analysts in the team. It is important therefore that the IF is led by an experienced and well-regarded analyst who can command the confidence of her/his team as well as the senior managers in the ICS. It is expected that in the early stages of an IF, this person will specialise in the function of data analytics. In this case, the lead should actively support colleagues in other IF functions to engage with evaluation and evidence networks and promote their role within the IF with senior leaders.

Given our knowledge of the sector, we would recommend employing a senior data analyst at Agenda for Change (AfC) band 8B, 8C or 8D, with the remainder of the team occupying a range of AfC bands from 6 to 8A. It is also recommended that the team incorporates data analysts from local government to reflect the public health and social care linkages.

As the IF matures, it would benefit from employing function leads for evidence and evaluation to ensure the integration of these specialisms into IF project designs.

Leads may benefit from receiving peer-support or coaching from their counterparts in other IFs or from the development centre hosted by the Strategy Unit.

The IF workforce should actively network with their counterparts in other IFs

Design principle 10: Encourage peer-support between function leads in IFs

Health and social care is a complex and diverse service sector. Effective IF function leads will need good domain knowledge of the structure of health and social care systems, health policy and regulation, funding models etc. Complete knowledge is not possible and the IF team is unlikely to become highly specialised within one sub-domain of the sector. They will therefore need to become proficient at rapidly assimilating knowledge relevant to their current project.

Technical skills gaps within teams and skills development, to keep pace with methodological advances, might be best addressed through collaboration with the wider network of IFs. This can be facilitated by the development centre hosted by the Strategy Unit, through its establishment of professional networks. There exist many sources of formal training including short or long-term courses with academic institutions and commercial training providers and an increasing quantity of on-line training materials. In many cases, it may be possible to source potential trainers or specialist skills from within the Decision Support Network.

4.2   Principles specific to the data analytics function of an IF

> ### Design principle 11: Establish a clear separation of analytical and business intelligence functions

The term 'data analytics' is often used loosely, and this can lead to confusion about the limits of a data analytics function and its overlap and relationship with other disciplines such as business intelligence, and data management. These allied functions are no less important but have distinct objectives and require distinct skills, methods and technologies. For the purposes of this document, we define these functions as follows:

- Data management (DM): the development and maintenance of systems to receive, process and store data on the health and care services, making these datasets available for business intelligence and analytics functions.
- Business intelligence (BI): the development and maintenance of information systems to enable those managing services to carry out routine business processes (e.g. operational management, audit, performance management, contract compliance etc)
- Data analytics: the use of technical methods (e.g. statistics, data science, epidemiology, operational research, econometrics etc) to structure and answer specific, strategic business questions.

A host will require high quality BI and DM services, but these should be seen as distinct from an IF data analytics function. BI services are entirely and immediately dependent on effective data management. For this reason, there is a clear rationale for jointly commissioning or managing DM and BI functions. Whilst it is likely that the data analytics function will also use datasets supplied by the DM function, this dependency is rarely immediate or critical. In our experience, when analytical teams are managed jointly with BI services, analysts are often unable to resist pressure to become involved in addressing short-run business imperatives. In contrast, when a clear separation exists between the data analytics and BI / DM functions, the work programme of an IF analytical function can be guided by the strategic objectives of a host and by the emergence of unanticipated challenges and opportunities.

> ### Design principle 12: Ensure T-SQL and R are the core coding languages for the data analytics team

Most analysis will be enabled or delivered through coding languages and software packages. The range of available software packages is large and include many niche tools, with very specific applications and a smaller number of competing generic software packages. Analysts will have preferences based on their training and experience, and this diversity of preferences should be supported to some extent. However, in the interests of collaboration, we recommend encouraging analysts to maximise their use of two languages and their associated software packages; T-SQL and R.

Design principle 13: Do not burden the data analytics team with extensive data management responsibilities

To be effective, data analysts within IFs will need access to high quality personal computers, a range of up-to date software packages and routine access to suitably powered, well-managed environments hosting pseudonymised and where possible, linked datasets. To ensure that the data analytics team remain focused on delivering analytical projects, rather than on managing data, we recommend that responsibility for managing the host's datasets and its associated infrastructure is located outside of the strategic analytical team of the IF.

Design principle 14: IF analysts should be encouraged to adopt mixed-methods approaches to analytical projects

Adopting mixed-methods (quantitative and qualitative) approaches to analytical projects can provide data with important context to support decision-making. IF analysts should develop confidence in using qualitative data and consider whether it should form part of a project at the outset. This may not be constrained to the evaluation of a project; qualitative methods can used to establish the project scope, and to support the interpretation of quantitative data. As an IF matures it is expected that it should develop its capability and capacity in qualitative research methods for these purposes. The development centre hosted by the Strategy Unit has developed a guide to evaluation that includes approaches to conducting qualitative studies.

4.3   Principles specific to the evidence review function of an IF

Design principle 15: Establish processes for leaning before, during and after analytical projects, drawing on empirical and experiential evidence

Before committing resource, it is sensible to understand what is currently known within the Decision Support Network, by exploring previous related work and the wider evidence base. This can help to frame problems as well as add to contextual understanding. For medium to long term projects, it can also help to use methods such as after-action reviews to capture and embed emerging learning. At the conclusion of projects after action reviews capture experiential learning and to understand how this should be embedded.

Design principle 16: Actively seek to recognise and minimise bias by clearly scoping reviews; reporting all outcomes, positive or negative; and explicitly searching for evidence which disproves your theory of change

It is important to recognise our own cognitive biases which may influence how we frame a problem or set out a theory of change. Bias can be minimised by setting out the scope of your work at the start, clearly stating what is included or excluded (e.g. populations, interventions, outcomes). This can always be adapted but it is useful to have an audit trail to

document yourdecisions along the way. It can be very easy to focus on evidence which confirms our worldview, so it is important to search for evidence which disproves your theory of change.

Publication bias is common in healthcare (where positive results tend to be reported and negative results less so) and IFs should aim to share and report all outcomes, positive and negative, to enable systems to learn from each other.

> **Design principle 17: Be open about limitations, uncertainties and gaps in the knowledge base**

Uncertainty is inherent in research and evaluation and it is important to be clear about the limitations of your work and remaining gaps. Be open and honest about the uncertainties and avoid 'overselling' findings.

> **Design principle 18: Seek out different perspectives when applying evidence to your context**

There are rarely 'silver-bullet' answers to be found in a review of the evidence and it is much more likely that the insights you find will add to your understanding and will likely lead to more questions. Recognising that we all have our cognitive biases, it is recommended that you involve stakeholders in making sense of the evidence base, inviting participation in discussion and other sense making activities.

4.4   Principles specific to the evaluation function of an IF

> **Design principle 19: Build a culture of evaluation across the host to ensure evaluation is included as critical to all major pathway and service redesign work**

Evaluation is essential to understanding what works, for whom and why. It is central to quality improvement. It is necessary to make the right commissioning and investment decisions. Yet, because evaluation is rarely the responsibility of a senior lead, it can be an after-thought or missed altogether. In the most effective learning systems, evaluation will be (almost) everyone's business. Effective evaluation uses both quantitative and qualitative methods.

A commitment to evaluation that comes from senior leaders permeates through all levels so that when new programmes or initiatives are being planned, evaluation is considered from the outset; and when front-line staff are engaged in something new, or when they know existing provision is under review, their views will be sought through a commitment to learning. A consistent approach that promotes evaluation will build a culture that understands evaluation as a linchpin of a learning system – and not a practice to audit, blame or uncover poor practice.

As suggested in Principle 9, a host should consider nominating an evaluation lead for their IF, who can provide or facilitate access to advice and guidance on appropriate approaches to

evaluation for new investments or service redesign. They should make evaluation visible; and draw on the resources of the network's development centre in providing training, guidance and services such as quality assurance.

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Design principle 20: Include direct work with patients where the evaluation includes patient outcomes

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Most evaluations will be focused on services, pathways and programmes for patients and service users (although some may be focused on initiatives for the workforce or new ways of integrated working). To understand these outcomes, those who are in receipt of the service or treatment must be involved in the evaluation. This involvement can take different forms, from short consultation questionnaires to more in-depth qualitative interviews developing a narrative understanding of their experience. An inclusive approach ensures that all perspectives are included; and identifies and addresses any cultural or other barriers to participation.

5. Next steps for your IF

These principles are to support hosts as they establish their own IFs. They are designed to provide a consistent approach that will make shared learning easier and more practicable.

The development centre hosted by the Strategy Unit can support IFs in applying and tailoring these principles to their development and evolution. In parallel, IF leads can use them to highlight to system stakeholders how an IF will differ from current practice and gather support for the model