

Predicting early interventions

In response to the national Troubled Families Programme, North Somerset Council's Predicting Early Interventions project aimed to create new digital tools that would analyse family-specific data in the local area.

The resulting system supports the early identification of families with multiple complex needs, allowing for a range of tailored interventions to be delivered.

Digital Transformation Programme

The work on this project undertaken by North Somerset Council has been funded through the Digital Transformation Programme, which is managed and overseen by the Local Government Association (LGA).

The programme was set up to help councils and their partners develop digital solutions to support their work on national programmes of transformation including the integration of health and social care, Troubled Families, welfare reform and public health.

The aim is for the digital tools and solutions created through the programme to be reused by other councils and contribute to the wider work to transform local public services.

The issue and context

The Troubled Families Programme (2015 – 2020) is a national initiative which aims to achieve significant and sustained progress with up to 400,000 families with multiple, high-need and high-cost problems by 2020. The programme pulls together cross-government funding and support to provide a catalyst for local services to transform and work together in a more effective and cost-efficient way to achieve better outcomes for families.

The issues faced by these families include:

- worklessness and problem debt
- poor school attendance and attainment
- mental and physical health problems
- crime and anti-social behaviour
- domestic violence and abuse
- children who are deemed as in need of help.

The Troubled Families programme is run from the Ministry of Housing, Communities and Local Government (MHCLG) and delivered by all 152 upper-tier local authorities and their partners. This includes the project in North Somerset that is labelled as the High Impact Families programme (HIF).

Making the best use of data has always been a key part of the Troubled Families programme, both in terms of the identification and analysis of families at a local level and the evaluation of the programme at a national level. Indeed, as part of the sign-up process for the Troubled Families Programme in 2015, all upper-tier local authority chief executives made a number of key commitments to:

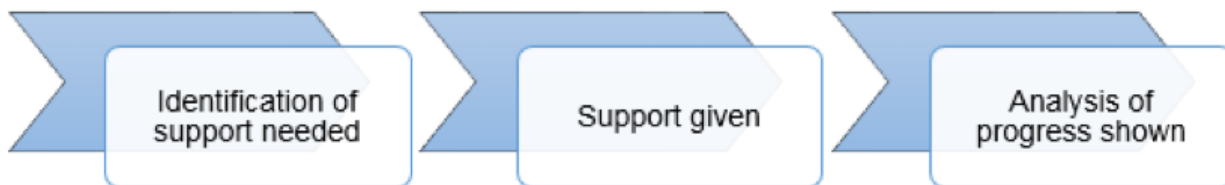
- engage with an agreed number of families over the lifetime of the programme

- achieve measurable outcomes with an agreed total number of families over the five-year period from 2015/2016 to 2019/2020
- integrate and transform local public services
- evidence how the programme is delivering for families and in the transformation of public services through participation in the programme's National Impact Study, the submission of Family Progress Data and completion of the programme's costs savings calculator
- develop a Troubled Families Outcome Plan (TFOP) with the support of local partners and services, internal auditors and local strategic leaders.

Involving a family in the HIF programme in North Somerset is a multi-stage process.

1. Potential families¹ can be proposed by a range of agencies and individuals (including family members and through self-referral). Each family must be assessed by the council to ascertain if they meet the programme criteria. If they do, then the family is enrolled in the programme and receives a range of support tailored to their needs.
2. Once enrolled and the necessary support is being delivered, each family must be assessed and their progress reviewed every three months for as long as they remain involved with HIF.
3. Families that make progress are reviewed in considerable detail before being considered as having shown 'significant and sustained' progress and no longer in need of HIF support.

¹ Note: for these purposes a family is defined as those individuals living at a single address.



In North Somerset these monitoring and evaluation processes are carried out centrally by the Business Intelligence Service. This is done by analysing information within a broad range of databases, spreadsheets and systems.

However, by 2016 the council was finding it challenging to manage the growing workload associated with the monitoring and evaluation requirements of the programme. Increasing numbers of families were being identified to receive support (the government target is for over 1,000 families to show improvement following help from the council) and each of these families had to be monitored both on entry to the programme, during the programme and post-programme.

It was recognised that one of the root causes of the difficulties being experienced was the complex and silo-based digital architecture that supported management information in North Somerset's children's social services. This was based on the use of four separate case management systems:

1. Integrated Children's System (LCS) – for children's social care
2. Early Help Module (EHM) – multi-agency early intervention
3. Capita One – for educational records
4. Troubled Families Excel/Access database (TFE) – set up at the beginning of the HIF programme.

In addition, further information that needed to be analysed involved a range of systems, spreadsheets and databases, including Childview and eStart.²

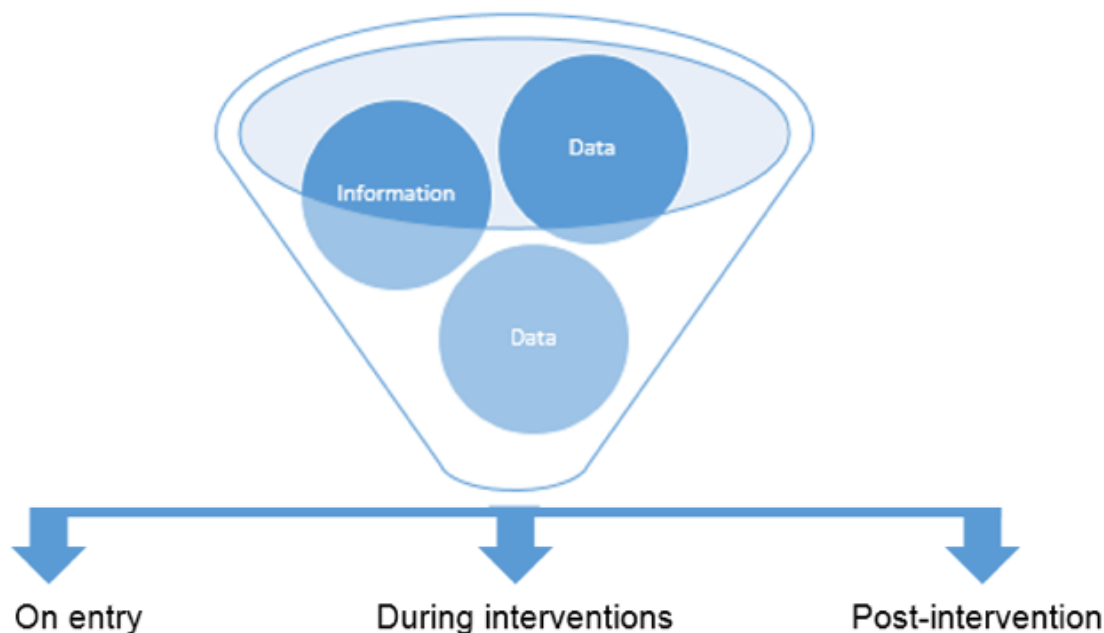
The project objectives and targets

Recognising that the existing monitoring and evaluation process for dealing with the HIF programme was unsustainable within current costs, and given there wasn't the option of increasing the budget, and forecasts clearly indicated that workloads would continue to grow, then it quickly became apparent that the team needed to 'work smarter' and redesign the processes to make these more efficient.

It was envisaged that this could be achieved by drawing all the related systems together under one umbrella, either via a single database or via interfaces, allowing the data within existing systems to be used in a smarter, more efficient way. Hence, this project, Predictive Early Interventions (PEI), was launched and this aimed to develop a tool that would use the data held within the various systems, to enable the team to analyse what support these families would need through their HIF journey.

As a result, frontline workers would be able to put the necessary measures in place to deal with those families at greatest risk both at the earliest opportunity and in a more joined-up way. For example, families where children had low school and nursery attendance could be prioritised for support by both education welfare officers and children's centre support workers.

² These systems hold education, youth offending and children's centre data.



Key elements underpinning such a system would include the ability to:

- bring together data in a consistent and useable format
- agree criteria to analyse the data in order to identify those at risk
- highlight those families at the greatest risk and produce relevant information for case workers to better target resources and support
- create statistical reports to meet the reporting requirements of the national programme.

This project fits with North Somerset Council's Transformation Programme which includes themes around 'digital first' and 'one council' including making maximum use of standard software and working in partnership across the organisation and beyond.

The approach and progress to date

Before PEI, when a family was identified for support, they were added to one main database (created at the beginning of the programme). Once added, data from numerous databases, spreadsheets and systems had to be collated and matched to the family ie does the family already receive social care support, is the family already attending a children's centre. This had to be done manually for each family

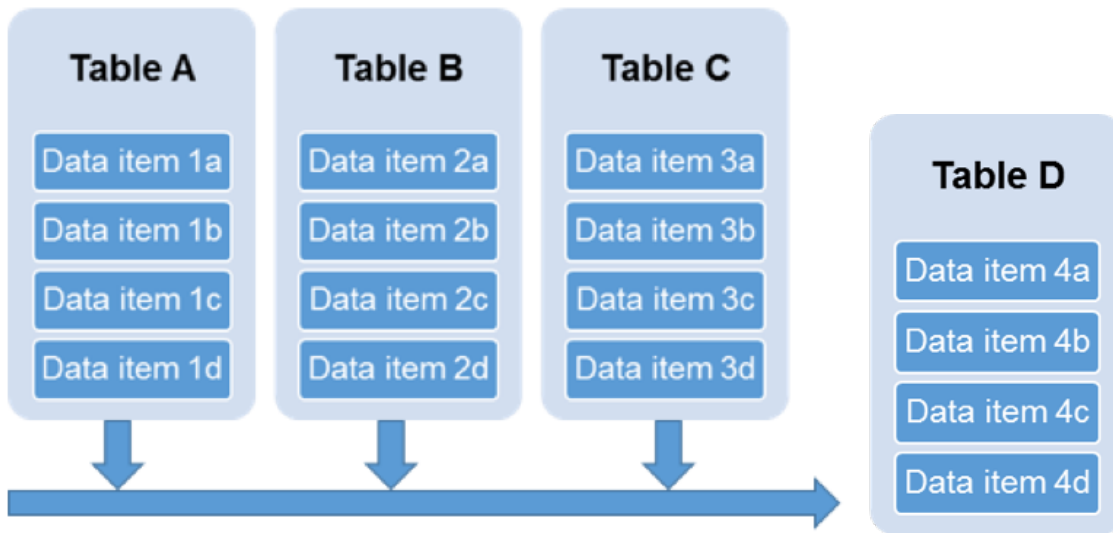
member as none of the systems, spreadsheets or databases were linked.

Consequently, the information was hard to maintain, difficult to access and as a result may not have been complete or reliable.

The initial aim for the programme therefore was to refine the infrastructure to create a single spreadsheet for Troubled Families by matching the data across the existing systems and creating a single 'golden record'. A front end would then be developed to interrogate the data.

However, issues with the quality of the data made it hard to de-duplicate the data from the various sources and to create a golden record for each family member on the HIF programme in North Somerset.

Consequently, the council made the decision to go with a relational database model instead of the original plan of 'de-duplication and golden record' approach. A relational database is a collection of data items organised as a set of formally-described tables from which data can be accessed or reassembled in many different ways without having to reorganise the database tables. This was to be achieved by building additional indicators, where necessary, into the various data sets and then joining them together via a set of linking tables. This relational model would be more flexible in dealing with duplicates, re-refreshing data and the incorporation of new datasets when required.



A front-end interface, in Access, would also be built to take full advantage of the new relational database model.

With this model in mind North Somerset submitted a bid to the Digital Transformation Programme. This bid was successful and the council received a grant of £25,000 to enable the funding of a data analyst to kick start the project and to release staff time to build the relational database and the user interface. Without this funding, the council would have struggled to get the project underway.

The first step in the project was to produce a map of the existing digital architecture – this process allowed analysts to understand what systems held the data needed to support the HIF programme, how that data could be extracted, and where it could be exported to.

The digital architecture map that was produced showed numerous databases, spreadsheets and systems holding relevant data. Many of these had the capacity to be linked, but most were not (with the exception of EHM and LCS).

Some systems sat outside of the North Somerset Council network including the Department for Work and Pensions (DWP) system and Avon and Somerset Police systems (ASP). Therefore these could not be linked directly.

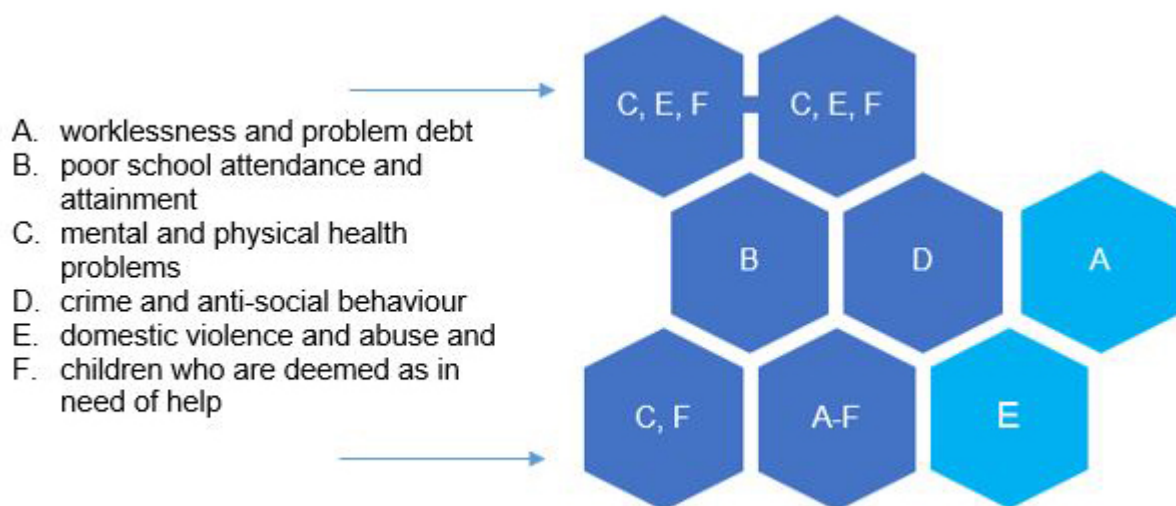


Step two – mapping the data

The next step was to map the data that sat within that architecture as follows:

- what data sits in EHM and in what format
- what data sits in LCS and in what format...
...and so on.

This process allowed analysts to link against the Government’s criteria for Troubled Families, and ask the question: what data does North Somerset have access to?



Step three – aligning the architecture and the data

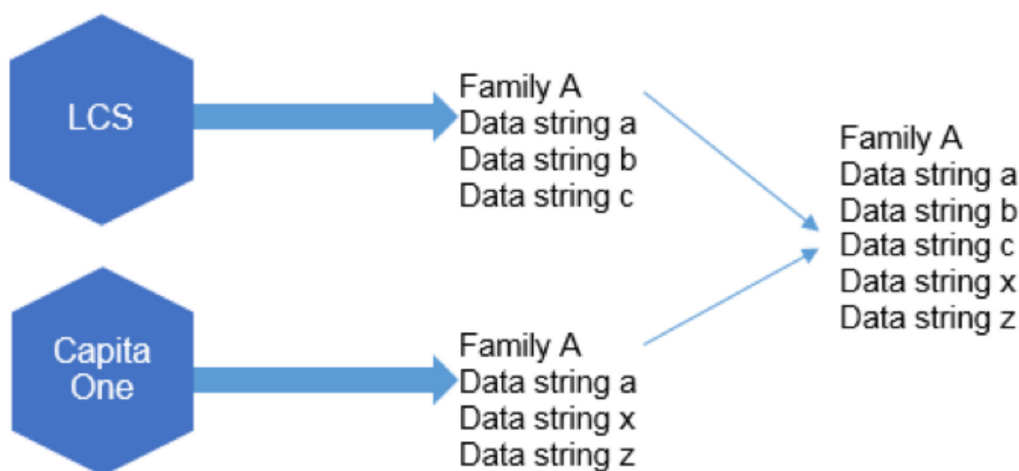
The third step sought to create a relational database from the architecture and the data within it. This was done by matching data sets using various match keys ie data strings that were common across different data sets.

Queries were built, using the programming language of Access (VBA), to remove duplicates and flag errors during this matching process. Each new dataset helped with de-duplication and reduced the error rate.

Step four - user interface

Finally, the project set out to create a graphical user interface which would analyse the data available on a person and a family, present it to analysts and/or practitioners in an easily accessible form, and highlight the potential areas of concern.

In the test case below, the person being evaluated shows up in numerous systems, the data of which corresponds to HIF criteria (as set out by government), and is either receiving, or is eligible for High Impact Families support.



63043	System	LCS	EHM	Capita One	Childview	eStart	DWP	ASP	HIF
63043	Forename	Test 1	Test 1		Test 1	Test 1		Test 1	Test 1
63043	Surname	Test 1	Test 1		Test 1	Test 1		Test 1	Test 1
63043	DoB	01/01/1980	01/01/1980		01/01/1980	01/01/1980		01/01/1980	01/01/1980
63043	System ID	ICS1	UPN001		CV001	UPN001		A001	HIF001
63043									HIF
63043	CLA	Eary Help	Attendance	Youth offending Children Centre	Universal credit	Call out			
63043	CP		Expulsion		Income support	Incident			
(New)	CiN				ESA	DA			
					JSA				
					Other				

Search ID

Link ID	IC_forename	IC_surname	IC_DoB	ID	EH_forename	EH_surname	EH_DoB	ID	Match
63043	Test1	Sur1	01/01/1990	ICS1	Test1	Sur1	01/01/1990	EH1	Yes
63044	Test2	Sur2	01/01/2000	ICS2	Test2	Sur2	01/01/2000	EH2	Yes
63045									
63047	Test3	Sur3	01/01/1998	ICS3	Test3	Sur3	01/01/1998	EH3	Yes
36048	Test4	Sur4	01/01/2001	ICS4	Test4	Sur4	01/02/2001	EH4	No
63049									

Project management

The project was managed using an agile methodology. The agile method is often used for software development and so was a good fit for this project.

Agile projects do not always follow a traditional structure, ie formal project sponsor, formal project manager, etc. though in this instance the project was sponsored by the head of transformation and policy, and the service lead for business intelligence acted as the project manager.

The project team included data analysts, data managers, business analysts and IT staff.

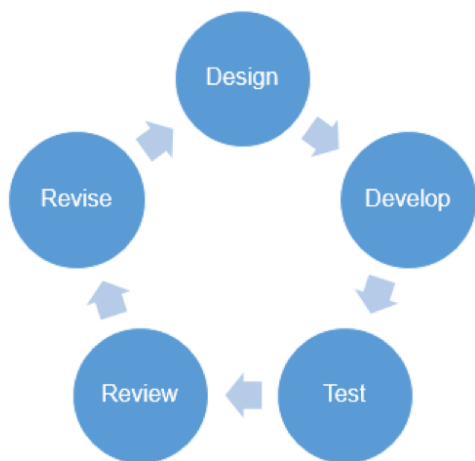
The approach to the development of the project followed the key agile methodology principles of:

- adaptive planning
- evolutionary development
- continual improvement
- rapid and flexible response to change.

The project team also worked on the key values of:

- tools and processes are important, but it is more important to have competent people working together effectively
- good documentation is useful in helping people to understand what we are building, but the main point of the project is to create a usable tool, not documentation
- a project plan is important, but it must not be too rigid to accommodate changes in technology or the environment, stakeholders' priorities, and people's understanding of the problem and its solution.

The project went through several cycles of 'design, develop, test, review, revise' before it was considered fully operational and usable within the organisation.



The outcome – successes and challenges

The PEI system is now fully operational and is utilised by the Business Intelligence team on behalf of the various service delivery units, including HIF operational management, HIF family engagement workers and Troubled Families employment advisors.

The system provides a simple, graphical and colour-coded overview of the analysis for each family in terms of:

- crime and anti-social behaviour
- children’s education
- children in need
- worklessness and finance
- domestic violence and
- involvement with the HIF Programme.

Operational benefits

By creating a simple, single access point to a comprehensive range of relevant data, the project has created an efficient system that allows the team not only to undertake assessments more quickly, comprehensively and to a greater level of accuracy but also to identify and forecast potential problem areas. In this way the system allows the trained staff on the team, who are familiar with the complex requirements of the HIF programme, to identify where individual family members may need more support and in what area that support should be targeted.

For example, the system enables the team not only to identify those children already meeting the educational criteria around school absence but also to flag up those on the cusp. This ability to be proactive facilitates earlier and hence more effective intervention.

“A case was raised in the Out of School Panel concerning a child that had stopped attending school for a few days. The mother worked nights and the step father was in prison with the result that the mornings were unstructured. I took the simple step of turning up the following morning to take the child to school and repeated this for several days until a routine was established. The rapid and accurate information provided by this system meant that this intervention could happen immediately rather than allowing the situation to drag on for weeks and non-attendance to become the established norm.”

Dave Slack

High Impact Families Practitioner

Previously there would be delays between queries being raised and information being made available to practitioners and service managers. However, the team are now able to quickly and effectively identify the child’s/family needs prior to, or actually during, weekly triage or Out of School Panel meetings. In this way, the practitioners on these groups have the relevant information available to make decisions in a timely manner rather than spending time checking and re-considering the same case because information is provided in a piecemeal way.

Consequently, practitioners are reporting greater buy-in from partners, eg schools, as they see the benefit of working in partnership with a unit that provides good data.

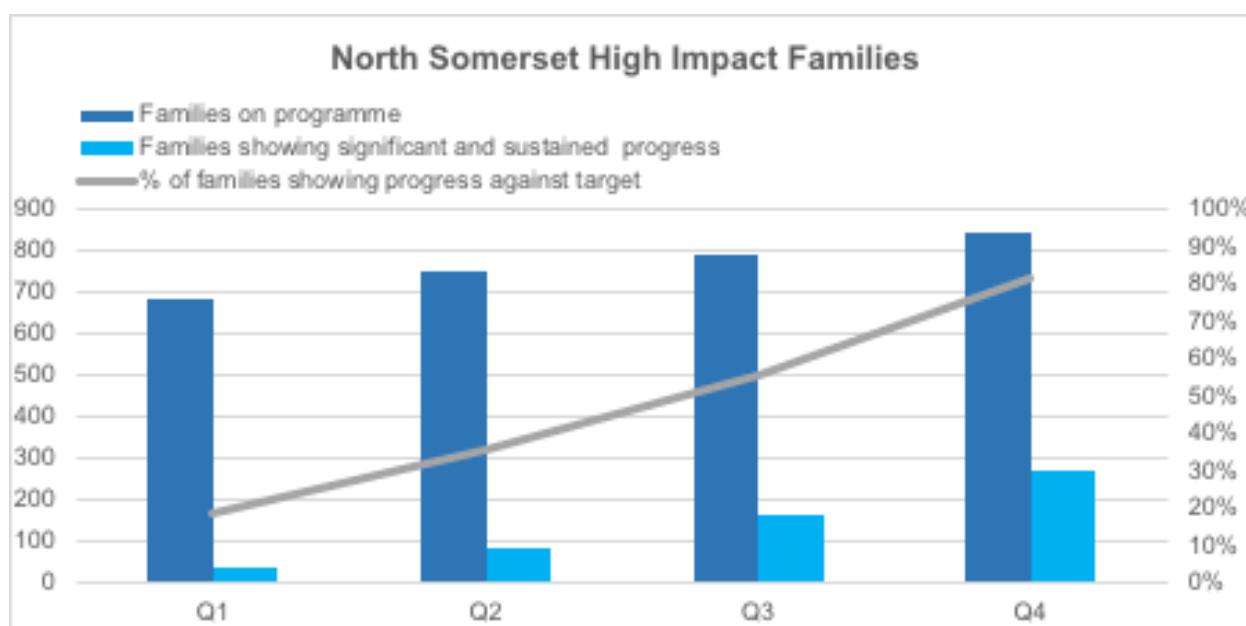
Having accurate information also allows practitioners to base their decisions on solid evidence and to challenge unsubstantiated claims, rumours and hear-say. For example, uninformed statements, such as “the child hasn’t attended for weeks” or “the parent hasn’t worked for...” can be challenged with facts and the relevant interventions actioned quickly.

More importantly, the provision of accurate and timely information facilitates early and relevant interventions resulting in problems being avoided or minimised.

“The efficiency and accuracy offered by this system means that we are now getting children back in to school within days rather than weeks.”

Mark Francis
High Impact Families Operational Manager

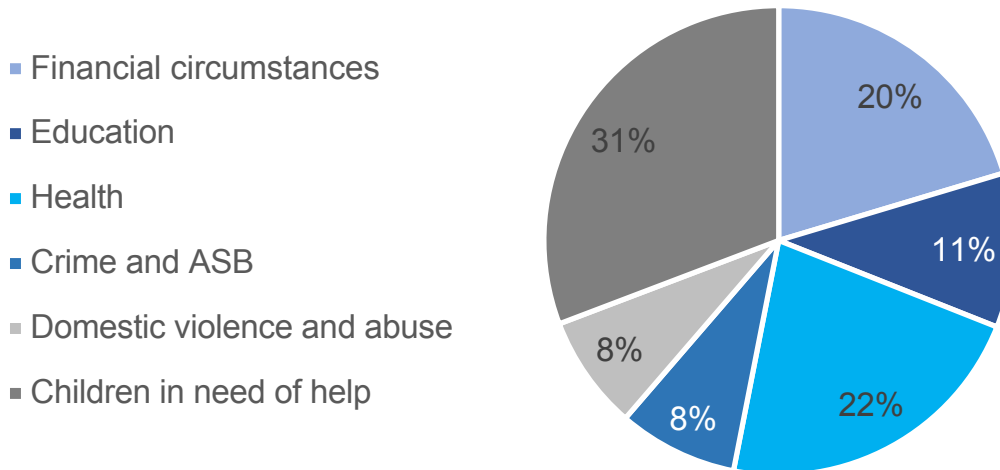
There are numerous factors that affect the performance of the HIF programme, and the significant and sustained progress shown by the families being supported. However, the provision of accurate and timely information by the PEI system facilitates early intervention and can be considered a contributory factor in the growth of the number of families showing improved progress over the period. It is also a major contributing factor in evidencing the outcomes of the work undertaken to support each family.



Analysis of outcomes* shows that for families worked with under the HIF programme:

- 20 per cent been supported to improve their financial circumstances
- 11 per cent have seen an improvement in the school attendance of children within the family
- 22 per cent have seen an improvement around their mental and physical health problems
- eight per cent have seen improvements around incidents of crime and anti-social behaviour
- eight per cent have seen improvements around incidents of domestic violence and abuse
- and 31 per cent of children who were deemed as in need of help were given that help.

North Somerset High Impact Families: outcomes



*Note: families will show improvement of outcomes in more than one area.

Financial benefits

In addition to the improved performance and better outcomes for families, the system has allowed the delivery of a much more efficient service that has allowed North Somerset to avoid significant increases in costs. The avoided cost, over the lifetime of the HIF Programme, is forecast to exceed £137,000 by 2020. It has generated a saving of approximately £39,000 over the last year.

This has been achieved by the reduction in the time spent by the Business Intelligence Service on each stage of the HIF process as well as a reduction in practitioner time when accessing family information. The time taken to undertake each task was measured pre- and post PEI with the time savings being measured in minutes. This saving is then applied to the average cost of a Business Intelligence analyst or a practitioner plus on-costs.

Costs avoided at each stage have been calculated below.

1. Families can be proposed for potential inclusion in the HIF Programme, via several different routes (eg children's social care, children's centres, youth offending team, etc). Regardless of the source, these proposals are evaluated by the Business Intelligence Service. Over a one-year

period there were 352 families proposed and use of the new system has generated a time saving equivalent to approximately £2,000 in evaluating these.

2. Once on the HIF programme families are reviewed every three months. There are approximately 800 families in this programme and this is growing with government targets suggesting it should be over 1,000. The new system has been used to undertake 2,553 reviews and is generating a time saving that has grown from £1,400 to £2,032 per month over this period - giving an annual saving of £22,456. However, the number of cases is growing month by month and an extrapolation based on the figures for the last three months gives a current saving of approximately £29,000 per annum.
3. Families that make significant progress are reviewed in considerable detail before possibly being removed from the programme. Over the last year 270 families have been reviewed in this way and a time saving equivalent to approximately £4,000 has been delivered.
4. The system also allows automatic completion of Government Returns which will generate a saving of £2,560 per annum.

5. Practitioners within the HIF team have access to extracts from the system meaning that when working with families they do not need to look up information on a number of different systems. They have the option of accessing data themselves or asking analysts to do so for them. Over the last six months, modelling suggests that around £4,500 worth of practitioner time has been saved by using the system.

North Somerset's figures report that they have avoided costs of approximately £39,000 over the last year and as use of the system grows, with more and more families enrolled on the HIF programme, NSC forecast a total avoided cost of over £137,000 by the end of the programme in March 2020.

Organisational benefits

The provision of the LGA Digital Transformation grant enabled North Somerset to develop the solution in-house which has resulted in a high level of ownership of the solution. In addition, it allowed the team to develop their skills in Access and SQL³ which will underpin future developments, particularly around integration with Microsoft 365 tools such as Power BI.

As this project has improved the use of data and allowed the Business Intelligence Service to become proactive the confidence and culture of the service has grown leading to greater job satisfaction.

Implementation of the system supports the council's desire to create a systematic approach to information sharing, collaborative working and joint decision making that empowers staff to work together confidently.

The project has also demonstrated the potential for partnership working, for example:

- information being provided to the police Think Family initiative
- information being provided to the Department for Work and Pensions (DWP) regarding job seekers.

This has enhanced the council's reputation with partners.

³ SQL is a Structured Query Language used to access data in a relational database

Key learning points

Data matching

A difficult problem encountered in projects of this type is the issue of data matching. Where information has been recorded historically in several different places, by different individuals or groups, for a variety of purposes then linking this information together for single individuals and families can be a major task.

Automated data matching processes may achieve a success rate of 85 or 90 per cent but it is inevitable that the final 10 per cent or so will require manual intervention to correct issues such as spelling mistakes.

The relational database model introduced by North Somerset minimised this issue by adding additional indicators to the underlying data sets and then creating linking tables to tie them together into a single database.

System updates

A linked problem, for a system that creates an overview of data from a number of underlying systems, is that those systems will themselves continue to develop and evolve in response to changing circumstances. For instance, if the police systems supplying data to North Somerset Council are amended or upgraded, the council's new PEI system will have to be modified in response.

It is essential, therefore, that the overview system is sufficiently flexible to take account of these changes without the need for extensive re-writing on a regular basis. The relational database model introduced by North Somerset delivers this flexibility.

Ownership and involvement

In a complex project that involves the integration of different system and the matching, cleansing and sharing of data it is essential that all key partners, internal and external, are kept involved in the process. For example, North Somerset found the knowledge and technical support of a representative from the IT service to be invaluable in the design and implementation of this project. This support contributed to the ability of the council to develop visualisation software internally and to avoid the need to purchase an expensive commercial package. This was wrapped up within the agile project management approach, with IT representatives being consulted as and when needed at different stages within the project.

Partnership working

One advantage of working in the public sector that should be maximised is the ability to openly share experiences, knowledge and work load with others in the sector. North Somerset Council already have a collaborative relationship with Bristol City Council and at one of their regular meetings discussed the PEI project. Bristol had already undertaken some work around predicting child sexual exploitation and had a user interface available to share, meaning that the ideas underpinning the final PEI user interface were based on the work previously undertaken by Bristol City Council.

Data security

The PEI system contains a significant amount of sensitive data on the families who are being supported by the High Impact Families programme. The project team worked hard to ensure that the General Data Protection Regulations were followed when considering who should have access to the data within the system.

The nature of the HIF workflow meant that the Business Intelligence Service needed primary access to the system followed by a small number of HIF practitioners. For other professionals a work request form allows the provision of information where necessary.

Next steps

North Somerset Council plans to build on this successful implementation by continuing to add more information to the database. Areas for the possible expansion of the database include health, universal credit and housing.

The PEI system will also be used to underpin other developments being undertaken by partner organisations.

For example, the police service has received a £3 million grant from the Police Transformation Fund to introduce a system that will focus on missing children and high-impact individuals. From the perspective of NSC, this will build on the PEI project and will be based upon the accurate and accessible data in this system.

The LGA funding has therefore contributed to the successful development of North Somerset's specific PEI project, as well as put in place the basis for further expansion and collaboration on a cross-agency basis.

Other possible future developments include:

- using this system facilitate a 'One Front Door' initiative relating to the prevention of domestic abuse
- extending the use of this system to provide a regional model.

To facilitate future enhancements to this system and other developments, more council staff will be trained in SQL.

Further Information

This is a well-documented system and North Somerset Council are willing to share both the Access database and the Excel front end (although it will need to be tailored to work with local systems) and their knowledge and experience with other public-sector bodies.

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