Social Care Digital Innovation Programme Implementation Phase Application

1.   Discovery Phase Review

Name of council:

Sunderland City Council

Project name:

Designing a Viable Platform to Capture and Present Data from Innovative Technological Solutions to Common Social Care Issues.

Project Stream:
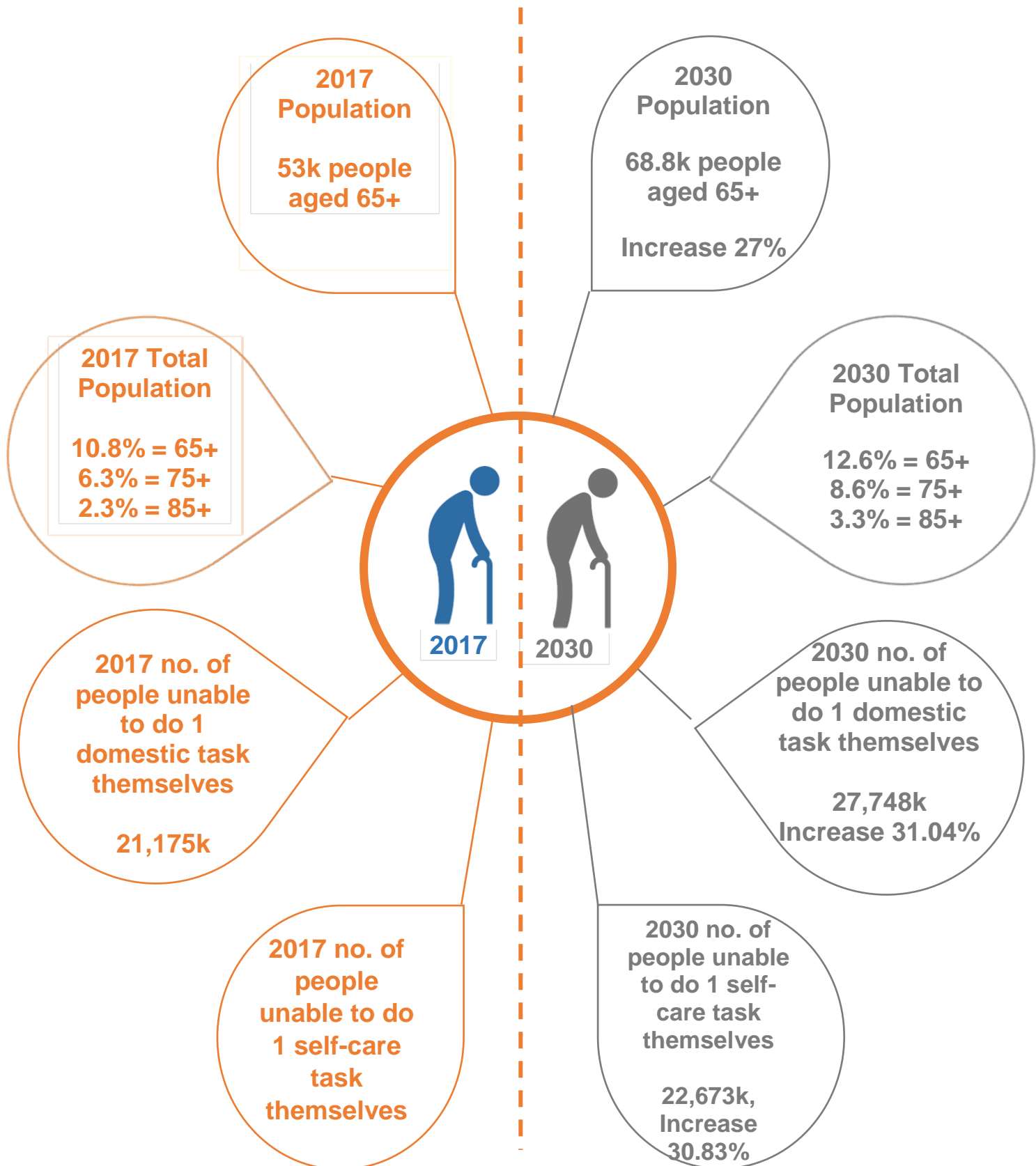
Sustainable and Integrated Care and Health Systems

Contents

The problem to solve

Sunderland, like many other local authorities, faces the challenge of supporting increasing numbers of vulnerable adults including the elderly to remain independent within communities and with improved quality of life while managing increasingly stretched budgets. A stark reminder of this is the Office of National Statistics (ONS) 2014 subnational population projection for Sunderland.

The examples below offer a flavour of the challenge from an older person's perspective.

2017 Population

53k people aged 65+

2030 Population

68.8k people aged 65+

Increase 27%

2017 Total Population

10.8% = 65+
6.3% = 75+
2.3% = 85+

2030 Total Population

12.6% = 65+
8.6% = 75+
3.3% = 85+

2017 no. of people unable to do 1 domestic task themselves

21,175k

2030 no. of people unable to do 1 domestic task themselves

27,748k Increase 31.04%

2017 no. of people unable to do 1 self-care task themselves

2030 no. of people unable to do 1 self-care task themselves

22,673k, Increase 30.83%

2017

2030

To meet these challenges requires new ways of thinking moving beyond traditional methods of support. It also requires organisational changes/support to manage increased numbers of clients in the most effective way. We know technology will have a role to play and our project is seeking to establish:

- How assistive technology can support people to live independently
- How technology, longer term will allow us to work differently to reduce reactive interventions and increase prevention and early intervention
- How technology can be used to deliver organisational support, initially within our organisation but potentially across the social care system

There is a vast array of IOT Assistive Technology Devices and Products on the market. Some of these products are purpose built to be used in social care and other products like Google Home and Amazon Alexa have the potential to be repurposed for social care use.

Here in Sunderland we have a well-received Telecare offer and we want to understand how assistive technologies can be combined with that to effectively modernise and future-proof the Telecare concept.

There are so many emerging technologies it is overwhelming to a point where an organisation could spend all of its time researching these technologies and running pilots, whilst knowing new innovations happen on a daily basis. In addition we know that interfacing different technologies is also an issue as is the capacity of staff and carers to respond to the information and messages that they receive.

This led to our original problems of:

There are so many assistive technology solutions out there at the moment. How do we know what good looks like?

Once we have identified what good looks like how do we use these technologies to produce good outcomes with consistent outputs?
(our definition of good includes the actual function of the device as well as how well it works)

How do we identify a good piece of assistive technology that can be trusted?

How do we get consistent relevant and useful information from this vast array of technology and how do we capture, display and make sense of the information?

To answer these, we recognised that we needed assistance from specialist in technology to work collaboratively on finding solutions. A partnership was established and following initial consultation we simplified the four problems above into one challenge. This resulted in the reframing and simplification of the problem, which is:

We wish to develop a score card to assess the most suitable assistive technology solutions to common social care issues and design a platform which is able to present the data collected by the technology in a meaningful and simple way.

Research Methodology

The Council worked with its partners, Digital Catapult and Urban Foresight to perform the research supporting the project. Digital Catapult is the UK's leading advanced digital technology innovation centre, while Urban Foresight specialise in helping local authorities, governments, and businesses to implement solutions that improve lives using technology.

The table below outlines the methodology used and the anticipated objectives:

Work stream	Element	Activity	Deliverable
Project Principles	Develop Design Principles for Use Cases	Working with SCC staff, SMEs, sample beneficiaries to understand how the project use cases will be delivered, monitored, evaluated and how transferability can be established to support scaling and sharing with other local authorities	Agreed evaluation criteria to assess feedback from users, devices and the Core platform into which all the data is collected from the devices. Developing a means of score-carding all of the solutions against a common set of principles.
Use Case Definitions	Stakeholder Workshops	Detailed workshops with end-user beneficiary families, intermediaries and council staff	X4 agreed test-bed use cases. Understanding of use case scenarios. Selected geography/location for x4 test-beds
Market Place	Initial Technology Sift based on Use Cases	Horizon scanning for current technology to understand what is already available, its maturity and gaps in the market place	Clear examples of already-in-market solutions. Clarity on gaps in the market to inform the open-call. Understanding of Application Programme Interface (APIs) required for the development of the Core Minimal Viable Product(MVP)
Procurement	Procurement Understanding	Review of potential procurement models for test-bed deployments and wider scaling including pre-commercial procurement methodology. Discussion with SCC procurement team	Report to SCC procurement team and agreement on how to procure devices and the Core
Procurement	Specify Standards for Testbed	Review and selection of international and national standards around openness, security, scalability, resilience, usability, economic viability	List of standards to be used as part of this project

The approximate cost of the discovery research phase listed above was £29,700(excluding SCC staff costs).

Research Findings

Project Principles Findings

Following lengthy discussions with our partners it was suspected that both purpose built technology and other products like Google Home and Amazons Alexa out on the open market, may have issues in interfacing with our proposal for a monitoring Core and in terms of large scale implementation into people's homes.

Partners agreed a set of principles of project delivery must be designed and specified against the headings of;

- o Openness
- o Security
- o Scalability
- o Resilience
- o Usability
- o Economic Viability

These principles will be applied as a **means of score-carding** all of the technology devices.

These principals will also be included in the development of a specification and initial design of a core platform. As an initial test of scalability we have set ourselves an ambitious target of **120** devices to be installed across the four use cases.

It was agreed that any developed Core would have to make sense of all the data presented by a range of technology devices and turn it into meaningful consistent and understandable intelligence. This intelligence can be managed and made available with appropriate governance in a way that can be understood by individuals, their carers and social care staff. The platform will make sense of the vast amount of useful data collected and frame it appropriately to alert the need for an intervention, promote independence, reassure or simply inform.

Security Findings

This phase has led us to learning about and now insisting on the following from suppliers to ensure security by design. The following now outlines and is integral to our tender expectations.

Where applicable, any technology offering must be accredited to relevant standards as amended, such as ISO:27001 for Information Security or equivalent.

Where any technology or data is to be cloud hosted, the appointed contractor(s) must confirm and explain how they follow the guidance of the National Cyber Security Guidance as set out in "Implementing the Cloud Security Principles" at https://www.ncsc.gov.uk/guidance/implementing-cloud-security-principles.

It is expected that contractors comply with the principles of the Government Code of Practice for Security in Consumer IoT Products and associated Services proposed by the Department for Digital, Culture Media and Sport (DDCMS) and its later iterations.

Bidding companies will be required as a minimum to consider and undertake the following appropriate precautions:

IOT Code of Practice	Appropriate Precautions	Applicable
No default password	• Strong user authentication • Avoid null or blank passwords • Automatic session timeout function to force logout • Protections against repeated login attempts • Factory login accounts should be erased or disabled prior to distribution	YES
Implement a vulnerability disclosure policy	• Vulnerability assessment; both initial and ongoing • Disclosure policy in place	YES
Keep software updated	• Remote software updates • Disable software downgrade	YES
Securely store credentials and security-sensitive data	• Ensure industry standard password encryption is used • Secure password recovery mechanisms in place	YES
Communicate securely	• Authenticated and encrypted communications between devices only • IP traffic to use only secure protocols • Any wireless interfaces that require passkeys must have unique passkeys for each device	YES
Minimise exposed attack surfaces	• Debug and communication interfaces disabled or protected	YES
Ensure software integrity	• Secure boot procedure • Digitally signed/authenticated • Fail safe procedures	YES
Ensure that personal data is protected	• Only store the minimum required amount of personal information from users • Encrypt all personal user data • Anonymise any data used in reporting • Clear and well defined data access control policies • Data retention policy • Enable users to check what data is collected and stored in the system • User explicit consent prior to collect any personal data • Data breach disclosure policy	YES
Make systems resilient to outages	• Device integrity protection against loss of communication	YES
Monitor system telemetry data	• Appropriate logging of system activity • Proactive monitoring of telemetry data to detect attempted or successful security breaches • Support the data breach disclosure policy	YES
Make it easy for consumers to delete personal data	• Enable users to erase any personal data collected and stored in the system	YES
Make installation and maintenance of devices easy	• Appropriate configuration documentation and support	YES
Validate input data	• Protection from code injection attacks	YES

Use Case Definition Findings

Part of our discovery phase involved gaining the views of the people we think could benefit most from the introduction of digital technology into social care and to identify the main issues in social care that people felt could be addressed by technology. Urban Foresight organised and held three separate stakeholder workshops which informed our discovery.

Following an initial project scoping exercise the lead adult social care managers identified four high-level areas of adult social care that present challenges on a daily basis, these consisted of:

| Dementia | Frailty & Disabilities | Learning Disabilities & Mental Health | Carers |

It was recognised that these areas are quite wide ranging and were the basis of the three workshops that were held with the following groups.

- Internal staff; SCC's social workers and care service staff.
- External partners; VCS, charities and contracted organisations supporting SCC.
- End-users; care receivers and carers.

In the first two workshops, the groups conducted a series of exercises that expanded on and then diverged on the different issues, attributes and data-sets for each of the four areas. The third workshop was attended by a selection of end-users; care receivers and unpaid care givers. The content of this workshop was developed from the outputs of the previous workshops so that they would be reflecting on and providing greater insight the shortlisted issues.

The broad range of challenges enabled workshop attendees to rapidly become involved in discussions and to share their thoughts on the main issues they experienced from their personal perspective.

In order to gain the most benefit from the workshops the attendee's comments were then recorded and our partner Urban Foresight designed a set of principles and Score Card which could be used to evaluate the workshop comments. This enabled Urban Foresight to evaluate and rank the comments.

Each of the four use cases and their respective solutions were based upon this rationale:

Use Case Design Principals and Scorecard

Start with users' needs	0 = technology-led rather than problem-led.
	3 = indirect benefits to address a minor problem.
	5 = part of a range of systems that in combination would directly address a minor problem.
	7 =part of a range of systems combining to directly address a major problem.
	10 = the main system for directly addressing a major problem.

| Be innovative	o = established technology with limited innovation.
	3 = established technology but a new service/ way of working.
	5 = new technology to improve an existing service/ way of working.
	7 = new technology and a new service/ way of working.
	10 = new technology and a new service/ way of working with automated decision-making.
Improve quality of life	o = no direct benefits for patients or carers.
	5 = direct benefits for patients or carers.
	10 = transformational benefits for patients or carers.
Reduce the level of care and support required	o = the care and support requirements are unchanged or have been increased by the introduction of the technology.
	5 = the same level of care and support is required but the quality has been improved by the system supplementing it.
	10 = the level of care and support required has been drastically reduced.
Protect users from potential avoidable harm	o = the pilot technology will not help to mitigate avoidable harm.
	5 = the pilot technology will provide information or assistance to mitigate avoidable harm.
	10 = the pilot technology will directly prevent a situation from occurring that would create avoidable harm.

At the first two stakeholders workshop participants identified a core set of high level, adult social care issues, that applied to a number of key user groups. The use cases were revised in order to demonstrate this.

The full workshop groups were asked to brainstorm a broad list of issues that they have experienced in the focus areas. Then they were split into sub-groups, representing one area each, and asked to compile a list of the 10 most prevalent issues and rate them against three criteria.

These criteria reflect the final three Design Principles for the use cases. The final lists were summarised into a list of the over-arching issues and the ratings from both workshops compiled.

This resulted in Dementia being focused down to the problem of Medication Management, Frailty/ Physical Disabilities being focused down to Nutrition & Hydration, Learning Disabilities & Mental Health and Concerns for Carer's becoming Moving around the Home.

An example of this was in the overarching area of Dementia the top three issues for this area were Medication Management, Risk of Falls and Nutrition & Hydration. A breakdown of how each of the issues was scored is summarised below:
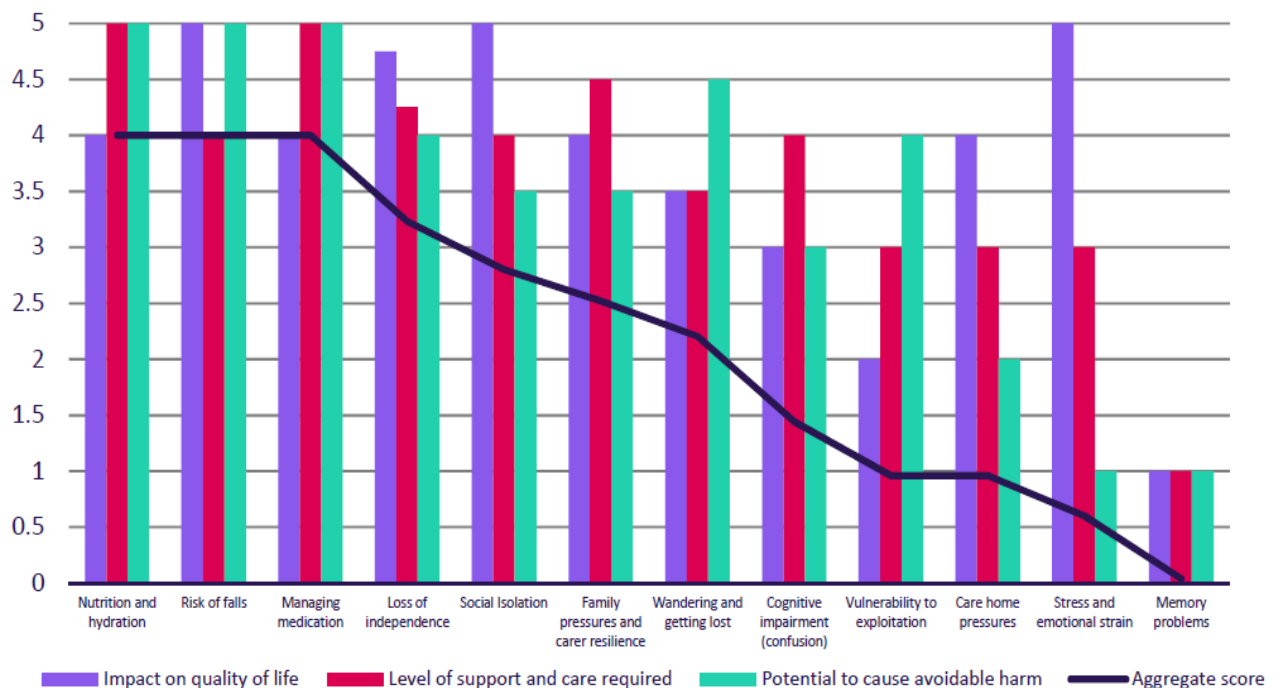
Reflecting on this it was decided to broaden the Use cases so that they could apply across more than one of the four social care areas identified in the initial scoping. So a device for Nutrition & Hydration could equally be of benefit to someone with dementia.

Research Findings Which Informed Use Case One

Medication Management

- The management of medication was rated as a top-three issue in the workshops for both the Dementia and the Frailty & Disability areas. The end-users recognised that in elderly patients particularly, comorbidities and polypharmacy pose considerable risk to the individuals' well-being.
- Individuals with inhibited cognitive ability struggle with adhering to dosages and timescales when taking multiple medications. Mismanagement of prescribed medication does not only pose a risk to the individual's health, but also causes significant waste of medications when courses are not completed, or circumstances change do to worsening health.
- The well-being of the individual may be impacted by anxieties over medication management. Their family members or carers may also struggle to support them in leading an independent lifestyle if they are overly concerned with their medication adherence.

Solution Brief

A connected device for:

- Those 18 years old and above whom have health needs requiring multiple medications.

- Presenting cognitive difficulties, or other difficulties that threaten their ability to manage their medication.
- The individual is in their own home, with a level of independence that they wish to maintain.

To support them in:

- Taking correct dosages at the correct times.
- Communicating with their family or carers in real-time to support them in adhering to their medication schedule.

This solution primarily applies in the adult social care high level areas of: Dementia; Frailty & Disability; and Carers

Research Findings Which Informed Use Case Two

Monitoring Mood

- For individuals who have difficulties in communicating, it is a challenge to ensure that they are receiving the right level of support, that they feel secure and that they are developing their levels of independence.
- This is particularly prevalent in those who struggle with anxiety, which could stem from social anxiety, stigma relating to their condition, pressures from their self-image or their family's culture.
- It would be valuable for individuals in this situation to be able to communicate their anxiety levels to their carers (paid and unpaid). This will support the carers in their understanding of the individual's needs and how the care they provide can be optimised to support the well-being of the individual.

Solution Brief

A connected device for:

- Those receiving care (paid or unpaid) who have difficulty in communicating their feelings.
- Individuals with a history of anxiety or anxiety-inducing disorders, such as OCD
- Individuals who wish to develop their independence.

To support them in:

- Recording the mood of the end-user at regular intervals and ad-hoc
- Communicating these mood levels to the individual's Carer(s)
- Communicating anxieties and discomfort to their Carer(s)
- Receiving appropriate levels of support that will enable them to develop their independence

This solution primarily applies in the adult social care high level areas of: Learning Disability; and Carers

Research Findings Which Informed Use Case Three

Nutrition & Hydration

- The risk of falls was rated as one of the top-three issues identified in the workshops for the areas of Dementia and Frailty & Disability. The steering group identified that alongside a history of illnesses, medication and the home environment, adequate nutrition and hydration is an important factor in reducing the potential for a fall.
- For those who are at risk of falls from their limited physical ability, frailty and old age, it can be detrimental to their ability to live independently in their own home. Managing their own nutrition and hydration is vital to them remaining active as safely as possible.

Solution Brief

A connected device for:

- Those who are at risk of falls
- Individuals who wish to remain in their own home and care for themselves
- Carers who are concerned that their family member or service user is not practicing self-care, and therefore putting themselves in danger of falls

To support them in:

- Monitoring the individual's intake of food and fluids
- Communicating this to the carer(s), to increase their confidence in the health and well-being of the individual

This solution primarily applies in the adult social care high level areas of: Dementia; Frailty & Disability; and Carers

Research Findings Which Informed Use Case Four

Moving Around the Home

- As with Use Case 3, this case intends to prevent falls in older adults and support them in remaining safely in their own homes for as long as possible.
- Patterns of movement around the home can be an early warning sign for individuals who are at risk of falls or provide an alert system when those individuals do suffer from a fall. Current alarm solutions are predominantly active as opposed to passive and rely on the user maintaining diligence in their use.
- Further, monitoring of movement and routine can help in the prevention of falls by providing carers with information on any deviation from routine and patterns of movement that suggests that the individual is beginning to struggle in moving around their own home.

Solution Brief

A connected device for:

- Those who are at risk of falls
- Individuals who wish to remain in their own home and care for themselves
- Carers who are concerned that their family member or service user is not practicing self-care, and therefore putting themselves in danger of falls

To support them in:

- Monitoring patterns of movement about the home and recognising changes in them in order to prevent falls
- Alerting carers to the occurrence of a fall

This solution primarily applies in the adult social care high level areas of: Dementia; Frailty & Disability; and Carers

Research Findings Regarding Market Place

An Initial technology sift was performed to understand what technology solutions were already on the market and identified any issues or gaps in the market to inform our proposed open-call for tech devices.

The findings identified that the majority of purpose built IOT care monitoring solutions had been designed to collect data from bespoke ring fenced devices and send this information via a purpose built hub into bespoke ring fenced monitoring platforms. Generally it appeared that this was linked to the design companies' intellectual property rights. This then would result in a monthly charge for the user or the Council.

The purpose built solutions also varied greatly in their ability to incorporate other IOT manufactured devices that may have been purchased separately into the solutions. It was found that some of the purpose built solutions monitoring platforms varied significantly in terms of functionality and usability.

Overall we found that purpose built solutions failed to live up to our design principals of Openness, Scalability and Economic Viability.

Sifting through the devices led us to conclude that we firstly need to be clear about the purpose for which we want the data, which will in turn help us clarify the data set that we are interested in at this stage, recognising that it is possible to gather lots of data, but it is sometimes only by combining data sets that the data becomes meaningful.

The sift also found that the generic open market technologies like Samsung Smart Things and Amazon Alexa were more open. This enabled other IOT manufactured devices to be easily linked together, such as light bulbs, smart plugs, door locks and various other devices. These devices seemed to be also very good from an economic viability perspective.

We found that monitoring of these devices could be performed through the free Samsung Smart App. Although we also discovered that this wasn't designed or suitable to be used other than by one or two individuals. If the intension is to monitor, potentially thousands of these devices at one time, then then the scalability becomes an issue.

Research Findings Regarding procurement

It became apparent very early in the project that procurement could potentially delay or restrict the projects aims. To reduce the possible risk of this, Procurement staff from within SCC Procurement Department were invited to become partners in the Project Steering Group.

This worked really well and they advised the project on the benefits and restrictions of differing procurement models. Based upon this advice the steering group agreed upon opting for procurement to follow the Official Journal of the European Union (OJEU) model of procurement. Although this can be potentially a longer model it offers greater flexibility, in upscaling should the implementation test bed prove successful.

Validating the Research Findings

For the Use case's the validation came from using the Designed Principal Score Card assessment. A couple of examples of this validation can be seen below and all four use cases were validated according to this methodology:

Validation that led to Medication Management

Factor	Score	Detail
Start with users' needs	7	This system would need to interact with GPs, prescription or care services for effective use. In combination with these, it would address a major problem.
Be innovative	5	Medication management tools are already on the market. This is perhaps the only one to also communicate as a connected device. (To be confirmed in the technology sift.)
Improve quality of life	6	This solution will improve the health and well-being of both the end-user and their carer. It will support the end-users in maintaining their independence.
Reduce the level of care and support required	5	Assuming that the technology will not need to be regularly maintained or managed by the carer, the level of care and support required will remain unchanged. However, as anxieties of medication adherence are reduced, the support given can be of a higher quality.
Protect users from potential avoidable harm	10	This technology will provide the end-users with the ability to avoid medication mismanagement; an issue that has potentially severe health implications.

Aggregate score = 33 /50

Validation that led to Monitoring Mood

Factor	Score	Detail
Start with users' needs	6	**The recording and communicating of the individual's moods** will not in itself reduce their **anxieties. However, the potential** for this **device** to **support active development of independence is high.**
Be innovative	5	**Some end-users may** already use an app, a **notebook or a similar communication tool** to **record their anxieties. (See results of technology sift)**
Improve quality of life	5	**The technology will benefit both the individual and their carer** (s) **in receiving and providing support for their emotional well-being.**
Reduce the level of care and support required	7	**The level of care and support required will reduce in the long**-term as the needs of the individual **are better understood and their levels of independence** are **developed.**
Protect users from potential avoidable harm	5	**A better source of information on the user's moods will help the carer(s) to avoid placing them in situations that may cause them undue emotional stress.**

Aggregate score = 28 /50

Once we discovered the results of narrowing of our high level, adult social care issues. We verified this with a selection of adult social care staff, as the results were not in line with our perceived perceptions. Following discussions with the staff group they confirmed that in their opinions the findings and proposed use cases were correct.

We also verified these findings with a selection of external partners; VCS, charities, who attended one of the original workshops. They also confirmed the research findings.

We would have liked to go back to all those end users who attended the final workshop to verify the research findings. However given the tight time constraints we didn't achieve this.

Learning From the Discovery Phase Process

At the outset of the project we were aware that the range of potential technology solutions was vast and we had concerns around understanding the technology and choosing the correct technology for social care. Through the discovery phase we have recognised our limitations as social care staff and recognised the need to **partner with tech & IT specialists**.

We've gained an understanding there are devices already out there that will bring back key information however the real value in the data to families and carers (both formal and informal) is in being able to see a range of metrics in one place in order that it becomes meaningful and manageable.

In addition we have learned that there are devices already available that can deliver, but these tend to be provided by a single supplier and don't allow for interoperability which validates the case for delivery of the test bed

This has resulted in the development of our principles for technology and allowed us to score card technology items against those principals. We are confident that we are now able to differentiate between technologies and **we now understand what good looks like**.

Having identified what good looks like the opportunity to use stakeholder workshops to better understand the issues was invaluable. Feedback from staff, VCS, charities and end users was crucial in us understanding how to use the technologies to produce good outcomes.

Harnessing the capabilities of Urban Foresight to correlate and score the feedback that came from the workshops has taught us the four key issues and four key user groups we want to prioritise for this piece of work and what issues we should be applying a technological solution to. Interestingly these are not consistent with our initial thoughts, again valuable learning. **We now know where to deploy technology to produce good outcomes.** The score card we have created will help us establish what good looks like when we come to procure as it takes account of feedback from customers, carers and practitioners

The methodology and evaluation score card devised by Urban Foresight highlighted that the four high level areas affecting social care were quite wide ranging. The score card was particularly useful in defining and focusing those four areas with greater precision.

The score card played a vital part in identifying the type of user likely to benefit most from the application of technology. This enabled social workers to identify potential participants to assist us with the study. **We now know who would benefit most from technology**.

We have also learned that in future we would where possible build more time in to the schedule to allow for in-depth verification.

We have also discovered that early engagement **with Procurement is critical** to the progress and eventual success of a project.

We have discovered that customers, carers and practitioners think that social care needs can be supported by technology and there is a willingness to receive meaningful alerts and information and drive to harness this way of working to better support the objectives of adult social care and prevent people from needing the support of services for longer

Ultimately, we have used the discovery phase to test our hypothesis, and established that there is value to our overall project.