# TRANSFORMING HEALTH SERVICES USING A DIGITAL CITIZEN EXPERIENCE

Health Fabric

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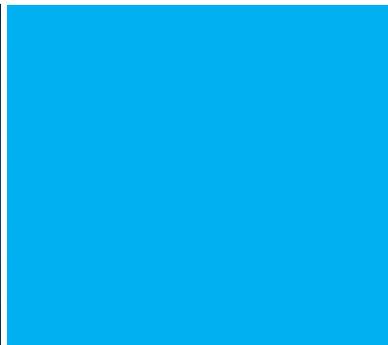
## Executive Summary

Over the last number of years, we have seen an exponential rise of digital health products and services that have transformed the way people interact with their health and wellness. This shift in consumer behaviour and emergence of the digital health and wellness citizen has the potential to transform the way that healthcare services are delivered, but any mainstream impact on the NHS has been slow to materialise.

In this paper we discuss how we can leverage the way citizens use digital health to transform the way that healthcare is delivered, with some focus on the NHS in the UK. This information has been gathered from working with patients, clinicians and commissioners of Health and Wellness services in the UK.

Several digital transformations initiatives outside the UK health service have been tremendously successful and there are lessons from these programmes that can be adopted to enable large scale change. The common denominator in all these change programmes is a focus on the customer and new ways of working.

We outline uptake and demands of digital health and wellness from citizens, and their common priorities which need to be understood to enable digital transformation within the health services industry. We define this as a hierarchy of patient needs, which at the foundation level includes patient self-service, moving upwards to AI enabled support systems.

In the NHS there is an aspiration of working differently together and transform the way services are delivered via what is known as the sustainability and transformation partnerships, underpinned with interoperability technology capabilities.

These programmes are more likely to be successful if they capitalise on the trend of digital technology adoption by citizens, to facilitate the change needed in large areas of the country. We define several strategies that define the interlock between these transformation objectives and the demand of digital technologies from citizens

These strategies are as follows:

- Integrate self-help content from different partners such as patient advocacy groups
- Enable convenience through self-service, for a range of transactions
- Support citizen generated data sharing across providers
- Share clinically generated data with citizens for long term condition management
- Enable remote monitoring and diagnostics
- Enabling patient support through peers, clinicians, and AI technology
- Use patient feedback and information gathering to improve the quality of supply chain of health services

In summary, with the concepts of transformation, patient adoption, and strategies covered we propose a high level 4 point digital health transformation framework which includes: strategy and vision, citizen motivation and demand, stakeholder benefits definition, ongoing operations and improvement.

# 1 Contents

# 2 Understanding Digital Transformation

A successful transformation programme has the customer at the heart of it. Health transformation by its nature must be holistic, which involves the citizen experience, purpose, outcomes, clinical stakeholders, processes and social factors at the very heart of the citizen journey.

Many traditional industries are being disrupted where digital technologies are making things easier for customers and other stakeholders in the eco-system such as employees and suppliers. Consumers have now unprecedented power. Digital transformation programmes enable companies to be more agile, people-oriented, innovative, customer-centric, streamlined and efficient.

Healthcare transformation in the NHS is different and more difficult to achieve. Its an industry dominated by physicians, medicine, evidence-based decisions and is risk adverse, with multiple suppliers delivering health services that are not joined up and each organisation with its own world view of what service they should be delivering to citizens. In this environment it has been challenging to deliver a holistic citizen-centred experience which cuts across different providers of health and care.

> Where there has been activity around transformation, this is largely driven by re-organising healthcare services and organisations rather than truly being citizen orientated, and using digital patient experience, patient satisfaction, and digital patient participation to drive the transformation. The focus for care re-design has focused on the service re design by different parts of the NHS system, who are governed, funded, inspected and regulated in silos.

## 2.1 What it means to achieve to digital transformation

A misconception around 'digital' transformation is that merely adding digital technologies to the mix translates to digital transformation. Adding digital technologies stimulates transformation but does not transform in isolation. In effect a customer focused digital transformation programme incorporates organisational culture, ecosystem and partnership models resulting in new business models

Fig 1 – Success factors in digital transformation

Outside the NHS organisations are learning more and more about what makes a successful transformation programme, Companies such as Coca Cola, Disney, Fidelity and Walmart implemented successful transformation programmes. Across these organisations one of the key learnings was that they had a single common denominator, which was to improve the customer experience (Ref1).

Transformation can be induced by technologies. Technologies with clear disruption potential include API strategies, Integration and Interoperability, Mobile, IoT, artificial intelligence and ledger technologies.

> The most disruptive energy occurs when technologies get combined and enable new capabilities as we see in the convergence of Integration, APIs, Mobile , AI, IoT and big data analytics. This convergence has a huge potential impact on healthcare digital transformation.

## 3   Citizens as the drivers of change

Despite the silo' d way healthcare is delivered in the NHS we can see a new model emerging where the citizen as the custodian and consumer of their healthcare information can help enable some of the transformation required around them in terms of organisation culture, and the NHS eco-system in which they exist. Citizens create a demand for the health system around them to be more proactive as an implication of greater awareness of their own health and wellness. This shift into proactiveness leads into a new healthcare paradigm working on prevention rather than acting on deterioration of health.

By enabling citizens to own, access their own healthcare data and interact with digital technology they become activated and motivated to become more involved in their wellness. To respond to this, NHS organisations have the potential to work alongside citizens and re-organise how they work to become more agile and deliver new health processes. These new ways of working will to enable citizens to get help and support outside a physical NHS environment, for example at home or virtually.

The nature of our transactions is fundamentally changing our relationship with healthcare. If we think about transactions this includes how we get our healthcare information, how we book appointments, see clinicians, how we pick up our prescriptions and how we receive information from investigations and diagnostic procedures. Where once we had to attend in person for these transactions to take place, we can move to transact digitally for these types of activities. However, this also requires that the NHS changes its resources and backend processes to enable these new types of transactions. This is one of the main challenges that the NHS faces, as its resources are under strain from increasing demand and an aging population, therefore digital transformation requires new ways of working, and vice versa, new ways of working should incorporate digital technologies to augment the much-needed service transformation.

## 4   The Transformation Journey

Organisations whom have been successful in digital transformation communicate their lessons learnt, and one of these have been the mantra of 'don't try and boil the ocean before you begin'.

Focus has been a common theme in successful transformation implementations and getting the right focus upfront is critical for any attempt by different health organisations to deliver benefit for citizens in a seamless way, so needs clear agreement upfront. This may mean identifying a specific group of citizens and then visualising a new experience for their needs (i.e. long term condition) to enable better models of support and prevention.

Analytics solutions such as Population Health Management solutions help identify the right people to start the transformation journeys but at that point we also need focus on how to engage these citizens to enable the needed transformation in their experiences and outcomes.

> Having the right focus requires an understanding of what to prioritise and this is based upon the use cases, technological demand and adoption by citizens. We have illustrated this in our hierarchy of citizen digital needs below, so that a transformation journey can be mapped out based upon what is likely to be adopted



Fig 2 – Hierarchy of Citizen Digital Health Needs

## 4.1   Hierarchy of Citizen Digital Needs

For citizen generated data to make a substantial impact on transformation plans, citizens will need to be engaged and undertaking many of the activities identified in this paper. We have defined an approach that defines a hierarchy of citizen's digital needs based upon trends associated with 'citizen demand'. The needs define an 'adoption journey'. This journey starts from a foundational level which is completely self-service, to more advanced capabilities that require technology, devices, and human support.

At the foundation level the needs the citizens should be provided with capability to undertake a set of self-service transactions. Examples of this include appointment bookings,

viewing test results, re-ordering medications, change requests to medications, and virtual consultations with clinicians.

The next level is associated with implementing a prevention-based model of healthcare using self-help content with remote support of clinicians where necessary, and access to support networks, discussion forums and peer support groups.

The layer above that requires interaction with specialist equipment such as wearables, digital self-test kits and diagnostic products made accessible to citizens where they can manage their own conditions and seek further help if necessary. This may work with the previous layer i.e. self-help content (which assists increase levels of health literacy) and access to clinical professionals.

The demand from citizens for these technologies are evident in their growth. The global point-of-care diagnostics market is projected to reach USD 38.13 Billion by 2022 from USD 23.71 Billion in 2017, at a CAGR of 10% during the forecast period. (Ref 2). The number of people who have had their DNA analyzed with direct-to-consumer genetic genealogy tests more than doubled during 2017 and now exceeds 12 million, according to industry estimates (Ref3). The global predictive genetic testing and consumer/wellness genomics market was valued at $2.24 billion in 2015. It is expected to double to $4.6 billion by 2025, according to a February 2017 report. Knowing our genetics allows us to include personalized medicines and even have preventive surgeries (Ref4). Step-obsessed Brits have helped drive sales of smartwatches and fitness bands to an estimated four million devices in 2017, up 18% on 2016. Highlighting the popularity of these gadgets, a step-loving one in five (20%) Brits report using wearable technology to measure their steps. (ref 5)

The last and highest level of activity that requires robust superseding data is citizen interactions with AI software, which helps them proactively structure their self-help efforts. AI technologies are adopted by better recognising patterns in behaviour and helping co-ordinating clinical resources to be more effective. This includes access to clinical expertise that is provided by AI technologies in conjunction to access to their medical profiles and personal information.

'Technology applications and apps encourage healthier behaviour in individuals and help with the proactive management of a healthy lifestyle. It puts consumers in control of health and well-being. Additionally, AI increases the ability for healthcare professionals to better understand the day-to-day patterns and needs of the people they care for, and with that understanding they are able to provide better feedback, guidance and support for staying healthy. (ref6)'

# 5   Introduction to Sustainability and Transformation plans

The Sustainability and Transformation Plans or partnerships (STP's) cover all of England in 44 areas and have an aspiration to implement place-based care. These form the main levers for transformation across the UK to enable integrated care. The transformation has a focus on the following objectives: improving quality and developing new models of care, improving health and wellbeing and improving efficiency of services.
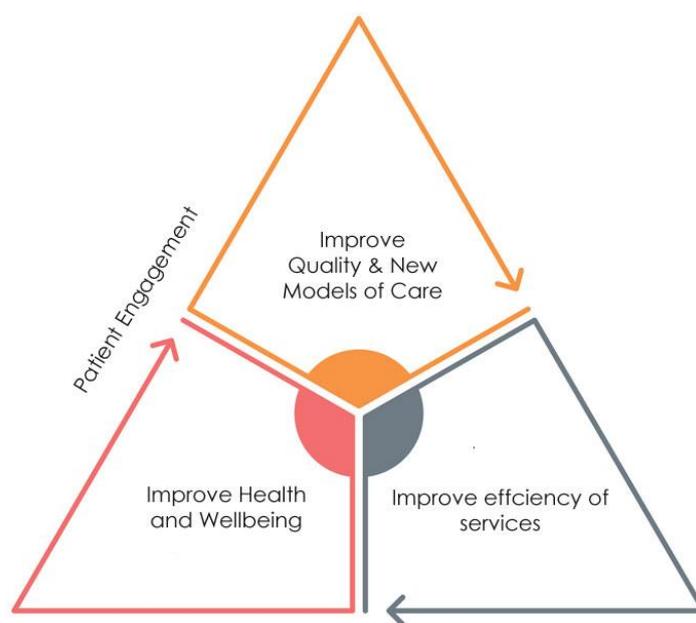


Fig 3 – Objectives of Transformation in the NHS

The requirement is for the providers of health services to collaborate and provide strategic and integrated care which serves the needs of its host population. Examples of how this can be done has been implemented in the 'Vanguards' and New Models of Care implemented across the country that demonstrate the power of health services collaboration and consolidation (ref7). There has been a recognition that delivering care for people with long term conditions and managing demand for urgent care services are best managed proactively by collective co-operation across health care organisations. Action is also needed to improve the health and wellbeing for a population by understanding the wider social, environmental and economic drivers behind health and wellness.  The need is to enable clinical and service integration to improve the citizen experience and move a preventative model of health and wellness.

The partnerships to enable the STP's across the regions have been established, however this has been a challenging process because of the scale and complexity of the plans in any given

region which involves multiple organisations attempting to work together each with its own culture, financial and regulatory priorities.

# 6 An approach to enable transformation in STP's via a digitally enabled Citizen

The delivery regional objectives within each STP is challenging based upon the fact the NHS eco-system is large, fragmented and driven by different incentives, however the common denominator in all of this is the citizen, who if enabled in the right way digitally, can form the catalyst for the successful implementation of the STP objectives around quality, wellbeing and efficiency.

Regional transformation programmes increase their chances of success if they engage the right levels of digital engagement with citizens, coupled with an interoperability strategy (e.g. FHIR). We outline the following strategies:

- Enabling multiple partners to provide content to the citizen digitally across from within and outside the NHS such as local authorities, the third sector and other partners.
- Allowing the citizen to digitally transact across different service providers
- Remotely support the citizen journey across different services
- Enabling a citizen to self-manage long term conditions by providing access the right information and support digitally
- Enabling remote diagnostic and monitoring to avoid A&E admissions, with the citizen generated information being sent to a pooled set of resources enabling real time monitoring.
- Responding and anticipating to citizen behaviour and demand, using AI technologies
- Ensure that the service for the citizen is governed and manged correctly across organisational boundaries using citizen generated data

Fig 4 – Digital Health activates

## 6.1 Integrate self help content from partners

Enabling multiple partners to collaborate with the citizen digitally across from within and outside the NHS such as local authorities, the third sector and other partners.



Citizens with long term conditions and mental health concerns often rely on citizen advocacy groups, and other partners outside the NHS. Organisations like Mind (ref8) produce a vast array of helpful content and services that can be used by citizens to get the support they need. Some of this content can be made available digitally through partnerships and syndication to assist citizens get the information they need when they need it. Smart digital signposting to this content to citizens in conjunction with other reputable information such as NHS choices provide them a valuable resource. Integrating

the content of patient advocacy organisations will enable citizens access to information that is personalised to them supporting the health and wellbeing objectives of the STP and reducing the burden on the NHS. Integration, Interoperability, and personalisation technologies are key to this.

## 6.2    Enable convenience through self service

Allowing the citizen to digitally transact digital across different service providers



NHS Digital's citizen online programmes has made great strides in providing citizens access to primary care data and functions such as appointment booking (Ref 9)

'Nearly 14 million patients across England are now securely using online services with their family doctor to book appointments, order repeat prescriptions and view their records – saving time for themselves and busy GP practices. It means 24 per cent of patients – 13.9 million – in England are now registered to book appointments, order repeat prescriptions, view their patient records and see their test results without having to phone or visit their GP surgery.

The NHS Digital figures from February 2018 show an average of one million appointments are being made or cancelled online every month, and nearly 2.3 million prescriptions ordered online, as practices and their patients are increasingly using digital technology (ref10)'

Giving citizens access to apps from primary care settings are immensely helpful in booking GP Appointments, reviewing test results, and viewing medications online, and re-ordering them. This good work needs to be expanded across organisations in a STP area using interoperability technologies extending transactional capabilities such as appointment booking across different providers as a user of primary care may also use secondary care resources and community services. Joining up the progress made in primary care across other services should be the goal, to provide a seamless experience for the citizen. This can be enabled by integration technologies such as FHIR, which in its self is now being adopted by a number of health technology companies such as Cerner, Google, IBM, Microsoft and others (ref11).

Transactional capabilities have resulted in cost savings for health organisations. Individual implementations digital appointment booking has reported a reduction of did not attend (DNA) instances by up to 44% reductions in hospitals proving significant cost savings (Ref12). The goal is to provide convenience when transacting across different providers which also in turn serves the objective of efficiency within the STP region.

## 6.3   Support citizen generated data sharing
Support the citizen personalisation journey across different NHS services

A single citizen may use a variety of NHS services from primary care, acute to community services Using Interoperability technologies, the citizen should have the capability to share their personally generated information with these different providers, and they should be able to access the relevant service information from these organisations without having to log on multiple times into different provider accounts. Shared citizen data provides continuity of data and personalised services as defined by the citizen themselves.



This citizen generated information could be fed into a region wide analytics engine to provide an accurate view of utilisation of services from the NHS, third sector and other partners. This works towards the quality, and efficiency of services within the STP area.

## 6.4   Share clinical data for long term condition management

Enabling a citizen to self-manage long term conditions by providing access to the right information and support digitally.



Population health systems provide insights that healthcare services vary based upon the number of conditions a citizen has. A small percentage of people consume a large amount of resource. It is common for people to have more than one long term condition and this impacts resource use in an exponential way.

There are numerous digital technologies such as health apps on the NHS app library, that help people self-manage their long-term condition, but many of them are point solutions which are targeted at a single long-term condition.

Citizens should be provided with support and digital content that supports multiple long-term conditions which promotes self-help and prevention, coupled with behaviour change programmes as part of their care planning. This content includes their medical record across different providers, which contains all relevant clinical data to enable them to help themselves.

'The use of citizens decision aids has been demonstrated to be effective compared to usual care with implications for improved quality of care and treatment adherence – as well as being cost effective (ref13) '

This content should also be responsive to change based upon an individual's needs. For example, a hypertensive citizen may need differing levels of support depending upon the severity of their condition.  Whilst delivering this service the citizen should also be supported with behaviour change techniques. 'Interactive online self-management programmes can improve citizen knowledge, understanding, social support, health outcomes and health behaviours. (ref 14).'

This could include rewards provided by third parties for self-management engagement, and access to peer-based support groups. This enables a prevention strategy that is both

personalised and peer orientated and a key part of the health and wellbeing objectives of the STP.

## 6.5    Enable remote monitoring and diagnostics

Enabling remote diagnostic and monitoring to avoid A&E admissions, with the citizen generated information being sent to a pooled set of resources enabling real time monitoring.



Place based systems of care involve current service providers pooling their resources to provide a more proactive service to citizen. Examples of this include GP Hubs where GP's have created a shared resource to support people with long term conditions which also draws upon resources from other GP Practices and community providers in their region. In the new vanguards, multiple GP's have federated together to provide pooled resources to manage groups of citizens with long term condition. The advent of IoT technologies and wearables enables citizens to stay in their own homes and use digital monitoring products, where the information is shared with a control centre remotely manned by the pooled clinical services. This enables citizens to share their information safely using interoperability technologies alongside IoT technologies and receive the remote support they need at the right time.

An example of this is an atrial fibrillation (AF) device that could save the NHS an estimated £2 billion by cutting the costs related to diagnosis of AF, not including the longer-term benefits and financial savings of potentially preventing severe and costly AF-related strokes (ref 15)

Citizen dashboards and near real time analytics provide the pooled clinical resources with the information they need to respond to avoid unnecessary A&E admissions which is a key focus for the STP.

## 6.6 Enabling citizen support through peers, clinicians, and AI
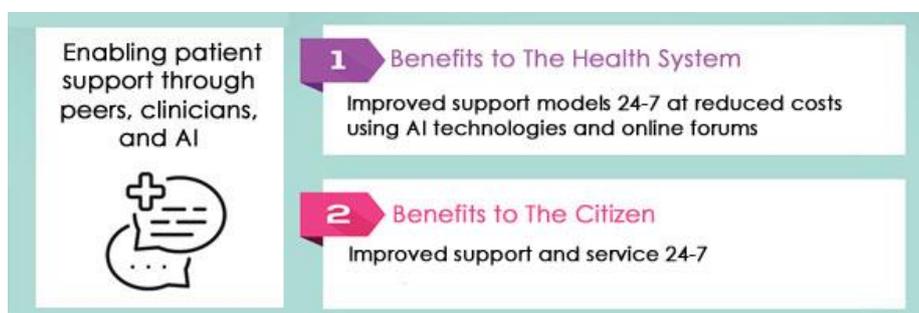


Self-management and behaviour change programmes have always worked effectively when there is a component that deals with support groups within the programme. That includes 1-2-1 support, or group support meetings. Typically, these are local and all participants share similar goals or interests.

More of these support groups have moved online organised into forums that discuss a range of topics from nutrition to pain management.

With the advent of Artificial Intelligence (AI) technologies, more of these types of support functions can be augmented based upon an analysis of user generated data.

Analysing user behaviour, and data generated from feedback, AI generated prompts and nudges will enable the development of further personalised algorithms to stimulate self-care and higher levels of citizen engagement and activation. This will not replace 1-2-1 support or online forums, but augment what is already available online. AI technologies also have the potential to automate many of the self service functionalities that are attractive to citizens and have high levels of adoption.

As more and more citizen generated information is collected by a place-based health system / STP, there will be an opportunity to feed this information into an analytics engine, powered by AI machine learning technologies. This will enable improved levels of support for citizens by mobilising the right levels of resources at the right time and for some citizens and proactively aligning the support that they need to support the prevention agenda, and which is part of the quality and efficiency objectives of the STP. 'The NHS could shave off a tenth of its budget by assigning nearly a third to robots and machine learning systems, a new report has claimed. AI could 'save NHS £12.5bn a year', claims Darzi report '(ref 16)

## 6.7 Citizen feedback for service improvement

Ensure that the service for the citizen is governed and manged correctly across organisational boundaries using citizen generated data



Citizens provide feedback on health services using questionnaires such as the 'friends and family test'. Typically, this has been done as 'islands of information' with specific trusts or primary care practices conducting their own surveys and collating the results which does not reflect the end to end experience of the citizen across multiple providers of care. In addition to this, citizens are now taking to new channels such as social media to express their views on the services they consume.

When looking at a system wide improvement plan we need to move to a near real time information gathering approach with actionable results. This feedback can be collected after virtual or face to face consultations and rated by the citizen (like ratings in other industries). This information should also be coupled with other public sources of information such as social media, so to be responsive to the quality of service provision.
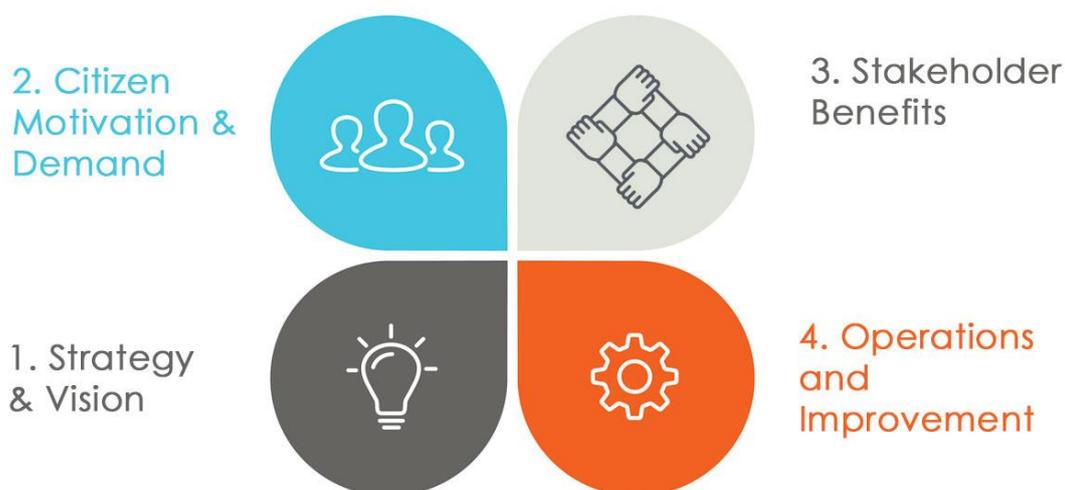
Citizen led feedback can also be used to complete existing processes that require citizen feedback (e.g. care planning), within a clinical environment which removes the burden of staff having to complete the information on behalf of the patient.

There are many digital channels which can be used for citizen feedback from websites, mobile, social media and targeted surveys, and the focus should be is to view the health system as a supply chain and understand the weaknesses in the chain with a view for continuous improvement.

# 7  A four point digital health transformation

As described in the paper, there are several stages to understanding how we can transform healthcare services by engaging citizens alongside their digital health activities, and the digital health trends we see emerging today. We have seen that there are a range of technologies and user behaviours which when underpinned by integration and interoperability can transform a health system. To bring this together we propose a 4-step framework to enable digital health transformation driven by the citizen.

## 4 Point Digital Health Transformation

2. Citizen Motivation & Demand

3. Stakeholder Benefits

1. Strategy & Vision

4. Operations and Improvement

The first step is to be clear on the objectives of the transformation, and to set the vision for change. Secondly its important to understand the patient demand and acceptance of the technologies and interventions proposed, as described in Fig 2 – Hierarchy of Citizen Digital Health Needs. At this point several strategies can be explored that articulate clear joint benefits for several stakeholders including citizens and clinicians, with the final phase that involves ongoing monitoring of quality and efficacy.

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## About the Author



Satnam Bains is the founder of Health Fabric. Satnam believes that technology can enable behavioural and cultural transformation to improve citizen's health and wellness. Satnam has spent many years discussing the challenges of enabling better patient outcomes with Clinicians, Patients, Carers, GP's, Family groups and Patient advocate groups.

## About Health Fabric

Health Fabric provides services and technology to enable people to improve their health and wellness through self-management and behaviour change which is supported remotely by coaching with health and wellness professionals. Health Fabric integrates different health systems together, and provides digital technologies where users access a range of digital self-help plans and are rewarded for their compliance and engagement through several incentives.

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