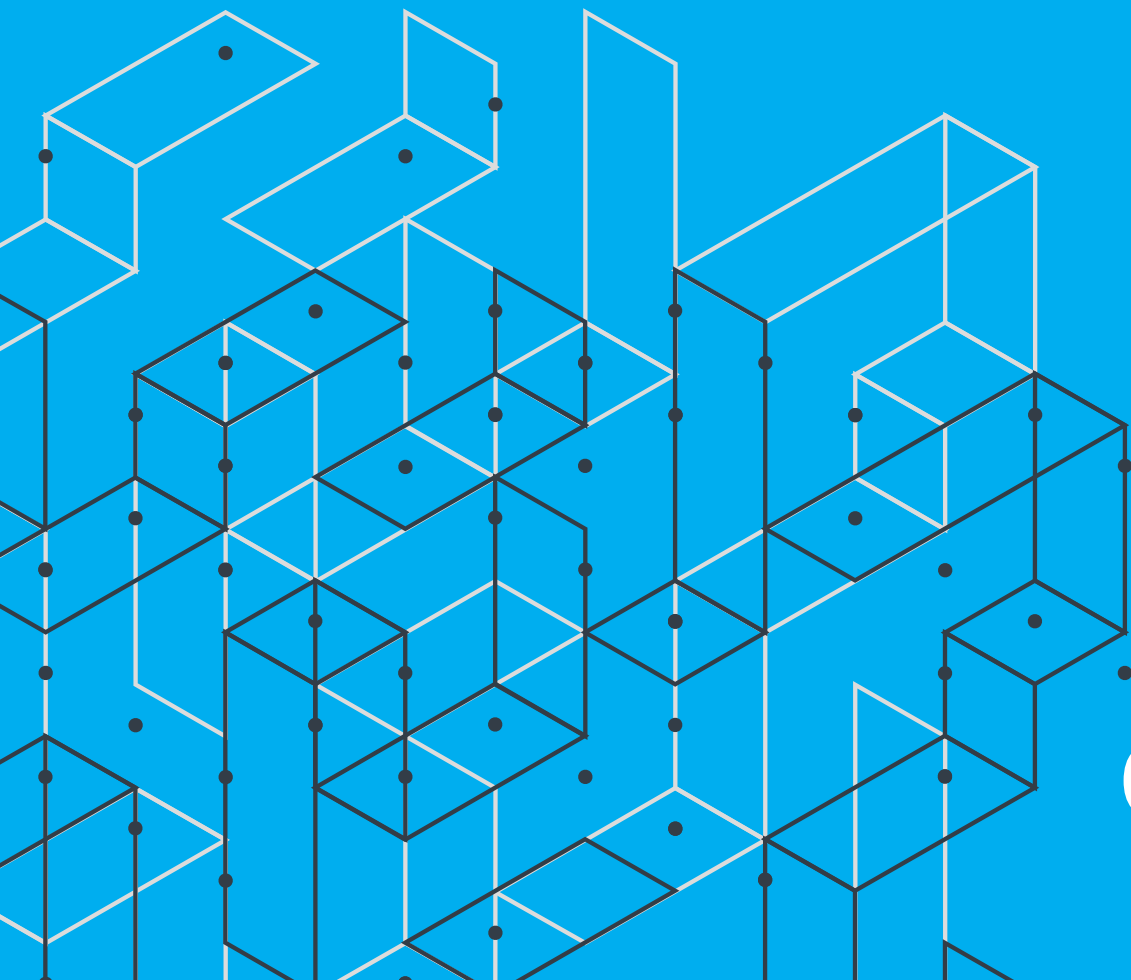


Data Mobility Infrastructure Sandbox

Report June 2019



CtrlShift

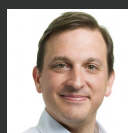
Foreword.



CtrlShift

**Liz Brandt,
CEO**

As our 2018 report found, Personal Data Mobility is a major lever for economic growth. It also identified a number of challenges to realising that value. The Data Mobility Infrastructure Sandbox is the first purposeful step towards resolving those challenges and in this first phase we've tested solutions to the challenge of safe data sharing and concluded that it can be both safe and valuable. We've also clarified the remaining challenges to enable us to map a clear way forward to realising the full potential of Personal Data Mobility.



centrica

**Peter Simon, Customer,
Product and Propositions Director**

As our sector undergoes a rapid transition from commodity to service, our customers need now to be able to see the benefits of the changing system first hand and have easy access to the tools that will let them benefit. Data is critical to delivering this transformation and the Data Mobility Infrastructure Sandbox shows us just what is possible.



BARCLAYS

**Michael Payne,
Managing Director, Information Business**

Through Open Banking, Financial Services is leading the way for data mobility and laying foundations on which other sectors can build. As data sharing extends, it's crucial to keep the customer front and centre, creating use cases that bring genuine value and above all allow individuals to maintain control of their data. This will be key to creating trust and confidence in data sharing, enabling it to grow. The Data Mobility Infrastructure Sandbox is a further step towards building this confidence.



facebook.

**Stephen Deadman,
Data Protection Officer**

Data portability is a significant economic and policy issue. Enabling people to move their data between different organisations in a trusted and lawful manner, that protects and respects their and others' rights, is critical to the growth of digital economies and unlocking significant public and social value. The Data Mobility Infrastructure Sandbox provides a supervised and collaborative environment for examining how to make data portability a reality for people, providing them with tangible benefits, and doing so in a way that is safe.



BBC

**Nick North,
Director of Audiences**

The potential benefits that Data Mobility can bring to people and to society are really interesting. But there are barriers to realising these benefits. The Data Mobility Infrastructure Sandbox will help us look at what role we could have in this data-led future, highlight what could hold us back, and help us to articulate which of these barriers may be best overcome through broader collaboration.



digi.me

**Fab de Liberali,
Chief Product Officer**

Data Mobility is very powerful and brings to life all the principles of Data Portability and GDPR. Digi.me are committed to making private data sharing safe and valuable for both individuals and businesses. The Data Mobility Infrastructure Sandbox and all future Sandboxes represent the transition into the new modern Data Economy world. Data Mobility marks the renaissance of the Data Economy and we want to remain at the forefront of this exciting area as the leading data facilitator.



BT

**Alistair Duke,
Research Manager**

Data Mobility will provide people with improved visibility and greater control of their online data, enabling them to realise greater value from it and enjoy more digital service personalisation. The Data Mobility Infrastructure Sandbox is showing how this vision can become reality by identifying what is required for people to share data in a simple yet safe fashion and for organisations to create value in the form of tailored and innovative new services.



Executive Overview.

This is the report on the first phase of work of the Data Mobility Infrastructure Sandbox. This work has broken new ground in understanding and determining practical ways forward to address critical aspects of the Core Issues that currently limit the transformational economic benefit that Personal Data Mobility can deliver.

The Ctrl-Shift 2018 report: [Data Mobility: The data portability growth opportunity for the UK economy](#) for the Department of Digital, Culture, Media and Sport (DCMS), found that Personal Data Mobility can be the next major accelerator of innovation and economic growth - creating entirely new forms of value for individuals, businesses and society.

The report crystallised the Core Issues that need to be addressed to realise the personal data opportunity. These fall into two main categories: the infrastructure required to enable Personal Data Mobility; and how it can be used to create value.

Data Mobility Sandbox Programme

Ctrl-Shift created the Data Mobility Sandbox Programme specifically to bring together leading businesses, consumers and consumer organisations, government, regulators, and data facilitators to collaborate on addressing the Core Issues, within an independent facilitated environment.

The central objective is to advance Personal Data Mobility to enable the safe and easy use of personal data, permissioned and controlled by the individual, enabling value that is fairly shared by all.

Data Mobility Infrastructure Sandbox

This first phase of the Data Mobility Infrastructure Sandbox has examined safe data sharing - one of the primary infrastructural challenges identified in the 2018 Data Mobility report. It has investigated how new markets can be unlocked by making data sharing safer for individuals and organisations.

The Sandbox participants are Barclays, the BBC, BT, Centrica, Facebook and the data facilitator, digi.me. Independent observers to the Sandbox programme include the Centre for Data Ethics and Innovation (CDEI), Consumers International, the DCMS, the Information Commissioner's Office (ICO) and the Web Science Institute at the University of Southampton (WSI).

Findings and Outcomes

01. Our primary conclusion is that the end-to-end process of personal data sharing can be made safe.

Much of the infrastructure and capabilities required for safe data sharing already exists. Significant in this are the services provided by data facilitators, in helping individuals share and gain value from their data whilst controlling it securely.

02. Personal Data Mobility can enable valuable new services, and the capabilities already in the market mean that progress can be made in developing these.

This Sandbox included a first exploration of how increased Personal Data Mobility can create value. Working with data innovators, the Sandbox demonstrated how combining multiple data types, made accessible by Personal Data Mobility, can lead to the creation of more valuable services, with increased personalisation, better prediction and more timely interventions.

03. Critical gaps exist which require co-ordinated intervention to fully unlock the value of safe Personal Data Mobility.

These fall into the two categories of Governance and the End-to-End Customer Journey.

04. A clear way forward has been defined to address these gaps, based on two streams of activity:

Key Governance issues of Liability Model and 3rd Party Validation. Building rigorous frameworks for the development of practical governance solutions, which also embody relevant and effective capabilities currently in market, to achieve rapid progress.

Enabling the End-to-End Customer Journey.

Making the user experience easy and safe is critical for there to be widespread uptake of Personal Data Mobility services. This workstream will focus on the design and technical challenges of enabling people to share their data with minimal effort and risk.

05. The Data Mobility Sandbox Programme also includes a series of Data Mobility Value Sandboxes.

Realising value from sharing their personal data will be what drives individuals to use Data Mobility services. The Value Sandboxes will concentrate on the Customer Value Opportunities which can offer greatest benefit to individuals and therefore, businesses, society and overall economic growth.

Opportunities for Key Stakeholders

The findings from the first phase of work of the Data Mobility Infrastructure Sandbox reinforce the primary conclusion from our 2018 report, namely that Personal Data Mobility presents a significant opportunity for all parties – individuals, businesses, government and society as a whole.

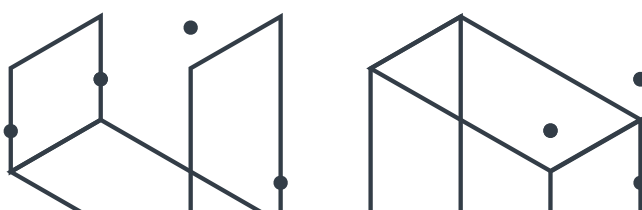
Most importantly, Personal Data Mobility has the potential to unlock significant value for **Individuals** in the form of service enhancements or valuable new services. However this will only happen if businesses embrace the innovation opportunity that Personal Data Mobility offers.

For **Businesses** the opportunity to create value from Personal Data Mobility already exists. The market is still immature, and some data sourcing will be manual. But participation even in these early stages will deliver valuable learning and accelerate the creation of innovative new services as the range of data sources becomes broader and the flow of data becomes more automated.

Governments have the opportunity to build on existing Personal Data Mobility initiatives, such as in financial services with Open Banking and PSD2, to accelerate the development of a new growth engine for the digital economy and ensure that the additional value created is fairly shared. They have an important role to play as legislators, data exporters and potentially data importers. Regulators also have an important role to play in supporting the development of the Personal Data Mobility market. In particular, sector regulators need to collaborate to make cross-sector data sharing a reality.

As guardians of the wellbeing of individuals, **Consumer and Citizen groups** have an exciting opportunity to collaborate with businesses on how to use Personal Data Mobility to create fairer value exchanges that deliver enhanced benefit to both individuals and the organisations who serve them.

There is a range of businesses, research firms, entrepreneurs, venture capitalists and academics that are the **Champions of Data Mobility**. They will be at the forefront of new service creation and the opportunity that Personal Data Mobility is creating will enable start-ups and smaller businesses to gain a foothold in this dynamic new market.





Introduction.



The Importance of Personal Data Mobility

Increasing Personal Data Mobility will enable the acceleration of economic growth and create better social outcomes.

In our 2018 report for the Department of Digital, Culture, Media and Sport (DCMS) – [Data Mobility: The data portability growth opportunity for the UK economy](#) – Ctrl-Shift outlined three benefits that Personal Data Mobility will bring.

01 Accelerate Innovation

It will accelerate all types of innovation – product, business model, platform, ecosystem, technology and infrastructure – by enabling data traditionally held by different parties to be combined.

02 Healthier Markets

It will enable new businesses focused on creating valuable services for individuals, resulting in markets that are healthier, fairer and value-oriented.

03 Improved productivity

The greater variety and volume of data that organisations will have access to will increase productivity and efficiency with the economic uplift estimated at being £27.8bn in the UK alone.

Data Portability and Data Mobility

Personal Data Mobility goes beyond Personal Data Portability. Under GDPR people can port personal data from one provider to another, but currently this process tends to be manual and ad hoc.

With Personal Data Mobility, personal data flows safely and efficiently to where it can create maximum value. These flows are controlled by the individual ensuring that personal, social and economic benefits are distributed fairly.

Data Mobility Infrastructure Sandbox

The 2018 Personal Data Mobility report highlighted the five Core Issues that need to be addressed if the full value potential of Data Mobility is to be realised – Infrastructure and Standards, Individuals’ Know How, Adaptive Regulation, Consumer Services and Applications, and Business Case. (See Figure 1: Core Issues and their Component Challenges).

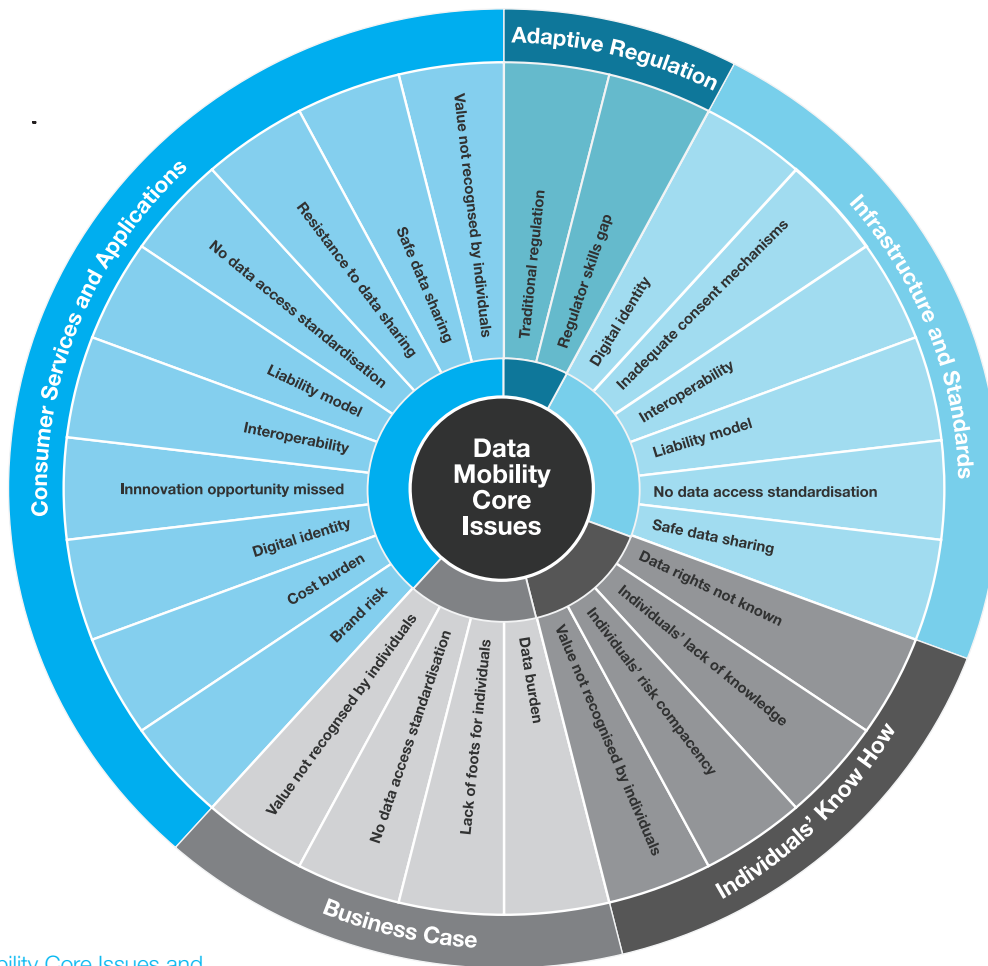


Figure 1:
Personal Data Mobility Core Issues and
their Component Challenges

As the first major step towards addressing the Core Issues, Ctrl-Shift created the Data Mobility Infrastructure Sandbox to explore Infrastructure and Standards.

Underlying the Infrastructure and Standards Core Issue there are a number of challenges, but the one in need of most urgent attention is the lack of mechanisms for safe data sharing.

This phase of work has focused on identifying what is in place currently to support safe data sharing and the gaps that need to be addressed, with the identification of both gaps and solutions being valuable during this exploration phase.

Why Safe Data Sharing

Safe data sharing is of foundational importance to Personal Data Mobility. If it is not in place, there is a risk that individuals experience harm and businesses suffer reputational damage, leading to both sides being less willing to participate and the full potential value of Personal Data Mobility not being realised.

Prior to GDPR, data sharing took place between organisations with minimal (if any) consent from individuals and limited transparency provided by the organisations sharing data. GDPR has given individuals more control over their data but legal enablement needs to be matched with infrastructural enablement to ensure data sharing is safe. Otherwise, GDPR has created a right to data portability that creates risks for both individuals and businesses.

For these reasons, the first phase of the Data Mobility Infrastructure Sandbox has investigated how safely and easily individuals can share their data using currently available services.

As people are unlikely to share data unless they see a benefit in so doing, the Sandbox also undertook an initial exploration of the potential value that Personal Data Mobility can create. This was focused on a small number of use cases and the value opportunity will be explored more deeply in forthcoming Value Sandboxes.

This report shares our conclusions on how safe data sharing is currently, the gaps that need to be addressed for it to be safe and valuable, and how Personal Data Mobility can help businesses create increased value for their customers.

Participants and Observers

The businesses participating in the Data Mobility Infrastructure Sandbox are Barclays, the BBC, BT, Centrica and Facebook, with digi.me acting as the facilitator for data sharing.

Valuable input to the Sandbox was provided by a number of organisations who kindly agreed to act as independent observers – the Centre for Data Ethics and Innovation (CDEI), Consumers International, DCMS, the Information Commissioner's Office (ICO) and the Web Science Institute at the University of Southampton (WSI).

Conclusions.

Personal data sharing can be made safe

The primary conclusion from this first phase of the Data Mobility Infrastructure Sandbox is that the end-to-end process of data sharing can be made safe. The presence of data facilitators, services helping users to share and gain value from their data, enabled a number of the criteria we established to define data sharing as safe to be met. A third of these criteria were met in full and just under a half were met in part with minor gaps that do not require significant intervention.

There remain a number of areas where there are significant gaps that need to be filled and doing so requires co-ordinated intervention, see Figure 2. But it is our conclusion that with the right focus and attention these gaps can be closed and data sharing can be made safe.

Valuable services leveraging cross-sector data can be created

Combining data leads to the creation of more valuable services for four reasons.

1. It generates higher quality insights into a user's specific needs, meaning service personalisation can be more relevant.
2. It enables more accurate prediction and better anticipation of a user's future requirements.
3. As more real-time data is incorporated, the more time-relevant these predictions are.
4. It enables a better understanding of why behaviour is changing – for example, expenditure may indicate a change in lifestyle but cross-referencing with social media data can explain why the change is taking place.

Organisations prepared to share their data and facilitators who will help aggregate that data already exist, meaning the foundations for creating more valuable services from Personal Data Mobility are in place.

While the market is not fully developed, and some data sourcing may be manual, established businesses or entrepreneurial start-ups seeking to create superior value from Personal Data Mobility, and be at the forefront of this developing market, can start to create those services now.

Breadth of available data is critical to value creation

The value that can be created is proportional to the breadth of data available, both for improved efficiency or effectiveness and the creation of more valuable services. The broader the data, the wider the insights that can be drawn and the greater the scope to identify opportunities for enhancing value.

For example, the data encapsulated in the QR code on energy bills is very limited – meter point number, period, energy usage, current tariff. This is sufficient to enable someone to obtain a quote from other providers and find a lower price. But it is not enough to enable a new provider to understand the individual's needs in detail – when they are consuming energy, what devices they have, how consumption is changing, etc. – so it does not support the creation of value-adding services.

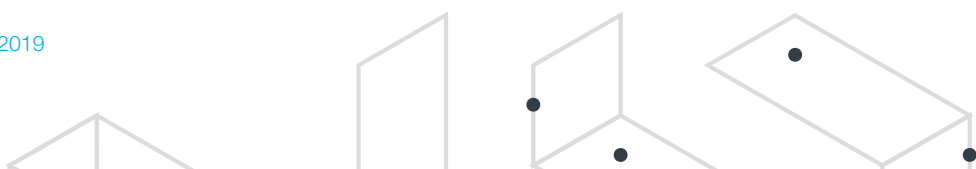
If the data in scope for sharing is narrow with the main focus being on pricing-related information, it drives price-based competition rather than innovation-based competition. The result is a race to the bottom – who can offer a customer the lowest tariff – rather than a race to the top, who can create the most value for the customer. To ensure a race to the top, the data being shared needs to be as broad as possible without compromising anything that is proprietary.

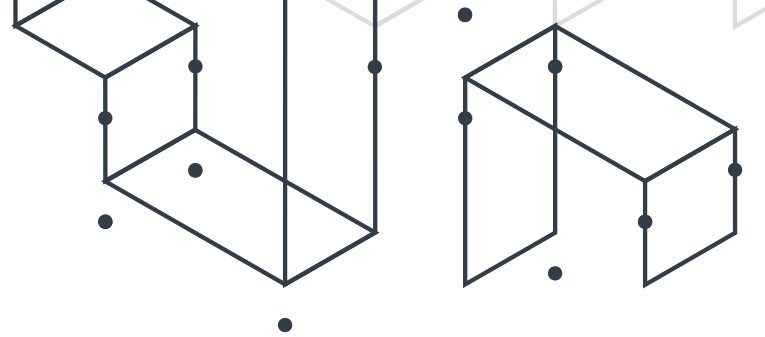
Digital identity will accelerate Personal Data Mobility

Strong digital authentication will enable the Personal Data Mobility market to develop more rapidly.

Interacting with multiple services – having to enter multiple sets of login details – is slow and frustrating, with the user likely to terminate the session if mid-journey a password can't be remembered, readily accessed or easily changed. Also without digital authentication, there is a risk that a user connects someone else's data, undermining data integrity, the value of the data and the trust that providers will have in it.

Value-adding Personal Data Mobility services can be created today without digital identity. But digital authentication that offers strong security, flexibility and ease of use will certainly improve the experience of using Personal Data Mobility services and accelerate uptake. From the other perspective, Personal Data Mobility is a valuable use case that digital identity providers should address.





Personal Data Mobility Infrastructure Gaps to be Addressed

01

Liability Model

Lack of a clear definition of liability causes businesses to pass on risk to users who have a limited understanding of the risks they are taking on board. Without clear definition of liability, the scope for creating mitigations is also limited.

02

3rd Party Validation

Current approach to validating the 3rd parties individuals can share their data with is manual, not scalable and not consistent across validating parties (typically data exporters and data facilitators). Standards vary and those being validated have to respond to multiple different approaches. A more scalable model for validation is required, with the degree of validation appropriate to the sensitivity of the data being shared.

03

Integrated Experience

Having to download multiple services, as it the case with today's Personal Data Mobility services, creates a fragmented experience. Downloading and using Personal Data Mobility services needs to be easy so the cost – in time taken and cognitive or physical effort – is low to ensure the uptake of Personal Data Mobility reaches its full potential.

04

Revocation

There is a lack of consistency in data exporters' user interfaces for revoking data sharing and a lack of standardisation in API coding of revocation, meaning that confidence in Personal Data Mobility services may be reduced if users cannot be sure data sharing has ceased.

05

Privacy Communication

Current approaches to communicating privacy policies by those sharing and receiving data do not aid user understanding. Should sensitivity to privacy continue to increase, there is a risk that the uptake of Personal Data Mobility services will be reduced if users aren't sure of their privacy rights.

06

Authentication

Password-based logins neither deliver a smooth authentication experience nor guarantee the individual is who they say they are and the data they are sharing is theirs. The Personal Data Mobility market growth will be limited without more trustworthy and more user-friendly forms of individual verification, authentication and access control than password-based approaches provide.

07

Know How

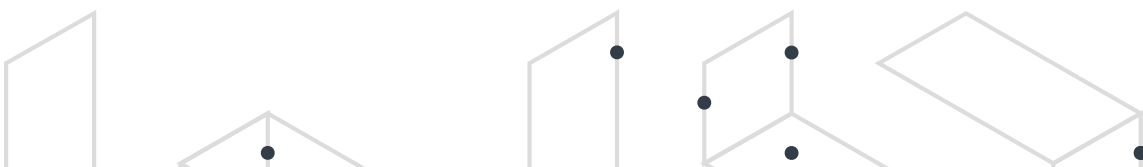
Individuals' understanding of the risks and opportunities of data sharing is limited and needs to improve if people are to safely and valuably participate in Personal Data Mobility.

08

Additional Sector Data

Realising the full value of Personal Data Mobility needs broad cross-sector participation. In particular technology companies, health providers, supermarket businesses, other retailers, travel providers and government services need to share data as well as banks, media companies, social media businesses, energy providers and telecoms businesses.

Figure 2:
Personal Data Mobility Infrastructure
Gaps to be Addressed



Approach.

The guiding principle in creating the Data Mobility Infrastructure Sandbox was our vision for Personal Data Mobility: personal data flowing safely and efficiently to where it can create maximum value, with personal, social and economic benefits distributed fairly.

The 2018 Data Mobility report defined the challenge to safe data sharing as: “Consumers have no way of knowing if it is safe to share data with an organisation or person” and highlighted a related risk to organisational brand value: “Even if legal liability issues are clarified, businesses still fear reputational damage if data is ported to the wrong parties or used in ways which harm consumers.”

To evaluate how safely individuals can share personal data, we defined data sharing as being safe when:

1. Individuals can confidently share their data and enjoy their privacy protection rights
2. Any organisations who store and share individuals' data do so in a way that maximises safety by default, through technical design and implementation that meets globally agreed security standards
3. Those taking part in the data sharing ecosystem make it easy for others to assess their trustworthiness

To explore the current state of data sharing, we used the Ctrl-Shift Data Mobility Model.

The Data Mobility Model is a model for safe, multi-lateral data sharing between four key stakeholders: data exporters (existing service providers holding data), individuals (who choose to share their data held by data exporters), data facilitators (who act on behalf of individuals, enabling them to transfer, store and use their personal data) and data importers (who use the newly mobilised data to create valuable products and services for the individual), see Figure 3.

To evaluate the model, four use cases were defined – one to cover the export of data to the facilitator, one to cover the management of data in the facilitators service, a third to cover the import of data by

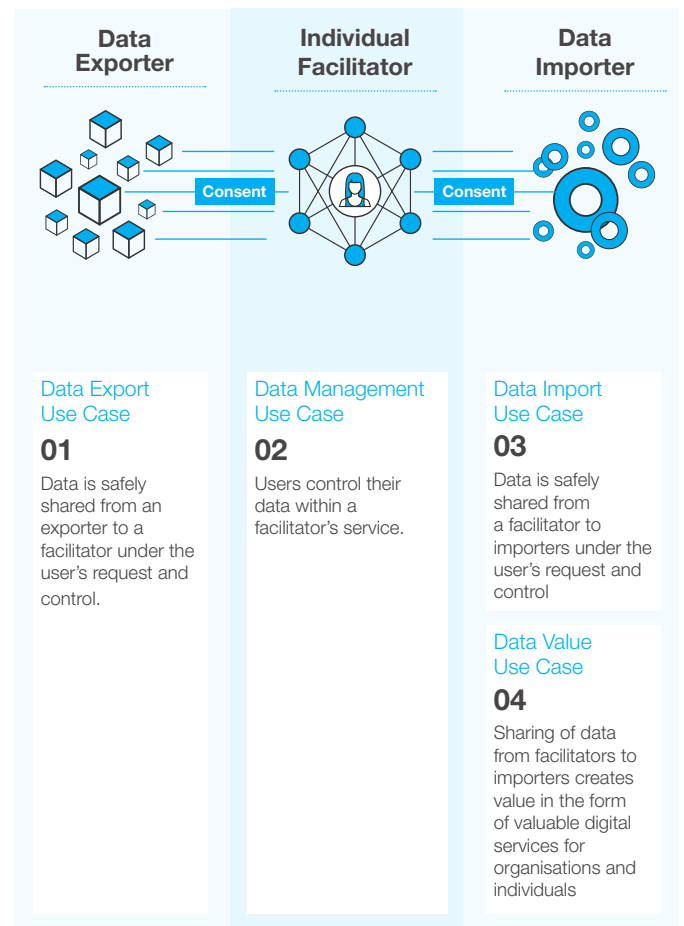


Figure 3:
The Ctrl-Shift Data Mobility Model

importers and a fourth to cover the value created by importers (also described in Figure 3)

Individuals can instruct the data facilitator to request a copy of their data from their existing service providers and store it for future use. Or if users discover a valuable service provided by an importer, they can arrange for the required data to be provided by the data facilitator, which in turn extracts a copy of that data from existing service providers if they don't already have it. .

The reason for focusing on the PData Mobility Model is because it enables individuals to manage consent conveniently and easily use (and re-use) their data. It also provides importers with access to consented and harmonised data, thereby delivering the foundations for enhanced value creation.



The use cases were explored across three workstreams:

01 Safety: System Design & Engineering

Identifying the system design and engineering requirements for making data sharing safe in the Data Mobility Model.

The model was tested using digi.me as the data facilitator. Digi.me has invested heavily in developing its data facilitation service. It has been subjected to extensive security and privacy due diligence as part of becoming approved to handle health data in both Iceland and the UK. Ctrl-Shift also undertook a security review of digi.me prior to any data being shared into its service. The Data Mobility Infrastructure Sandbox aims to look at a wider range of facilitator models in later phases.

The **System Design & Engineering** review involved defining end-to-end test criteria - requirements for data to flow safely from exporter to data facilitator to importer - and evaluating the Data Mobility Model against them based on a detailed review of digi.me, supplemented by interviews with other data facilitators – The Hub of All Things, Meeco, Onecub and PORT. In parallel, system-level security test criteria to cover general data security practices were developed and applied to digi.me to validate the due diligences previously undertaken and to validate the applicability of the security criteria created.

02 Safety: User Interaction

Observing, understanding and testing the Data Mobility Model with individuals sharing their data.

The **User Interaction** research involved 22 participants connecting their data via the APIs digi.me has in place with Facebook, Instagram, Twitter, Pinterest, Yodlee (for banking data), Spotify and Fitbit. Two other data transfer techniques - the upload of data from energy companies via a QR code and from the BBC via a CSV file obtained from submitting a Subject Access Request - were also tested. The importing leg was tested using Sand – a social media analytics app developed by digi.me.

The research was structured to understand how safe and privacy enabled consumers feel with a market model that enables them to move data from an exporter to a facilitator and onwards.

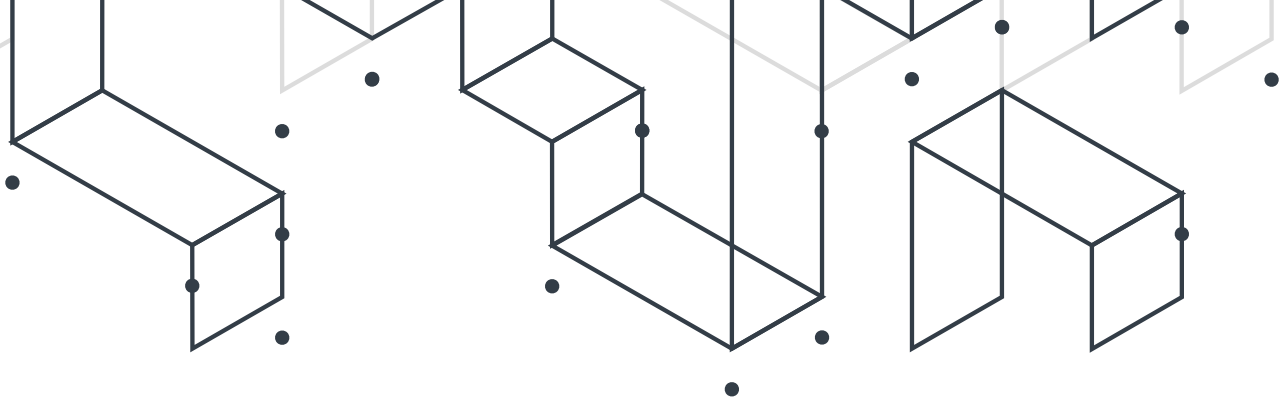
The research undertaken was qualitative – focused on customer behaviour and feelings - rather than quantitative. Given the sample size, the findings should be seen as indicative rather than definitive.

03 Value: To Data Innovators

Testing the potential for the Data Mobility Model to create value for individuals and organisations.

For the **Value to Data Innovators** workstream, a number of filters were applied to Ctrl-Shift's Customer Value Opportunity (CVO) framework generating a shortlist of seven CVOs. In collaboration with the participants, three were selected for focus - help me manage my mental health, help me find and stick to a diet and fitness plan, help me manage household budgeting using smart data.

These were examined in a workshop attended by over 20 service providers, all of whom were offering or developing services in one of the three areas. In the workshop we shared high-level data ontologies and investigated how - assuming this data was made available to them via a data facilitator – the service providers would be able to create more value for their users and identify the challenges they would face in doing so.



Findings.

01. Safety – System Design and Engineering

To evaluate the safety of the Data Mobility Model from a System Design and Engineering perspective, Ctrl-Shift defined a series of test criteria.

These test criteria focused on the end-to-end process of data sharing – the transfer of a user’s data from an exporter to a data facilitator (as per Use Case 1 in Approach section), management of a user’s data within the facilitator’s service (Use Case 2) and the transfer of a user’s data from the facilitator to an importer (Use Case 3). These end-to-end test criteria were then used to evaluate how safely people can share personal data using the Personal Data Mobility Model.

Our evaluation identified that approximately one-third of the end-to-end criteria we defined to test for safe data sharing were met in full. All the requirements met in full were the responsibility of data facilitators (as opposed to exporters or importers) - businesses set up to enable Personal Data Mobility. Just under half of the criteria were met in part, but with minor gaps that do not require collective intervention.

One criterion - clear definition of a liability model (see table to the right) - was not met at all. Addressing this gap needs to be a priority. Users are at risk of harm if they do not understand the liability they are accepting and this could create reputational damage for the businesses enabling data sharing.

There were four areas where the test criteria were partly met but addressing what is missing will require significant and co-ordinated intervention. Firstly that the processes in place for validating who data is shared with are not scalable. Secondly user authentication is insufficiently robust too ensure that it is the users’ data being shared rather than anyone else’s. Thirdly privacy is not communicated in a way that is standardised and easy for users to understand. Finally revocation of data sharing arrangements is not automatically two-way so that both pulling and pushing of data is ceased. These gaps are summarised on the right.

Gaps requiring significant intervention

- | | |
|---|--|
| 01
Liability Model | There is no clearly defined liability model with standardised communication of liability to users. |
| 02
3rd Party Validation | Current approach to validating who data is shared with is not scalable. |
| 03
Authentication | Password based authentication means data shared may not belong to user |
| 04
Privacy Communication | There is a lack of standardisation and consistency in privacy communication |
| 05
Revocation | There is a lack of integration between parties with regard to ceasing data sharing. |

02. Safety – User Interaction

The User Interaction research involved real people sharing data using the Data Mobility Model so that their experience could be better understood and evaluated from a safety perspective.

Those participating in the User Interaction research recognised that having a data facilitator could improve the security and privacy of their data sharing and that such organisations could play a valuable role in protecting them against harm. However the research found that a focus on enabling data sharing as a priority, rather than keeping those doing so safe, created a gap between the level of advocacy desired by individuals and the level of advocacy being offered by the data facilitator (see table to the right).

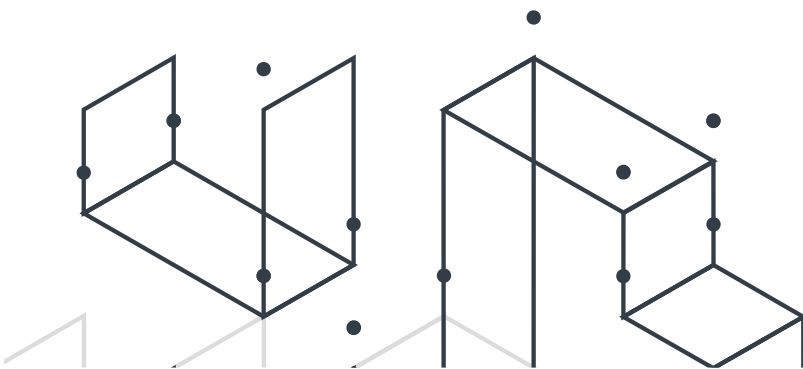
Another significant gap the research found was users' lack of understanding of what is required to keep data secure, meaning their existing sharing behaviours were inherently unsafe. Participants also used existing unreliable proxies for assessing the services with whom they were sharing data because there is no easy way for assessments of trustworthiness to be made – thereby meaning the third criterion in our definition of safe data sharing outlined in the previous Approach section is not yet met.

Participants also found that setting up services was time consuming and complicated, reducing their willingness to do so. Similarly they found having to download multiple apps created a fragmented and confusing experience.

This difficult user experience results in the need for them to perceive the value of the service to be high. Finally participants found the process of revocation did not inspire confidence that data sharing had ceased as intended.

Gaps requiring significant intervention

01 Know How	The pre-existing data management and sharing behaviours of most participants were not safe.
02 Easy Assessment of Trustworthiness	Most participants used unreliable proxies for determining the trustworthiness of apps they share data with.
03 Seamless Set-up	Many participants found the set-up process complicated.
04 Advocacy	Most participants made a distinction between control and responsibility for data safety, expecting the facilitator to help them keep themselves and their data safe.
05 Integrated Experience	Most participants disliked having to download and use multiple apps to get value from their data.
06 Easy Revocations	It was difficult for participants to feel confident that they had effectively revoked access to their data.
07 Perceived Utility	The participants' comfort in sharing to and from the facilitator app was linked to features and value.



03. Value to Data Innovators

The service providers attending our workshop identified the opportunity to create value from combining data in each of the three Customer Value Opportunities selected.

These were ‘help me manage my mental health’, ‘help me find and stick to a diet and fitness plan’, and ‘help me manage household budgeting using smart home data’. Figure 4 incorporates comments from service providers – Big White Wall (mental health), Diabetes Digital Media (diet and fitness plan) and Onedox (household budgeting) – detailing how access to cross-sector data would enable them to gain additional insights into users’ needs, enhance the services provided and offer more timely interventions.




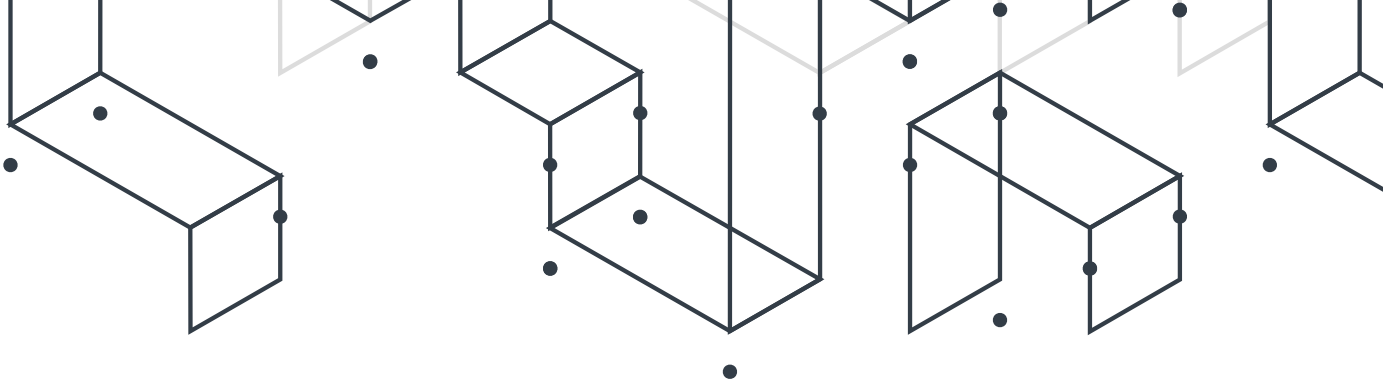
Customer Value Opportunity		
Help me manage my mental health	Help me find and stick to a diet and fitness plan	Help me manage household budgeting using smart home data
Company and Service Provided		
 <p>Big White Wall is an anonymous, online, 24/7 digital mental health support service</p>	 <p>Diabetes Digital Media is a provider of evidence-based digital health solutions</p>	 <p>Onedox is a free service enabling people to manage and save money on household bills</p>
Workshop Attendee		
Steph Evans, COO	Krish Panesar, CTO	David Sheridan, CEO
Identification of additional insights into user needs		
“What is needed is an understanding of what is someone’s normal pattern of behaviour. If that is known, once they change from that, it could be a signal they need help, though of course it could not.”	“We could have easier integration with wearable devices and other health programmes. Our service would be based on data of a higher quality, as we’d be ingesting user-provided data that was potentially more accurate and less subject to inadvertent bias than the user-volunteered data we receive today.”	“Integrating data on the services used by an individual and providing insights based on that is what we do. If there is broader acceptance of that with industry-level standardisation of data provision, we will be able to access more data and provide more value to users.”
Enablement of service enhancements and creation of new services		
“Mental health provision is based on the idea that there is a neutral expert who observes someone and decides whether they have a problem or not. Access to multiple data streams could reduce the need for expert assessment as it could be done algorithmically.”	“It would enable us to get insight into reasons for non-engagement and better understand the reasons for drop-off when it occurs.”	“At the moment we have to access data in non-standardised ways and the effort to do that is significant. Not having to focus on back-end data integration will enable us to focus on providing more valuable services. We have identified a lot of additional value that we could provide.”
Enablement of timely interventions		
“There is a huge amount of predictive power in this data. You can see how the different data link together, you can see patterns. And if these change, it can enable an earlier intervention and that means a bigger problem can be avoided.”	“It would provide real-time data to for understanding critical health metrics, enabling early detection of conditions (i.e. detecting blood glucose spike after eating, detecting high heart rate).”	“So the more data we have, the better we are able to understand timeliness and the more effective our recommendation will be.”

Figure 4: Customer Value Opportunities Investigated



The additional value from combining data was identified and categorised in six ways – two of direct value to individuals, two of primary benefit to organisations, and two of benefit to both.

For individuals the first benefit is better identification of the life risks they may be facing (for example, spotting and acting on a potential mental health episode). The second is the opportunity to save or earn money if they can better predict their future needs – for example avoiding having to build contingency into services being purchased, thereby reducing the cost.

The service providers identified the ability to create more value for users by being more responsive to changes in requirements and by offering more personalised service that reflect a user's specific needs or better matching them to existing products.

They also identified the opportunity to create new value from developing new service models. Finally the service providers recognised how accessing broader data sets would enable them to be more efficient and effective in their business operations.









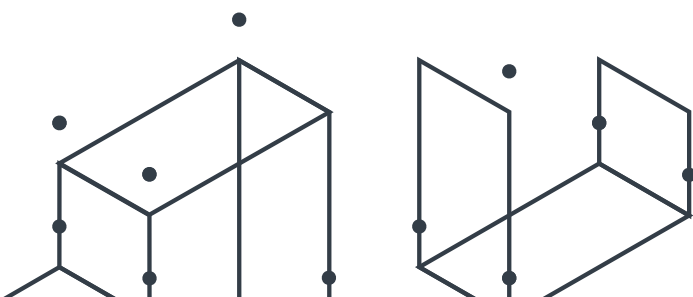
Opportunity		Beneficiary
01 User Risk Identification	Integrating data enables more accurate prediction of risks that the user may be facing	
02 Financial Gains	Better understanding of their needs will enable users to access financial opportunities	
03 Greater Responsiveness	Better understanding of user needs enables providers to address them in a more timely manner	 
04 Personalised Service Provision	Access to broader data sets enables better matching and greater service customisation	 
05 New Service Models	Cross-sector real-time data sharing will enable different business models	
06 Improved Productivity	Access to broader data sets will enable providers to be more efficient and effective	



Figure 5: Value Opportunities





Gaps Identified

While the focus of this workstream was on value creation, a number of challenges to achieving this value creation were also identified. Firstly there is a gap with regard to breadth of data. Achieving the full potential of Personal Data Mobility will require the involvement of more sectors than those represented by the participant businesses with data from technology businesses, health companies, government services, retailers and travel providers being seen as particularly valuable. The broader the sector participation the greater the scope for value creation.

Secondly, for the benefits of such services to accrue to all parts of the population, digital exclusion needs to be reduced. For example, those suffering from health or mental health problems are often digitally excluded.

There was also some concern that the Personal Data Mobility Model may give people the impression that they have more control of their data than they actually do. For example with health data, they have less control over deleting data transferred to a service than they might expect as the service provider may need to keep it for regulatory reasons.

Establishing the trust required to share data was also seen as a challenge for services that a user might never have heard of before. Also there would be a need for people to know who they can speak to if something went wrong, but with multiple parties involved there is a risk that no one takes responsibility.

Gaps requiring significant intervention

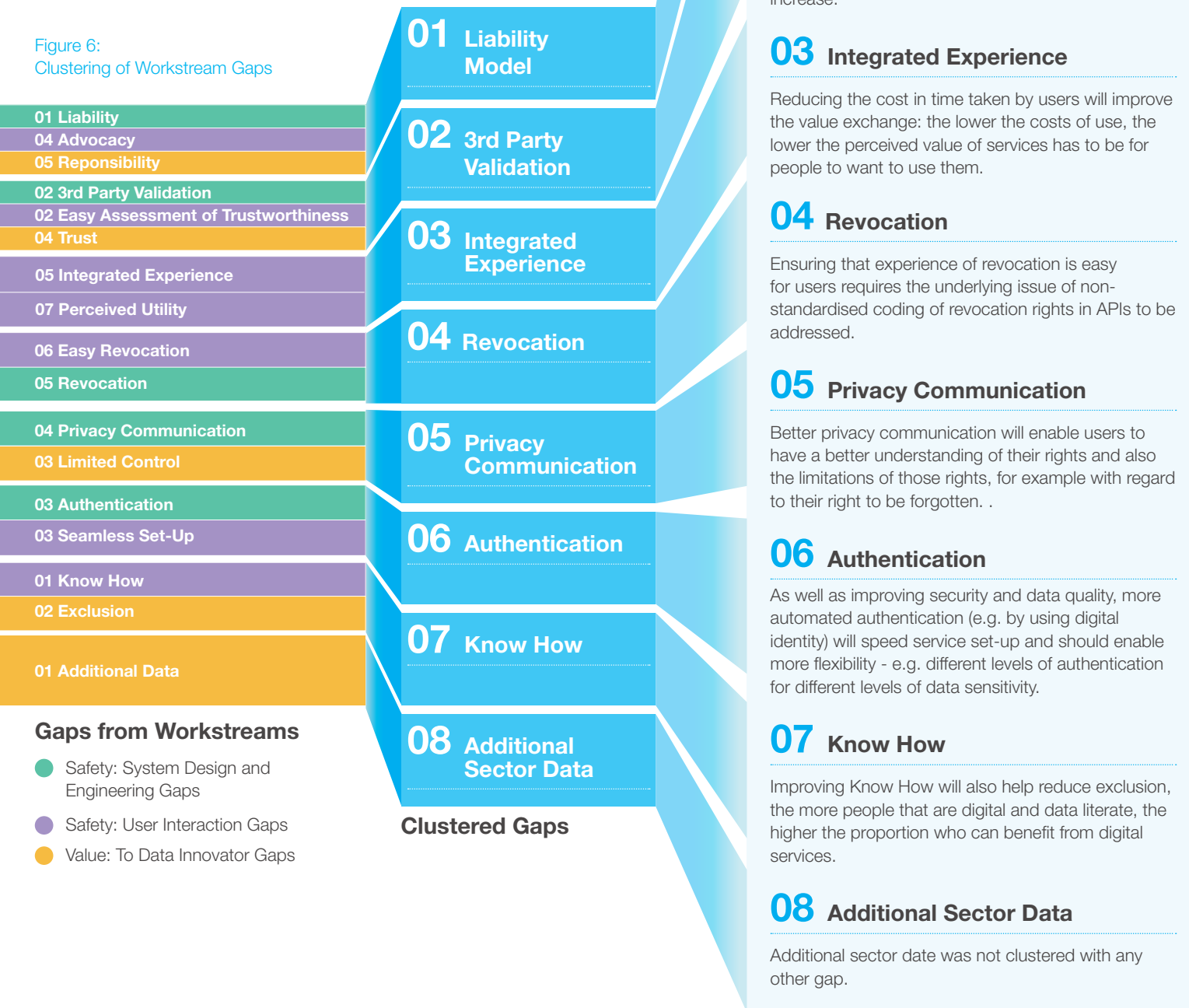
- | | |
|---------------------------------------|--|
| 01
Additional
Data | While data provided by participants was seen as valuable, adding data from other sectors would add further value. |
| 02
Exclusion | Many of those most in need of services may be unable to benefit from Personal Data Mobility due to being digitally excluded. |
| 03
Limited
Control | Right to be forgotten is limited by regulatory and other requirements. |
| 04
Trust
Communication | Sharing data, particularly sensitive data, requires trust in who the data is being shared with. |
| 05
Responsibility | Who to speak to if something goes wrong. |

Clustering the Gaps.

Our analysis of the gaps identified a number of overlaps and commonalities.

In particular resolving a gap identified by one workstream would provide a resolution to a gap defined in another. This enabled the clustering of the workstream gaps into eight groups (see Figure 6).

Figure 6:
Clustering of Workstream Gaps



Addressing the Gaps.

In the Personal Data Mobility report, Ctrl-Shift introduced the Intervention Stack as a means for analysing gaps and identifying the best way to address them (see Figure 7).

This was applied to the clustered gaps to examine the types of intervention that would be needed to address them.

Components of the Intervention Stack

At its simplest an intervention may be better communication - creating a Label with explanatory information, for example clothes washing labels. Interventions can also be design-led, such as creating new Features or Products and Services that deliver an enhanced experience. Then there is the creation of Standards to ensure consistency and defined levels of quality and reduce some of the costs and risks of participation. Some gaps may require investment in Infrastructure to provide the mechanisms needed. Others may need the creation of Governing Frameworks that provide the oversight required to make a market safer. Finally an investment in Market Development may be required to initiate or sustain growth in a market. For example, stimulating demand by providing education about a particular service.

None of these interventions are the province of a single group.

Governments have a big part to play in Market Development but so do businesses. Governing Frameworks may be government imposed via regulation (for example the need to have car insurance) or created by an industry body such as the Association of British Travel Agents. Similarly Standards often emerge from interest groups before being codified by a quasi-government body such as the International Organization for Standards (ISO) or British Standards Institute (BSI). Products and Services and their Features are typically designed by businesses but are subject to regulation. Governments may also influence or directly control Labels, an example of the latter being road signs.



Figure 7:
The Ctrl-Shift Intervention Stack



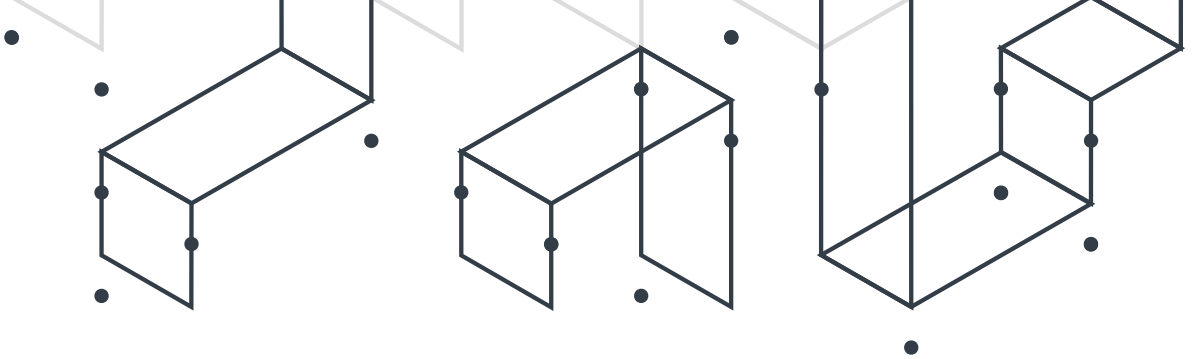


Figure 8:
Key Gaps and Interventions

Gaps	Labels	Features	Products & Services	Standards	Infrastructure	Governing Frameworks	Market Development
Liability Model							
3rd Party Validation							
Integrated Experience							
Revocation							
Privacy Communication							
Authentication							
Know How							
Additional Sector Data							

Our analysis of the eight clustered gaps highlighted the types of interventions required (see Figure 8).

At one extreme, a gap such as Additional Data, which only requires interventions in the areas of Market Development and Governing Frameworks, may be addressable by governments alone. But at the other extreme, for example in the case of Authentication, six separate interventions are required.

The intervention analysis highlights the opportunity for multiple stakeholders to play a role. These stakeholders include businesses, legislators, regulators, consumer and citizen groups and standards bodies. All have good reasons to be supportive.

For **Businesses**, Personal Data Mobility is creating an opportunity to innovate and develop valuable new services. By innovating they will help address some of the Feature and Products & Services gaps identified. In addition those at the forefront of developing Data Mobility services can initiate the development of the Governing Frameworks and Standards required and support their formalisation by working with relevant industry bodies, legislators or standards authorities.

For **Governments**, there is an opportunity to enhance economic growth by accelerating Data Mobility through undertaking Market Development initiatives, enacting any enabling legislation required and supporting the development of appropriate Labels, for example regarding privacy.

For **Regulators**, Data Mobility supports healthier and fairer markets. Data regulators clearly have an important role to play in encouraging the development of Personal Data Mobility services through nurturing the innovation required and ensuring it is fair and valuable to both businesses and individuals. Sector regulators can also help by working together to provide momentum for cross-sector data sharing initiatives.

For **Individuals**, Personal Data Mobility provides an opportunity for higher value services and fairer value exchanges which **Consumer and Citizen Groups** are well positioned to champion. These groups also have a key role in ensuring that any risks that individuals face are properly mitigated.

Engaging with these different groups will be a clear priority as we move into the next phase of this Sandbox and start to create solutions to the gaps identified.

The Intervention Stack also enables grouping based on the relatedness of the interventions involved (e.g. grouping the gaps where creating Governing Frameworks are the most important intervention).



The Way Forward.

The final step in this phase of the Data Mobility Infrastructure Sandbox was to group the eight clustered gaps into related market development requirements.

Two of the related market development requirements have been prioritised as workstreams for the next phase of the Data Mobility Infrastructure Sandbox, based on what we believe will have the greatest impact on the development of the Personal Data Mobility market. They are Data Mobility Governance and the End-to-End Customer Journey.

The remaining clustered gaps are likely to be advanced by ongoing market initiatives which the Data Mobility Sandbox Programme will monitor.

Clustered Gaps

01 Liability Model

02 3rd Party Validation

03 Integrated Experience

04 Revocation

05 Privacy Communication

06 Authentication

07 Know How

08 Additional Sector Data

Related Market Development Requirements

Data Mobility Governance

End-to-End Customer Journey

Other Market Initiatives

Figure 9:
Clustered Gaps and Related Market Development Requirements

Data Mobility Governance Workstream

The Data Mobility Governance Workstream will carry forward addressing the Liability and 3rd Party Validation gaps. These two have been grouped together as creating effective Governing Frameworks will be critical to their resolution.

The first step in this workstream is to create roadmaps for how these highly complex challenges should be addressed. Our objective is to define what needs to happen to help us to engage the relevant stakeholders, provide guidance for those looking to create solutions and enable all parties to achieve rapid progress.

End-to-End Customer Journey Workstream

The End-to-End Customer Journey Workstream will primarily address the Integrated Experience gap, but bringing in some of the challenges identified in the Privacy Communication and Revocation clusters. The common element in this workstream is the need for high quality user experiences that make Personal Data Mobility transparent, easy and safe.

Making the customer journey easy and safe is critical if there is to be widespread uptake of Personal Data Mobility services. So this workstream will focus on the vital requirement of enabling people to share their data with minimal effort and risk, again looking to work with partners that have the capabilities to address the design and technical challenges involved.

Monitoring Other Market Initiatives

With regard to the remaining three gaps – Authentication, Know How and Additional Sector Data - the Personal Data Mobility Infrastructure Sandbox will monitor developments in the first instance. There is significant investment in digital identity solutions and so there will be rapid progress in the next 1-2 years in the area of Authentication, with little need for the Sandbox to provide impetus. Also, as identified by the Intervention Stack analysis, Know How and Additional Sector Data are gaps which government or regulators are better placed to address than the Sandbox and its participants.

Value Sandboxes

In parallel to the Data Mobility Infrastructure Sandbox, Ctrl-Shift will be creating a series of Data Mobility Value Sandboxes. Being able to realise value from sharing their own data will be what drives individuals to use Personal Data Mobility services. Making it safe is not enough, making it valuable is imperative if the potential benefits for individuals, businesses and society are to be realised and for economic growth to be accelerated.

To ensure they are focused on what is important and valuable, the Value Sandboxes will focus on the Customer Value Opportunities that are most critical to individuals, for example: help me manage my money; help me manage my health; help me manage my home; and help me manage my travel.

The Data Mobility Infrastructure Sandbox has initiated the process of unlocking the opportunities that Data Mobility brings.

We have explored a dynamic market in its first phase of development. Encouragingly we have discovered that there are capabilities in place to enable individuals to safely share data and also defined what needs to be addressed to make their data sharing safer. We have shown that great strides can be made by a diverse group encompassing businesses from multiple sectors, a regulator, government departments, a consumer group and a university.

The progress we have made is both exciting and valuable. The next step is to turn the insights we have gleaned into solutions that address the gaps we are proposing to address. This will be taken forward in the next phase of the Data Mobility Infrastructure Sandbox.



Further Forward.

“

Identifying new ways to share data in a way that is efficient and trustworthy is set to unlock significant value for society and individuals. The Centre welcomes efforts focused on doing this.

Roger Taylor,
Chair, Centre for Data Ethics and Innovation

“

Data portability rights are coming into legislation all over the world, but consumers will only be able to exercise these rights within a safe and trusted infrastructure. Developing this infrastructure with consumers at the centre right from the start, listening carefully to what they value will help make data mobility a success.

Liz Coll,
Head of Digital Change,
Consumers International

“

It's great to see UK organisations taking a proactive approach to supporting the right to data portability, and helping find ways for us to move to a world of data mobility. Like the ICO's own regulatory Sandbox, this is another great example of privacy and innovation working hand in hand, and it is critical that business and regulators work together to develop ideas that benefit everybody. I am looking forward to continuing working with Ctrl-Shift and the other participants on this exciting project.

Simon McDougall,
Executive Director - Technology Policy and Innovation,
Information Commissioner's Office

“

At the University of Southampton's Web Science Institute, we are concerned about the obstacles to data sharing, which is essential for the UK's future participation in the Artificial Intelligence and Machine Learning revolution. Ctrl-Shift's work on Data Mobility, focused on the Data Mobility Infrastructure Sandbox whose results are reported here, is producing some of the first tangible evidence of these impediments, and of how the flow of data can safely be freed up for the benefit of government, industry and individual citizens.

Dr Kieron O'Hara
Associate Professor, Web Science Institute at the
University of Southampton

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Get involved.

If you would like to become involved in any of the Sandbox initiatives, please contact:

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