

# Bus Open Data Service

**KPMG Data Analytics**  
Digital Lighthouse



## Data flows into the future

Open data can unlock enormous potential in public services. UK Public transport data investment projects responsible for co-ordinating transport services in metropolitan areas have led to an increase in journeys, generating cost savings for the local authorities, and other economic benefits for cities.

In the first project of its kind in the UK, KPMG, with its subcontractor, ITO World Ltd, has developed a national unified open data platform for England's bus network. This platform pulls together data from more than 400 bus operators to enable consumers to view timetables, fares and bus location data in a unified form.

The resulting open data platform improves bus users' travel information and increases bus patronage by providing data for journey planning software providers, innovators and town planners, leading to innovations within the digital transport sector.

## Key considerations

- Do you operate a public sector service which has unfulfilled potential?
- Is your data working to help you evolve your service provision?
- Are you using your data to improve customer experience?
- How do your data practices deliver insight into your public services?
- Could you adopt statistical and advanced tools to help meet emerging needs?
- Could publication of your data create jobs, generate other economic benefits or lead to efficiency savings?
- Would you like to reap the benefits of open data and open government for your institution but don't know where to get started?
- Do you have harmonized data standards and schemas across disparate data silos?



## How we can help

- Developing a unified open data platform for consumers and service providers to provide valuable data in a way that meets complex stakeholder requirements
- Using our proven Agile delivery methodology to design, build, test and deliver solutions that meet exacting UK government Digital Services (GDS) and Technology Code of Practice (TCOP) standards
- Embracing a multi-disciplinary approach by combining extensive expertise across different teams (e.g., UX, Dev, Test) to deliver seamless end-to-end excellence
- Combining our proven framework and our experience of building open data portals from scratch to design the optimal solution tailored for each client problem



## Driving the future of bus services

The UK's Department of Transport wanted to tap into the unrealised potential of England's bus services by collating information on services, fares and real-time locations for passengers. KPMG led the delivery of the entire project, from design and testing to deployment and implementation – all while meeting strict GDS service standards and adhering to legislative requirements.

The resulting Bus Open Data Service (BODS) provides real-time accurate passenger information on services, fares and bus location to encourage the use of buses and to save passengers time and money. Economic benefits will flow from companies innovating with the open data to build apps and solutions, creating high-value jobs, while passengers will save time and money on their journeys, leading to efficiency savings and increased productivity.

BODS has the potential to enable Mobility-as-a-Service (MaaS) journey planning, enabling improved modelling across different types of public transport provision, while the valuable insights generated from the data can help policymakers in determining how to increase public transport use and reduce carbon emissions.

### Benefits of open data platforms

Improve and create new public insight services using open data



Create efficiencies through use of analytics



Open the door to innovation and employment creation



Foster greater transparency with easily-accessible public data



## KPMG's UK 'Agile in Government' methodology

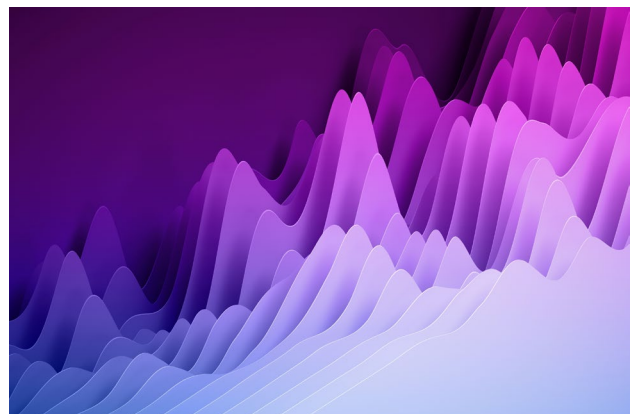


### Our 'Agile in government' method

Our proprietary 'Agile in government' delivery methodology is used in all public sector technology design and delivery projects. This involves creating multi-disciplinary teams to meet the project's requirements then running through eight different phases: discover; define; create; build; test; release; business change management and continuity.

These phases run with simultaneous and continuous GDS liaison: researching the problem space, creating a problem statement, crafting a winning solution, prototyping with key users, building a digital system, ensuring there is a rigorous Quality Assurance and Performance Testing capability, doing continuous integration and releases in agile fashion, continuously measuring change via qualitative and quantitative feedback; ensuring a consistent agile methodology.

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## Our 'Agile in Government' methodology:

### 1. Discover



Discoveries are crucial to setting design projects off in the right direction by focusing on the right problems and, consequently, building the right thing.

The **discover stage** focuses on thoroughly researching the problem: evidence and data is gathered to inform the direction for solving the researched users' pain point(s). We talk to users, learning what they want to achieve, identifying any constraints or opportunities to improve things.

**Research methods include** exploratory research, user interviews, field studies and workshops, as well as evaluating all gathered evidence with qualitative insights from other methods. The goal is to bring a broad research area into a narrower space to clearly define the problem.

The foremost objective is identifying user needs. Working collaboratively, we determine the goal for discovery. The user research team:

- Conducted interviews with bus operators, large and small, across England.
- Completed contextual research.
- Interviewed and engaged with developers and third parties to understand needs.
- Held workshops, consultation sessions and continued conversations, ensuring a holistic approach and resolving conflicting requirements.

The insights gathered helped us to form the comprehensive list of pain points, vital to later stages in the overall framework.

### 2. Define



The **define stage** identifies the correct problem to solve. We narrow the scope of the challenge via a process of analysis and subsequent synthesis.

The problem statement needs to be human-centred, narrow enough to be manageable and achievable, but broad enough to allow for creative exploration. This stage allows the team to move into a “**creative consideration**” phase.

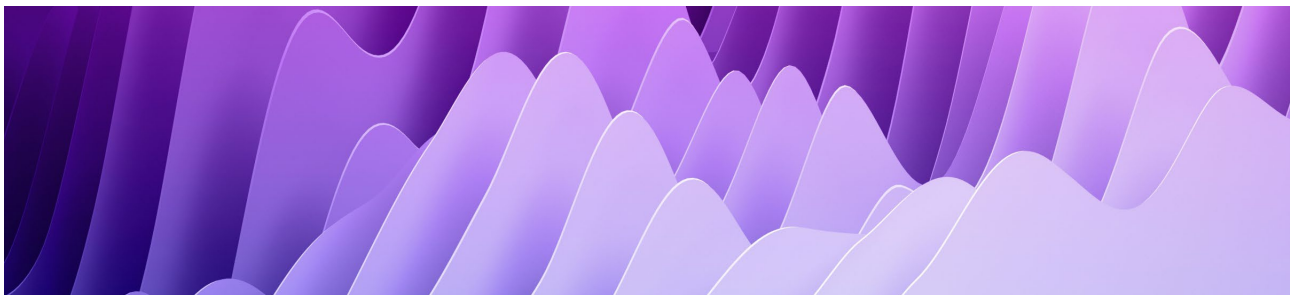
Following discovery, all research and insights are collated, grouped, considered, and evaluated. In organising and understanding the users we were able to identify the key personas relevant to BODS: namely the data suppliers, bus operators, data consumers. We were able to create specific human-centred problems and hypothesis statements per persona; a way to frame the goals with the user at the heart. We then used research data to refine the personas into further sub-personas with their own key user needs, pain points and motivations (in total we ended up with 6 key personas, including Assisted Digital personas).

In the Define stage with the help of technical subject matter experts (SMEs), we also identified and refined the data standards required for all the different types of data (e.g., TransXchange for timetables data, SIRI-VM for live location data and NeTEx for fares data).

Human-centred design activities such as:

- focus groups,
- quantitative surveys,
- diary studies,
- live gemba walks,
- and 1-2-1 interviews

enable us to truly understand the personas better.





## Our 'Agile in Government' methodology:

### 3. Create



The approach to design and build successful solutions in today's dynamic world must be agile and robust. Products must be built with user needs, behaviours and motivations in mind. Designing products and services with a focus on human outcomes ensures user interactions are logical and meaningful. Our user experience designers employ principles of human-centred design, behavioural science and accessibility.

**Create stage** begins with prototyping: designing interactive visualisations to demonstrate the potential capabilities of a product. Prototyping turns concepts into tangible simulations. This sparks creativity amongst the product team, facilitating exploration, challenge, testing and iteration of ideas. But more importantly, prototyping enables the idea to be shown to the user for valuable feedback and iteratively enhanced to evolve into accurate representations of solutions. With thoughtful and appropriate UI design, we can create a solution that visually meets the needs of the user.

In creating the Bus Open Data Service, we followed the Government Digital Service rules. This ensures the solution has been designed to meet the needs of the user. We utilised the established styles and patterns to produce user-centred design services. Recalling the user needs, designs were initiated with wireframes and user flows. Using the GOV.UK styles for consistency, we were able to create rapid prototypes using Sketch, Invision and GOV.UK Prototype Kit. Interactive prototypes were shared with users continuously, where feedback insights informed further design iterations.

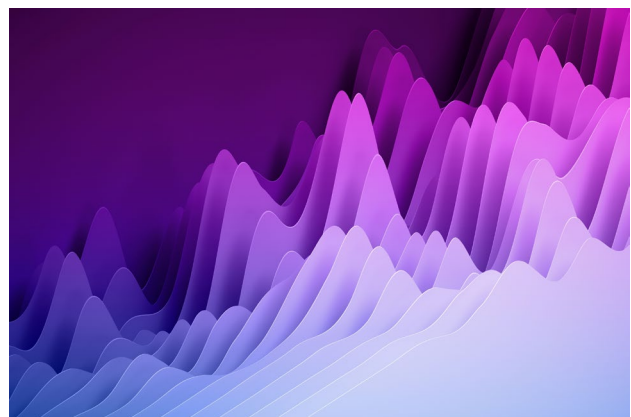
In creating a service fit for purpose, it was essential that we considered the assisted digital pathway, where users may not be comfortable with digital service or may choose not to. Our research explored what type of help users may need in order to use the Bus Open Data service which includes following the WCAG 2.1 accessibility guidelines and audit of designs too. All design prototypes were user tested in task-based usability testing sessions along with card-sorting techniques to understand the correct information architecture to employ for the website. This method of participatory design enabled us to understand and refine the end-to-end user journey of the different personas to achieve their desired need (which we identified in **Discover** and **Define** stages).

### 4. Build



We focus on building the digital system that stakeholders really need through continuous communication and improvement. The goal of the **Build Phase** is to shape a user-friendly system and supporting provision of compliant data by constant testing and optimisation. We ensure rapid builds are underpinned by introducing an agile methodology. The efficient cooperation between front-end user designers and back-end infrastructure developers not only establishes an open data system but also provides a communication platform and a link for communication from the public transportation industry.

The implementation of agile methods on Bus Open Data Service includes the needs of users expressed in the form of user stories according to the overall planning and design. User needs are divided into different user stories where in each user story followed the **INVEST criterion** (Independent, Negotiable, Valuable, Estimable, Small and Testable). From a user value perspective, we know what to build and how to build, prioritising the highest-value stories based on user needs, programme needs, infrastructure needs and so on. Agile scrum ceremonies, for instance, sprint reviews, backlog refinement sessions, daily stand-ups and retros were held to coordinate the civil servants, product owners, UX designers, developers, test and dev ops teams to ensure the team was building the right things at the right time for the right people. The build on BODS was also based on open-source code and serverless cloud architecture that's robust and scalable.







## Our 'Agile in Government' methodology:

### 5. Test



Implementing technology change and changing industry standards raises the risk that new or updated services may not offer intended business benefits and may negatively influence existing services, harming business operations, finances, or customer experience. As part of a Quality Assurance (QA) methodology, the **Testing Stage** is used to control and mitigate this risk.

A major element of the Bus Open Data Service (BODS) has been to ensure a rigorous approach to Quality Assurance and Performance Testing, as part of the end-to-end build and deployment process of the application. A mix of manual functional and automated regression testing is applied to enable comprehensive coverage for releases and quick execution of regression tests.

To ensure the project remained agile, fast and efficient was KPMG's in-house designed testing tool, pyAX. Using pyAX, the team could build automated regression tests for both individual API calls and end-to-end processes for BODS various business flows such as timetable data, ticket fare calculations and live bus location data. KPMG was able to build on its in-house developed testing modules and microservice based architecture to suit the BODS requirements. As the pyAX framework is cloud-enabled, it allowed for easy collaboration as well as clear dashboard reporting, meaning that any issues could be seen and resolved quickly. KPMG helped to reduce the BODS programme's time-to market by 30-percent, and gave DfT the confidence it needs in BODS.

Performance testing has also been managed through KPMG, using the StressStimulus tool, providing stress and load statistics for the systems overall performance prior to major releases. KPMG's testing approach has enabled the requirement of the engagement to support continuous release of features and bug fixes for the platform without sacrificing quality.

### 6. Release

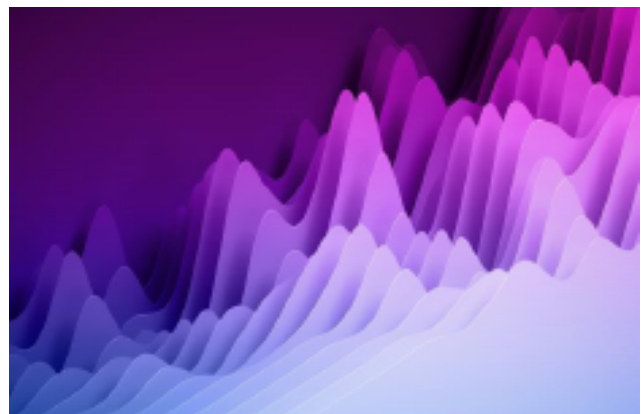


By achieving agile releases, instead of a hefty big bang release at the end, we release earlier and regularly. This ensures that consistent incremental value is being delivered to the end users of the service. Each **Release stage** should be carefully designed: including features, use cases, and changes for the current release, expressed in user stories that also represent the ideas of stakeholders. Each release should contain a different number of user stories, according to the priority and size of each story. This approach optimises for platform/product stability, whilst ensuring continuous rapid improvement of the service.

On average, BODS releases a new version every month. Any changes and upgrades will be notified by email to the industry. Additionally, the changes and improvements of the new release and the impacts on any stakeholders are clearly explained on the changelog page on the BODS system.

For each release, through frequent communication, our team is very clear about the value and scale of each story and has distinct goals and plans, which support us to prioritise and decide what to build now and what to build later. We think the agile approach can be better achieved when individuals and interactions are more important than processes and tools. Timely communication ensures team members fully understand the goals of the current release and plans for future releases.

At the same time, ensure that the team engages directly or indirectly with stakeholders. The short feedback loop on frequent deliveries to real users helps us to get more real experience timely and help us to better update forecasts and manage expectations.





## Our 'Agile in Government' methodology:

### 7. Change



**Change Stage** creates and communicates the strategy for the program/service's change process, aligning the ecosystem to enable industry wide transformation. The idea is to collaborate with a range of stakeholders to understand their specific current states and desired future states. This helps define the exact steps that will enable the transformation. Change teams should use all available communication avenues to provide engagement e.g., in the form of emails, calls, online forums, research sessions, workshops, demos, and ongoing working groups. In all of this, collation, measurement and analysis of the feedback is key in order to refine the change management approach. By continuously measuring the change and feedback from the industry, the program's strategy, services and products are iteratively improved. For a full-blown beta product, usually a Helpdesk function is helpful as it delivers fast support to a wide variety of queries across the program, continuously expanding their baseline knowledge, and escalate complex queries to specialist stakeholders.

The Bus Open Data Service has a dedicated team of domain experts who provide support and knowledge to the users through the Business Change and Helpdesk services. They work one-on-one with transport operators to understand their legal requirements for publishing open data to the service. Providing training on the Department for Transport's supporting software and introductions to suppliers that can enable them to comply with the regulations. The team remains in consistent communication with key stakeholders, including suppliers, publishers, and consumers, to ensure the ecosystem is aligned with a clear vision forward.

### 8. Continuity



The Agile in Government methodology allows us to design and build business continuity into the services we deliver. To ensure the smooth running of all products and services, the continuous usage of a robust agile framework based on feedback from stakeholders, users and civil servants is critical. In particular for a mature service/product, feedback from users across the industry should be consistently collected by all functions to ensure developments solve the end-to-end problem for the user. Value is delivered to the client and industry alongside training to ensure maximise value to the users of new features.

Feedback is collected through a variety of channels and synthesised where appropriate into feature requests stored in the backlog. The Bus Open Data team then works with the industry to share their ideas. By asking the right questions and collecting accurate responses, the user needs are better understood, allowing the stories to be refined. Prioritising these backlog stories, we then ensure that the most valuable improvements are made for our users.

### Conclusion:

In order to design great products and services akin to the Bus Open Data Service (BODS), first and foremost requires an obsession with excellence and improvement. Secondly it requires the adoption of our **Agile in Government** framework to ensure the delivery and build fulfils not only the government prerogative to achieve the intended policy outcome, but also to make sure a great digital service is created which is loved by end users and citizens.