

SCHEDULE 6.5
SYSTEMS INTEGRATION

LOT 2

VERSION CONTROL

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SCHEDULE 6.5 – SYSTEMS INTEGRATION

1. PURPOSE

- 1.1 This Schedule sets out the responsibilities of the Parties during the delivery of both the Transition Services and the Operational Services in respect of the Interfaces between the Service System and the Interfacing Systems and the use of Interface Layer in the delivery of the Interfaces.

2. GENERAL REQUIREMENTS

- 2.1 The Supplier shall be responsible for:

2.1.1 the design, development and Testing of the IVR System in order for the IVR System to:

(a) send the relevant data from the IVR System to the relevant Interfaces; and

(b) receive and ingest the relevant data from the relevant Interfaces;

2.1.2 the design, development and Testing of the Supplier Interfaces (co-ordinating with TfL and the relevant Other Suppliers as appropriate);

2.1.3 provision of necessary environment and relevant access to TfL and Other Suppliers to participate during testing of the interfaces;

2.1.4 conduct, organise and participate in Interface design workshop, where necessary, in collaboration with TfL and relevant Other Suppliers as appropriate;

2.1.5 working with TfL and the Lot 1 Supplier as and to the extent required by TfL and the Lot 1 Supplier in respect of the design, development and Testing by TfL of the TfL Interfaces and Lot 1 Supplier Interfaces (including Testing that the Service System supports the TfL Interfaces and Lot 1 Supplier Interfaces);

2.1.6 support and maintain the Supplier Interfaces (co-ordinating with TfL and the relevant Other Suppliers as appropriate) as part of the Operational Services; and

2.1.7 working with TfL and the Lot 1 Supplier as and to the extent required by TfL and the Lot 1 Supplier in respect of the support and maintenance by TfL of the TfL Interfaces and Lot 1 Supplier Interfaces,

in each case in accordance with the Systems Integration Strategy, the Systems Integration Plans, the Interface Specifications (where applicable) and this Agreement (including any applicable Mapping Rules and Service Management obligations).

- 2.2 In delivery of both the Transition Services and the Operational Services the Supplier shall:

2.2.1 enable the effective implementation and operation of all Interfaces; and

2.2.2 ensure that each Interface complies with the integration requirements set out in paragraph 4.

- 2.3 Without limiting the Supplier's obligations set out in this Agreement, TfL shall on reasonable notice provide reasonable assistance and information to support the Supplier's performance of its obligations set out in this Schedule, which may include:

2.3.1 provision of relevant information held by TfL and where TfL is authorised to disclose such information;

- 2.3.2 supporting the development of the Systems Integration Strategy, the Systems Integration Plans and the Interface Specifications in respect of matters relating to TfL;
 - 2.3.3 provision of reasonable access to TfL Personnel;
 - 2.3.4 attendance at meetings organised by the Supplier;
 - 2.3.5 supporting the definition and specification of the Mapping Rules to be applied in the Service System, the Interface Layer and/or the Interfacing Systems; and
 - 2.3.6 participation in joint testing initiatives with the Supplier.
- 2.4 In addition to the Supplier's cooperation obligations set out in Clauses 5.10 to 5.15 (Co-operation with TfL and Other Suppliers) of this Agreement, in the delivery of both the Transition Services and the Operational Services the Supplier shall on reasonable notice provide reasonable assistance and information to support TfL and/or any relevant Third Party in respect of any Interface related responsibility that is not the responsibility of the Supplier, which may include:
- 2.4.1 provision of relevant information held by the Supplier and where the Supplier is authorised to disclose such information;
 - 2.4.2 supporting the development of documentation owned by TfL;
 - 2.4.3 provision of reasonable access to Supplier Personnel;
 - 2.4.4 attendance at meetings organised by TfL;
 - 2.4.5 supporting the definition and specification of the Mapping Rules to be applied in the Interface Layer and/or the Interfacing Systems; and
 - 2.4.6 participation in joint testing initiatives with TfL or relevant Third Parties.
- 2.5 For illustrative purposes only the responsibilities of the Supplier with regards to Systems Integration are illustrated in Appendix 1 and the Interfaces identified at the Effective Date are provided in the Interface Catalogue.
- 2.6 The Supplier shall not in the performance of this Schedule (including the Interface Documentation) introduce any undue risk to the continuing operation and use of the Service System, the Interface Layer and the Interfacing Systems.
- 2.7 The Supplier shall appoint a Systems Integration Manager in accordance with Schedule 9.2 (Key Personnel) who shall be responsible for managing the Supplier's responsibilities in respect of this Schedule.
- 3. INTERFACE DOCUMENTATION**
- 3.1 Within the timescales identified in Schedule 6.1 (Transition) the Supplier shall provide to TfL for Approval (and subsequently maintain during the Transition Period and delivery of the Operational Services) the proposed:
- 3.1.1 Systems Integration Strategy;
 - 3.1.2 Systems Integration Plan; and
 - 3.1.3 Interface Specification for each Supplier Interface.

Systems Integration Strategy

- 3.2 The Outline Systems Integration Strategy is set out at Appendix 2.
- 3.3 The Systems Integration Strategy shall set out the Supplier's strategic approach for the delivery of the Interfaces during the Transition Period and the maintenance and support of the Interfaces during delivery of the Operational Services, and shall detail as a minimum:
- 3.3.1 the scope, objectives and key principles for the Systems Integration;
 - 3.3.2 the key deliverables and sequence of activities required to deliver the Systems Integration;
 - 3.3.3 consideration of the potential approaches to the Systems Integration and the recommended approach;
 - 3.3.4 any Test Data, Test Environments and Test harnesses required for Systems Integration and how these will be sufficed (including how they will be maintained for the duration of the Agreement);
 - 3.3.5 the use of Interface Layer and any other tooling required and the means with which these will be built to deliver the Systems Integration;
 - 3.3.6 the ways in which the Parties shall work together for the purpose of this Schedule; and
 - 3.3.7 where applicable, the expedited operation of the Document Approval Procedure and (where applicable) the Change Control Procedure for the purposes of paragraph 6.

Systems Integration Plan

- 3.4 Each Systems Integration Plan shall set out the scope, methods, means and timing of all Systems Integration activities owned by the Supplier and shall:
- 3.4.1 be based on the System Integration principles set out in the System Integration Strategy;
 - 3.4.2 set out the scope, methods, means and timing of all Systems Integration activities owned by the Supplier in respect of the Transition Services and Operational Services;
 - 3.4.3 cover the entirety of the scope of System Integration related to the Transition Services and Operational Services as outlined in the Systems Integration Strategy; and
 - 3.4.4 in addition detail as a minimum:
 - (a) the scope and objectives of the Systems Integration Plan;
 - (b) the key deliverables and sequence of activities required to deliver the Systems Integration;
 - (c) the details of the members of Supplier Personnel who will carry out the Systems Integration along with their qualifications, experience and competence;
 - (d) the Interfaces within scope of the Systems Integration Plan;

- (e) risks associated with the Systems Integration Plan and how such risks will be managed;
- (f) any assumptions made by the Supplier; and
- (g) any dependencies of the Supplier on TfL, the Lot 1 Supplier and any Third Parties to deliver the Systems Integration and how such dependencies will be managed (including, but not limited to, resources and environments required to support integration testing).

Interface Specification

- 3.5 Each Interface Specification shall include as a minimum:
- 3.5.1 the specification of data, including the structure and format, to be transferred between the Service System and the Interfacing System;
 - 3.5.2 the mechanism for how the relevant data will be sent from or received by the Service System, the Interface Layer and the Interfacing System including any endpoints;
 - 3.5.3 the definition of the interface boundary and clear demarcation of responsibilities for each part of the end-to-end integration;
 - 3.5.4 any Mapping Rules which will be applied to the data and where these Mapping Rules will be enacted (i.e. the Service System, the Interface Layer or the Interfacing System);
 - 3.5.5 how the data will be validated (including specific data validation rules) to protect the integrity of the data and the operation of the Interface;
 - 3.5.6 the frequency and timings of the data transfer and how the Supplier Interface availability will be handled;
 - 3.5.7 the measures and methods to be used to validate that the data has been sent or received successfully;
 - 3.5.8 the process for how any errors incurred during the data load will be identified, handled and rectified;
 - 3.5.9 any supporting tools, technologies and/or infrastructure required to support the Interface;
 - 3.5.10 how adherence to the requirements of Schedule 2.4 (Security Management) will be achieved; and
 - 3.5.11 the use of Interface Layer .
- 3.6 TfL shall produce and own the Interface Specifications for the TfL Interfaces. The Supplier shall support the development of such Interface Specifications pursuant to paragraph 2.4.

4. INTEGRATION REQUIREMENTS

Monitoring and Audit Logs

- 4.1 During the Transition Period and delivery of the Operational Services the Supplier shall design, develop, Test, maintain and support the Supplier Interfaces such that they:
- 4.1.1 automatically record an audit log of all messages sent and received across the Interfaces, including any associated data (including, but not limited to response times when making a request, response times when processing a request and the number of requests received, accepted and rejected) which may be used to support the resolution of any issues which arise relating to the operation of the Interfaces, which shall be retained for a minimum of seven (7) days; and
 - 4.1.2 automatically monitor each component of the Interfaces up to the interface boundary where data is being passed from one system to another, and in the event of a failure (which shall include, but not be limited to, rejection due to poorly formed requests, system failure, poor latency and attempted connections by clients that do not have the appropriate security privileges):
 - (a) automatically alert the Application Support Team;
 - (b) demonstrate where responsibility for the failure lies;
 - (c) store any failed messages and associated data to be re-processed in order when the issues preventing the transfer have been resolved; and
 - (d) automatically re-process failed messages and associated data in order when the related issues with the Interfaces have been resolved.

Re-use

- 4.2 The Supplier shall ensure that the Interfaces are designed and built with components which can be re-used by other Interfaces or any new Interfaces that may be established during the Term which handle similar types of data with limited re-work required.

Transfer Rates

- 4.3 During the Transition Period and delivery of the Operational Services the Supplier shall design, develop, Test, maintain and support the Interfaces such that:
- 4.3.1 any transactional data handled by the Interfaces shall be received by the Target Systems in real time and in any event no longer than fifteen (15) minutes after the relevant trigger event has occurred in the source systems which initiate the transfer of data across the Interfaces; and
 - 4.3.2 any master data handled by the Interfaces shall be received by the Target Systems in no longer than one (1) calendar day after the relevant trigger event has occurred in the source systems which initiate the transfer of data across the Interfaces.

5. TESTING

The Supplier shall plan and execute Testing of the Interfaces in accordance with the timescales described in Schedule 6.1 (Transition) and the Testing Process described in Schedule 6.2 (Testing).

6. INTERFACE CHANGES

6.1 During the Transition Period and delivery of the Operational Services the Supplier acknowledges that for operational and/or technical reasons certain changes may need to be made to the Interfacing Systems owned or managed by TfL, the Lot 1 Supplier and/or the Interface Layer.

6.2 For the purpose of paragraph 6.1 the Supplier agrees to:

6.2.1 maintain a flexible approach in respect of:

(a) its design, development, Testing, maintenance and support of the Service System and the relevant Interfaces; and

(b) its maintenance of the Interface Documentation; and

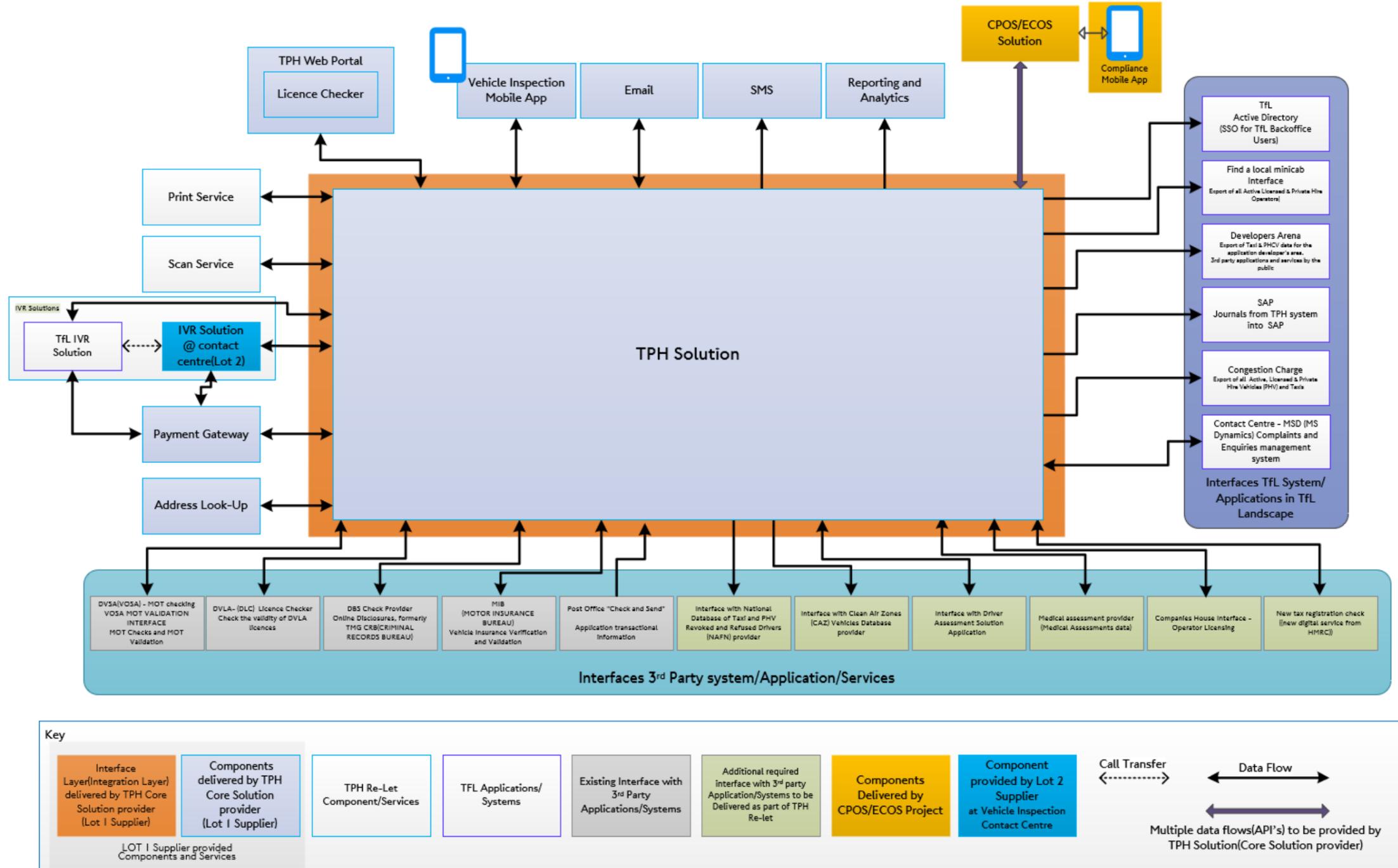
6.2.2 at its cost accommodate any reasonable changes required to the design, development and/or Testing of the Service System and the relevant Interfaces and/or the Interface Documentation during the Transition Period and delivery of the Operational Services which are required as a consequence of any changes to the Interfacing Systems and/or the Interface Layer described in paragraph 6.1 and which are notified to the Supplier.

7. REPORTS AND MEETINGS

The Supplier shall report progress against the Systems Integration Plans at the relevant Transition Group and Service Delivery Group meetings in accordance with Schedule 8.1 (Governance).

APPENDIX 1 – INTERFACE OVERVIEW

For illustrative purposes only the diagram below provides an overview of the Interfaces, the use of the Interface Layer, and the Supplier's responsibilities with regards to the system integration activities.



APPENDIX 2 – OUTLINE SYSTEMS INTEGRATION STRATEGY

3. Provision of an Outline System Integration strategy as per Appendix 3 (Schedule 6.5)

We agree that clarity of communications and understanding between all stakeholders in the implementation of the Service System and the Lot 2 service provider is key to the successful integration of the various systems required to deliver the end to end solution to TfL. The purpose of our Systems Integration Strategy is to ensure that data flows seamlessly between all the solution components required to give the Customer a joined-up journey through the service platform. To achieve this, we will break this down into 6 equally important phases:

1. Requirements gathering

Our first step consists of one or more meetings/workshops with TfL and the Lot 1 and 2 Stakeholders to share ideas and capture requirements. Once the scope of what is required is established, we will define exactly what is required of the solution and its components to deliver the overall service. All systems integrations are different, and every company uses different subsystems to achieve different goals. It is extremely important for us to know all requirements in detail.

2. Analysis

Once we have documented the requirements, we will analyse them to determine the operational feasibility. This will involve translating requirements into needs and improving the processes wherever possible. A successful collaboration with all the 3rd parties will help them to provide the best solution. Clear documentation and agreed statement of requirements will help achieve that goal.

Understanding the scope of the integrations is key here. Is it just one system connecting to another, or is it multiple systems with interdependencies on the data being transferred between each e.g.

- ▶ System A- Field Name is Firstname and format is Alphabetic
- ▶ System B- Field Name is Name and format is Alpha-Numeric

- ▶ System C- Field Name is Firstname and format is Alphabetic

This highlights issues with the name of the field and the format across the different systems. If you fix one of the systems then you have to standardise the other to match, otherwise there will be an integration issue.

3. Architecture design

After the analysis phase, we will be ready to perform the process of putting the solution subsystems together. In order to eliminate any risks, we will write a plan of how multiple the components should be integrated so that they can function as a whole. This involves creating blueprints of the integration to help all parties to visualise the process.

The aim of this is to provide a solution which will boost productivity and improve the workflow, but the main objective is to ensure seamless data connectivity between all of the components. Proper architecture design will allow us to perform an efficient integration. This design will include identifying the type of integration that is required work with specific service providers. Examples of this would be:

- ▶ **Point-to-Point Integration** - This is when there are only two system components involved that need to communicate with each other. This is the least complex type of integration and does not involve any complex business logic, but it still connects a system to another system for them to function together. Typically, such point-to-point integration handles only one function. We would expect that any cloud-based applications would offer these types of integrations as “out of the box” modules.
- ▶ **Vertical Integration** - Here, the system components (sub-systems) are integrated by creating functional “silos”, beginning with the basic bottom function upward. This is normally relatively simple and easy method that only involves a limited number of systems (more than two), but on the other hand, this integration method is quote rigid and more difficult to manage in the long term as any new functionality will require its own functional “silo”.
- ▶ **Star Integration** - Where each sub-system is connected with other sub-systems using point-to-point connections. This allows for more functionality, but as the number of integrated systems increases the number of integrations also increases significantly, and the management of the integrations becomes very demanding. As an example, to connect 10 systems to each other using this method, will require 45 separate integrations, and every time there is a change in one system, nine connections may need to be re-worked as well.
- ▶ **Horizontal Integration** - Here, a separate sub-system is used as a common interface layer between all sub-systems. This layer is referred to as an Enterprise Service Bus (ESB) that allows each sub-system to have just one single interface to communicate with all the other sub-systems connected to the common interface layer (e.g., with 10 systems, there are only 10 connections). The benefit of this method is also that each sub-system can be changed or even replaced without having to re-work the interfaces of any other systems.
- ▶ **Common Data Format integration** - Integrating different IT systems to each other usually requires that the data coming out from one system needs to be transformed to a different data format used by the receiving system. If each transformation needs to be done system-by-system basis, the number of data transformations increases significantly and becomes a high maintenance task. To overcome this problem, common data format approach, allows each system to do only one data conversion from its native format to the common (and vice versa). This way the number of required data transformations is just a high as the number of the sub-system.
- ▶ **Constant changes of the integration landscape** - We recommend keeping the integration projects short to improve the success rate of the project. The longer a project takes, the more significant this issue becomes. We are used to working using the Agile methodology that can cater to changing requirements along the way. We also recommend that RESTful APIs are utilised wherever possible so that the architectural design is kept to a standard across all integrations and avoids the high maintenance types of integration mentioned above.

- ▶ **Legacy System Integration** - We will also plan to readily connect and communicate with all required legacy systems
- ▶ **Interface Innovation** - A long term design goal is to enable tight integration with third party services via the application of RESTful API technologies, and move away from batch based processing, ultimately delivering greater speed and service to the customers whilst at the same time reducing cost and complexity

4. Systems integration design

Here, the actual integration is performed. This is based on the architecture design, which is rather a logical design, its physical equivalent is developed. The type of integration required will dictate the speed at which it will be delivered and its complexity.

We will work with TfL and the Lot 1 Supplier to design, develop and test all the in-scope interfaces. This will involve documenting all of these integrations to feed into the plans, specifications and will include mapping rules and service management obligations such as proactive monitoring and alerting of the interfaces.

5. Implementation and Testing

Any assumptions that have been made can only be tested and corrected at the point of full integration. We would look to reduce risk of issues by making sure all parties are in communications about formats. Any changes, no matter how small, are documented and communicated to all parties. This will require co-ordination with TfL and the relevant Other Suppliers as appropriate.

Once the integrations are built, they are verified and tested. For XML testing we would use something like Swagger or Postman, to send XML files to upstream systems as an automated call is not in place. For physical file transfers, we would be manually placing files in folders in order for them to be collected by an upload tool which would normally be polling the folder. If test engineers detect any bugs, they are fixed, and the system undergoes operational testing one more time to ensure the product you receive is errorless. It is often through the System Integration Testing (SIT) that formats come to light and can be finalised especially if integrating with an older system which may not be able to cope with certain formats or have restrictions in place which cannot be changed e.g. some older systems won't allow names of only 2 characters or which include special characters. For example, when testing the iIVR solution, we will be able to test new flows and integrations on the platform in a completely segregated manner, to ensure all flows work exactly as designed and that data integrity remains throughout the process. This would ultimately be signed off by TfL before anything is put live.

6. Maintenance

Once these integrations have been built and tested, they need to be supported and maintained, co-ordinating with TfL and the relevant Other Suppliers as appropriate, as part of the Operational Services. Any further changes required through the life of the contract will need to be managed through change control and documented as they are processed. Any source systems change not communicated to recipients of the data may cause service issues. Up to date documentation, shared between parties is a key deliverable. Our modern Managed File Transfer (MFTs) tools enable us to be alerted when issues occur with integrations and deal with them quickly, but more importantly, we can proactively monitor services through our service desk.

Lot 2 Specific Integrations

With the interface catalogue and Appendix 1: Interface Overview being provided by TfL; we have a comprehensive starting point to identify and prioritise the system integration work required to deliver a seamless TPH service.

The solution we are proposing for this opportunity are all well versed in working with RESTful APIs and can provide modern interfaces to integrate with the Service System. Using the example of making appointments through the IVR, we would use similar APIs to those used by the web portal service to make a booking.

There are minimal API interfaces with Lot 1, as they will need to provide the full service system. We will need to understand their API's and specifications but are confident that these can be delivered efficiently through RESTful Open APIs. We have integrated to such API's on numerous previous projects.

The table below gives an overview of the key integrations required using our supply chain, to deliver the service and the dependencies between lots.

Service Solution	Marston Supplier	Lot	Service description	Integration required	Lot 1 Integration requirements
Intelligent IVR	8x8	Lot 2	IVR system that interfaces with TfL's IVR system and all the service lines mentioned. This needs to be AI driven and integrate with all the providers.	Payment Provider	Service System integration with the IVR
Payment Channel Provider	KeyIVR	Lot 1	Web & ATP to integrate with the TfL payment gateway. The payment IVR will be an option off the main IVR that allows for payments.	Payment Gateway	Service System integration with KeyIVR
Contact Centre Telephony platform	8x8	Lot 2	Phone system for the 25 contact centre agents & the phones in the Vehicle inspection sites	Lot1 Service system	Service System integration with the telephony system
PCI compliant agent payment solution - Border	Key IVR	Lot 2	DTMF suppression to enable agent assistance whilst Customer is on the line and keep credit card data out of the contact centre environment and the service system.	Lot1 Service system	Service System integration with the phone and service system