

# Transport for London

## Revenue Collection Services

# **Schedule 9.2 – System Design & Operating Principles**

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# 1 System Design and Operating Principles

## 1.1 Introduction to System Design and Operating Principles

- 1.1.1 The purpose of the System Design and Operating Principles is to set out core standards for System Development and service operations to ensure that such development facilitates future requirements and supports the provision of the Services.
- 1.1.2 In relation to Changes (other than Related Changes), the Contractor shall comply with the relevant System Design and Operating Principles in addition to the relevant provisions of this Contract, and shall advise on such compliance with regard to all Changes. Where the Contractor believes it is unable or inappropriate to comply with the relevant System Design and Operating Principles:
- (a) in respect of any Technical Change it may request a Non-Compliance Waiver from TTL; and
  - (b) in respect of any Change which is not a Technical Change, the Contractor may notify TTL and the Parties may agree that the System Design and Operating Principles shall not apply.
- 1.1.3 The objective of this Schedule, which shall be deemed a TTL Objective for the purposes of Clause 3 (Objectives) is to ensure that in designing and operating the System and Services, cost-effective and fit for future and fit for purpose solutions are provided which allow TTL to operate without Intellectual Property Rights restrictions.
- 1.1.4 TTL shall update and reissue to the Contractor by Variation the System Design and Operating Principles as soon as reasonably practicable following changes to those principles. The Contractor shall ensure that all subsequent Technical Changes (other than Related Changes) comply with the most recent version of the System Design and Operating Principles, and shall advise on such compliance with regard to all Technical Changes. Any retrospective changes that TTL requires to make the IRC System compliant with the revised System Design and Operating Principles pursuant to Schedule 9.1 (Technical Authority) shall be agreed and implemented pursuant to Schedule 12.3 (Contract Variation Procedure).

## 1.2 System Design and Operating Principles

### Generally

- 1.2.1 Subject to Clause 51 (Intellectual Property Rights), the Contractor shall use open source software where available unless in TTL's reasonable opinion other products are demonstrated to offer significant advantages.
- 1.2.2 Subject to Clause 51 (Intellectual Property Rights), the Contractor shall use Commercial Off The Shelf (COTS) products unless in TTL's reasonable opinion other solutions are more appropriate in the circumstances.
- 1.2.3 In operating, developing and maintaining the System, the Contractor shall at all times have due consideration to the future development, interface and operational costs so as to demonstrate Value for Money in accordance with Schedule 12.2 (Value for Money).

- 1.2.4 The Contractor shall ensure that any System Development interfaces with the OSS and that compliance with the requirements set out in Schedule 4.1 (Service Delivery) is, as a minimum, maintained so as to ensure that any Devices or Services can be efficiently monitored and maintained. Where the Contractor considers that interfacing a System Development with the OSS is not possible or that the cost of such interfacing would substantially outweigh any benefit to be gained by TTL, the Contractor shall present in writing a detailed justification to TTL including proposals for alternative solutions for TTL's consideration. TTL shall give full consideration to such justifications and solutions when considering any request for a Non – Compliance Waiver.

**System development environment**

- 1.2.5 The Contractor shall utilise industry standard software development environments, frameworks and tools to develop the System and shall ensure that the minimum number of different environments, frameworks and tools are used. Where the Contractor proposes to introduce a new environment, framework or tool it shall provide to TTL in advance of the implementation of such environment, framework or tool, a detailed written submission justifying such a proposal and demonstrating how such a proposal will enhance Value for Money, taking due account of the cost to TTL of future support. Where the Contractor is unable to provide a sufficient justification that such proposal provides enhanced Value for Money, TTL shall be entitled to request that the Contractor suspend implementation of such new environment, framework or tool and continue to utilise industry standard software development environments, frameworks and tools until such a time as it can provide a sufficient justification to TTL.

**Open systems design**

- 1.2.6 The Contractor shall apply the following principles of open systems design to all System Development, which include but are not limited to:
- (a) collaborative design process – a consensus driven process that is open and non-exclusive;
  - (b) reasonably balanced – ensures that the process is not dominated by the supplier or the supplier's commercial interests;
  - (c) due process - includes consideration of and response to comments from TTL;
  - (d) gated process – to track and control design phases through the development lifecycle to Assure compliance with TTL's business aims;
  - (e) quality and level of detail – sufficient to permit the development of a variety of competing implementations of interoperable products or services;
  - (f) supportability – to ensure any development can be maintained and supported over a reasonable period of time;
  - (g) future proofing; and
  - (h) ensuring that such System Development aligns with the Technology Road Map.

**Data definition requirements**

- 1.2.7 The Contractor shall use industry standard rather than bespoke System data definition and communication standards.
- 1.2.8 Subject to paragraph 1.2.9, the Contractor shall utilise the system data definition and communication standards set out below:
- (a) Extended Mark-up Language (XML) and JavaScript Object Notation (JSON) for the definition of data structures;
  - (b) in relation to system to system communication, the following methods shall be used according to the scenario having due consideration of factors such as volume, synchronous/ asynchronous, batch/individual:
    - (i) services: Representational State Transfer (REST) or Simple Object Access Protocol (SOAP) Interfaces;
    - (ii) file transfer: Extended Mark-up Language (XML) or flat file; or
    - (iii) message queue.
- 1.2.9 If the Contractor is able to identify system data definition and communication standards other than those set out above which provide enhanced Value for Money the Contractor may submit a proposal to TTL including a detailed explanation of how such enhanced Value for Money is achieved.

**Documentation requirements**

- 1.2.10 The Contractor shall ensure that:
- (a) Interfaces are catalogued on the Interface Register in accordance with Schedule 7.3 (System Interfaces);
  - (b) Documentation is produced in accordance with Schedule 11.1 (Document Management); and
  - (c) the Module Breakdown Structure is maintained and managed as set out in Schedule 14 (IPR Management and Licences).

**Networks**

- 1.2.11 The Contractor shall use industry standard rather than bespoke networking standards.
- 1.2.12 Subject to paragraph 1.2.13, the Contractor shall utilise the networking standards set out below:
- (a) Ethernet and TCP/IP;
  - (b) Multiprotocol Label Switching (MPLS);
  - (c) Transport Layer Security (TLS) or Secure Sockets Layer (SSL);
  - (d) File Transfer Protocol (FTP) for standard, non-encrypted file transfer;

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- (e) Secure File Transfer Protocol (SFTP) or Hypertext Transfer Protocol Secure (HTTPS) for encrypted file transfer; and/or
- (f) Simple Network Management Protocol (SNMP) for the management of network devices.

1.2.13 If the Contractor is able to identify network standards other than those set out above which provide enhanced Value for Money the Contractor may submit a proposal to TTL including a detailed explanation of how such enhanced Value for Money is achieved.

**Devices and Modules**

1.2.14 Subject to paragraph 1.2.4, the Contractor shall ensure that all Devices and/or Modules introduced or modified through System Development are designed with open interfaces for remote access, control and monitoring. In addition:

- (a) all Devices and Modules shall be monitored and managed by the OSS;
- (b) for integration into the OSS architecture all Devices and Modules shall be capable of reporting events via an appropriate Element Manager System;
- (c) all Devices and Modules shall be automatically discoverable by the relevant Element Manager System within the OSS and registered in the CMDB;
- (d) all Devices shall be fully Simple Network Management Protocol (SNMP) manageable;
- (e) any requisite private Management Information Bases (MIBs) will be Assured by TTL;
- (f) all Devices and Modules shall be capable of being remotely managed and configured;
- (g) all Devices and Modules shall be capable of being polled in real time on an ad-hoc basis for status information and performance reporting;
- (h) all Devices shall be capable of accepting Software and configuration updates remotely;
- (i) all System Interfaces shall where practicable be efficiently monitored via the OSS; and
- (j) the design of networks shall where practicable minimise the number of single points of failure in the transaction and status messaging between Front Office and Back Office Devices.

**System Monitoring**

1.2.15 The Contractor shall apply the following principles in the design and operation of the System:

- (a) all System monitoring shall be performed using non-proprietary monitoring tools; and

- (b) all monitoring tools shall include event definition, event/alert management processes, incident management and dashboard design capability to enable efficient automatic threshold exception event/alert monitoring and incident resolution.

### **Interfaces**

1.2.16 The Contractor shall ensure that all External Interfaces have Interface Specifications which include:

- (a) details of the technical specification of the Interface;
- (b) details of the data flow through the Interface;
- (c) details of the monitoring of the Interface including event/alert thresholds; and
- (d) details of the service processes associated with the Interface, including clear definition of roles and responsibilities, escalation paths and processes.

### **Operating Principles**

1.2.17 The Contractor shall apply the following principles in the design of service processes for the operation of the System and Services:

- (a) all tools and processes utilised to operate the System shall be selected to reduce the dependency on Proprietary Tools to enable easy transition to TTL or any Successor Operator;
- (b) all operational processes shall enable the Contractor to demonstrate compliance with those same operational processes if required by TTL;
- (c) all operational activities shall be designed to enable auditing and traceability of actions to individual Operating Personnel;
- (d) all operational activities shall be automated unless the Contractor can demonstrate this is not technically possible or will not deliver better Value for Money;
- (e) knowledge management tools and processes shall be utilised to enable more efficient operation of the System and Services (e.g. providing tools and capability for the Level 1 Help Desk to identify and resolve System Incidents, rather than Level 2 Support or Level 3 Support);
- (f) operational management tools shall be implemented to provide TTL with visibility of the service operations at an executive/overview level for control and governance purposes;
- (g) the Contractor shall where practicable and agreed with TTL via Variation use the OSS to monitor Related Systems, Interfacing Systems and other TTL services;
- (h) the Contractor agrees to develop and implement an OSS Service Catalogue and a Service Knowledge Management System using industry recognised tools that interface to TTL's service operation, change and release management tools and processes;

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- (i) the Contractor shall integrate its Trouble Ticketing System with TTL's incident management system (BMC Remedy);
- (j) the Contractor shall where practicable adopt service operation best practices as defined in ISO 20000 and ITIL V3; and
- (k) all operational processes shall enable continual service improvement (e.g. through the use of suggestion boxes, known error/workaround reviews, problem/root cause analysis reviews and service improvement actions).