**Vehicle Fleet Technology Upgrade  
Functional Specifications**

The following Unified Modeling Language (UML) use-case models identify the functional requirements of our desired Vehicle Fleet Technology Upgrade (VFTU) system. Our proposed operational process provides contextual reference and scope understanding. However, the contractor may propose alternative processes or technologies - we encourage innovative solutions. The contractor may propose any solution configuration such as hosted or internal. However, we prefer a Cloud solution - i.e., Software as a Service (SaaS) or Platform as a Service (PaaS). The contractor may collaborate with a Cloud provider and propose a development activity using PaaS. The city provides a fully functional IBM Integration Bus (IIB), enterprise service bus (ESB) to include an ESB instance in our demilitarized security zone to interface with internal city applications such as Customer Care and Billing discussed in our use-case model. The City identified the required performance response in each table describing interface descriptions shown on the adjacent sequence diagram. If the contractor is proposing a PaaS or other software development solution requiring development activity, provide qualifications and past performance of similar functional experience rather than describing an existing proposed technology performance.

# 1.0 Collect Route and Driver Information

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| Select to enlarge... <http://austinea.org/arch/arr/collectRouteAndDriverInformation/UCD.jpg> **Use Case Diagram Collect Route and Driver Information** |

**Scope:**At any time during daily operations, the Route Supervisor uses a geospatial map to load route templates and/or modify Driver routes. When the Route Supervisor creates a route change, the system updates the Driver's map Route information and notifies the Driver and Dispatcher of the change. The Dispatcher and Route Supervisor map shows near real-time Driver position sent from mobile device. The system provides the turn-by-turn audio and video instructions, which the Driver may disable the audio. When the Driver Route deviates beyond the thresholds settings of the device, the system provides an audible warning and notifies the Dispatcher and Route Supervisor. As the Driver collects and empties carts, the system scans and stores radio frequency identification (RFID) information possibly using Bluetooth technology or similar wireless technology to communicate information with the mobile devise. The system collects and reports Route information and uploads the required Route information incrementally throughout the day. The system interfaces with the City's Customer Care and Billing system to report services requiring extra charges. The Route Supervisor, Dispatcher and Driver communicate using voice over IP (VOIP) or similar technology when needed. The system uses push-to-talk similar to hand-held radios and the system records all communications including text messaging and email when needed.

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| Select to enlarge... <http://austinea.org/arch/arr/collectRouteAndDriverInformation/01SD.jpg> **Sequence Diagram Collect Route and Driver Information** |

**Table of Interface Descriptions**

| **Req#** | **Type/Interface - Requirement Description** | **Performance** |
| --- | --- | --- |
| CRDI01 | **Provide Waste Pickup and Reduction/setUpRoutes** | Describe solution relevant to the functional description or explain developmental approach and experience. |
| At any time during daily operations, the Route Supervisor uses a geospatial map to load route templates and/or modify Driver routes. The Route Supervisor may use crowd-sourcing tools such as Waze or other mapping, navigational application to provide the situational awareness of route conditions to reroute Drivers around incidents or road congestion. Ideally, the Route Supervisor map displays real-time traffic information as a geospatial overlay on the Driver positional location and Route. When the Route Supervisor creates a route change, the system updates the Driver's map Route information and notifies the Driver and Dispatcher of the change. The Dispatcher and Route Supervisor map shows near real-time Driver position sent from mobile device. Drivers stay on the assigned Routes unless the Route Supervisor approves a deviation. Approved city staff set route deviation warning thresholds. |
| CRDI02 | **Provide Waste Pickup and Reduction/initiateSystem** | Describe how the system ensures operational status prior to departure or explain developmental approach and experience. The system confirmation of safety inspection is out of the scope of this SOW - information provided for contextual understanding of other planned uses of hand held RFID device. |
| The Driver performs a system check to ensure accurate load of daily Route information. The system confirms completion of safety inspection with the Driver (see use case [Perform Safety Inspection and Audits)](http://austinea.org/arch/eoss/performSafetyInspectionAndAudits/). |
| CRDI03 | **Provide Waste Pickup and Reduction/navigateAndCollectRouteInfo** | Describe solution relevant to the functional description or explain developmental approach and experience. |
| The mobile device uses a touch screen interface and provides push-button controls to quickly move between the information collection and presentation points. The system provides the turn-by-turn audio and video instructions, which the Driver may disable the audio. When the Driver Route deviates beyond the thresholds settings of the device, the system provides an audible warning and notifies the Dispatcher and Route Supervisor. As the Driver collects and empties carts, the system scans and stores radio frequency identification (RFID) information possibly using Bluetooth technology or similar wireless technology to communicate information with the mobile devise. When a Customer sets out extra refuse, the system provides the Driver a means to input the amount and type of refuse and ensures application of applicable charges with Customer Care and Billing (CC&B). For special conditions such as damaged, missing carts, or contaminated recycle carts (i.e., inappropriate refuse), the Driver uses a wireless hand-held device to record evidence using relevant media (e.g., photography or video) to upload to the system and stored with the daily Route information and easily observable by the Dispatcher, Route Supervisor or other approved city staff. The system inserts a notation on the picture or video of the responsible customer. The Route information collected by the system includes, but is not limited to, the ability to collect carts set out rate, routes driven, miles driven, accelerometer information, time on route, seat belt use, truck weight, and gross vehicle weight. The mobile device uploads the required Route information incrementally throughout the day representing the entire daily actuals. The mobile device is permanently fixed to the Driver's console and ergonomically accessible. The mobile device must be ruggedized to survive in harsh environments. |
| CRDI04 | **Customer Care and Billing/applyCharges** | Explain ability for the system to interface using the city's IBM Integration Bus, enterprise service bus (ESB) or ESB past performance. |
| For excess refuse bags or other debris removal, there may be additional charges that apply. The Driver or Operations Staff use the system to enter extra items removed. Based on the type and volume of services entered (extra refuse bags, additional debris removal, etc.), the system applies required charges to the Customer Care and Billing (CC&B) system. |
| CRDI05 | **Provide Waste Pickup and Reduction/reviewRouteStatus** | Describe solution relevant to the functional description or explain developmental approach and experience. |
| The Route Supervisor and Dispatcher use the mobile device to observe the Driver's status such current location, route driven, and other relevant status information collected by the Driver's mobile device. The Route Supervisor, Dispatcher and Driver communicate using voice over IP (VOIP) or similar technology when needed. The system uses push-to-talk similar to hand-held radios and the system records all communications including text messaging and email when needed. The system uses Long-Term Evolution (LTE), commonly marketed as 4G LTE, a standard for wireless communication of high-speed data for mobile phones or similar technology. |

# 2.0 Ensure Customer Cart Needs

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| Select to enlarge... <http://austinea.org/arch/arr/ensureCustomerCartNeeds/UCD.jpg> **Use Case Diagram Ensure Customer Cart Needs** |

**Scope:**During daily operations, customer carts may inadvertently fall or slip into the truck's hopper, require repair or replacement, or require a change in service. The system provides the Driver a lost cart indication. Using the system, the Driver confirms a cart is lost in truck's hopper. On the Route Supervisor's route display, the system provides indication of lost cart in hopper, including Cart Identification information. The system displays the same information on the Dispatcher's display. The system uses the customer Cart Identification to identify the Customer in the Customer Care and Billing system to provide notification via text message or email of the lost cart and the anticipated replacement schedule. During daily operations, the Driver uses the system to identify a cart as needing repair or replacement. The system stores cart repair or replacement information along with the Cart Identification information. The system provides a queue mechanism to assist in efficient routing for Cart Maintainer staff. Customers call Austin Energy to open or close an account for services with Austin Resource Recovery or to make other changes to services. The Customer Care and Billing system updates the Cart Identification information and updates the system with pickup or delivery schedule. The Cart Maintainer use the system to navigate to scheduled daily cart locations based on service requests for repairs or replacements. After making repairs or replacements, the Cart Maintainer enters action taken or assigns new Cart Identification information with the cart customer.

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| Select to enlarge... <http://austinea.org/arch/arr/ensureCustomerCartNeeds/01SD.jpg> **Sequence Diagram Ensure Customer Cart Needs** |

**Table of Interface Descriptions**

| **Req#** | **Type/Interface - Requirement Description** | **Performance** |
| --- | --- | --- |
| ECCN01 | **Provide Waste Pickup and Reduction/indicateLostCart** | Describe solution relevant to the functional description or explain developmental approach and experience. Contractor may propose alternative, effective solution. |
| During daily operations, customer carts may inadvertently fall or slip into the truck's hopper. The system provides the Driver a lost cart indication. Using the system, the Driver confirms a cart is lost in truck's hopper. The system ensures a cart in truck dump arm when returned to downward position to verify cart lost in hopper. When a radio frequency identification (RFID) picks up the customer information such as name, phone number, address, etc., this information is stored with the lost cart indication. Current cart inventory provides a small number of carts with an RFID device. If RFID does not exist, the system displays a list of known addresses in the surrounding area for the Driver to make a visual determination of the appropriate address selection - e.g., the system correlates Customer address with the cart number or the Driver makes address observation. |
| ECCN02 | **Provide Waste Pickup and Reduction/notifyRouteSupervisor** |
| On the Route Supervisor's route display, the system provides indication of lost cart in hopper, including Cart Identification information. The system displays the same information on the Dispatcher's display. The system uses the customer Cart Identification to identify the Customer in the Customer Care and Billing system to provide notification via text message or email of the lost cart and the anticipated replacement schedule. The Driver may also choose to leave a note on the customer door. Route Supervisors are responsible for replace lost carts within 48 hours. |
| ECCN03 | **Provide Waste Pickup and Reduction/indicateRepairReplace** |
| During daily operations, the Driver uses the system to identify a cart as needing repair or replacement. When the vehicle's radio frequency identification (RFID) identifies the cart, the Driver uses the system to indicate observed cart condition and recommended repair or replacement actions required. When no RFID or RFID is unreadable, the system displays a list of known addresses in the surrounding area for the Driver to make a visual address determination or use the system to determine address from the cart number. The Driver uses a portable hand RFID scanner or cart number to identify damaged carts when the vehicle lift mechanism is unable to scan the cart. |
| ECCN04 | **Provide Waste Pickup and Reduction/notifyCartMaintenance** |
| The system stores cart repair or replacement information along with the Cart Identification information. The system provides a queue mechanism to assist in efficient routing for Cart Maintainer staff. The queue ensures fair, responsive cart replacement or repair by efficiently concentrating cart maintenance needs within typical workday delivery zone. For carts that fall/slip into the hopper within the vicinity of the daily planned service deliver, replacement information shows up on that day's delivery schedule and provide the appropriate Route Supervisor cart replacement status to ensure 48-hour replacement turnaround. The system tracks cart count inventory prior to accepting replacement of fall/slip carts by Cart Maintainer staff. When Cart Maintainer cannot replace the fall/slip carts within 48-hour window, the system provides Route Supervisor cart status indication of need to replace the cart. |
| ECCN05 | **Provide Waste Pickup and Reduction/provideChangeOrder** |
| Customers call Austin Energy to open or close an account for services with Austin Resource Recovery or to make other changes to services. In the event of a service order such as change to cart size, the Customer Care and Billing system updates the Cart Identification information and updates the system with pickup or delivery schedule. |
| ECCN06 | **Provide Waste Pickup and Reduction/maintainCartStatus** |
| The Cart Maintainer use the system to navigate to scheduled daily cart locations based on service requests for repairs or replacements. After making repairs or replacements, the Cart Maintainer enters action taken or assigns new Cart Identification information with the cart customer. The system uses enumeration elements for commonly repaired items such as replaced lid, wheels, etc. The enumeration list is modifiable by approved city staff. |

# 3.0 Service Brush, Bulk, and Household Hazardous Waste Request

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| Select to enlarge... <http://austinea.org/arch/arr/serviceBrushBulkAndHHWRequest/ucd.jpg> **Use Case Diagram Service Brush, Bulk, and Household Hazardous Waste Request** |

**Scope:**The 311 Call Advisor creates service requests for brush, bulk, and household hazardous waste via Motorola's Citizen Service Request (CSR) system. CSR also provides a customer self-service Web portal to allow customers to submit requests online. The 311 Call Advisor uses the system to indicate the type of refuse requested. The 311 Call Advisor uses CSR to generate a brush, bulk, or household hazardous waste work order - CSR processes the work order request with the system. For required audit work orders, the system notifies Supervisor to determine cost for out of cycle pickups. The Supervisor uses the system to determine daily out of cycle audit assessments to establish cost to service the work order. The system assigns audit needs based on geospatial information relevant to the assigned work area of the Supervisor. For excess refuse bags or other debris removal, there may be additional charges that apply. The Driver or Operations Staff use the system to enter extra items removed. The system logs the pickup information and provides a queue mechanism to assist in efficient routing for appropriate Operations Staff. The system displays the daily pickup information on the Operational Staff's mobile device using a geographic information system (GIS) map for optimal routing guidance. The pickup staff uses a mobile device to indicate pickup volumes and types recovered. If a service request (work order), the Operations Staff uses the system to close the request and/or to indicate condition and status serviced through 311 Advisor and the CSR system.

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| Select to enlarge... <http://austinea.org/arch/arr/serviceBrushBulkAndHHWRequest/01SD.jpg> **Sequence Diagram Service Brush, Bulk, and Household Hazardous Waste Request** |

**Table of Interface Descriptions**

| **Req#** | **Type/Interface - Requirement Description** | **Performance** |
| --- | --- | --- |
| SBBH01 | **Provide Waste Pickup and Reduction/establishServiceRequest** | Explain ability to integrate solution with the city's enterprise service bus (ESB) and the Motorola Citizen Service Request (CSR) system. |
| The 311 Call Advisor creates service requests for brush, bulk, and household hazardous waste via Motorola's Citizen Service Request (CSR) system. CSR also provides a customer self-service Web portal to allow customers to submit requests online. The 311 Call Advisor uses the system to indicate the type of refuse requested (e.g., brush, bulk, and household hazardous waste). The 311 Call Advisor uses CSR to generate a brush, bulk, or household hazardous waste work order - CSR processes the work order request with the system. For required audit work orders, the system notifies Supervisor to determine cost for out of cycle pickups. Based on the information entered, the system returns an estimated pickup date/time or anticipated range. On task completion, the system closes the CSR work order item. |
| SBBH02 | **Provide Waste Pickup and Reduction/performAuditAssessment** | Describe solution relevant to the functional description or explain developmental approach and experience. |
| The Supervisor uses the system to determine daily out of cycle audit assessments to establish cost to service brush, bulk, and household hazardous waste work order. The system assigns audit needs based on geospatial information relevant to the assigned work area of the Supervisor. The system tracks the number of requests per household to allow for a set number of free service requests before billing for the service. The number of free service requests is adjustable by approved city staff. The Supervisor uses the system to enter assessed volume/amount of audited material and associated cost relevant to the servicing household. |
| CRDI04 | **Customer Care and Billing/applyCharges** |
| For excess refuse bags or other debris removal, there may be additional charges that apply. The Driver or Operations Staff use the system to enter extra items removed. Based on the type and volume of services entered (extra refuse bags, additional debris removal, etc.), the system applies required charges to the Customer Care and Billing (CC&B) system. |
| SBBH03 | **Provide Waste Pickup and Reduction/queuePickup** |
| The system logs the pickup information and provides a queue mechanism to assist in efficient routing for appropriate Operations Staff. The system displays the daily pickup information on the Operational Staff's mobile device using a geographic information system (GIS) map for optimal routing guidance. GIS indicates pickup points and communicates location information to the Dispatcher and Supervisor device. The queue determines fair and responsive pickup schedule by efficiently concentrating pickup needs within typical workday delivery zones. |
| SBBH04 | **Provide Waste Pickup and Reduction/servicePickup** |
| The pickup staff uses a mobile device to indicate pickup volumes and types recovered. When a Supervisor previously performed an assessment audit, the system uses the volumes and types assessed. The system stores information to provide analysis of waste type and volume to determine if customer training and/or other waste management functions provide an effect on the amount and type of waste collected. If a service request (work order), the Operations Staff uses the system to close the request and/or to indicate condition and status (including notes) serviced through 311 Advisor and the Citizen Service Request (CSR) system. The user interface is simple to use and intuitive for simple routine information entry and push button (icon) focused to the maximum extent possible. |

# Logical Data Model

The following logical data model is not complete; rather, it's representative of kinds of information we wish to maintain.

| **Req#** | **Type/Interface - Requirement Description** | **Performance** |
| --- | --- | --- |
| LDM01 | **Logical Data Model** | Describe proposed solution relevant to solution logical data model or discuss developmental experience and performance. |
| The following logical data model is representative of our existing Solid Waste Tracking System (SWTS) used for reporting. The future system replaces and includes management dashboards useful for day-to-day operations and future planning. The sample logical data model does not propose this structure as a design; rather, we're including the LDM as a representative sample of the information we wish to integrate. |
| SS02 | **Provide Open Data Access** | Explain solution's ability to provide open data access. |
| The system provides access to all data records. The data must be accessible to create reportable data-marts and data warehouses as needed to accomplish reporting needs. The system must provide open standard Web interface protocols in order to synchronize application information using internal enterprise service bus. |

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| Select to enlarge... <http://austinea.org/arch/arr/ldm/SWSLDM.jpg> **Logical Data Model Vehicle Fleet Technology Upgrade** |

# 5.0 Supplemental Specifications

| **Req#** | **Type/Interface - Requirement Description** | **Performance** |
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| SS01 | **Manage Records** | Describe solution relevant to records management functionality. |
| The system prevents the loss or unauthorized deletion of records before the expiration of their retention period as authorized by an approved records control schedule or with the written permission of the Texas State Library and Archives Commission. Texas Local Government Records Act §202.001(a). The system prevents the unauthorized alteration of records before the expiration of their retention period. The system provides logs or audit trails that document edits and views of records. The system provides systematic deletion of records upon expiration of their retention period as authorized by an approved records control schedule or with the written permission of the Texas State Library and Archives Commission. Texas Local Government Records Act §202.001(a) and §201.003(16), Austin City Code §2-11-11. Sufficient metadata must be present to identify records eligible for disposition based on defined triggering events and dates. Upon expiration of the retention period, the system ensures destruction of all duplicate records to include convenience copies. Texas Rules of Evidence, Rule 1003. The system's back-up strategy ensures retention of backup records doesn't excessively exceed destruction of originals. System procedures must ensure retention rules apply to copies of production data used to develop, test, or train. The system ensures that records are retrievable and available until the expiration of their approved retention period. Texas Local Government Records Act §205.008(b). Records stored on contractor, outsourced, cloud, or hosted platforms remain the property and responsibility of the City. When contacted by an authorized City employee or when the contract ends or is terminated, contractors must deliver records, in all requested formats and media, along with all finding aids and metadata, to the City at no cost. Austin City Code §2-11-15. Until expiration of retention period, hardware and software must be available to access records and sufficient metadata must be present to facilitate timely retrieval of records. Contracts with hosted solution providers must specify the contractor’s duties with respect to management of records as required by Austin City Code §2-11-15. The system ensures retention of specific records – even if their retention period has expired – if they are the subject of known or reasonably anticipated litigation, public information request, audit or other legal action. Texas Local Government Records Act §202.002, Austin City Code § 2-11-11. The system maintains a log of litigation and other holds allowing release of holds after resolution of litigation, audit, or public information requests. The system creates records/logs of destruction activity. Texas Local Government Records Act §203.046, Austin City Code §2-11-11. Destruction logs must (a) show a minimal set of metadata sufficient to uniquely identify the records purged; (b) show who approved and who executed the destruction, and the dates on which these events took place; (c) reflect compliance with an approved, written standard operating procedure; and (d) be retained permanently. |