

Product Delivery

Scenario Overview

Metro Delivery Company (MDC) is a B2B company whose core business is delivering same day Intracity shipments originating from registered business partners to their destination. MDC delivery operations are provided in three major cities in Massachusetts, USA (Boston, Worcester, Springfield). The business is growing rapidly and is expected to expand to additional cities and states. To support the expansion, the company wants to automate specific business operations using the Pega platform which are:

- Business partner Registration and Renewal
- Delivery Slot Request / Demand
- Truck procurement
- Invoicing

Possible future business for MDC is to expand into moving services.

Actors

- **Executive Manager** – Approves registrations and renewals throughout the company
- **City Manager** – One for each city, responsible for manual truck allocation and maintaining shipping discounts and tracking shipment
- **Business Partner Manager** – Represents the business partner, registers business and can raise shipment requests
- **Truck Vendor Manager** – Represents the truck vendor and fills the details required for the registration process
- **Accountant:** External invoicing expert to complete invoicing process for each city.

Process Overview

Business Partners register directly on the MDC website to utilize shipping services. The Business Partner purchases a shipping price plan (see Appendix A) to register. Once registration is approved and payment is complete, business partners can login into the MDC delivery application to schedule shipments.

Business partners initiate shipping requests which consist of A pickup from the business partner, consolidation at the local warehouse, and then final delivery to the destination.

Upon delivery, the system will automatically notify the business partner that the delivery is complete and initiate invoicing for that delivery.

Process Details

Business Partner Registration and Membership Renewal

To utilize MDC product delivery services, business partners register directly on MDC website. The following information is gathered:

Name of the business:

Address:

Phone:

Contact Person (name):

Contact Person (email):

MDC allows Membership types as Bronze, Silver, Gold, and the registration cost varies by membership type. Registration requests are routed to the executive manager for approval. The registering Business partner is notified via email upon approval or rejection. An approved business partner will also receive their login credentials within the approval notification, so that they can login into the application to schedule shipments. Also, during the registration, A Delivery Price Plan is selected during the registration process which would affect the invoicing of the shipment request. (See appendix A)

The membership must be renewed every six months, and the partner will be able to upgrade or downgrade their membership during renewal. Renewal can be initiated at any time before the expiry of membership. A notification is triggered 15 days (about 2 weeks) prior to the membership expiry date. For any membership upgrade during the renewal process, the Executive Manager must approve. An email is sent to all the parties involved with the approval or rejection of the reasons mentioned.

Registered business partners are allowed only a single active registration at any time, and a registration is valid only for six months. Registered partners can cancel their registration when there are no pending shipment requests.

Business partner shipping request

The shipping process consists of a scheduled pickup in the morning, followed by delivery in the afternoon.

Shipment scheduling is prioritized by partner level. Shipments for Gold members are guaranteed for any number and category (size/weight) of packages if they reserve the shipping request up to 1 pm the day before the shipping date. This may generate a truck request (if required) and the respective 'city manager' is notified to check and confirm the availability. Based on the truck capacity, available space is released by 2 PM which is then available to be reserved by customers as follows:

Between 2 PM and 6 PM the day prior, silver, and bronze members can view the unused pickup capacity for the trucks which are already scheduled for pickups in the city for the next day and can reserve slots to pick up packages to utilize the remaining area in the truck. (See Appendix B for Truck Size/Weight

calculation). Between 6 PM the day prior, and 6 AM the next day (the shipping date), any members can reserve a shipment to utilize the remaining capacity.

Once business partners complete the shipping request, a cost estimation should be displayed for that request only. A business partner can make multiple requests for any given day.

In summary, when a gold partner schedules a delivery prior to 1 PM the day prior, this guarantees truck space for shipment and delivery (it may involve generating a truck request). The remaining space on trucks is calculated before 2 PM and can be reserved by other members according to the schedule above.

See Appendix B for shipping capacity detail.

Scheduling Example 1: Gold customer A schedules a shipment from Boston at 10 am the day before.

The shipment consists of SC01 category 6 packages. Gold Customer B schedules a shipment from Boston at 11 am the day before. The shipment consists of SC03 category 3 packages. This requires 39 capacity units in the truck. Let us assume, 64-unit capacity truck is available then 25 units space is available for other partners. At 2 pm, Silver Customer C schedules SC05 category 4 shipments, a, and Bronze Customer D reserves SC05 Category 3 shipments, leaving remaining capacity at 18 capacity units available. At 6 pm Bronze Customer E reserves SC02 category 4 shipments, leaving the remaining space at 2 units. These could be reserved up to 6 am, the day when the schedule is set.

Scheduling Example 2: Gold customer A schedules a shipment from Boston at 10 am the day before.

The shipment consists of SC02 category 20 packages. Gold customer B schedules a shipment from Boston. The shipment consists of SC01 category 12 packages. This shipment will consume 140 capacity units. Let us assume three 64-unit capacity trucks are available by 2 pm. One partially filled truck is available for other partners. The remaining capacity of 52 units can be reserved up until 6 am the next day, as discussed scheduled above.

Truck assignment is automatically made by the system, please read 'truck assignment' process.

Once the shipment is scheduled, every status change triggers a notification sent to all stakeholders. Cancel requests can be taken only before the item / product is picked up from the business partner. Gold partner's shipments can be cancelled any time up to 6 am of the scheduled delivery date, if the truck contains packages of only gold partner. If the shipment contains packages of Gold and other partners, the shipment continues with the other partner packages though the gold partner cancels the shipment request.

Truck Vendor Registration

Trucks are procured only from the registered vendor. MDC website has an option for the registration for the truck vendors, who wish to provide the truck services in specific city for products shipping and delivery.

Truck vendor registration process requires following details

- Truck company Name and Address
- Contact Name, Phone and Email
- City in which services can be provided (more than one city can be specified)

- Minimum number of trucks which can be provided daily per city (capacity of each truck is always 64 units – subject to change in the future)
- Truck registration number (VIN (Vehicle Identification Number)) of each truck
- Type of contract
 - **Daily assignment:** A company is contacted to supply up to a specified minimum number of trucks per city per day (automated assignment). Few cities allow only daily assignment contract due to many shipment requests.
- Flat rate of truck: \$50/Day.

Truck vendor registration with MDC may vary from city to city in future and the current design should support this requirement.

The Executive manager first reviews, then approves or rejects the registration. Upon approval, the city manager is assigned the task of ranking the companies who will provide truck services for that city.

Truck rating is retrieved from an external system by providing VIN, average rating of all trucks belonging to that company becomes the initial rating of the company. GTRS (Global truck rating system) a centralized truck rating system will provide the rating for a given VIN belonging to a state. The company's initial rating gets overridden after completion of every delivery. The city manager will rank every truck after delivery which will impact the truck company rating in turn. The average of all truck ratings will be the rating of the truck company. An update of truck rating will be sent to GTRS.

Assume that there will be no cancellation of agreements between Truck Vendors and MDC.

Truck Assignment

Available trucks are assigned automatically by the system in the descending order of rating. Orders should be taken for the available truck space on a given day. If available trucks are full, then orders should not be taken.

The Truck assignment process starts at 1 PM the day before (after all shipping requests from gold partners completes by 1 PM the day before shipment). Assume that there will be no shortage of trucks for assignment.

Truck assignment is automated as follows:

Daily assignment (automated): All companies who specify at least one truck for Daily assignment participate in this segment. Assignments are prioritized by ranking and are assigned in a round robin fashion.

- a. **First round:** The first truck from the higher-ranking company is assigned before the first truck from the lower ranking company, until all Daily assignment companies have been assigned one truck to supply, or no more trucks are required for assignment.
- b. **Second round:** Companies which have specified more than 1 truck to supply participate in the second round of truck assignment. Truck assignment is identical to the first round in which ranking determines assignment order.
- c. **Third round:** Companies which have specified more than 2 trucks to supply participate in the third round of truck assignment. Truck assignment is identical to first/second round in which ranking determines assignment order After completion of three rounds, a notification should be sent to the city manager with details of every round allocation and any pending truck assignments.

Post product delivery and Invoicing

Once a product is delivered to the customer, the truck driver updates the city manager with a phone call (automation of this step is not in the scope of current MLP). The city manager updates the system with

the status as product delivered. Invoicing starts after the product is delivered. The system should be updated with the products delivered.

Invoicing for business partner: As per the 'Delivery Plan' purchased by the business partner, invoicing (PDF) should be generated for every business partner and should be notified.

Payments for Truck Vendor: As per the price of the truck utilized for that product delivery, payment receipt (PDF) should be generated that contains charges to be paid to the truck vendor and should be notified. Emails should not be sent, only attached to the case.

Once delivery is completed, the system should show the invoicing report. The invoicing report contains the charges plus tax applicable for that state. It is verified manually by the accountant and submits. Routed for approval by respective 'city manager.' The default discount that can be applied for a city is maintained by the executive manager (see Appendix D). If required, an additional discount of up to 5% is applied to the invoice by the city manager, before approving the invoice. The final invoice will be sent to the respective business partners. Once the payment is received, it is manually verified, and will be updated by the 'Accountant' and resolves the process. The city manager is also responsible for validating the applicable taxes.

The invoice generated for truck vendor payment should be routed directly to the respective city manager for approval. Once approved, it reaches out to the accountant to pay the charges to truck vendor and resolve the payment process.

The current invoicing is simple, but in future it will become more complex as MDC is in plan to expand the business. Different invoicing methods may be applicable for different new lines of business; hence MDC has appointed invoicing experts as contractors. They are responsible for processing the invoicing.

The 'Accountant' system is a separate system, dedicated to invoicing. PKM agency is an expert organization. PKM provides accounts-related support to MDC and has access only to the invoicing process of MDC. Currently, PKM has one Accountant per city.

PKM accounting is specialized in accounts supporting various clients in the market. PKM is flexible to support accounting workflow defined by its client or if client wants PKM can build the workflows for them. In the current scenario MDC designs, defines and develops accounting workflow required for Product delivery, however the payments and receivables are maintained, and validated by PKM accountant.

Future Processes – enhancements / phase 2 requirements

As part of phase 2 requirements, MDC would like to introduce 'Moving Services' as a new business as a part of expansion.

Moving Services

As MDC is doing good in product delivery, it wants to expand their delivery business. MDC is planning to enter 'Moving Services.' Any individual can request for 'Moving Service' on their website. MDC will dedicate a Truck and Driver for Moving service as per individual request. A separate price chart to be prepared for Moving services.

Security Requirements

- Only Executive Manager can approve registrations and renewals
- Business partners can we view only their requests and reports
- Accountant can access only invoicing process
- Partner Type and Pricing Plan can be updated only by Executive Manager
- City Manager can see requests only pertaining to their city
- Truck vendor registers on MDC website and provides the required details, they do not have access to the application.
- Profit-related information should only be seen by the Executive Manager and city managers can view their respective city profit information.

Reporting requirements

The application must be designed in such a way to support the creation of the following reports

- Executive manager reports
 - Profit report: required for week /month /quarter / year
 $\text{Revenue} = (\text{payment received from business partner}) + (\text{Registration / Renewal charges})$
 $\text{Profit} = \text{revenue minus charges paid to truck.}$
 - Registrations and Renewals at end of every quarter are generated and sent to the executive manager.
 - Products delivered per partner graphically within given date range on the dashboard of the executive manager
- The City Manager has access to all reports of the Executive manager but can view only specific to their city.

User Interface Requirements

It is expected that User Interfaces, including views used in Portals, can be maintained in APP Studio.

Appendix A

Membership fee and Delivery Price Plan

- Business should purchase a single membership level --- Bronze, Silver, and Gold – these categories and fees may vary in the future –
 - Bronze - \$100
 - Silver - \$200
 - Gold - \$500
- After purchasing a membership, a business should select a “Delivery Price Plan” to utilize the product delivery services
- Available delivery price plans are as below
 - **Tiered Pricing** - Available for only gold business partners
 - **Volume Pricing** –Available for both gold and silver business partners

- **Unit Pricing** - Available for all partners. Unit price is \$25 per package.
- The design should support the additional pricing plans like Freemium / Premium for the future.
- The following chart represents the price for Tiered and Volume. Billing is done based on the 'Delivery Price Plan' selected by the Business Partner during registration / renewal. The number of packages shipped is considered while billing as per the delivery price plan.

Number of packages shipped	Price
0 to 10	\$50
11 to 30	\$30
31 to 100	\$20
Above 100	\$10

Billing Example

Assume we have 65 packages to be shipped.

Tiered pricing:

First 10 packages $10 * 50 = \$500$

Next 20 packages $20 * 30 = \$600$

Next 35 packages $35 * 20 = \$700$

Total shipping cost is $\$500 + \$600 + \$700 = \1800

Volume pricing:

65 packages come under third type; Total shipping cost is $65 * 20 = \$1300$

Appendix B

Shipment Categories Each package needs are assigned a category which estimates the volume/weight of the shipment as follows:

Category	Dimensions	Weight	Units
SC01	60 inches * 60 inches	250 lbs.	5
SC02	48 inches * 48 inches	200 lbs.	4
SC03	36 inches * 36 inches	150 lbs.	3
SC04	24 inches * 24 inches	100 lbs.	2
SC05	12 inches * 12 inches	50 lbs.	1

No Package should be over 60 inches in any length, or over 250 lbs. The category assigned to the package represents the capacity unit required in the truck to accommodate the package.

Appendix C

Delivery Request Format

Category	Number of Packets	Pickup Location	Delivery Location	Customer Contact Number

Appendix D

Partner discounts applicable on invoicing

The discounts applicable for a partner are managed by the executive manager with the following initial values. Partner discounts are applied by default to the invoice, before routing it to the city manager. If required, an additional discount of up to 5% is applied to the invoice by the city manager.

These default values can be changed in future, with partner type and can be updated any time.

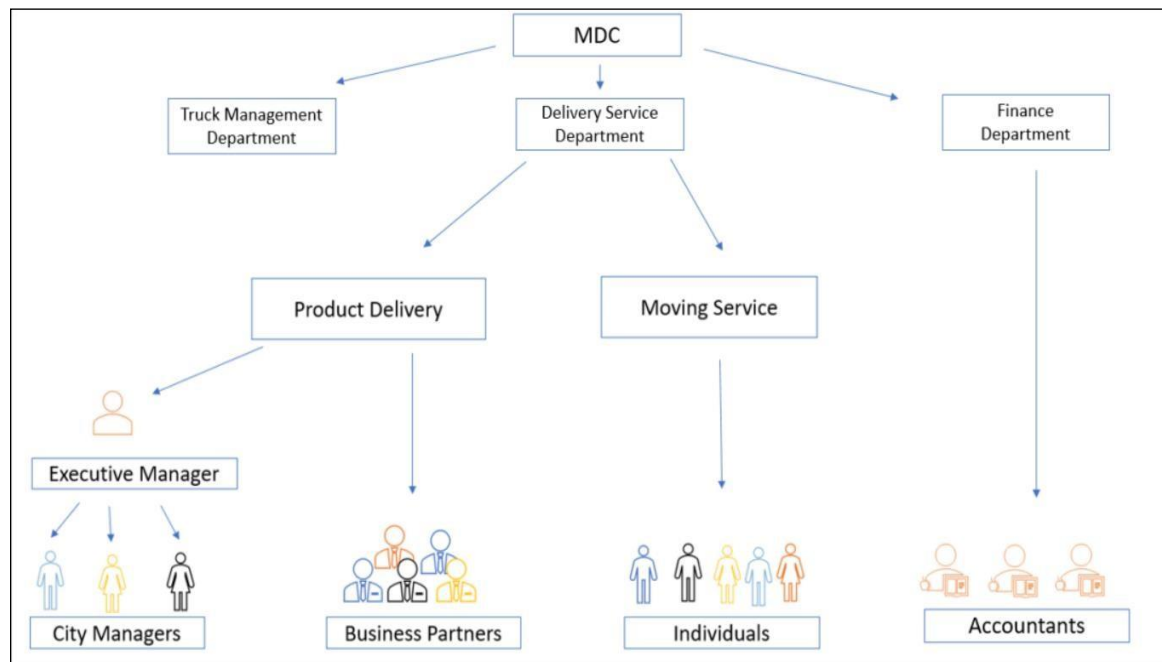
Partner Type	Total invoice	Applicable
Gold	above	12%
Silver	Above	10%
Bronze	Above	8%

Appendix E: Users and Roles

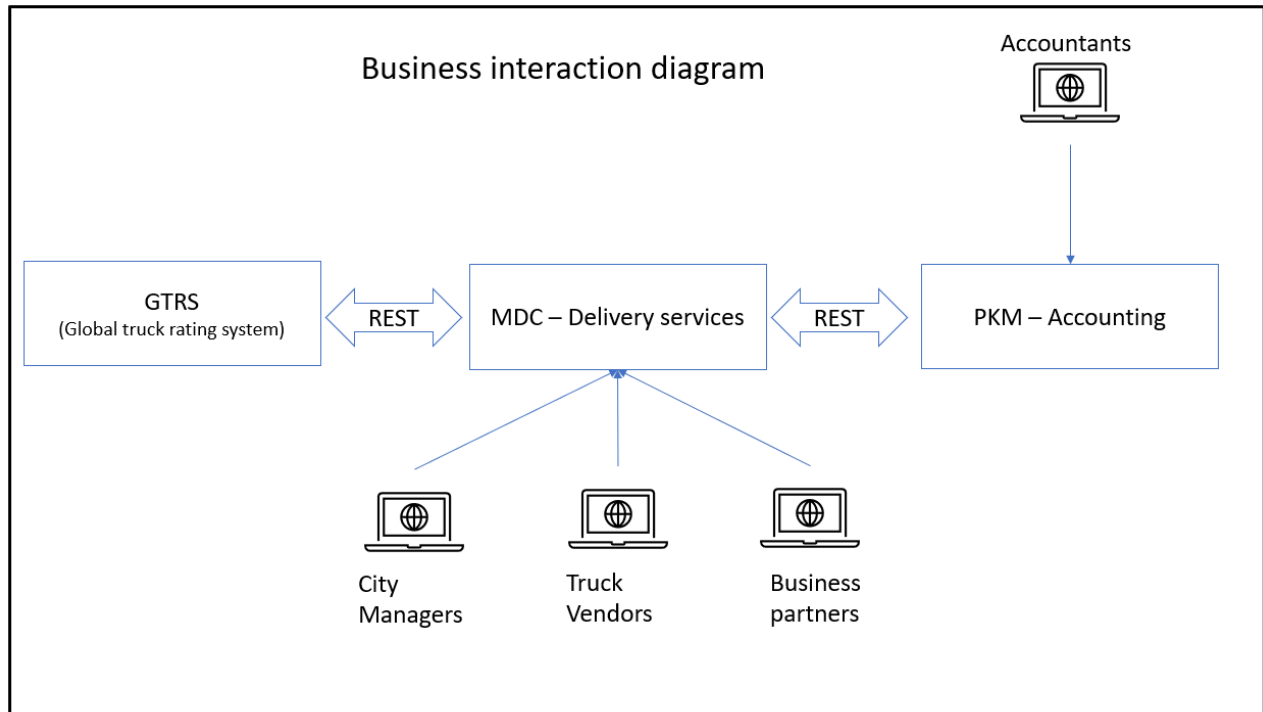
Roles	User ID
Executive Manager City Manager	ExecutiveManager@MDC BostonCityManager@MDC WorcesterCityManager@MDC SpringfieldCityManager@MDC
Business Partner Manager	Create operator for every business partner. Include the city name in the operator ID.
Accountant	BostonAccountant@PKM WorcesterAccountant@PKM SpringfieldAccountant@PKM

Appendix F: Organizational Structure

MDC's organizational structure for Product Delivery Services looks as follows:



Business interaction diagram



Build phase expectation – Build GTRS, MDC, PKM accounting in Pega platform as independent applications which can work in individual Pega instances in production. For non-production they can be in a single Pega instance with three separate applications.

Design Questions

MDC is expecting design solution for above given scenario, but also wants to understand viable solutions for the below design only questions. These questions should be answered at the END of the design template document.

Design Question 1: MDC wants to add Moving services. Explain how your current design of registration, pricing, delivery request and invoicing will support the addition of this new delivery services.

Design Question 2: MDC wants to expand the business to other states in the USA. Provide your design to accommodate the requirement of considering the state specific tax regulation during invoicing.

Design Question 3: Gold Business partners want the ability to schedule recurring shipments (Daily, or weekly). Tell us how you would accommodate this request in the recommended design.