Integration of Transportation Management System

The Integration of Transportation Management System ES bundle provides for the seamless integration of SAP ERP with SAP Transportation Management (SAP TM) or with third-party transportation management systems (TMS). Through the enterprise services that the Integration of Transportation Management System ES bundle provides, greater business process flexibility can be achieved. Use of SAP TM or another TMS along with the Integration of Transportation Management System ES bundle allows transportation planners to turn over the details of arranging for shipments to a system designed to optimize this important task.

Implementing the enterprise services in the Integration of Transportation Management System ES bundle allows manufacturers, retailers, and logistics service providers to:

- Offload the many complexities and details of arranging logistics to a system dedicated to optimizing this important process
- Improve shipment accuracy and efficiency
- Increase visibility of goods and shipment processes
- Reduce costs throughout the entire transportation ecosystem

The Integration of Transportation Management System ES bundle leverages enterprise SOA by enabling service-based communications between SAP ERP 6.0 and SAP Transportation Management or a third-party transportation management system.

Audience

The Integration of Transportation Management System ES bundle can be deployed by companies in the manufacturing industry, specifically consumer products, mill, chemical, automotive, retail, and high-tech manufacturing as well as those in service industries such as retail, logistics service providers, and transportation service providers. Once integrated with SAP TM or a third-party TMS solution, the Integration of Transportation Management System ES bundle provides data transparency across transportation networks.

For details on Service Operations, Business Objects and Process Components, please check the ES Workplace.

How To Use This ES Bundle

Implementing the Solution

Freight shipping can account for between one-third and two-thirds of a company's total logistics costs. As such, the cost of transportation represents one of the single most important factors for all manufacturers and retailers to consider when contemplating the logistics of their deliveries. This is particularly true when businesses recognize that in today's economy it is possible for the costs of products in distant markets to be
In the past, logistical processes for shipping freight were frequently handled using third-party systems that were either stand-alone, and possibly tracked through spreadsheets, or integrated with SAP ERP using EDI-based interfaces. Even though EDI allowed for electronic communications - in other words, it was a better way to manage logistics than a spreadsheet - it still had limitations. First, all transactions were typically processed only once a day, usually at night, as a batch. If changes had to be made, they would typically take another day. Also, efforts to create the most rudimentarily connected systems required custom code that was costly and fragile; upgrades to either system would break the integration. Furthermore, SAP ERP's business process for creating shipments had to be followed in a specific format, starting with a sales order and then creating a delivery that would be converted into a shipment. The service enablement of SAP ERP along with its integration with SAP TM and potentially other transportation management systems offers more flexibility in adapting business processes to suit corporate needs.

Now with the enterprise services offered by the Integration of Transportation Management System ES bundle, logistical processes that once took days and even weeks can be reduced to minutes and seconds. Greater monitoring is possible, along with the ability to allow a dedicated TM system to take over all the details related to logistics planning and optimization, offering savings in time, money, and effort when arranging shipments to customers. With the service-oriented environment and standardized messages that the Integration of Transportation Management System ES bundle makes possible, integrating disparate systems is much easier, while updating business processes, models, and methods becomes increasingly effortless.

This section will explore a series of use cases for the Integration of Transportation Management System ES bundle. In general, the use cases assume that SAP TM is being deployed, though integration with third-party transportation management systems is also possible. Each use case will show how different outcomes can be achieved by using the enterprise services in different combinations. Note that these examples may refer to users directly invoking enterprise services. This illustrates the flow of the service operations; in fact, service operations are invoked by an application, by an application's user interface, or by another service operation.

While these examples illustrate a few of the ways that this ES bundle could be used, the intention is to show the flexibility and reusability of these business objects and enterprise service operations so that you will have a clearer understanding of how to best deploy them in your own environment. This wiki is also a space for you to share knowledge and collaborate with others who are implementing the Integration of Transportation Management System ES bundle.

**Use Case 1: Outbound Logistics**

In this use case a transportation manager collects sales orders in SAP ERP, creates deliveries, and then for example notices that certain deliveries are going to the same location. These deliveries are then used to create a "master" shipment. However, he would rather not deal with the logistics of a "master" shipment that might be sent by any number of transportation modes and through any number of legs of a journey. Such details are best handled by a transportation management system.

SAP TM uses optimization algorithms to figure out the best way to send the consolidated shipments at the least possible cost. It can select routes, transportation modes, and freight forwarders or carriers. As such, the transportation manager need not concern himself with the shipment's logistics. Instead, he simply invokes the Request Shipment Request service operation, which uses the Outbound Delivery business object. A Shipment Request is based on the industry standard EDIFACT message. SAP TM combines related shipment requests into one, and calculates the means of delivery and route.

If the most efficient and cost-effective means of transporting goods is a single mode of transportation - such as by truck, rail, air, or carrier - SAP TM will use that mode. However, SAP TM can just as easily arrange any combination of transportation

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modes and may well determine, for example, that it is best to use truck for the first leg of the route, rail for the second, and truck again for the third.

SAP TM combines shipment requests into a freight order. Based on this business object Freight Order SAP TM then invokes Request Freight Order Execution in direction of SAP ERP which in turn creates the business object Freight Order in SAP ERP. This business object represents the shipment document in component ERP-LE-TRA.

**Use Case 2: Tendering**

SAP TM can arrange for shipments, either to a single location or to and from multiple locations. However, the transportation manager might want to know ahead of time how much the shipment will cost. The process of obtaining a quote is called tendering.

To obtain a quote, the transportation manager again creates shipments (business object Freight Order) in SAP ERP. To trigger a tendering process for shipments, he invokes the Request for Supplier Freight Quote service operation, which uses the Freight Order business object. SAP TM then sends out a Freight Request for Quotation, which may either be broadcast to a number of logistics service providers or sent to a single preferred provider.

The logistics service provider then responds with a quote for the freight order, which becomes a freight quote in SAP TM. The freight quote can be automatically accepted by the transportation planner if it falls within preset limits or may need to be approved manually.

In response to the request for quotes, SAP TM can receive a freight confirmation. It can also change a shipment based on the quote it receives. To finalize the process, SAP TM will invoke service operation Supplier Freight Quote Notification to SAP ERP which effectively updates the shipment document with the tendering result.

**Use Case 3a: Freight Invoicing - Creation of Supplier (Carrier) Invoice**

After the tendering process is completed and the carrier has been ordered to execute on the transportation request an invoice can be expected from the logistics service provider (LSP). SAP TM can be leveraged to pre-calculate the exact transportation charges to be expected from the LSP. This process is intended to either automate the payment of carrier services (self-pay) or set-up a process to validate invoices in more detail. In times of rising fuel costs, the calculation of accessorials like fuel surcharges and port handling charges is becoming increasingly important. SAP TM in an early stage can calculate transportation charges with the help of the Freight Order business object.

As a preparation step, a freight clerk can invoke the service operation Request Freight Order Invoicing Preparation based on business object Freight Order in SAP TM. In SAP ERP service operation Maintain Purchase Order based on Freight Order Invoicing Preparation will be used to create business object Purchase Order. This purchase order essentially represents the procurement of transportation services.

SAP ERP can leverage service operation Confirm Freight Order Invoicing Preparation to confirm the creation of the purchase order to the external TMS system. SAP TM receives this confirmation in form of service operation Change Freight Order based Freight Order Invoicing Preparation Confirmation.

Best practice would now wait for the transportation execution to start, e.g., the pick-up taking place by the carrier. Once this activity is confirmed, the freight clerk can create the business object Supplier Freight Invoice Request and invoke service operation Request Supplier Freight Invoice Request in SAP TM. In return, service operation Maintain Supplier Invoice based on Supplier Freight Invoice Request Request is invoked in SAP ERP and creates business object Supplier Invoice.

This supplier invoice is then used to actually complete the payment process in ERP-FI/CO once an electronic invoice comes in (Electronic Receipt Settlement/ERS) or a physical invoice is put in manually into the system.

SAP ERP can invoke service operation Confirm Supplier Freight Invoice Request in direction of SAP TM which uses service operation Change Supplier Freight Invoice Request based on Supplier Freight Invoice Request Confirmation.
Use Case 3b Freight Invoicing - Creation of Customer Invoice

A further use case showcases how a company can pass on costs of transportation services to its customers. SAP TM can be used to calculate transportation charges based on a multitude of logistical factors such as mileage, weight, and volume. In more sophisticated scenarios, consolidated shipments such as multi-pick-multi-drop, continuous move or international multi-leg scenarios can be used to distribute costs accordingly to different partners or internal organizations. In some scenarios, long-term freight agreements determine how costs for transportation services are being passed on to clients - these freight agreements also handle contractual terms such as payment terms or rebates.

In this case, a customer service representative uses the business object Customer Freight Invoice Request in SAP TM and invokes the service operation Request Customer Freight Invoice Request. This in turn addresses the service operation Maintain Customer Invoice based on Customer Freight Invoice Request Request in SAP ERP and creates the business object Customer Invoice in ERP-SD.

Service operation Confirm Customer Freight Invoice Request can be used to confirm the creation of the customer invoice in SAP ERP. SAP TM receives this in form of service operation Change Invoice Request based on Customer Freight Invoice Request Confirmation.

This customer invoice can be used to send an electronic invoice, fax, or printed document to a customer asking for payment of these transportation services. Integration to ERP-FI/CO will handle the physical settlement of these charges.

Future Directions

There are several possible future directions for the Integration of Transportation Management System ES bundle in conjunction with SAP TM and other third-party systems.

Whereas manufacturers and retailers on the outbound side of the logistics equation can now create invoices, in the future it is likely that the ocean carrier providers themselves will be able to use the Integration of Transportation Management System ES bundle to create invoices, as well, which they can present to customers upon delivery of goods. Request booking may also be a possible functionality, providing customers with the ability to reserve containers on a given carrier weeks in advance of actual shipment dates.

Should customers desire a proposal that details various methods, based on speed or availability of routes, by which they can ship goods from departure points to final destinations, enterprise services may be added to this ES bundle to provide this functionality. The costs associated with each method, respectively, will be included in the proposals. When sourcing or material availability contingencies factor into shipping costs, the ability to split deliveries into multiple orders that were originally scheduled to be shipped in a single master shipment will play a vital role in these aforementioned use cases. Interfacing the Integration of Transportation Management System ES bundle with RFIDs, satellite GPS, or Google maps would also provide a host of opportunities for logistical innovations.

System Requirements

- SAP ERP 6.0 with EhP3 (or higher)
- SAP ERP SOA Add-On
- SAP NetWeaver Process Integration (formerly XI)
- optional: SAP Transportation Management Release 6.0 (or higher)

End-to-end Processes Where This ES Bundle Is Used

- Logistics and Fulfillment Management

Links

- SOA Homepage on SDN