

SAP® TRANSPORTATION MANAGEMENT

A STAND-ALONE APPLICATION –
FULLY INTEGRATED

SAP® solutions solve the core dilemma of transportation: how to meet the unique delivery requirements of your customers while still achieving profitability. You can integrate business processes across your entire enterprise and extended transportation network. The SAP Transportation Management application enables you to plan, schedule, and dispatch transportation orders; collaborate with logistics service providers; and manage freight costing and settlement processes. It can help you manage task-, industry-, and company-specific processes; automate decision making; and deliver real-time event notifications to underlying processes.



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INCREASINGLY COMPLEX TRANSPORTATION ISSUES

TOUGHER THAN EVER TO MANAGE ALL THE MOVING PARTS

Commercial transportation has become an extremely complex procedure involving worldwide networks of business partners and logistics service providers (LSPs) moving raw materials, parts, and finished goods along global supply chains. Now more than ever, transportation operations require greater accuracy, speed, and flexibility to manage all the moving parts.

Whether your organization is a global shipper, local third- or fourth-party logistics (3PL or 4PL) company, or car-

rier, your transportation and distribution strategies must be supported by solutions that optimize the buying and selling of transportation services. Your supply chain network should be tightly integrated to support transparent global and domestic shipping in areas such as:

- **Transportation request management** – Managing the order receipt, life cycle, and completion of transportation requests
- **Planning** – Planning sales, purchases, stock transfers, deliveries, and order returns (including route and LSP optimization and tendering) while

continuously improving simple to complex routing and LSP selection decisions

- **Subcontracting** – Planning equipment and resource capacities with carriers and other LSPs
- **Transportation operations** – Getting the shipment picked up, loaded, and on the road through a transparent yet controlled process
- **Transportation charge management** – Determining and accounting for freight-related billing to customers, expenses for accruals, and payments to LSPs
- **Process integration** – Integrating the supply chain network to support complete visibility and transparency for both global and domestic shipping while measuring important process metrics
- **Technology** – Supporting growth and stability with a future-proof platform based on worldwide standards such as service-oriented architecture

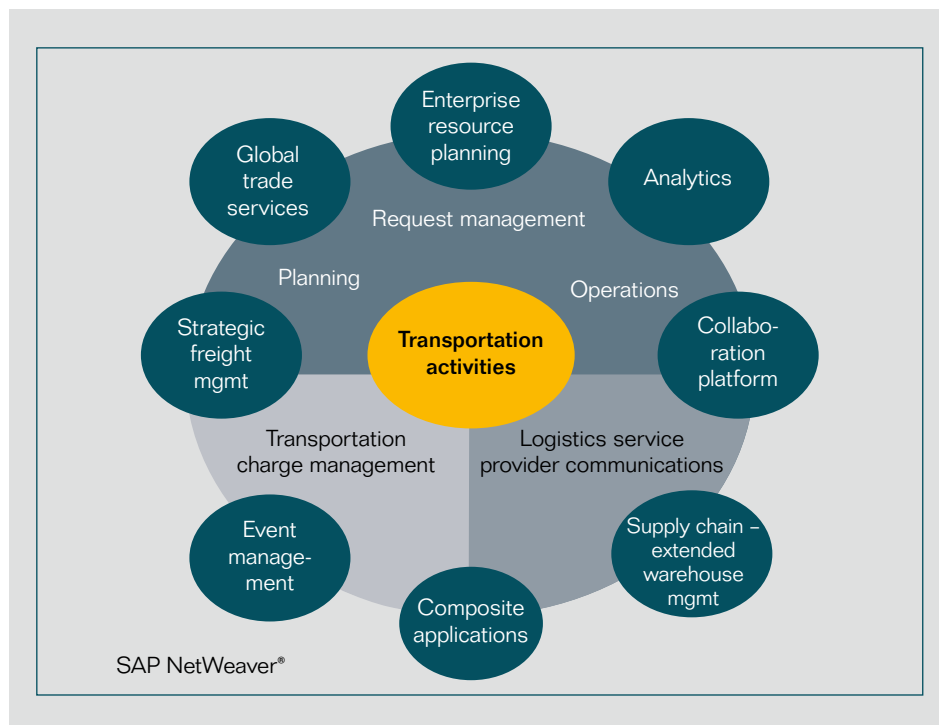


Figure 1: A Transportation Platform for Growth and Flexibility

A ROBUST, FLEXIBLE APPLICATION FOR TRANSPORTATION MANAGEMENT

KEY FUNCTIONS

From the time an order is received from a customer, you have to efficiently plan, execute, and manage your operation to meet customer expectations. The SAP® Transportation Management (SAP TM) application simplifies and enhances your transportation processes by providing a robust order management environment. You can automatically route orders, collaborate with carriers, rate orders, generate documentation, coordinate with the warehouse, ship product, and track every step.

SAP TM also provides flexibility to combine and manage transportation processes according to your company's needs. Figure 2 shows how information can flow internally and out to partners to support transparency and control.

Process Overview

Whether your organization is a carrier, freight forwarder, 3PL, or an in-house transportation department, orders are received throughout the day – quite possibly from multiple order management applications. SAP TM treats these orders as requests for transportation services, either as shipment requests or freight requests. From these requests, freight units are created and used to group shipment request items to be transported together. In addition, freight units can be used to

help in the process of automatically splitting large order sizes to fit within the available transportation equipment.

Activities also play an important role and help you manage each logistical step. Whether you have loading, transportation, unloading, or customs activities, for example, SAP TM automatically enables you to monitor and account for each.

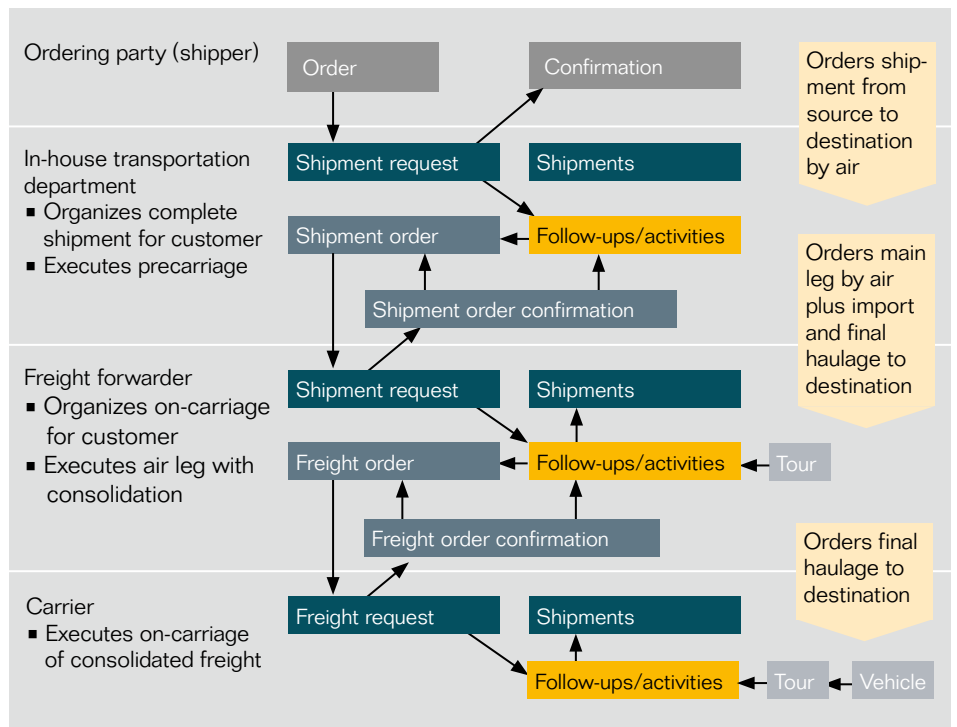


Figure 2: Process Overview

From the time an order is received from a customer, you have to efficiently plan, execute, and manage your operation to meet customer expectations. SAP TM simplifies and enhances your transportation processes by providing a robust order management environment.

- There may be additional information provided in the process such as the driver or vehicle information.
- The LSP may change the mode or carrier based on last-minute requirements.
- Use of standard content from the SAP NetWeaver® Process Integration (SAP NetWeaver PI) offering for incoming shipment request and freight requests
- Standard integration with different SAP applications, including the SAP ERP application, for support with deliveries and shipments

Furthermore, these steps in the process are independent of each other, allowing for greater flexibility across the different functional areas of your enterprise. You may simply need to dispatch drivers and equipment for existing orders, execute and manage the tendering process, or simply coordinate the daily shipping schedule.

The next few sections outline in more detail the features and functionality of SAP TM.

Transportation Request Management

Your ability to manage orders affects your entire business. Orders must be managed in concert with other operations such as manufacturing, warehouse, and export and import activities. Orders represent what you have received, worked on, and promised to your business partners or customers and are often communicated using worldwide or regional standards such as ANSI x12 or EDIFACT. (EDIFACT is the international electronic data interchange standard developed under the United Nations as the communication protocol for administration, commerce, and transport.) SAP TM supports this through:

- Standard open interfaces allowing any back-end system to get connected

With SAP TM, you can plan the transportation of shipments for many common order types such as sales and purchase orders, returns, and stock transfers. You can use the order management functionality in SAP TM to create, edit, and confirm the transportation orders from your various ordering parties.

Transportation Orders

Transportation orders can originate independently of SAP TM from an external order management application or directly from SAP ERP. These are used to generate shipment requests (also known as “transportation requests”).

Managing the volume of orders throughout the day requires you to manage many different types of order information, while at the same time dynamically managing the changes that frequently occur to those orders. The shipment request helps you receive the order information more easily. SAP TM orders, both received and sent, are based on the EDIFACT standard, which streamlines communications. Also, knowing at all times the order status and its history helps you better communicate with your business partners. Shipment requests maintain this infor-

Once the shipment requests are planned and freight units created and ready to be dispatched, they will become shipment orders or freight orders. These orders represent the instructions and information to order transportation services from the LSP. This could be in the form of a tender or a simple bill of lading, for example. Throughout the process, each step retains a status, and each business partner can be notified through standard confirmation messages of the current status.

The flow will continue accordingly with minor variations depending on the business processes being supported. For example:

- The shipment request may be combined with other orders to create more economic shipment quantities or a multistop tour.

mation so you know what changes you have received, and you can send confirmations to ensure a closed-loop communication cycle.

There are many levels to the shipment request, helping you maintain information regarding products, partners, document references and attachments, freight costs and revenue, status and tracking, stops or stages, as well as any important notes, documents, references, or legal information. The software supports quotations for transportation charges and booking orders to reserve and book carrier capacity.

Quotations

Quotations can be created and stored to provide your internal and external customers the potential costs and route for an expected shipment request. For example, if you have been asked to quote the freight prior to receiving the purchase order for the material, the quotation provides a record of what you had initially confirmed to your customer. The shipment request can also be generated directly from the quotation, providing a complete document history of the order.

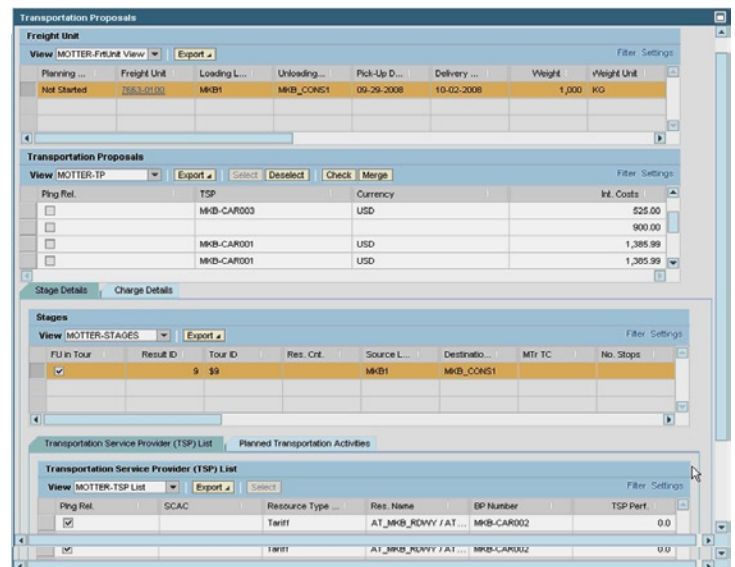
Transportation Proposals

Customers and business partners may request routing information at the time of transportation order creation. The transportation proposal helps you quickly generate feasible shipment plans for your order by determining the best possible routes, logistics service providers, and costs. On an order-by-order basis, you can view all possible routes based on carriers, capacities, real freight costs, and lead times, and then choose or use predefined strategies to allow automatic selection of the options that best fit your needs.

You can also automatically trigger the transportation proposal functionality when you create or change orders. This is especially useful for rush orders. For rush or last-minute orders, the ability to create shipments from orders automatically helps reduce total cycle time from the moment a customer enters an order until you load the product onto a vehicle (see Figure 3).

After determining an effective method to deliver your customer orders by using the transportation proposal, you can later take advantage of the functionality of the SAP® Transportation Management application to optimize routes even further. You decide how best to serve your customers while saving on freight costs.

Figure 3: Transportation Proposal



Ocean Shipment Management

Globalization and outsourcing of manufacturing processes to low-cost countries has increased the need for international transportation. Often, the ocean transport of an international multileg shipment presents a bottleneck as container vessels operate under regular sailing schedules.

Missing the cutoff time in a port can have a significant impact on promised customer delivery dates or on production facilities that depend on timely replenishing of raw materials or components.

The ocean logistics service provider (LSP) industry has grown over time; however, communication to these carriers even today is often not standardized or depends on manual or outdated processes (fax, phone). Automating booking and streamlining documentation processes can increase business productivity and lead to faster interaction and better service by carriers.

Finally, it is more important than ever to control supply chain activities and have end-to-end visibility of events influencing your logistics performance. Tracking shipments on a container level and tying these events to your core enterprise resource planning (ERP) logistics processes will allow adherence to service-level agreements and preparation for unexpected events such as port closures and severe weather delays.

The SAP® Transportation Management application helps you streamline ocean shipment by supporting the following processes:

- Booking
- Shipping instructions
- Documentation – ocean bill of lading
- Tracking and tracing

The message-based integration to a multitude of ocean carriers can be simplified by taking advantage of SAP partnerships with multi-LSP e-commerce platforms or “ocean portals” that have been founded since 2000. The “ocean portals” were formed for multi-LSP access and cover a majority of the global container capacity being shipped internationally today. Besides streamlining electronic communication with one standardized message format, shippers can take advantage of data quality-assurance measures and performance metrics provided by these ocean portals.

Booking Orders

Order-booking functionality allows you to obtain a commitment of transportation services from an LSP prior to the actual order receipt. You can use this to book two kinds of transportation services: booking an order for freight space or for a resource. With a booking order for freight space, you can book capacity. For example, you can book container space aboard an ocean vessel weeks in advance of the actual shipment. With a booking order for a resource, you can book a vehicle resource – for example, reserving a truck for a defined time period.

Managing Changes

Order changes can dramatically impact your current operations. In SAP TM, these are managed through business rules and alerts and are visible throughout the process. SAP TM uses sophisticated logic to help you manage these unexpected changes to your daily operations, such as automatically checking equipment space availability or notifying users of sudden shipment-scheduling changes. This is managed by the inbound controller.

The inbound controller in SAP TM checks important fields such as locations, order dates, quantities, and stage information, and can include other customer-specific fields as required. The action it takes with respect to the new changes depends on the conditions for those specific fields. Based on these conditions, the inbound controller will determine one of several strategies on how to manage the change, such as removing, updating, or keeping the associated freight unit.

When the condition is evaluated, the strategies determine how the changes will impact the existing documents and associated plans, if there are alerts to be sent, and if any existing business objects such as the shipment order should be rebuilt based on the changes. For example, if the new change does not exceed the capacity of the vehicle, no rebuilding would be required. However, if the change caused the trailer to be over capacity, then the strategy would determine how to rebuild the shipment order.

Planning

SAP TM functionality helps you reduce transportation-related costs, increase vehicle utilization, and improve on-time delivery of shipments. It involves routing and scheduling vehicles, selecting carriers, and tendering shipments to carriers. You can:

- Search for feasible solutions through sophisticated optimization techniques that factor in costs and penalties
- Manage more than 30 unique hard and soft constraints separately or in combination with one another
- Simultaneously view schedules, pickup and delivery routes, load consolidations, and vehicle assignments
- Assign carriers based on equipment constraints, allocations, and continuous-move options
- Link inbound to outbound shipments based on user-defined business rules

With SAP TM functionality, you can reduce the total costs of all shipments while maximizing customer service. The various engines help simultaneously plan single or multimodal shipments

manually or automatically, consolidate orders, identify transportation modes, determine delivery and pickup sequence, and schedule planned shipments.

Meeting Customer Expectations While Managing Costs

SAP TM determines the most effective transportation modes and routes, including the sequence of pickups and deliveries. The vehicle scheduling and routing optimizer automatically selects the mode and carrier depending on your customer satisfaction goals such as on-time delivery, lowest cost, and highest utilization.

With SAP TM, you can minimize costs while managing real-world hard constraints – such as:

- Vehicle capacities based on different units of measure such as weight and volume
- Transportation lead times
- Transportation modes compatible with the customer’s shipping and receiving facilities
- Product compatibility restrictions
- Appointment times
- Source and destination locations’ hours of operation

Some constraints are subjective, and SAP TM takes into account these “soft constraints” by using “penalties.” Essentially, penalties comprise a scoring system that assigns a value to logistics contingencies, such as delivering shipments too early or too late, or forces customer priorities when modeling optimization decisions.

With SAP TM, you can plan the transportation of shipments for many common order types such as sales and purchase orders, returns, and stock transfers.

Having the ability to incorporate master and transactional data constraints is an important aspect of integrating your order management processes. You can use customer master records or order information to factor the proper constraints into your planning efforts. Such constraints may include product incompatibilities (chemicals can’t be shipped with food products), space limitations at customer locations (the customer can’t accept equipment over 28 meters long), and scheduling stipulations (the seafood must be delivered before 8 a.m. on Friday).

There are also direct cost factors, which include distance, weight, volume, or time. These costs include variables such as the number of stopovers and the equipment used. Such cost parameters help you determine which route and schedule to use, and whether to employ commercial transportation, a company vehicle, or another mode.

SAP supports industry standards in many ways and at the same time, wants to decrease your time to imple-

ment and your total cost of ownership. Partners in the marketplace provide standardized content such as rates, distances, and geographic information system (GIS) information pertinent to transportation planning and operations. SAP supports integration with content from providers such as SMC³, which supplies LTL rates and transit times for many of the carriers in the North American market. Through services, we support mileage providers and GIS application support for ensuring correct distance and location information.

Automated Routing and Scheduling of LSP or Fleet Assets

You may also need the ability to manage, monitor, and schedule your own assets. Those assets could be on scheduled or standard routes. Or you may have specific assets such as power units, containers, or trailers; drivers you must utilize; or subcontracted assets such as a carrier's.

Equipment and Compartment Planning

In times of volatile energy prices, the need to support more complex transport operations with flexible planning tools becomes increasingly important. An inability to plan transportation assets on an individual basis leads to inefficient use of these assets and can cause competitive advantages in service or product offerings to disappear. In addition, these enhanced capabilities will support compliance with legal restrictions such as weight limits or hazardous goods restrictions.

SAP TM helps you plan at a more granular level by supporting the following:

- Driver, vehicle (tractor), and transportation unit (trailer) planning

- Managing driver certifications and qualifications
- Matching drivers to specific shipment orders based on their qualifications
- Maintaining separate independent planning for trucks and trailers to enable decoupling and coupling of truck and trailer in a single route
- Compartment planning
 - Identifying incompatibilities, such as restricting dangerous goods to certain compartments only, with enhanced functionality
 - Concurrently transporting different liquids or products (such as grades of fuel)
 - Possibly using flexible separators when planning capacity

Subcontracting

In planning, a transportation plan is created based on transportation requests (shipment requests and freight requests). In addition, freight units are created from the transportation requests during planning, either manually or automatically. During this process, various constraints are taken into account – for example, the requested delivery dates and times. Based on the transportation plan, SAP TM generates transportation activities and tours.

With SAP TM, the tours represent the outcome of your planning efforts. Tours and planned transportation activities are created to represent the logistical steps from loading to final unloading of the transportation resources. Using these planned activities, SAP TM helps you monitor and manage each step of the transportation process – loading, unloading, transit, customs, placing seals, and so forth.

In addition to tours, SAP TM shipment-freight and tour-builder functionality can also automatically generate the associated shipment and freight orders. These business objects are used to drive transportation operations.

Subcontracting – LSP Collaboration

LSP collaboration functionality helps you determine which transportation service providers (that is, carriers) you will use to deliver materials from their origins to their destinations. SAP TM applies rules for LSP selection, including priority, business share, and least freight cost, and helps you base your decision on these factors:

- **Priority** – Allocate shipments to preferred carriers, when the LSP has not yet exceeded its maximum shipment allocations.
- **Freight costs** – Select carriers based on carrier-tariff and contract data stored in SAP software or from external rate providers.
- **Business share** – Allocate shipments based on the business share your company has assigned to that carrier.

SAP TM uses an advanced algorithm to help you select carriers that offer the lowest-cost solution for all shipments. This technique also considers constraints such as equipment availability and allocations, customer-specific conditions, and continuous moves.

Equipment Allocations

You may need to manage your shipments based on the equipment availability of your LSPs or your own equipment. SAP TM can help you manage this process through allocations. This helps your carriers communicate their freight capacities and availabilities for

specific time periods across geographical areas. Transportation allocation describes both minimum and maximum capacity constraints used during LSP selection. You can use this information to determine the maximum and minimum number of shipments for each LSP per shipping and delivery location; transportation lane; time frame (day, week, or month); and transport.

From a technical standpoint, SAP TM integrates the business-object transportation allocation with the business-object shipment order and freight order. When you assign an LSP to a shipment order or freight order, the software tracks the existing transportation allocation availability. For example, if an LSP has 10 pieces of equipment available on Monday, and you select the LSP for 10 shipments and the LSP accepts all 10, the allocation logic will recognize that no additional equipment is available from that carrier.

The logic can be driven by source, source and destination, lanes, and regions (zones). You can then manage where the LSP is willing to send those shipments, as well – for example, if the LSP is only willing to accept a limited number of shipments to an undesirable location, but can still provide the remainder elsewhere.

Tender Management

Planning your tendering strategies in collaboration with your carriers helps you both streamline your work processes and benefit from reduced handling costs, greater transparency, and enhanced efficiency. Communicating through electronic data interchange (EDI) or e-mail, you can inform your

carriers about your shipment plans, and your carriers can accept, reject, or change shipment requests. For example, your LSP may suggest alternate pickup or delivery dates and times.

The main characteristics of the tendering functionality are a flexible configuration and the reduction of required manual interactions to support ease of use and lower total cost of ownership.

There are three methods of tendering:

- **Peer-to-peer** – Sequential tendering to preselected LSPs
- **Broadcast tendering** – Simultaneous tendering to preselected LSPs
- **Open tendering** – Simultaneous tendering to all LSPs

SAP TM supports cascade tendering, meaning that processes can be established to sequence through the individual tendering steps based on your needs. For example, the software will go through each of these in sequence until an acceptable match is determined.

Peer-to-peer tendering allows you to tender to your preferred LSPs one at a time. You can configure SAP TM to register an acceptance automatically

for each tender or to wait until the LSP responds with an acceptance, rejection, or change. The LSP may change the tender as with the earlier example, at which time the tendering manager would accept or decline the change. In the case of a rejection, the next acceptable LSP will receive a tender and a cancellation will be sent to the previous LSP. If no LSP accepts under the peer-to-peer method, the next method – such as broadcast or open tendering – will be started.

With both broadcast and open tendering, rules on timing and costs can be set to select either the LSP that responded first or the one with the lowest bid after a certain period of time. Each tender can also be given a time window in which the tender is valid.

SAP TM functionality creates tendering announcements from your shipment plans, providing your LSPs access to the tendering data via a collaborative portal and using other methods such as EDI, fax, and e-mail (see Figure 4). Your transportation planners can use the Internet to offer shipments to carriers, respond to carriers' offers, and supervise the status of the tenders.

Figure 4: Tendering in SAP® Transportation Management

The screenshot shows two tables from the SAP Transportation Management interface. The top table is 'Tendering Process Steps' and the bottom table is 'Transportation Service Provider (TSP) List'.

Sequence	Type	Tend. Type	E.Type	Eval.Type	Resp.Dura [h:mm]	Total Price Limit	Currency
1	P	Peer-to-peer tendering	F	First acceptable quote	2:00	0.000000	
2	B	Broadcast tendering	C	Cheapest quote after maximum response time	1:00	1,250.00	USD
3	O	Open tendering	C	Cheapest quote after maximum response time	:30	1,250.00	USD

Sequence	Bus. Part	Descript.	Ind. Tot. Price Lin.	Currency	Price_Lin_%	Resp.Dura [h:mm]
1	TM_CAR003	Fast Trucking & Logistics / Reading PA 19801	1,000.00	USD	100.000000	1:00
2	TM_CAR001	P&G Truck Lines / Pittsburgh 19088	1,000.00	USD	100.000000	1:00

SAP TM manages tender responses for you by automatically accepting tenders, tendering to the next priority LSP if the previous tender is rejected, as well as providing the opportunity for the LSP to respond with alternatives such as different pickup times.

Transportation Operations

Transportation operations are critical to putting your transportation plans into action. Key to these activities is managing the shipment orders and freight orders used to communicate with your LSPs.

Shipment Order

A shipment order describes a request to a transportation service provider to ship goods from a shipper to a single consignee with agreed terms and conditions. The corresponding confirmation from the transportation service provider is also part of the business object.

Freight Order

A freight order is a request to a transportation service provider to ship goods from shippers to consignees. For example, a multistop truckload shipment is a freight order comprising multiple shipment orders, each shipment order representing a unique origin and destination pair such as a distribution center to a customer.

The processes involved in readying shipments for dispatch to customers include picking, packing, staging, loading the shipments, and posting goods issue. At check-in (when trucks arrive on your premises), you can record information about the means of transport such as driver details, truck weights, and arrival times. You can store all this information in SAP TM and print it on the transportation documents (see Figure 5).

Managing the unexpected, such as late arrivals, missed appointments, missing inventory, and equipment problems, is critical to transportation operations. SAP TM provides your dock operations a work list personalized to the user or role to manage these exceptions, alert affected parties, and control the problem to minimize the impact on your daily operations.

Transportation Charge Management

SAP TM is designed to apply to companies that can either buy or sell transportation services. Services are sold by transportation companies either directly or indirectly through intermediaries such as 3PLs. The intermediaries themselves may provide their own transportation services as well. These services are ultimately purchased by shippers needing to move their products to the market. This component contains the functions for calculating and invoicing transportation charges, such as revenues, costs, and profits, for transportation services.

Depending on how you view the responsible parties – from the perspective of the carrier, the 3PL or 4PL, or the shipper – you need to manage the costs and revenue of services differently. Transportation charge management functionality supports complex rating based on transportation contracts and tariffs. With this functionality, you can sell those services to your customers with additional services charges and profit. For example, a 3PL can buy transportation services from

Shipment	Shipment Request	Shipment Order	Freight Order
House Sea Bill of Lading	Freight Forwarding Order (Inbound)	Freight Forwarding Order (Outbound)	Shipment Manifest
House Air Waybill	Confirmation of Freight Forwarding Order	Road Waybill (Europe)	
Road Waybill (Europe)		Road Waybill (USA)	
Road Waybill (USA)		Master Air Waybill	
Multimodal Transport Bill of Lading		Master Sea Bill of Lading	
Transportation Labels			

Figure 5: Document Generation

multiple parties, including carriers, consolidators and deconsolidators, freight forwarders, and so forth, and then sell those services to the shipper needing to move their products using those services. The customer will receive an invoice for the services provided. To represent these charges, SAP TM will calculate a customer freight invoice request. The service providers will invoice the 3PL for the services they provided based on contractual agreements. SAP TM will calculate a supplier freight invoice request for each service provider, which is used to accrue the costs to be paid by the customer.

SAP TM and the SAP ERP application are tightly integrated so you can tie freight costs back to the correct financial accounts and possibly aggregate those costs via channel, product group, and so forth. This way, you can determine the full cost of the customer order – and ensure that the correct representation for each freight-cost item appears in the general ledger. Non-SAP financial applications are also supported through standard interfaces so that third-party freight payment and financial systems can also be utilized.

Contracts and Tariffs

Transportation contracts are complex legal agreements requiring dynamic support to properly evaluate the costs and potential revenue of transportation services. Shippers in many countries derive freight costs from freight rates they negotiate with their carriers. With hundreds of forms and methods of calculating rates, the ability to calculate freight costs precisely is mandatory.

SAP TM separates the contractual terms of the agreements from the actual tariffs of the service providers to support flexible yet simple methods for determining the correct values. The freight agreement is used to represent the contract between the various parties involved, the payment terms of the agreement, credit limits, and services provided. The tariffs associated with the freight agreement are used to determine the basis by which the costs are calculated.

The tariffs are a combination of published rates, charges, or related freight conditions specific to customers and partners. The software determines the tariff based on the preconditions. During tariff determination, the software checks whether all preconditions are fulfilled.

The tariff determination conditions are specific to transportation charge management. Specific conditions allow you to maintain the most common condition directly, as follows:

- Geographic location (source location, destination location, source zone, and destination zone)
- Transportation mode (priority for transportation, transportation mode, and transportation means)
- Partners (in combination with the freight agreement partners)
- Services (service codes, such as service-level code, cargo code)
- User-defined rules (specific rules to determine the correct tariff)

Using a transportation-charge calculation sheet along with the tariff rates and scales, the total charges can be calculated based on the charge elements of the calculation sheet.

The software uses the transportation-charge calculation sheet as an instruction for determining which transportation charges to calculate, and how to calculate them, in order to bill customers for transportation services and pay suppliers for subcontracted services. The calculation sheet points to transportation-charge calculation elements, each of which can result in a calculated amount. For example, line-haul, detention and demurrage, and fuel surcharges can all be calculated separately. The calculation sheet is used to determine how these are accrued and whether they are applied as charges to another business partner such as a customer.

Customer and Supplier Freight Invoices

The customer and supplier freight invoices are used to hold the data for transportation invoicing. You forward this information via SAP NetWeaver PI to an enterprise resource planning (ERP) system, for billing in the case of the customer invoice and for invoice verification in the case of the supplier invoice.

For the supplier freight invoice, the transportation charges are calculated in SAP TM on the basis of a shipment order. For the customer freight invoice, the transportation charges are calculated on the basis of the shipment request (see Figures 6 and 7).

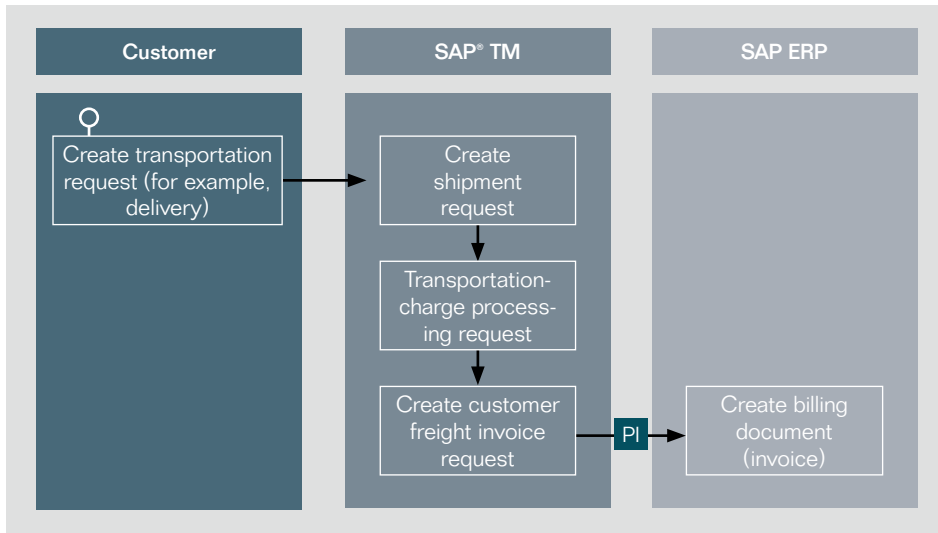


Figure 6: Customer Freight Invoice Process

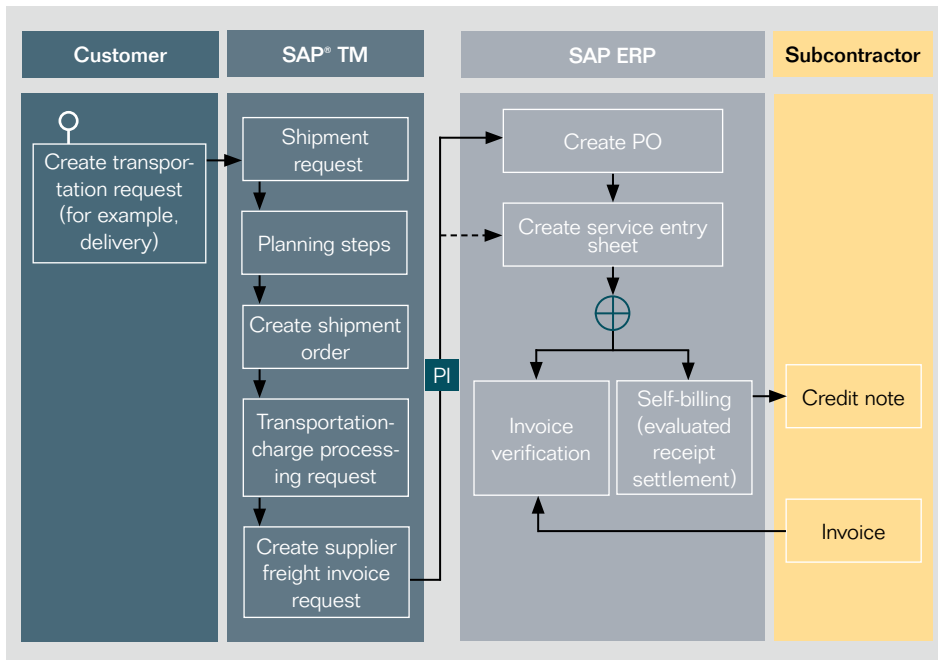


Figure 7: Supplier Freight Invoice Process

Freight Cost Settlement

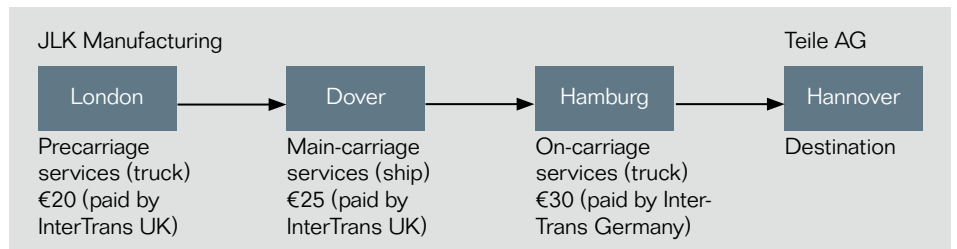
Transportation doesn't end with the shipment leaving the dock door; it also involves managing the freight payments and settlement to financial and cost accounts. Freight cost settlement functionality enables you to understand the impact of the costs of your shipments on the bottom line of the enterprise's many business units, sales channels, and products. Freight cost settlement includes:

- Assignment and forwarding of the shipment costs to financial and cost accounting for creation of accruals and posting of payables
- Automatic settlement using the self-billing procedure or manual settlement with the transportation service agent

Process Integration

Transportation does not occur in a vacuum, but is often part of the larger business process – for example, an order-to-cash or procure-to-pay process – or simply integrated with your warehouse operations. Frequently, there may be different applications supporting these processes, both SAP and non-SAP. With service-oriented architecture (SOA), communication across a disparate system landscape is managed through predefined services working in conjunction with SAP NetWeaver PI technology. Below are some primary business process areas that complement SAP TM and help you provide an end-to-end business process solution.

Figure 8: Intracompany Billing



Inter- and Intracompany Billing

For a third-party logistics provider or freight forwarder, managing cross-company transportation charges and revenues can be complex. You could be selling services from one organizational area to another while also purchasing those services for your own transportation requirements.

Figure 8 demonstrates how the sales organization of a UK-based freight forwarder, "InterTrans," sells an origin-to-destination transportation service to a customer in London ("JLK Manufacturing"), that has a customer ("Teile AG") in Hannover, Germany. InterTrans must purchase transportation services from providers that actually perform the movement. These transportation services are actually bought by the InterTrans UK purchasing organization and the InterTrans Germany purchasing organization. Hence, these two organizations are both responsible for paying the intermediary transportation service providers, and each organization needs to be reimbursed for its costs, plus a profit.

Revenue – The InterTrans UK sales organization sells services to JLK Manufacturing in London for a shipment to Teile AG in Hannover:

Revenue to InterTrans UK for the shipment request: €100.00

Costs – There are 3 shipment orders with the following associated costs:

▪ Precarriage services purchased by InterTrans UK (London to Dover):	– € 20.00
▪ Main-carriage services purchased by InterTrans UK (Dover to Hamburg):	– € 25.00
▪ On-carriage services purchased by InterTrans Germany (Hamburg to Hannover):	<u>– € 30.00</u>
	€ 75.00

Profit – Overall profit from the sale: € 25.00

Profit distribution – The profit may be distributed in various ways – for example, based on profit percentage or based on costs. The following illustrates both.

Example of reimbursement based on profit percentage of 20%:

Total profit for InterTrans: € 25.00

Profit share (paid to the InterTrans Germany purchasing organization):

20% = € 5.00

Costs to InterTrans Germany: € 30.00

InterTrans UK sales organization reimburses

InterTrans Germany purchasing organization cost plus profit: € 35.00

Example of reimbursement based on cost:

Costs incurred by InterTrans Germany purchasing organization: € 30.00

Cost surcharge of 15% = € 4.50

Reimbursement from InterTrans UK to InterTrans Germany: € 34.50

In this example, the internal invoicing is sent from the InterTrans Germany sales organization to the InterTrans UK purchasing organization. The InterTrans Germany sales organization creates a customer freight invoice request (CFIR) for €34.50.

Warehouse Operations

With SAP ERP, you can streamline your warehouse operations. Logistics-execution functionality supports shipment execution. The application helps you prepare shipments for dispatch to customers including picking, packing, staging, loading the shipments, and posting goods issue. At check-in (when trucks arrive on your premises), you can record information about the means of transport such as driver details, truck weights, and arrival times. You can store all this information and print it on the transportation documents.

Event Management and Fulfillment Visibility

The SAP Event Management application is an open, extensible, rules-driven engine supporting tracking, monitoring, proactive alerting, and analysis of business processes within companies and across business partners. SAP Event Management provides key functionality within the SAP Supply Chain Management application. SAP Event Management enables or improves visibility within your logistics processes for both planning and execution. Thanks to the flexibility of the solution, you can map, control, and check all required business processes. A role-based approach makes it possible to view the same business process from various points of view.

You can use SAP Event Management to process messages about the events in business processes and then in various ways, notify those involved in the supply chain network about business events that have occurred. By actively notifying the responsible persons and

making them aware of critical situations or exceptions, you can optimize reaction times and improve quality and customer satisfaction. The following explains in more detail:

- Each relevant business object or process is represented by an event handler in SAP Event Management, including attributes (IDs, information and control parameters) and statuses.
- Milestones and expected measurements contain information about what is planned to happen to the object or process.
- Actual events and measurements are posted manually or from another system.
- Attachments (for example, a digital signature) can be posted with an event.

Monitoring is handled through a Web interface, which supports role-based access to all data for a thorough authorization and filter concept. A role-based approach makes it possible to view the same business process from various points of view. This Web interface, with accompanying security, can be made available to outside trade partners for viewing the status of their order, production, or object of interest.

SAP Event Management provides visibility into your supply chain so you can track and trace business objects such as orders, shipments, deliveries, and tender processes related to SAP TM. The application receives information about supply chain events from your partners through a variety of channels and systems, including radio frequency identification terminals and EDI messages.

You can do this because SAP Event Management provides rules to help you determine how to respond to events. It also supports a list of expected events for all objects to watch. You can customize the rules and list of expected events, depending on the type of object you want to assign. With the help of this functionality, SAP Event Management also supports management by exception.

Global Trade Management

Managing international customs and trade activities is commonplace in transportation today. Whether you are screening for sanctioned parties or approved geographical routings, checking for the necessary licenses, or creating legal documentation such as export declarations or customs invoices, the SAP GRC Global Trade Services application plays an integral role. SAP GRC Global Trade Services makes automatic checks based on invoice and shipment data. SAP TM calls SAP GRC Global Trade Services for the customs status. Once the customs status is released, the SAP TM shipment status will be changed so that execution is possible.

The customs invoice is an extended form of commercial invoice required by customs (often in a specified format). In the customs invoice, the exporter states the description; quantity and selling price; freight, insurance, and packing costs; terms of delivery and payment; weight; and volume of the goods for the purpose of determining customs import value at the port of destination.

THE WORKING ENVIRONMENT

SIMPLIFYING ACCESS TO PROCESSES AND INFORMATION

Technology

Transportation is a broad area of practice. It spans industries and worker roles and is strategic to operational decision making. SAP TM is designed to work across all areas to make processes more efficient and consequently, more productive.

SAP NetWeaver Business Client

To this end, SAP developed the leading-edge, desktop-based SAP NetWeaver Business Client software. SAP NetWeaver Business Client is designed to provide end users with smooth integration of portal-based transactions, classic SAP GUI-based transactions, and new applications developed in the Web Dynpro development environment (ABAP™ programming language and Java). Existing browser-based SAP applications can also be integrated. This simplifies access to processes and information according to the needs of business users in their own familiar work environment.

With this new front end, existing UI portal services such as roles and navigation can be reused. The data exchange between SAP NetWeaver Business Client and the server of the SAP NetWeaver technology platform is based on standards and open services. Today, the client is based on technology from Microsoft Corporation. SAP NetWeaver Business Client comes delivered with several predefined roles:

- Transportation booking agent
- Transportation charge administrator
- Transportation charge clerk
- Transportation dispatcher
- Transportation execution clerk

- Transportation manager
- Transportation network administrator
- Transportation service provider
- System administrator for transportation

Service-Oriented Architecture

SAP's approach to SOA affords you many new opportunities to automate your business processes and react flexibly to changes. You can convert new business processes much more easily. You can also implement SOA in a heterogeneous, distributed system landscape by implementing standardized Web technologies.

SOA is used to split the complex functions of a business process into interoperable services. These individual enterprise services can then be reused, exchanged, combined into new combinations, or incorporated into completely different business processes according to your own needs.

Integration

SAP helps you adopt SOA by delivering SOA-enabled business applications, enterprise services, and SAP NetWeaver as the enabling technical foundation for SOA. Unlike generic Web services, enterprise services conform to the SAP data model and process model, helping ensure efficient operations of core business processes. A large number of enterprise services for typical business processes are already available in SAP Business Suite software. You can implement these services so that they communicate directly with other applications, client programs, user interfaces, and so on.

SAP TM and SAP ERP are tightly integrated so you can tie freight costs back to the correct financial accounts and possibly aggregate those costs via channel, product group, and so forth.

Examples of these services include the ability to receive and confirm orders, order transportation services from your LSPs, communicate invoices to your customer and partner systems, respond to requests for freight quotes, and send bills of lading.

Alternatively, you can use enterprise services from SAP using SAP NetWeaver PI. In this case, communication occurs using SAP NetWeaver PI, which contains additional functions for the processing and creation of messages. Enterprise services are standardized interfaces for specific functions within an application – for example, for functions that read the business partner's address or that update reports.

With the help of enterprise services from SAP, you can trigger automated processes, enter and process data, and exchange data with other systems and applications. In contrast to simple Web services, enterprise services from

SAP are generally logical steps of a business process and can thus be used to support cross-application and cross-departmental business processes.

Business Object Structure

SAP TM is designed and built from the ground up using SOA. To provide the

greatest flexibility for supporting your business processes, SAP TM uses business objects. The business objects are addressable through Web services and allow you to customize SAP TM to more fully meet your business process needs – for example, if you only need to perform tendering or transportation charge management without perform-

ing planning or operations. Figure 9 illustrates many of the business objects within SAP TM.

Furthermore, SAP designed these standards using worldwide standards based on EDIFACT.

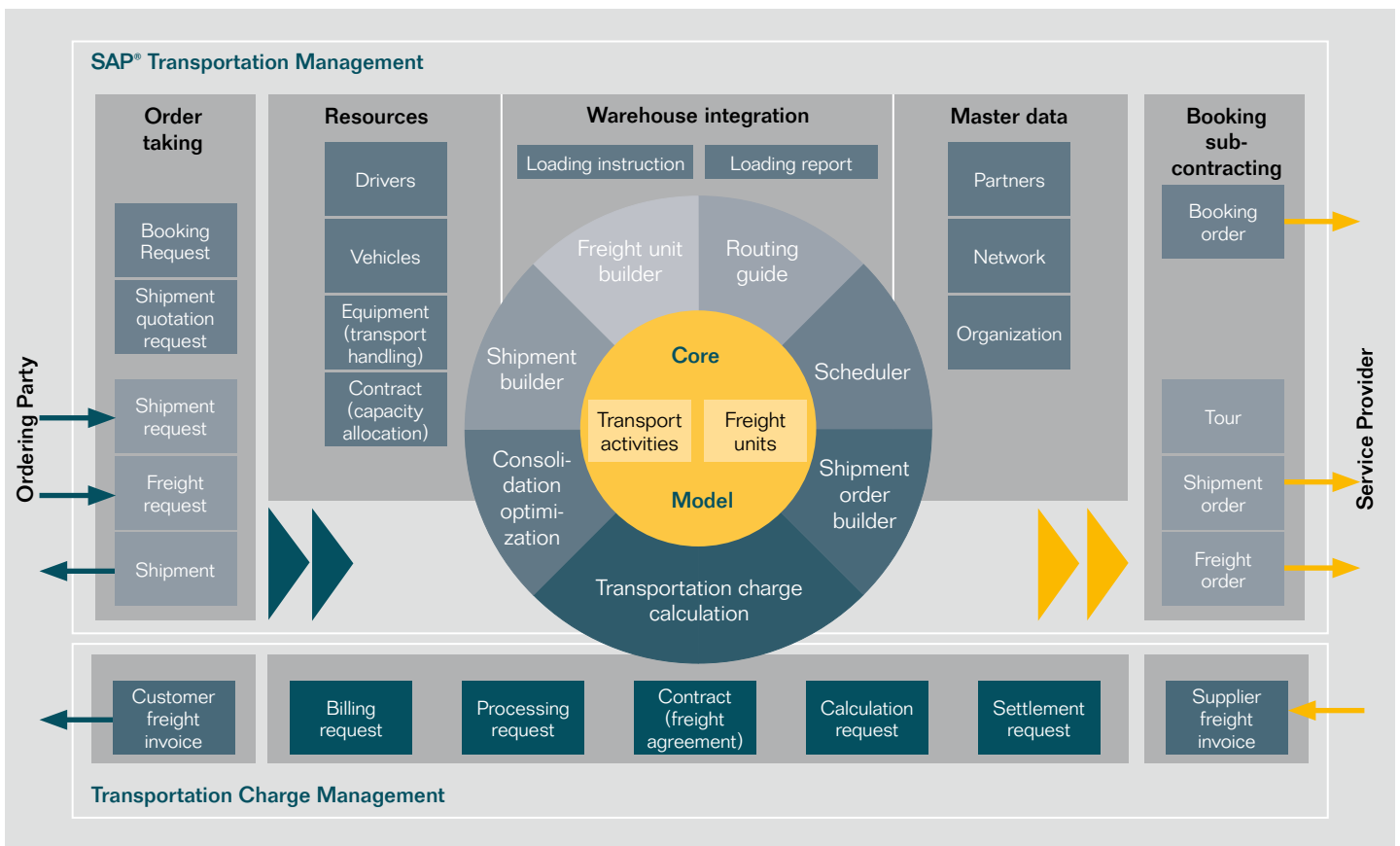


Figure 9: SAP Transportation Management Business Objects and Engines

OPTIMIZE YOUR TRANSPORTATION OPERATIONS AND EXPAND YOUR CAPABILITIES

SAP solutions help you optimize your transportation management processes, make better business decisions, and significantly enhance your transportation management operations. You can create holistic order-to-cash, transportation management, and supply chain management processes as you seamlessly expand your global trade, event management, and inventory collaboration capabilities.

Additional benefits include the following:

- Greater ability to provide accurate status and cost information online
- Enhanced visibility into shipments and orders

- Ability to collaborate more closely with carriers, suppliers, and customers to create more economical transportation processes
- Ability to achieve advanced shipment optimization
- Ability to align processes with other departments to create delivery efficiencies

To learn more about how SAP TM can help your organization transform and integrate its IT systems for flexible, streamlined business processes, call your SAP representative today or visit us on the Web at www.sap.com/solutions/business-suite/scm/execution.epx.

With SOA, communication across a disparate system landscape is managed through pre-defined services working in conjunction with SAP NetWeaver PI technology.

Summary

The SAP® Transportation Management application simplifies and enhances your transportation processes by providing a robust order management environment. You can automatically route orders, collaborate with carriers, rate orders, generate documentation, coordinate with the warehouse, ship product, and track every step.

Business Challenges

- Complexity of commercial transportation
- Difficulty in managing a worldwide network of business partners and logistics service providers (LSPs)
- The need for greater accuracy, speed, and flexibility to manage all the moving parts

Key Features

- **Service provider management** – Select and evaluate logistics service providers
- **Freight contract management** – Negotiate, award, create, and monitor freight contracts with rates
- **Tender management and volumes** – Prepare and create contract tenders for mid- and long-term contracting of transport capacity
- **Transportation volume forecasting** – Determine midterm transport capacity based on carriers, geography, and other factors
- **Capacity and equipment tendering** – Secure availability of freight space
- **Freight order receipt** – Receive any types of requests for transportation services
- **Freight subcontracting, tendering, and booking** – Order transportation services and reserve freight capacity
- **Routing guide** – Optimize planning with rules-based processes for planning, vehicle scheduling, routing, and LSP selection
- **Freight cost management** – Determine selling and buying costs and calculate profitability
- **Event management** – Handle activities for track, trace, pickup, and delivery processes
- **Freight cost settlement** – Settle accounts, pay and bill freight costs
- **Analytics** – Analyze transportation-related key performance indicators and strategic freight management data

Business Benefits

- **Meet the unique delivery requirements of your customers** while still achieving profitability
- **Integrate business processes** across your entire enterprise and extended transportation network

For More Information

Call your SAP representative, or visit us on the Web at www.sap.com/solutions/business-suite/scm/execution.epx.

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