

KDD038 - Use of GIS in Transportation Management

Status	Approved
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Issue

Milk run transportation orders are multi-stop shipments which deliver goods to multiple customers, or shipments with multiple pick-up locations. Handling of of milk-run orders is currently mostly a process handled outside of the system. Sometimes that is because the carrier is taking care of consolidations, sometimes it is because the charge calculation for milk-run shipments are not supported by current SAP system.

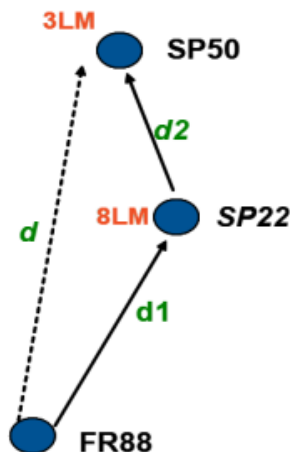
Some milk-run shipments are currently managed by having multiple ship-to's. Some business users are splitting the costs over multiple shipments. For invoice verification it is often challenging to know if distances reported are realistic and if the correct charges are invoiced.

GIS integration in SAP TM would give the transportation planner the planned distance and duration based on real world routing. This can be a basis to create milk run transportations when planned these shipments by Syensqo. And this can be utilised for calculating transportation charges where distances are a basis to calculate the rate.

Recommendation

It is recommended to **integrate SAP TM with GIS systems** to enable planning of transportation journeys using real-life transportation distances and durations, thus unlocking the ability to plan milk runs without prohibitive manual effort in transportation planning, charge calculation and sustainability reporting.

Milk runs are labour-intensive to plan manually due to the variety of complex inputs required for route planning and charge determination. A Geographic Information System (GIS) can calculate real-life transportation distances and durations between locations. When integrated into transportation planning in SAP TM, the reduction of manual planning effort is expected to significantly increase the percentage of shipments planned as milk runs. Integration between SAP TM and a GIS also allows for more precise allocation of transportation costs: Charges are determined from first pick-up to the last drop-off, plus a cost component for each additional drop off, plus distance-based charges for detours. Without GIS integration, charges would need to be manually determined and divided between different deliveries; this manual effort would reduce the number of milk runs being used, and prevent Syensqo from unlocking cost and carbon savings.



Determining a milk run opportunity is not easy as the following conditions need to be met:

- The combined cargo should fit in the truck, and
- Drop off locations should geographically be in the same region, and
- The total duration should fit in a driver's shift considering travel time, loading and unloading duration.

Multiple different GIS systems may be needed due to differing regional coverages; for example commonly-used GIS systems will not have detailed coverage in markets where regulations limit the use of geospatial data by foreign companies (e.g. South Korea, China). However SAP TM does support the integration of multiple GIS systems.

Resolution

Decision as taken during the business meetings: it has been decided that the solution as presented and recommended was not required for the business scenarios at Syensqo. The recommendation was rejected and GIS integration with SAP will not be implemented.

Background & Context

Industry Context

The prevalence of milk runs in transportation, and the associated benefits of reduced transportation costs, increased fleet utilisation, and reduced carbon emissions, vary widely by industry and business model. The benefits of milk runs also vary widely and are based on many factors. An illustrative example is provided by a doctoral thesis published in 2015 ([Meyer_Anne.pdf](#)) which mapped empirical evidence of benefits to the logistics operations of a single location of Bosch Automotive, a world-leading supplier of automotive components. This estimated that a 24% reduction in transportation costs could be achieved through the increased use of milk runs in Bosch's logistics operations.

Table 1. Benefits of implementing the Kanban and the milk run system.

Indicator	Benefit
Transport costs	Decrease by 24.3 % / year
Movements of transport devices	Decrease by 21,184 movements
Time of transport and handling	Shortening by 19.89 %
Number of forklift trucks needed	Decrease by 50 % by the implementation of system trucks
Utilization of forklift truck	Increase by 23.06 %
Storing area	Increase by 49.84 %
Transport area in the warehouse	Decrease to 52.07 %
Inventories in workstations	Reduction by 80 % by the cancelation of interim storages

Technical Background

There are three main functions in SAP TM where a Geographic Information System (GIS) is being called:

1. Location Master Data creation
2. Distance and Duration Determination
3. Visualisation

Location Master Data creation

During the creation of Location Master Data, the system stores the geographical data of the location. On default the system is taking country code level coordinates as stored in the system. When GIS server integration is activated, then the system will pass the address data to the GIS server which will return the geographical coordinates based on this address data.

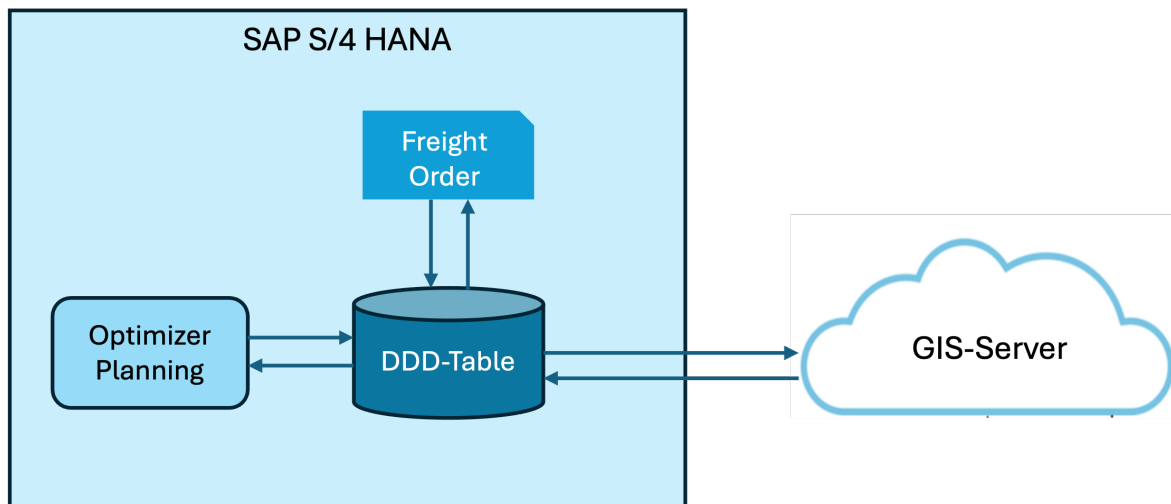
Geographical Data				
	Sgn	Deg.	Minutes	Seconds
Longitude	+	4	17	57
Latitude	+	51	25	45
Time Zone	CET		Precision	700

Distance and Duration Determination

There two main processes where distance and duration is being determined;

1. Freight Order creation
2. Optimizer Planning

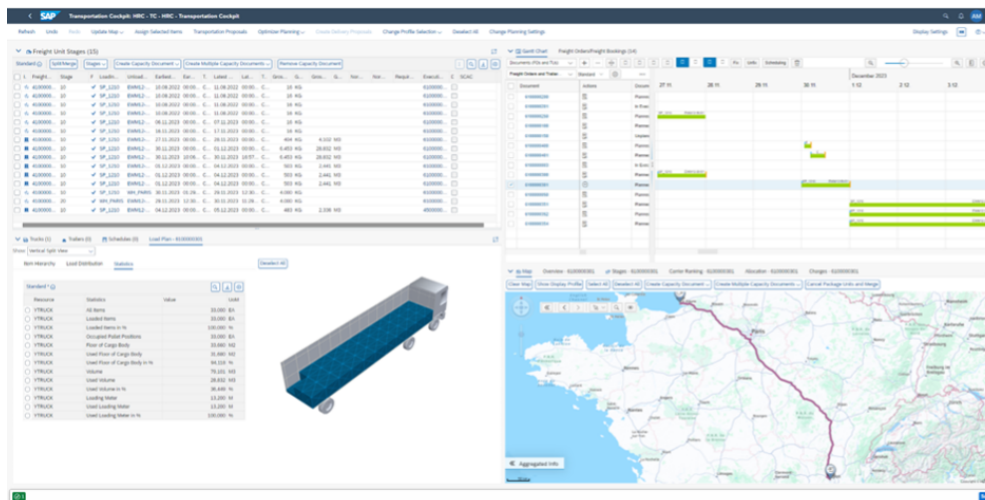
The system doesn't execute a call to the GIS server for each determination. Instead the system will check the buffer table first: Distance and Duration Determination table (DDD). When the combination between two locations is unknown, then the system will do a call to the GIS server to determine distance and duration. Once received, the system will store the result in the buffer table.



Visualisation

With the use of SAP Visual Business, a visual representation on a map can be displayed in the Freight Order and Transportation Cockpit.

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Business Benefits

Milk run validation

During manual planning a milk run can be created. The milk run can be validated with actual travel duration, loading and unloading duration, and maximum number of working hours for the driver. Users can then more precisely determine if a normal delivery can be turned into a milk run, without relying on guessing based on experience. This will increase the number of milk run transportation orders as a result from Manual Planning.

Automatic planning

To implement automatic planning that includes milk run planning, actual transportation duration is essential. Similar as with milk run validation, the system has to determine actual durations to be able to generate correct milk run planning results.

Charge Calculation

Where charges are calculated based on actual distance, when the system has determined the actual distance based on a GIS result, the system can automatically calculate the correct charges. This calculated amount can be used for validating the invoice. When there are large discrepancies, the carrier can be challenged to justify the difference.

Sustainability reporting

The Corporate Sustainability Reporting Directive (CSRD) strengthens the rules concerning the social and environmental information that companies have to report. The rules ensure that investors and other stakeholders have access to the information they need to assess the impact of companies on people and the environment and for investors to assess financial risks and opportunities arising from climate change and other sustainability issues. Companies subject to the CSRD will have to report according to European Sustainability Reporting Standards (ESRS).

With actual distances in the system, Syensqo will be better capable to have accurate CO2 reporting and it will be easier to comply with the CSRD.

Sustainability in planning

When optimising transportation planning, CO2 impact can be taken into account by preferring more sustainable routes and means of transport in the transportation network.

Assumptions

Number of milk run orders

As part of transportation optimisation, Syensqo would like to increase the number of milk run orders as they have a cost benefits.

Automatic planning

Transportation planning is mostly a manual process within Syensqo, however for a future proof system automatic planning could be considered within the current scope of the ERP Rebuild project, or as a future improvement.

Transportation Forms

Transportation Forms will support multi-pick up and multi drop shipments. There where changes need to be reprinted due to loading discrepancies (e.g. actual weight), this is covered in solution design.

Charge Calculation

Most agreements with carriers are based pick-up and delivery location. However, when milk run orders are provided then these kind of charges are not applicable and charges need to be calculated per (additional) stop and mileage.

Most freight agreements are setup with pick-up and delivery location, due to limitations on charge calculation capabilities at shipper.

Agreements in North America are more prone to be calculated based on mileage. When North America is scoped for SAP Transportation Management then correct distance determination is important. For more detail on North America scope see [KDD048 - Way Forward with BluJay](#).

Sustainability

Not only does Syensqo would like to comply with CSRD regulations, it is part of Syensqo's strategy to have a positive impact on climate and nature. Optimizing transportation capacity and reducing CO2 emissions fit into that strategy.

Constraints

Multi drop off for Road Freight

Multi drop off or milk run shipments are supported for Road Freight only. Ocean Freight Bookings or Air Freight Bookings don't support multi pick-up or multi drop-off.

When the GIS provider doesn't cover all countries

Not all GIS servers cover the whole world. Especially China GIS integration is best serviced with a Chinese provider. SAP TM configuration caters for this, but it requires extra setup time to make this integration as another set of interfaces is required.

Automatic planning

When initially setting up SAP Transportation Management, it is always preferred to have a solid solution for supporting manual planning. This keeps control with the user that have the best understanding of the business process. Some planning steps could be automated, but a careful approach is advised. When users have a solid understanding of the system's functionality, then more and more automation and optimisation can be implemented to return better planning results, like milk run orders.

Milk Run Charge Calculation

As described at the issue statement, transportation charges for milk run are determined by taking charges for first pick up to last drop off + \$ per additional drop off + \$ additional km for detour. If charges cannot be calculated based on the full distance then for this scenario there is a need for an enhancement in the charge calculation. The system will then calculate the additional km for detour.

Impacts

- GIS server is a 3rd party offering. If GIS integration is decided.
- Implementing a GIS server takes about 10-15 consulting days.

Business Rules

Loading / unloading duration - Loading and unloading durations need to be setup to cater for correct total duration calculation.

Maximum shift duration - To limit the full duration of a Freight Order, business rules are to be defined during detailed design. Maximum duration can be different per region and per scenario.

Manually planning - Transportation planner needs to be mindful of milk run opportunities during planning. When consolidation opportunities exist then shipments should be planned together.

Automated planning - During setup of optimizer planning, the system should optimize combining shipments into a milk run where possible.

GIS service providers

For consideration, the following GIS service providers are among the most well known:

- [ArcGIS / ESRI](#)
- [HERE](#)
- [PTV](#)
- [Rand McNally](#)
- [Trimble ALK](#)
- ...

Syensqo US has a license with PC Miler that could be utilised for integration with TM.

Evaluation

GIS integration makes the SAP TM solution much more mature. There are definitely some business benefits, especially when milk run planning is involved.

However, the system can run without this feature. It should be on Syensqo business representatives, that know their business best, to estimate what their preferred approach is here: do not integrate with GIS / have integration with GIS on the road map / at go-live have GIS integration.

	Option A: Use TM without GIS	Option B: Integrate with GIS
Costs	 No additional license costs	 License costs  Development effort for integration
Optimisation	 Milk run planning based on transportation planner judgement	 Support for manual planning to build milk run shipments  Option to include automatic planning with milk run optimisation
Charge Calculation		 Possibility to calculate charges based on actual distance  Agreements are mostly made based on source and destination location
Sustainability		 CO2 reporting based on means of transport and actual distance.  Possibility to include CO2 into consideration during transportation planning.
User friendliness	 No need to learn and understand complex automated planning logic and results	 Map display with actual route gives users the feeling of a mature solution  Having actual distance and duration on the Freight Order provides better identification of real world representation

See also

[SAP Blog Post: The benefits of integrating SAP Transportation Management with a Geographic Information System \(GIS\)](#)

[SAP Blog Post: 33 GIS Integration facts](#)

[SAP Blog Post: Key features of SAP TM: SAP HSS service for GIS integration](#)

Ivana Sulířová et al. (2017), State-of-the-art approaches to material transportation, handling and warehousing, pp 862.



State-of-the-art_...al_Transporta.pdf

Kai Furmans and Stefan Nickel (2015), Milk Run Design: Definitions, Concepts and Solution Approaches, pp 220.



Meyer_Ann.pdf

Change log

Version	Published	Changed By	Comment
CURRENT (v. 20)	Feb 20, 2026 16:34	VAN OS-ext, Nico	
v. 19	Oct 07, 2024 09:38	VAN OS-ext, Nico	
v. 18	Sept 12, 2024 12:59	VAN OS-ext, Nico	
v. 17	Sept 12, 2024 12:43	VAN OS-ext, Nico	
v. 16	Aug 26, 2024 09:42	VAN OS-ext, Nico	
v. 15	Aug 21, 2024 12:49	WENNINGER-ext, Sascha	
v. 14	Aug 21, 2024 12:16	WENNINGER-ext, Sascha	
v. 13	Aug 20, 2024 09:19	VAN OS-ext, Nico	
v. 12	Aug 19, 2024 15:41	WENNINGER-ext, Sascha	
v. 11	Aug 19, 2024 12:38	VAN OS-ext, Nico	

Workflow history

Title	Last Updated By	Updated	Status
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There are no pages at the moment.

Workflow history

This view shows the 5 most recent entries. The complete workflow log is available from the 'Document Activity' menu item.

Mar 17, 2026	Actor	Type	Activity	Version
Approved	LEIGHTON-ext, Dean	State	changed state to Approved at 7:29 am	v20
Edited following Approval	LEIGHTON-ext, Dean	State	gave <i>Minor change</i> approval at 7:29 am No change - Format update	
Feb 20, 2026				
	VAN OS-ext, Nico	Edit	updated the page at 4:34 pm	
		State	changed state to Edited following Approval at 3:34 pm	v20
Oct 08, 2024				
Approved	 FALL-ext, Cheikh	State	changed state to Approved at 9:20 am	v19
Edited following Approval	 FALL-ext, Cheikh	State	gave <i>Minor update</i> approval at 9:20 am	