OptiFlow
Product Description

Short title	Product Description OptiFlow
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1 Product objective

OptiFlow uses powerful algorithms to help you lower the total logistics cost of operational planning. The application optimizes and assigns orders to vehicles in a cost-efficient manner, while delivering faster results than traditional methods. The application offers the flexibility to set the cost drivers, ensuring that the optimization aligns with your specific business needs.

OptiFlow enables tactical exercises, as the speed of the algorithm allows the user to create multiple variants of one plan. Each variant plan can be evaluated and compared, so the user can apply new insights to further optimize operations.

As OptiFlow aims for automatic planning instead of manual planning, it not only saves money but also saves time, freeing up transport planners to focus on more strategic initiatives. The application is a valuable tool that empowers transport planners to focus on what really matters and to play a more analytical role in the process.

2 Product description

2.1 OptiFlow (Route optimization module)

2.1.1 Map data, routes, and addresses

Maps and routes

The interactive digital map displays order details (including the pickup and delivery points), the designated routes, and vehicle starting locations such as depots and sites.

Routing can be based on vehicle type. Routing is provided using either an average travel time for the route, or a time-dependent-travel time which reflects the likely travel time for the specific time of day the vehicle is scheduled to travel the route in the plan.

Distance matrix calculation, routing, time-dependent-travel times can differ in availability based on the geographical region of the plan.

Addresses and Geocoding

Upon uploading orders and vehicles, all addresses without associated Latitude and Longitude coordinates are thoroughly checked for accuracy and completeness through a 'resolved address score' system. OptiFlow leverages Bing and Google Places for geocoding. Each address geocoded by OptiFlow receives a score ranging from 0 to 9. The quality of geocoding is determined by assessing the difference between the resolved address and the original (uploaded) address, with higher scores indicating more consistency and thus more accurate geocoding. This approach empowers OptiFlow users to make adjustments in cases where addresses may be incomplete or incorrect.

If Latitude and Longitude coordinates are provided from an external system, OptiFlow will not change these or score the geocoding, but will plan the routes using the location provided.

2.1.2   Overview of Plans

An overview of historical OptiFlow plannings is available for the user to re-use, delete, copy, export, and filter the plans.

2.1.3   Orders

Existing order sets define the scope of orders to be optimized together in one plan. Order sets can be re-utilized, or a new set can be selected as needed. Users can remove, copy, merge, and export order sets. A planner can customize the overview of the orders by customizing which columns are visible. The planner can also filter to easily find an order. Order attributes include but are not limited to their location, allowed time windows, duration, and capacity (volume/unit/weight/ etc.).

2.1.4   Vehicles

'Vehicles for route optimization' represent both the vehicle and its allocated driver. Vehicle attributes include the driver's name, start, and stop locations for the plan, depot information, the driver availability timing, vehicle capacities, cost parameters, and break settings.

2.1.5   Optimization settings

Basic settings

- Labels: Labels can optionally be associated with one or more orders in a plan. More than one label can be assigned to an order.

- Description: Like labels, the description field is optional. Each order has only one description.

- Set a runtime, i.e., the time allowed for OptiFlow to create and optimize a planning. There is the option to continue the optimization once the initial run time has exceeded.

- Select a speed profile. The speed profile you select determines which routes are used for optimization, and at what travel times are used for those routes. Different vehicle types could have different routes available or travel those routes at different speeds, and this is represented in the speed profile.

- The speed correction factor can be used to decrease or increase the drive time of one or more vehicles within a planning. This is the factor by which the drive time of the planning gets multiplied. There is no impact on traffic time.

Advanced settings

The advanced parameters include:

- Break Settings: OptiFlow provides several predefined break rules, but you can customize the break rules yourself based on work or drive Time.
- Traffic: OptiFlow offers a choice between average travel times or time-dependent travel times. Time-dependent travel times are calculated dynamically during optimization, based on historical traffic patterns for the time of day and day of the week the route is scheduled to be travelled.

2.1.6   Planning KPI's

Throughout the optimization phase, planning KPIs (key performance indicators) are visualized so you can understand the progress of the optimization. KPI's include total cost, the total distance, the number of unplanned orders.

2.1.7   Plan board

The plan board provides a comprehensive overview of all scheduled routes, in either time-dependent or static view mode. The plan board enables the user to make modifications to the planning, such as introducing new vehicles, locking orders or routes, or to rearrange orders through drag and drop.

2.2   OptiFlow PowEr mode

PowEr is an optimization mode for the OptiFlow Route Optimization Module that uses the same input but achieves savings faster. This optimization mode is unique in the industry and is especially valuable for larger problem sets with more freedom in the input data.

2.3   OptiFlow Orderbook (Order management module)

2.3.1   Orderbook module description

Our orderbook module is designed to provide a real-time connection with the order generation system via REST API.

The attributes to model business drivers for your optimization are not necessarily captured in upstream systems. OptiFlow Orderbook automates the enrichment of source orders with data needed for achieving more savings from the optimization, by providing a rule-based order enrichment mechanism. Orders cannot be created or updated by end users in OptiFlow Orderbook.

Note:
The feature-fit analysis is conducted during the as-is/to-be project phase of the Maturity Grid. If features are needed which are only available using excel import, then OptiFlow Orderbook cannot be used.

2.3.2   Orderbook orders

Orders are captured in orderbook as one of three types: a **pickup**, a **delivery** to/from the depot, or both **Pickup and Delivery** in the field.
Order attributes include capacity, execution time frame, and requirements for the driver/vehicle that should perform the activity. Orders for orderbook require an absolute time window. Geocoding scores are available as part of the API response.
The source system is responsible for managing order state. If an order has been completed, the order generation system is responsible for updating (time windows) or removing it to reflect that it is no longer available for future planning.

2.3.3   Order enrichment for optimization

Orderbook conditionals

Orderbook conditionals are a system of customer specific rules to automatically enrich the source order with optimization-related data.
This relieves the external order generation system from the responsibility of collecting and maintaining data only pertaining to route optimization.
The condition: the condition determines which orders the rule will apply to. Conditions include orders of a certain category, orders for a certain location, orders within a date range, or orders for a specific client.
The rule: The orders corresponding to the condition will be enriched automatically to ensure maximum information for the optimization strategy. Enrichment options include changing the time windows or restricting which vehicles / drivers can be assigned to the order.

Define the maximum duration an order can be in the vehicle

The 'maximum time in vehicle' rules can be configured in Orderbook.

The maximum time limit a passenger or parcel can be in a vehicle can be automatically calculated in Orderbook for each order received via API, based on the distance between the given pickup and delivery.

Different rules can be created for different types of orders. The rules are applied (or not) based labels for the order.

For orders that are not type pickup-delivery, a fixed maximum time in vehicle can be configured for the route optimizations.

Orderbook site locations

Locations can be managed in Orderbook to centralize and facilitate management of rules or properties which relate to many orders for a unique location.
The use of location management is optional.
Location information includes:
-   Address and planning address
-   Open and closed times
-   Requirements and restrictions
-   Fixed Stop Time at the location

At the upsert of an order, the order can either include the address information or optionally refer to a known location. Orders are enriched with the location attributes and any relevant conditional rules when locations are used.

Orderbook companies

Companies can be imported or configured in Orderbook. When an order is upserted it can refer to a Company as the order 'Client.'

The client attribute can be used to filter orders when defining Conditional enrichment rules (see above).

2.4   OptiFlow Transport Resource Management

Note:
The feature-fit analysis is conducted during the as-is/to-be project
phase of the Maturity Grid. If features are needed which are only
available using excel import, then OptiFlow Transport Resource
Management cannot be used.

Drivers are managed as Employees. Trucks, Trailers, and Tractors are each managed as Transport Resources. In OptiFlow Match, routes are planned on vehicles. A vehicle in OptiFlow Match could be used to represent a specific driver and their vehicle, or simply a vehicle which is then assigned to a specific driver after the routes are created.

Employees and transport resources for route optimization can either be managed directly in OptiFlow Resource management or fed to the Resource Management module from an external source system via REST API.

2.4.1   Drivers

Drivers

OptiFlow can capture driver identifiers, skills, (default) start location, the assigned vehicle, and custom attributes.

Driver availability (for route optimization)

A Driver 'availability' is a continuous period the Driver is available. One availability has one vehicle assignment for the entire duration. The default start location for your Driver will be used for all that Driver's availabilities, unless it is specifically overruled at availability level.

Driver shift schedules

Driver Shift Schedules describe a repeating pattern of availability on a week basis. Each day in the pattern can have a different start and end hour.

Shift Schedules help facilitate the creation of availabilities for your Driver; by letting you generate Driver availabilities automatically. Shift Schedules are not used to assign vehicles to drivers, or to plan routes for drivers in OptiFlow.

After Driver availabilities are generated using a Shift Schedule, you can edit each availability independently to adapt the start and end times, or the start location. Availabilities can also be deleted if the Driver has a day off.

2.4.2   Transport Resources

A transport resource can be a Truck, a Tractor, or a Trailer. OptiFlow captures vehicle identifiers, including business ID and license plate, vehicle capacity, and custom attributes.

Transport resource unavailability

Transport resources can be made unavailable for route planning with a start date and time and end date and time for the period.

3   Implementation Scenarios

3.1   Data flow and data input / export

OptiFlow platform supports machine-to-machine integration through public REST API endpoints for some functions. The integration process relies on asynchronous communication, with each component responsible for correctly processing and retrying messages, as necessary.

3.1.1   Input of data

Order input via excel

Orders can be input by end users into OptiFlow in Excel format.

Order ingestion via REST API

Orders from the order generation system can be ingested in the OptiFlow Orderbook module via REST API. All future orders are communicated in real time to OptiFlow Orderbook, and the scope for a single optimization can be defined using filters on order time windows and label. Order state is not captured in OptiFlow, so an order can be optimized in multiple plans.

Our orderbook API documentation:

- https://developer.conundra.eu/orderbook/

Vehicle input via excel

Vehicles can be input by end users into OptiFlow in Excel format. The vehicle upload file includes restrictions.

Vehicle input via API and transport resource management

An API integration is supported for drivers and vehicles separately. The drivers are assigned to vehicles in the OptiFlow resource management module before the route optimization.

Our transport resource API documentation:

- https://developer.conundra.eu/resource-management/

3.1.2   Creation of a plan and initiation of the optimization

Optimization is started by an end user in the OptiFlow module.

3.1.3   Export of a plan

Export by end user

The end user can export the plan in excel format.

Planning REST API

The optimized plan, including plan costs and KPI's, is available for downstream systems via a REST API endpoint.

Our planning API documentation:

- https://developer.conundra.eu/planning

Released routes REST API

The released routes are available for execution in external systems via a REST API endpoint.

Our release API documentation:

- https://release.redoc.ly/

3.2   Implementation Scenario 1

User initiated excel input for orders and vehicles, user initiates and reviews the optimized routes, user triggered excel output of optimized routes.
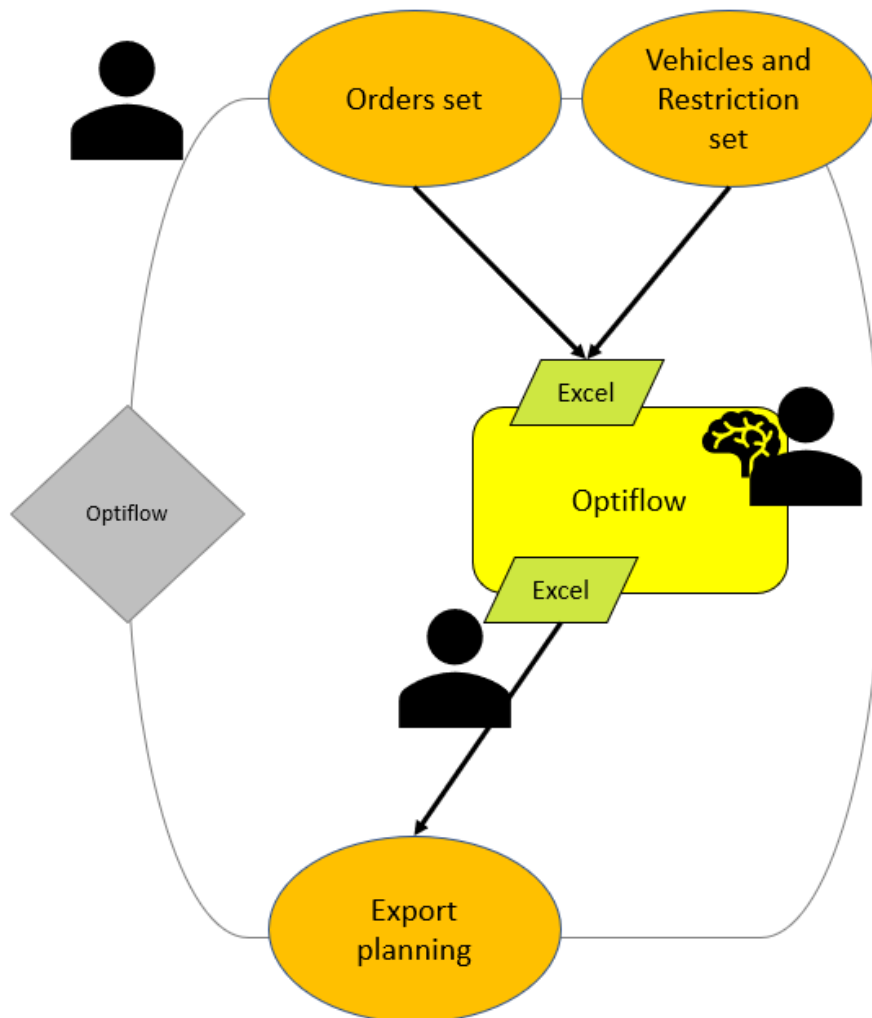Components involved:

* OptiFlow

Figure 1 Scenario 1: OptiFlow

3.3   Implementation Scenario 2

User initiated excel input for orders and vehicles, user initiates and reviews the optimized routes, user triggered or timed polling from downstream component using REST API to retrieve excel output of the plan and KPI's, or JSON output of planned routes.
Components involved:

- OptiFlow (excel import and export)
- OptiFlow Planning export rest API for BI (excel payload)
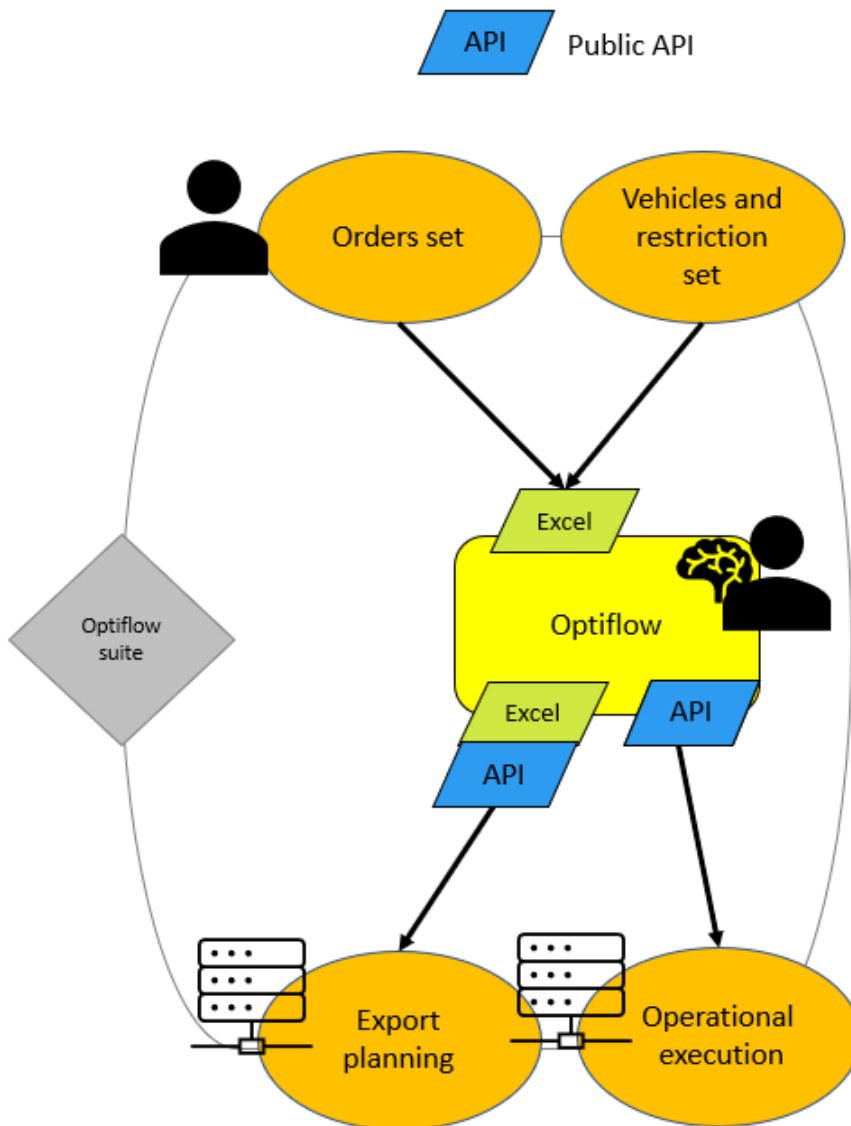- OptiFlow Release API for operational execution (JSON)

Figure 2 Scenario 2 OptiFlow with output in excel or JSON via REST API

3.4   Implementation Scenario 3

Orders input via API, user initiated excel input for vehicles, user initiates and reviews the optimized routes, user triggered or timed polling from downstream component using REST API to retrieve excel output of the plan and KPI's, or JSON output of planned routes.
Components involved:

- OptiFlow Orderbook via API (Order management module)
- OptiFlow
- OptiFlow Planning export rest API for BI (excel payload)
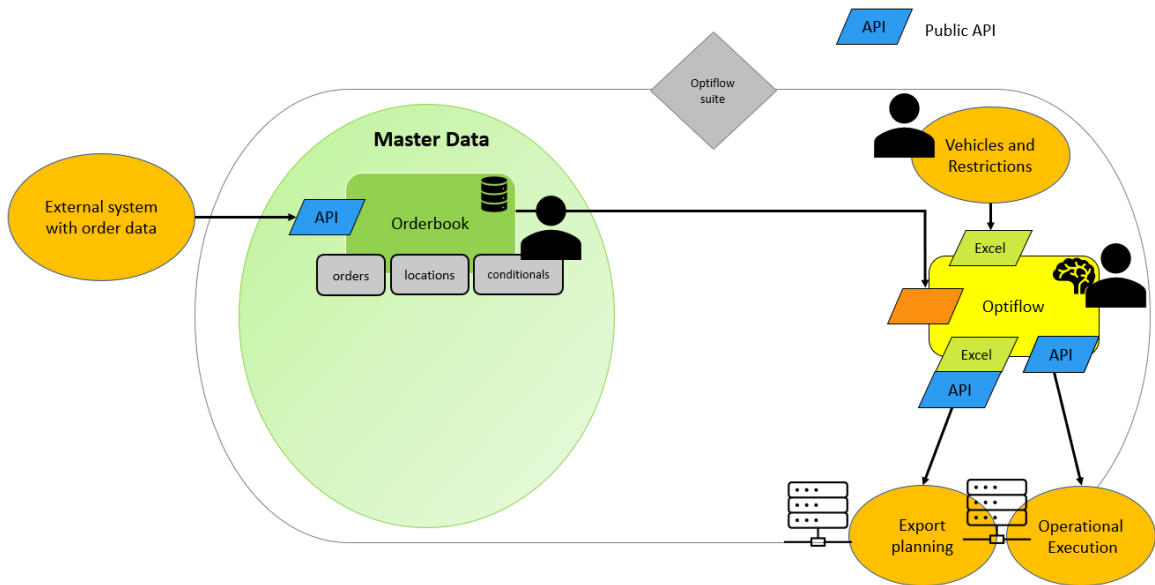- OptiFlow Release API for operational execution (JSON)

Figure 3 Scenario 3 Orders are input via REST API

3.5   Implementation Scenario 4

Orders input via API, drivers and vehicles input via API or managed in OptiFlow, user initiates and reviews the optimized routes, user triggered or timed polling from downstream component using rest API to retrieve output of optimized routes. Components involved:

- OptiFlow Orderbook via API (Order management module)
- OptiFlow Transport Resource Management
- OptiFlow
- OptiFlow Planning export rest API for BI (excel payload)
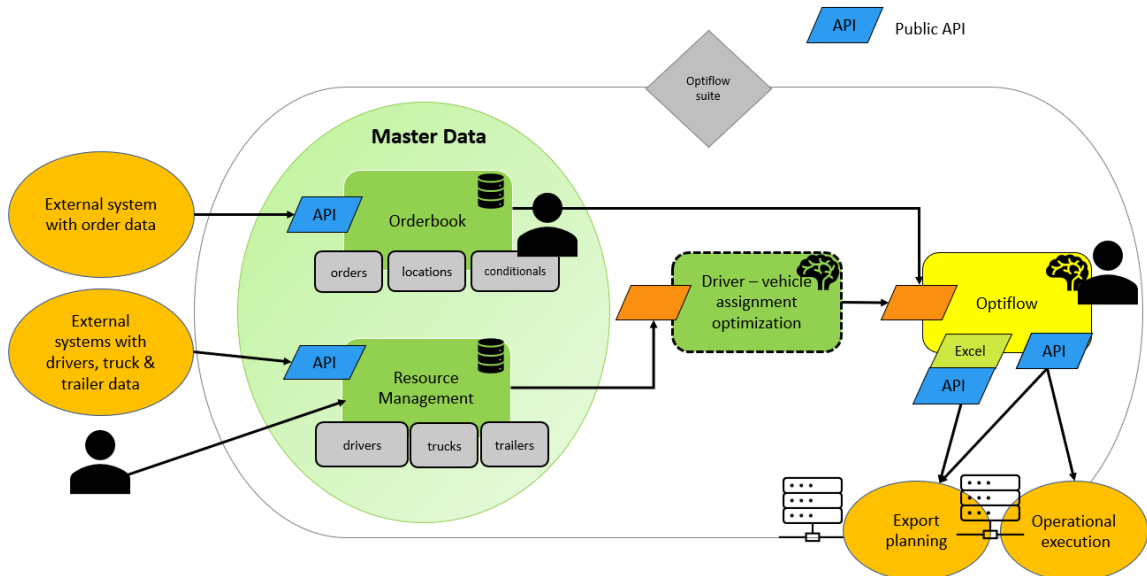- OptiFlow Release API for operational execution (JSON)

Figure 4 Scenario 4 Drivers and Vehicles via rest API or managed in OptiFlow

4 Technical system description

4.1 System requirements

OptiFlow can be used as a web client and is recommended to be used with the Google ChromeTM web browser on a desktop computer.

Functionality and layouts from untested web browsers and operating systems can vary. The Product Description is not an assurance of a claim to all variants.

- Browser: Use the latest version of Google ChromeTM or another Chromium-based browser.
- Network bandwidth: connection speed 20 Mbps or more.
- Screen resolution: minimum 1600 x 900 (high color quality), recommended 1920 x 1200 or higher.

4.2 Functional limits

Data retention:

- Standard data retention period for positions is limited to 24 months. After this period, the data may be deleted. Those periods might be subject to change or agreed upon in the individual subscription contract.

4.3 Available program languages

End users

- English
- Czech
- Italian
- French
- German

No or limited support for right-left languages.

The accompanying online user manual is provided exclusively in English.
Units of measurements: Capacities and Distance is represented using the metric system.

Administrator users

The API documentation and contracts are provided in English.