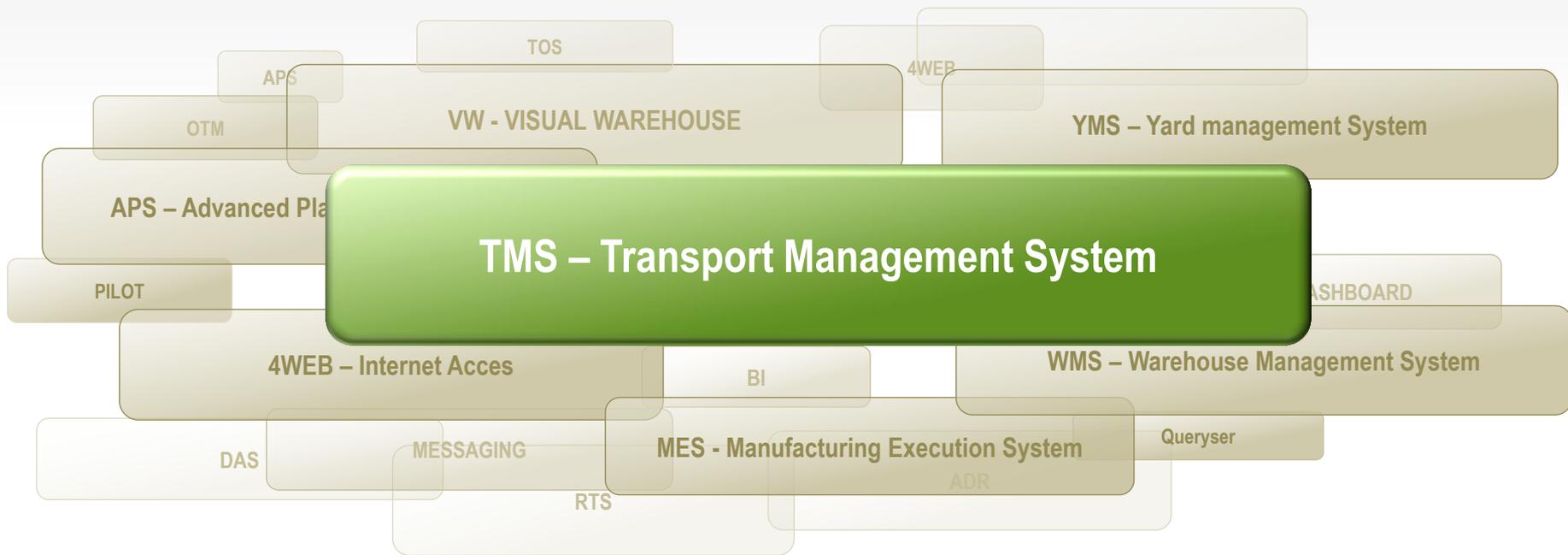
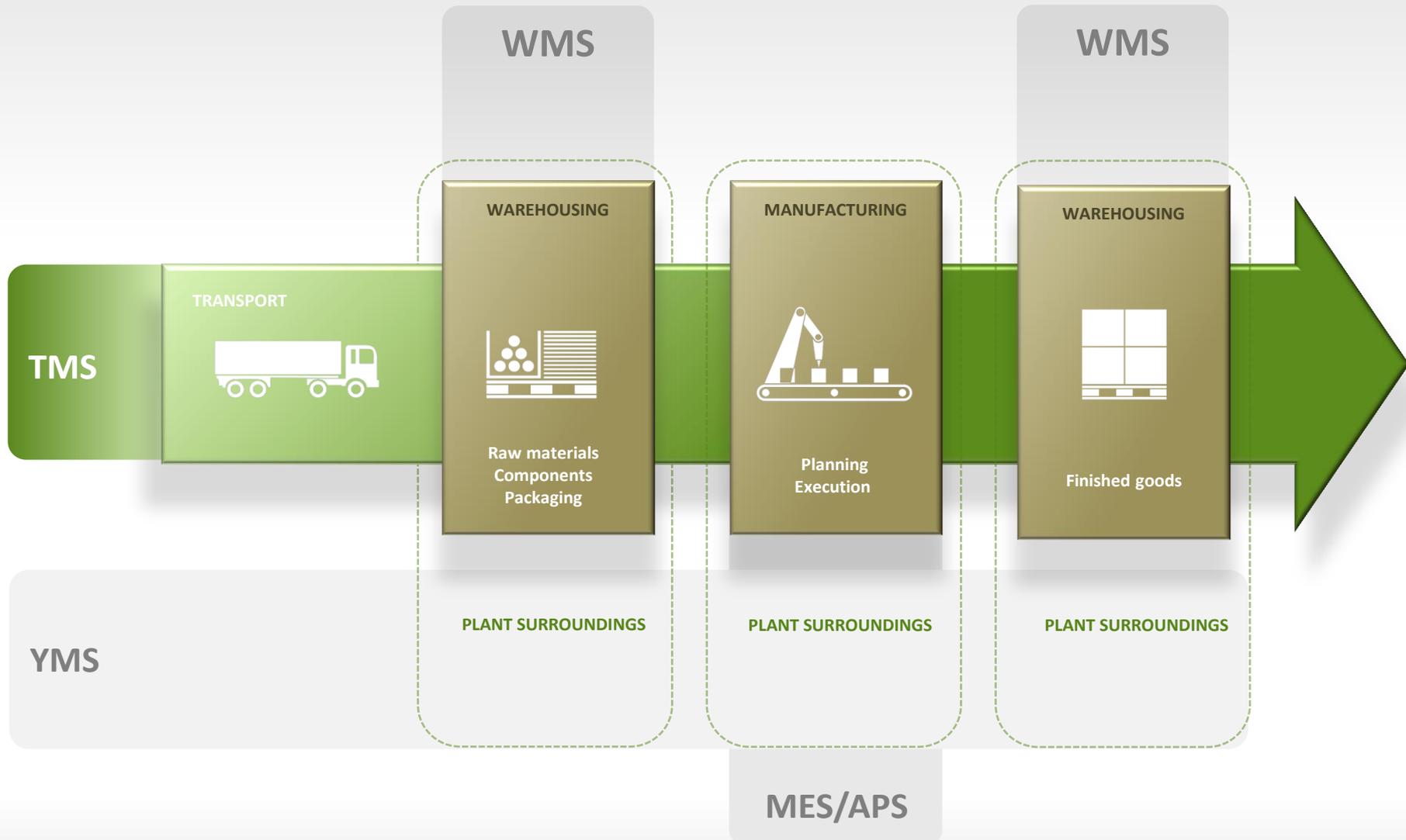


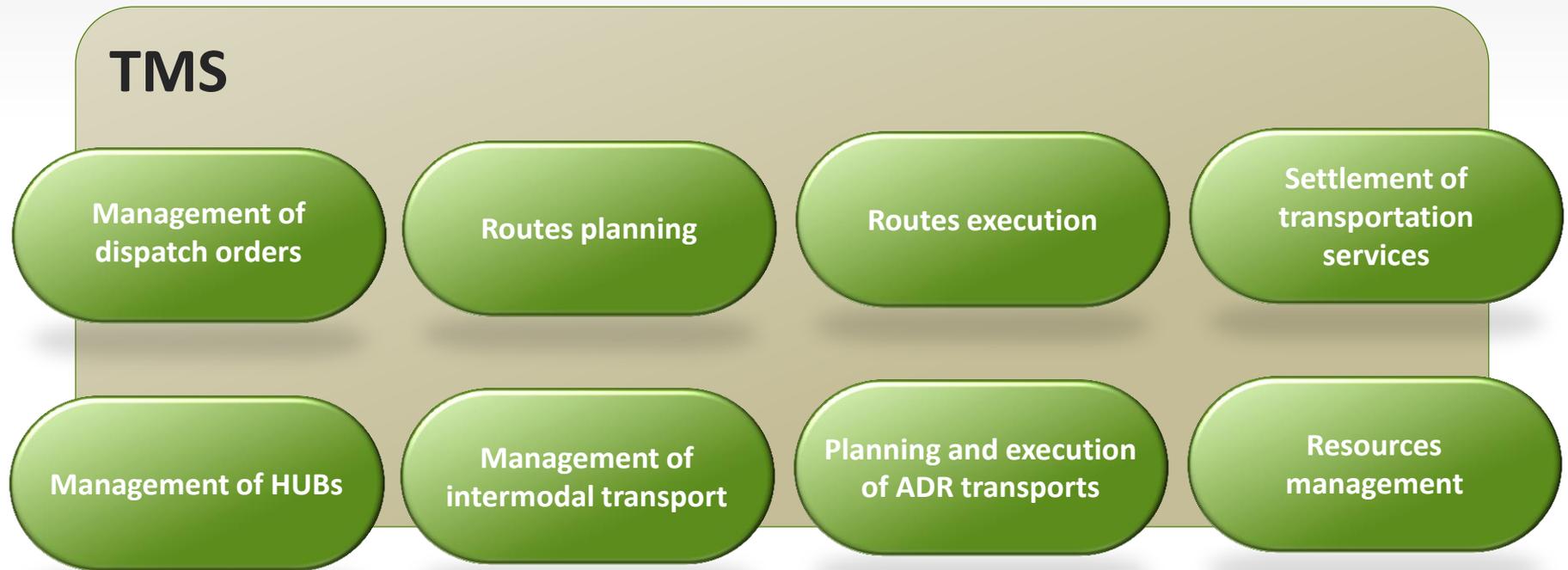


**Qguar** TMS  
Transport Management System

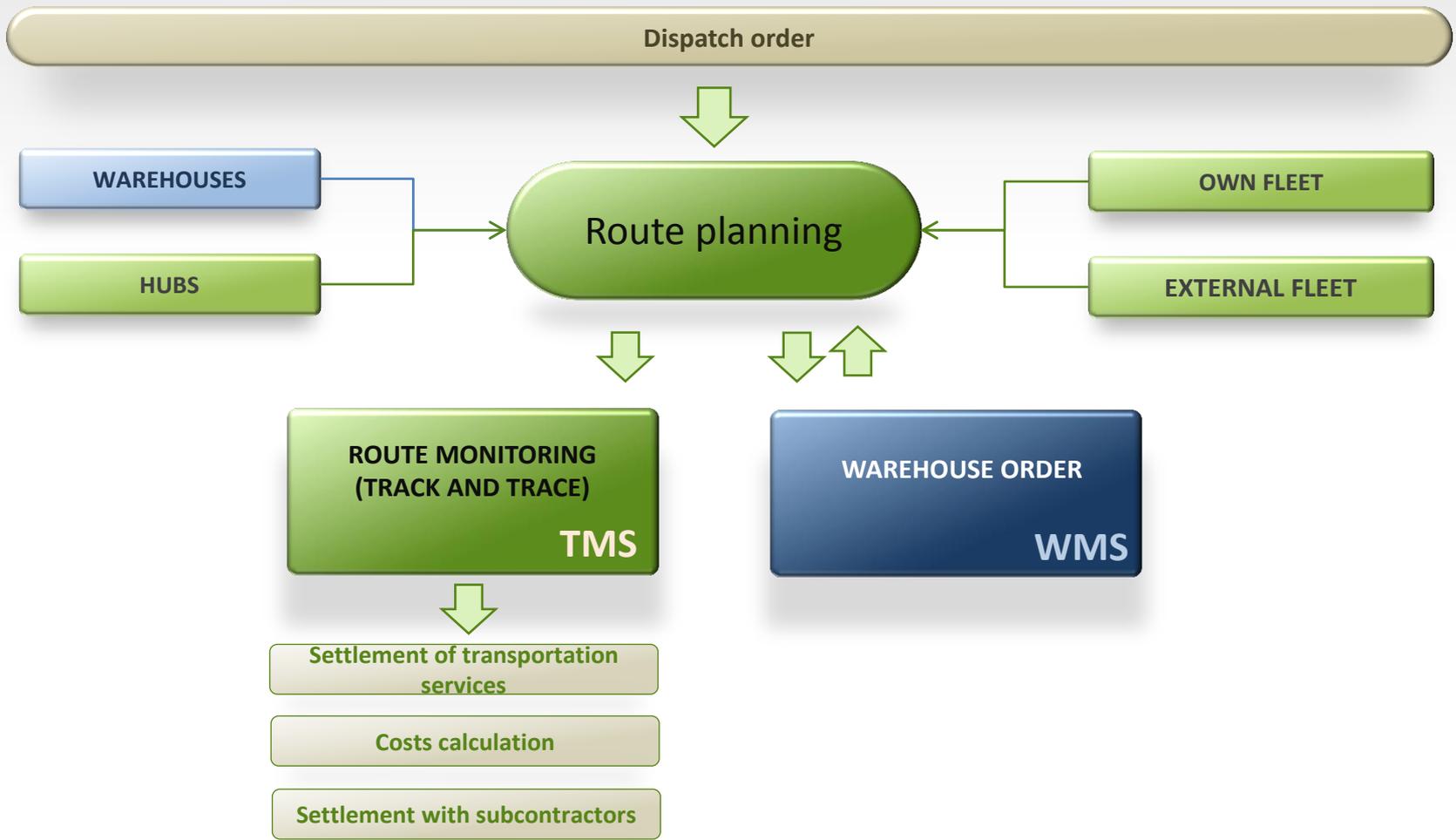


# QGUAR TMS according to SCM





# Main functional blocks – process approach



## DISPATCH ORDER

order to perform transport of goods (calculated into load units), their delivery at a specified date and time, at a specified place, to a specified recipient, not necessarily transported by the same means of transport.

## COMPOUND DISPATCH ORDER

set of Dispatching Orders, typically having the same common feature, like: the same ordering customer, the same, common price

## LOAD

Defined number of homogenous goods transported between 2 locations as a part of one dispatch order.  
Load – means goods with the same features and requirements from transportation point of view.

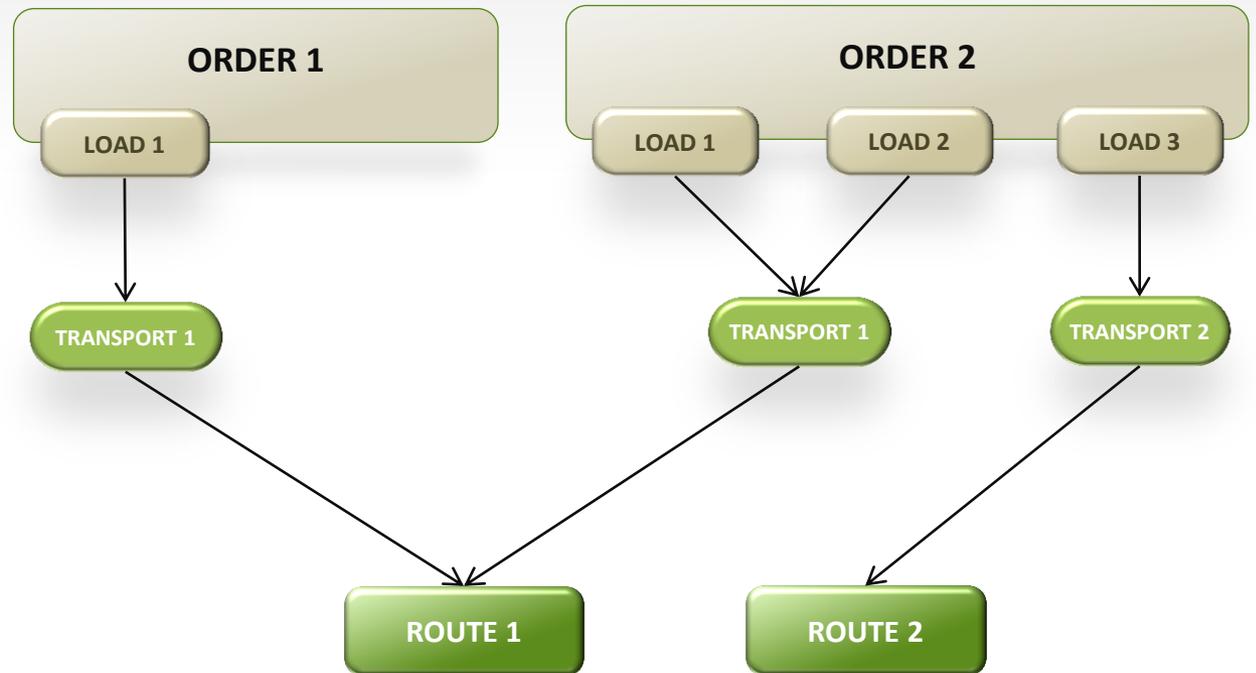
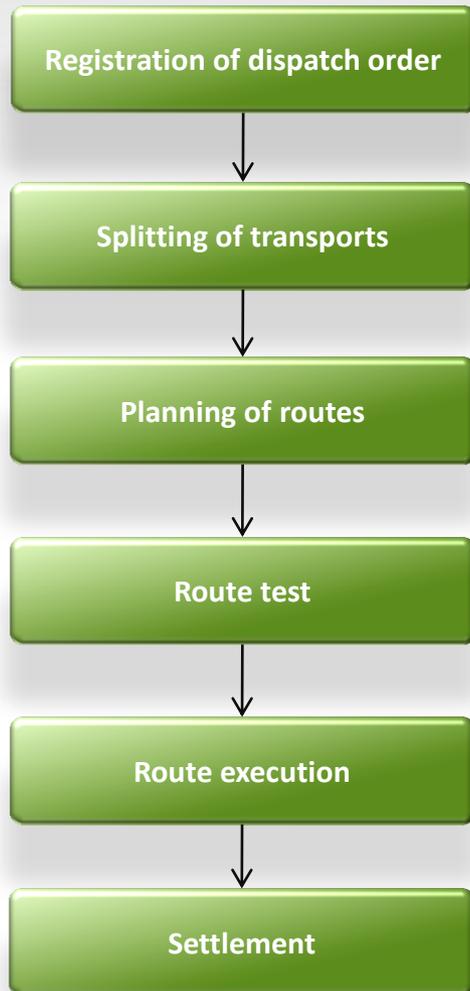
## TRANSPORT

item on the waybill and a transport order, using an assigned means of transport, for a specified quantity of load units loaded (e.g.: pallets ), transported at the same time, locations, dates and times of their loading and unloading.

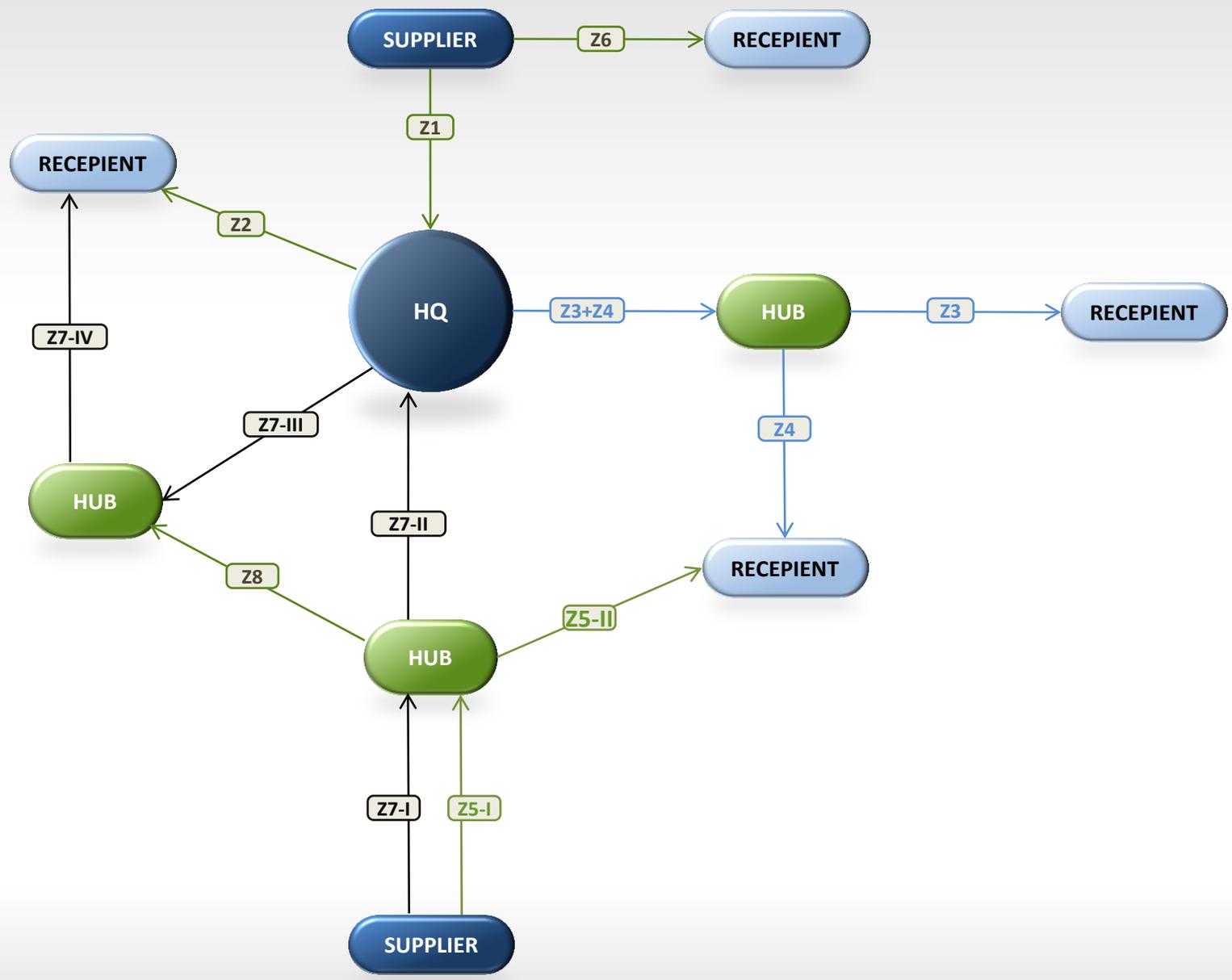
## ROUTE

one way of one means of transport, having 1 start, 0..n intermediate stations and 1 end, at each station it is possible to load and unload the load units, the route executes 1..n transports assigned to it, as entire or partial dispatching order.

# Course of transportation process



# Transport network model



- ✓ Grouping of orders into routes
- ✓ Assignment of transport means
- ✓ Possibility of transportation through HUB
- ✓ Possibility to split the loads and their execution on different routes and transport means.
- ✓ Possibility of routes planning by using reloading points (HUBs)
- ✓ Possibility of multi stage dispatch order execution with controll of:
  - Line haul (to the HUB) and transport to the final destination point
  - Transport with load splitting
  - Combination of both
- ✓ Centralized of dispersed planning (done in the HUBs)
- ✓ Possibility to group the routes on following stages
- ✓ Management of HUBs hierarchy





## GPS

Tracking of processes in SCM



## GPRS

Sending of package GSM data



## GS1

Global system for barcoding of logistic units



## RFID

Electronic tags

# Dispatch orders – management model

## Dispatch order registration

Manually or automatically (import from external system)

## Consolidation of orders

Merging of few orders from one supplier, recipient, sender with the same locations into one order

## Splitting of orders

Management orders, which are too big for one transport

## Linking of orders

Allows for common settlement of orders coming from one orderer

## Settlement of orders

Calculation of price of order execution, based on defined pricelists and settlement processes

## Choosing the forwarder

Searching the cheapest forwarder for the given order

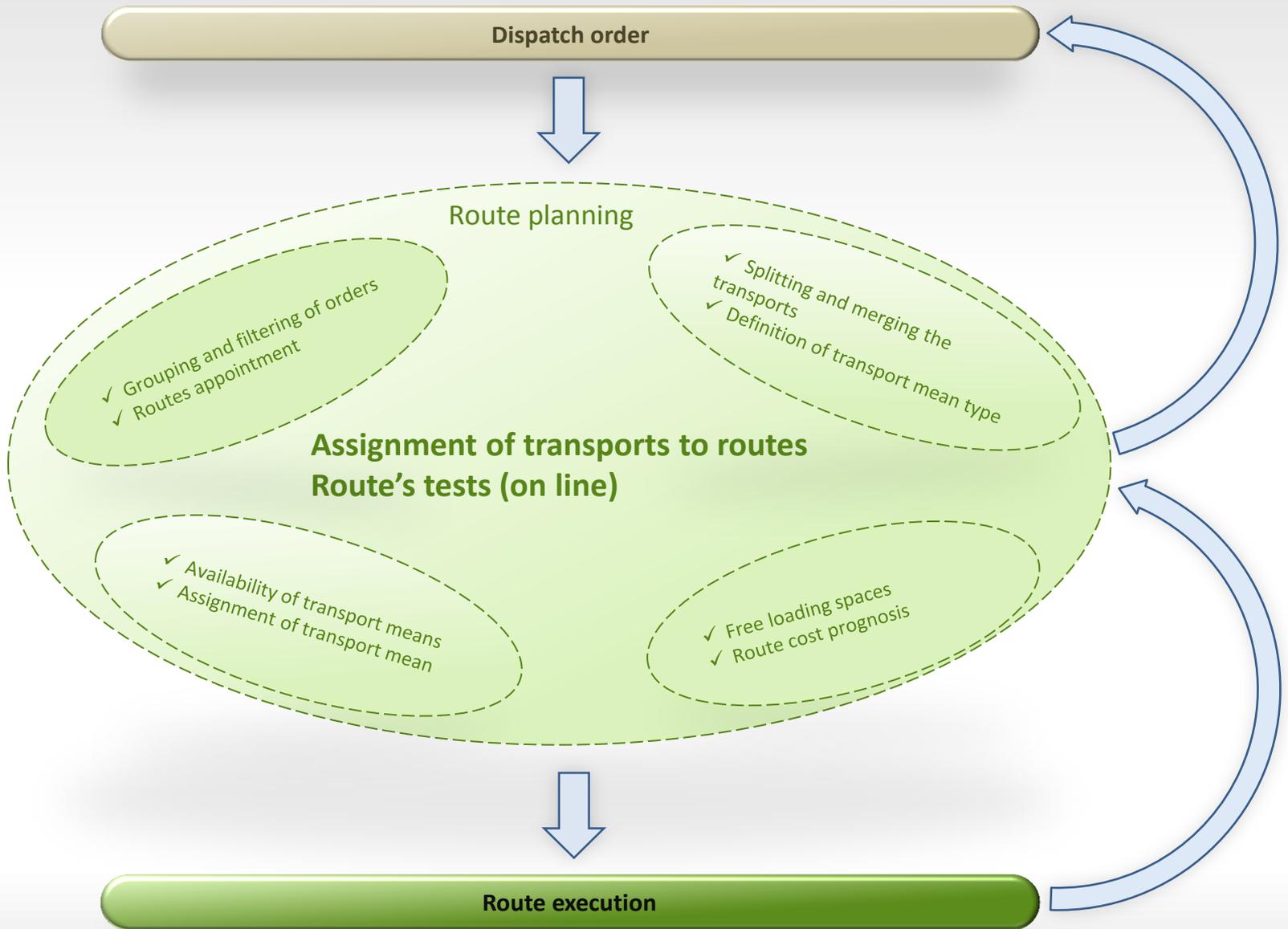
## Management of full truck orders

System creates automatically route and blocks assignment of any other orders

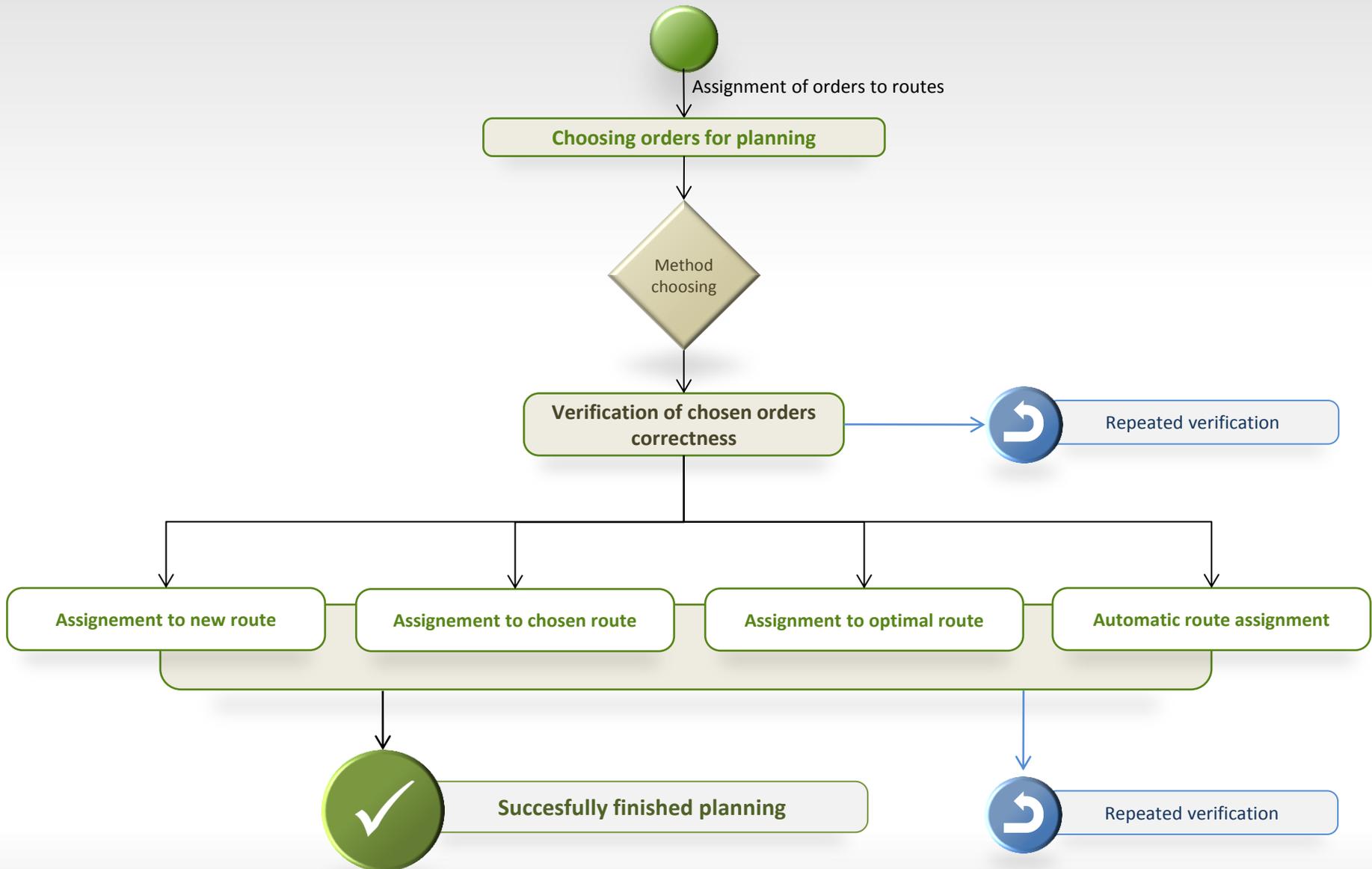
## Execution of dispatch orders

Real dispatch order's execution – planning and execution of proper transports and routes

# Model of routes planning



# Assignment of orders to routes



## Grouping of orders into routes

### Automatic methods

They allow for planning of many orders in the same moment.

- ✓ **Heuristic methods** – fast methods adjusted to the way of planning in a given company. They rely on choosing the proper algorithm depending on specific nature of dispatch tasks.
- ✓ **Optimization methods** – rely on searching for better solutions for given orders. Those methods take into consideration the whole space of available solutions. Effectiveness depends on time of calculation

### Manual methods

Those methods allow for manual planning of order assignment to the routes – in this way they enable management of untypical situations.

The manual methods base on data base functions, e.g. sorting of orders according to delivery hour, the same client, etc.

In this case automatic finding of existing optimal route for the chosen order is also possible.

Process of orders grouping is supported by route correctness check mechanism

# Algorithms of automatic planning

The screenshot displays the Qguar TMS web interface. At the top, a browser window shows the URL `localhost:8080/tms/desktop?app=TMS&token=1460016942411#7694`. The main content area is titled "Algorithms of automatic planning" and features a table with the following data:

Name	Algorithm	Maximum r. length(km)	Maximum driving time (h)	Active	Unloading time (min.)	Loading time (min.)	Max route time (h)
APT	Planning by ...	1000	24	Yes	10	10	32
WLOG	Planning by ...	4000	3000	Yes	10	10	3000

Below the table, a configuration window titled "Algorithms of automatic planning" is open, showing the "Basic data" tab. The configuration includes the following fields and options:

- Name: APT
- Algorithm: Planning by region
- Max.length of the route with no return (km): 1000
- Max.number of unloading stops for the route: 10
- Maximum driving time (h): 24
- Max route time (h): 32
- Default unloading time: 10
- Default loading time: 10
- Active: Yes
- Max planning time: 6000000
- Load units qty. control:
- Weight control:
- Volume control:
- Minimum transport mean fulfillment (%): 0

At the bottom of the configuration window, there are three buttons: "New", "Save", and "End".



# Control over route execution

## Management of route stops

Allows for changing the course of route during its executions, verification of arrival time, stoppage, loading/unloading time.

## Management of orders during execution

System allows for adding new orders to the route during its execution.

## Control over drivers work time

Allows for control over drivers work time on the basis of defined regulations  
Planning of relax time on the level of route stage is possible.

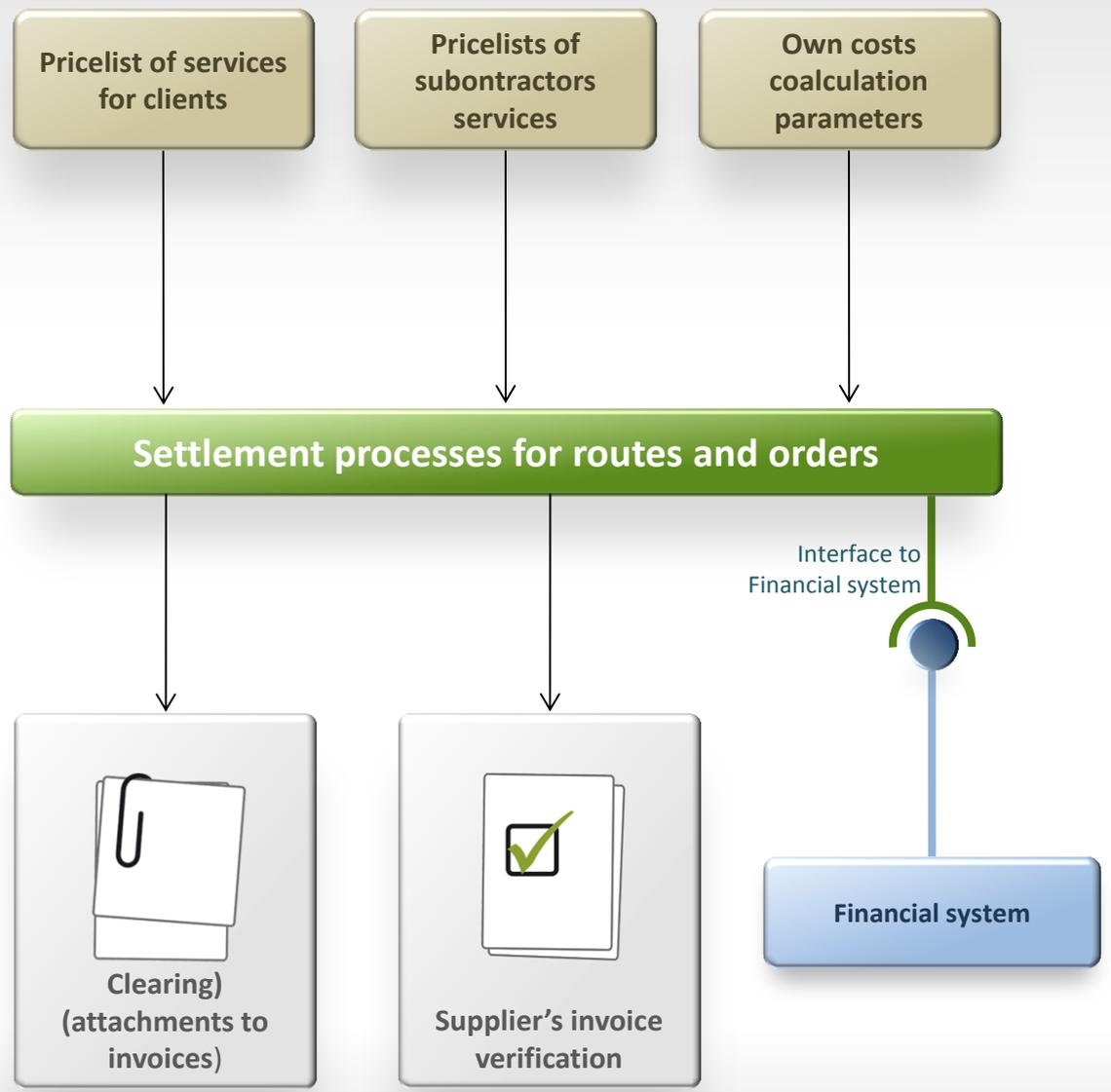
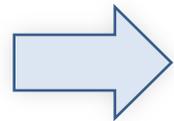
## Registration of refuelling and mileage

System enables keeping records of refuelling and update the mileage records

## Tracing of load units

Monitoring of transported load units history.

# Settlement of services and costs



# Settlement

Route's tree

Dispatching orders Transports Routes Orders in automatic planning Routes in automatic planning

Quantity of rows on site: 25

Route no.	Partner	Carrier no.	Dock no.	Vehicle Registration	Means of transp. name	Driver	Source location	Target loc.	Pt. loading date	Pt. departure date	Pt. dist (km)	Route status	Auction	Auction's status
10		TUSPED		KR1001	Flat Panda	Basket Ziggy	Cracow Quantum...	STK Wroclaw	2015-12-01 00:00	2015-12-01 01:00	269.41	In realization		
9		QUANTUM										In realization		
8		TLOG										In realization		
5 - loads/unl...		TLOG										In realization		
4 - loads/unl...		TUSPED										In realization		
3 - loads/unl...		TUSPED										In realization		
2 - loads/unl...		TUSPED										In realization		
1 - ADR rights		TSTK										In planning		
26		TUSPED										Confirmed	1	Confirmed(Carrier)
7 - loads/unl...		TKINGX										Confirmed		
6 - loads/unl...		TSTK										Confirmed		
27		--										Planning in APT		
28		--										Planning in APT		
29		--										Planning in APT		
30		--										Planning in APT		
31		--										Planning in APT		

Settlement logs

Filters

Settlement log:

Accounting process RT\_Umowiona/Wartosc valid from: 2004/01/01 to: 2015/12/06<  
data szukania ceny =>15/12/06<  
Numer trasy =>7 - loads/unloads<  
Umowiona cena =>0<  
-- Beginning of accounting process --<

Register Documents Packages

+ New Save X End

Management of reloading hubs and  
control over loading and unloading

Registration of loadings and  
unloadings

Monitoring of actions

Control over stock levels in the  
hubs

Stocktaking of load units

Tracing of loads

Monitoring of deliveries to the  
hub

Monitoring of shipments

# Loadings / unloading

Qguar TMS [Load transac...]

localhost:8080/tms/desktop?app=TMS&token=1460016942411#7694

Route stops

Filters

Route no.: Loaded on: Stop no.: Name: Arrival date: Departure date: Status: Route status: Omitted:

Page 1 Quantity of rows on site 25 Displayed 1 - 25

Route no.	Loaded on	Stop no.	Name	Pl arrival	Pl departure	Plan stopping time (mins)	Plan load time (mins)	Plan unload time (mins)	Planned break on the road (min)	Planned break on the stop (min)	Arrival date	Departure date	Status	Route status	Real break period	Omitted
1 - ADR rights	Car	1	ZPC G...	2015-11-30 19:20:11									OK	In planning		No
1 - ADR rights	Car	2	PSS L...	2015-12-01 03:45:11									OK	In planning		No
10		1	Craco...	2015-12-01 00:00:00									Finished	In realization		No
2 - loads/unl...	Car	2	STK W...	2015-12-01 05:59:00									OK	In realization		No
2 - loads/unl...	Car	1	ZPC G...	2015-12-01 19:20:11									OK	In realization		No
2 - loads/unl...	Car	2	KINGX...	2015-12-02 05:43:22									OK	In realization		No
26		1	Craco...										OK	Confirmed		No
26	Car	2	MAKR...										OK	Confirmed		No
26		1	Craco...	2016-04-07 07:50:00									OK	Planning in APT	0 No	
27	Car	2	ZPC G...	2016-04-08 04:54:00									OK	Planning in APT	0 No	
27		3	Craco...	2016-04-09 01:58:00									OK	Planning in APT	0 No	
28		1	Craco...	2016-04-07 07:50:00									OK	Planning in APT	0 No	
28	Car	2	HURT...	2016-04-07 13:19:00									OK	Planning in APT	0 No	
28		3	Craco...	2016-04-08 05:03:00									OK	Planning in APT	0 No	
29		1	Craco...	2016-04-07 07:50:00									OK	Planning in APT	0 No	
29	Car	2	STK W...	2016-04-07 12:29:00									OK	Planning in APT	0 No	
29	Car	3	OPER...	2016-04-07 13:29:00									OK	Planning in APT	0 No	
29		4	Craco...	2016-04-08 05:09:00									OK	Planning in APT	0 No	
3 - loads/unl...		1	ZPC G...	2015-12-02 19:20:11									OK	In realization		No
3 - loads/unl...	Car	2	ZPC G...	2015-12-02 20:21:22									OK	In realization		No
30		1	Craco...	2016-04-07 07:50:00									OK	Planning in APT	0 No	
30	Car	2	STK L...	2016-04-07 11:53:00									OK	Planning in APT	0 No	
30		3	Craco...	2016-04-07 16:41:00									OK	Planning in APT	0 No	
31		1	Craco...	2016-04-07 07:50:00									OK	Planning in APT	0 No	
31	Car	2	USPE...	2016-04-07 10:10:00									OK	Planning in APT	0 No	

**Load transactions**

**Operations on loads**

Stop: 1 ZPC G Chmielna Route: 3 - loads/unload 3 - loads/unloads

**To loading/unloading**

Load unit no.	Transport no.	Order no.	Operation type	Reason
16	3	2015/11/4/00103/00	Loading	
17	3	2015/11/4/00103/00	Loading	
18	3	2015/11/4/00103/00	Loading	
19	3	2015/11/4/00103/00	Loading	
20	3	2015/11/4/00103/00	Loading	
21	3	2015/11/4/00103/00	Loading	
22	3	2015/11/4/00103/00	Loading	
23	3	2015/11/4/00103/00	Loading	
24	3	2015/11/4/00103/00	Loading	
25	3	2015/11/4/00103/00	Loading	
26	3	2015/11/4/00103/00	Loading	

**Loaded/Unloaded**

Load unit no.	Transport no.	Order no.	Operation type	Started
---------------	---------------	-----------	----------------	---------

**Additional information**

Reason:

Responsibility:

Description:

Confirm

Change

Change

Finish End

## Intermodal orders

Loactions with the feature - reloading:

Automotive

Railway

Maritime

Aviation

Intermodal transport consists in loads, which can be viewed in any constituent order (\*)

(\*) Constituent order: :

- ✓ external order: railway, maritime, aviation
- ✓ transport mean order : dispatch order, standard

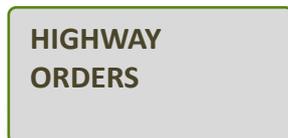
## Intermodal dispatches

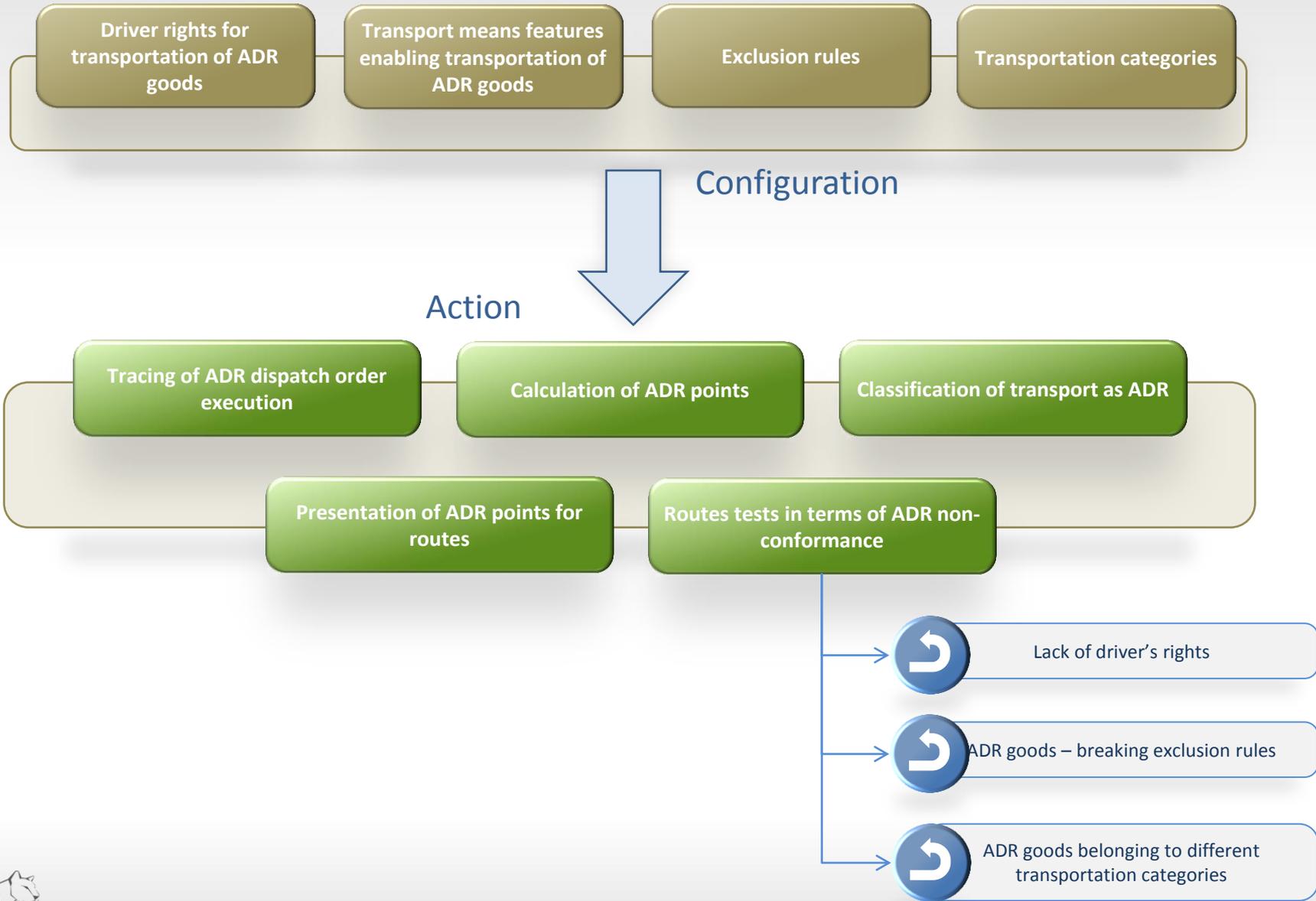
Railway

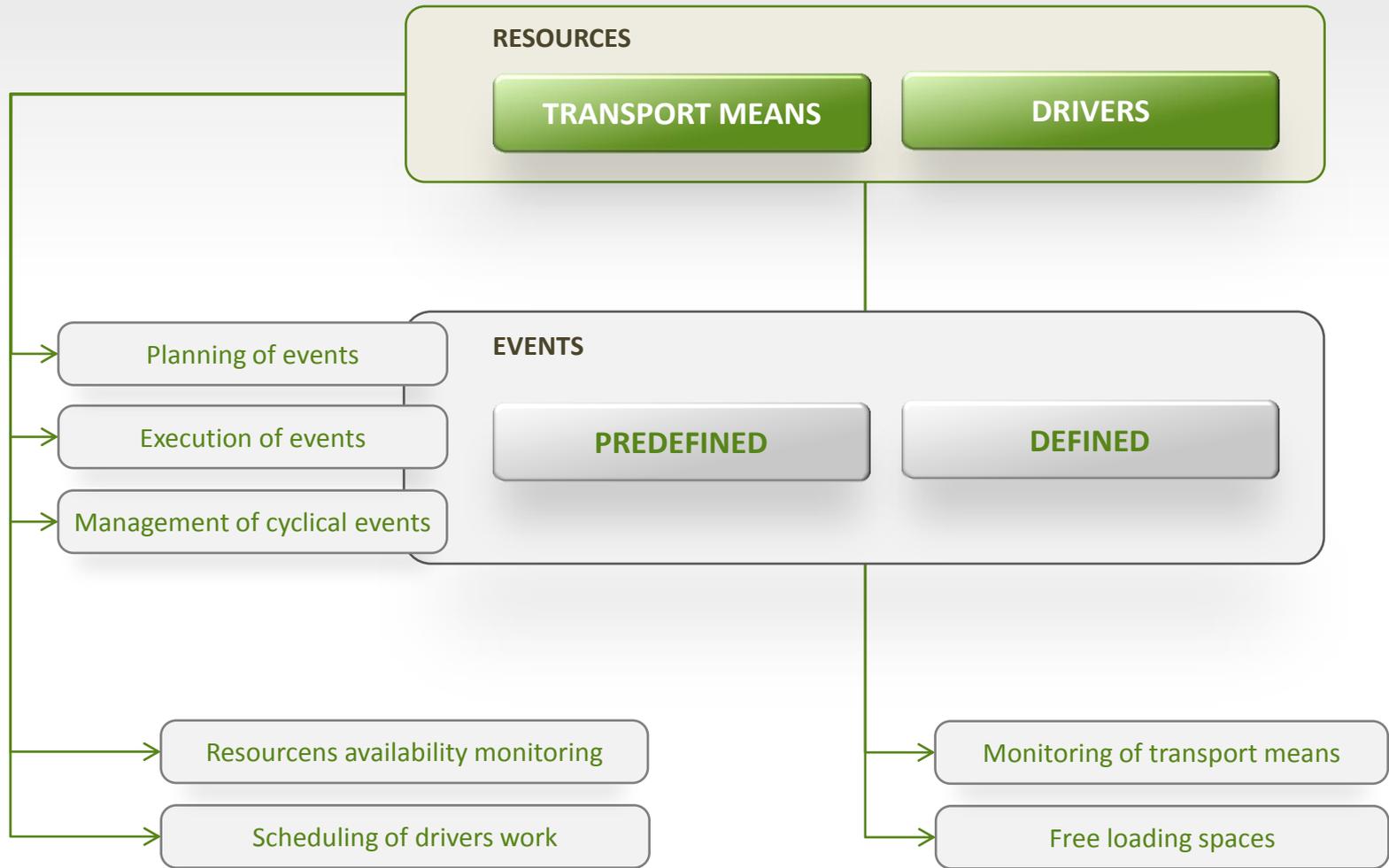
Maritime

Aviation

External orders with different types (railway, maritime, aviation) are grouped into dispatches (railway, maritime, aviation) in order to pass them on to adequate forwarder.







Qguar TMS [Emap] x  
 localhost:8080/tms/desktop?app=TMS&token=1460016942411

Route's planning  
 Dispatching orders | Transports | **Routes** | Orders in automatic planning | Routes in automatic planning

Route's tree  
 Routes  
 Unassigned transports

Page 1 | Quantity of rows on site 25 | Displayed 1 - 11

Route no.	Partner	Carrier no.	Dock no.	Vehicle Registration	Means of transp. name	Driver	Source location	Target loc.	Pt. loading date	Pt. departure date	Pt.dist (km)	Route status	Auction	Auction's status
10		TUSPED		KR1001	Fiat Panda	Basket Ziggy	Cracow Quantum	STK Wroclaw	2015-12-01 00:00	2015-12-01 01:00	269.41	In realization		
9		QUANTUM		KR1005	Volkswagen Caddy	PARSON Ra...	ZPC G Szeroka	MARKO No...	2011-05-19 10:55	2011-05-19 11:55	799	In realization		
8		TLOG		KR3002	Star 1142	LIQUID John	ZPC G Brama OL...	KINGX	2011-05-19 10:55	2011-05-19 11:55	518	In realization		
5 - loads/unl...		TLOG										In realization		
4 - loads/unl...		TUSPED										In realization		
3 - loads/unl...		TUSPED										In realization		
2 - loads/unl...		TUSPED										In realization		
1 - ADR rights		TSTK										In realization		
26		TUSPED										In realization	1	Confirmed (Carrier)
7 - loads/unl...		TKINGX										In realization		
6 - loads/unl...		TSTK										In realization		

**Emap** Searching

Country: Polska

Province:

District:

City:

Street:

House number:

Post code:

Current route  
 Route no.: 26

Route stops

No.	Route course	km	Converted Load Units	Weight (kg)
1	Cracow Quant...	0	0	0
2	MAKRO Warsz...	302...	2	350

Loaded on	No.	Order no.	Customer order no.	Location from	Location to	km	Firm no.	Converted Load Units	Target loc.	Target city	Postal code of target location	Street of target location	Trans st.
Car	42	2015/11/KR...	Automatic planning	Cracow Quant...	MAKRO War...	302...	TMARKO	2	MAKRO Wa...	Warszawa	01-380	Powstańców Śląskich 70	Confirmed

Reload route's tree | Move up | Move down | Add stop | Remove from the route | Transport orders | Generate distance

# Digital Map

Qguar TMS [Emap] x  
 localhost:8080/tms/desktop?app=TMS&token=1460016942411

Route's planning  
 Dispatching orders | Transports | Routes | Orders in automatic planning | Routes in automatic planning

Route's tree  
 Routes  
 Unassigned transports

Page 1 | Quantity of rows on site 25 | Displayed 1 - 11

Route no.	Partner	Carrier no.	Dock no.	Vehicle Registration	Means of transp. name	Driver	Source location	Target loc.	Pl. loading date	Pl. departure date	Pl. dist. (km)	Route status	Auction	Auction's status
10		TUSPED		KR1001	Fiat Panda	Basket Ziggy	Cracow Quantum...	STK Wroclaw	2015-12-01 00:00	2015-12-01 01:00	269.41	In realization		
9		QUANTUM		KR1005	Volkswagen Caddy	PARSON Ra...	ZPC G Szeroka	MARKO No...	2011-05-19 10:55	2011-05-19 11:55	799	In realization		
8		TLOG		KR3002	Star 1142	LIQUID John	ZPC G Brama OIL...	KINGX	2011-05-19 10:55	2011-05-19 11:55	518	In realization		
5 - loads/unt...		TLOG		KR3003	Star 1142	Basket Ziggy	ZPC G Szeroka	MARKO No...	2011-05-19 10:55	2011-05-19 11:55	742	In realization		
4 - loads/unt...		TUSPED										In realization		
3 - loads/unt...		TUSPED										In realization		
2 - loads/unt...		TUSPED										In realization		
1 - ADR rights		TSTK										In realization		
26		TUSPED										In realization		
7 - loads/unt...		TKINGX										In realization		
6 - loads/unt...		TSTK										In realization		

Emap  
 Searching  
 Country: Polska  
 Province  
 District  
 City  
 Street  
 House number:  
 Post code:  
 Find

Current route  
 Route no.: 26 Refresh  
 Edit Confirm Open realization

Route stops

No.	Route course	km	Converted Load Units	Weight (kg)
1	Cracow Quant...	0	0	0
2	MAKRO Warsz...	302	2	350

Loaded on: Car | No: 42 | Order no: 2015/11/KR/... | Customer order no: Automatic planning | Location from: Cracow Quant... | Location to: MAKRO War... | km: 302... | Firm no: TMARKO | Converted Load Units: 2 | Target loc: MAKRO Wa... | Target city: Warszawa | Postal code of target location: 01-380 | Street of target location: Powstańców Śląskich 70 | Trans st: Confirmed

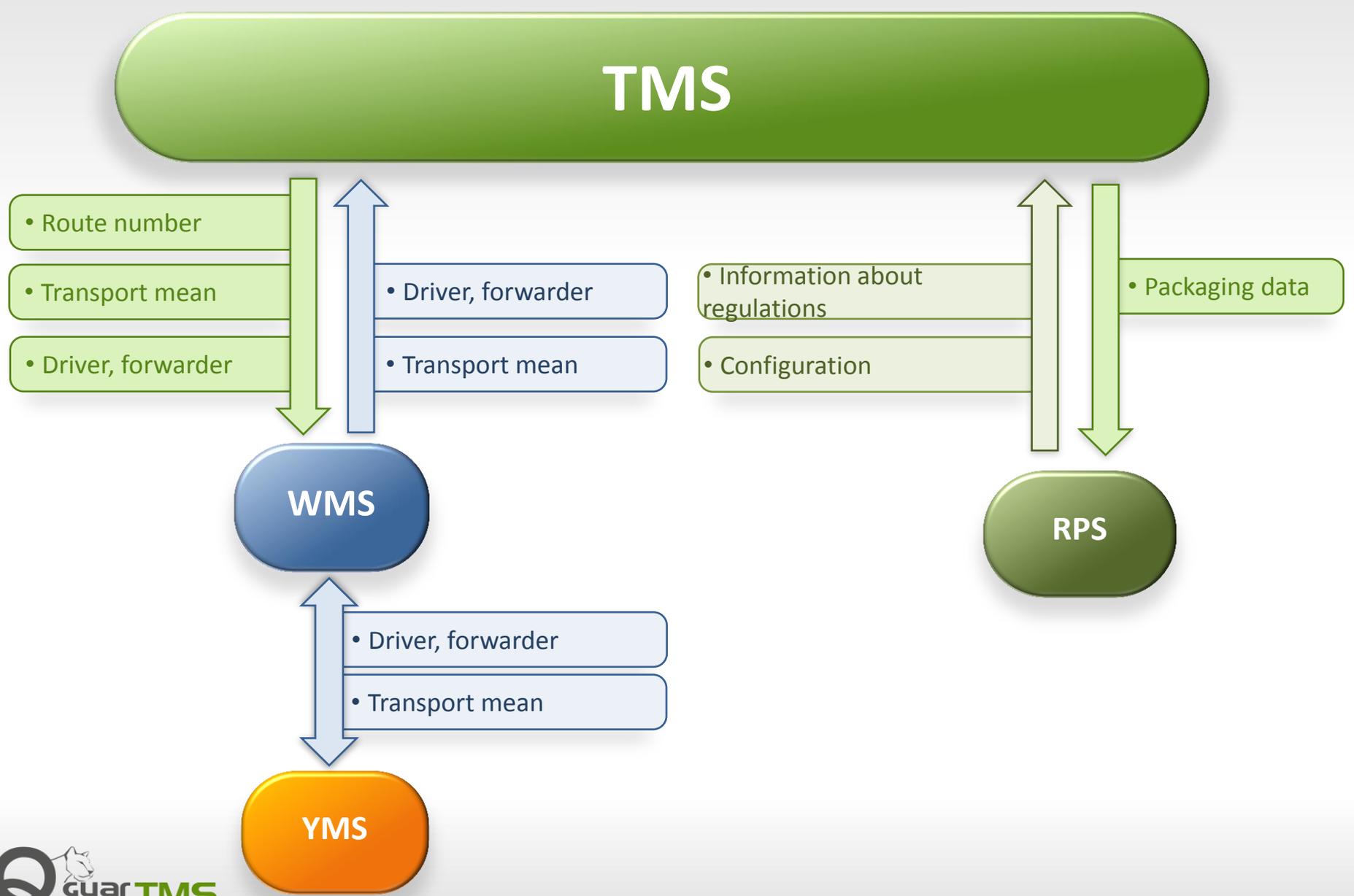
Reload route's tree | Move up | Move down | Add stop | Remove from the route | Transport orders | Generate distance



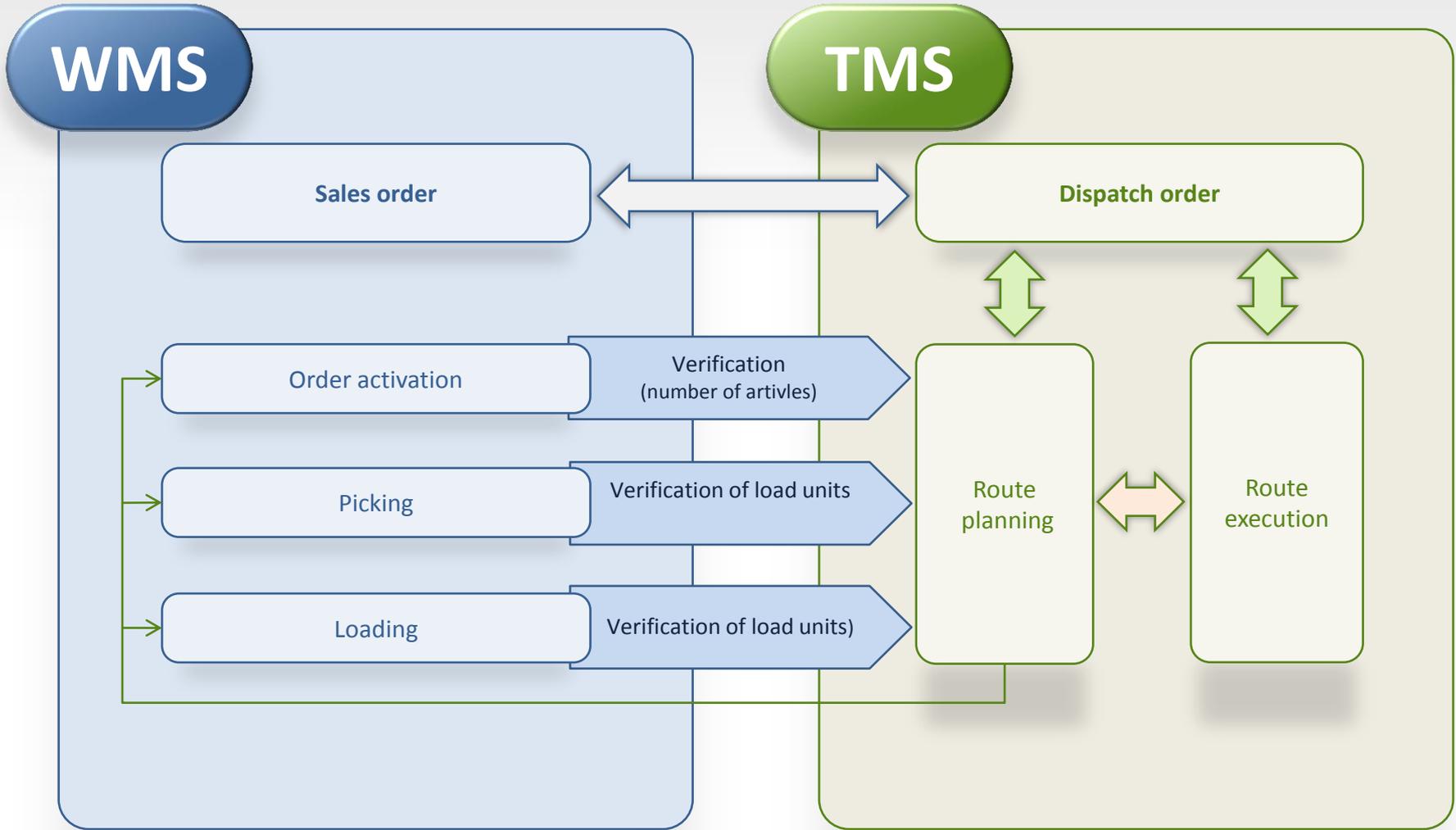
- ✓ Integration with digital maps (emapa, navigox)
- ✓ Cooperation with mobile equipment
- ✓ Archiving external documents (system enables recording in the database and reading from the database in order to save or read the external documents)
- ✓ Database link with other Qguar modules
- ✓ Standard file interface
- ✓ Management of messages

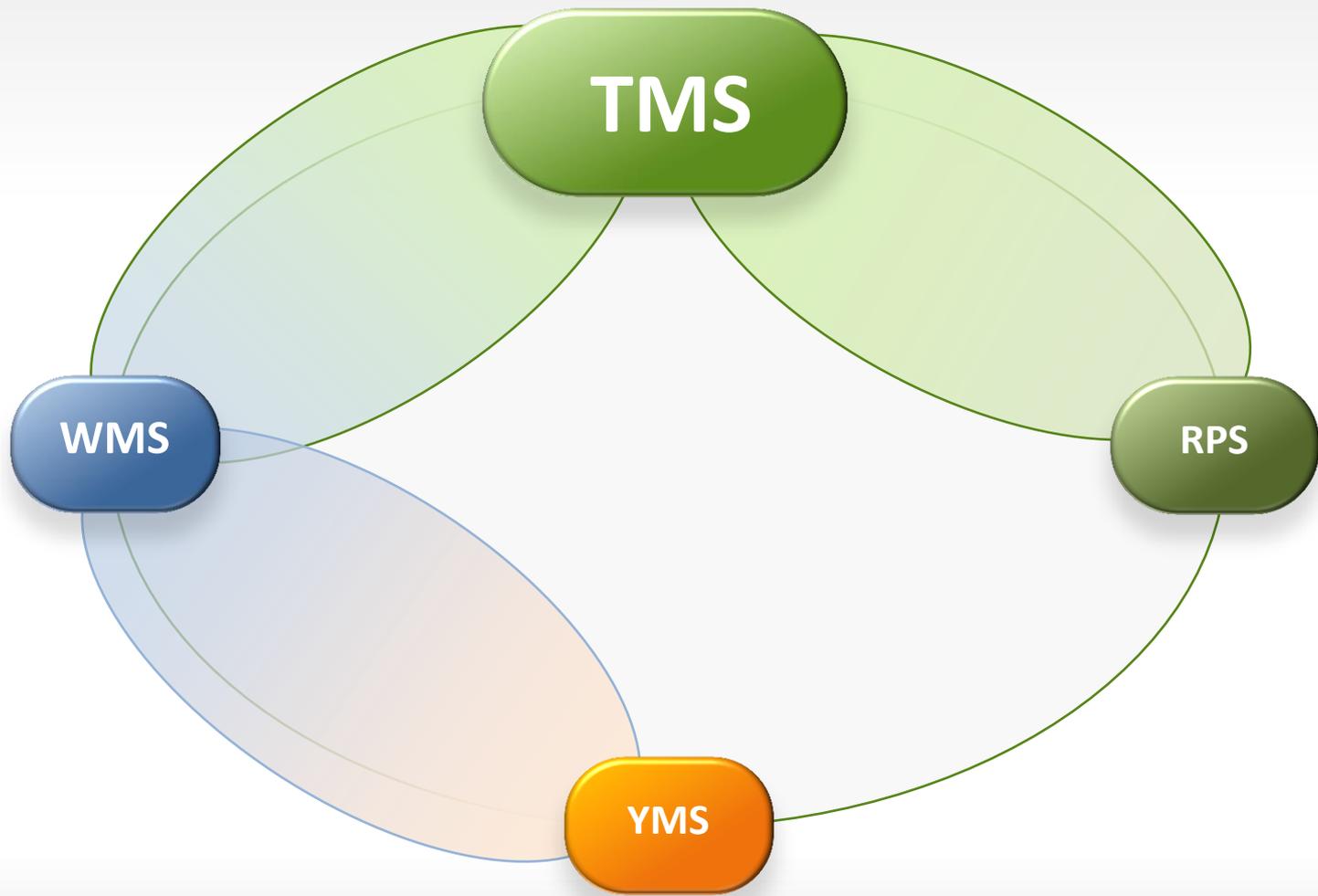


# Information exchange between QGUAR TMS and the other QGUAR modules



# Power of detailed integration between WMS and TMS





## Messages:

**SAR**

Import of article master data

**SKH**

Import of company master data

**TAD**

Import of addresses

**TTO**

Import of dispatch orders

**TSO**

Simplified import of dispatch orders  
(with addresses)

**TRT**

Export of dispatches:

**TRT.01** – export of routes

**TRT.02** – export of routes and stops

**TRT.03** – export of routes, stops and orders

**TRT.04** – export of routes, stops, orders and load  
units

**TRT.05** – export of routes and orders

**TRT.06** – export of routes, orders and load units

**TRT.07** – export of orders

## TRANSACTIONAL DATA

Executed dispatch orders

Reloadings in the hubs

Routes for executed dispatch orders

ADR notofications

Dispatch order

Transport order

Loading list

List of planned loadungs/unloadings in the HUBs

ADR order

Weekly dispatch report

Specification for forwarder

Cost decreations

Order's profitability

Settlement of drivers

History of changes on the route

Annual ADR reports

## STATISTICS AND ANALYSES

Drivers master data

Conflicts of postal codes

Report of filling the transport mean

Delays on routes

Level of filling the transport mean by dispatcher

# Order's profitability

Qguar TMS

localhost:8080/tms/desktop?app=TMS&token=1460016942411

Order profitability

Filters

Owner:      Order no.:      Transport no.:      Route no.:      Ordering hub:      Hub clearing costs:      Order status:

Page 1      Quantity of rows on site 25      Displayed 1 - 12

Owner	Cost carrier	Compound order no.	Order no	Transport no.	Transport price	Route no.	Ord...	Hub...	Route status	Planned loading date	Invoice receive date	Order status	Delivery	External income	Internal income	LU Count	Qty of pack.	Weight	Distance	Profit	Margin
QUANTUM			2015/11/4/00...	1		1 - ADR rights	KR...	KAT...	In planning	2015-11-30 19:20:18		In realization	2015-12-20 ...	0	0		0		400	0	
QUANTUM			2015/11/4/00...	2		2 - loads/unloads	KR...	KAT...	In realization	2015-12-01 19:20:22		In realization	2015-12-20 ...	0	0	15	60	500	518	0	
QUANTUM			2015/11/4/00...	3		3 - loads/unloads	KR...	KAT...	In realization	2015-12-02 19:20:26		In realization	2015-12-20 ...	0	0	15	60	500	1	0	
QUANTUM			2015/11/4/00...	4		4 - loads/unloads	KR...	KAT...	In realization	2015-12-03 19:20:26		In realization	2015-12-20 ...	0	0	15	60	500	1	0	
QUANTUM			2015/11/4/00...	5		5 - loads/unloads	KR...	KAT...	In realization	2015-12-04 19:20:26		In realization	2015-12-20 ...	0	0	15	60	500	712	0	
QUANTUM			2015/11/4/00...	6		6 - loads/unloads	KR...	KAT...	Confirmed	2015-12-05 19:20:26		In realization	2015-12-20 ...	0	0	15	60	500	312	0	
QUANTUM			2015/11/4/00...	7		7 - loads/unloads	KR...	KAT...	Confirmed	2015-12-06 19:20:26		In realization	2015-12-20 ...	0	0	15	60	500	712	0	
TSTK			2015/11/WR/...	8			WR...	WR...	In realization	2011-05-19 10:55:00		In realization	2015-12-08 ...	0	0	12	132	560	518	0	
TSTK			2015/11/WR/...	9			WR...	WR...	In realization	2011-05-19 10:55:00		In realization	2015-12-08 ...	0	0	12	36	44.5	442	0	
TSTK			2015/11/WR/...	10			WR...	WR...	In realization	2011-05-19 10:55:00		In realization	2015-12-08 ...	0	0	12	36	44.5	45	0	
QUANTUM			2015/11/KR/...	11			KR...	KAT...	In realization	2015-12-01 00:00:00		In realization	2015-12-20 ...	0	0	3	6	150	269.41		
QUANTUM			2015/11/KR/...	42			KR...	KAT...	Confirmed	2015-12-02 19:00:00		In realization	2015-12-20 ...	0	0		0		302.13		

Start      Order pro...

## I-Net Crystal Clear

- ✓ documents
- ✓ labels
- ✓ Current and statistical reports

Sending the printout directly to printer or with with view possibility on the screen

Possibility to change the existing printouts

Creation of own printouts by the user

## Controll queries

Defined as query in SQL

Fast speed of creation – under condition of knowing the database structure

Possibiity to create own filters

Effect:  
Classic table of Qguar

Instert of own lists into menu

## Export od data into MS Excel

Export of any table from Qguar

Possibility to choose exported columns

Further processing of data in MS EXcel



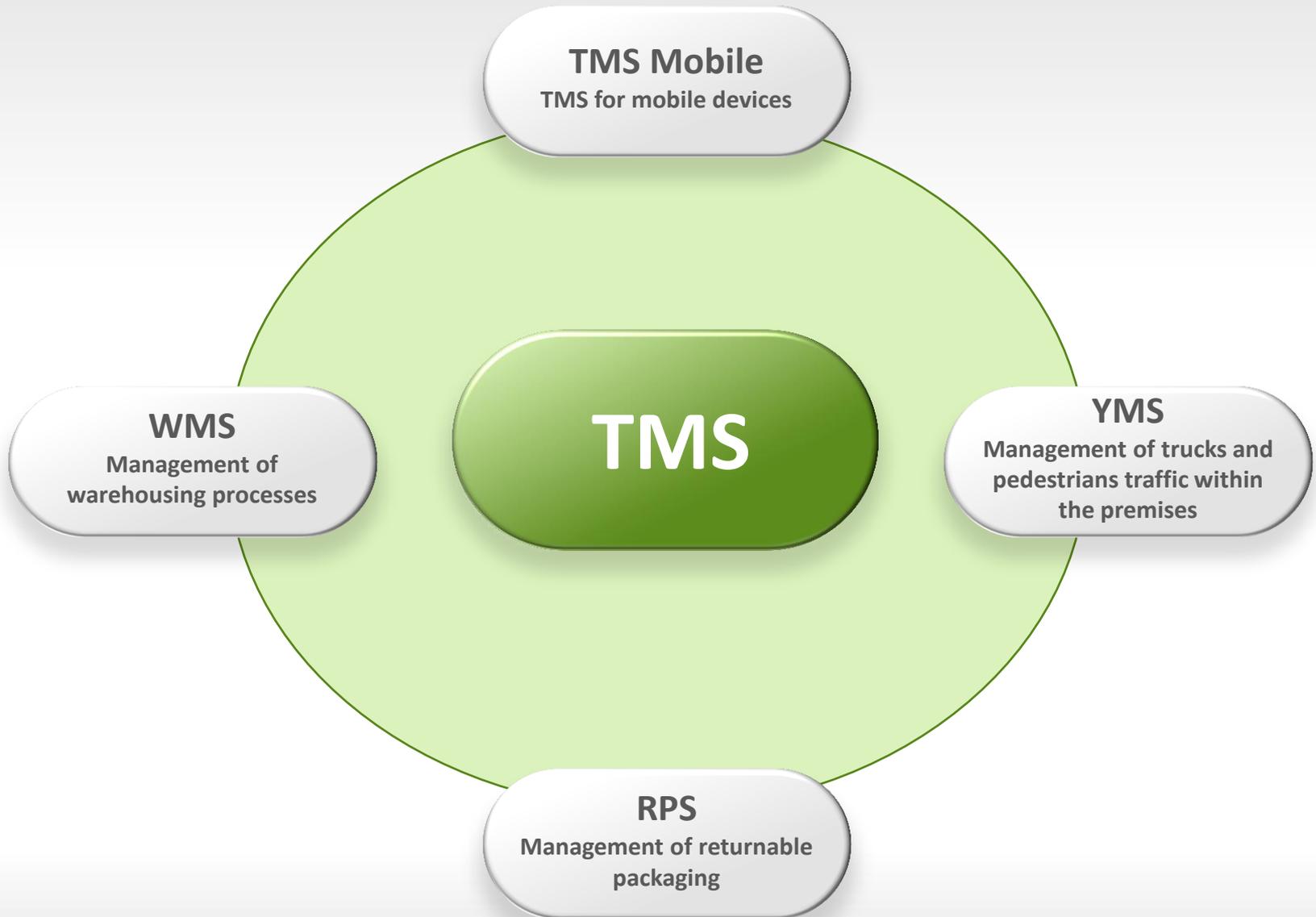
- ✓ Monitoring of events connected with transportation
- ✓ Optimization of transport processes
- ✓ Improvement of transport services settlement
- ✓ Logistic costs reduction
- ✓ Processes automation
- ✓ Possibility to carry out statistics and analyses
- ✓ Fast access to historical data
- ✓ Precise cost controll
- ✓ Improvement of work efficiency

# Work improvements indicators after QGUAR TMS implementation

- ✓ Reduction of time needed for servicing the transport events
- ✓ Decrease of transportation costs
- ✓ Synchronisation of processes between hubs
- ✓ Better detection of conflicts regarding the planned transport mean and its assignment to other earlier planned routes
- ✓ Better detection of conflicts regarding the availability of the load compared with planned route start
- ✓ Automation of route planning
- ✓ Optimization of route planning
- ✓ Improvement of forwarding documents creation process
- ✓ Controll over road completion
- ✓ Time schedule of arrivals, departures, unloadings, loadings.



- ✓ Number of orders completed
- ✓ Number of delayed transports
- ✓ Conformity of time of delivery with the required one
- ✓ Conformity of load availability with the planned date of route execution start
- ✓ Income from transportation services
- ✓ Costs of transportation services
- ✓ Value of settled transports
- ✓ Number of settled orders/routes
- ✓ Average time of order completion
- ✓ Level of not fulfilled orders
- ✓ Level of fulfilled orders
- ✓ Average transport cost per forwarder
- ✓ Efficiency of orders





**Thank you for  
attention!**

**Quantum**<sup>GUAR</sup>