

THE COMPANY



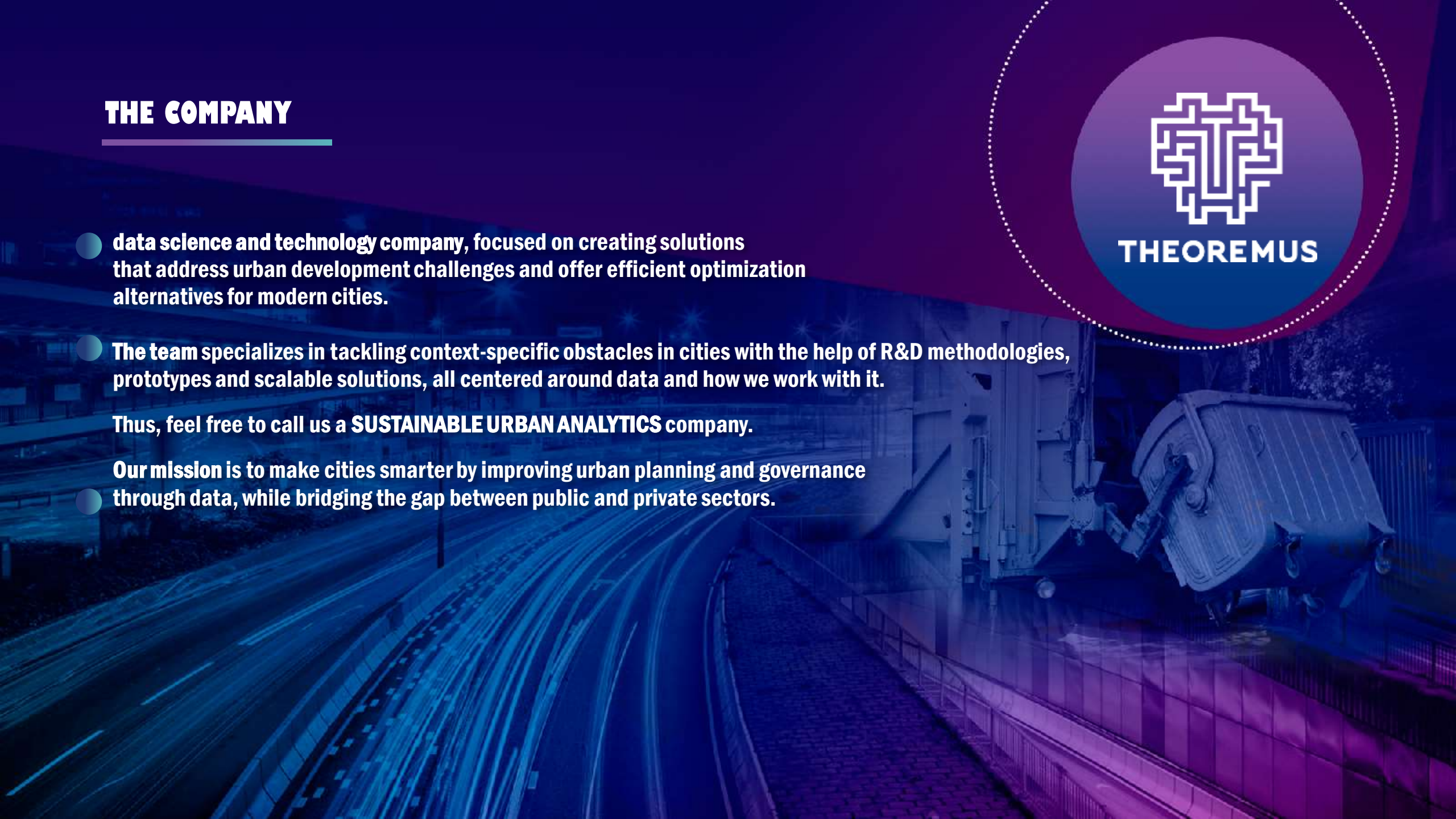
THEOREMUS

- **data science and technology company**, focused on creating solutions that address urban development challenges and offer efficient optimization alternatives for modern cities.

- **The team specializes in tackling context-specific obstacles in cities with the help of R&D methodologies, prototypes and scalable solutions, all centered around data and how we work with it.**

Thus, feel free to call us a **SUSTAINABLE URBAN ANALYTICS** company.

Our mission is to make cities smarter by improving urban planning and governance through data, while bridging the gap between public and private sectors.



WE ARE ALL IN THIS TOGETHER NOW

- **Municipalities are facing how to better manage city waste.**
- **Waste management is transformed by a full scale digital transition.**
- **Selecting a proper smart waste management solution requires technological and a strategic approach, often lacking in municipalities.**
- **A successful business model is one that delivers the objectives of decreasing costs, increasing the rates of separation and treatment of the waste, enabling waste management taxes and collection prices to be defined based on actual generated waste.**
- **Citizens are more engaged than ever seeking better environment for themselves and their families.**

THE SOLUTION

- **THEOREMUS - SMART WASTE MANAGEMENT SYSTEM** is a software platform for automation of waste collection activities and an analytical-predictive platform providing tools, processes and a team for analysis and optimization of activities.
- The solution combines technology components for direct weight and volume measurement of waste in waste containers with an automatic inventory system.



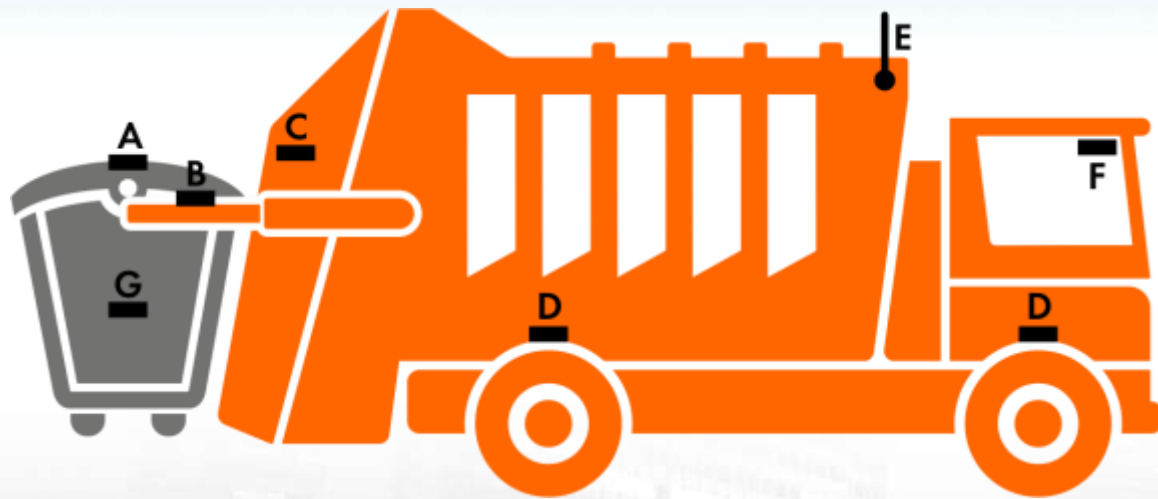
IN BIN MEASUREMENT



**VEHICLE
MEASUREMENT**



**WASTE MANAGEMENT
CLOUD PLATFORM**



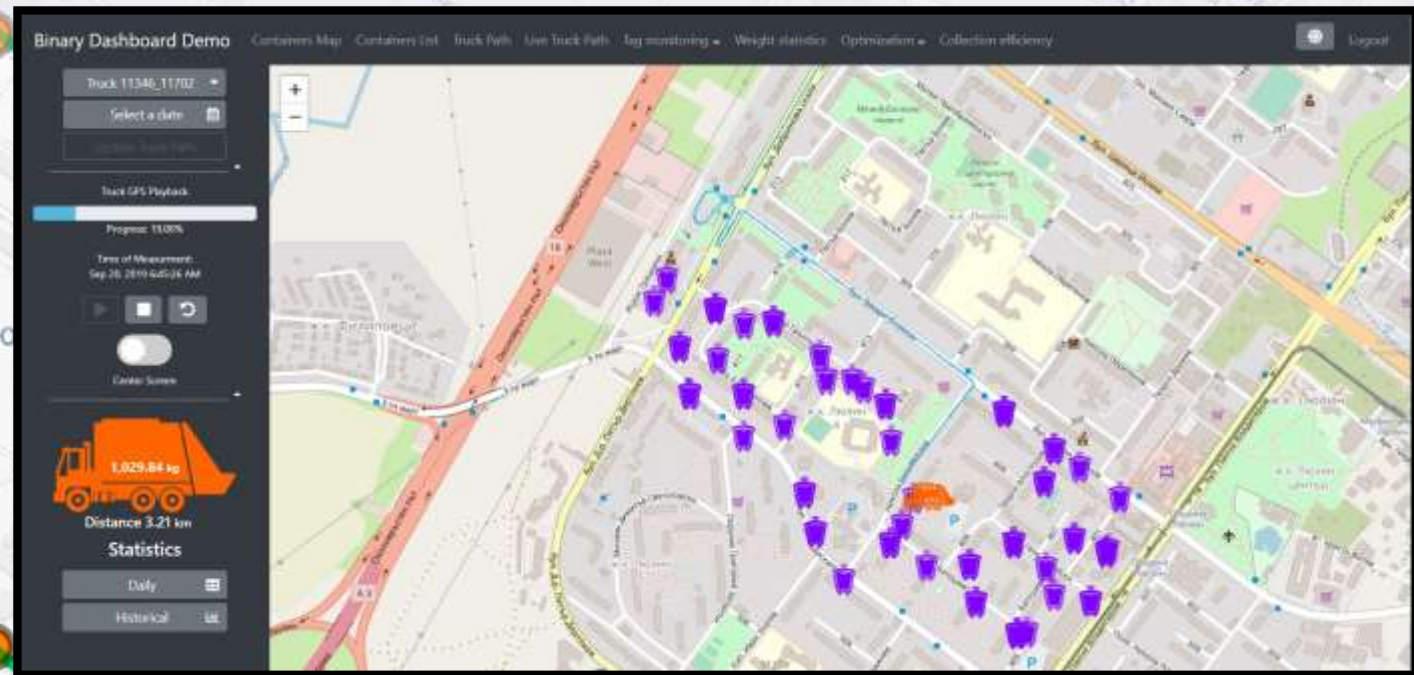
- A** Active sensor for volume measurement
- B** Load cells for container measurement
- C** RFID tag antenna
- D** Load cells for accumulated weight
- E** GPS sensor
- F** Device tracking vehicle parameters
- G** RFID tag sensor

All sensors support GPRS/3G/LTE communication, among others.



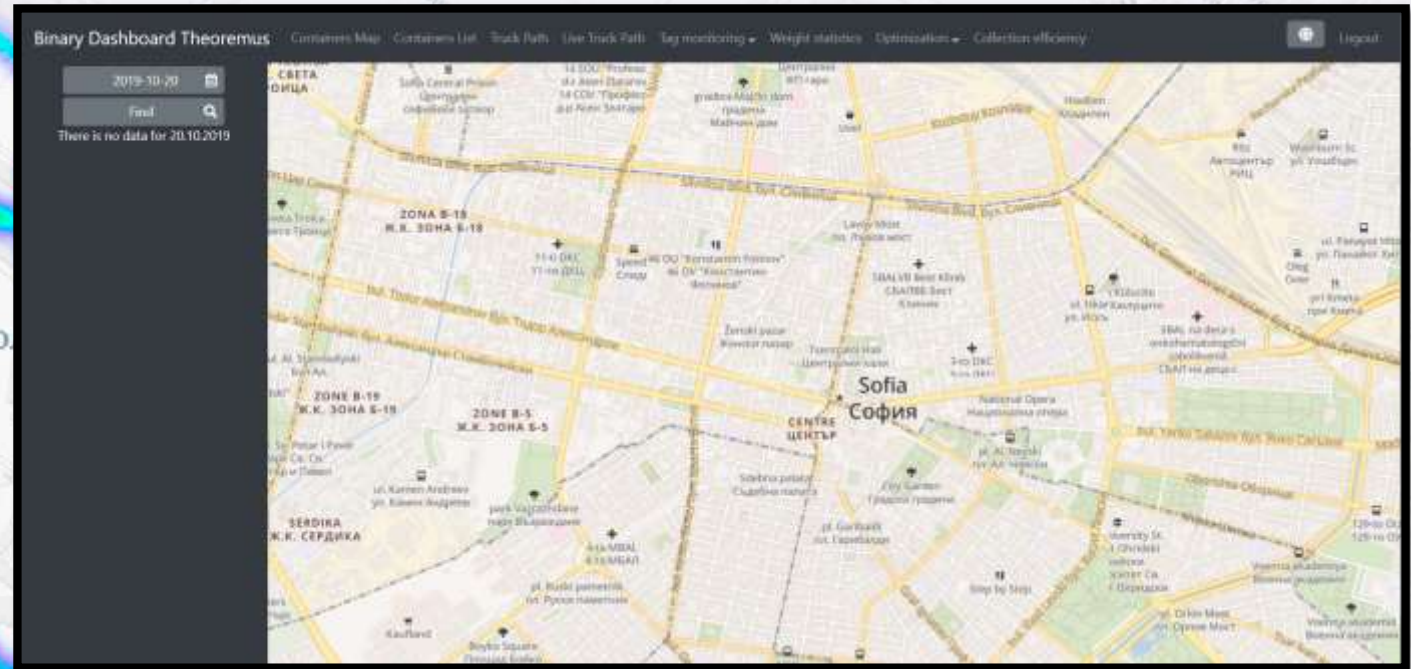
ROUTE MONITORING

- Routes, distance and time for collection.
- Fuel consumption.
- Number, location, and weight of containers.
- Unexpected pickups.
- Total weight per route.



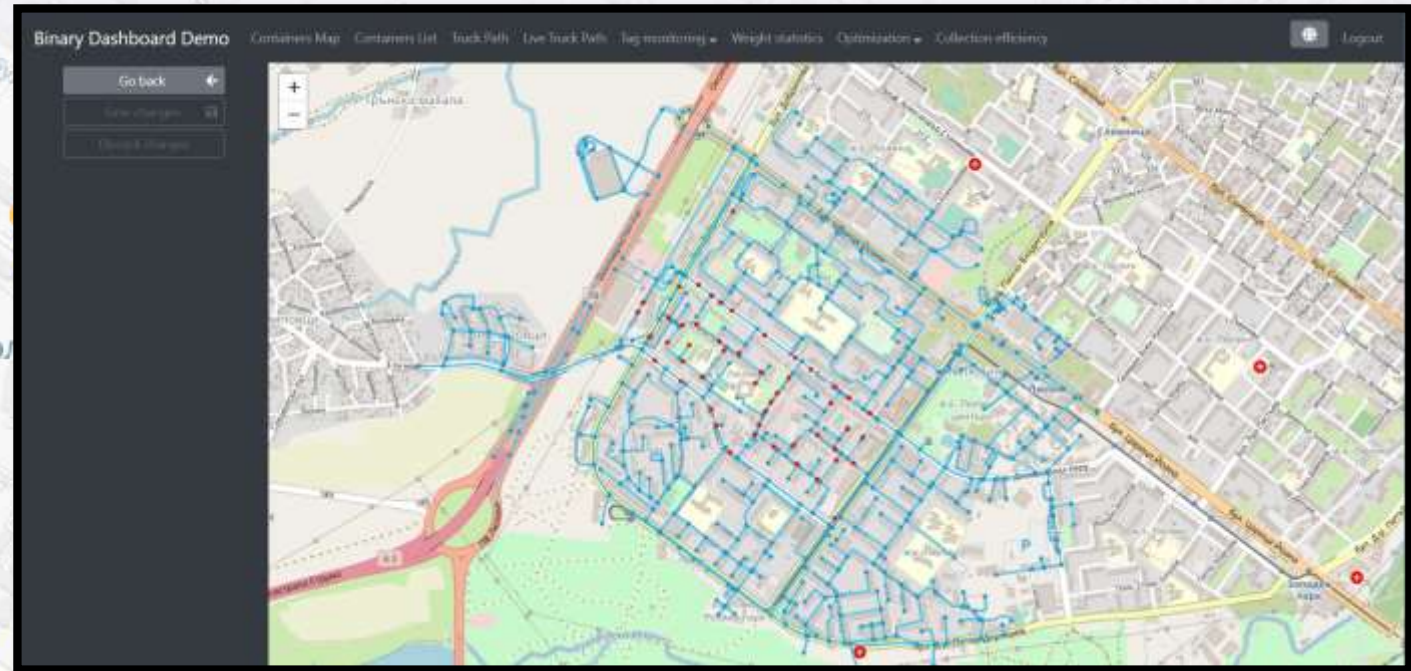
WEIGHT MONITORING

- Weight in individual buildings, which leads to fair waste tax collection.
- Weight in individual points, which leads to optimal number of containers per point.
- Weight clusters, which helps operators identify hot spots.



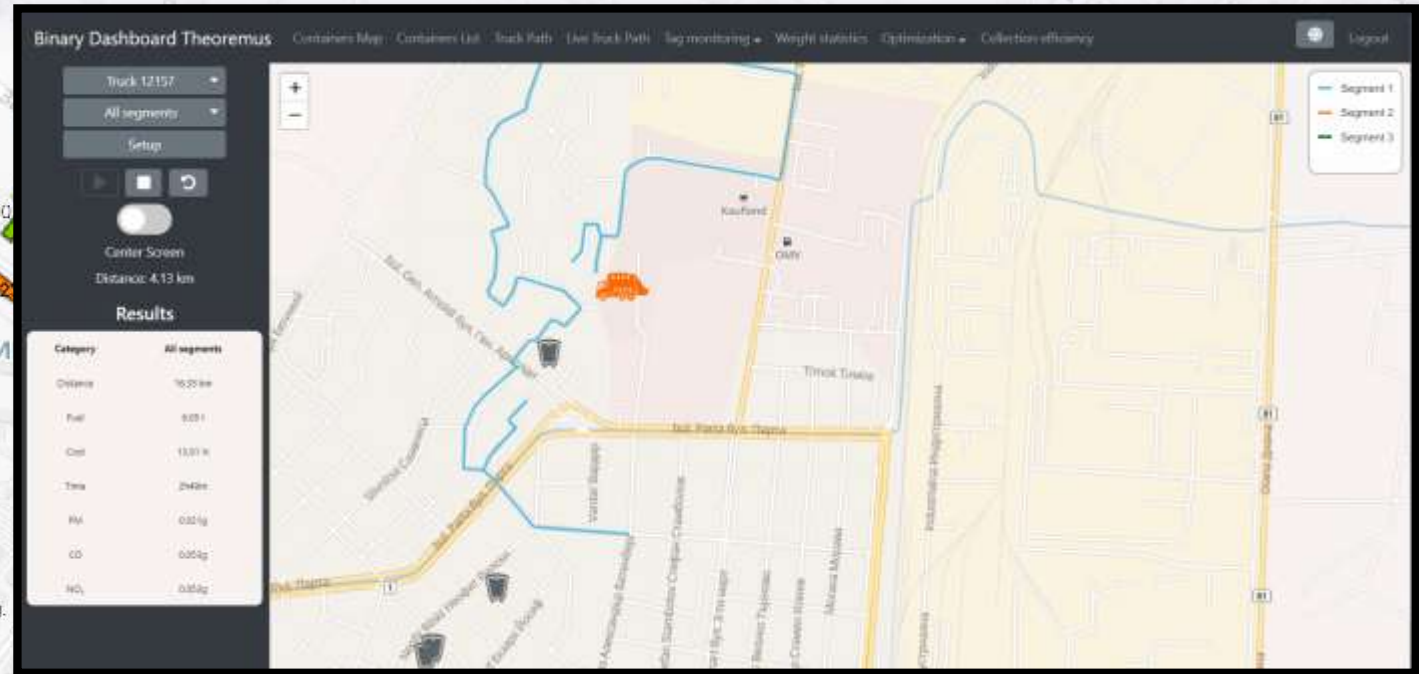
AREA REPRESENTATION

- **Issues with optimization include:** impossible u-turns, noise, traffic, driver's expertise, among others.
- **Road modifications, which incorporate u-turns, blocks, and side swaps.**
- **Point modifications, which include numbers of containers, time windows, etc.**
- **Information is gathered through fieldwork and automated methods.**



OPTIMIZATION

- Takes into account a area representation data.
- Create an optimization which is valid both from a temporal and spatial perspective.
- Constraints can be based on distance, fuel consumption, emissions, time window, driver's shifts, etc.
- Reaches ~20% optimizations in all criteria.



THEOREMUS – SMART WASTE MANAGEMENT SYSTEM



Monitoring and Control



Forecasting



Route optimization



Monitor the truck's deviations from the specified route



Monitor differences in performance between drivers



Track the length of the route



Monitor the weight of the collected waste in the truck during the route



Monitor the weight of each container when it is collected



Track historical information on waste levels



Real-time inventory with accurate geolocation of waste containers

BENEFITS FOR THE MUNICIPALITY



**Service cost
optimization**



Happier citizens



**Observation and control
of waste collection
operators**



**Volume based
waste tax**



**Traffic decrease
and air quality
improvement**

BENEFITS FOR WASTE COLLECTION OPERATORS



**Optimization of
container number
and location**



**Full inventORIZATION and
real-time traceability of
container location**



**Monitoring of fill level
and servicing**



**Improved service
quality and therefore
less fines**



**Independent
measurement of waste
weight
for each cycle**



**Decreased cost for
fuel, maintenance
and salaries thanks
to smart routing**

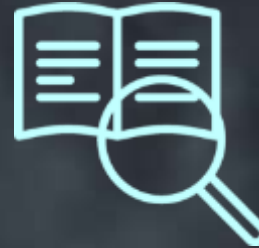


**No more
emergency calls**

BENEFITS FOR CITIZENS



Fair cost of waste management (taxes or costs based on actual generated waste)

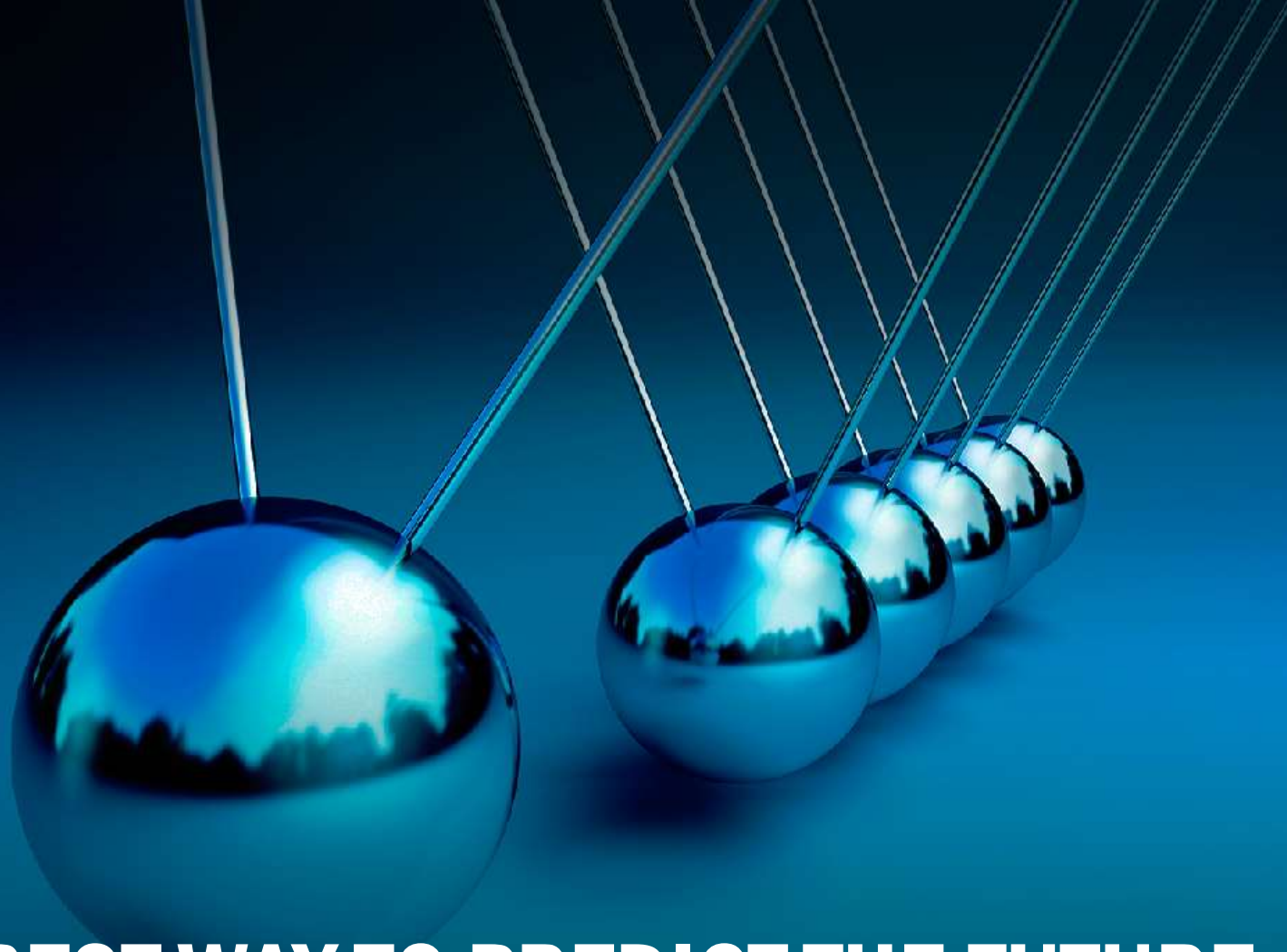


Transparent collection process – reporting of the actual collected waste

NO MORE FULL CONTAINERS!



THEOREMUS



**THE BEST WAY TO PREDICT THE FUTURE
IS TO DESIGN IT**