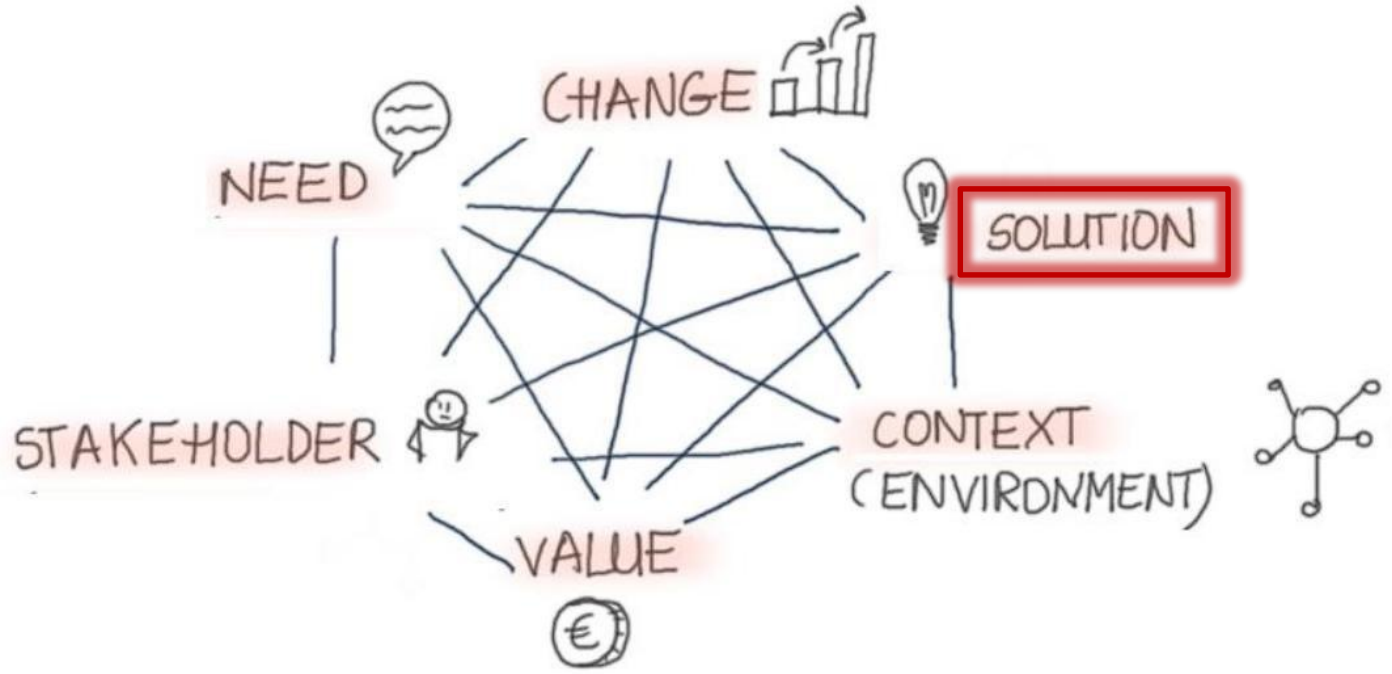
Business Analysis - Solution



A solution is a specific way of satisfying needs in a context by resolving a problem or enabling an opportunity.

Proposed Solution for Minsktrans:

Minsktrans will implement a data-driven intelligent transport system (ITS) that enables proactive operational management and provides full transparency to passengers.

Solution Components:

1. **Technology & Data Infrastructure**
   - Install GPS tracking devices on the entire vehicle fleet.
   - Develop a central data platform to aggregate location, passenger count (via sensors), and traffic data.
   - Build a real-time operational dashboard for dispatchers.

2. **Passenger-Facing Digital Services**
   - Launch a mobile application and website showing real-time vehicle locations and predicted arrival times.
   - Install digital information displays at major stops.
   - Introduce a trip planner within the app.

3. **Analytical & Operational Tools**
   - Implement a scheduling tool that uses historical and real-time data to create and continuously optimize realistic timetables.
   - Develop an alert system for dispatchers to predict and manage bunching and major delays.

- Introduce a performance analytics module to monitor KPIs like OTP, bunching frequency, and passenger load efficiency.

4. **Process & Policy Changes**
   - Redesign the dispatcher's workflow to be proactive, using the dashboard to issue hold/skip-stop commands to maintain even spacing.
   - Establish a formal feedback loop where operational data informs long-term planning (route changes, fleet purchases).
   - Initiate a joint working group with the Traffic Management Centre.

Function 1	Get Real-Time Arrival Predictions
Actor	Passenger
Description:	Allows a passenger to get predicted arrival times for vehicles at a selected stop.
Starting Event:	Passenger opens the mobile app or views a digital display at a stop.
Preconditions:	Passenger has the app installed/loaded, or the digital display is operational. GPS data is available.
Postconditions	The system displays a list of arriving vehicles with their predicted arrival times.
Main stream:	1. **The system** displays a list of nearby stops or a map. 2. **The passenger** selects a stop. 3. **The system** retrieves real-time vehicle positions and calculates predictions. 4. **The system** displays a list of routes serving that stop, along with the next vehicle's predicted arrival time (e.g., "Bus #100 - 3 min", "Tram #5 - 8 min"). 5. **The system** highlights vehicles that are delayed compared to the schedule.
Alternative streams:	**No vehicles en route:** 1. If no vehicles are predicted for a route, the system displays the scheduled time with a note ("Scheduled: 14:25"). **Data error:** 1. If GPS data is unavailable, the system displays the static schedule and a "Data Not Available" icon.
List of rules	1. Predictions are calculated based on current vehicle position, average speed, and historical traffic data for the time of day. 2. Predictions update every 30 seconds. 3. A vehicle is considered "delayed" if its predicted time is > 2 minutes later than the scheduled time.

Function 2	Proactive Delay Management
Actor	Dispatcher
Description:	Allows a dispatcher to identify potential vehicle bunching and implement corrective actions.
Starting Event:	The system's alerting module triggers a "Bunching Risk" alert.
Preconditions:	Dispatcher is logged into the operational dashboard. Real-time vehicle tracking is active.
Postconditions	The system log records the dispatcher's intervention. The vehicle spacing begins to correct.
Main stream:	1. **The system** highlights two vehicles on the same route that are below the minimum time/distance threshold on the dispatcher's dashboard. 2. **The dispatcher** selects the leading vehicle. 3. **The dispatcher** sends a "Hold at Stop" command to the driver's tablet for a specified time (e.g., 1 minute). 4. **The system** sends the command and receives confirmation from the driver's device. 5. **The system** updates the predicted arrival times for all subsequent stops for that vehicle. 6. **The system** notifies passengers via the app/digital displays of the "Hold" and adjusted times.
Alternative streams:	**Driver rejects command:** 1. The driver indicates "Not Safe" (e.g., due to crowding). The system notifies the dispatcher, who must choose an alternative action (e.g., instruct the following vehicle to slow down). **No connection:** 1. If the driver's tablet is offline, the system alerts the dispatcher, who must contact the driver via radio.
List of rules	1. A "Bunching Risk" is triggered when the headway between two consecutive vehicles on the same route falls below 50% of the scheduled headway. 2. A "Hold" command cannot exceed 2 minutes without supervisor override. 3. All interventions are logged for performance review.

Expected Outcomes:

- A significant reduction in passenger wait times and journey time uncertainty.
- More efficient fleet utilization and reduced operational costs (e.g., fuel).
- Improved ability to manage the network in real-time.
- Increased passenger satisfaction and ridership.
- Enhanced public and political perception of Minsktrans.