



The LEAD Digital Twinning Platform

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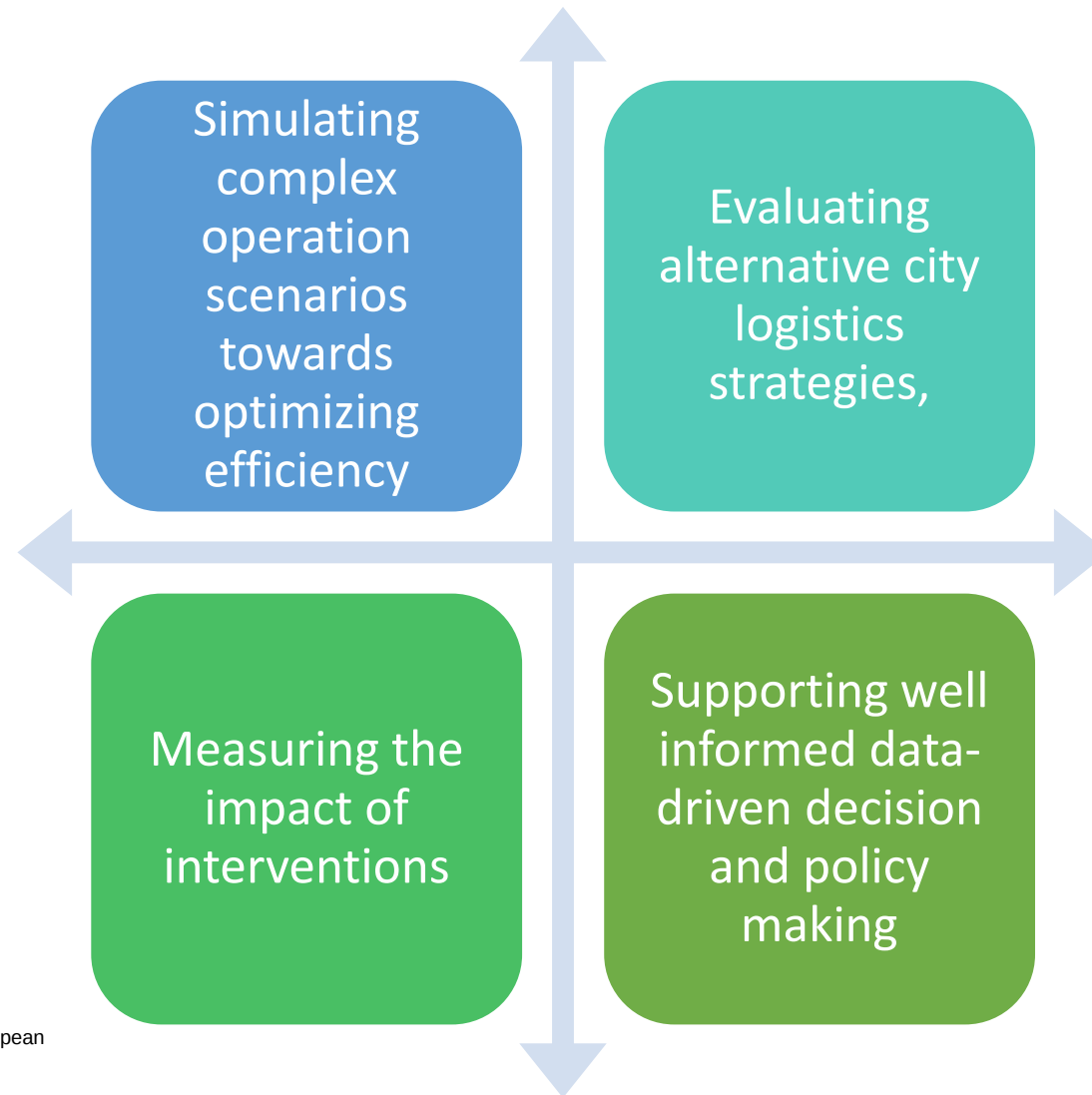


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861598



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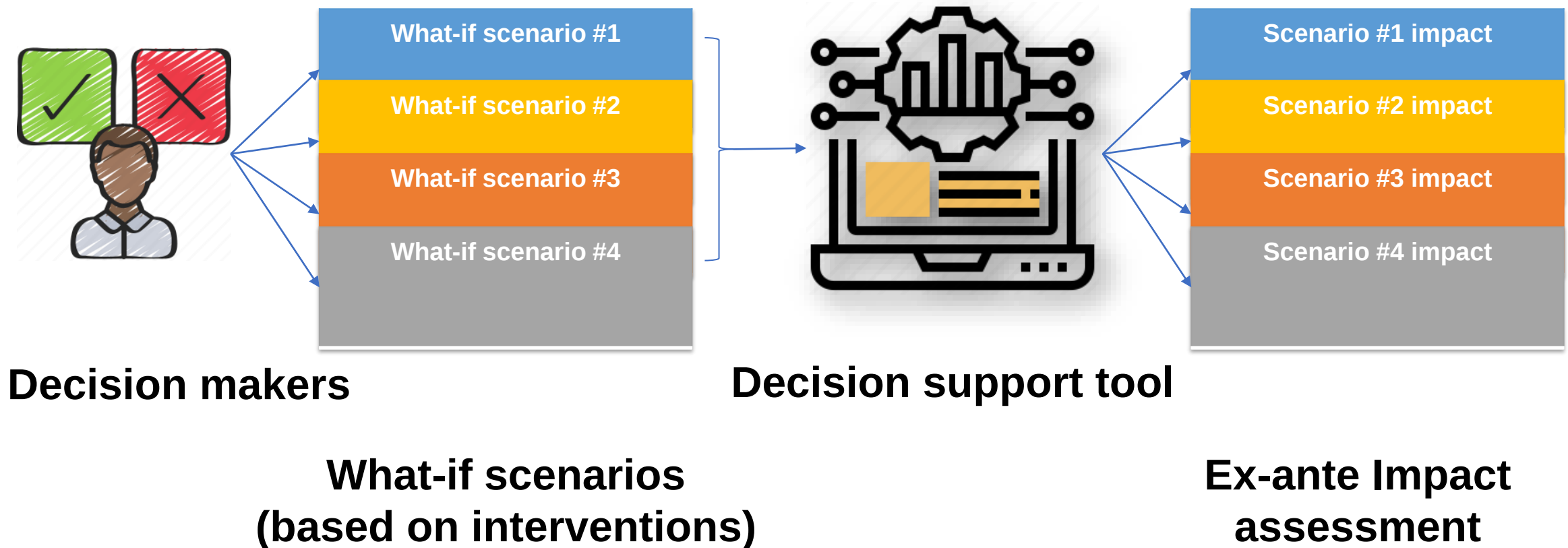
Impact assessment tool



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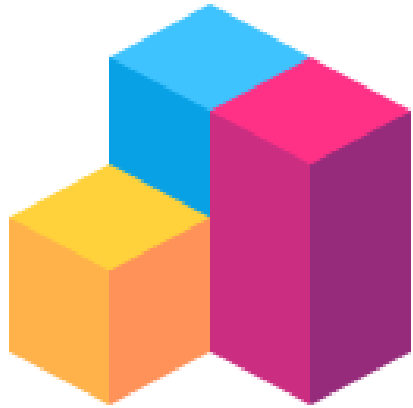
Overall motivation for using the platform



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The LEAD Platform

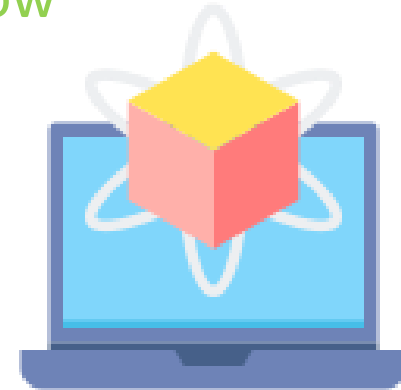


Model Library



Data Assets

Scenario: Model
Workflow



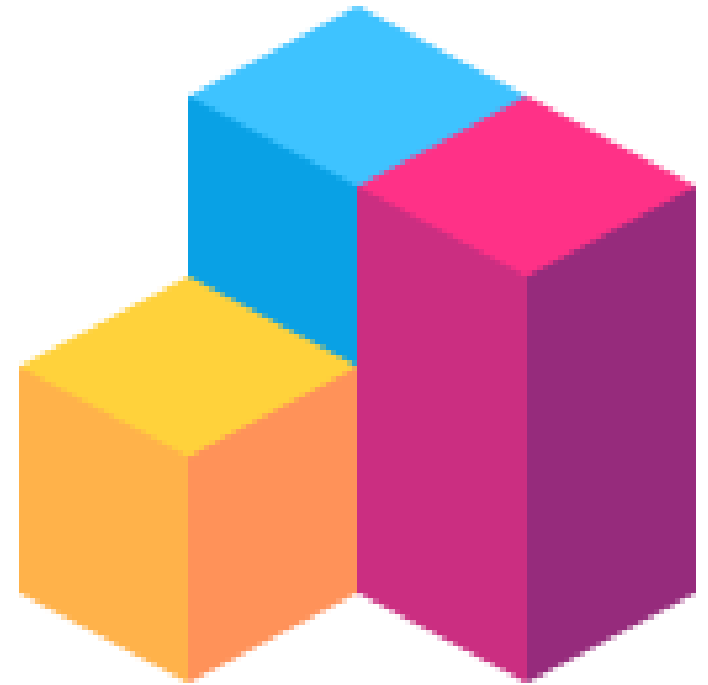
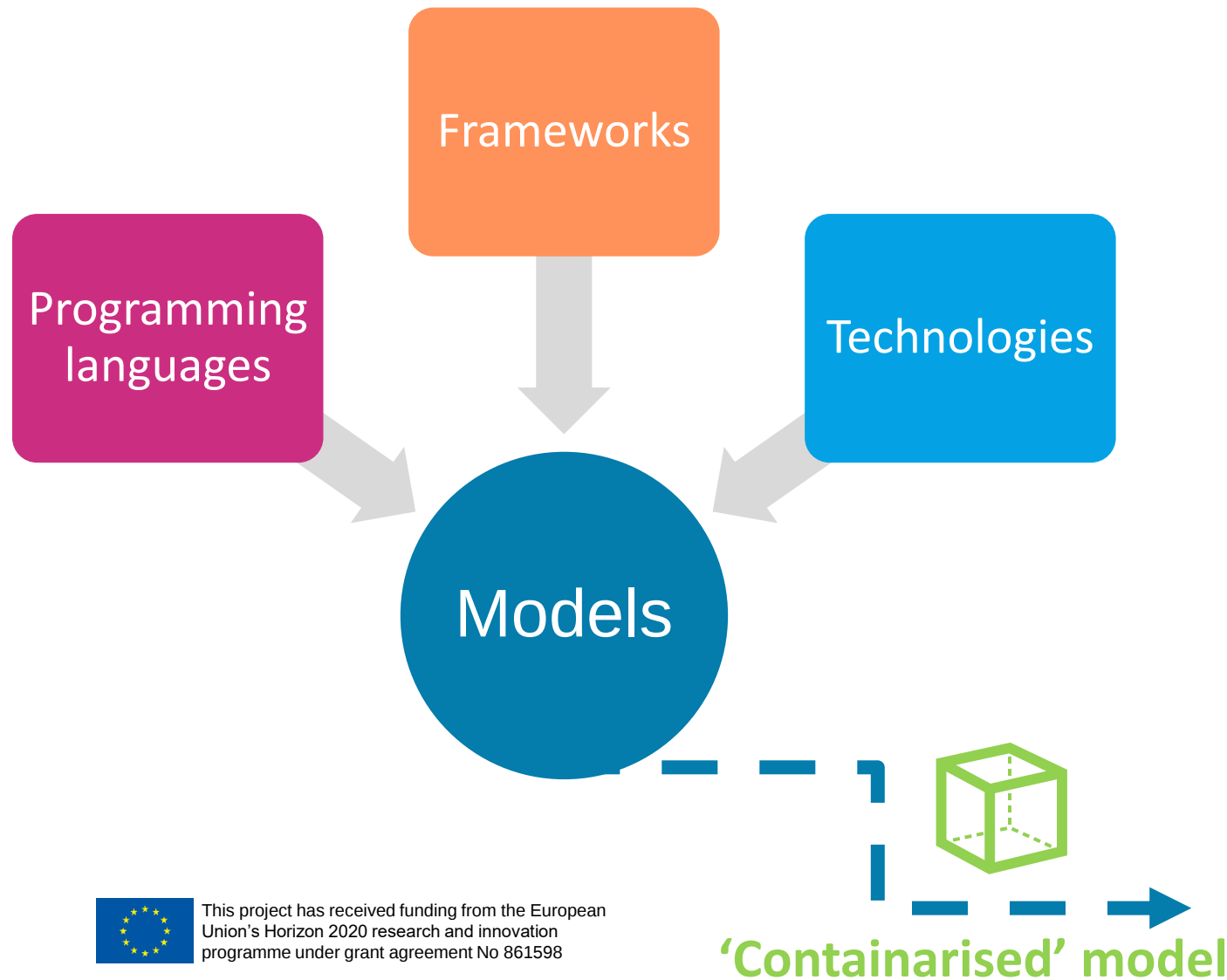
Simulations



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Digital twin models



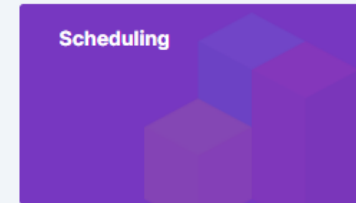
LEAD Model Library



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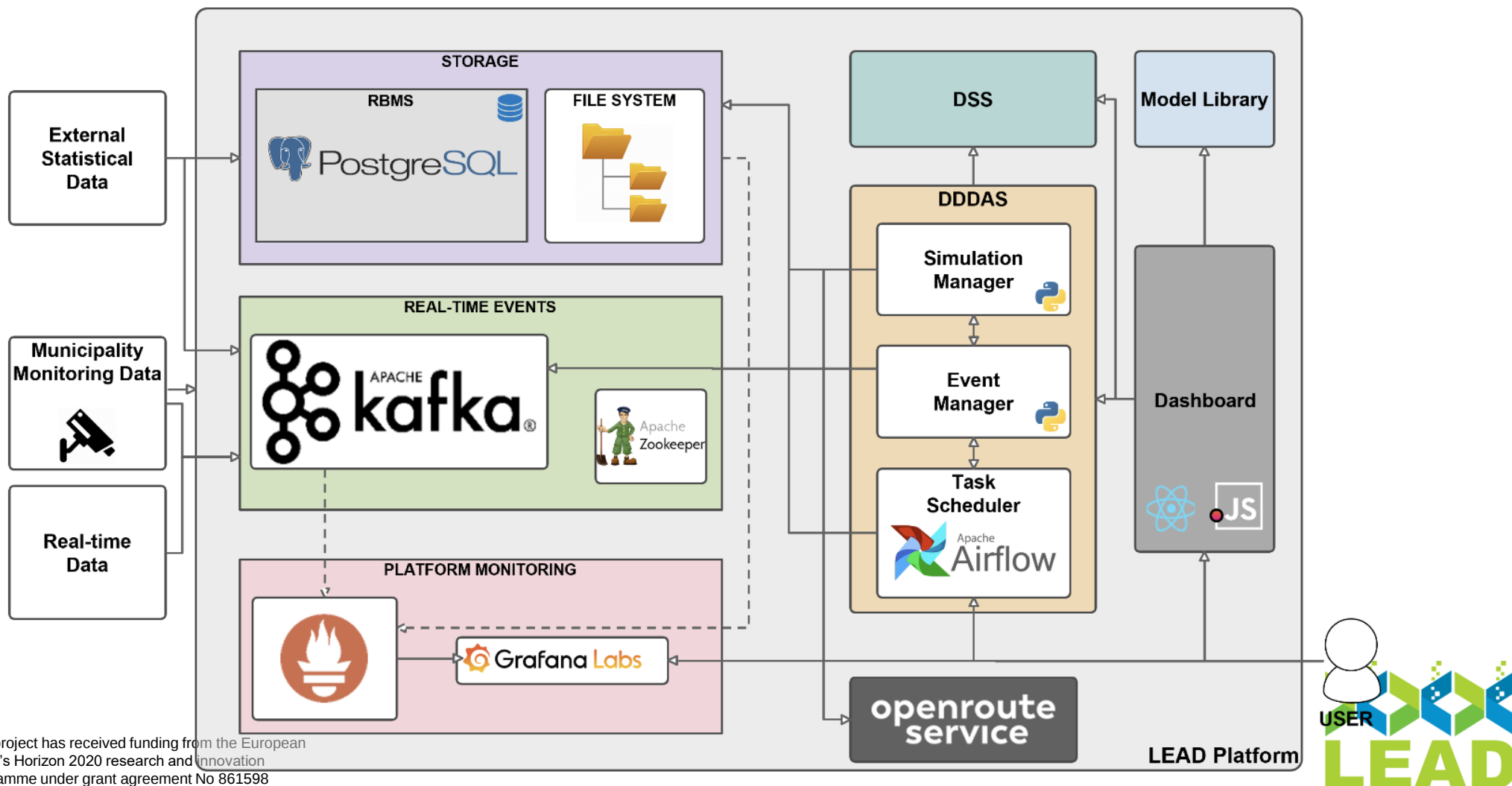
Models Workflows

Generate The Hague Simulation



Start 1 Simulation

The LEAD Platform under-the-hood



Dashboard





LEAD Administrator
admin@lead.eu

Dashboard

Users

Data Assets

Model Library

Scenarios

Simulations

Hello, LEAD Administrator

You have 6 running simulations

7

Models

1

Connections

6

Scenarios

6

Simulations

Simulations

Name	Public	User	Runtime	Status	
Echelon v1 baseline 1 Echelon v1	●	LA	Fri Sep 23 2022 11:55:2...	...	
LL1-Madrid: Echelon v1 b... Echelon v1	●	LA	Fri Sep 23 2022 11:55:2...	...	
Parcel Generation Parcel Generation	●	LA	2022-09-20T08:17:54...	✓	
LL1-Madrid: COPERT ba... COPERT	●	LA	Fri Sep 23 2022 11:55:2...	...	
LL1-Madrid: Echelon v2 ... Echelon v2	●	LA	Fri Sep 23 2022 11:55:2...	...	

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Scenarios

Name	Public	Flows #	Models	User	
Echelon v2	●	1	# ::	LA	
Parcel Generation	●	1	# ::	LA	
ST	●	0	# ::	LA	
Echelon v1	●	1	# ::	LA	
COPERT	●	1	# ::	LA	

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Use Case: Madrid LL

- In the Madrid case the challenge was to choose the optimal setting for transforming an underground parking facility to a logistics micro-hub.
- The key incentive was to reduce delivery costs and the environmental impact of the last mile logistics network in Madrid central.
- Examples of “**What-if**” scenarios :
 - What if I move from a 1-echelon network to a 2-echelon network configuration?
 - What if the demand changes?
 - What if handling times or stop times are changed/reduced?

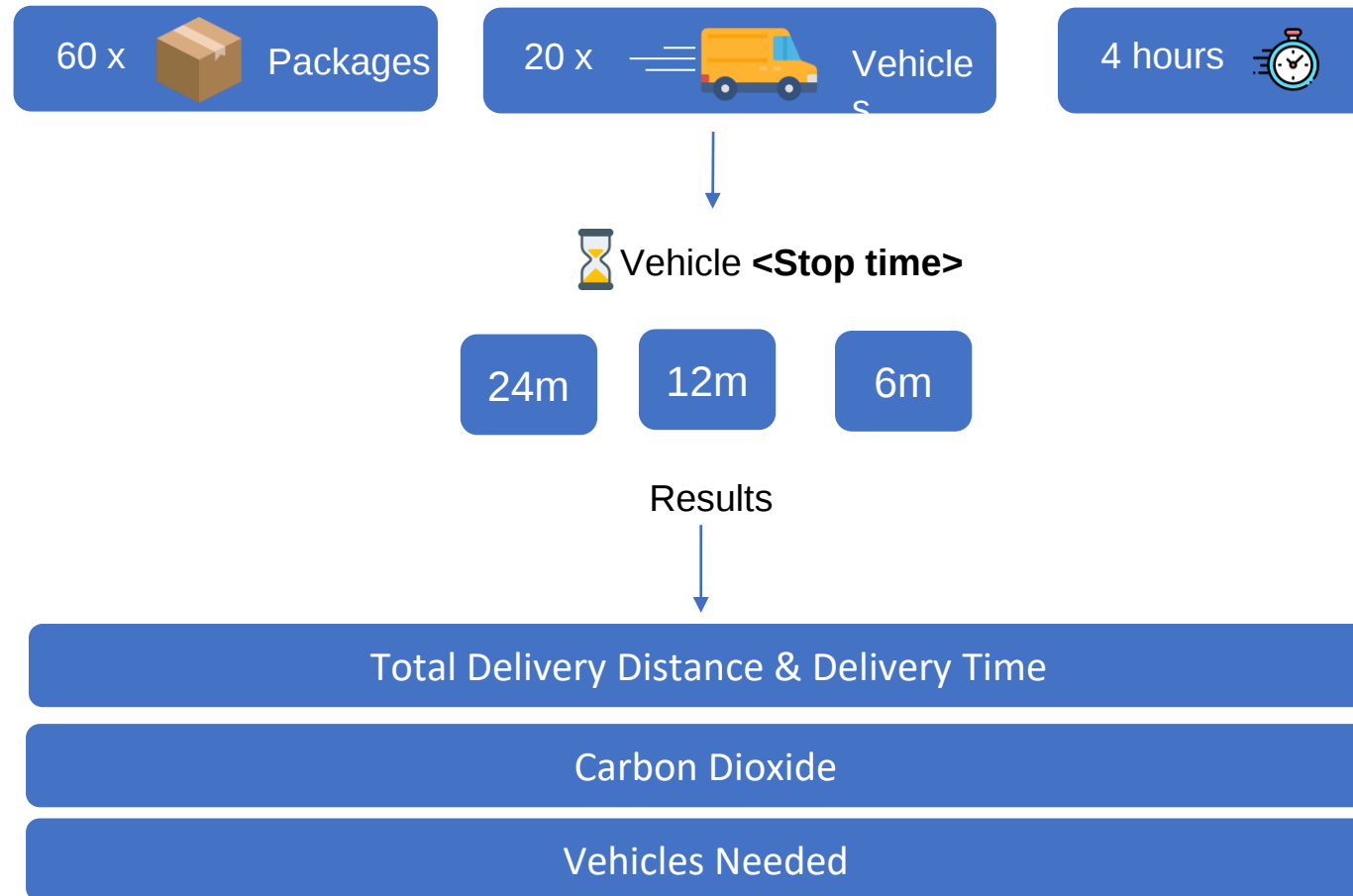


Models used in decision support

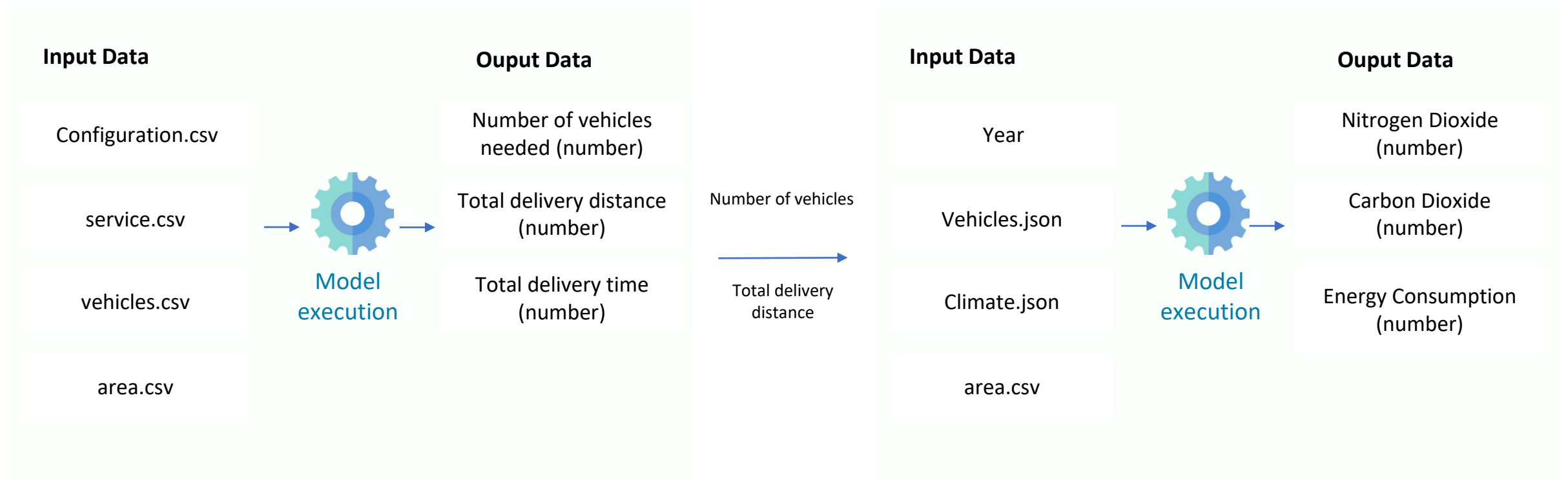
	2-Echelon	COPERT
Inputs	• Facilities locations, • Fleet characteristics, • demand, • Zones and map data, • Handling times, • Required stop times at facilities	• Temperature, • Humidity, • Traffic estimates, • vehicles types used, • Activity per vehicle type, • Number of vehicles
Outputs	• Number of vehicles required, • Distance and Travel time required to cover demand in the as-is and to-be scenarios	• Total energy consumption and • Estimated air pollution metrics (CO₂, PM_{2.5}, NO₂, VOC).



Echelon - COPER Simulation



Scenario Definition



Model Definition (Platform)

Update Echelon v1 Model

Model Name *

Echelon v1

Model Version *

1.0.1

Model Type *

Network Model

Model Url

https://github.com/Horizon-LEAD/2echelon

Docker Image

registry.gitlab.com/inlecom/lead/models/echelon:latest

☐ Shared

☐ Use As Connector

Model Description

2-Echelon model estimates the resources needed (vehicles, drivers), total distance, delivery time per type of vehicle for 1-echelon or 2-echelon network configuration. Version 1 of the model accepts the area as a zip file with a shapefile and meta objects.

Update Draft Model

Input Data

Configuration File	file .csv	⊖
Service File	file .csv	⊖
Facilities File	file .csv	⊖
Vehicle File	file .csv	⊖

Output Data

CSV output file	file .csv	⊖
Number of Vehicles Needed	number	⊖
Total Delivery Distance	number	⊖
Total Delivery Time	number	⊖



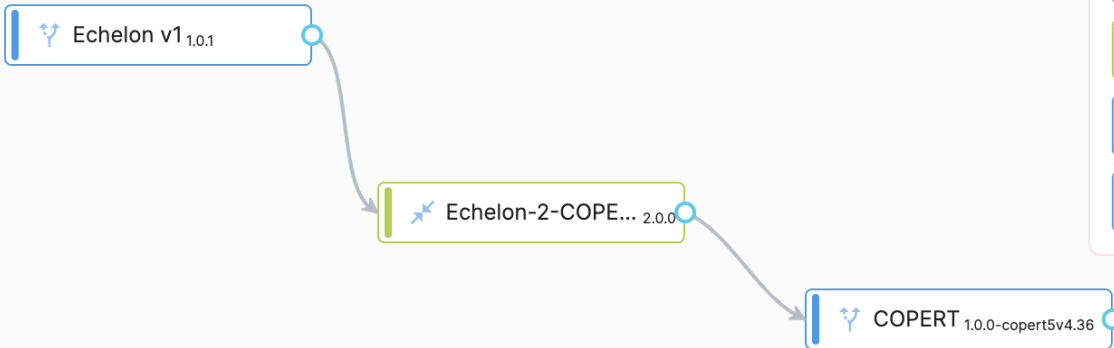
Scenario Builder

Scenario Builder

Scenario Name

Echelon-2-COPERT

Search Model By Name



Echelon v1 v1.0.1	Echelon v2 v2.0.0	COPE... v1.0.0-copert5v4.36
Echelon-2-COP... v2.0.0	Parcel Generation v1.0.1	Parcel Market v1.0.0
Parcel Tour For... v1.0.0	Parcel Generati... v1.0.0	Parcel Market t... v1.0.0
EVCO2 v1.0.0	EDM v0.0.1	DCM v0.0.1



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Simulation Configuration & Execution

Echelon-2-COPERT - 4

1 Echelon v1

2 Echelon-2-COPERT

3 COPERT

4 Overview

Echelon v1

Version 1.0.1

2-Echelon model estimates the resources needed (vehicles, drivers), total distance, delivery time per type of vehicle for 1-echelon or 2-echelon network configuration. Version 1 of the model accepts the area as a zip file with a shapefile and meta objects.

Network Model

*Configuration File ⓘ

config-stopTimeSecondEchelon-0.3.csv



*Service File ⓘ

services.csv



*Facilities File ⓘ

facilities.csv



*Vehicle File ⓘ

vehic

-- None --

Echelon v1 demo data

config

vehicles

facilities

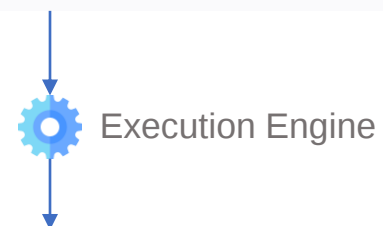
services

Next



Union's Horizon 2020 research and innovation
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Simulations

	Name	Public	User	Status		
	EDM		LA	✓		
	DCM-Oslo DCM		LA			
	Echelon-2-COPERT - 3 Echelon-2-COPERT		LA	✓		
	Echelon-2-COPERT - 2 Echelon-2-COPERT		LA	✓		
	Echelon-2-COPERT - 1 Echelon-2-COPERT		LA	✓		
	COPERT demo sim COPERT		LA	✓		
	Echelon v2 - Baseline Echelon v2		LA	✓		
	Echelon v1 - Baseline Echelon v1		LA	✓		

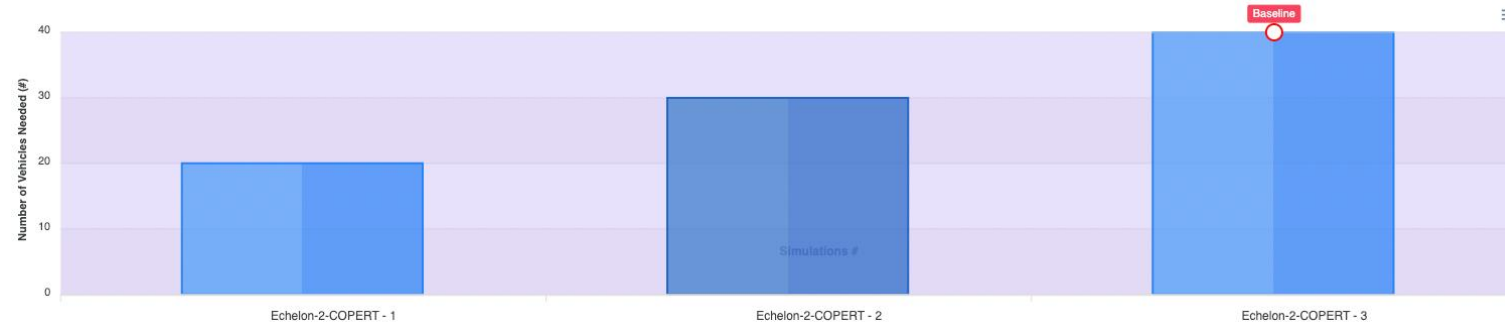
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1 – 11 of 11



Simulation Results

Number of Vehicles Needed #



Total Delivery Distance (km)



Carbon Dioxide (CO2) Total (ppm)



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Key Advantages

Open Platform standardizing the execution of complex model workflows

Integrates models that have been developed in 3rd party tools

Scalability

Flexibility and resources sharing



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