	Parameter	Type	Description	Values	Notes
TAZ	Hourly mean requests	Real data	Hourly mean number of requests per TAZ.		
	Hourly std dev requests	Real data	Hourly std. dev. of requests per TAZ.		
	Hourly mean traffic cars	Real data	Hourly mean number of cars per TAZ.		Max. 180 hourly cars per TAZ. Gridlock above this threshold.
Rides	Length distribution	Real data (Chicago) [1]	For each TAZ, the other TAZ regions are grouped in 4 sets (short, normal, long, extreme), which represent the distance of the given TAZ with respect to the others.	The probability of the ride lengths is actually the following: **36% short** **22% normal** **18% long** **24% extreme**.	The distances are labeled based on the distance quantiles between centroids (in meters). Specifically: [0,3305]: short (3305,5307]: normal (5307,7446]: long (7446,+inf): extreme.
Customer	Probability generation	Editable	This parameter sets the probability of generating customers (default 100%, meaning that 100% of the customers scheduled is generated).		This parameter is useful to build failure scenarios regarding absence of customers.
	Personality distribution	Real data (editable) [2][3]	Generated customers can have 3 different personalities, depending on the acceptance rate based on economic conditions (specifically the surge multiplier value): **hurry, normal, greedy**.	The probability of the personalities is actually the following: **Hurry**: 37% (age 16-24) **Greedy**: 18% (age 45-64) **Normal**: 45% (age 25-44).	Following [2], we see that older riders are less likely to pay the surge price. By using data about riders' age provided in [3], we discretised the age distribution in the 3 personalities.

	Acceptance distribution	Arbitrary (editable)	The personality of the customer defines the probability that he will accept the ride, given the current economic conditions (surge multiplier value).	The probability of the acceptance distributions (based on the surge multiplier value) is actually the following: **Hurry**: (-inf,1.5]: 100% [1.5,1.8]: 90% [1.8,2.1]: 80% [2.1,2.3]: 70% [2.3,+inf): 60% **Greedy**: (-inf,1.3]: 100% [1.3,1.5]: 80% [1.5,1.7]: 70% [1.7,1.9]: 50% [1.9,2.1]: 40% [2.1,+inf): 30% **Normal**: (-inf,1.4]: 100% [1.4,1.6]: 90% [1.6,1.8]: 80% [1.8,2]: 70% [2,2.2]: 60% [2.2,+inf): 50%.	
Driver	Probability generation	Editable	This parameter sets the probability of generating drivers (default 100%, meaning that 100% of the drivers scheduled is generated).		This parameter is useful to build failure scenarios regarding absence of drivers.
	Personality distribution	Real data (editable) [4][5][6]	Generated drivers can have 3 different personalities, depending on the acceptance rate based on economic conditions (specifically the surge multiplier value): **hurry, normal, greedy**.	The probability of the personalities is actually the following: **Hurry**: 21% **Greedy**: 24% **Normal**: 55%.	Considering the papers [4][5], which claim that the more experience the driver has, the more greedy he will be, and the thresholds referred to the number of trips in [5], we computed the proportion using the data provided by [6].

Acceptance distribution	Arbitrary (editable)	The personality of the driver defines the probability that he will accept the ride, given the current economic conditions (surge multiplier value).	The probability of the acceptance distributions (based on the surge multiplier value) is actually the following: **Hurry**: (-inf,1]: 80% [1,1.2]: 90% [1.2,1.4]: 95% [1.4,+inf): 100% **Greedy**: (-inf,1]: 5% [1,1.2]: 30% [1.2,1.4]: 40% [1.4,1.6]: 50% [1.6,1.8]: 70% [1.8,2]: 80% [2,+inf): 100% **Normal**: (-inf,1]: 70% [1,1.2]: 80% [1.2,1.4]: 90% [1.4,1.6]: 95% [1.6,+inf): 100%.	
Movement distribution	Arbitrary (editable)	Probability for a driver to change TAZ every 15 minutes, based on economic conditions (surge multiplier value).	The probability of the moving distributions is actually the following: (-inf,1]: 5% (1,1.2]: 10% [1.2,1.4]: 20% [1.4,1.6]: 30% [1.6,1.8]: 40% [1.8,2]: 50% [2,+inf): 60%.	
Stop work distribution	Arbitrary (editable)	Probability for a driver to stop working because of unprofitable surge multiplier, computed for each timestamp.	The probability of stop working is computed by multiplying the time without accepting rides with a factor which depends on the driver personality: **Hurry**: 0.000005 **Normal**: 0.00001 **Greedy**: 0.00005.	E.g., timestamps without working = 600 (10 minutes), greedy driver factor = 0.00005, P(stop) = 600*0.00005 = 0.03 (i.e., 3%).

	End of work	Real data + arbitrary trend (editable) [7][8][9]	Computes the probability for a driver to end the work every timestamp.	The distribution spans from 0.000001 (i.e., 0.0001%), when the driver starts working, to 3% after 4 hours (average time). Then, the % remains stable until 12 hours, when the driver is forced to stop (max. allowed by Uber).	The distribution has an exponential trend.
	Driver ratio	Real data (editable) [10][11]	Defines the ratio between customer requests and drivers generated.	4	The pickup value (real data) refers to the hourly requests in specific TAZs. Thus, we hypothesise to generate pickup_value/driver_ratio drivers. The real data refers to the fact that we know that in SF there are 50000 active drivers.
RS-Digital Mirror	Start hour	Editable	Defines the begin hour of the simulation.	Midnight for normal scenario, 2 hours before failure injection for failure scenarios.	
	End hour	Editable	Defines the end hour of the simulation.	Depends on the scenario.	Actually tested normal scenario until 12 hours.
	Time update surge multiplier	Real data [12]	Defines the periodic interval for the updating of the surge multiplier in each TAZ.	5 minutes (300 timestamps).	

	Time move driver	Arbitrary (editable)	Defines the periodic interval for triggering a function that checks if there are the conditions for each driver to move from a TAZ to another TAZ.	Actually 15 minutes (900 timestamps).	
	Time remove idle driver	Arbitrary (editable)	Defines the timestamp threshold referred to the quantity of time that a driver does not accept/receive rides. Every timestamp, if the value goes over the threshold, the stop work distribution parameter is computed.	Actually 30 minutes (1800 timestamps).	
	Driver support	Real data (editable)	Defines the number of cars at the beginning of the simulation.	Actually: Adding x drivers and y pickup cars for each TAZ, based on the beginning hour and real pickups/traffic data.	
	Time to stabilise	Editable	Timestamp needed to stabilise the digital mirror behaviour.	Actually inferred visually from the graphs of the indicators. Current security threshold is 2 hours (7200 timestamps).	

	Final timestamps to cut	Editable	Timestamps to cut at the end of the simulation. This has to be done because otherwise we consider indicators referred to rides not yet completed (i.e. with NaN values).	Actually inferred visually from the graphs of the indicators. Current security threshold is 30 minutes (1800 timestamps).	
Provider	Base fare	Real data (Uber)	Base fare applied to each request.	2.2	
	Minimum fare	Real data (Uber)	Minimum amount of fare.	8	
	Service fee	Real data (Uber)	Expenses concerning the service, to add to the computation of the price.	3.5	
	Fee per mile	Real data (Uber)	Fee applied for each mile of ride covered.	0.91	
	Fee per minute	Real data (Uber)	Fee applied for each minute of ride.	0.39	
	Surge multiplier	Arbitrary algorithm (editable)	Arbitrary algorithm to emulate the real surge multiplier (ML algorithm not available). It takes into account the ratio between active customers and active drivers, plus the number of unserved requests.	Min: 1 Max: 5	Could use ML to predict it in case we obtain the data (e.g. from API, which are currently not available).
	Max driver distance	Arbitrary (editable)	Maximum radius within which to search for drivers.	3000 meters	Uber seems to have no max radius. However, this is done for optimisation purposes.

	Max drivers available	Real data [12]	Max number of closest drivers available shown to the user in the app.	8	
	Uber/Lyft choice	Realistic (editable) [13]	Simulates user choice between Lyft and Uber based on current market share (75% Uber, 25% Lyft).		More in detail: With 75% probability the user opens the Uber app to book a ride (25% Lyft). If the request is accepted the ride starts, otherwise the user turns to the other concurrent app to book a ride. If the request fails again, the user is not served.
	Lyft price model	ML model (Lyft)	ML model (Random Forest) trained on Boston.		Takes in input length of the ride and surge multiplier value.

[1] https://data.cityofchicago.org/Transportation/Transportation-Network-Providers-Trips-2022/2tdj-ffvb/data
[2] Kooti, Farshad & Grbovic, Mihajlo & Aiello, Luca & Djuric, Nemanja & Radosavljevic, Vladan & Lerman, Kristina. (2017). Analyzing Uber's Ride-sharing Economy. 574-582. 10.1145/3041021.3054194.
[3] statista.com/statistics/822833/us-ride-sharing-uber-users-age/
[4] Peyman Ashkrof, Gonçalo Homem de Almeida Correia, Oded Cats, Bart van Arem, Understanding ride-sourcing drivers' behaviour and preferences: Insights from focus groups analysis, Research in Transportation Business & Management, Volume 37, 2020, ISSN 2210-5395, https://doi.org/10.1016/j.rtbm.2020.100516.
[5] Cody Cook, Rebecca Diamond, Jonathan V Hall, John A List, Paul Oyer, The Gender Earnings Gap in the Gig Economy: Evidence from over a Million Rideshare Drivers, The Review of Economic Studies, Volume 88, Issue 5, October 2021, Pages 2210–2238, https://doi.org/10.1093/restud/rdaa081
[6] https://data.cityofchicago.org/Transportation/Transportation-Network-Providers-Drivers/j6wf-834c/about_data
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[8] https://www.sciencedirect.com/science/article/pii/S221053952030078X
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[12] Chen L., Mislove, A., & Wilson, C. (2015). Peeking Beneath the Hood of Uber. Proceedings of the 2015 ACM Conference on Internet Measurement Conference - IMC '15.
[13] https://secondmeasure.com/datapoints/rideshare-industry-overview/