

# Identifying Ineffective Operators

Analytical research for

CallMeMaybe

01.01.2021

# General conclusions

We've defined **5** categories of ineffective operators based on **3** parameters:

## ***Waiting time (identified 143 operators)***

1. Operators whose **daily average waiting time** does not drop below **97 seconds**.
2. Operators whose **average waiting time** more than **97 seconds**.
3. Operators whose **monthly average waiting time** does not drop below **60 seconds**.

## ***Missed calls share (identified 23 operators)***

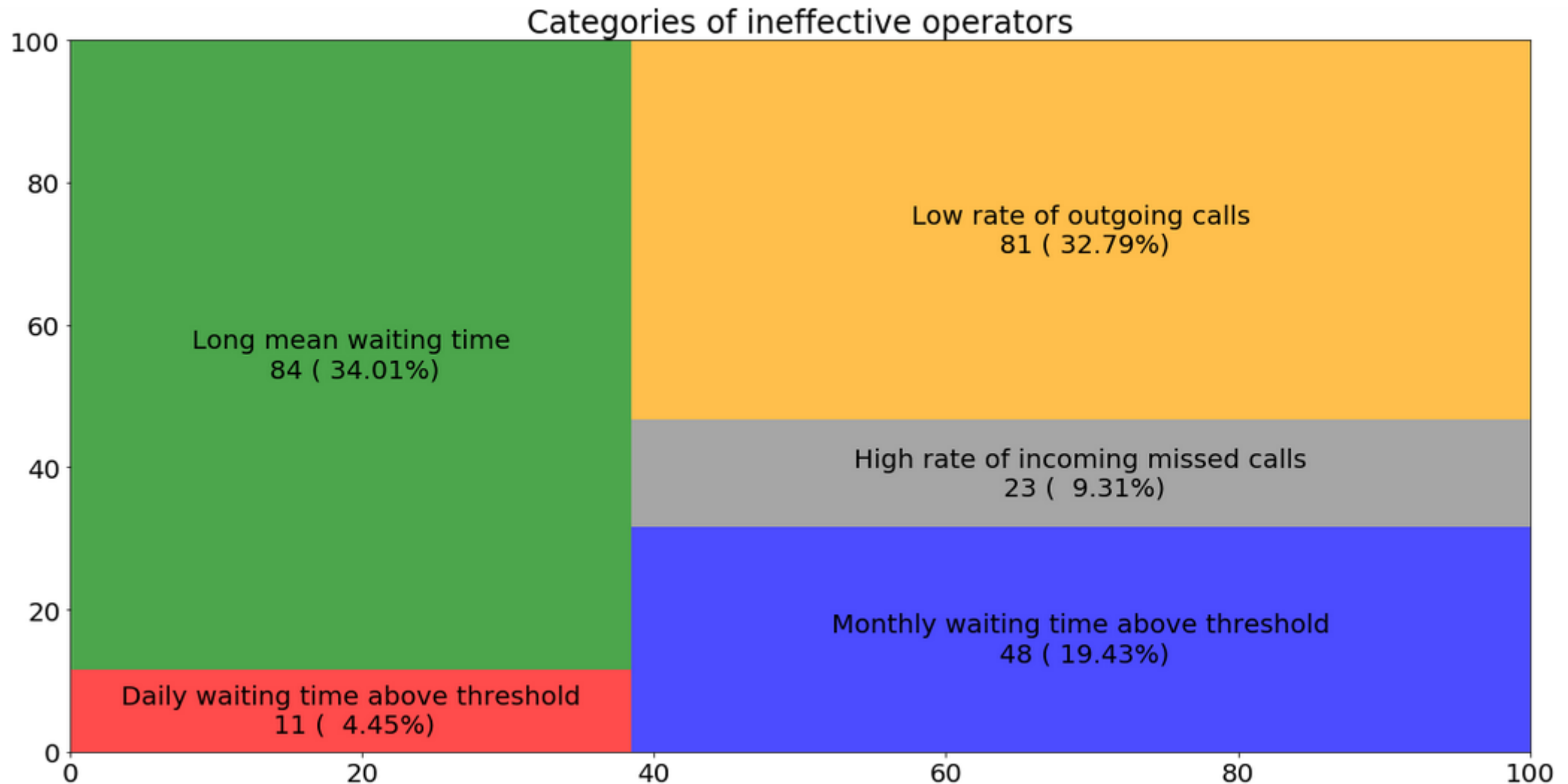
4. Operators whose **share of missed incoming calls** exceeds **12%**.

## ***Outgoing calls share (identified 81 operators)***

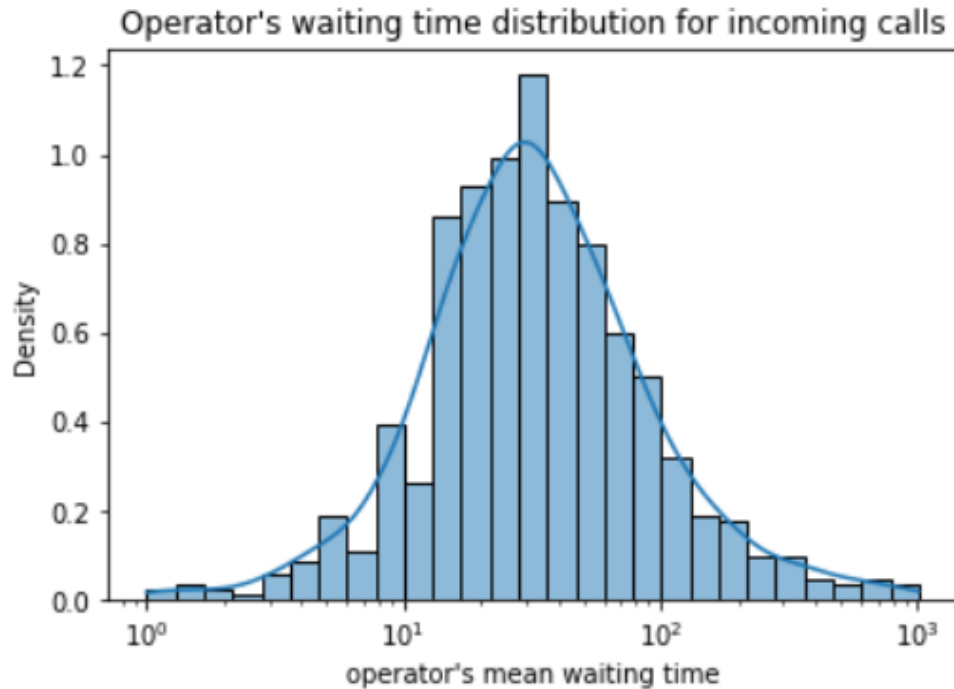
5. Operators supposed to make outgoing calls whose **share of outgoing calls** is below **50%**.

Totally identified **247** ineffective operators (**23%** of all operators).

# Ineffective operators split into categories



# Methods used

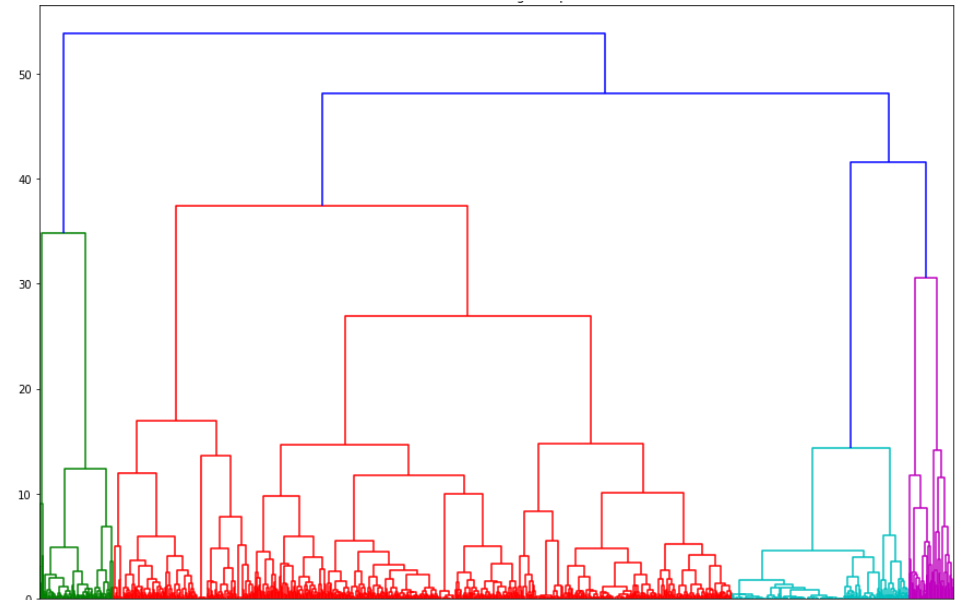


## ***Cluster analysis:***

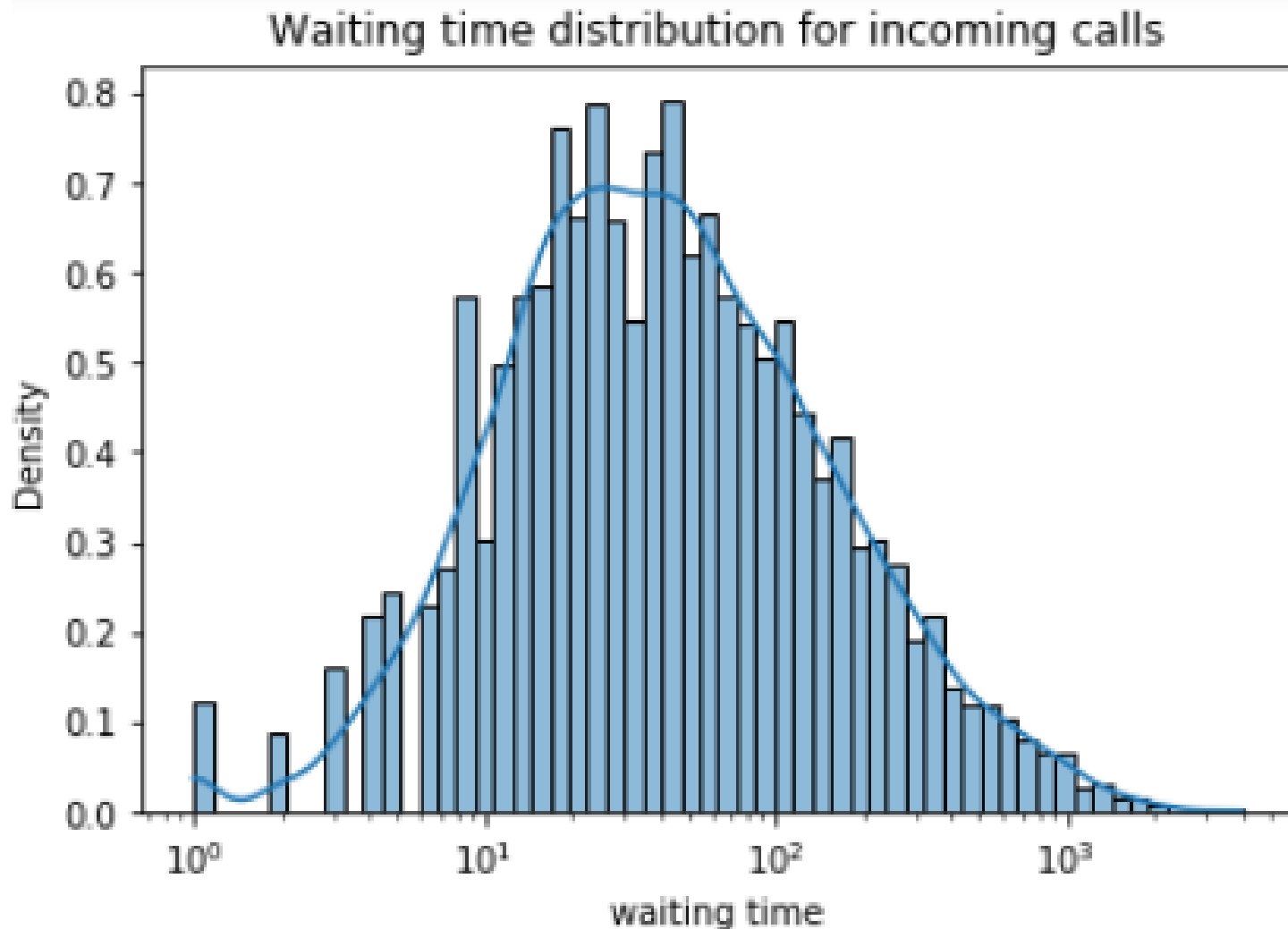
- Dendrogram was used to identify the number of clusters
- KMeans algorithm was used for clustering

## ***Distributions analysis:***

- Median, mean and std values identified
- Operators having values out of typical range are identified as ineffective



# Distributions analysis: waiting time

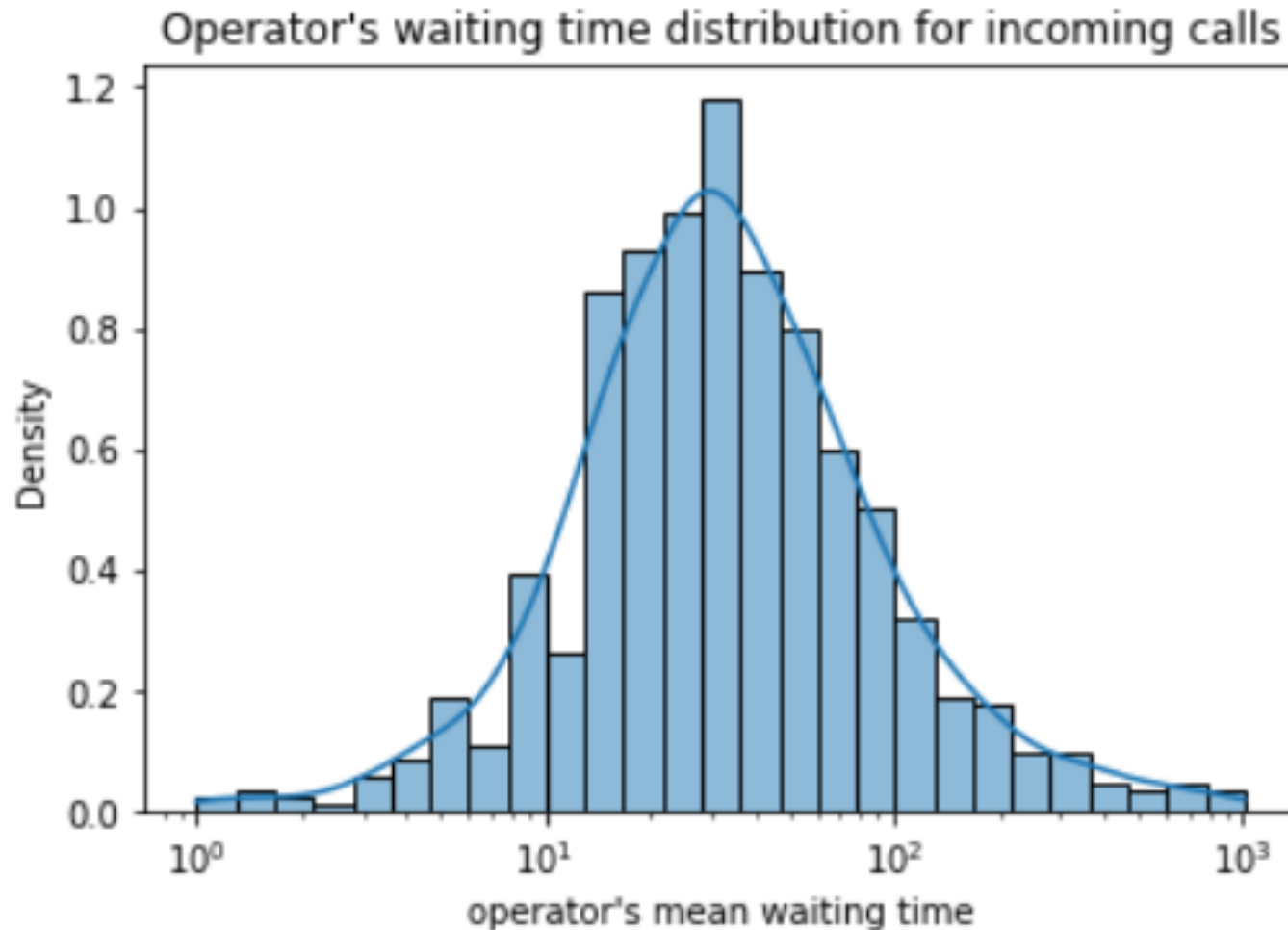


- **38s** median
- **97s** mean (and 3Q)
- **185s** std

## ***Criteria:***

*Operator's mean waiting time/daily mean waiting time more than **97s** (for incoming calls)*

# *Distributions analysis: waiting time per operator*

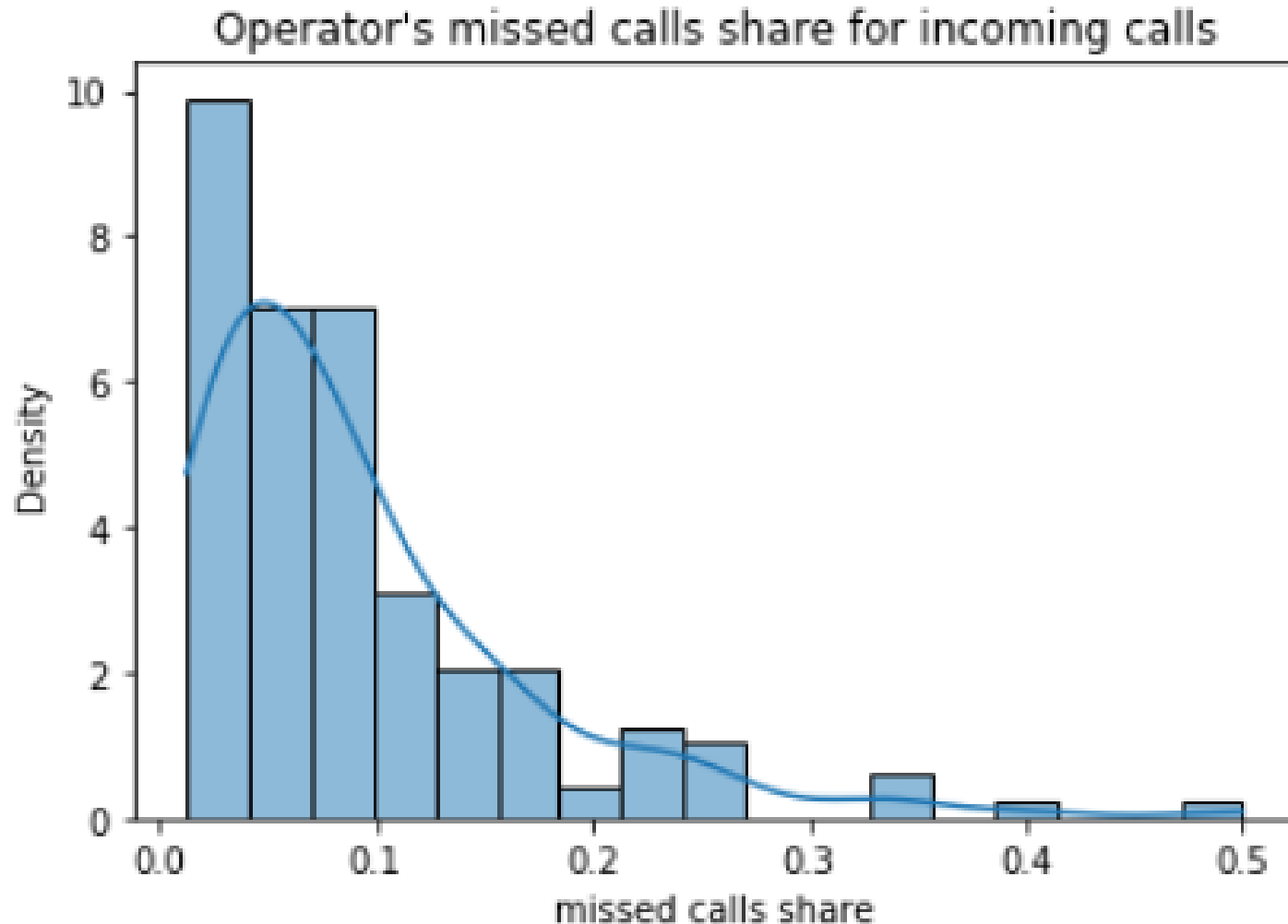


- **31s** median
- **58s** mean and 3Q
- **96s** std

## ***Criteria:***

*Operator's monthly mean waiting time more than **60s** (for incoming calls)*

# Distributions analysis: missed calls share



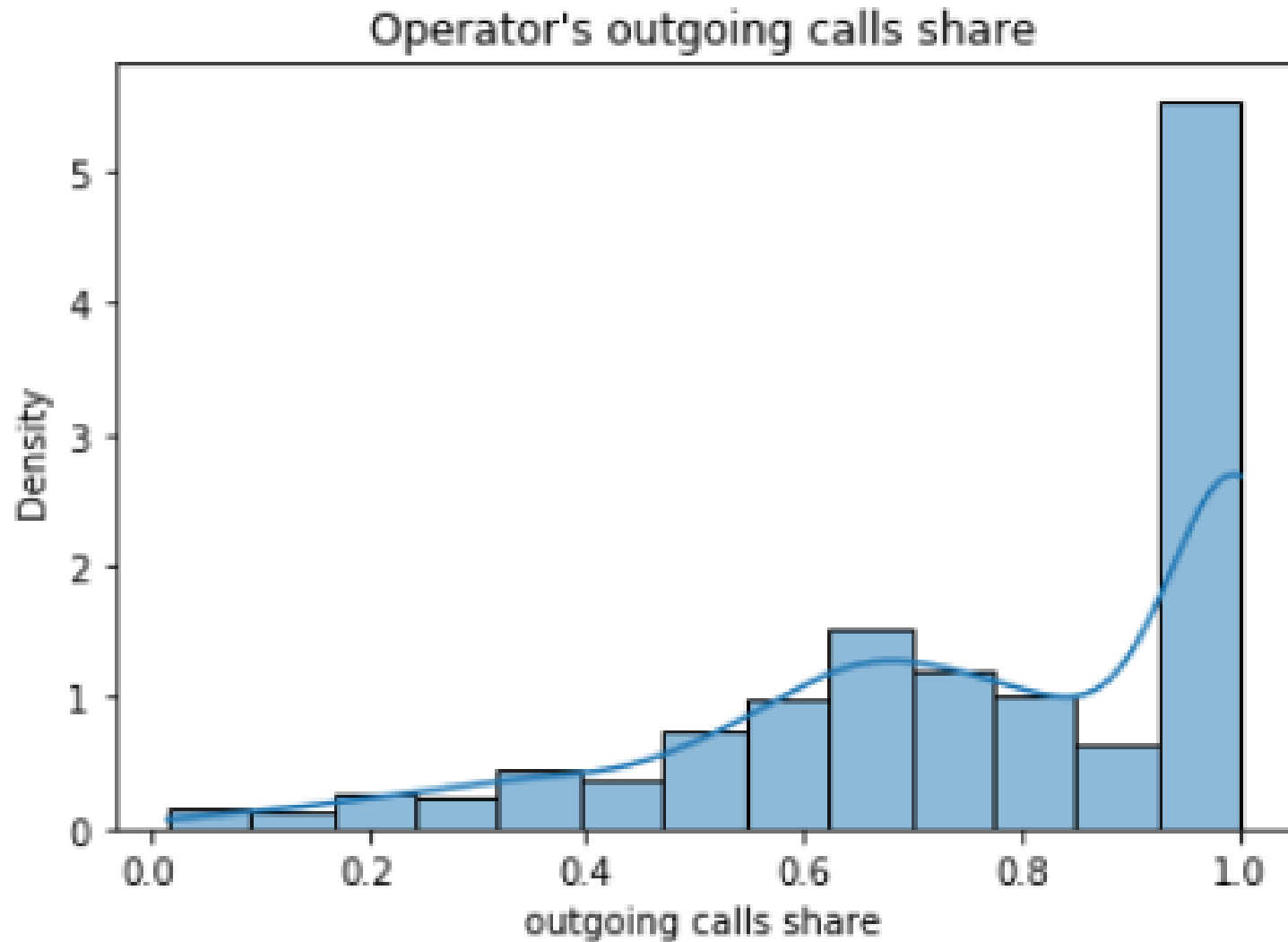
Among operators who *missed* calls:

- ~**9%** mean
- ~**8%** std
- **11.8%** 3Q

## ***Criteria:***

Operator's share of missed calls is *more than* **12%** (for incoming calls)

# Distributions analysis: outgoing calls share



Among operators who are supposed to make *outgoing* calls:

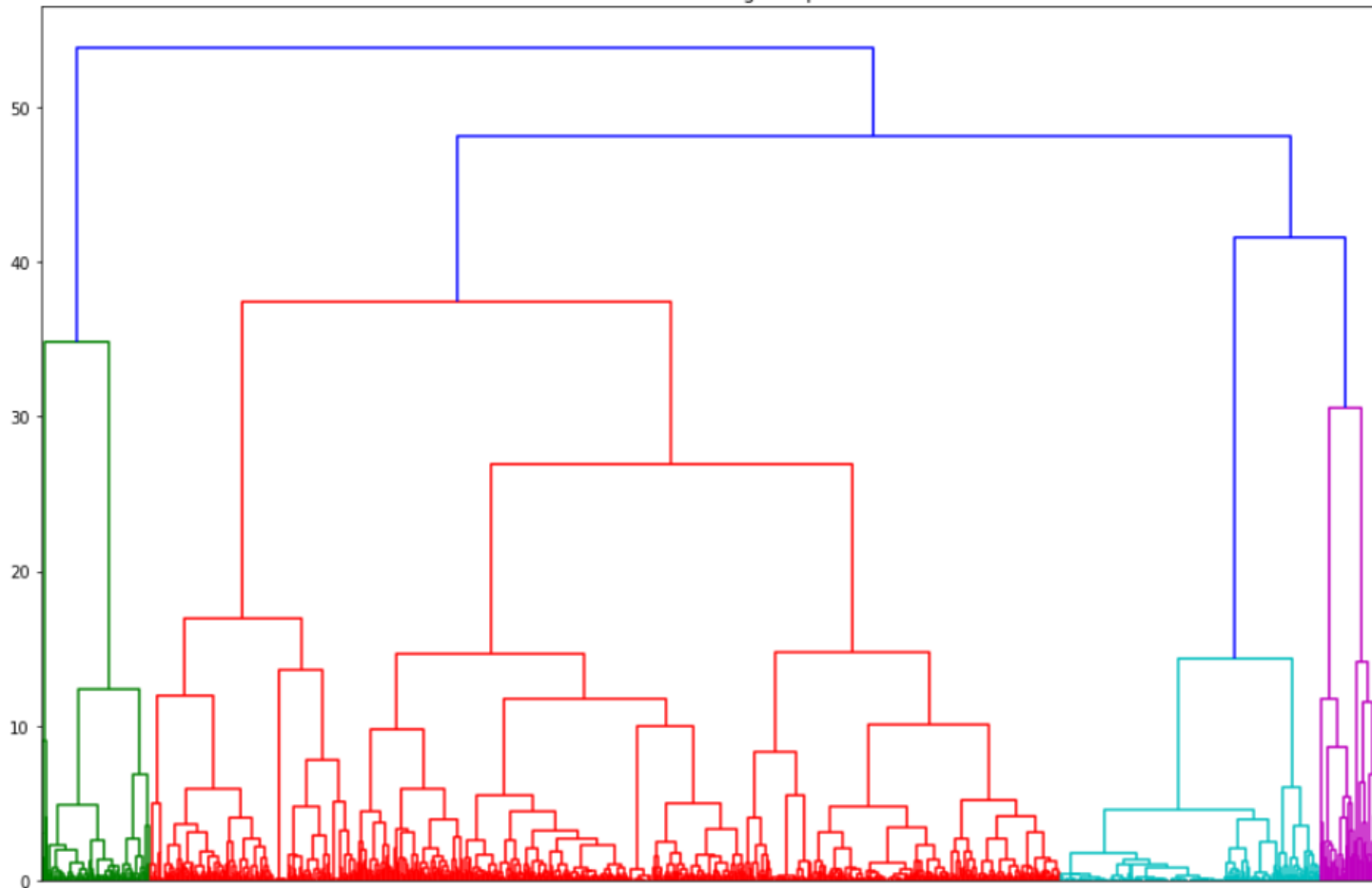
- ~**77.3%** mean
- ~**24%** std
- **62.5%** 1Q
- mean-std = ~**53%**

## **Criteria:**

Operator's share of outgoing calls is *less than* **50%**



# Cluster analysis: features used



**The following features were selected:**

Per each operator

✓ mean values of:

- waiting\_time
- waiting\_time for incoming calls
- direction
- internal
- calls\_count
- is\_missed\_call

✓ share of missed incoming calls

# Cluster analysis: KMeans algorithm

labels	mean				
	0	1	2	3	4
waiting_time	1645.104771	25.308587	149.163057	36.539276	223.134643
direction	0.984781	0.839045	0.823528	0.095961	0.505421
internal	0.025846	0.695069	0.078910	0.040417	0.088852
calls_count	81.121295	2.240964	8.883201	2.414383	14.025200
is_missed_call	0.500106	0.380673	0.408893	0.048397	0.307303
missed_share	0.005718	0.000552	0.005289	0.009160	0.143185
waiting_time_inc	4.172324	19.788779	27.139269	38.617489	231.059204

## Input:

From the dendrogram view we implied 5 clusters.

## Output:

Cluster #4 (**67 operators**) seems to contain **ineffective** operators due to the following parameters:

- mean direction = **0.5**
- mean share of missed incoming calls = **14%**
- mean waiting time for incoming calls = **231s**

# Cluster analysis: relation to distribution analysis

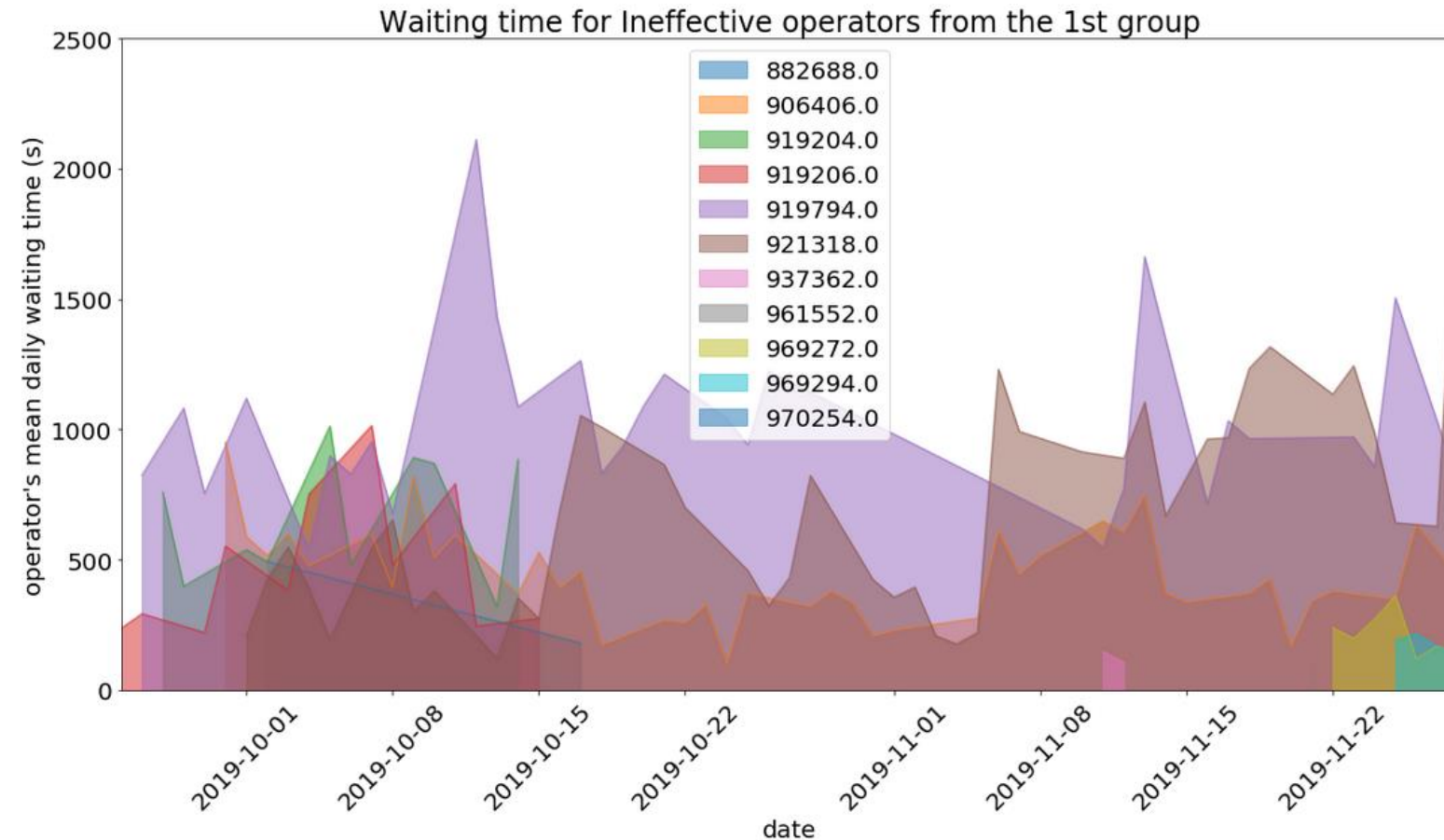
mean

labels	0	1	2	3	4
waiting_time	1645.104771	25.308587	149.163057	36.539276	223.134643
direction	0.984781	0.839045	0.823528	0.095961	0.505421
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All operators from the cluster #4 are already contained in the categories from the distribution analysis, namely 3 categories based on:

- average waiting time
- monthly average waiting time
- share of missed calls

# Ineffective operators: waiting time for the 1<sup>st</sup> category



There're no any patterns in waiting times:

- the values bounce having peaks and troughs during the period but it does not drop below **97** seconds.
- operator **919794** is the most ineffective more often having the longest waiting times.

# Ineffective operators: tariffs do not differ

We've tested the following null hypothesis:

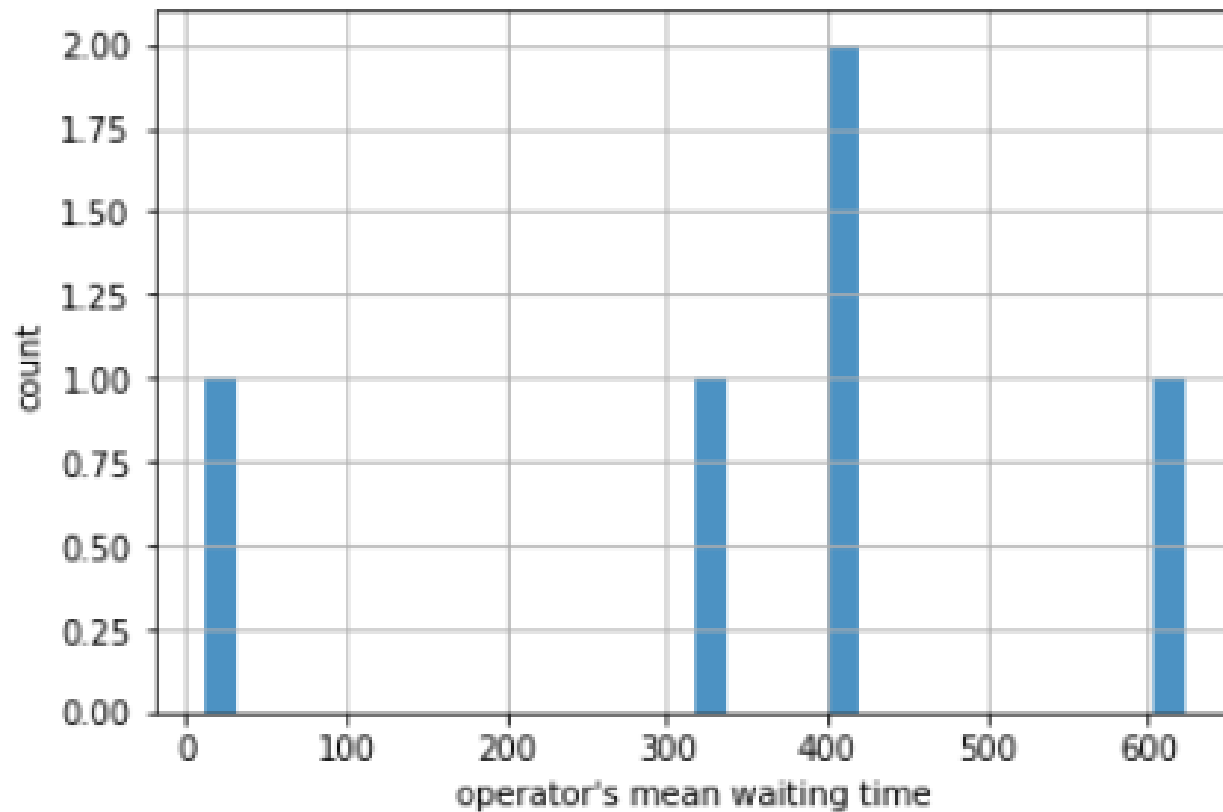
*proportions of ineffective operators for all tariffs are equal.*

## ***Results:***

We failed to reject the null hypothesis so we conclude that the proportion of ineffective operators **does not differ** among all three tariffs.

# Ineffective operators per client

Operator's mean waiting time distribution for client 167626



For client 167626 either:

- almost all operators are ineffective (which is a rare case).
- OR: long calls are normal for this client (for example if it's a psychological help service) and the long waiting time is due to lack of operators and it's not an operator's fault rather the client's one.

# Recommendations

- It's recommended to consider the 1<sup>st</sup> group of **11 operators** as the most ineffective as their daily mean waiting time does not ever drop below **97s**.
- Other categories based on mean waiting time (**84 operators**) and monthly mean waiting time (**48 operators**) should be treated as moderately ineffective operators categories.
- If missed calls share or outgoing calls share are also crucial the corresponding categories should be also used for identification.
- Cluster analysis provided a universal category of **67 operators** which combines all 3 criteria (long waiting times, high rate of missing calls and low rate of outgoing calls).
- We noticed that the long waiting time might be due to lack of operators and it's not an operator's fault rather the client's one.
- We applied universal thresholds to all clients to identify ineffective operators. An alternative approach for future research: try to elaborate individual criteria for each client.