A Call Center Model for Online Mental Health Support

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A short resume

- **2016-2019: BSc Business Analytics at VU Amsterdam**
- **2019-2021: MSc Business Analytics at VU Amsterdam**
- **2021-now: PhD candidate at CWI Amsterdam**

- **Research interest: Queueing theory, Simulations, Forecasting, (mental) Health care**

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Introduction

- **Many countries have one or multiple (mental) health helplines.**
- **The Netherlands alone have: listen line, line for children, 113 suicide line, etc.**
- **Critical that help seekers are helped quickly**
- **Needed: insights into the helpline**
- **Focus on 113 suicide prevention**
  - **But** insights can be used at other helplines

113 suicide prevention

- **113 is the suicide prevention helpline of the Netherlands**
- **The number of arrivals of phone and chat show an increasing trend**

Model of the helpline

- **Two types of arrivals (chat and phone)**
- **Chat arrivals are first filtered by triage**
  - The triage can handle 5 chats at a time and filters out chats that are at the wrong helpline
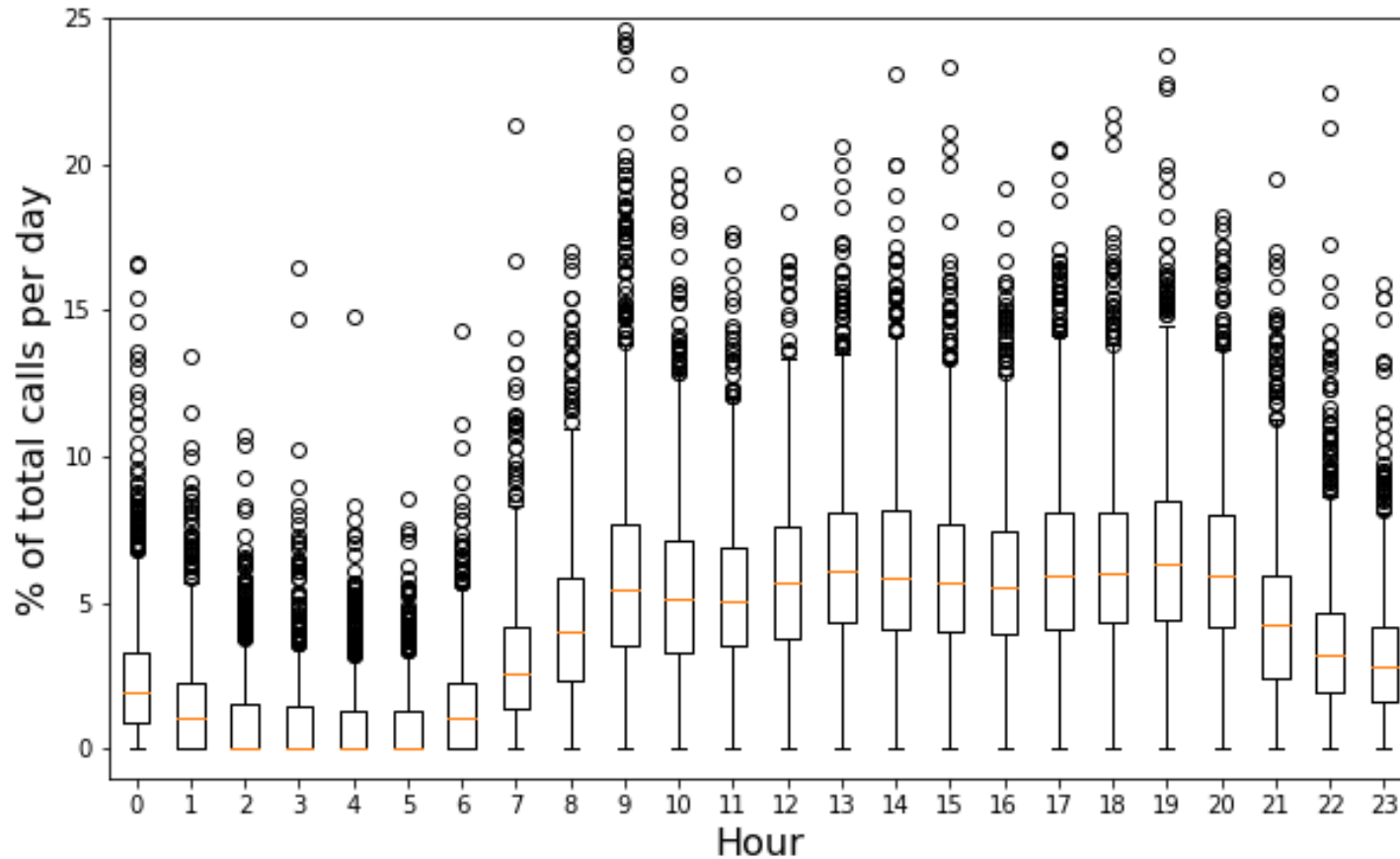- **Chats after triage and new phone arrivals are both handles by counselors, with chats having priority**
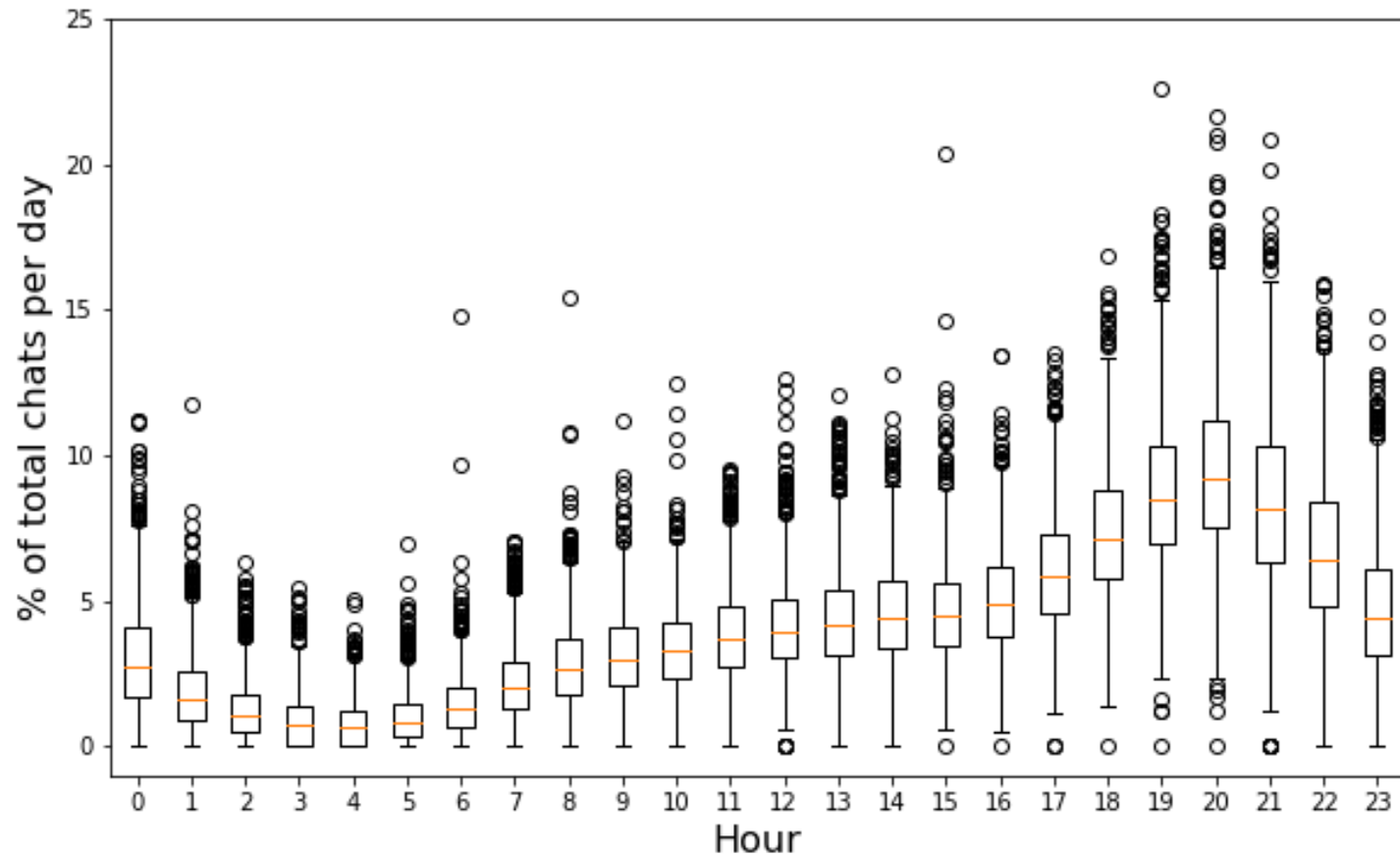
Model of the helpline
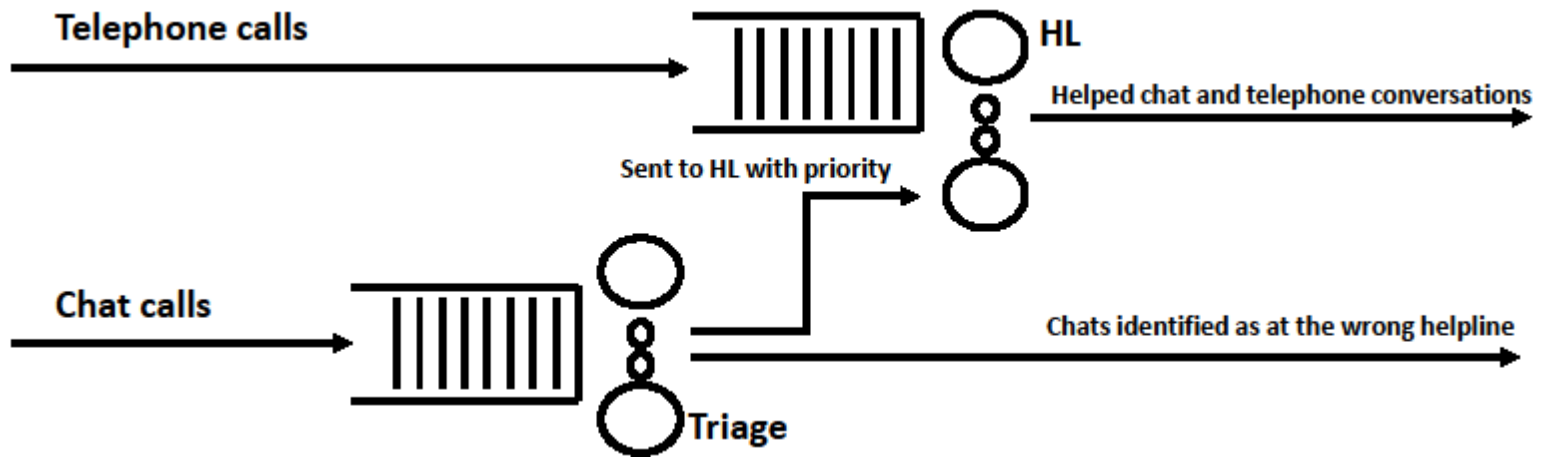
Data plan

- **Trend**
- **Cycles**
- **Durations**
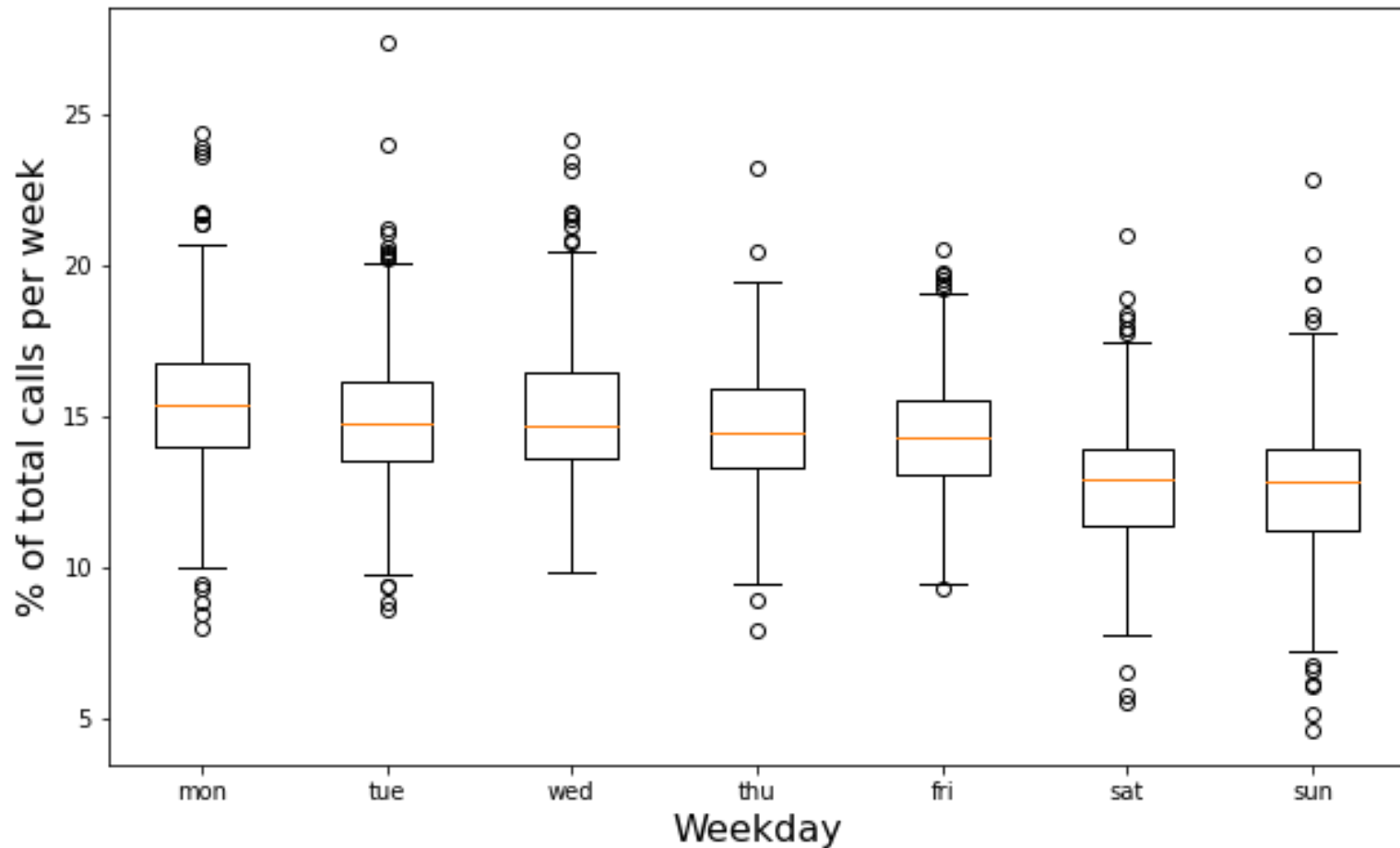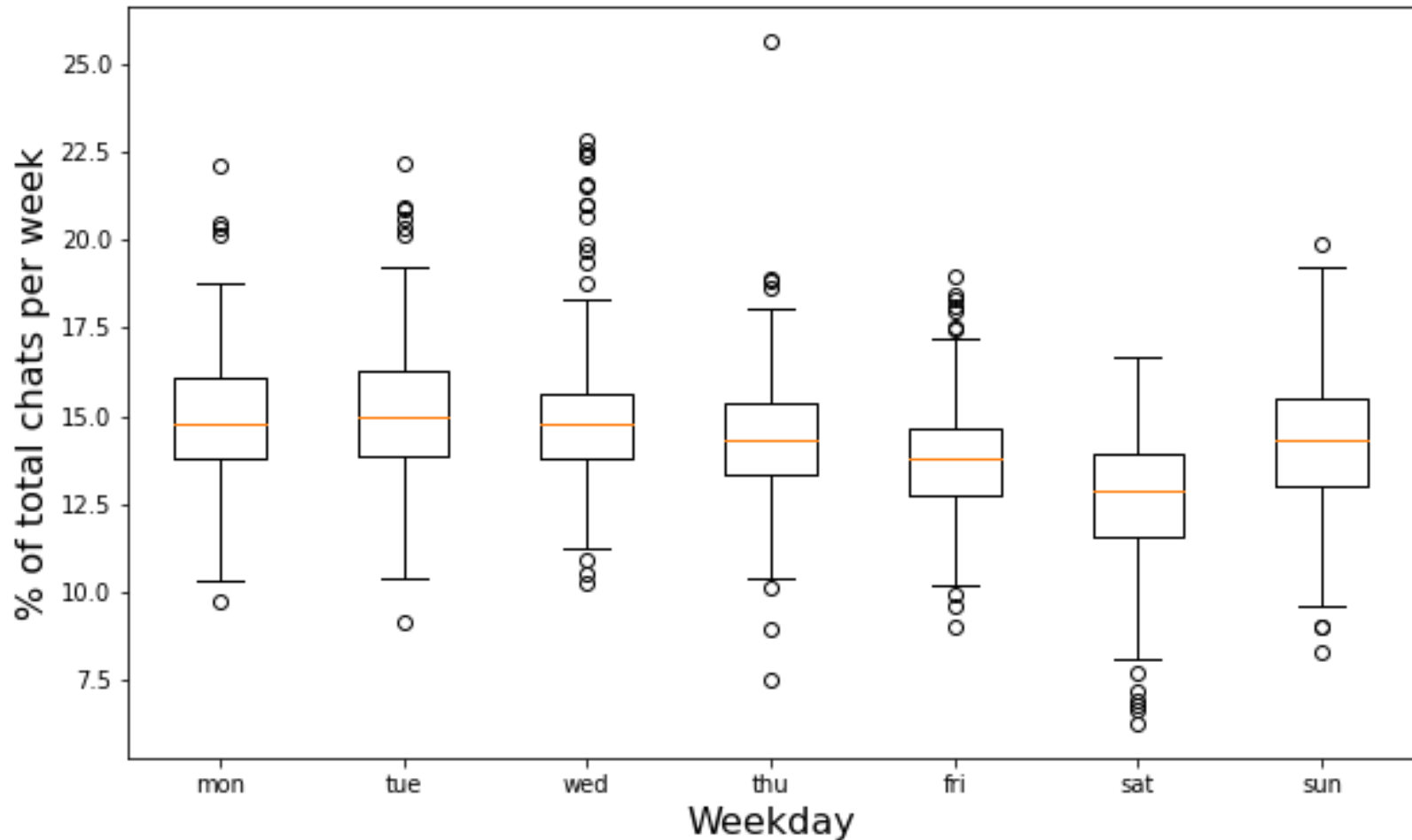- **Experience of agents**
- **Media events**

Data: Daily cycles
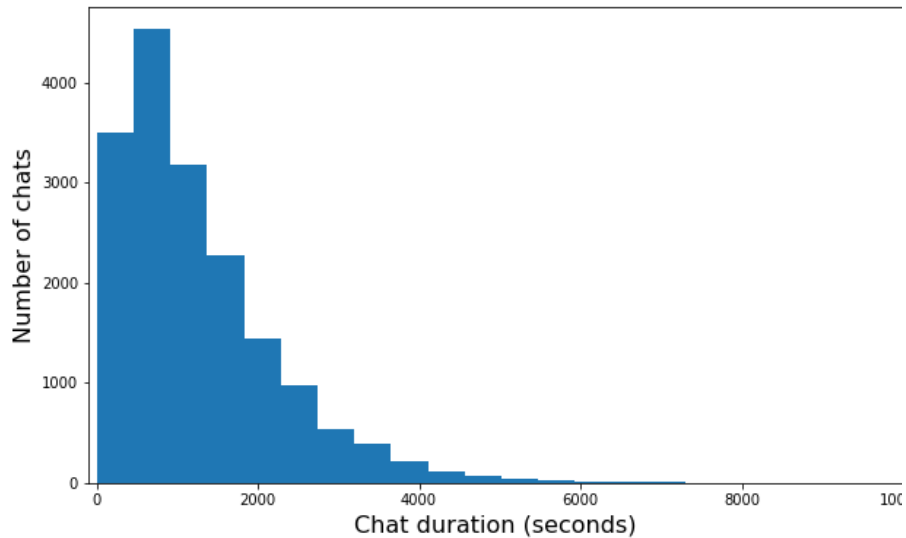
Data: Daily cycles
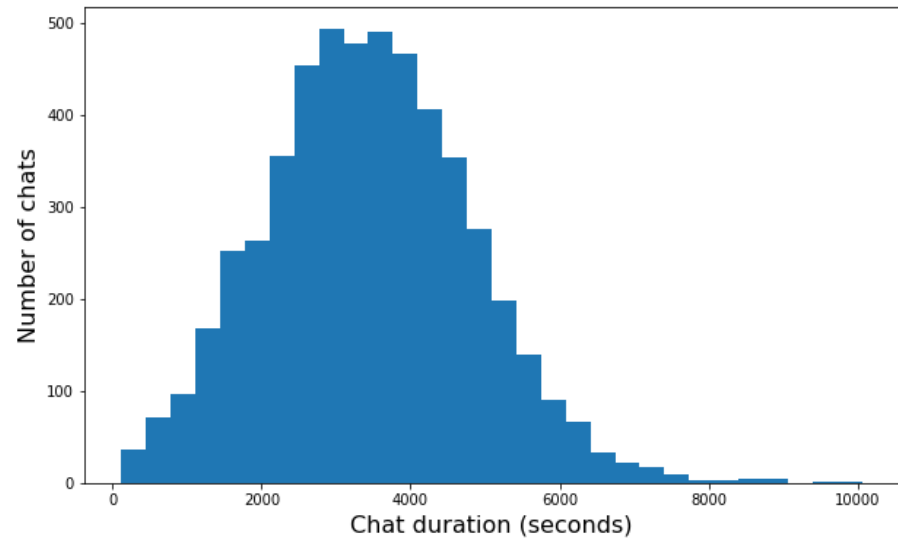
Data: Weekly cycles

Data: Weekly cycles

Data: durations

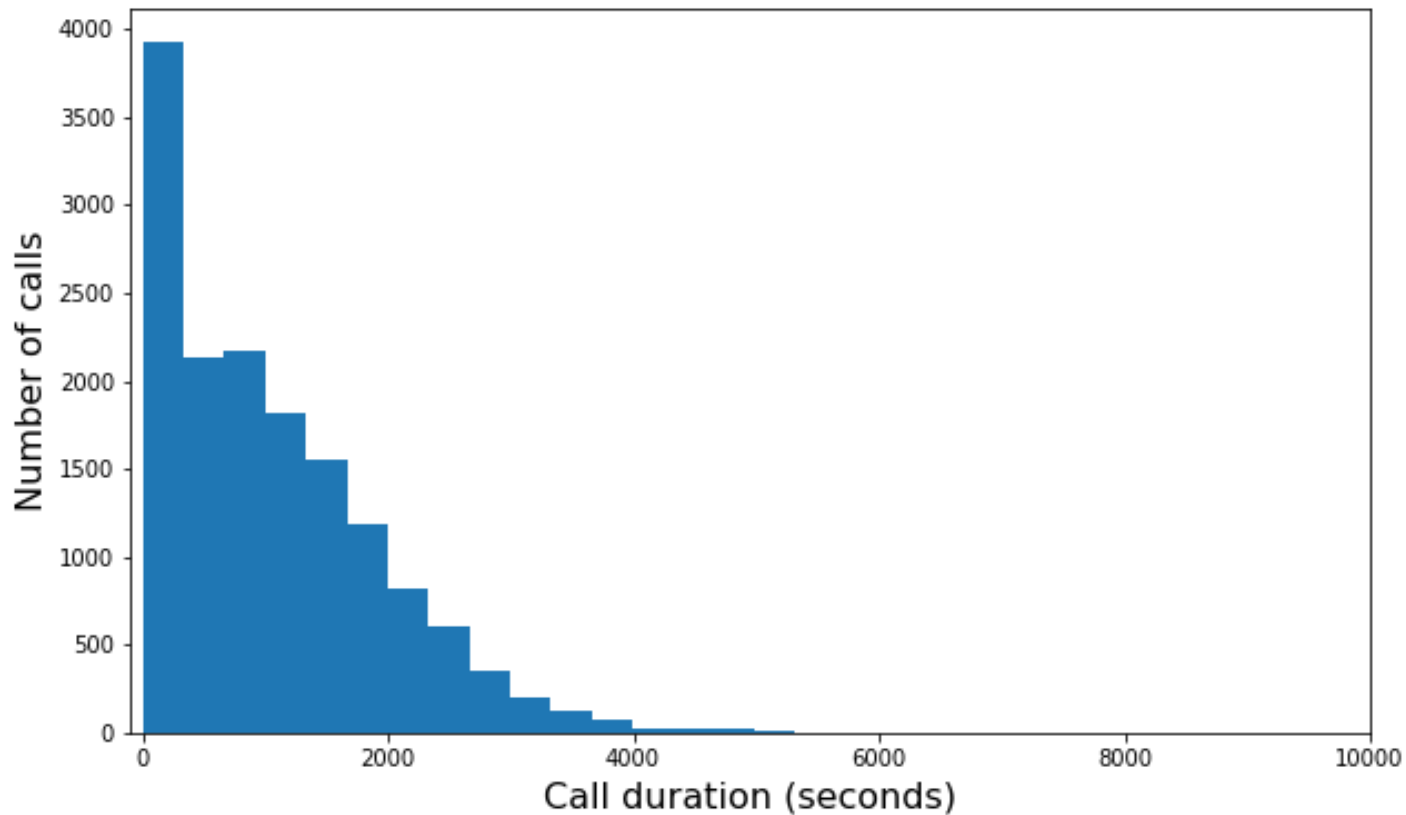**Chat duration in Triage**
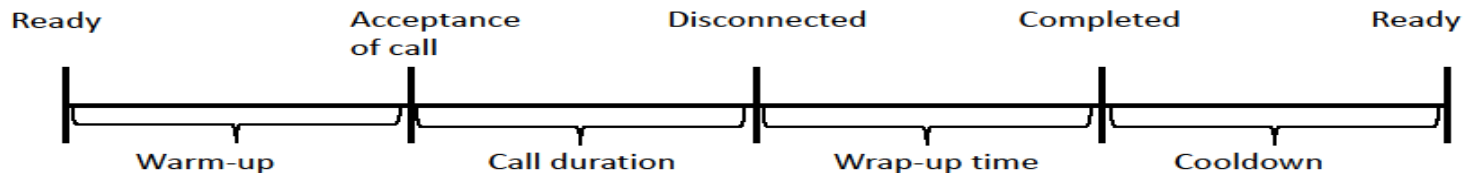

Chat duration after Triage

Data: durations

Phone call duration
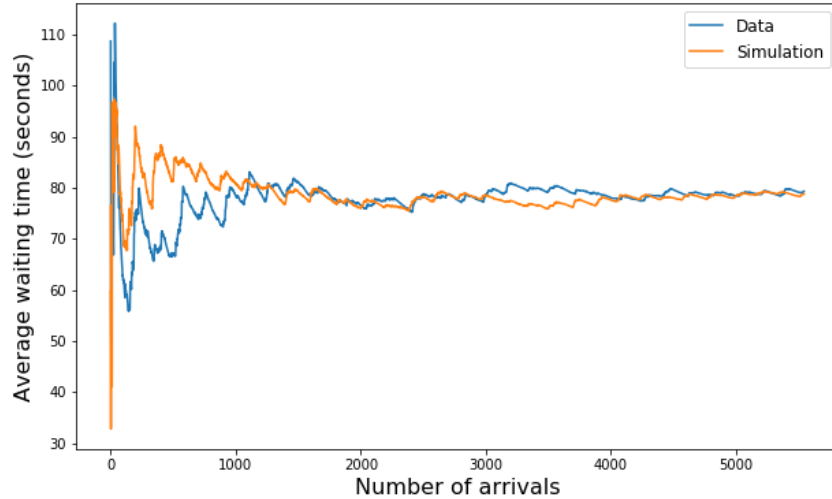
Data: remarks

- **Experience of agents:**
  - No significant difference in service time

- **Media events:**
  - No large or long-lasting effect on number of arrivals

- **Before and after each conversation agents have to warmup/cooldown**
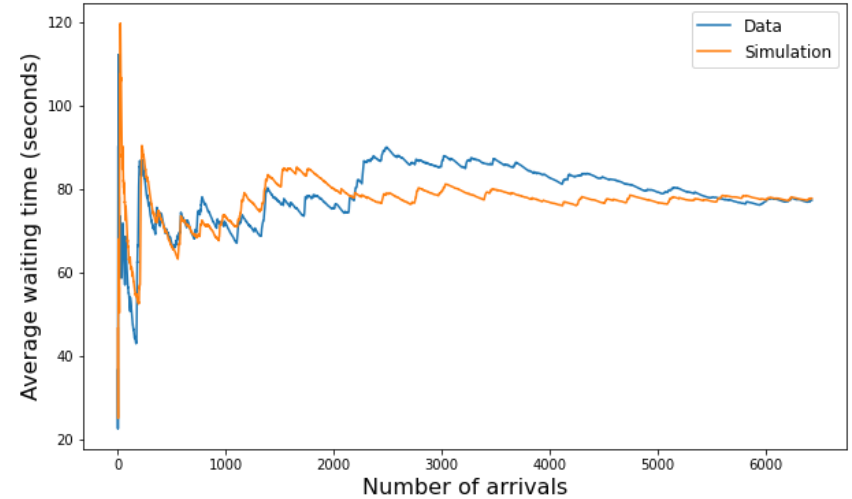 - Due to complex conversations

Model validation

- **Using trace-driven simulation**

**Phone validation**

Chat validation

Demand forecasting: models

- **Linear regression using trends and cycles**
- **(S)ARIMA**
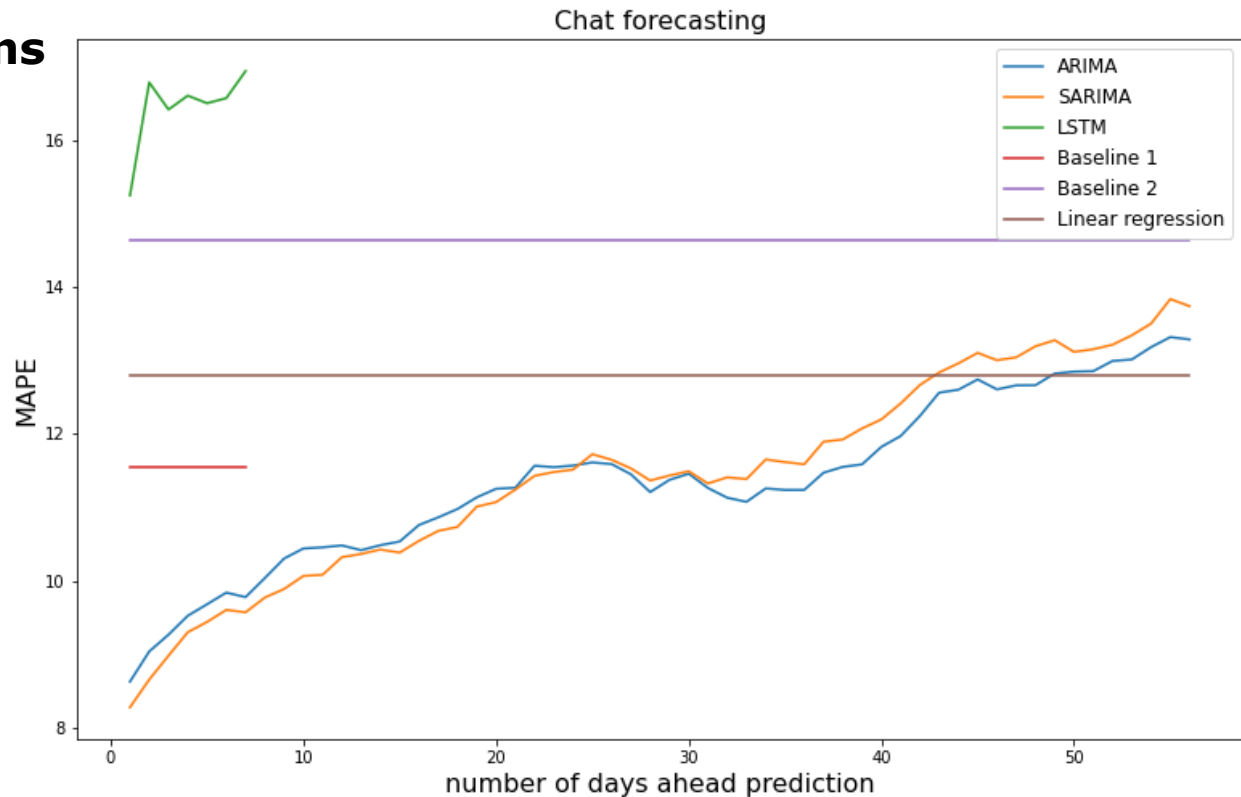- **Machine Learning (Neural Networks)**
- **Baseline**

Demand forecasting: results calls

- **LSTM seems to perform worse than other models, however, could be improved further**
- **Short term (<4 weeks) (S)ARIMA perform best**
- **Long term (>4 weeks) Linear Regression seems to perform best**
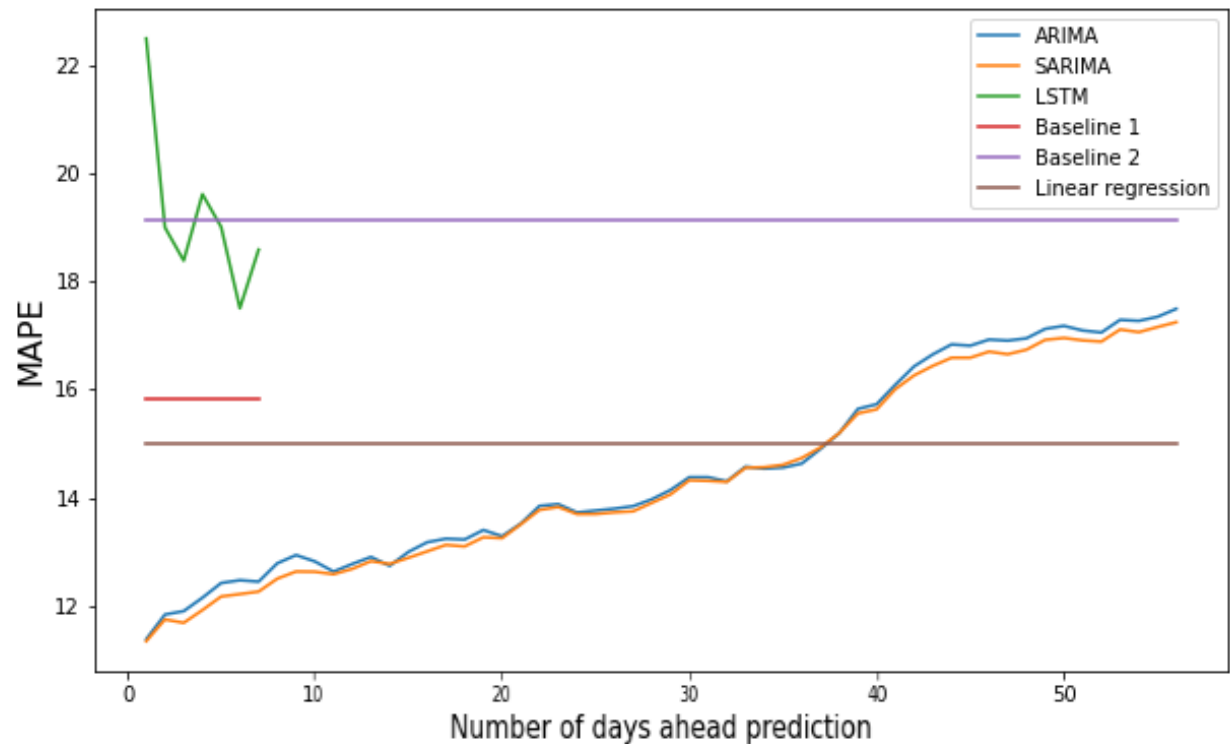
Demand forecasting: results chats

- Again, LSTM seems to perform worst

- (S)ARIMA performs best

Chat forecasting

Conclusion

- **A new call center model**
- **Importance of warmup and cooldown**
- **(S)ARIMA can best be used for forecasting**

Future:

- **The effect of volunteers**
- **Predict caller types**

Q&A