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SURT 2.0: Advances in Transducer-based Multi-talker Speech Recognition

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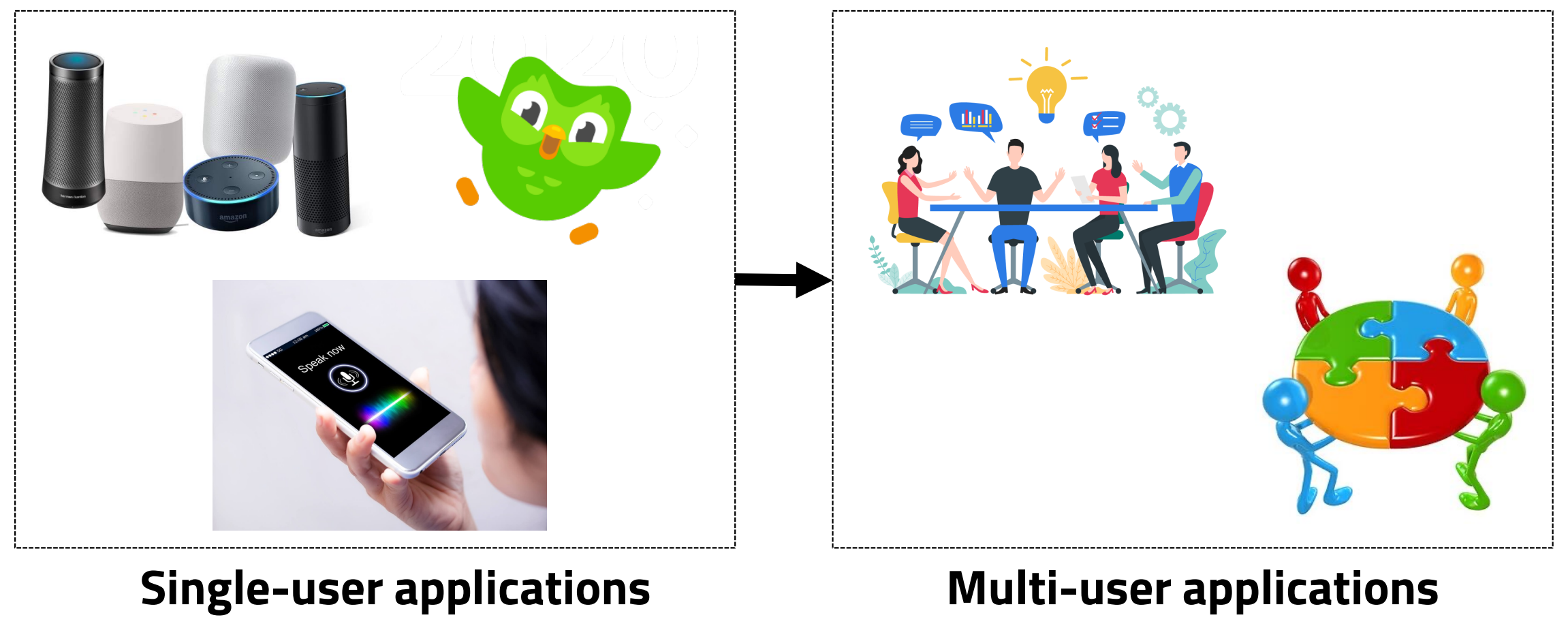
Motivation

- Existing ASR systems are mostly geared towards single-user applications.
- We want to build systems that answer "**who spoke what**" for free-flowing multi-party conversations, in real-time.
- How to train efficient **end-to-end** neural models for this task?



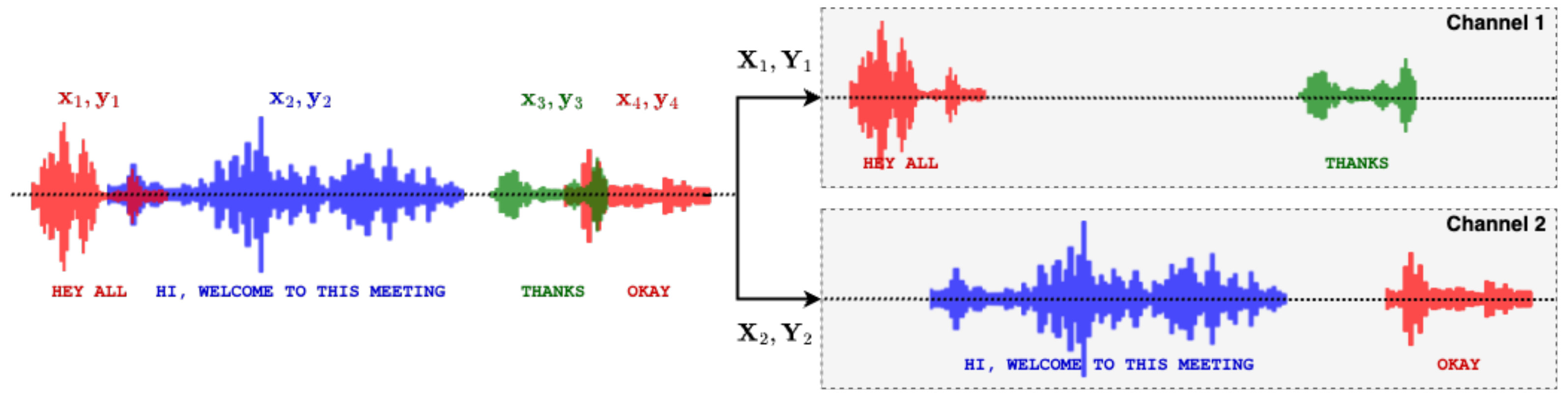
Challenges

Model — Multi-talker conversations contain **overlapping speech** and back-channels.

Data — There is limited amount of **real data** available for training end-to-end neural models.

Compute — Training such systems requires **large computational resources**.

Continuous Streaming Multi-talker ASR

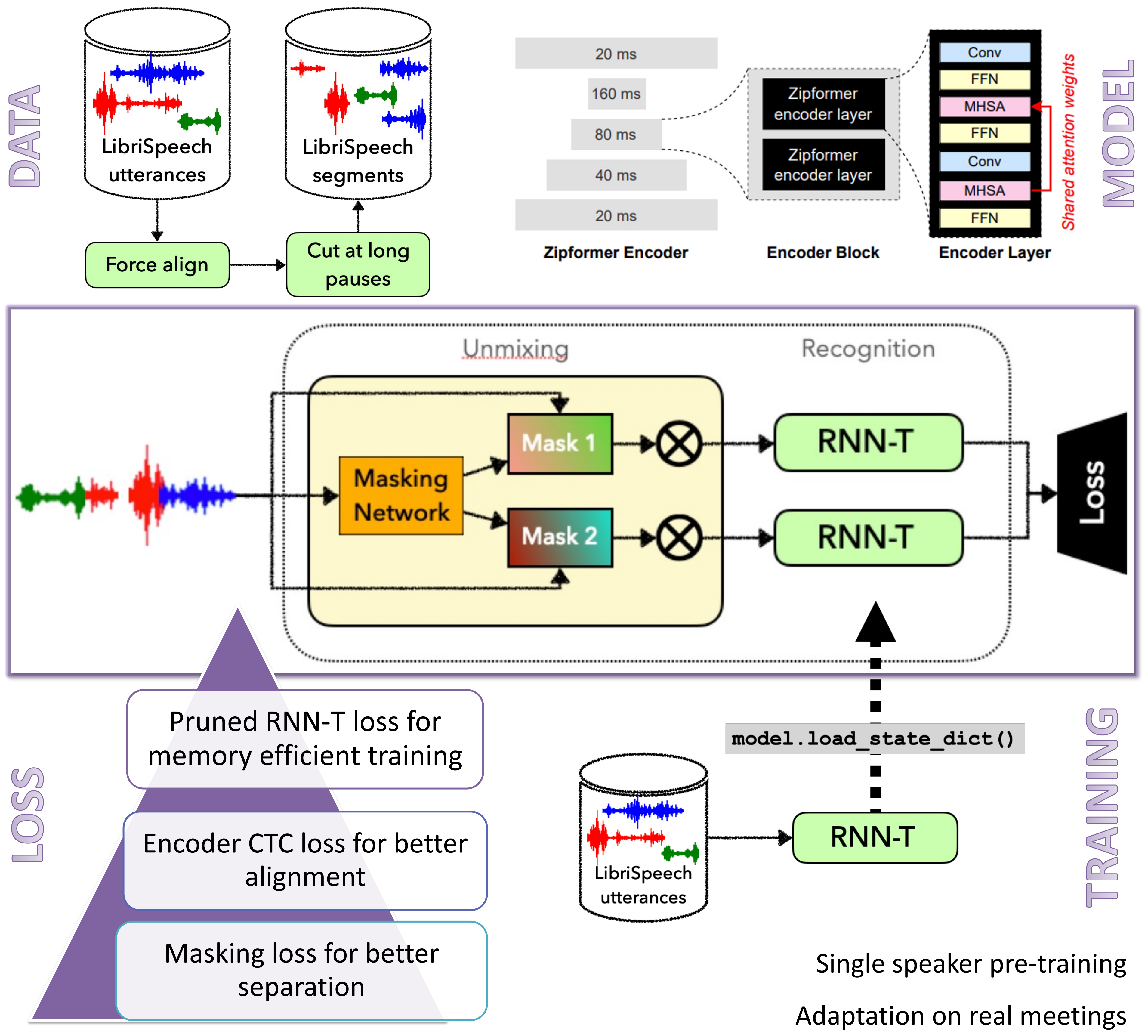


Continuous	Streaming
No need of external segmentation	Overlapping speakers transcribed simultaneously

Streaming Unmixing and Recognition Transducer

Shorter mixtures with more turn-taking

Zipformer for efficient sequence modeling



Pruned RNN-T loss for memory efficient training

Encoder CTC loss for better alignment

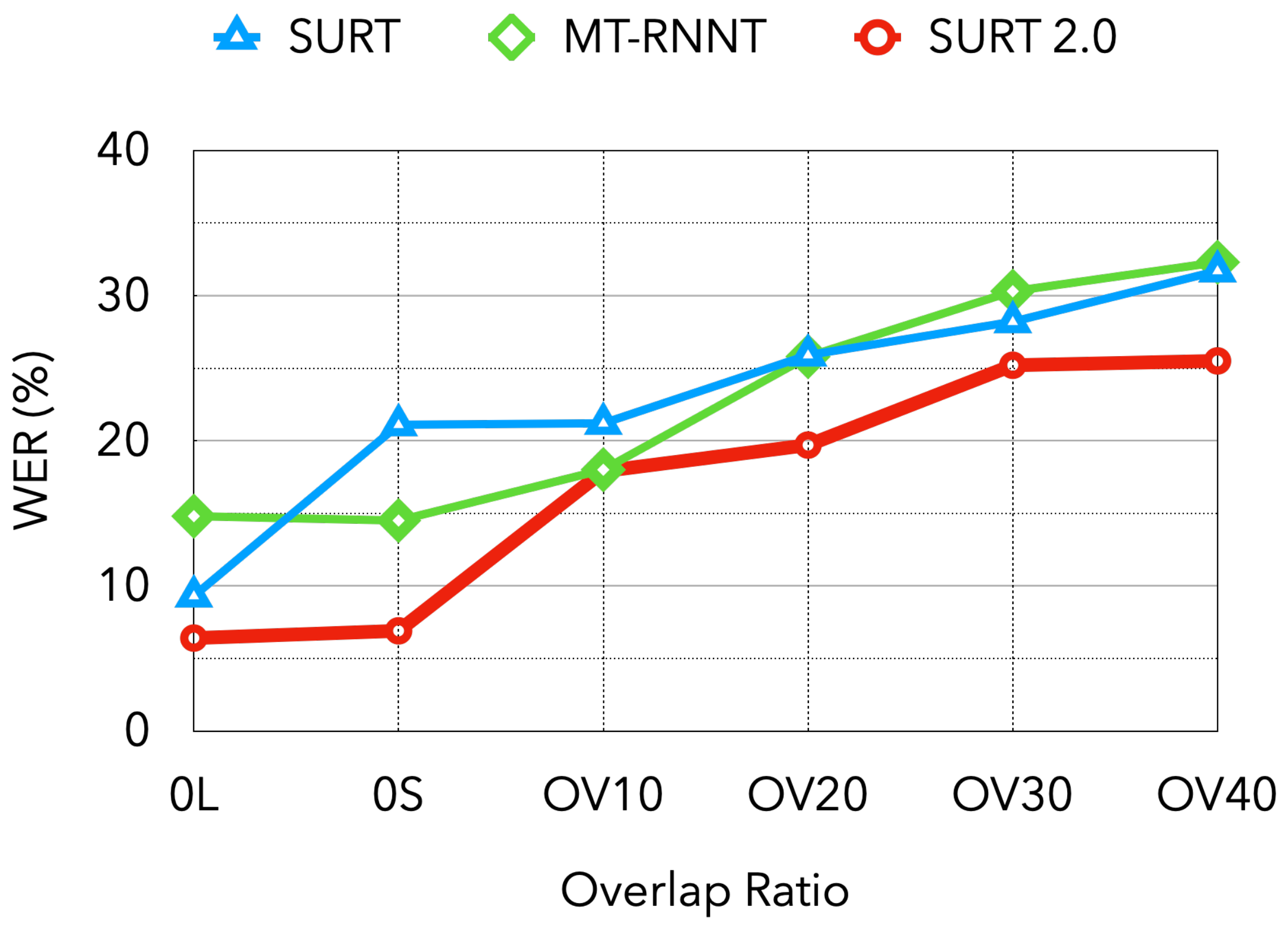
Masking loss for better separation

Single speaker pre-training

Adaptation on real meetings

Results

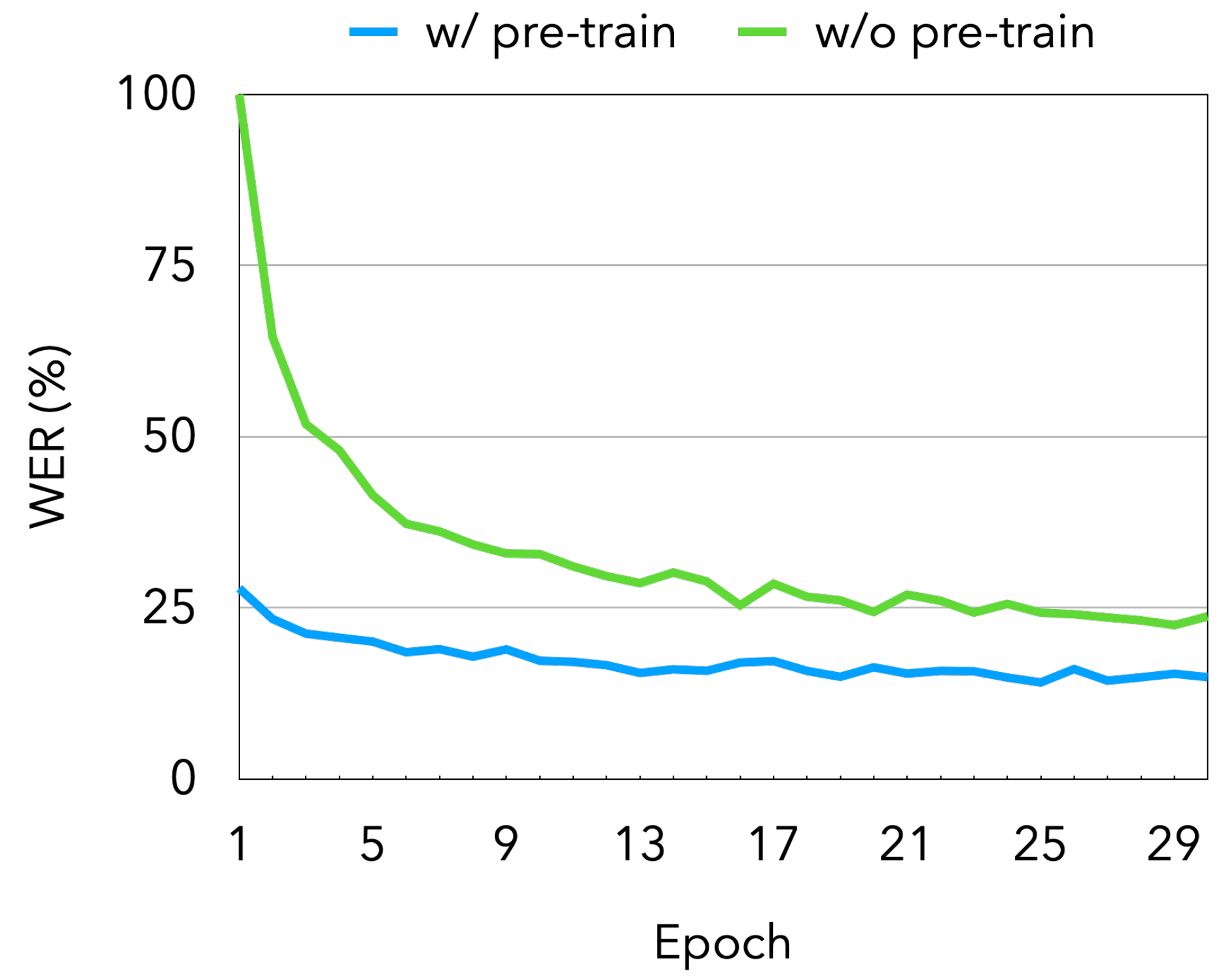
- Experiments on meeting corpora: LibriCSS, AMI, ICSI
- LibriCSS is "simulated"; AMI and ICSI are real meetings
- SURT 2.0 obtains 44.6% and 32.2% WER on real far-field meetings.



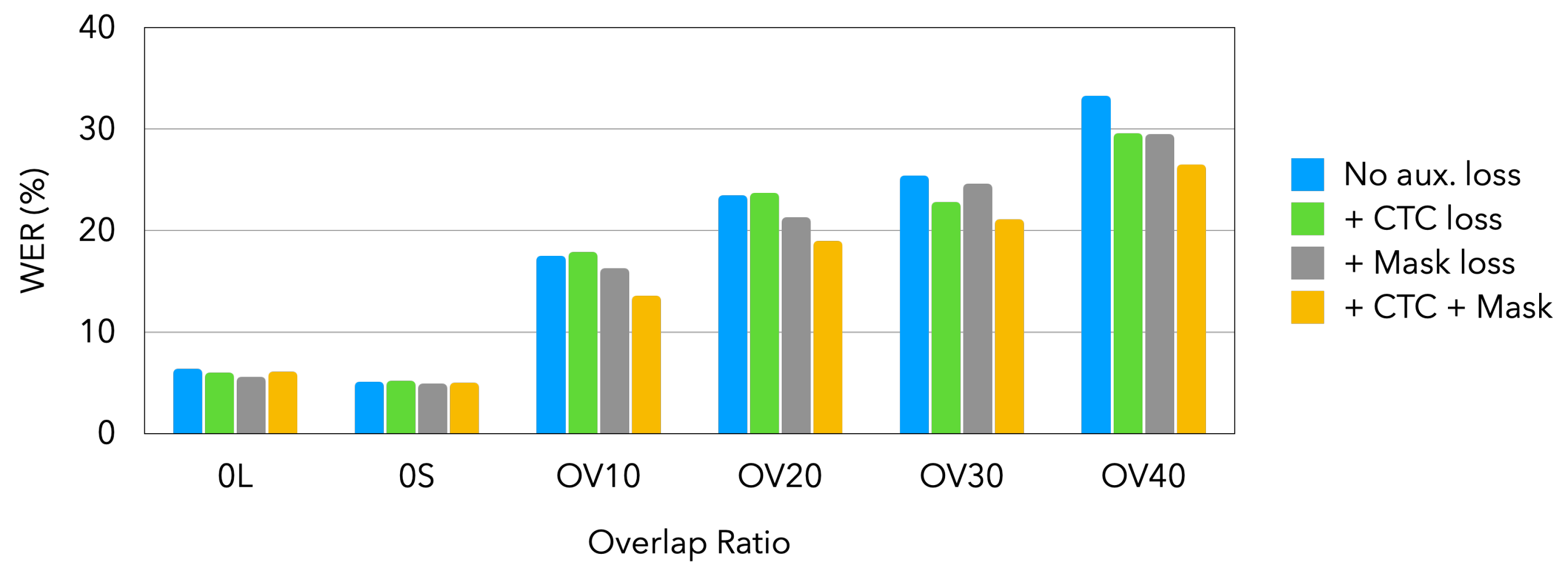
Model	# params (M)	WER (%)
MT-RNNT [1]	81.0	22.6
SURT [2]	42.9	22.9
SURT 2.0	**37.9**	**16.9**

Analysis

1. Single speaker pre-training is critical.



2. Auxiliary objectives improve performance on high-overlap conditions.



LHOTSE k2 ICEFALL

References

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[2] D. Raj, L. Lu, Z. Chen, Y. Gaur, J. Li. "Continuous streaming multi-talker ASR with dual-path transducers." *IEEE ICASSP 2022*.

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