Text-to-Speech (TTS) for Seven Swiss German Dialects

SwissText, June 18, 2019

Christof Traber, Schamai Safra, Bleicke Holm,
Dominic Schnyder, Philipp Lichtenberg

SlowSoft GmbH, Zurich

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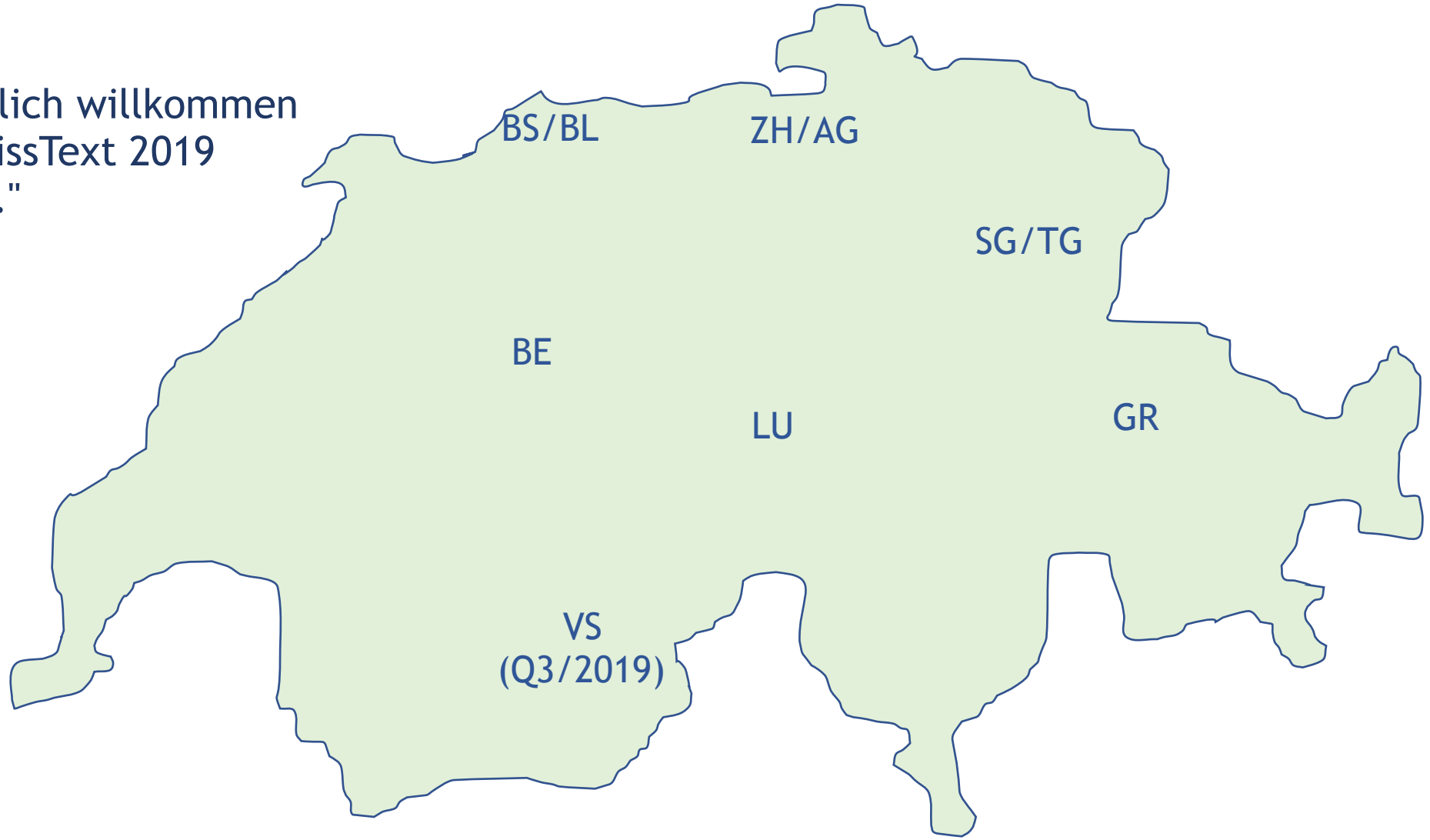
Project Background

- Presenter worked entire life on TTS systems for various languages
- It was high time to attack Swiss German dialect as native language
- Started in a commercial setup in 2015; Swiss German since 2017
- TTS is usually highly underestimated in its complexity
- Swiss German is much bigger challenge than Standard German TTS
  - dialects are not standardized, vary from place to place, even from speaker to speaker → chose one reference variant
  - no standardized way of writing; difficult to do NLP
  - few corpora available

Demonstration of Current Status

"Grüezi, und herzlich willkommen zur Konferenz SwissText 2019 dd#zu Winterthur."

Currently:
- 6 dialects, initial quality
- 3 male, 3 female voices



Input Formats For Swiss German I: Pseudo-Phonetic Writing Style

Must be used in applications such as reading aloud of short messages

Example:

{Ich chume hüüt echli spöter, wil ich de Zug verpasst han.} (ZH)

{I chom hüt achli spööter, wäli dä Zug vopasst ha.} (SG)

Writing not standardized, depending on dialect and author

→ most difficult application, not yet started

Input Formats For Swiss German II: Full Standard German

Most desirable input form for most applications (e.g., dialog systems): can be used identically for all dialects

"Peter arbeitete gestern bis in die Nacht."

→ "*Der* Peter *hat* gestern bis in die Nacht *geschafft*."

- Translation needed from Standard to Swiss German as first step (lexical substitutions, past tense -> perfect, genitive -> dative etc.)
- Translation possible by rules, but needs extremely good input analysis

Input Formats For Swiss German III: Normalized Swiss German

Use Standard German words to denote Swiss German words

"Los[dd], der Peter ist heute go[dd] posten[dd] gegangen."

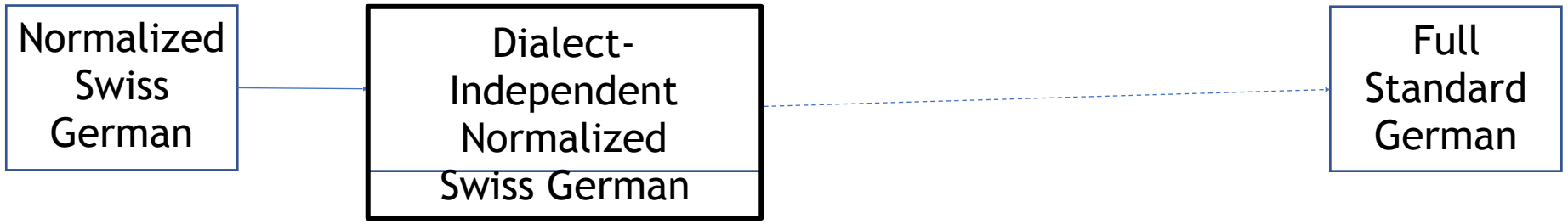
→Easiest for TTS, somewhat awkward to write, but still very useful for many applications (esp. dialog systems)

However: Different variants needed for different dialects

1) "Da können Sie Ihre Bestellung aufgeben." (Non-BE, Non-VS)
2) "Hier könnt Ihr Eure Bestellung aufgeben." (BE, VS)

Envisaged Input Format For Swiss German: "Dialect-Independent Normalized Swiss German"

Minimal aim: Same input should work for all dialects
(some lexical substitutions, uniform notation of different polite forms)



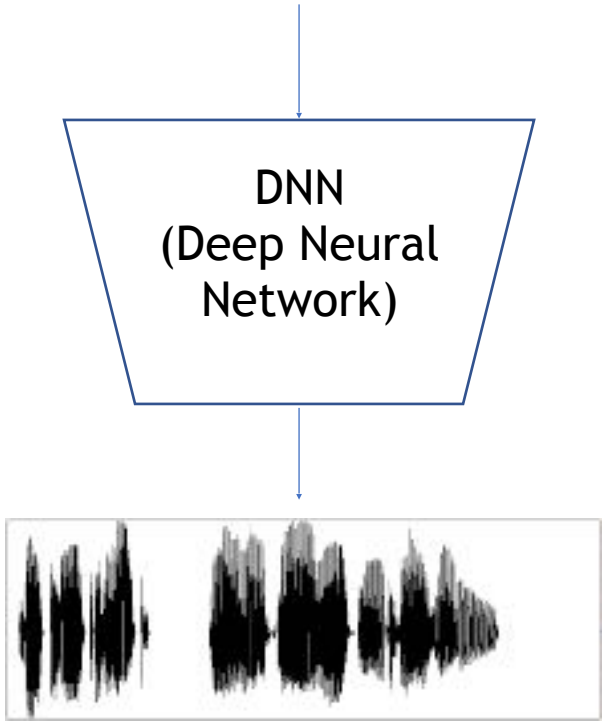
Currently: "Hier können#po Sie#po Ihre#po Bestellung aufgeben."

1) GR: {Do könd Sie Ihri Pstellig ufgää.} ("hier"→"da")
2) BE: {Hie chöid Dihr Eui Pstellig ufgää.} ("können Sie"→"könnt Ihr")

TTS System Structure I: End-to-End Learning

Text

"Guten Tag, meine Damen und Herren"



Speech Signal

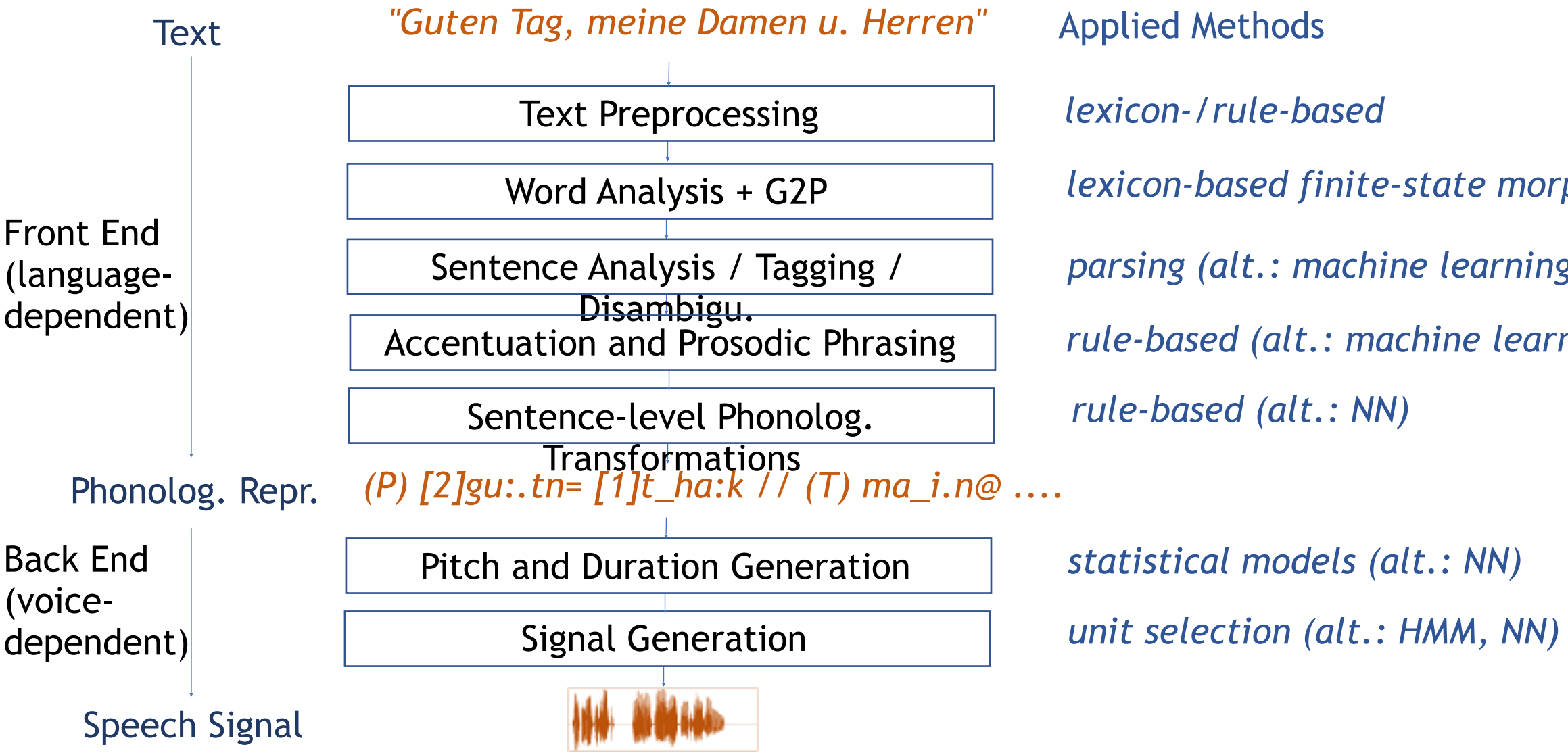
Advantage:

- Avoids linguistics/ phonetics

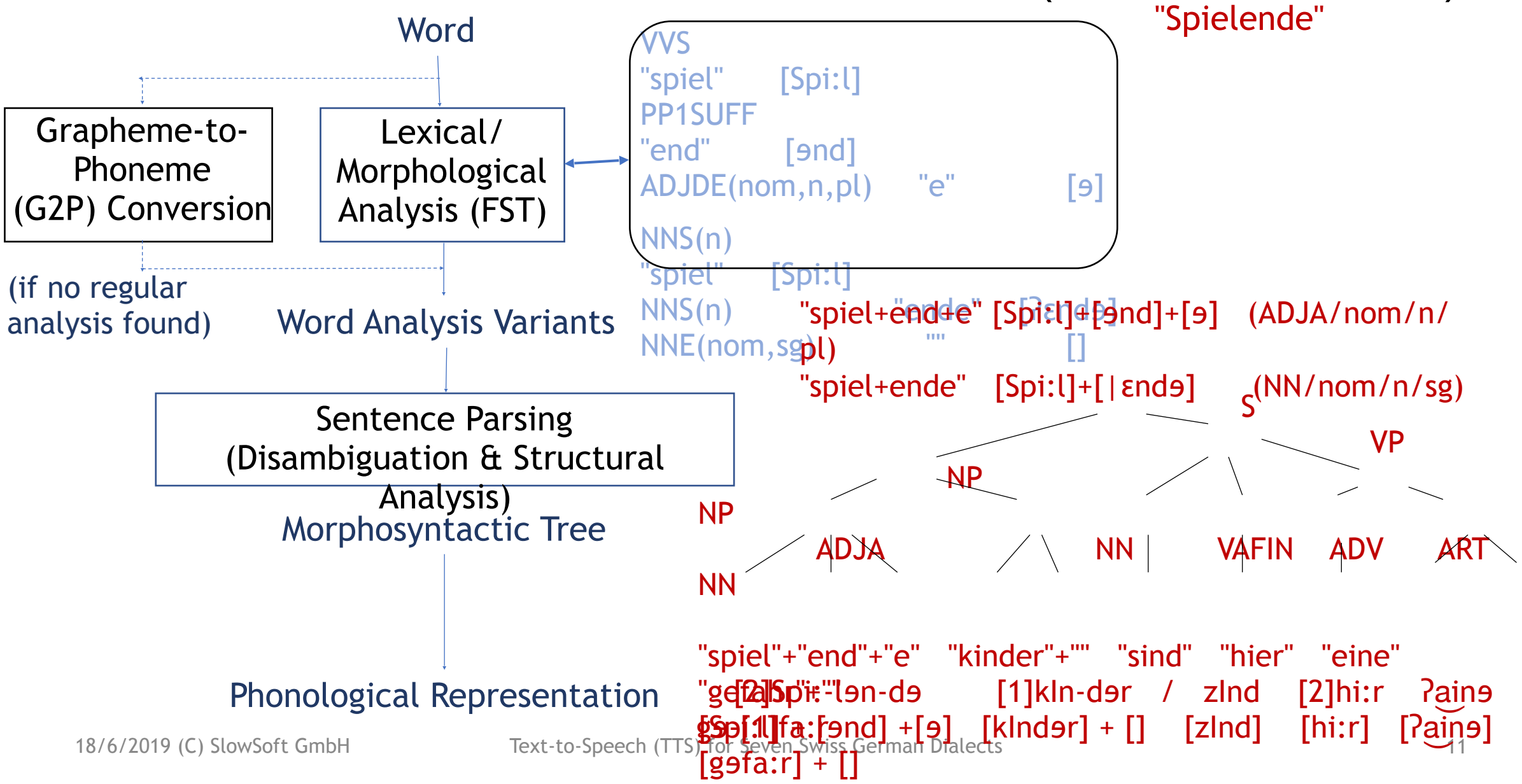
Major drawbacks:

- Needs huge corpora, for Swiss German more than for Standard German
- Correctability: How to do corrections / additions by user (e.g., how to add name pronunciations)?
- High computational load at run-time (real-time?)

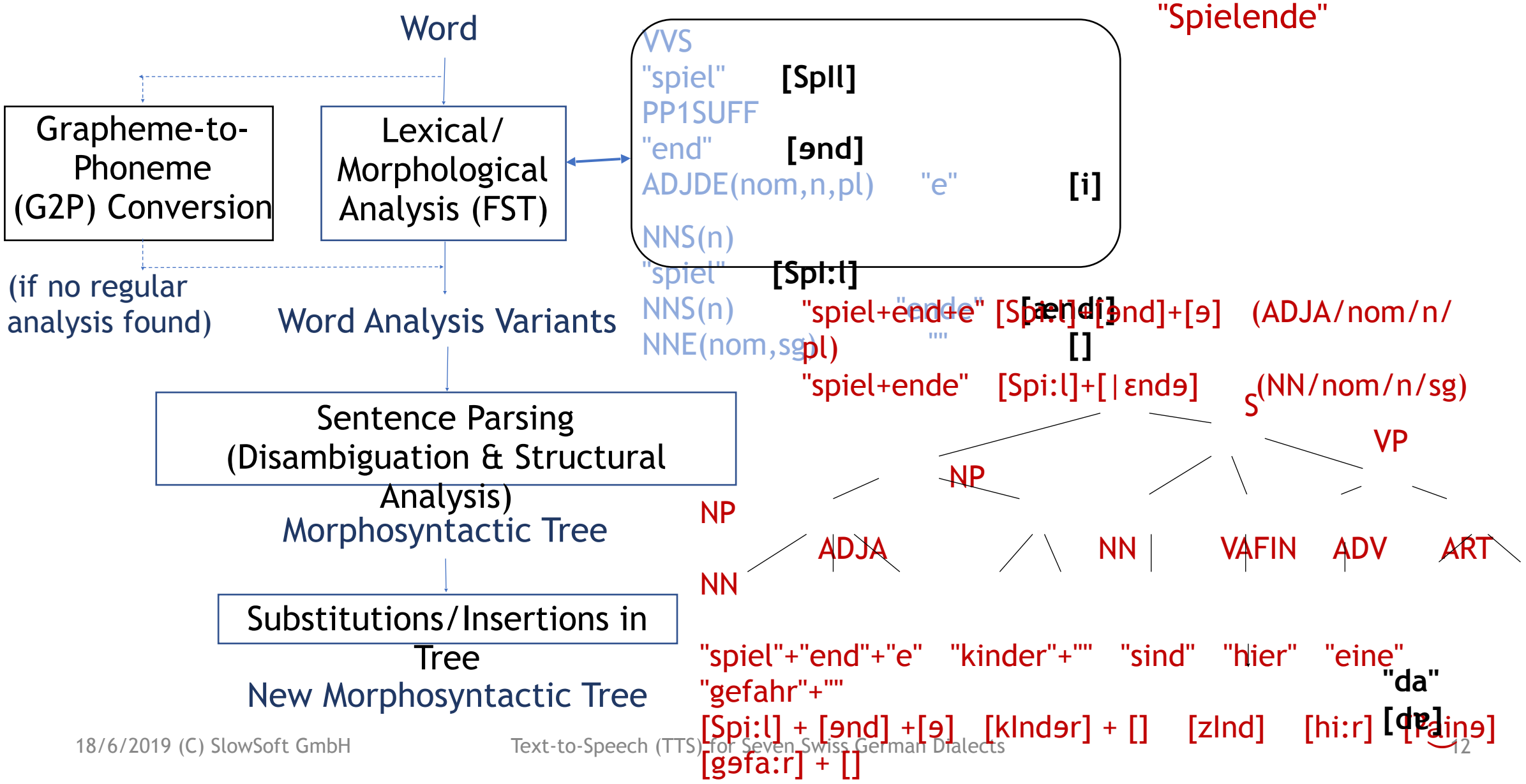
TTS System Structure II: Classical Processing



Classical Core NLP Part in TTS (Std. German)



Classical Core NLP Part in TTS (Swiss German)



TTS Problems Even With Normalized Text Input

Many homographs only pose problems in Swiss German (function words!)

	Std. German	Swiss German	
• "meinen"	[mainən]	[mainə]	(VVINF)
	[mainən]	[mainəd]	(VVFIN/pl1 or VVFIN/pl3)
	[mainən]	[mi:n]	(PPOSS/acc/m/sg)
	[mainən]	[mi:nə]	(PPOSS/dat/X/pl)
• "zu"	[tsu]	[tsu]	(APPR)
	[tsu]	[ts]	(PTKZU)
	[tsu:]	[tsuə]	(PTKVZ)

→ Swiss German requires much more accurate tagging than Standard German

Application Requirement: Correctability

- TTS mercilessly makes NLP errors audible, esp. with Swiss German (TTS acts like magnifying glass for NLP errors)
- Even best NLP will make errors, but TTS output must be correct

→ Correctability needed/offered:

- markup of word category (STTS tag set)/features
  e.g. "weiss#adjd", "weiss#vvfin", "können#p1"
- markup of Standard German use (to come)
  e.g. "Maurer#hh", "Gott sei#hh Dank"
- in extreme case markup of phonetics via SSML (to come)

Envisaged/Demo Applications

- *Accessibility*: Speaking aids for Swiss ALS patients and reading aids for blind people
- *Language learning* tools
- *Dialog systems* in Swiss German for robotics, digital assistants, voicebots
- *Sägemol* App (free) on iOS and Android: Speech-to-speech translator from several languages to Swiss German
  - Apple/Google ASR, Google translation
  - SlowSoft TTS from Standard to SwissGerman

https://www.facebook.com/LuzernerZeitung/videos/551817122000456/

Outlook 2019

- Commercial approach not successful (so far)
  - commercial continuation not clear, but project continues
  - free use of TTS for research and medical purposes
- Voice/dialect-specific improvements
  - improved speech signal generation (using more recorded material)
  - improvements in dialect lexica
- Generic improvements
  - improved prosody control (NN approach, almost ready)
  - improved speech signal generation (transition to deep learning)
  - improved text analysis (esp. tagging)
  - improved rule-based deu->gsw translation

Thank you for your attention!

ZH: "Ich finde, das langt jetzt aber."

BA: "Genau. Also tun wir uns doch zusammen verabschieden."

All: "Vielen Dank für Ihre#po Aufmerksamkeit."