

The Webinale logo, which consists of a white speech bubble shape with the word "webinale" written inside in a lowercase, sans-serif font.

by entwickler.de

ACCESSIBLE WATCH EXPERIENCE:

How WDR is using AI to shape the future of media for people with hearing disabilities

Session at Webinale 2025 by Hannes Hölzl, Appmatics GmbH & Christian Klöckner, WDR

This is us



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Agenda

1.

Introduction

What is hearing loss and why does it matter?

2.

WDR and automated subtitles

How WDR developed an accessible subtitle format

3.

You are not the user!

How Appmatics tested the subtitles and what we learned



13 mio.

people in Germany have hearing loss
(19 % population over 14) mild to hard

Study of "Deutscher Schwerhörigenbund" (www.schwerhoerigen-netz.de)



80.000 –
100.000

deaf people live in Germany

Deutscher Gehörlosenbund (www.gehoerlosen-bund.de)

Importance of accessibility in media

1.

Promotion of inclusion and equal opportunities

- enablement of disabled people to participate equally in social life
- removal of barriers to support access to information and entertainment

<https://accessibility.usc.edu/accessibility-at-usc/digital-accessibility/social-media/>

2.

Expanding the target group and improving the user experience

- accessibility driven organizations reach wider audiences and improve user experience

<https://www.levelaccess.com/blog/accessible-social-media>

Importance of accessibility in media

3. Compliance with legal requirements and ethical standards

- worldwide legal regulations require accessibility
- non-compliance can have legal consequences and damage reputation

<https://support.webservices.ufhealth.org/social/social-media-accessibility/what-is-digital-accessibility>

4. Promoting innovation and creativity

- possibility for new, innovative approaches to media design
- example: Rock in Rio Festival, tactile art pieces

<https://apnews.com/article/brazil-sign-language-intepreters-rock-rio-accessibility-disability-7dfcf27e39440881b216fc105d55b100>

EU Legislation on Accessibility for the media sector



**Audiovisual media
services directive
(AVMSD)**



**EU accessibility act
(EUAA)**



**Web accessibility
directive
(WAD)**

Not valid for PSM

https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/disability/union-equality-strategy-rights-persons-disabilities-2021-2030/european-accessibility-act_en?prefLang=de
<https://eur-lex.europa.eu/eli/dir/2019/882/oj?locale=en>



Audiovisual media services directive (AVMSD)

! ... does not cover features of services or products providing access to audiovisual media services, nor does it cover accessibility features of EPGs.

- ④ The AVMSD requires media service providers to make their services gradually accessible to viewers with a visual or hearing impairment;(Art. 7(1), Recital 22).
- ④ The means to achieve the accessibility should include, sign language, subtitling for the deaf and hard-of-hearing, spoken subtitles, and audio description (Recital 23).
- ④ Member States should encourage media service providers to develop accessibility action plans ... making their services more accessible (Art. 7(2) and (3), Recital 22).
- ④ Member States must also ensure that emergency information ... is provided in a manner which is accessible to persons with disabilities (Art.7(5)).



EU accessibility act (EUAA)

PSM websites, applications, as well as EPGs are on the scope of the EUAA and therefore need to comply with accessibility requirements set in Annex I of the EUAA.

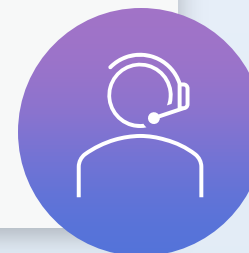
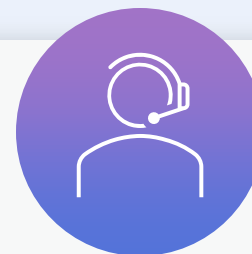
- ④ The EUAA sets accessibility requirements for a broad range of services and products, including services providing access to AVMS (such as EPGs, websites and applications) and consumer terminal equipment (Art. 1 and 2, Recital 31).
- ④ Annex I of the EUAA lists the accessibility requirements in relation to terminal equipment and services providing access to AVMS, including to ensure interoperability with accessibility components provided by media service providers:
 - ④ **Products** must be designed and produced to maximise their foreseeable use by persons with disabilities...
 - ④ **Services** providing access to AVMS, such as websites, online applications and EPGs must be accessible...
 - ④ **Interoperability requirements:** the terminal equipment and services providing access to AVMS must be capable of making available to users the accessibility components provided by media service providers

Automated live subtitling at WDR

„Classic" Subtitles are based on ReSpeaking

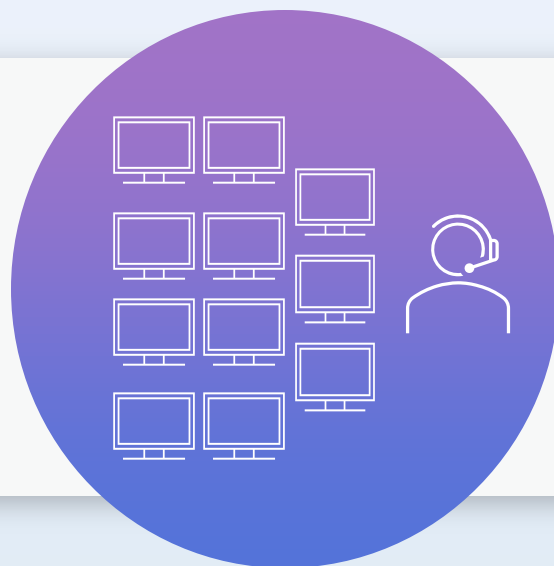
- Person A respeaks the text live
- Speech recognition generates text
- Person B corrects and formats and publishes

⌚ Conversion time: 1-5 seconds



Challenge

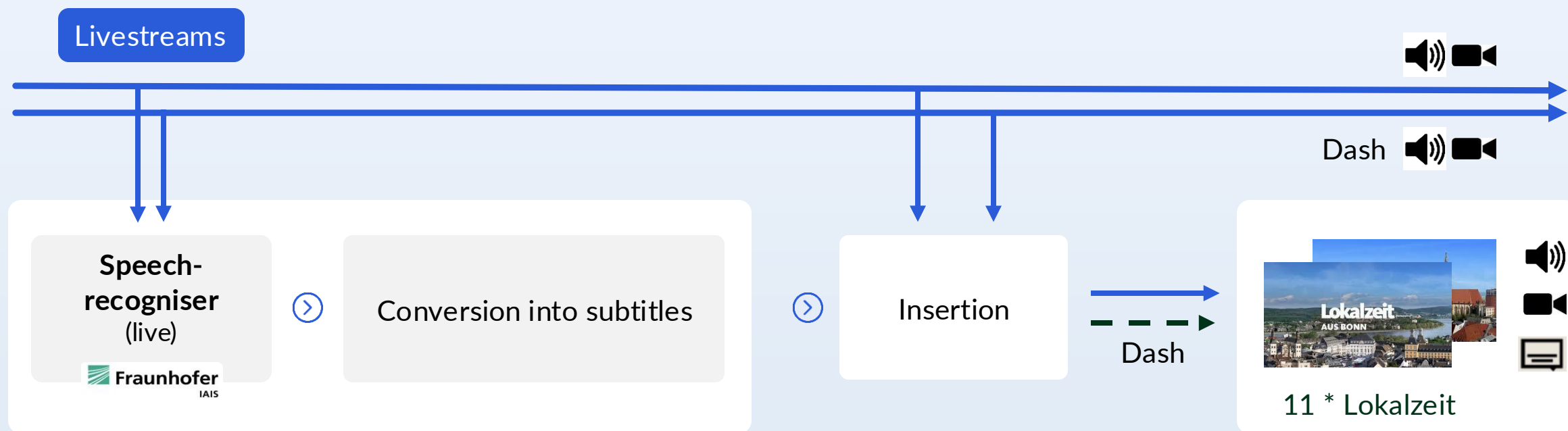
- Regional News Format LOKALZEIT
11 editions at the same time at
19:30



- Playout initially: Live-streaming for Browsers (DASH)
- Next playout : Smart TVs/HbbTV
- Project status: Apps and Catch-Up/Mediathek (HLS)



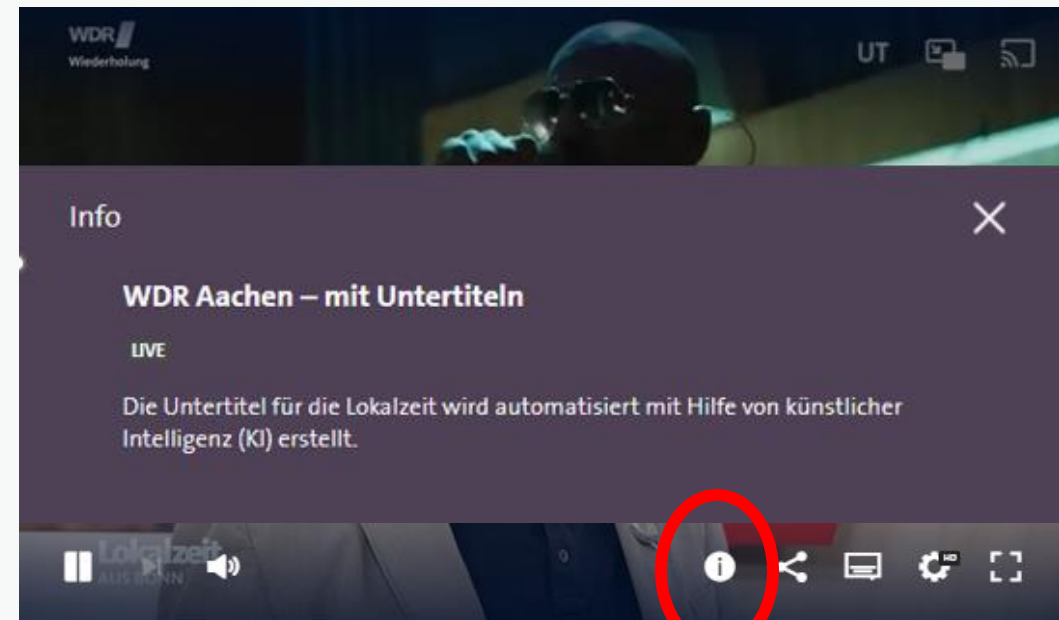
How does it work?



Labeling AI gen content

- Note on the websites
- As soon as Playback starts:

Info button in the Videoplayer
with the following note



And here we go

Genau die Familie ich mir gewünscht
habe gutes Leben verdienen. Hallo Tierheim,

Lokalzeit
AUS KÖLN

Does it work?

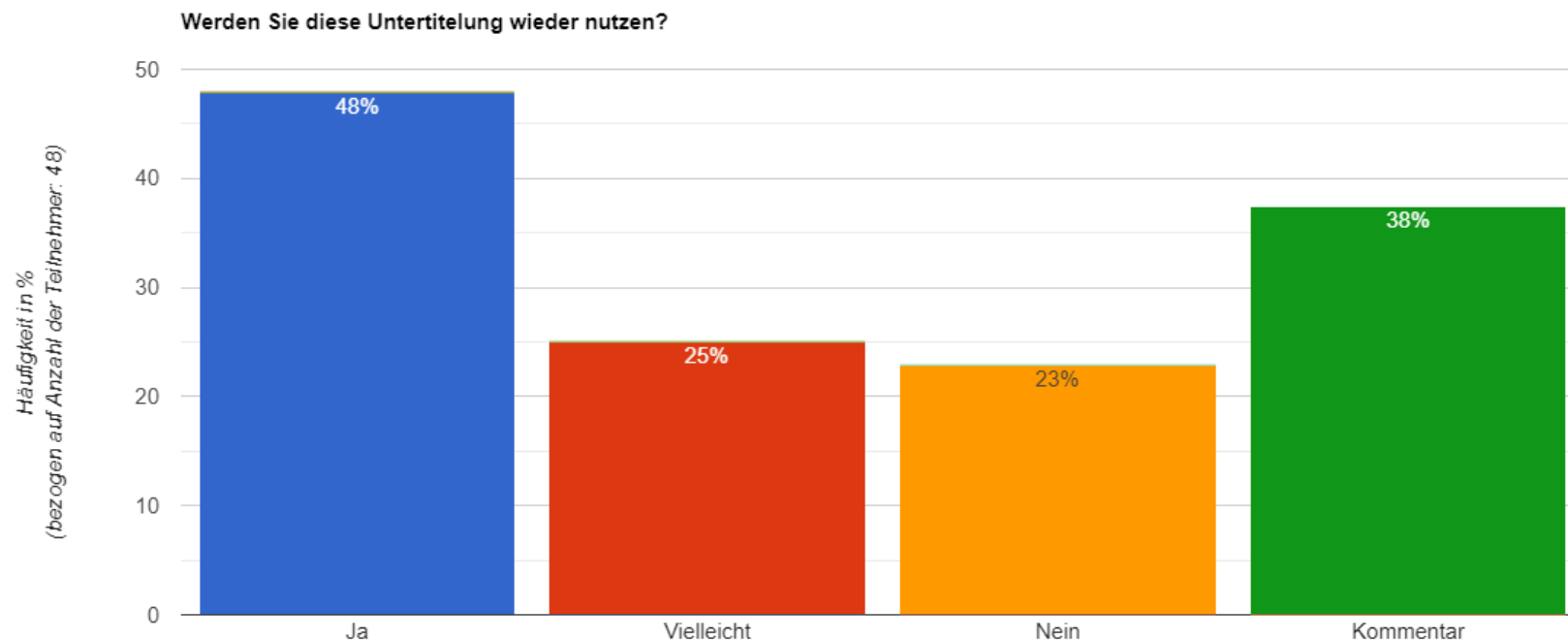
Yes, but ...



- Word recognition (Lokalzeit): not yet perfect
- Synchronisation: sometimes inaccurate
- Punctuation & sentence recognition: fluctuating quality

What do average users say?

Quantitative audience test, not focused 2021



powered by www.lamapoll.de

Around half of all respondents would use subtitles again.
(Survey on prototype in 2021)

Why did we ask average users first?

- First survey for a new product*
- Get feedback and ideas
- Trend: subtitles and captions also increasingly used outside the deaf and hard-of-hearing groups
e.g. Netflix (US): half of all viewing hours with subtitles/captions
- But: Different requirements for deaf vs foreign language speakers
 - quantitative test not enough,
 - qualitative & Group-specific test with hard-of-hearing users crucial

Research objectives and methodology

Research objectives and methodology



Objectives

Assess AI-generated subtitle perception and improvement areas in WDR Lokalzeit



Hypothesis

Quality, speed and clarity influence watch experience and perception of subtitles



Methodology

Six participants with different hearing losses took part in user tests watching WDR Lokalzeit excerpts

User Testing

⌵ Semi structured Interview

Participants were asked introduction questions described their disability (some tests were run with a interpreter)

⌵ Lab Study

The study took place at PIKLS Labor Cologne, where we could access a tv and a suitable testing room

⌵ 6 x Participants

- Different backgrounds
- 2 x 100 % deaf
- 4 x different hearing capabilities and hearing aids (e.g. cochlea implant, hearing amplifier)

Method



Participants

- Six hard-of-hearing participants with different levels of hearing loss
- German language skills, almost all sign language skills
- Different forms of hearing loss
- Demographic data secondary
 - From Cologne area

Research Process

- Users would watch different excerpts (editorial piece, interview), all ca. 3 minutes long
- Guided interview as well as spontaneous questions
 - Note taking

Analysis

- Video recording was analyzed based on qualitative content analysis
- Creating different categories

[0:18 EINSTIEG bei 0:18 im UT steht dann "heftigen Protest / Jetzt live aus Köln
0:22 Anmoderation und Film "Petition gegen CSD-Teilnahme des Kölner Erzbistums" bis
3:35](#)

1. Was hast du bisher aus der WDR Lokalzeit mitgenommen? Fasse mir den Inhalt bitte kurz zusammen.
2. Wie bewertest Du die Untertitel der WDR Lokalzeit Sendung?
 - a. Was hat dir **gut** gefallen? Was weniger?
 - b. Was war besonders **schwer** oder **unverständlich**?
3. Wie gut oder schlecht kommst du beim Lesen der Untertitel mit?
4. Wie bewertest du die **Zeichensetzung und Rechtschreibung**?
 - a. Was gefällt dir gut?
 - b. Wo siehst du ggf. noch Schwierigkeiten? Warum?

[3:35 Abmoderation CSD und Anmoderation "Flut" und Film "Drei Jahre nach der Flut: Anwohner:innen müssen selbst für Flut-Schutz sorgen" bis 8:13](#)

1. Hast du das Gefühl, dass du mit Hilfe der Untertitel den Inhalt des Beitrags erfassen kannst? Warum ja/nein?
 - a. Was hast du bisher aus der WDR Lokalzeit mitgenommen? Fasse mir den Inhalt bitte kurz zusammen.

User Testing – asking the right questions

Participants were shown different parts, e.g., editorial contributions or a studio interview

The goal was to identify the requirements subtitles must fulfill for the viewer to fully understand the content and to be able to correctly assign the various speaker roles



User Testing

Multi camera setup

User study results



User study results

Positive Findings

- Subtitles are important, good readability
- Quality better than YouTube, behind Netflix
- Test participants would watch WDR Lokalzeit this way
- Quality subtitles are always positive for hard-of-hearing viewers – no matter if AI or human made
- Overall, the participants would recommend subtitles in this quality



User study results

Challenges

- ⌕ Speed and timing issues (subtitles showing up to early or late or covering important screen sections)
- ⌕ Lack of speaker identification (especially during interviews)
- ⌕ Spelling and grammar errors
- ⌕ Different reading comprehension skills (due to hearing loss) within the test subjects - one set of subtitles for all reading levels is not enough
- ⌕ Speed and timing issues result in test participants concentrating on reading and missing video content





User study takeaways and user needs



Nice to have

- ⌕ Customize subtitle location and being able to move them on the screen
- ⌕ Possible setting / toggle for switching to simple language subtitles



Needs

- ⌕ Possible setting / toggle for controlling subtitle speed
- ⌕ Improved / correct grammar and spelling
- ⌕ Speaker color coding or other ways of differentiate



User study takeaways and user needs

Takeaway



AI subtitling works
and delivers the chance
to support other tv
formats and maybe even
live tv in the near future

Importance of testing



Continuous testing with
different
user groups is essential
in order to keep and
improve quality
and acceptance

Our learning



Accessibility testing with
disabled participants requires
extra preparation, more time
and is demanding.

Optimization and future perspectives

Next Steps at WDR

Expand playout channels to include



- Smart TVs with HbbTV
- Smartphones and Apps (HLS)

Planned



- Improvements in transcription
- Translation
- Diarisation and colour differentiation

Conclusion and discussion



Conclusion and discussion

Summary

- AI-powered subtitles show potential but require refinement
- Need: Increase quality and individual settings for different users
- Importance of user feedback



Discussion

What is your experience with AI-created subtitles?

Sources

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- www.gehoerlosen-bund.de
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