Early-stage development of the SignON Application & open Framework - Challenges & Opportunities

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SignON - Sign Language Translation Mobile Application & Open Communications Framework

SignON is an EU Horizon 2020 Research & Innovation project, that is developing

- a smartphone Application & an open Framework to facilitate translation between different European Sign, Spoken & Text languages.
- The Framework will incorporate state of the art sign language recognition & presentation, speech processing technologies & multi-modal, cross-language machine translation.
- The Framework, dedicated to the computationally heavy MT tasks & distributed on the cloud powers the Application -- a lightweight app running on a standard mobile device.
- The Application & Framework are being researched, designed & developed through a co-creation user-centric approach with the European deaf & hard of hearing communities.

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SignON Application
Framework’s Machine Translation Components

WORK PACKAGE 3

ANALYSIS

DEPENDENCIES ROLES

ENRICHED GLOSSES, Sign_A + RRG SOURCE SL

language: ISL
speaker: female
gloss: man woman book give
mood: neutral

language: English
speaker: female
transcript: the man gave the woman a book
mood: neutral
syntax: semantico: deep: give
A0: man / A1: woman / A2: book

WORK PACKAGE 4

TRANSFORMATION

InterL Representation

speaker: Dutch

FRAMENET
frame: transfer
donor: wn_10306910 (man)
recipient: wn_10204 (woman)
transferors: wn_12346 (book)

AMS (Abstract Meaning Rep.):
\( g / \text{give-01} \):
\( \text{arg0} \ (m / \text{man}) \)
\( \text{arg1} (w / \text{woman}) \)
\( \text{arg2} (b / \text{book}) \)

InterL Embedding For Sentence
[12.2 -1.5 56.76 ...]

language: Dutch
speaker: female
text: de man gaf het boek aan de vrouw
mood: neutral

WORK PACKAGE 5

SYNTHESIS

TEXT-BASED REP

LANGUAGE DEPENDENT GLOSSES

language: Dutch
speaker: female
text: de man gaf het boek aan de vrouw
mood: neutral

language: VGT
speaker: female
avatar instructions: man vrouw boek geven
mood: neutral
Early-stage development of the SignON Application & Framework

- DevOps Approach
- Users’ driven Co-Creation Cycle
- Early & many Fast Prototypes
- Iterative Evolution towards the final Service
Agile DevOps approach

• User-driven Iterative co-creation evolution of the Application until its final release at the end of the project - to ensure
  • wide uptake,
  • improved sign language detection &
  • multilingual speech processing on mobile devices for everyone

• An initial fast prototype to enable users become actively involved in the Co-Creation Cycle of its functional specification & its co-development from start of project.
Nothing about us without us

=> Co-Creation Cycle

- **Expectation management**: SignON service (at its present stage) outline its intended use for defined use-cases & benefits for users.

- **Quality assurance & verification**: Quality of the SignON service tested by the user community. Defined expectations are confirmed/discarded. QoS will re-evaluated & verified.

- **Use-cases**: Quality & functionality of SignON service considered in redefining currently addressed use-cases (if needed) & defining new ones.

- **User-requirements**: Collect evaluation metrics & statistics, reviews, & use case (re)definitions translated into user requirements drives development cycles.

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Initial Fast Prototype

- **For Signed, Spoken & Text Languages**
  - SignON Mobile App Input Functions
  - SignON Platform & Framework Services
  - SignON Mobile App Output Functions

- Users start to see, hold & feel something tangible
  - to provide realistic inputs on what they need,

- Developers appreciate the realities of the mobile app & Framework platform & cloud requirements.

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Published on Google Play Store as closed/hidden, for “Internal Testing” by Authorised Testers, that the Partners’ Users applied to join MTSummit2021, UP14, 18/08/2021, https://signon-project.eu
Cognitive Walkthrough Evaluation Methodology

• Users’ Use Case Tasks & Functions
• Scored the severity of any problems doing these
• System Usability Scale (SUS).
• User feedback suggestions

<table>
<thead>
<tr>
<th>SignON Use Case Tasks / SignON Functions.</th>
<th>Functional App</th>
<th>SL input</th>
<th>SL output</th>
<th>Speech input</th>
<th>Speech output</th>
<th>Text input</th>
<th>Text output</th>
<th>Translate Mode</th>
<th>Translate Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Install &amp; run the SignON App on your Android mobile phone.</td>
<td>X</td>
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<tr>
<td>2. Record a Video of yourself or another person Signing a message (in the Sign Language Translation screen).</td>
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<td>3. Display the Video – can you clearly see the Signing?</td>
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<td>X</td>
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<tr>
<td>4. Choose the Speaker’s Input language &amp; your output language (English, Spanish or Dutch) in Setup screen.</td>
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<td>X</td>
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<tr>
<td>5. Record an Audio of yourself or another person speaking a message (in the Speech Translation screen).</td>
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<td></td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>6. Play the Audio &amp; read its Text translated to your chosen output language (in the Speech Translation screen) – are they understandable?</td>
<td></td>
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<tr>
<td>7. Key in a Text message &amp; translate to another language as text &amp; speech. (in the Text Translation screen).</td>
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Cognitive Walkthrough Results

- Users’ overall severity score for the Walkthrough steps was “Low” & 79% (including 73% of sign language users) indicated they would recommend the App to a colleague
  - Indicating a usable first prototype & good foundation for future evolution of the App,
- Users feedback was over 70 suggestions that will now be addressed in the next iteration of the prototype
- Users’ SUS rating for the SignON Mobile App was 80 overall
  - Well above the SUS threshold of acceptability of 68,
  - Indicating the SignON App has started on the right track of what users need & want.
- From the overall process the we defined the User technical requirements of the SignON Mobile App & Framework under the following features:
  A. User’s Mobile Device
  B. System Performance
  C. User Preferences
  D. Sign Language Translation
  E. Speech & Text Translation
Challenges, Opportunities & Lessons Learned

● Challenges
  ➢ Creating a **genuinely useful SignON** Sign, Spoken & Text languages translation & communications Service.

● Opportunities
  ➢ Users’ positive feedback
    o They understand this is just the **first step**, but agree it has the **right look & feel**
    o **Text & speech translations are good** already, but **Sign Language translation functions need to be developed & be as simple**, & available soon.
  ➢ Cognitive **Walkthrough** process facilitates the **Co-Creation Cycle**.

● Lessons Learned
  ➢ Co-Creation DevOps process with a **proactive user community & fast prototype App** enables an iterative evolution towards an **excellent final Service**
  ➢ As one user commented -
    “**Keep working with end users & everything will be fine**”. "

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Thank you for your attention!