Centralized Workflow Process for Multilanguage Subtitling of Live Events

Aims of the platform

Subtitling TV programs is a very important aspect because improving the lives of deaf and hard of hearing people. Broadcasting is sensitive to deaf people and most of their programs are subtitled. Subtitling storage programs is no complicated task but in live events, such a soccer match, it's necessary to create understandable subtitles in the faster way. Broadcasting usually generates subtitles with stenotype operators or speech recognition (SR) from commentator sound. Both systems face the problem of long delay since they have to wait until the phrase is constructed. Besides, while the speech recognition can generate errors, the stenotype increases human cost due to operator needs.

The World Federation of the Deaf (WFD) estimates the deaf population in 72 millions within the 7.000 millions of people in the world. 1% of the population is deaf, and more than 80 % of these live in developing countries where authorities are rarely familiar with their needs and desires.

For instance, the final of champions league of 2013 FC Bayern München's 2-1 Wembley, victory against Borussia Dortmund was aired in more than 200 countries to an estimated global average audience of 150 million, we can estimate 1,5 million of deaf audience. More than 200 TV channel aired the match, but we can pose several questions: how many TV channel subtitled the program? How many languages were there available for each TV channel? How many languages in total? How many deaf people were able to see the match with subtitles?

In a classical production schema, if we want that all deaf people can see subtitling information, more than 200 TV channels have to subtitle their respective transmissions in several languages. For example, provided that there are 4 different languages here in Spain, TV channel that has the rights would make 4 different subtitling streams, It´s an economic problem for the channel. How many subtitling systems have to be made for our 200 channels? 400, 600 or perhaps 800?.

This work is, at heart, an economic platform that generates, in the production process, subtitles for broadcasting with short delay and low production cost.

Basic content of proposed session:

1. **Introduction**
   - Subtitling technology and recommendations
   - TV subtitling
     - Subtitling workflow
     - Storage programs
     - Live events
       - With scripts
       - Without scripts
     - Subtitle benefits
       - Deaf and hard hearing people
       - Language learning
       - Content indexing
       - Automatic highlights generation
   - Economic and technical problems in the TV subtitling for live sports broadcasting.
   - Multilanguage subtitling
   - Controlled Natural languages

2. **Proposed method**
   - Basic workflow
     - Distributed workflow
     - Centralized
   - Multilanguage Subtitle Platform (MSP) architecture
     - Components and technology
       - Subtitle generation
       - Cloud server (translation and distribution)
       - Diffusion (TV, Cable, WebTV and emerging technologies)
   - Commentator program (soccer)
     - Screen
     - Block diagram
   - Coexistence with actual subtitling system

3. **The showing**
   - 10 minutes of soccer match with a commentator program.
   - Subtitle generation in Spanish
   - Screen for viewing the soccer match with several windows for subtitles in: English, French, German, Finnish, Italian, Ketchoua and Spanish languages.
   - Web for smart TV applications for all previous languages

4. **Future Works**
   - New Architecture
   - New games
   - New languages

- Levels of subtitling
- Sentences refining

5. **Discussion**

Platform Architecture

We adopted the centralized one due the several advantages it offers against decentralized in terms of SW or phrases updates and others possibilities

The architecture is based on:
- Cloud computing.
- Pull messaging for synchronization.
- Commentator program in PC.
- Phrases in TTML (XML language).
- Web Services communication.
- Natural Controlled Language.

The architecture has three modules: commentator program, server and clients. The application for the commentator sends the phase code with other arguments to the server application though web services
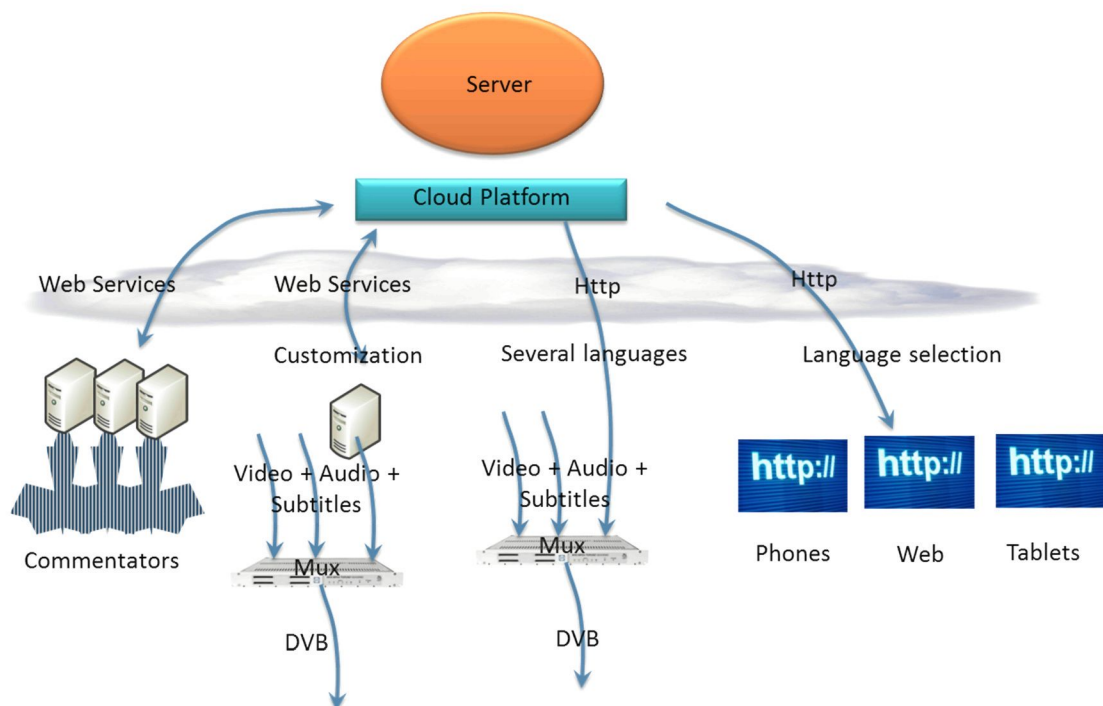

Commentator application

For a soccer match, the application has three different spaces: change scenarios, type phrase selection and team management. A soccer match has several situations and each situation has its own phrase types, which are, needless to say, different to other situations.

Scenarios   Phrases types   Team management
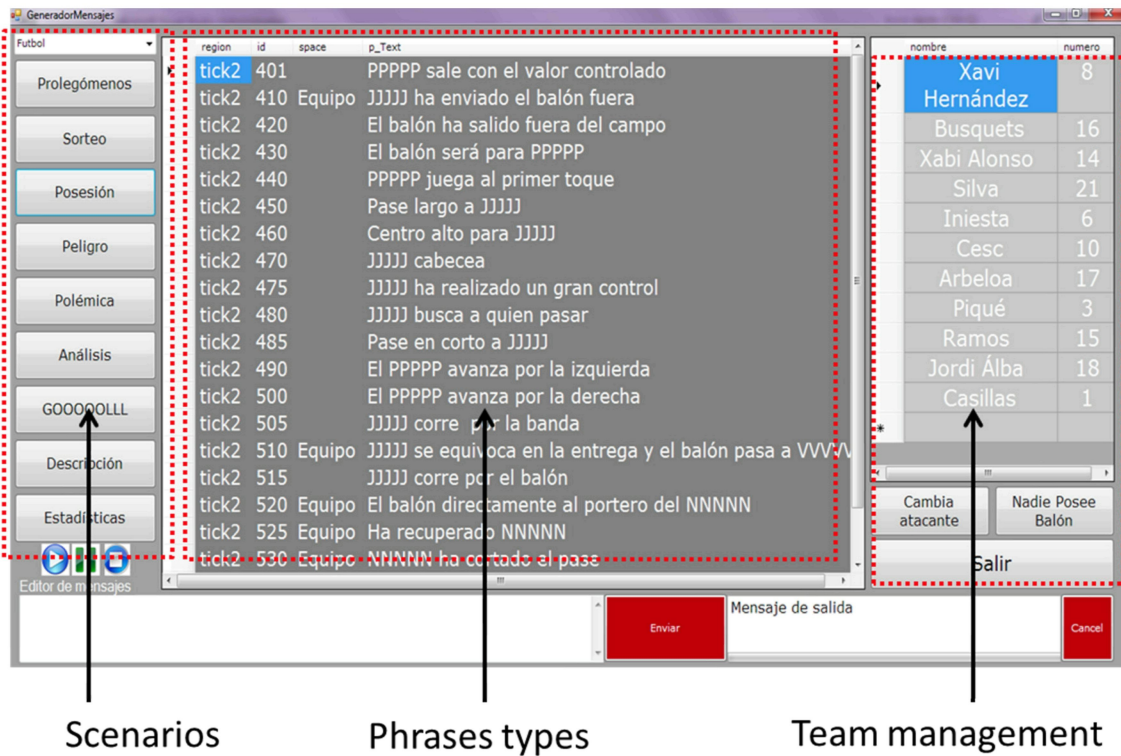
Cloud Server

After the initializing phase, the server application has to wait for the commentator messages. The messages have an identifier of the phrase type and can have cero or multiples arguments, depending on the phrase type. With the Id, the selector can only choose an unique phrase from a set of phrases; therefore the application has N sets of phrases for each language where N is the number of identifiers.
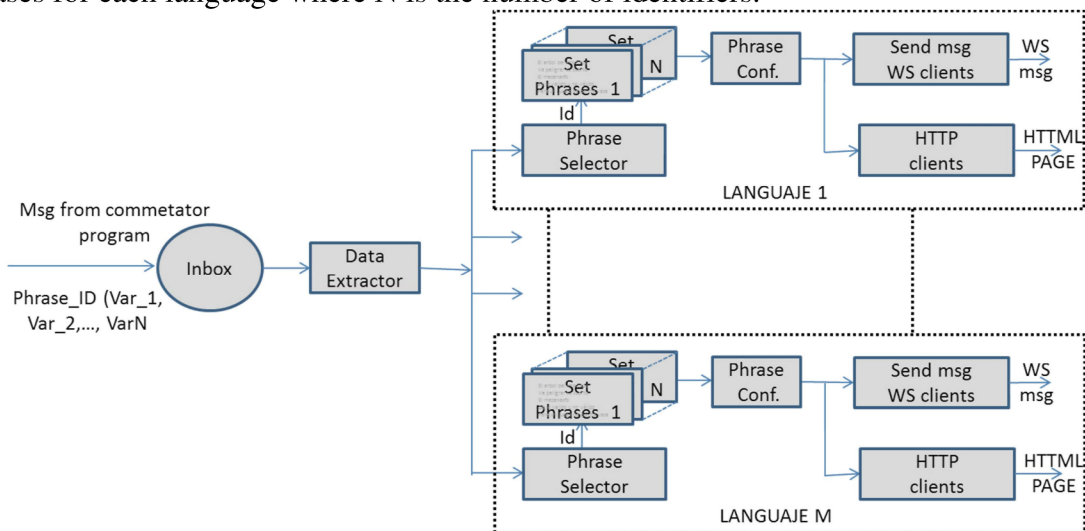
Entire System

The platform can manage several matches, not just one event or solely soccer. In fact, it is designed to manage different types of messages and it can be used for different live event types.
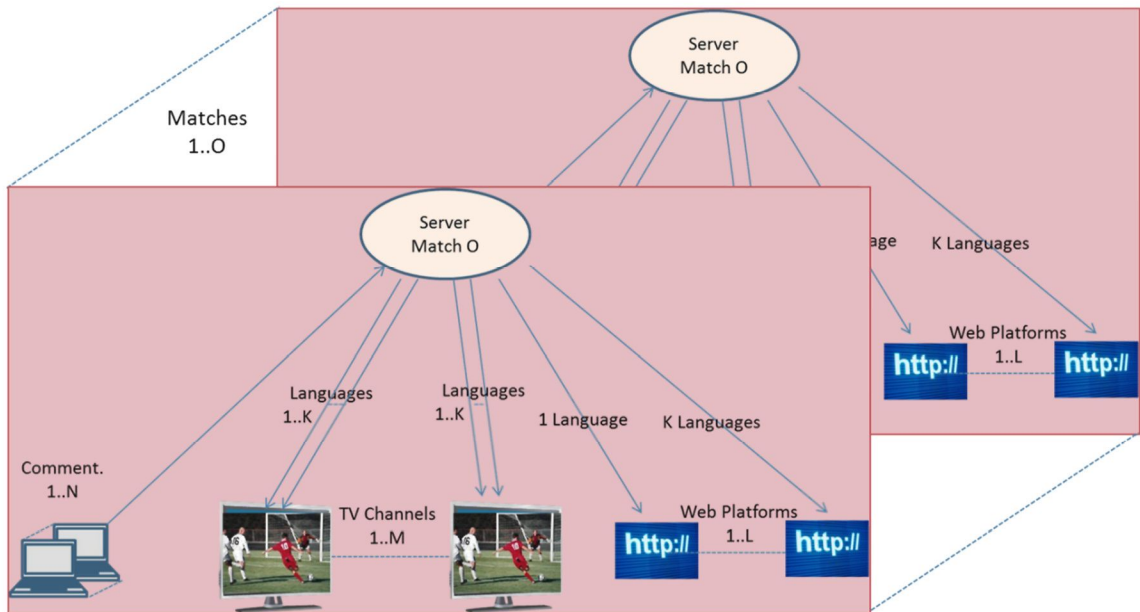
Discussion

With the architecture presented in this document it is possible to create a cheap multi language subtitling service for live sport transmission, all the TV channels and web platforms around the world can be clients of this service. Deaf and hard hearing people will be the final beneficiaries of this service.