Institution: University of Roehampton		
Unit of Assessment: 34 - Communication, Cultural and Media Studies, Library and Information Management		
Title of case study: Making film and TV accessible for all		
Period when the underpinning research was undertaken: 2008-2016		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Pablo Romero-Fresco	Reader Honorary Professor	November 2008 – 2016 2016 – present
Period when the claimed impact occurred: 2013-2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact (indicative maximum 100 words)

Pablo Romero-Fresco's research into live subtitling and accessible filmmaking practices has enhanced the audiovisual media experience of millions of people across the world. The development of his innovative live-subtitling technique and subtitling quality assessment model – the NER model – has been adopted by government regulators and broadcasters in the UK, Canada, USA, Australia and Brazil to evaluate and improve the experience of their audiences. Romero-Fresco's development of accessible filmmaking (AFM) practices builds on the NER model, by providing a new model to integrate accessibility and translation into the filmmaking process. His research has influenced the creative and production processes of award-winning filmmakers as well as the audio description guidelines and filmmaking practices at Netflix, of potential benefit to their subscribers in over 190 countries.

2. Underpinning research (indicative maximum 500 words)

Traditionally, media accessibility has focused almost exclusively on people with sensory impairments (mostly deafness and blindness), especially through academic work on subtitling for the deaf and hard of hearing and audio description for the blind. These media accessibility tools have, in general, been implemented by experts who have developed accessibility guidelines and standards in line with the principle (often supported by user associations) of *'nothing about us without us'*. Until now, media accessibility has been designed as an afterthought, once the artistic product is finished, with translators and accessibility experts having no contact with filmmakers and artistic directors. Romero-Fresco's (Reader in Translation and Filmmaking (2008-2016); Honorary Professor in Translation and Filmmaking (2016-present)) research has advanced a new, wider and integrated approach to media accessibility that benefits anybody who does not have full access to the original version of an artistic product (including people with sensory impairments, foreign users, the elderly), and adopts a user-centric research approach, integrating translation and accessibility into the production process.

Addressing the need to provide live subtitles on TV in order to meet legal requirements regarding accessibility for deaf and hard of hearing viewers, Romero-Fresco developed an innovative live subtitling technique through respeaking (**R1**). In this live subtitling process, a subtitler paraphrases the speech of a live programme to speech-recognition software in order to produce live subtitles. Developed with users' input throughout the EU-funded projects DTV4ALL and HBB4ALL, Romero-Fresco's monograph on live subtitling is the first to present a comprehensive overview of the production of subtitles through speech recognition in Europe. Romero-Fresco's research proposed the means to assess and improve the quality of live subtitles, through the creation of a user-informed, metric-based model – the NER model (**R1**, **R2**, **R3**).

Good quality live subtitles may be expected to reach a 98% accuracy rate based on this model, through an analysis of the number of words in respoken subtitles (N), edition errors (E) and recognition errors (R), correct editions (CE) and assessment (**R3**). The findings obtained with the use of the NER model have been crucial in identifying the challenges, namely accuracy and delay,

involved in live subtitling and in ascertaining the extent to which live subtitling errors are caused by the subtitlers, the software, or the features of the different TV programmes.

Concurrent to the development of better live subtitling techniques, Romero-Fresco also focused on the quality of accessible audiovisual translation practices in the filmmaking process (**R4**, **R5**). Although there was considerable research in this field during the first decade of the twenty-first century, subtitling for deaf and hard-of-hearing people, and audio description for blind and partially sighted people were still not embedded in the filmmaking process. The implementation of subtitling and dubbing is typically relegated to the distribution process. Romero-Fresco's research into accessible filmmaking (AFM) (**R4**, **R5**) – the integration of translation and accessibility into the filmmaking process through the collaboration of directors and translators – shows that this relegation has had a negative impact on the way foreign and sensory-impaired audiences consume and respond to films. Instead, his research proposes that AFM should be incorporated into every stage of production, costing only a small proportion of the total production budget, but leading to high revenue returns and, most importantly, enabling a better experience for millions of people with hearing and sight impairments.

3. References to the research (indicative maximum of six references)

R1 Romero-Fresco, P. (2011) *Subtitling Through Speech Recognition: Respeaking*, London/New York: Routledge. ISBN: 978-1-905763-28-3. Submitted to REF2014. Available on request.

R2 Romero-Fresco, P. (2012) Quality in Live Subtitling: The Reception of Respoken Subtitles in the UK in Remael, A., Orero, P., Carroll, M. (eds.) *Audiovisual Translation and Media Accessibility at the Crossroads: Media for All 3*, Amsterdam/New York: Rodopi, pp.109-131. ISBN: 978-90-420-3505-8. Available on request.

R3 Romero-Fresco, P., Pérez, J. M. (2015) Accuracy Rate in Live Subtitling: The NER Model in Baños Piñero, R., Días Cintas, J. (eds.) *Audiovisual Translation in a Global Context: Mapping an Ever-changing Landscape*, London: Palgrave Macmillan, pp.28-50. https://doi.org/10.1057/9781137552891. Available on request.

R4 Romero-Fresco, P. (2013) Accessible filmmaking: Joining the dots between audiovisual translation, accessibility and filmmaking, *The Journal of Specialised Translation,* 20, pp.201-223. https://www.jostrans.org/issue20/art_romero.pdf.

R5 Romero-Fresco, P. (2015) Long questionnaire in the UK in Romero-Fresco, P. (ed.) *The Reception of Subtitles for the Deaf and Hard of Hearing in Europe*, Bern/Berlin/Bruxelles/Frankfurt am Main/New York/Oxford/Wien: Peter Lang, pp.117-162. https://doi.org/10.3726/978-3-0351-0888-0. Available on request.

4. Details of the impact (indicative maximum 750 words)

i. The application of the NER model to improve speed and accuracy of live subtitling, benefitting audiences internationally

Since 2014, the NER model (**R1**, **R2**, **R3**) has been adopted by governmental regulators in the UK, Canada and Brazil, by VITAC, the largest captioning company in the USA, by Ai-Media, a company that develops subtitles for some of the largest broadcasters in Australia and by Red Bee Media, the largest supplier of managed media services in the market. The NER model's high-quality standard for live subtitles – where good quality live subtitles need to achieve an accuracy rate of at least 98%, which is a significant increase on previous industry-standards (in Canada, for example, the accuracy rate was 95% previously) – ensures that the audiences reached by the broadcasters that adopted the model deliver a higher quality service, explicitly benefitting deaf and hard of hearing audiences.

In 2013, Ofcom decided to undertake the first official assessment of live subtitling quality on UK TV. Ofcom determined that the NER model would be the methodology that the broadcasters involved in the exercise – BBC, ITV, Channel 4, Channel 5 and Sky – should adopt and Romero-Fresco was approached to conduct the assessment. Over the next two years, four assessments were conducted, in which UK broadcasters had to measure live-subtitling samples from their own programmes using the NER model (**IMP1**). At the start of the exercise, the accuracy rate of the

broadcasters' subtitles was judged at 98%, with the average quality of the live subtitles reaching 98.5%. Following Romero-Fresco's recommendations and further assessments using the NER model, an increase of 0.3% in accuracy was already noted in the second assessment (November 2014). By the conclusion of the fourth assessment round (November 2015), the average accuracy rate of the subtitles was 98.55%, the highest of the four exercises. In news subtitles, there was an increase from 98.49% in the first exercise to 99.02% in the fourth, with their latency reducing from an average of 5.7 seconds to 4.6 seconds (**IMP1**). These results show the efficiency of the NER model in identifying the key issues in live-subtitling processes among the largest broadcasters in the UK, consequently leading to corrections that resulted in significant improvements in accuracy, speed and overall quality of live subtitles. The NER model has since been adopted by Red Bee Media, the largest supplier of managed media services in the market and the largest subtitling company based in the UK (**IMP2**). Their Access Services team is responsible for creating over 200,000 hours of captioning, 70,000 hours of live captioning, 2,500 hours of translation and subtitling and 6,000 hours of audio description annually.

At the end of 2013, the NER model was adopted by Ai-Media, the company that provides captioning for television broadcasters such as Nine Network Australia, Foxtel, FoxSports and the Australian News Channel. At the same time, Ai-Media announced the appointment of an independent auditor to develop several assessments of their caption quality. Between 2014 and 2017, five assessment exercises using the NER model were conducted, always scoring higher than 99% (**IMP3**). The high-quality standard imposed by the NER model ensures that Ai-Media provides the best possible live subtitling service in Australia, directly benefiting their clients' audience. This includes the audience of Nine Network Australia, the highest-rating television network in the country in 2019. Ai-Media's effort to provide a high-quality live subtitling service was recognised in 2014 at the Deafness Forum of Australia's Captioning Awards, with Foxtel and Nine Network Australia taking awards (**IMP3**).

In 2015, the Canadian Radio-television and Telecommunications Commission (CRTC) started the review process of the English-language closed captioning quality standard related to the accuracy rate for live programming. At that point, the quality standard required English-language broadcasters to reach a captioning accuracy rate of at least 95%. The working group responsible for leading the review process proposed the development of a modified version of the NER model to evaluate the accuracy of the subtitles. It also proposed that all broadcasters commit to a two-year trial of the NER model (**IMP4**). By imposing a minimum rate of 98%, the adoption of the NER model ensures that the caption quality of the English-language broadcasters in Canada is held to a higher standard and will consequently benefit the 15,500,000 Canadians who watch live subtitles on TV (**IMP5**).

To ensure the certification of all persons asked to perform the NER evaluation exercise, Romero-Fresco developed a certification programme – the KMI/LIRICS certification – which was accepted by the Canadian NER Advisory Council (**IMP6**). Ten candidates have since been certified and are currently involved in the two-year trial that started in 2019. This certification programme has also been adopted in the UK. Until now, one of the reasons why deaf and foreign students were not provided with live subtitles as a means to access school or university classes was that the UK government's Disabled Students' Allowances were not available for respeakers, as live subtitling was not recognised as an official profession. The Department for Education has now assessed LIRICS and decided to recognise respeaking as a valid profession that can be covered by Disabled Students' Allowances to grant access to classes for deaf students (**IMP5**).

Following his work in Canada, Romero-Fresco and his team were invited to train the staff at VITAC (the largest captioning company in the USA), and Gallaudet University (the leading research institution in the USA in this area), in the use of the NER model. VITAC's subtitles are now partially assessed through the NER model, directly benefiting the 50 million viewers who watch the 600,000 hours of TV programmes live captioned by VITAC every year (**IMP5**). In collaboration with Gallaudet University, Romero-Fresco has also provided consultancy services for the US governmental regulator, the Federal Communications Commission, to introduce the NER model in national legislation on accessibility. In Brazil, the Associação Brasileira de Normas Técnicas

NBR 15290 standard published in 2016, which stipulates the standards for subtitling and audio description in the country, has adopted the NER model to assess accuracy (**IMP7**). According to the scope of the standard, the aim of these alterations is to *'enable the largest possible number of people, regardless of age, limitation of perception or cognition, access to television programming'*. The adoption of the NER model ensures higher-quality subtitles that directly benefit all those accessing subtitles in Brazil.

ii. Innovation in filmmaking to support accessibility

Led by the same principle of high-quality accessibility practices behind the NER model, Romero-Fresco's AFM (**R4**, **R5**) has also contributed to enhance the experience of media consumers across the world. AFM was implemented in the film *Notes on Blindness* (*NoB*), produced by Archer's Mark, which follows the story of John Hull and his quest to understand blindness after losing his sight. In an attempt to make *NoB* the most accessible film ever released, the filmmakers teamed up with experts, including Romero-Fresco. They embedded Romero-Fresco's AFM (**R4**, **R5**) into the film, developing audio-description versions which use spoken description to convey what is happening outside of the dialogue. The directors noted the importance of the implementation of AFM, stating that *'Integrating translation and accessibility into the schedule, as envisaged within the Accessible Filmmaking model, allows these versions to become an extension of the wider creative approach of the film'* (**IMP8**). The success of the application of AFM in *NoB* led to Archer's Mark subsequently integrating the AFM model into all of its films. Since its premiere in 2016, the film has played at over 40 international festivals, winning the Best Documentary at the British Independent Film Awards and being nominated for 3 BAFTAs (including Best Documentary and Outstanding British Film).

In collaboration with Archer's Mark and the Doc Society, Romero-Fresco adapted his research (**R4**, **R5**) in the writing of ***The Accessible Filmmaking Guide*** (**IMP8**), a document that focuses on explaining AFM practices and benefits to professionals within the film industry who wish to become accessible filmmakers. On the value of this guide, Jon Garaño and Aitor Arregui, directors of *Handia* (2017), winner of 10 Goya awards, noted that *'Improving the experience of our foreign viewers has always been a priority for us. The best way to do this is to listen to those who know most about it, which includes both professionals and researchers. This is why adopting a collaborative approach to translation, such as the model proposed by Accessible Filmmaking, is so important for all our films'* (**IMP8**). The guide has recently been adapted into a web format (https://accessiblefilmmaking.wordpress.com/) which is being used by 74 companies, public institutions and filmmakers across the world (**IMP9**).

AFM, its implementation in *NoB* and the 2018 guide, have been recognised in the Doc Society's ***Impact Field Guide & Toolkit*** as the key example of filmmaking as emancipatory practice (https://impactguide.org). This document has been used by over 55,000 filmmakers and has been translated into Spanish, Arabic and Portuguese. The document emphasises *NoB*'s dedication to being accessible to all audiences, and in particular those who are living with sight loss and those who are hard-of-hearing. The relevance of Romero-Fresco's ***Accessible Filmmaking Guide*** is also emphasised in the ***Impact Field Guide***, as the key manual supporting filmmakers to embed greater accessibility into their films, consequently reaching *'new audiences for films, and new agents of impact'*. *NoB* was subsequently acquired by Netflix, which has been investing in development of the accessibility features of their content, including pioneering the use of Romero-Fresco's ***Accessible Filmmaking Guide*** and leading the industry in the implementation of accessibility practices. In 2019, Romero-Fresco was asked to revise the company's audio description guidelines. Building on his body of research, Netflix's audio-description guidelines now incorporate an innovative engagement-based approach, which is centred on the users' abilities instead of their impairments, something initially explored in the research that Romero-Fresco conducted while at Roehampton (**R4**, **R5**). This new approach delivers a multi-sensorial experience, echoing social rather than medical models of disability, and resulting in an artistic and collaborative process, more concerned with the viewer's experience than previously (**IMP10**). These new guidelines also encourage a closer collaboration with filmmakers, so that principles of accessible filmmaking can be implemented throughout the project, instead of only being covered at the distribution stage (**R4**, **R5**).

In 2019, Romero-Fresco raised awareness of AFM among key Netflix teams working on localisation and accessibility through dedicated training. He was invited by Netflix to provide training to highlight how their access services could be enhanced both for their foreign audiences who use subtitles to view foreign language content, in addition to those with visual or hearing impairments. Building on his research (**R2**, **R4**, **R5**), Romero-Fresco explained how films are viewed, processed with subtitles and the best practices to ensure that the filmmaker's vision is maintained across subtitled versions (**IMP10**). According to Netflix's supervisor in Creative Dubbing, *'This training session provided an important opportunity for these teams to more fully understand the importance of implementing accessible filmmaking principles at the start of the project, ensuring that every person is able to enjoy the same visual entertainment product, regardless of their ability or capacity to understand the language'*. Following the delivery of these training sessions, Netflix decided to invest in the implementation of AFM principles from the first stages of content conception (**R4**, **R5**). The revision process of the audio description guidelines was finished in October 2019 and they are now being used as the baseline across all of Netflix's productions, including Fernando Meirelles' *Two Popes* and Martin Scorsese's *The Irishman*, two of the most acclaimed productions of 2019 (**IMP10**). The implementation of the AFM principles in Netflix's own productions has enhanced their accessibility offer to over 193 million subscribers in 190 countries, and particularly their 115 million subscribers in non-English-speaking countries (**IMP5**). This benefit will be extended as new productions are released. Commenting on the impact of Romero-Fresco's research on Netflix's accessibility practices, the company's supervisor in Creative Dubbing stated that the company '*strive[s] to incorporate the most recent accessibility practices in order to enhance the experience of our members of all abilities. The implementation of Professor Romero-Fresco's research, his collaboration and the support he provided in sharing the key aspects of accessible filmmaking are invaluable to achieve this goal'* (**IMP10**).

5. Sources to corroborate the impact (indicative maximum of 10 references)

IMP1 Document composed of Ofcom's ***Measuring the quality of live subtitling*** report (16 October 2013), and the four reports concerning each of the sampling exercises (30 April 2014 – 27 November 2015).

IMP2 Red Bee Media's Interactive Guide. 2019. Page 48 shows the NER model being used to assess the quality of their service.

IMP3 Document composed of Ai-Media's press releases, concerning the launch of the audit (13 May 2013), and the five external captioning quality scores (09 May 2013 – 22 December 2017).

IMP4 Document composed of the Canadian Radio-television and Telecommunications Commission's Broadcasting Notice of Consultation CRTC 2015-325 and Broadcasting Regulatory Policy CRTC 2016-435, which explain the context of the adoption of the NER model in Canada (22 July 2015 – 02 November 2016).

IMP5 Final report of the Interlingual Live Subtitling for Access project. 2020.

IMP6 Letter from the chair of the NER Advisory Council, accepting the KMI/LIRICS certification proposal. Dated 29 October 2019.

IMP7 Associação Brasileira de Normas Técnicas NBR 15290 standard. Information about the adoption of the NER model is disclosed in A.2. 19 December 2016.

IMP8 ***The Accessible Filmmaking Guide***, written by Romero-Fresco and published by Archer's Mark in collaboration with the Doc Society. 2018.

IMP9 Pablo Romero-Fresco's report on the impact of his work entitled ***Ayudas Ramón Y Cajal: informe seguimiento científico-técnico 4ª anualidad***. 2020. Information about the use of Accessible Filmmaking guide is available on page 3.

IMP10 Testimonial from Netflix's supervisor in Creative Dubbing. Dated 02 October 2020.