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Collaborative translation of emergency messages (Co-TEM): An Australian case study

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ABSTRACT

Emergency messaging in highly multicultural societies can be problematic when the language of communication is restricted to the official language. The ‘ideal solution’—professional translation—is high-priced, mainly because of issues associated with ongoing cost burden, administrative/legal implications, and the challenge of finding available translators for every unique language pair. Citizen translation can potentially help to break down the communication barriers between emergency authorities and people from culturally and linguistically diverse (CALD) background. However, emergency authorities in many countries are still sceptical about relying on non-professional citizen translators to engender emergency messaging in multiple languages. This paper presents new findings from an Australian case study to further establish the evidence base required to support a successful implementation of citizen translation. This qualitative research contributes by investigating how members of CALD communities respond to the messages or warnings issued by emergency authorities, including the implications that the observed responses have for implementing citizen translation of emergency messages. A distinct form of citizen translation, known as the Collaborative Translation of Emergency Messages (Co-TEM), is proposed along with its underlying principles for specifically delivering the translation of official warnings or emergency messages. The study reports on key findings from Co-TEM that could further strengthen or extend existing knowledge in citizen translation. It was observed that while citizen translators could successfully translate emergency messages, a major threat to Co-TEM is that the official messages to be translated are sometimes flawed with jargons, ambiguity and lack of clarity. Recommendations are made to address this issue.

1. Introduction

Disaster risk reduction depends a great deal on the effective communication of risk information in a manner that is both timely and understandable to the target communities [1]. However, effective crisis communication is far more difficult today because our world is now more globalised and characterised by higher levels of multiculturalism, with millions of migrants resettling in areas outside their culture zones—places where the dominant language and attitudes towards disaster risk may be different [1]. As people move across international borders to resettle elsewhere, there are approximately 5000 languages potentially being moved in and out of the departure and destination countries [2]. Consequently, many developed countries such as Australia, the USA, Canada, etc. are experiencing an increase in cultural and linguistic diversity at a time when natural hazards are also occurring in increasing frequency and intensity [3].

Language and cultural differences can pose significant barriers to communication between emergency authorities and multicultural communities [1,4]. Multicultural communities often comprise indigenous populations, recent migrants, and other visitors who cannot clearly understand emergency warnings in the official language [5]. In fact, the official language is often the second or third language for many crisis-affected communities [5]. According to O’Brien [6], crisis communication can fail very quickly and result in negative consequences, when the messaging is in the second or third language for those affected. For example, after Hurricane Andrew, several Latinos and Haitians could not access food, medical supplies, and emergency assistance because much of the early relief information was provided only in English [1,4]. Similarly, after the Great Hanshin-Awaji Earthquake hit Japan in January 1995, many migrants and visitors suffered disproportionately in accessing emergency support because they could not understand the emergency information in Japanese language [7]. To avoid a similar communication barrier in the 2017 Grenfell Tower fire in West London, there was need to translate emergency information into 18

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languages [5].

It is truly encouraging to see several studies [5–7] emphasise the need to provide emergency information in multiple languages. According to Bean et al. [8], emergency managers can no longer afford to rely on a one-message-fits-all strategy, when there are great opportunities to explore technology and human efforts in making emergency messages available in multiple languages. In recognition of the tens of thousands of non-English speaking Americans (e.g., Hispanics) who have lacked equal access to the information and warnings that others were receiving during recent hurricanes, the Federal Communication Commission (FCC) has also openly acknowledged the need to disseminate emergency information in multiple languages [9,10]. The FCC added that all Americans, including those whose primary language is not English, deserve the same protections from disaster risks [9,10]. Apparently, it is also a fundamental human right to be provided access to crisis information in the language, formats, and channels that are most appropriate for the individual at risk [5].

Despite the acknowledgement of the need for emergency messaging in multiple languages, there are serious concerns that adequate actions are still lacking both in research and practice. For example, Lindell and Perry [11] expressed concerns over the neglect of the challenges involved in communicating disaster risks to culturally and linguistically diverse (CALD) communities. Spence et al. [12] noted that CALD communities are amongst those often hit the hardest during a crisis, yet little or no attention is paid to their emergency information needs. O’Brien [13] noted that while the crisis communication literature is gaining increased recognition of the importance of language translation and cross-cultural communication, there is still a lack of in-depth studies focusing on the translation experience and the associated implications for crisis communication. In another study, the authors described the translation of emergency information as an underexplored or neglected research topic [14]. They analysed the disaster response approaches for five countries, namely New Zealand, Ireland, the UK, Japan and the USA, and found different levels of inadequacies in the use of language translation [14]. In a more recent article, the need for increased attention to the translation of emergency information was again highlighted, with a recommendation that this be included in emergency planning and preparation [5].

However, it must be noted that multilingual emergency messaging can be a complicated and unsustainable initiative when relying solely on professional translators [7]. Professional translation requires disaster management agencies to have a decent budget. The agencies also face issues with the availability of professional translators in the right language combinations, not to mention the fact that these professional translators may also be impacted by the crisis [5]. To address these issues, the concept of citizen translation has emerged as a burgeoning phenomenon that holds huge potential for engendering multilingual messaging in CALD communities. Rather than rely solely on paid professional translators, citizen translation allows for bilingual individuals to support their communities by translating emergency messages on a voluntary or pro bono basis [15]. Evidence from previous disasters (e.g., the 2011 Great East Japan Earthquake, the 2010 Haiti Earthquake, etc.) has shown that volunteering citizens are already playing a significant role in translating emergency information [16]. To fully harness the immense potentials of citizen translation, it is important to investigate how bilingual members of CALD communities perceive official emergency messages, and how the broader CALD community understand and respond to the translated messages as compared to the official ones. In this study, we aim to address the following research questions:

1. How do members of CALD communities respond to the emergency messages issued by disaster management agencies, and what implications do the observed responses have for the translation of emergency messages?

2. What are some key findings from collaborative translation of emergency messages (Co-TEM) that could further strengthen or extend existing knowledge in citizen translation?

In this study, translation is conceptualised as the rendering of the meaning expressed in one language into another language, including through the spoken and written formats [14]. The following section will discuss the meaning of Co-TEM, including its underlying principles and a justification for its use in the translation of emergency messages.

1.1. What is Co-TEM?

We define collaborative translation of emergency messages (Co-TEM) as the mutual engagement of two or more bilingual individuals in a coordinated effort to work collaboratively in translating an emergency message from a source language to a target language [17]. Unlike professional translators who may not have the trust and knowledge of the target community, Co-TEM relies on community translators, who have the local knowledge and established networks of trusted relationships to help improve community participation and connection to translated resources [18]. The translated message in Co-TEM is expected to be represented in both written and spoken forms, and delivered using multiple, appropriate channels such as social media, local community radio, short messaging service (SMS), multimedia messaging service (MMS), etc. [6,19]. Another key requirement of Co-TEM is to ensure that the original information and intent in the source text is clearly conveyed in translated text/voice, using culturally appropriate language [15]. Depending on the mode of interaction, Co-TEM can take two forms, namely face-to-face Co-TEM and computer-mediated Co-TEM [20]. In face-to-face Co-TEM, the community translators come together in the same shared collaborative physical space to translate the emergency message. The translation therefore occurs synchronously. Whereas, in computer-mediated Co-TEM, the shared collaborative space is spatially distributed, and the translation occurs asynchronously using computer communication networks [21]. In the present study, the focus is on face-to-face Co-TEM.

Co-TEM builds on the concept of citizen translation, which is sometimes described using other terms such as community translation, collaborative translation, translation crowdsourcing, crowdsourced translation, and user-generated translation [18,22,23]. Scholars in translation studies would argue that these terms do not necessarily mean one and the same thing, and understandably so because of the different contexts in which the terms have been used in the literature. According to Cordingley and Manning [81], concepts and definitions that are associated with collaborative translation have blurred boundaries. The term, community translation has been described by Taibi and Ozolins [75] as encompassing all translating work carried out to facilitate inter-community relations and participation within a given country where CALD communities cohabit. In other words, this definition views community translation as translation done for the purpose of community empowerment, preferably by qualified professional translators. Whereas, in the present study, community translation is conceptualised as translation done by community members, irrespective of whether they are professionally qualified to translate or not [22]. “Citizen Translation is defined as translation practice conducted, sometimes voluntarily, sometimes by people who are volunteered, by an individual, or a community of individuals who may be trained or untrained linguists. The translational activity is conducted with the assumption of achieving a common good and may be paid or unpaid. The term Citizen Translator, in turn, refers to a person who participates in Citizen Translation” [15, p.4]. Again, going by this definition, one may argue that translation crowdsourcing is not the same as citizen translation because crowdsourcing is not necessarily done for ‘achieving common good’. We note, though, that in the context of this study that focuses on supporting communities in disasters, crowdsourcing of translation is done with the motive of achieving a common good for CALD...
communities [82]. As Cronin [77,78] points out, language is a shared resource and emergency communication in clear language, be that through crowdsourcing translation, can help keep communities informed to take appropriate actions that would otherwise have had direct or indirect impact on common goods such as air (e.g., poor air quality from avoidable bushfires), land (e.g., land pollution from loosely secured rubbish bins that are blown over during wind storms), and water (e.g., utilising limited water supply for fighting avoidable fire). Another argument could be that collaborative translation differs from citizen translation because, by definition, collaboration is not done by an individual. Co-TEM is a distinct form of citizen translation because it always adopts a collaborative approach anchored on several underlying principles to specifically deliver the translation of *officially issued warnings or emergency messages*. These Co-TEM principles, described below, include community-mindedness, adjuntivity, ownership, functional equivalence, personalisation, and validation.

1.1.1. The underlying principles of Co-TEM

Community-mindedness: Community-mindedness is a unifying quality that transcends personal selfish gratifications and allows individuals to take interest in aiding one another and helping the wider community [3, 24]. Co-TEM thrives on the principle of community-mindedness, wherein citizens can volunteer their bilingual skills to support vulnerable members of their communities who are at risk of disasters. Previous studies suggest that vulnerability can be minimised if the multilingual skills within CALD communities are harnessed to facilitate communication and interpretation of emergency messages for those who cannot comprehend the messages in the dominant language [3,25]. In describing the important role that volunteering citizens play in disasters and emergencies, Whittaker et al. [26, p. 359] stated that “individuals and groups have generally been found to become more cohesive than in ‘normal’ times, commonly working together to overcome disaster-induced challenges”. Ultimately, when people, particularly those with strong bonding social capital [73], are together confronted with the same threat, there is a sense of “we-ness” that allows individuals to temporarily put aside self-interest in pursuit of the common good of the community [3].

Adjuntivity: The principle of adjuntivity states that the translated emergency message should be treated as an adjunct to the corresponding official message from authority, not as a replacement to it. Members of CALD communities should still receive the official emergency message [in the dominant language] just like other members of the broader community. The output from Co-TEM is therefore an extra measure to ensure people from CALD background, who cannot understand the official emergency message, have an alternative option to access an understandable version of the emergency information. Co-TEM does not excuse responsible authorities from disseminating timely emergency information to CALD communities. It is a community-led auxiliary mechanism to make sense of the official emergency message in other CALD languages.

Ownership: As Federici et al. [19] rightly noted, ownership is an issue that tends to discourage disaster management agencies from implementing professional translation of emergency messages. Ownership raises questions of who will be responsible? Who will own the generated data? who will own and manage the system (in the case of computer-mediated Co-TEM)? In Co-TEM, ownership belongs to the community. Co-TEM is essentially a community-led initiative to promote disaster resilience and better support vulnerable minority groups; the responsibility and control belong to the community. The role of disaster management agencies is to work constructively with the community leaders and members to ensure proper coordination and access to adequate support from the government. Disaster management agencies can support in several ways. One of such ways is to provide real-time access to the emergency messages that require translation, including through Application Programming Interface (API) access to data. In terms of finance, disaster management agencies can support CALD communities to access government grants as needed to fund Co-TEM. Moreover, the data generated from Co-TEM could be useful to disaster management agencies for better understanding the needs and strengths of CALD communities, thereby enabling tailored planning and delivery of emergency services to these communities. To access these data from the Co-TEM system, disaster management agencies can opt to pay monthly subscription fees, thereby supporting the ongoing maintenance and sustainability of the system. The subscription fees can be used to cover the cost of IT infrastructure and other related services, particularly when all the required capacity is not freely available within the CALD communities. This is a win-win situation for the participating disaster management agencies and the CALD communities.

Functional equivalence: According to Nida [27], the validity of a translation should be determined by the extent to which the translated text adequately fulfils the function conveyed in the corresponding source text. We refer to this as functional equivalence. In other words, a translated text has high functional equivalence if it adequately delivers the intended effects or purpose of the corresponding source text from which it was translated. For example, if the purpose of the original message [in the source language] is to make people evacuate a flood risk area, then the translated text would have achieved high functional equivalence if it is clear and convincing enough for the recipients to take appropriate actions to evacuate the area. Co-TEM advocates for crowdsourced translations that deliver high functional equivalence. The crowdsourcing approach can rely on open-source crowdsourcing solutions such as the Kató translation platform [6]. A high functional equivalence can be attained by using a translation quality moderation system, including the meta-moderation technique for crowdsourced disaster management and other urban participatory applications [74]. In Co-TEM, a translated message with high functional equivalence is satisfactory, even if it contains minor grammatical errors arising from the use of non-professional translators. Grammatical errors that do not compromise the clarity and functional equivalence of translated messages are acceptable when relying on non-professional translators in emergency situations [19]. After all, as the results of this study will show, an emergency message drafted by professionals can be grammatically correct, but still lack the clarity required to solicit appropriate actions from communities. In other words, that which is formally written may not necessarily be understandable or actionable by members of CALD communities. A functionally equivalent translation is what is required.

Personalisation: In Co-TEM, translations can be personalised to the unique language needs of the CALD communities that the messages serve. Unlike professional translation, where formality and grammatical accuracy is normally compulsory, Co-TEM promotes the personalisation of translations by allowing for regional slangs, abbreviations, mixed dialects, colloquial expressions, and emoticons that are widely accepted and well understood in the target communities. It is not unusual for places to become more popularly known by their informal names (e.g., abbreviations or nick names) as compared to their official names. Professional translators, who are unlikely to be geographically situated in the CALD communities, may not use these unofficial place names in their ‘formal’ translations, potentially undermining the ability of local community members to quickly identify the places that are referenced in the translated message. Slangs are known to have cultural and social meanings, which can signify identity with the target communities when used in personalising translated emergency messages [28]. These language features for personalisation are acceptable in Co-TEM, provided that the clarity and functional equivalence of the translated message are not weakened.

Validation: Co-TEM implementation must incorporate mechanisms to ensure high quality translations, including through age and minimum language proficiency requirements, cultural awareness, community-led evaluations, peer review by other citizen translators, and moderation by professional translators [15]. Co-TEM does not advocate for the replacement of professional translators with volunteer or citizen translators, but rather recommends that these two categories of translators
work together constructively to deliver resilient communities. One way for this to happen is to provide a role for professional translators to assist in scrutinising and validating the translated messages before dissemination to members of CALD communities. Recipients of Co-TEM translated messages should also be involved in validating the relevance, appropriateness and usefulness of the messages.

1.1.2. Justification for Co-TEM

There is a shared understanding within disaster management agencies that emergency messaging in multiple languages is a complex and unsustainable endeavour, mainly because of budget constraints to maintain the payment of professional translators, inadequate capacity, shortage of trained staff, political resistance, cultural factors, and the issue of ownership within organisations [19]. However, O’Mathúna et al. [29] argued from an ethical viewpoint, that rather than doing nothing about the emergency information needs of CALD communities, non-professional translators should be engaged and supported through virtue ethics and training to provide reliable translation, when the ideal solution (professional translators) is not available. Co-TEM acknowledges that the services of professional translators may not always be available or financially accessible when needed. O’Brien [6] reminds us of how local professional translators in Florida, USA could not be relied on because they were also impacted by Hurricane Irma that hit on September 11, 2017. In another study, the authors [18] argued that in crisis or disaster situations, where urgent decisions about translation are to be made without adequate access to the required resources, it is ethically justified to rely on timely and accurate translations from volunteering citizens, who may not necessarily have the same formal training as professional translators. Federici et al. [19] added that the issue of translation quality needs to be balanced against the ethical responsibility and humanitarian goal of keeping communities informed of impending disaster risks, so that members of the communities can take appropriate and timely actions to safeguard their lives and property. In other words, a solution such as Co-TEM that employs the principle of validation to provide timely and accurate translation, howbeit with occasional lack of professional quality, is far better than providing no translation at all [19]. Moreover, research findings have shown that over the last few years, participants in the translation industry have been moving away from the traditional approach of relying on individual professional translators to a more dynamic and collaborative model [76].

1.2. Related work

The present research sits within and derives its study design from the broader literature on emergency messaging, including in relation to warning mechanisms, message characteristics, and public response to warnings, particularly within CALD communities [8,30–44]. There are more related studies, though, focused on the technical solutions for the translation of emergency information. For example, Hasegawa et al. [7] introduced a multilingual disaster information system (MLDI) that is proposed to translate information relating to disasters such as earthquakes, volcanic activity, and flooding. The system relies on web-based templates, where users can fill in the blanks in a specific language and obtain the pre-translated equivalence in another language of interest. The system, which can support up to 8 different languages, is able to deliver quick translations with high level accuracy. However, the downside is that the solution is not robust for a broad range of scenarios considering that the content must be pre-translated and stored on a database for retrieval when required. Machine translation (MT) seems to be a more popular technical solution [45–47]. CoSMOS is just one example of existing MT solutions, and was proposed by Ikeda et al. [48] to serve the function of an intercultural collaboration support system. Hu et al. [49] proposed an iterative looping protocol that combines machine translation (MT), post-editing by monolingual speakers, and back translation. Back translation, here, refers to the process of re-translating a previously translated text into the original source language [48]. The iterative looping protocol is a promising technique but would require more robust mechanisms of checking for the potential introduction of errors by humans or machine. Machine translation has also been combined with crowdsourced translation [50]. The approach was found to be helpful in translating to Japanese as required to support crisis mapping after the tsunami in Japan [50].

Big tech companies are playing their parts in delivering technical solutions for the translation of emergency information. Microsoft Research and Google Research have been involved in building Statistical Machine Translation (SMT) Systems, including in response to the Haiti earthquake [50]. There also seems to be a strong link between collaborative translation and social networking on Facebook. O’Hagan [22] discussed Community Translation on a Social Network—a Facebook’s translation application patented in 2009. According to O’Hagan [22], the application design can allow Facebook users to translate contents, which are then voted on by other Facebook users. The system learns from the generated data and can recognise high quality contributors over time. A key strength of conducting translation on a social network is that the platform provides a social space to discuss and engage around the subject of the translation [22]. More recently, McDonough Dolmaya and Sánchez Ramos [51] used the term, online social translation to describe the inherent collaborative and social nature of translations, which are conducted on internet-based applications that rely on Web 2.0 technologies.

Another set of studies have focused on developing foundational knowledge to foster human translations of emergency information. For example, Federici et al. [19] discussed the 4-A standards of language access in relation to translation and interpretation. These 4-A standards are availability (ensuring that two-way translated information is made available), accessibility (ensuring that the translated information is freely accessible on multiple platforms, languages, and modes), acceptability (ensuring that there are provisions for checking the accuracy and appropriateness of translated information) and adaptability (ensuring that translation is adaptable to different settings, including flexibility in the use of language and technology [19]. Federici and Cadwell [15] discussed the design, delivery and evaluation of training materials developed to support recruited citizen translators working in the humanitarian sector. The citizen translators were mainly bilingual members from CALD communities in Wellington, New Zealand. The authors reported that the training materials were found to be useful for teaching the fundamentals of translation to citizen translators involved in a project run by the New Zealand Red Cross (NZRC) in collaboration with the Network on Crisis Translation (INTERACT) [15]. O’Brien and Cadwell [23] investigated whether the translation of health-related crisis information from the official language (English) to the people’s first language (Kiswahili) helped to improve comprehension for rural and urban Kenyans. The study found that the translated text in Kiswahili was more suitable than the official English version, suggesting a need for translation [23].
companies, translators and commercial users. There is also Yeeyan.com, but this platform mainly allows volunteers to translate blogs and other web contents from English to Chinese, not necessarily for a crisis need [49]. The Standby Task Force was established in 2010 as a humanitarian link between the digital world and disaster response. This establishment has hundreds of members that are involved in translating crisis information [50].

Mission 4636 is an initiative by Josh Nesbit of FrontLineSMS to establish a text-message based emergency reporting system through a free ‘4636’ phone number, giving a voice to crisis-affected populations [50,53,54]. The initiative was in response to the information needs of Haitians impacted by the 7.0 magnitude earthquake that struck on January 12, 2010 [50,53,54]. CrowdFlower (a San Francisco-based technology company, now Figure-Eight) contributed to the success of the project, including through the processing of the SMS messages and the translations to generate situational maps [54]. In the first six weeks of the disaster, collaborative translation was used to translate more than 40,000 messages from Haitian Kreyol to English so that the primary emergency responders and the US Military could better respond and provide support [53,54]. More than 1000 volunteers were involved and the average turnaround time to translate a message was less than 10 min [50,53]. It was evident from the 4636 initiative that local knowledge of places, regional slang, abbreviations and spelling variants are very important and should be accommodated when translating crisis information for communities [53,54].

1.3. Research contributions

The translation and dissemination of emergency warnings/messages is typically considered a responsibility of the state emergency authorities to the target community. While the option of citizen translation is not unknown to these emergency authorities, there seems to be limited knowledge, inadequate government appetite, and the lack of place-specific evidence to support the implementation of this type of translation solution. The results from previous research are mostly based on a case study approach, leaving room for a genuine concern as to whether the findings can be generalised to other regions of the world. However, this concern could be diminished as practitioners and academics begin to find significant consistency in the results of multiple independent case study research conducted across different regions of the world. The present study is the first empirical research in Australia to investigate how members of CALD communities respond to the emergency messages issued by the state emergency services, including the implications that the observed responses have for the translation of emergency messages. The study further contributes to the literature by presenting some key findings from the collaborative translation of emergency messages (Co-TEM) that could strengthen or extend existing knowledge in citizen translation. Importantly, the underlying principles of Co-TEM are presented to support future adoption of this solution. Lastly, the implications of the findings are discussed along with some recommendations to state emergency authorities.

2. Methodology

2.1. Study area: Australia—a country in need of emergency messaging in multiple languages

Australian cities are amongst the most culturally and linguistically diverse (CALD) communities in the world. The 2016 census found that 49% of the Australian population comprises immigrants and their children, and over 300 languages were regularly spoken at home [55]. CALD communities in Australia are particularly vulnerable to natural hazards due to limited English proficiency and cultural differences that sometimes distort the interpretation of emergency information. For example, language differences may cause Australian residents from CALD backgrounds to either delay response or completely ignore time-critical warnings/emergency messages that they do not understand, potentially resulting in catastrophic consequences [56]. The likelihood of misunderstanding emergency messages is particularly higher for those migrants who are still getting familiar with the geography of their new environments and may exhibit poorer cognitive coordination due to the anxiety associated with experiencing emergency events. With Australia’s increasing annual cost of natural disasters set to reach $33 billion by 2050 [57], it is important that new measures are taken now to minimise vulnerabilities, including the tailoring and translation of emergency messages to suit the specific information needs of CALD communities.

Hence, there is need to provide emergency communication in languages that are best understood by Australian CALD communities. This community need is further established by a strong evidence base. The Australian Institute for Disaster Resilience [58] released a report in 2007 highlighting the need for emergency agencies to pay greater attention to the communication needs of CALD communities, who may not be able to understand emergency warnings conveyed in the dominant language (i.e., English). Schroeder et al. [49] reiterated the need to appropriately tailor warning messages to suit the varying information needs of communities. A study by Sullivan and Hökkkinen [41] explored the challenges faced by vulnerable populations during disaster events and reported linguistic differences within communities to be a major issue that requires simplified multilingual communication strategies. Baillie and Adam [59] studied emergency communication strategies within the Australian context and also found the need to tailor messages. Research on past disasters in Australia has found that when warnings are not personalised, people ignore or fail to obey the warnings, either because they do not understand the message, or they imagine that the warnings are not applicable to their situation [60]. Worse still, the framing of these messages has meant that emergency communications were not even in the form that native English speakers could comprehend, let alone CALD communities [61–65]. Not surprising, one of the recommendations from the royal commission’s inquiries into the 173 deaths in the Black Saturday bushfire was to strengthen the relevance of emergency warnings to communities [66]. According to Clerveaux et al. [1, p.7], “disaster managers cannot continue to ignore the multicultural aspect of disaster management and persist in the use of a ‘one size fits all’ policy approach in dealing with disasters in multilanguage communities”.

In 2008, the US Federal Emergency Management Agency (FEMA) openly acknowledged the need to have warnings and emergency messages translated into other languages [67]. In October of that same year, Australia’s then Ministerial Council for Police and Emergency Management - Emergency Management (MCPEM-EM), endorsed several national emergency warning principles, one of which is “complete” [68]. Complete means a message should be presented in a way that is easily and quickly understood by the population, including in multiple languages in some cases [68]. It has been well over a decade now and Australian CALD communities are yet to benefit broadly from emergency messaging in multiple languages. At best, makeshift multilingual resources are put out sparingly, often in response to the demand from CALD communities during emergencies. The Australian Government (2008) has provided a document on choosing the wordings of emergency warnings [69]. However, this document has limited use as it provides only few examples of words to avoid or words to use when framing emergency warnings for CALD communities. It also does not provide any solution for message translation. The present situation in Australia necessitates the development of a sustainable solution to address the challenges of translating emergency messages for CALD communities.

2.2. Research participants

The aim of this research is not to make statistical inferences in relation to the wider population, but rather to examine a real-life phenomenon of collaborative translation of emergency messages using a
small sample. Hence, a non-probabilistic sampling method was adopted. More specifically, the researchers adopted elements of the non-random convenience sampling and the judgement sampling techniques [70]. The convenience sampling entailed that participants who met the selection criteria were recruited based on their availability to participate and whether they reside in the place of research-the Illawarra region of Australia (shown in Fig. 1).

The Illawarra region of Australia is in the New South Wales (NSW) state and located on the southeast coast of Australia. The main metropolitan area, known as Wollongong, is approximately 1296 km² in land size and is approximately 70 km south of Sydney (see Fig. 1). The region is as culturally and linguistically diverse as other major Australian cities and towns that have been historically attractive to immigrants. Based on the 2016 Australian census, there are over 7267 residents in the Illawarra region who either cannot communicate in English or do so with little competence [25]. As Illawarra communities are exposed to various natural hazards (e.g., floods, bushfires, storms, landslides, etc.), it is vital that translated emergency messages are available to warn or prepare minority groups against impending disasters [25]. With reports of inaccurate translations, lack of tailored messages, and poor access to translated resources during the COVID-19 pandemic, it is clear that there is inadequate involvement of CALD communities at grassroots levels and more needs to be done to improve the way the Australian government engage with CALD communities during crises.

The judgement sampling technique entailed that the researchers worked in collaboration with the Multicultural Communities Council of Illawarra (MCCI), who provided the required expertise and support to gain access to the relevant CALD communities and to make the decision on who meets the selection criteria for inclusion in the sample. The selection criteria are that the participant must: (1) be an adult (18 years and above), (2) be bilingual, and (3) belong to one of the top 7 largest CALD groups in the Illawarra, namely Macedonian, Italian, Mandarin, Arabic, Spanish, Serbian, and Greek speaking communities (ABS 2016). The aim was to identify and recruit at least 3 bilingual representatives from each of the target CALD groups. Ideally, these would be people who may already be helping to meet the information needs of their communities by volunteering with the New South Wales State Emergency Services (hereafter referred to as SES). They could also be well-meaning individuals who can potentially be empowered to act as intermediaries or gatekeepers to facilitate message translation and engender culturally appropriate communication between their communities and emergency agencies. Each participant received a $100 gift card in appreciation of their time and effort in translating emergency messages. While it was easy to find participants for certain groups (e.g., Serbian), the same could not be said for the Italian community, mainly because the Italian community is an aging cohort mostly comprising elders who are not necessarily self-confident to translate emergency messages. Hence, the research was restricted to the remaining top six CALD groups in the Illawarra. Table 1 shows a breakdown of the age and original country of the participants. All the participants were female except for one male participant from Egypt.

While there were slight variations in language competence among the participants, the MCCI only selected participants whose competence levels in both languages were above average and adequate for the translation tasks. Participants from the Arabic, Mandarin, and Spanish-speaking communities, who have lived in Australia for relatively fewer years, reported that they were more (completely) fluent in the spoken and written forms of the first language as compared to the source language (English). Participants from Serbian, Macedonian, and Greek-speaking communities, who have lived in Australia for several decades, reported equal levels of competence in both languages, except for one Australian-born Greek-speaking participant who was far more proficient in English than in Greek. Nevertheless, the variation in language competence among the participants was not a major issue. This is because the translations were done in teams, allowing participants to use their language strengths in ways that complement and blend well with others to achieve optimal results. While language attrition did not come up as a major issue in most of the language groups, the participants from the Serbian team identified the need to localise the translation to meet their community’s changing language use, brought about by language mixture with English and the long-term disconnection from the ‘pure’ form of language use back in their home country.

In addition to the 16 participants, it was important to involve the broader target CALD communities in assessing the translated messages. There were over 120 individuals (at least 20 individuals from each of the six CALD communities) who were collectively involved in evaluating the understandable, relevancy, and appropriateness of the messages translated by the bilingual representatives from their own community. While some of the individuals involved in the evaluation were also bilingual, most of the people could only understand and communicate in their CALD language-these are essentially the target users who would benefit significantly from translated emergency messages.

2.3. The emergency messages

The project was delivered with the support of the SES. The SES provided the relevant warnings and preparedness messages as well as their emergency contextualisation for the purpose of linguistic processing and translation to the different CALD languages. The messages provided were exhaustive of what the agency uses to prepare communities for emergencies and natural hazards. Based on this message bank, the researchers selected 6 of the frequently issued messages, to be translated by the identified bilingual representatives. The project scope is such that the message translation focused on the static messages, which do not change from one event to another. Below are the 6 emergency messages selected for translation:

- Never enter floodwater. Never drive, ride or walk through floodwater. If it’s flooded, forget it.
- Act early, stay safe. Find the safest route to travel in the event that you might need to evacuate and identify the height at which your evacuation route may be cut.
- Don’t wait, it could be dangerous. As soon as you are aware of an evacuation warning, you should move quickly. Waiting could cause you to become isolated, trapped or worse.
- Prepare an emergency kit with essential items. We recommend that you and your family have an Emergency Kit made and ready to go, in case of evacuation, isolation or inundation.
- Maintain your yard and balcony. Try to keep items around your property tidy. Identify things which you may need to secure or put away if strong wind or a severe storm is forecast. Storms can affect your home even if you’re on holiday, so if you are going away consider securing these items and following other relevant steps before leaving.
- Clean your gutters, downpipes and drains regularly to prevent blockages. Keep the drains around your property clear to help surface water move away and prevent water from pooling and entering your property. Pot plants in courtyards and around houses are often used to hide drainage grates. Make sure to move these if heavy rain is likely. Remember to park away from low lying areas and drains if heavy rainfall is expected.

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1. https://www.abc.net.au/news/2020-08-13/coronavirus-messages-translated-to-nonsense-in-other-languages/12550520.
2. https://www.abc.net.au/news/2020-07-25/australia-coronavirus-response-multicultural-communities-covid19/12484464.
2.4. The design of the Co-TEM process

The bilingual representatives (participants) from each CALD community were brought together to work collaboratively in translating the selected emergency messages from English to the target CALD language. Each participant group was given one tablet to document the translated text. The process allowed for the group to provide alternative ways of translating a message. Both the text and voice translations were recorded, ensuring there is an option of voice message for people who may not be able to read in their native language. It should be noted that the translations were scheduled at different times for each CALD group, ensuring each language group worked together separately from other groups. Once the translations were complete, the translated messages were then presented by the researchers to the respective broader target community to be evaluated. As part of the evaluation process, the researchers also examined the extent to which the CALD communities understood the original (English version) of the translated messages. The evaluation process is necessary to ensure that the messages have been meaningfully and suitably translated. It is also important that the communities themselves establish the suitability and relevance of the translated messages for purposes of emergency communication. For each target community group, the SES nominated one or more staff members or volunteer workers to be present to observe the process of validating the translated messages.

The researchers and SES staff or volunteers were not necessarily competent in the CALD language. Hence, the evaluation process relied on community facilitators, who are competent in both English and the CALD language. The community facilitators administered the message evaluation using the CALD language because many of the community members could not communicate fluently in English. The process starts by the community facilitators explaining the purpose and procedure for the message evaluation. The English message (text) is presented via venue projector to the community group. Members of the community are then allowed to explain their understanding of the message to the community facilitators, using either English or their community language. Those who cannot understand the message also indicate this issue to the facilitator. The community facilitators use English language...
to relay the feedback from the community members to the researchers. Next, the translated message (text) is presented to the community group for evaluation. The community members provide feedback as to whether they understood the message, including whether they consider the message relevant and culturally appropriate for use in their community. Furthermore, the voiced (audio) version of the translated message is played, thereby providing an opportunity for feedback from those who cannot read in the first language. Similarly, feedback on the understandability, relevance, and appropriateness of the audio translated message is conveyed from the community facilitators to the researchers. The process of evaluating the messages is keenly observed by the researchers and the SES staff or volunteers. The translated and validated messages could potentially form the basis for SES to drive behavioural change and risk awareness amongst the target CALD communities in preparation for impending disasters (see Fig. 2).

3. Results and discussion

3.1. Participants’ responses to the emergency messages for translation

In this section, we present the various ways in which the bilingual representatives (participants) from the different CALD groups responded to the emergency messages presented to them for translation. We convey findings on any positive remarks or key challenges encountered in the process of the collaborative translation.

Message 1:

Never enter floodwater. Never drive, ride or walk through floodwater. If it’s flooded, forget it.

In response to message 1 above, one of the participants from the Macedonian team stated: “If it’s flooded, forget it? This doesn’t make sense in our language. Forget it is very informal in our language—we usually don’t speak that way—it is not polite”. A considerable problem seems to lie with the informal tone (‘forget it’) rather than just the choice of words. While informal tone might work well with native speakers of Australian English, this tone may not transfer well to other languages that tend to be more formal. This suggests that when drafting emergency messages, it is important to pay attention to the difference in the levels of formality across languages and the difficulties it could pose to translation. A positive remark from the Macedonian team is that the word “Never” is powerful to emphasis not to enter floodwater. One of the participants stated: “If the message had said it is not advisable to enter, I would enter if I have to. But the word never means I will never do it—it is a strong word”. These findings suggest the need for emergency authorities to carefully choose the words used in emergency warnings as some words can be more persuasive and powerful while others may be less appropriate.

When message 1 was presented to the Mandarin-speaking team, one of the participants asked: “Forget what? Does it mean that if the flood has already happened, we shouldn’t do anything?” The same question came up during the Spanish translation session. One of the participants from the Spanish group asked: “Forget what? Does it mean that if you find someone or something to which you may have an attachment (like a dog, pet, or valuable) drowning or flowing away in a flood emergency, you should forget it? Don’t try to save the person or object?” The other Spanish participant replied: “I think it means that if flooded, stay there. Don’t go anywhere”. While some may think that message 1 is intuitive to the native English speaker, it appears to be ambiguous to members of CALD communities. This suggest the need for disaster managers to strengthen the clarity and understandability of emergency messages. In terms of the technical difficulties in translating message 1, the Arabic team mentioned that the word, “ride” has no direct translation in Arabic. Ride and drive are the same in Arabic.

Message 2:

Act early, stay safe. Find the safest route to travel in the event that you might need to evacuate and identify the height at which your evacuation route may be cut.

In relation to message 2, the Arabic team had some difficulties in translating the words, “act” and “evacuation”. However, the major issue was with the part of the message that states: “identify the height at which your evacuation route may be cut”. They thought the word, “height” was referring to the personal height of the individual in the floodwater. This part of the message was also confusing to the Serbian team. One of the ladies stated: “This is complicated. I don’t think our people who do not have good English skills will understand this. I personally think the Serbian translation is better and clearer to communicate the message to our people.” Similarly, no participant from the Greek and the Mandarin-speaking groups could understand this part of the message. A participant from the Mandarin-speaking group asked: “isn’t it saying you should find the safest evacuation route on a higher ground?”. Apparently, some of the participants, including those from the Spanish team misunderstood the use of the word, “height” to mean the height of the land or to identify a place of higher elevation above the ground to make it safest to avoid flood water. It is important to note that one of the participants from the Greek group was born in Australia and has lived in the country for more than 55 years. Her English is as great as those of English native speakers. Yet, she could not understand the message. She asked: “isn’t this the situation where you would have to ring up the SES? How would you know the height? Are we to work out the height ourselves? We can’t”. “This message is putting the responsibility to know the flood height on the individual, but they are not going to know”, she added. It is safe to say that message 2, in its current form, is likely to be difficult to translate due to its lack of clarity and the frustration experienced by the community translators.

Message 3:

Don’t wait, it could be dangerous. As soon as you are aware of an evacuation warning, you should move quickly. Waiting could cause you to become isolated, trapped or worse.

Message 3 above was not as confusing for the participants as the previous two. However, a participant from the Greek group noted that it would have been ideal to specify the source of the expected warning in the part of the message that states: “As soon as you are aware of an evacuation warning”. The Arabic team struggled to find a suitable Arabic equivalence for the word, ‘trapped’, but eventually did so using Google Translate. The Serbian team had the same issue translating the
word, “trapped”. When they eventually found the equivalent word with the use of Google Translate, it created a massive excitement and laughter as they recited the suggested Serbian word (blokirani) that kept them thinking for minutes. This experience and many more observed moments of shared delight suggest that Co-TEM creates avenues for positive social exchange between the participants. It also shows that technology is a supportive tool for effective Co-TEM. Google Translate, in particular, provides free and instantaneous translation. However, because Google translations are based on statistical occurrence (i.e., translation based on high frequency matches to database records of previous translations produced over the years by human translators), the results are often better with popular language pairs that have high similarity (e.g., English/Spanish) and have greater records of existing human-translated texts. Hence, the results from Google Translate should be used with caution as they are not always 100% accurate and may also fail to account for the proper context of the emergency message.

Message 4:
Prepare an emergency kit with essential items. We recommend that you and your family have an Emergency Kit made and ready to go, in case of evacuation, isolation or inundation.

In translating message 4, a common issue observed across all the six CALD groups is the question of what an emergency kit is, and what it should contain. Many of the participants associated emergency kit (also known as a Go Bag or a Grab Bag) [6] with first aid. There was extensive discussion within each group to ascertain what should be included in an emergency kit and whether this should be reflected in the translated message. A participant from the Serbian group stated: “we need to explain what should be contained in an emergency kit, otherwise some people may grab money and leave other essential items like medication”. Message 4 was even more problematic to translate mainly because the community translators could not understand the meaning of technical terms or jargons such as inundation. In fact, many of the participants heard the word, inundation for the first time. A Macedonian participant mentioned: “there is need to use simpler words in place of words such as evacuation, isolation, and inundation”. To complete the translation, participants needed to check online dictionaries in their smartphones in order to confirm the meaning of inundation. This, again, reinforces the supportive role that technology can play in overcoming some of the challenges that community translators might encounter with Co-TEM.

However, there are instances where online dictionaries may not be as helpful. For example, in translating the other remaining two messages (see Section 2.3), the terms, “pooling” and “low lying” were not easily understood from the online dictionaries mainly because pooling is a homonym with contextual meaning whereas the online definition of low lying contains even more technical terms or jargons (e.g., sea level, altitude) that are difficult to understand. This emphasises the need for emergency messages to be simple and intuitive as online dictionaries may not always be completely helpful. This also highlights the need for some basic trainings in translation and technology aids to support non-professional translators involved in collaborative translation.

3.2. Summary of other key findings from the research

1. There are several members of CALD communities who cannot comprehend the messages issued by emergency agencies: This research presented an opportunity to evaluate community understanding and response to the messages issued by the SES. What we found is that there are several individuals within the different CALD communities who have lived in Australia for several years (though weakly connected to the broader society), but do not have sufficient English language skills to understand the emergency messages issued by the SES. The current messaging in English does not serve this group; what is required is emergency messaging in their native language.

2. Some of the messages issued by the emergency agency cannot be easily translated because they lack clarity and are easily misunderstood, even by native speakers: The bilingual representatives from the different language groups, who helped to translate the messages, found some of the messages to be ambiguous and misleading. They requested further clarification. When we presented the same messages to English native speakers, the response was the same. This indicates that the issue is the lack of clarity in the message, not always the language skills of the receiver. Our findings are consistent with previous study, which found that written information from government authorities are often very difficult to translate because of the technical nature and complexity of the writing [72]. Notwithstanding, the SES is committed to the safety of NSW communities, including through continuous improvement in service delivery. The involvement of SES in this research is an indication of their keen interest to understand where the gaps exist and to explore better ways of meeting the information needs of CALD communities. We are therefore hopeful that the evidence from this research will inform improved planning and practice of emergency messaging to CALD communities.

3. Working collaboratively, bilingual members of CALD communities can potentially translate emergency messages from the dominant language [English] to the appropriate CALD languages: Collaborative Translation of Emergency Messages (Co-TEM) can deliver translated messages with less cost burden for emergency agencies; it relies on bilingual members of CALD communities to translate and help engender emergency communication in multiple CALD languages. However, it should not be assumed that there are no costs to other parties involved in the process. For instance, the work done by the MCCI to ensure the success of this project indicates that there is significant time and costs (e.g., venue, telephone, transport) involved in mobilising community members to participate. Community members who participate also give their own time and effort to translate or validate translated messages. Although, these kinds of contributions are mainly done on voluntary basis, the long-term sustainability of any Co-TEM solution would depend on the ability to deploy appropriate incentive mechanisms to attract and ensure sustained participation [79]. In this study, the translated messages (in text and voice formats) from the Co-TEM process were put forward to the broader target communities for evaluation and found to be more meaningful, understandable and relevant to members of the CALD communities as compared to the corresponding English versions of the messages.

4. Technology plays an important role in Co-TEM: It was observed that the bilingual representatives, who translated the messages, sometimes used online dictionary on their smart phones to clarify the meaning of certain technical terms or jargons such as inundation, pooling etc. When a specific word in the source text proved difficult to translate, Google Translate was useful in finding the most appropriate word in the target language. The autocompletion feature for written text helped to speed up the translation process. These findings strengthen previous recommendation to consider the various ways in which technology can help facilitate translation work [23]. However, as O’Brien [6] noted, it is important to also keep in mind issues such as power loss, internet connectivity, and access to lightweight mobile devices that could potentially undermine the use of translation technology, particularly in the context of disaster response. The ability to identify and exploit opportunities will be key to maximising the benefits of translation technology. For example, emergency agencies can make conscious effort to frame messages in ways that allow the messages to be readily exploitable by translation technology. Bowker and Ciro [80] used the concept of Machine translation (MT) literacy to emphasise the need to train writers in adapting the writing style of their messages in such a way that if processed by MT systems, the results of the translation will be more accurate and reliable. Some recommended guidelines for
Co-TEM is a positive social experience for communities: The collaborative process of translating the messages brought community members together, allowing for socialisation and exchange of opinions through a shared language and a similar cultural lens. For some, it was a great opportunity to meet and fraternise with other members of their community for the first time. It was also observed that Co-TEM delivers synergistic value, as compared to working individually, both in terms of the process efficiency and the outputs generated. Each participant made known their strengths and weaknesses in relation to the translation tasks (e.g., fast typing speed, cultural appropriateness of language use, not computer savvy, unequal versatility in the source and target languages), so that complementary use of individual skills was maximized to enhance efficiency. The participants showed increased confidence when told they could do the translation collaboratively as a group, rather than individually. This increased self-efficacy to translate is good for future participation in similar translation exercises. When asked, the participants indicated their willingness to help in future translations, if required to support their communities. One participant stated: “We should do this often; my involvement today has revealed how bad I am losing my first language skills because of inadequate use in Australia”. As Federici and Cadwell [15] noted, the act of translation is good for CALD communities because, amongst other benefits, it helps integrate CALD populations into national plans for community-focused resilience.

Co-TEM could potentially be undermined by dialectical differences or regional variations in the use of language: Co-TEM requires two or more individuals to work collaboratively in translating emergency messages from a source language to a target language. Though the individuals involved may understand and speak the same [target] language, there could be differences in dialects or regional slangs that could potentially introduce inconsistency in language use, sometimes with cultural implications. In our study, the participants identified these issues in the process of translation and agreed to adopt a consistent dialect and a written form of the language. For example, the Mandarin dialect was adopted as opposed to other dialects such as Cantonese. In terms of written language, the simplified form of Chinese (popular in Mainland China, Malaysia, and Singapore) was adopted over the traditional form of the language (mainly used in Taiwan, Hong Kong, and Macau). Similarly, the Arabic team acknowledged that there are differences between Egyptian Arabic, Iraqi Arabic, and Jordanian Arabic. Consequently, they agreed to use the Saudi Arabia version of Arabic, which they described as the official language taught in school.

Co-TEM is a self-organising socially distributed production that relies on several discourse units: Co-TEM is not an individual activity, but a socially distributed production that requires mutual engagement and joint decision making in a group setting. It involves participants taking turns in conversations about how best to translate a message by using several discourse units such as questions, acceptances, disagreements, and repairs [71]. Personal insights are introduced, which are either accepted, fine-tuned or rejected by the group. In other words, suggestions are put forward and the best is adopted. Some participants admitted that their peers suggested better words to translate the messages. Participants questioned ill-formed suggestions and were less likely to accept ideas with divergent interpretations. Co-TEM is considered a self-organising process because the community translators were able to self-manage the translation process with minimal intervention from the researchers.

A person in the group reads the English text aloud. The group members think and talk [in the target language] about what that means. The discussion goes back and forward from target language to source language, but mostly in the target language. One person typically takes the lead, often dominating the conversation. When a person is confused, the others or another person helps to explain. The researchers observed that the collaborative activity sometimes produced temporary moments of disagreements as individuals try to negotiate their own ideas. However, such misunderstandings were quickly resolved without any external mediator as all participants brought great respect to the shared work. Roschelle and Teasley [71] described this as repairs—the use of interpersonal and social communication skills to achieve and consolidate shared understanding, thereby (re)-establishing mutual intelligibility of the collaborative problem-solving activity.

4. Implications and recommendations

The findings from this research have shown that the official messages issued by emergency agencies can sometimes lack clarity. This threatens the success of Co-TEM. To ensure that non-professional translators can clearly understand the official messages to be translated, we strongly recommend that emergency agencies such as the SES simplify the messages and warnings issued to communities. Ambiguity and technical jargons should be avoided where possible. The messages in the dominant language (English for Australia) should be simple and intuitive. This is in line with previous recommendation by Vázquez and Torres-del-Rey [72] to apply the “Easy-to-Read” and “Plain English” principles to any resource that is to be translated from English into another language. Importantly, the principles of Co-TEM discussed in this study should be adopted to ensure the desired outcomes are achieved. Where technical terms cannot be avoided, community translators should be trained to understand the meaning of those terms. Such trainings should also involve contents to help prepare community translators for any inherent challenges, including how to deal with traumatic situations [18,19].

This research has also shown that the emergency messages translated by non-professional community members are better suited to the information needs of certain members of CALD communities, who cannot understand the original messages in English language. These findings are consistent with the results from previous research [23] and therefore strengthen the call for emergency messages and warnings to be made available in different CALD languages that are better understood by the people. It is the duty of a responsible government to ensure the emergency warning arrangements are adequately serving all members of the community and that vulnerable groups such as CALD population are not disadvantaged or marginalised. Mere recognition of the problem is not sufficient—emergency agencies should be adequately funded by the government to meet this very important community need. We are hopeful that the emergency information needs of NSW CALD communities will receive the deserved attention as there seems to be significant interest from key stakeholders such as the SES (see Fig. 3) to address the issues identified in the research findings.

The excuse that multilingual emergency messaging is too resource intensive is no longer tenable. This research has shown consistent results with previous studies [23], suggesting that non-professional community translation is a viable approach to delivering emergency messages in multiple languages. The researchers have developed some principles to support successful implementation of Co-TEM. In this paper, the emphasis was on face-to-face Co-TEM and the application focused on the translation of messages to support disaster preparedness. A solution that supports computer-mediated Co-TEM is vital in order to apply collaborative translation in the disaster response phase. It is important to emphasise that time and accuracy are very critical when translating to support disaster response. Hence, it will be necessary to provide some training to support volunteering community members in delivering translated resources that are both accurate and culturally appropriate for CALD communities in times of crises. The works of O’Brien and
Fig. 3. EmerCALD project partners and key contributors. The photo was taken in November 26, 2019 during a UOW event to present the findings of the EmerCALD project. From left (designation as at the time of the photo): Mr Joshua McLaren is the Coordinator Community Capability, NSW SES - Regional Operations. Joshua is a major contributor to the EmerCALD project. He led and coordinated the required project support from the NSW SES. Assistant Commissioner Paul Bailey is in support of addressing the issues identified through this project and he is the Assistant Director Regional Operations NSW SES. Dr Robert Ogie is the principal investigator and project leader from the UOW. Mr Chris Lacey is the CEO, MCCI. Chris was very instrumental to the success of the EmerCALD project. He provided intellectual contributions to the design of the research instruments and assisted a great deal to encourage participation from the target CALD communities. Through Chris’ support, several staff members of MCCI volunteered to administer the survey and assist the researchers in organising the message translations/validation with various CALD communities in the Illawarra. Mr Ken Habak (OAM) is the Chairperson, MCCI. Ken is very supportive of the project and would like to see Illawarra CALD communities benefit broadly from this laudable initiative. Mr Colin Malone, Zone Commander South Eastern Zone NSW SES. Colin is supportive of the project to deliver tangible outcomes for CALD communities in the South East region of Australia.

colleagues [13,18,19] have been outstanding in this respect and could form the basis for developing training materials, including in relation to virtue ethics and self-efficacy, which are quite important for community translators.

Furthermore, the case study in this research focused on the largest CALD groups in the study area. For smaller long tail language communities, it might not be as easy to find local community translators or even professional translators with the right language skill sets. In which case, we recommend the use of computer-mediated Co-TEM to leverage the support of volunteer translators who may be geographically distributed across different parts of the world. Again, this is not going to be a straightforward process. There are issues that would need to be considered, including linguistic capacity, training needs, collaboration across different time zones, and the lack of internet access for some remote translators. Emergency agencies could benefit, though, by developing partnership with well-established and globally connected translation service providers (e.g., Translators without Borders), who have the wide-reaching network to provide connections to volunteer translators around the world.

As a way of extending the present research, there is ongoing work by the researchers to implement Co-TEM principles in developing a cost-effective and sustainable computerised approach of delivering emergency messages/warnings in various CALD languages. The conceived solution, which is beyond the scope of the present paper, is designed to facilitate computer-mediated Co-TEM and any associated challenges (e.g., incentive mechanism, error in translation, etc). The solution, still in design phase, is very promising and has the potential to engender multilingual emergency messaging to various communities in NSW and across Australia. However, it is important that the required support come not only from the emergency agencies such as the SES, but also from other state and national government authorities that have a responsibility for promoting disaster resilience within communities. Multilingual emergency messaging for CALD communities needs to be better appreciated and accorded the required priority when supporting projects that build the resilience and capacity of communities to prepare for and respond to crises.

5. Conclusion

Effective communication of emergency information is crucial to disaster risk reduction. When emergency messaging and warning is restricted to the dominant or official language [English in Australia], this can be problematic for those who are from a culturally and linguistically diverse (CALD) background. The idea of citizen translation is an option available to emergency authorities, when seamless and timely access to professional translator’s service is not viable or available in the local community. However, there are genuine concerns within state emergency authorities as to whether non-professional citizen translators (i.e., bilingual members of CALD communities) can be relied on to translate official warnings or other types of emergency information. This case study research, which focuses on the Illawarra region of Australia, has delivered new findings to further establish the existing evidence on the issues that should be addressed to improve the success of citizen translation. The study has contributed to an improved understanding of how bilingual members of CALD communities perceive official emergency messages, including any associated implications for successfully implementing citizen translation, as well as how the broader CALD community comprehend and respond to citizen-translated messages as compared to the official ones. Furthermore, the study has presented a distinct form of citizen translation, known as the Collaborative Translation of Emergency Messages (Co-TEM). The concept of Co-TEM is explained, including its underlying principles for specifically delivering the translation of officially issued warnings or emergency messages. The six principles of Co-TEM discussed, include community-mindedness, adjunctivity, ownership, functional equivalence, personalisation, and validation.

A key finding from this research is that there are several members of CALD communities who cannot comprehend the messages issued by emergency agencies. However, by adopting Co-TEM, bilingual members of CALD communities could successfully translate the emergency messages to facilitate comprehension for those members who could not understand the official (English) version. Six CALD communities from the Illawarra region of Australia were adequately involved in the study, including the Macedonian, Mandarin, Arabic, Spanish, Serbian, and Greek communities. There were some of the messages issued by the state emergency agency that could not be easily translated because they lacked clarity and were easily misunderstood, even by native speakers. To address the threat that this issue poses to Co-TEM, it is recommended that emergency agencies simplify the messages and warnings issued to communities, including through the avoidance of jargons and ambiguity. Co-TEM was, overall, a positive social experience for the communities involved and technology played an important role in aiding the process. Issues of dialectical differences or regional variations in the use of language were identified, but by agreeing to the adoption of a consistent dialect, this issue was resolved.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
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