

# Designing Technology to Support Empathy for Rural Community

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**Abstract:** In isolated, rural areas, people are necessarily independent and it can be difficult for them to seek help. One of the ways to improve this is to find a remotely accessible solution. Information and communication technology (ICT) can be used to eliminate distance as a barrier to social interaction, and in turn can create new optimism for rural areas when it is a device to improve interaction. The important benefit of receiving emotional support and information from others is that it encourages and increases hope. This research suggests that when collaborating virtually, the farming community can receive effective advice from experts to facilitate their decision making and at the same time to support their psychosocial health.. The user experience of the emotional expression in the discussion among community members will be highlighted. We posit that it is important that empathy and hope are included in interaction between participants, especially when ICT is used to deal with complex conversations (e.g. climate change, agricultural information).

**Keywords:** Rural community, psychosocial health, empathy, interaction of hope.

## I. Introduction

Community is defined as groups with the same interest, shared goals, activities and individuals who cooperate to share resources and satisfy each other's needs [1]. In this research, the community refers to the rural community. As rural communities are remote, they rely on farming to obtain food and at the same time generate their income and contribute to the economy [2]. Farming is a stressful occupation which is impacted by the environmental context of farming, such as decreased yield, as well as the prices of goods from competitors, cost of fuel and globalization. It has one of the highest rates of suicide and farmers are at high risk of developing mental health problems. In Australia, for instance, approximately one male farmer dies from suicide every four days [3]. As people in rural areas live in isolation, they are necessarily independent and it is difficult for them to seek help. One of the ways to improve this is to find a solution remotely. People in situations of isolation lack the contact that is important for their psychosocial wellbeing.

In spite of the great technological leaps in ICT, there remain many issues and challenges that must be addressed and integrated with the technology so that the rural communities will not be overlooked and the technology can at the same time be applied to solve rural problems. The farming population has been identified at high risk of suicide and having difficulty in coping with the range of pressures associated with life and work in the agricultural industry [4]. According to Argent [5], rural communities feel isolated, demonstrate low morale and are less self confident in response to social interaction which can lead to dissatisfaction and create more social problems. Combined, these issues show the importance for local agencies, governments and non-government organizations working together to overcome the problems [6].

From the above discussion, it is apparent that rural communities lack technology development that meets their lifestyle needs. ICT can be used to eliminate distance and questions of location and social interaction, and in turn can create new optimism for rural areas when it is a device to improve interaction. This research will suggest that when collaborating virtually, the farming community can receive effective advice from experts to facilitate their agricultural decision making and at the same time to support their psychosocial health.

The design of collaborative systems is a useful paradigm for the development and sustainability of virtual collaboration, so that higher levels of collaboration may be achieved among geographically dispersed community. The social process is critical to understanding how ICTs may be used effectively to support the geographically dispersed collaboration of farming communities and experts in rural areas.

### A. ICT for informing

The fast growth of information and communication technology, mobile communication and the Internet has played an important role in people's social lives. Relationships, social interactions and information sharing among people in a community can be strengthened with the increasing accessibility and speed of communications platforms. Communities can incorporate this emerging technology into their social interactions without losing social touch and engagement [7].

While information and communication technologies can accelerate development in rural areas, it is important to

explore how information, such as agricultural and climate change information can be disseminated in rural communities so that members will get the most benefit from the interaction. For instance, when farmers send data to experts, they hope that the experts can interpret it in such a way that it will help them to increase their productivity. When farmers send the data but do not receive any response, or the data received does not show things getting better, they can discuss the problem with the experts via technology. Information has played an important role in agricultural activities and farmers have always made key decisions about what and when to plant, how and when to harvest, or how and where to sell, based on the information that is exchanged and transmitted using any means of technology that are available to them and their communities [8].

### *B. ICT for affecting*

An important side-effect of this informational interaction is the reduction of stress levels. This is becoming more necessary as farmers need social contact. When contact is made, the negative feelings and problems experienced by farmers can be transformed to positive and balanced thoughts and emotions, which can in turn improve the productivity of their farm. This research suggests that when collaborating virtually, the community members can receive effective advice from experts to increase their knowledge and at the same time to support their psychosocial health. This research aims to increase the understanding of using the concept of empathy and interactions of hope in system design particularly for user experience.

User experience is a term that has become popular in user-centered design in recent years. It is an approach that gives more understanding into the relationship between the user and the product, and the experiences that result from their interaction [9]. In the context of design, a broader view should look into the needs, emotions and experiences of users to facilitate the design of the system that would benefit them. This research is inspired by studies into exploring and understanding computer supported cooperative work (CSCW) systems that can support and allow people to communicate with each other when they are in different physical locations and thus not able to communicate in the usual face-to-face manner [10]. The main focus here is how to design a platform that allows community members to communicate via a technology intervention that enhances social interactions in a normal community conversation context. The design should also look into better ways of supporting empathy as well as information exchange. This research will observe the usage and leverage off related work in ICT for development in rural areas [11] where the design of the new technology intervention will be proposed. In the design process, the functionality of the data interaction from the community to the expert will be studied to ensure the usability of the future design, that is, to ensure it is easy to use and clear to the users. This research will be based on the hypothesis that the user experience of interacting through a collaboration technology can be more supportive when using empathic communication techniques.

## **II. Computer supported cooperative work**

The emergence of ubiquitous computer networking and communication technologies has made possible many new ways for people to interact and work together. Computer supported cooperative work (CSCW) is defined as technology which “allows people in remote places to interact with each other and with the same documents and files through voice, data and video links” [10]. CSCW is broken down into two dimensions, namely, time (synchronous and asynchronous) and place (co-located and remote). Today, we are seeing a rapid growth in the use of networks and applications to support CSCW and considerable development of the early applications such as email. Previous ICT-enabled physical collaboration and computer mediated communication (CMC) supported by some level of face-to-face communication, help us to understand virtual collaboration. ICT-enabled physical collaboration is also known as technology-based collaborative systems with the presence of some level of face-to face communication [12]. The main objective of CSCW is to look into how technology can contribute and help people to work together remotely.

Assembling people face-to-face is usually difficult and sometimes impossible, so people seek ways to interact from different locations, contributing synchronously or asynchronously, using different forms of technology support. CSCW presents many problems for the system designer. According to Fitzpatrick, the CSCW community has two main characteristics: the social, which is the study of how people work cooperatively; and the technical, the study of how to build systems to support this work [13]. In order to make cooperative work successful, it is useful to look into the theory of interactions in the CSCW system development where interactions are carried out by an individual or a group of individuals.

The social process is critical to understanding how ICTs may be used effectively to support the geographically dispersed collaboration of the farming community and experts in rural areas [14]. Therefore, the computer supported cooperative work concept is a practical way to tackle this issue. This research will suggest that when collaborating virtually, the farming community will receive hope as well as effective advice that facilitate their decision making.

## **III. Human computer interaction approaches in the design of ICT**

The field of human-computer interaction (HCI) has a long history of user involvement in developing ICT that is useful and usable in a rural context. One of the major difficulties is in understanding the real needs of the end users and the constraints imposed by the rural environment. Many heuristics and techniques can be adapted for use in the rural areas, for example paper prototyping and mapping work processes. However the results show that many heuristics fail to capture the social complexities involved when designing ICT solutions for rural communities [15]. Therefore, while the social effects of information technology (IT) have received much attention, there is very little work on targeted methodologies to design technology for rural communities.

Various studies have been done that use a HCI approach in order to discover user requirement and needs of the rural

communities. For example, based on a user-centred approach and participatory design, software engineering practices and iterative action research paradigm in order to include the community-based users of the systems [16]. Another example is a framework designed and developed using activity theory to examine past failures and success of ICT intervention as a guideline in future HCI design [17]. There are also issues related to human-computer interaction involved in designing the interface for an information kiosk that is suitable to be used in rural areas as a communication tool and information exchange between entrepreneurs and academics [18] and also on the user interface design in managing community-based financial institutions for semi-literate village women from local communities [19]. One of the major difficulties in understanding the real needs of the end users is the constraints imposed by the rural environment.

Many heuristics and techniques can be adapted, but many heuristics fail to capture the social complexities involved when designing ICT solutions in rural areas as there are no connections between the user and the designer and a lack of understanding of user needs. Knowledge capture, the high cost of information access and infrastructure constraints all affect the equitable distribution of information in rural areas. Therefore, there is a need to investigate the potential role and current interventions of HCI approaches in ICT for rural development as a guideline on how to design technology intervention that can be employed to support decision making and encourage healthy interaction, while at the same time contributing to psychosocial well-being in rural communities.

#### IV. Rural community conversations and psychosocial wellbeing

People living in rural and remote communities have low health status due to many stressors. Farmers and supply industries in the farming community have to face unpredictable weather, government regulations and loss of farm or livelihood due to crop or production failure. According to Ramsey and Smit, rural community wellbeing can be classified into four inter-related categories, namely, economic, social, physical and psychological wellbeing. They defined rural community wellbeing as the condition of individuals and communities within rural areas, noting that individual wellbeing can be affected by a person's perceptions of the rural community as a whole. 'Psychosocial' is a term which implies that social and psychological issues are closely inter-related [20]. Social wellbeing is characterized by social support and activity, personal interaction and life satisfaction, while psychological wellbeing is measured by suicide rates, indicators of life satisfaction and psychological assessment. In this paper we propose activities that are intended to support positive psychosocial results by integrating with other interventions in the context of the wellbeing of the farmers (Figure 1). The affected population will be identified by their psychosocial needs, problems and issues, and how technology intervention can facilitate the enhancement of these. In addition, significant collaboration is needed among experts to tackle all areas of physical and psychosocial needs.

A conversation in the community on this research is not a conflict resolution, and it is also not just talk. It can help to ease tension in conversations and relationships and establish

new relationships. The new relationship will lead to new ways of understanding and in discussing issues come out with possible solutions. When a group in a community find that the conversation that they have is successful, they are willing to meet again and continue discussion, speak honestly regarding their concerns and uncertainties of what actions should be taken to resolve an issue which can only be imagined before the discussion occurs [21].

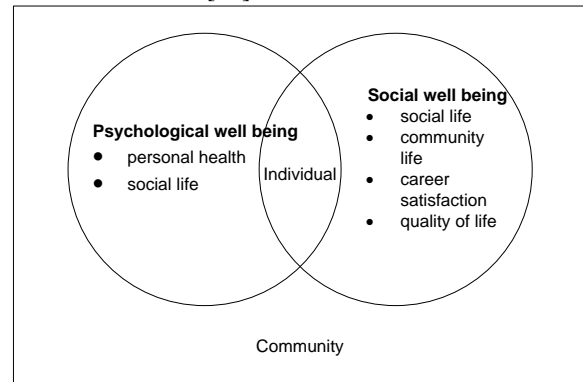


Figure 1. Psychosocial well being of a rural community

##### A. Social support in farming community

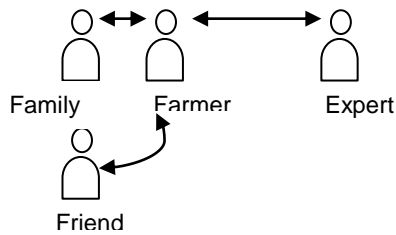
It has been identified that a social network can be a potential source of both support and stress. This finding is based on the observation that people may perceive social support but feel upset or stressed when the network fails to provide wished-for support or contributes negative input, leading to depression. This is the type of scenario that could occur when farmers seek agricultural advice from experts remotely, but still their farm productivity does not improve. Fiore's concept of the social network as a potential source of stress supports the aim of the present study to develop a platform for farmers and experts to interact regularly via technology so that farmers can be satisfied with the expert advice, with the result that stress levels can be reduced and work can be performed more effectively [22].

Rural communities have strong relationships within themselves. Stain states that there is an association between a current level of psychological distress and the potential of stressors and aspects of the social environment in Australian rural communities [23]. He also proposes a model showing that a farming community does not only rely on the individual or community support but also has alternative or additional sources of support. Farming persons in rural areas might find other forms of support as they have limited access to community support resources or activities. This finding supports the focus of the present study to investigate what other resources contribute to the psychosocial well-being of the farming community in reducing their stress level.

Social support is a ubiquitous part of human interaction, such that people serve as both provider and recipient of social support in important times throughout their lives. One of the reasons that people utilize technology is to support their wellbeing. There are several components of a person's need for social support in various life situations, including hope (the expectation that something good will happen) and the need to trust others when receiving support in the environment [24]. The social interaction and support in rural communities that is involved in a farming community can be divided into three parts: experts, farmers, and families and friends, as

depicted in Figure 2. The role of each entity in this relationship can be defined as follows:

- Experts - The agricultural experts give suitable advice remotely and interpret the data received from the farmers.
- Farmers - The farmers send data to the experts, follow the advice, take appropriate steps and provide feedback.
- Friends and family (community) - Farmers and workers share their problems with their social support (friends and families) to discuss complex issues (e.g. climate change and agricultural information) and to reduce stress.



**Figure 2.** Social interaction and support among the farming community

One way to reduce stress is by interacting through technology that can support rural workers to establish interaction more regularly with experts and can transfer data automatically. It is important to create interaction so that, even though the bandwidth of data is low or the information to be transferred is not significant, there is still interaction among them. Consequently, this will contribute to the psychosocial wellbeing effect where the farmer can share not only the agricultural information but also information on other topics. For instance, if there is only bad news to share (such as the data showing that productivity might not improve), interaction should still occur as bad news is better than no news at all and gives the expert the opportunity to know how the farmer is doing physically and mentally.

Computer-mediated communication (CMC) allows people to participate in supportive interactions with friends or strangers, synchronously and asynchronously. These interaction partners can be separated by geographic distance that would be difficult, if not impossible, to traverse using traditional face-to-face modes of support. To provide a foundation for research on computer-mediated social support, this research examines how social support unfolds within the world of computer-mediated empathic communication by delivering advice, news or opinion appropriately and assists the farmers to deal with negative emotions by introducing the concept of hope.

## V. Empathy for support

ICT design should not only consider how people communicate but also what they communicate [25]. It is necessary to incorporate human to human interaction mechanisms in the design of new technology as this can provide a sense of relatedness socially and psychologically when communicating [26]. Much of the research in CSCW and computer-mediated communication focuses on performance in formal tasks, where empathy is usually not obvious. The increasing number of studies in empathic communication provides researchers with opportunities to take a new perspective on the role of empathy in informal communication.

As Levenson and Ruef point out, empathy is “knowing what another person is feeling, feeling what another person is feeling and responding compassionately to another person’s distress” [27]. Empathy is the key ingredient in giving comfort or emotional support. Although there is no data yet about whether CMC may be more or less empathic than face-to-face conversation, some scholars have stated the importance of empathy to be applied as an emotional support. For example, empathic emotion has been embedded in a learning system to consider students’ needs in learning, help them deal with negative emotions, encourage students by listening to their social and affective needs, provide empathic feedback and give them appropriate advice to overcome academic problems [28-30]. The components of offline empathy, which are understanding, emotions, similarity and concern, are also applied in online communication [31]. Embedding empathy into the design of health technology interactive systems can potentially be very important for the acceptance and success of the technology intervention [32]. Their study shows that empathetic systems can play a key role in contributing to a better user experience based on the work that they have done to build long-term social-emotional relationships in a mobile interactive health application system by using empathetic dialogue to facilitate a more satisfying and less stressful user experience. Preece designed an online support community that helps members to deal with emotional distress, empathise with common problems and exchange information about symptoms and treatments [33].

This literature shows that CMC offers a great tool for support as participants are able to share the same or similar experience. Therefore, when the farmers express their emotions and share their feelings, the social sharing with others is effective in improving physical and psychological health [34]. Positive emotion may lead people to a better life, improve wellbeing, and can contribute toward emotional wellbeing which leads to happiness and success in work [35]. Hence, it is essential to incorporate the concept of empathy as an important part of social interaction. People seek out social interaction to cope with emotional distress. Computer-mediated emotional support allows support seekers who have limited mobility to participate in or attend the support offered in face-to-face formats. One important factor in empathic communication is hope. This concept supports the farmers’ needs in dealing with negative emotions by giving them hope and appropriate advice if there are any problems. Hope has been identified as an important therapeutic factor in effective coping, decision making, psychosocial adjustment, quality of life and has been used in the process of recovery in mental health [36].

## VI. Interaction of hope design pattern

In earlier work [37] applying the Locales Framework to the ICT for Development (ICT4D) literature, we identified that there is a clear gap in supporting mutuality or how presence is enabled in a locale and how awareness of that presence is supported. Systems in remote rural/regional primary industries work to improve the efficiency of information flow and allow for faster responsiveness and reduced costs, but also have a contact reducing impact. Remote regional workers who use technology to automatically measure and report data and to ask for advice in decision making rather than through

regular direct contact with work offices also find themselves with reduced social contact. An argument can be made that meeting social contact needs through professional interactions is not the best solution, and thus that the reduction of that contact simply returns responsibility for social interaction rightfully to the affected party. However, as new technologies that transmit information are introduced into an environment, we see an opportunity for design enhancement that increases benefit to the affected user's psychosocial wellbeing [38].

Thus, *interaction of hope* is introduced. Groopman defined hope as "the elevating feeling we experience when we see in the mind's eye a path to a better future". Future is based on the reality that there would be obstacles existing along the path. He also differentiates between true hope and false hope [39]. In the present study, this distinction is important because the expert must know how to express hope as well as the risk that it may be proven wrong. When farmers interact with the expert, they anticipate that there is some hope when they have to deal with bad news regarding their crops. According to the studies done, hope is a path to a better future and the interaction of hope can improve the communication between farmers and experts. This can be expected to result in self care and higher level of psychosocial adjustments. In contrast, when farmers have the feeling of hopelessness, it can lead to depression, suicidal ideation and decreased physical health [40].

To create successful interactive systems, a definition of a design pattern is a proven solution to a recurring design problem. It gives special attention to the positive and negative consequences of the application and also the usability [41].

The factors involved in the interaction pattern between farmer and expert through technology are outlined as follows: **Problem:** Farmers in rural areas in a situation of isolation need advice and lack the contact which is important to their psychosocial wellbeing.

**Use when:** Experts provide farmers with appropriate advice and regular contact. The main objective of this study is to enhance the quality of interaction among farmers and agricultural experts via CMC.

**Principle:** The underlying principle is to add user experience design to technologies that can support empathy and build hope among farming communities in rural areas.

**Solution:** There is an open channel transmission that can be utilized for this intervention (e.g. online communication from experts to farmers). Ideas are taken from technology interventions in the literature.

**Why:** It is meaningful for the farmers if experts can support emotional communication/empathy and provide hope in the communication as well as factual information exchange.

**Examples:** Farmers interact with experts remotely via technology. With the proposed enhanced technology intervention, the contact between farmers and experts is replaced with technology that delivers advice with empathy and hope. With the availability of the network connectivity, experts can contact farmers, or vice versa, to share information and thus contribute to the psychosocial wellbeing of farmers. When data is sent to the experts, there is an open channel of communication that can be utilised to establish contact between the parties.

Thus, designing to support empathy and interaction of hope design pattern needs to be introduced to support the interaction between communities and experts especially when

ICT is used to deal with complex conversations (e.g. climate change or agricultural information).

## VII. Understanding and meeting user needs

Emotional experiences play an important role when users adopt a new technology. Understanding emotional responses that emerge during use will result in the design of usable and successful products. The empathic design process, as explained by Mattelmaki involves seeing and understanding people's emotions and feelings in their own environment as opposed to laboratory test objects [42].

Battarbee and Koskinen [43] have identified three approaches to apply and interpret user experience in HCI. Firstly, the measuring approaches whereby experiences can be measured via emotional experience. Secondly, the empathic approach that builds from not only the user's experiences but also the designer's experiences. The inspiration can be constructed from the rich understanding of people's experiences, dreams, expectations and life context. Thirdly, the pragmatist approach sees experience as the basis of all action and interaction and generates a framework from everyday experience.

This research will take the pragmatist approach whereby knowing the user and felt life experience involves understanding what it feels like to be that person and what their situation is from their own perspective, which involves empathy. Empathic relationship has been explored in design and HCI. The design of empathy is a personal connection between user and designer that facilitates seeing and understanding from their own perspectives and as people with feelings rather than test subjects. The pragmatist approach to empathy is also used in training professionals in medicine and social work. It involves self and other awareness and practical communication skills such as careful listening and responding. This is important to encourage an understanding of what it is like to be that person in his/her situation.

Vreek [44] use pragmatic-dialogical conceptualization in a communication model of empathy. They highlight that empathy is an affective response to other people and their needs that start from basic needs. Empathy evolves in the context of a relationship where one person learns about the needs of the other by responding empathically. Wright and McCarthy [45] explored some experience-centred practices in design by 'knowing the user' which employs empathic dialogue that is also associated with narrative and with imagination.

### A. Empathic communication as a model of interaction in meeting human needs

Communication has two purposes: to convey information and to define and express relationships between participants. For that reason, nonviolent communication (NVC) is introduced. NVC, also known as empathic compassionate communication, is a communication methodology created by American psychologist and mediator Dr Marshall Rosenberg [46]. NVC proposes that the purpose of communication is to create a common understanding so that information can be exchanged in a way that makes it more likely that all parties will get what they are seeking.

Expressing one's own observations, feelings, needs and requests to others is one part of NVC. Empathy is the second part; this is the process of connecting with another by guessing their feelings and needs. Making an empathic connection in times of conflict, by communicating to another person that we understand their feelings and that their needs matter to us, can be an effective strategy in problem situations. Connecting empathically with another person is a way to meet human needs (Figure 3). The language of NVC helps people to relate with others and have the ability to compassionately connect and offer an empathic presence. NVC encourages people to communicate what is actually going on for them when something is happening that they find pleasant or unsettling. At the same time, it is hoped that empathy would meet the other person's needs as well and would aid both parties in finding strategies that meet respective needs.

Peringer [47] uses NVC as a mediator in order to understand that there are many points of view and to argue that we need to hear and understand them to develop strategies to resolve conflict from the user's point of view. Concomitantly, to understand the user, there is a need to establish relationships based on honesty and empathy that will fulfill everyone's needs. Everything that is said and heard is a request for cooperation, so that all actions can be seen as relevant to needs and every interaction as an opportunity for connection. In addition, NVC language skills are natural and offer a sense of presence, strength and compassion; the skills also support change as they provide a way of translating back and forth between the information part of the communication (the observation and request parts of NVC) and the affective part (the feelings and needs parts of NVC) [48].

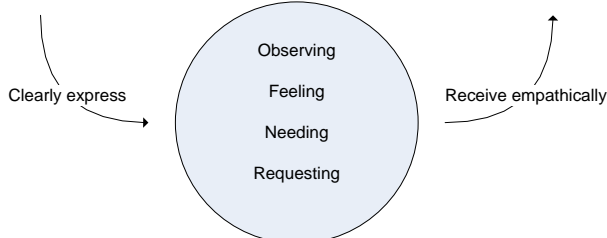


Figure 3: Empathic communication

## VIII. User experience design

Design means the process of modelling use and specifying system behaviour to fit the user's tasks, making it efficient and easy to use and learn. It is argued that all areas of technology usage, such as functionality, usability and user experience, need to be considered in the design of a technology intervention [49]. Furthermore, the appearance of a system also will affect the user experience as the users will express themselves when dealing with the system. Ultimately, usability also will influence the user experience. Poor usability will contribute to negative user experience, which then discourages and lessens the user engagement in using the system in the future.

Developing a good design for community conversation is important. This is because it will satisfy the community members' needs and contribute to the well-being of society [33]. The design will need to have good usability so that people can interact and perform their tasks intuitively and easily. Good usability supports people's creativity, improves their productivity and makes them feel good. Poor usability

leads to frustration and the wastage of time, energy and money. The technology will be consistent, controllable and predictable, making it pleasant and effective to use. McNamara [50] points out that usability relies on the interaction of the users and also the product. A user's ability in using a system depends on whether he or she can communicate well with the system and achieve the task that he or she plans to perform. The need of functionality is clear. It can provide functions for the users to perform their tasks. Functionality itself can affect usability if the functions provided in the system do not match the task that the users want to achieve [51].

Battarbee [9] states that the term 'experience' comes from various literatures that connect the user's disappointment to usability. User experience covers all aspects of the product that include usability and also the positive and negative feelings towards the developed product. Design from user experience should be understandable and holistic, which includes the concept of considering the user, the product and the context of use. User experience also emphasizes the importance of the emotional feelings of the users in their experience in using a product.

In this research, when sharing information or predictions (functionality), users will want a product that is usable (usability) and will want to experience the feeling that they are being supported.

### A. Interaction analysis using NVC

An interaction snapshot has been done from the interaction analysis between a group of farmers and experts via FARMSCAPE [52]. The snapshot is scenario-based and uses assumptions taken from interaction analysis. Currently, the system operates from a web-based system where the farmers and experts interact in a real time mode. The system has an information rich environment where simulations are done from the data given by farmers and then graphs will be generated. Then, images will be displayed when the connection is established which also include audio and video. As the discussion is being done remotely, the explanation of information needs to be carried out slowly and step by step so that farmers can easily follow with the discussion. From the observation, all participants come in unprepared and the exploration of data is done in real time. Time is wasted for both parties because when the experts are explaining the results of the simulation, the other party (the farmers) is 'learning'. From the scenario basis, an information narrative and emotional narrative is analysed from the interaction and photo attached. Information narrative analyses have been conducted using the NVC concept in which observation, needs, feelings and requests of the user when using the current system have been identified. During the process, the designer needs to have a self connection with the users so that expressing with honesty can be done. The scenario is described as below.

#### Situation:

The scenario is the information exchange during the interaction between farmer and expert. The discussion between them assists farmers in making right decision on how to manage their farm.

#### Expert judging and blaming thoughts about farmer(s):

He/she hesitates to express feelings and give response to the information given. All opinions are acceptable. Sometimes, a

quiet discussion is underway among the farmers that are not heard by the experts.

*Judging and blaming thoughts about myself (expert):*

I am excluded in the decision making process and my presence is not appreciated.

From the scenario above, a complete expression has been conveyed which consists of two parts:

*Part 1: Self-connection*

The elements of the first part of the expression is summarised in Table 1 below.

<i>Description of behaviour (observation)</i> Describe other’s behaviour or the situation – absence of judgement, criticism or blame	When I (see, hear, notice, remember, imagine)...that he is putting his head down, concentrating on what he’s been doing and tension is seen in his jaw...
<i>Feelings</i> Express feelings congruently and non-evaluatively	I feel disquiet and tense.
<i>Needs</i> Describe what needs are underlying these feelings	My needs are cooperation, inclusion, connection, mutuality and communication
<i>Request (farmers)</i> Describe an action which is do-able in the present moment, make it positive – what would you like to have happen?	Would I be willing to empathically listen to them first?
<i>Connection to the other: Request (expert)</i> Describe an action which is do-able in the present moment, make it positive – what would you like to have happen?	Would you be willing to tell me how you feel about what I have just said?

Table 1. Elements of self-connection between farmers and experts

*Part 2: Connection with other person (complete expression message):*

*When expert notice that the farmer is putting his head down, concentrating on what he has been doing there is tension in his jaw. The expert feels disquiet and tense because he has not been included in the interaction. Would you (farmer) be willing to tell me (expert) how you feel about what I have just said regarding the results of the simulation?*

As the discussion proceeds, some feelings (namely, disappointment frustration, discouraged, irritation etc.) have been discovered during the discussion process. This is possibly due to the environment which is through computer-mediated communication and it is difficult to express feelings and needs online as farmers do not know the experts. For example, since the interaction is an information rich discussion, farmers need to concentrate on the graph displayed and on the explanation given. Sometimes, they could not clearly see the graph especially the figures which lead them to feel frustration and disappointment. Farmers also will be irritated if they are always being asked about their understanding of the explanation given just to ensure that they are not lost or being too slow. In addition, farmers also will

feel impatient and lose interest due to the amount of time taken for them to discuss remotely (experts need to re-explain if they do not understand) including to reconnect due to technical problems and financial constraints as they need fast feedback on the proposed actions because they need to go back to their work. Back and forth discussion is being done to negotiate and agree on particular matters before decisions are made. Farmers also feel helpless as they need the expert view to assist them in decision making. Their feelings and needs are not clearly defined and conveyed to the experts as they rarely turn down suggestions given although there are always doubts of what has been suggested does not always present a satisfactory result. Therefore, the emotion versus usability of the future system will be investigated in experiments of the possible system. The user experience from the emotional expression and usability are interrelated, so that when bad information is received, negative emotionality is produced. Subsequently, bad usability of the system will lead to negative user experience and negative emotion and vice versa. Therefore, the emotion versus usability of the future system will be investigated in experiments of the possible system in order to foster positive emotional experiences [53].

From the analysis, it has been identified that there are gaps in the mutuality context. In earlier work [38], research reviews on presence has been done to discover any opportunity for incorporating it in the future design of the technology intervention. It appears that the interaction pattern in presence technologies still requires attention in order to design technologies that are effective in creating the sense of presence in the interaction between farmers and experts.

## IX. Conclusion and future work

The aim of our work is to design a system that supports empathy during community conversation. In examining the possibilities of CSCW systems, we have investigated technology already in use to explore how locales can be enhanced to better support the various activities to tackle the unmet needs existing in the process. We argued that the usage of ICT in farming creates an open channel, which can be tapped to enhance the psychosocial wellbeing of farmers in times of crisis by delivering empathy and hope. However, not much is known about the effectiveness of ICT in expressing empathy. Therefore, in this paper we have introduced a hope interaction pattern. The application of this pattern in the rural farming community is the focus of our future work.

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