

## Listening to end-users improves access and usability for climate change website

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**Abstract.** Knowledge transfer is enhanced by engaging potential website end-users in the development of a tool that facilitates the transfer. In order to provide land managers and their rural advisers with high quality information, a digital library of resources on climate change topics has been developed and is available via an internet website, [www.climatecloud.co.nz](http://www.climatecloud.co.nz). The library was constructed with several key indicators in mind: credibility, trustworthiness, attractiveness and functionality. Focus groups of potential website end-users endeavoured to discover what these key indicators mean to the end-users and to uncover other design elements that might assist in the uptake of the library's offerings. The insights gained about the key indicators from the focus groups and individual testing enabled the digital library developers to design and implement features specifically for the needs of the land managers and their advisers, such as simplifying the search tool. This gives us greater confidence that the library will be used and as a result of this, knowledge transfer will occur because end-users expectations are met.

**Keywords:** engagement, resilience, decision making, focus groups, resources, indicators.

### Introduction

Knowledge transfer is an important element for creating resilience and building adaptive capacity in New Zealand land managers and their rural advisers as they attempt to manage the impacts of climate change (George et al. 2007). Before knowledge transfer can occur relevant information needs to be available. This process is variable and dependant on the system under consideration (Michaels et al. 2006; Rowley 2007). Barriers to information uptake exist when the information is widely dispersed across organisations and inaccessible to computer search engines. Databases accessed via the internet allow the flow of information from a centralised collection to the website visitor and is one step to removing this barrier. However, knowledge is only created when meaning is made of the information available.

The Ministry for Primary Industry (MPI) Climate Change Resources project was initiated with some New Zealand primary sector organisations (AgResearch, Scion, NIWA and PGG Wrightson Consulting). The project aimed to help land-based sectors to become better informed and to assist with decision making and therefore be more resilient and adaptable to the challenges and opportunities of climate change.

The five parts of the project were to:

1. Investigate land manager's current knowledge levels and interests and find out what additional information on climate change was wanted.
2. Collect and collate existing climate change and greenhouse gas resources suitable for land managers and their rural advisers.
3. Identify gaps between what new knowledge was needed and what was available in the existing range of resources.
4. Develop new resources to fill the gaps.
5. Place all resources into a web-based digital library.

This paper refers specifically to the fifth requirement in this project, the development of a web-based library to act as a repository for climate change and GHG resources for land managers and their rural advisers. The contents of the library are targeted to the New Zealand land-based sectors to provide timely access to peer reviewed information and research findings to assist sector land managers in understanding and responding to the challenges and opportunities of climate change.

A digital library was chosen as the tool for storing information about climate change because it allows the items in the repository to be categorised and organised to cater most effectively for the end-users' needs. Jeng (2005) provides a definition of the digital library as 'an organised and managed collection of digital information, that is accessible over a network and that may include service'. Providing information held in a digital library through a website has become common in the recent past (Saragevic 2000). Publications on climate change were reviewed for inclusion into the library, and metadata (descriptive keywords) about each resource were applied. An important consideration of digital library design is ensuring that people can successfully search for and retrieve information via a public website. The design and

development of a tool such as this is both a technical task and social process (O'Neill 2001 and Saragevic 2000).

The Climate Cloud website ([www.climatecloud.co.nz](http://www.climatecloud.co.nz)) and digital library were developed to a point where it was considered to be functional and presentable. However, successful uptake of the resources in the digital library depends on how well the needs of the end-users have been understood by the developers. One way to understand their needs is to involve a sample of potential end-users in the development of the website.

Most adults enjoy learning in a social context where open discussion, sharing of ideas is encouraged, all the opinions of the group are valued and the learning is achieved collaboratively (Mezirow 1997). Adults, with an accumulation of life experience, are able to reflect and build new insights from their past experience. These, learning preferences were taken cognizance of by allowing the study participants to 'teach' the developers what an attractive, functional and credible digital library and website would look like. Therefore, a focus group approach was adopted to give the developers confidence the library will meet the needs of our end-users (land managers and their advisors).

The aim of this paper is to report on how the use of focus groups informed and added value to the development of a digital library and its associated website. This paper addresses the question of, 'Did engagement through focus groups provide information that informs the design of the library so that it is more useable to end-users?'

### **Focus group methodology**

Digital libraries and websites can be evaluated in many ways (Jeng 2005; Chiou et al. 2010). Website design and development can be assisted through a focus group participatory method because it is an effective means of reaching some common understanding between the developers and the users about what makes a website usable (O'Neill 2001). A workbook was developed as a pragmatic solution to combine hands-on exercises and discussion to guide the focus group sessions because it allowed participants to individually undertake website evaluations which then could be discussed collectively. The questions in the workbook were presented in a variety of formats to cover a range of preferences for how participants preferred to record their responses. For example, some information was captured with likert tables or by tick boxes but there were also open questions with space to write answers. Some of the exercises were completed individually and others in pairs or in group discussions because adults are able draw on their life and work experience to solve problems (Mezirow 1997). Creating a workbook with a variety of tasks is likely to keep the participants actively engaged but also prevent individuals from becoming too engrossed in any particular question. As a reference point for the discussions on the digital library, the study participants were invited to view five other pre-selected websites. The inclusion of these websites with differing styles of language, colours, themes, layout, images, and videos was to allow for feedback on features that were not already part of the climate cloud.

The key areas of interest on which to gather feedback from focus group participants were the appearance, functionality and the credibility of the website, similar to Schaupp et al. (2006) (information quality, system quality, perceived effectiveness, and social influence) and others (Hong 2004; Lee 2006). The appearance section of the work book focused on the participants' initial judgments on the layout of the pages, the colours, fonts and language style of the climate chance website, focusing on the homepage in particular, for example, 'Is the language on the climate cloud website 1) not formal enough, 2) about right, 3) too formal?'. Information about functionality of the website was gathered by asking the participants to perform one or two searches, as time allowed, and asking them to report on their experiences, for example, 'Did you use the refinements to help you locate the article?'. What makes a website credible or trustworthy was determined by asking open questions about past experiences with using websites and also by commenting on specific devices that might be employed to re-assure a potential website visitor that a site is safe such as: endorsements from known individuals, roles in agriculture, or organisations, as well as the inclusion of recognised logos or images. An example of an open question was, 'In general, how do you usually decide if a website is trustworthy and credible to use?'

To cater for adult learning preferences (Mezirow 1997), participants met in small groups of between 6 and 7 people. Three of the sessions were held in the early evening to avoid interrupting people's work schedules and one of the sessions was held in the afternoon. The location and room for the groups was set up to be convivial and conducive to open conversation. Refreshments or a light meal were offered at the end of each session.

The five participant demographic parameters of interest were: age, occupation, gender, location, time currently spent on the internet, and use of smart phones (Table 1). Internet and smartphone usage were chosen as indicators of experience with technology and websites. Occupation was a pre-determined demographic because the end-users for the website were land managers and their rural advisors.

**Table 1. Overall demographics of focus group participants.**

	<b>Number (28)</b>	<b>Percent (100%)</b>
<u>GENDER</u>		
Male	18	64%
Female	10	36%
<u>AGE</u>		
20s	7	25%
30s	5	18%
40s	8	29%
50s	6	21%
60s	2	7%
<u>OCCUPATION</u>		
Farmer	16	57%
Rural Professional	12	43%
<u>LOCATION</u>		
Canterbury	7	25%
Manawatu	21	75%
<u>RESPONSE TYPE</u>		
Focus group	25	89%
Individual	3	11%

Most of the library development feedback was gathered from focus groups. Some study participants could not attend the focus groups. In these cases individual interviews were conducted in the participant's own environment. One individual worked remotely at their farm computer in a self-directed fashion through the questionnaire and also followed up with a discussion via the telephone.

The facilitators' role in the focus groups was to guide the participants through the workbook and stimulate conversation and the formation of ideas while also staying impartial. There was also an impartial observer present at all the focus groups who captured ideas from the general discussions and noted any extra information arising independently from the workbook questions. These roles included elements of engagement with the participants and observation of their behaviour in order to be open to co-learning opportunities.

Analysis for the website development included the tabulation of the focus group and interview data and where possible the quantitative data was summarised using descriptive statistics. The qualitative data were assessed in terms of:

- What are the key features of a credible, attractive and functional website?
- What issues do we need to address with the current state of the website?
- What novel ideas did the participants put forward?
- Was there anything additional needed to specifically cater for the preferences of land managers and their advisors?

## **Results and discussion**

### ***Enrichment from the focus group process***

There are many benefits of using the focus group approach, such as the efficiency of working with one facilitator to many participants. It is an effective way of gathering a combination of rich qualitative and quantitative data. The additional observational and contextual data gathered during focus groups allows for a more enriched and thorough interpretation of the participant responses to the questions. Goodman (2011, p. 13) says:

Interaction is key, and one of the more distinctive characteristic of the focus group is the ability of group members to share their thoughts and ideas in a group setting [leading to a more] nuanced perspective on a topic than could have been discovered through individual interviews.

The enrichment provided from 'actually hearing and experiencing the thoughts and feelings of group members expressed in person as opposed to unilateral, non-interactive collection methods' (Goodman 2011, p. 14) led to co-learning outcomes between the facilitators and the participants and this gave the website developers confidence that the needs and concerns of potential visitors to the website were understood.

Bringing together the knowledge and skills of the study participants and the facilitators in a participatory setting such as this, enables better results to be achieved compared to working alone (Hoffmann et al. 2007) because the facilitators are able to more fully understand the intensity of the end-users reactions when unexpected things happened. For example, the developers were made more aware that the functionality of the search capacity and the outcome of the search are likely to be highly important factors effecting the success of the website as a result of observing the study participants in action. Two search outcomes caused strong reactions amongst the study participants. When a study participant searched for information but did not get any results the participants expressed disappointed and indicated they would simply give up and leave the website. Conversely, when the search outcome provided too many results the some participants felt very overwhelmed. However the reactions varied, some participants simply gave up and others looked for ways to narrow down the number of results. The group reaction to these experiences, the resulting discussions and problem solving adds value to the focus group approach, and this led the developers to re-think the search function to minimise either of these scenarios occurring.

The advantage of working with potential end-users is that developers gained an appreciation about what is important to the end-users and what is not, rather than relying on their own assumptions. An example of the developer's decision making having benefited from the direction provided by the focus group data was the inclusion (by the developers) of an advanced search feature on the front page. It was assumed by the developers that this feature would assist the search of the end-user, however the feature created a negative experience and consequently, very clear feedback from the study participants *against* this feature was received. As a result of this feedback, the developers removed this feature from the home page replaced it with a simpler search box. This type of considered feedback allows decisions to be made quickly and with confidence about the website development.

The data collected from the discussions and observations by the facilitators was another benefit of using a focus group for feedback. For example, one set of participants gave feedback about the website design; however, they had strong views about the cause of climate change which had potential to over-shadow the discussions. Differentiating between causes of climate change and finding solutions on managing climatic impacts makes them willing users of the site. This highlights the importance of the social context of the end-users, so the language used and the information available in the library could have as much impact on library use as any other criteria. If the workbook data was being collected using a more impersonal method this enrichment is unlikely to have surfaced. This enrichment allows the developers to understand the needs of an otherwise 'hard to reach' segment of the target audience. In response to this feedback the developers re-assessed the language and terminology on the home page to focus more on the resilience to weather extremes rather than climate change.

The workbook was developed around three separate key indicators: credibility, appearance and functionality. However, it became apparent to the facilitator through the focus group process that there was overlap between these indicators. This inter-linked nature of the data became apparent because the study participants gave answers from one set of questions which appeared to be the answers to questions in other sections of the workbook (Table 2). Because this occurred in a focus group setting where the facilitator was present, the facilitator was able to adapt the line of questioning as the individuals in the group progressed through the workbook. This experience provided a co-learning opportunity for the facilitators because witnessing and analysing this 'apparent' confusion led to insights about what constitutes a credible website in this instance. Once again, observing the participant behaviour enriched the data and will support the developers' decision making with regard to prioritisation of website development, for example adding links from images on the homepage to information in the digital library.

**Table 2. Examples of the overlap between three indicators of this website useability.**

The developers included images on the front page to help the end-users identify with the website content and improve the appearance of the website. However the study participants also wanted the pictures to link to information therefore the images improve the appearance **and** they are functional.

Videos were considered relevant by the developers because they provide information and the study participants also suggested videos of known and trusted peers presenting case studies as a way of increasing trust **and** the credibility of the website.

### ***Logistics and practicalities of the focus group***

The focus groups were selected in the first instance by their occupation. The hypothesis was that rural professionals and the land managers might have different needs regarding website use and the way the information is presented. However, in these focus groups, there was a wide variation in responses within demographics. This resulted in no patterns in participant responses between different demographics. The lack of demographic difference gives the developers' confidence that the opinions of the end-users were captured in the focus groups despite the small sample size of participants within these demographics. There was no difference in response between groups was also true for participants who answered individually. The individual study participants gave similar kinds of responses to the workbook questions as those of the farmers and rural professionals and were equally able to generate novel ideas.

The practicalities of the focus group settings may have had some influence on the level of participant engagement. The size of the computer screens has the potential to hinder eye contact with the facilitator and participants. The arrangement of the computers in the room has the potential to either enhance or impede conversation. However, in all focus groups the facilitators were able to stimulate useful discussion despite the physical limitations.

Timing of when to gather focus group feedback can have considerable influence on the value of the feedback (Pitariu et al. 2009). Consideration was given to when in the life cycle of developing the digital library and website, should the developers engage with the end-users to seek feedback. For this project, the developers decided to engage the end-users when there was a moderate amount of infrastructure in place and some items/resources about climate change in the library so that the study participants would be able to search for and find information. It was reasoned that, if the end-users were consulted too early, their feedback and suggestions might be too wide ranging to give practical direction to the project and maybe beyond the software's capacity. Conversely, if the developers engaged with the end-users too late in the process, too many features which the participants did not like may have been implemented and undoing this work would be costly. The use of five pre-existing websites in the focus group allowed for the feedback to occur in the development phase of the website construction by asking about features not yet added to the Climate Cloud. The feedback received during the focus groups suggests that the timing of the focus groups had been at the optimum time in the development process for adding value and shaping the end product. After the developers have responded to the first round of focus group feedback, the end-users can be re-engaged as the website continues to be developed.

Open access to the website is the first step towards facilitating the flow of climate change information to New Zealand land managers and their rural advisors. However, just opening a website does not necessarily mean knowledge transfer and behaviour change will occur. Other extension or outreach activities will likely be necessary to facilitate the creation of knowledge to assist with managing the risks associated with the impact of climate (George et al. 2007). These activities might include the traditional workshops and face-to-face demonstrations of the climate cloud website but they might also include communication about the website and the resources through electronic communication and social media such as blogs, webinars and discussion forums.

### **Conclusion**

Focus groups provided valuable information for developing a digital library to cater for different land manager and rural advisor needs for accessing climate change resources. The focus group participants identified areas for website design changes that would improve access and usability. Using focus groups proved to be an efficient way of reaching end users of the library. The social context of the focus groups adds enrichment through co-learning between the end users and facilitator-developers. The co-learning is afforded by interacting with and observing

the participant discussions and responses to workbook questions, allowing new insights to emerge. Hence, both the formal evaluation by end-users of website functionality and typology; as well as the understanding of the social context that the library will be situated provides useful and valid information for designers on improving useability.

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