Using a scenario-planning tool to support an engaging online user experience

Jon M Pearce
The University of Melbourne
Parkville, Australia, 3010
j.pearce@unimelb.edu.au

John Murphy
Novell Pty Ltd
St Kilda, Australia, 3004
john.murphy@novell.com

David Patman
Centrelink
Melbourne, Australia, 3000
david.patman@centrelink.gov.au

ABSTRACT
This paper describes a pilot project to research the use of a dynamic visual interface as the basis of a scenario-planning tool. We introduce 'flow' as a theoretical framework that underpins the research, describe the design and development of the software tool and, through its evaluation in user-testing trials, we develop the ideas of scenario-planning in the context of providing e-government online services. Finally, proposed future research is discussed.

Author Keywords
e-government, self-service, flow, engagement, scenario-planning

ACM Classification Keywords
H.5.2 [Information Interfaces and Presentation]: User Interfaces – interaction styles, user-centred design, graphical user interfaces (GUI), theory and methods; H.3.5 [Information Storage and Retrieval]: Online Information Services – web-based services; H.1.2 [Models and Principles]: User/Machine Systems – human factors, human information processing, software psychology.

INTRODUCTION
Governments worldwide are grappling with the problems of escalating demands for government services brought about, in part, by an aging workforce (Accenture, 2005). Such services are designed to help citizens stay in the work force longer, find jobs after mid-life retrenchment, or re-enter the workforce after being absent for reasons such as taking on the role of a carer. They have traditionally taken the format of interviews by phone or face-to-face contact. However, existing services are stretched and governments are turning to the Internet – 'e-services' or 'self-service' – for help. Whereas such services are growing rapidly, they tend to offer little more than an ability to enter data into forms, or provide information via Web pages.

Online services also play an important role in presenting an image of government departments to the citizen. A recent report in Australia from the Department of Communication, Information Technology and the Arts on trust and growth (DCITA, 2005) highlighted that organizations and government agencies are becoming concerned that online transaction experiences do not just deliver convenience and effective services to online users but also promote trust and reliability. Dealing with the customers' concerns of potential fraud, privacy, and information misuse among others, has become a focus of attention in the implementation of these services.

There is a clear need to provide self-service in such a way that the requirement for interaction with customer service staff through face-to-face interviews or telephone-based support centres can be reduced. At the same time, it is important to continue offering valuable and considered advice on important issues. Dealing with personal issues is not the place for a simplistic computer-based automated response system, yet online services need to be offered that in some way do provide appropriate support.

The research described here addressed this problem through the design and development of a prototype for an online system that encouraged citizens to partake in reflective engagement that would be of value in preparation for a consultation with a human advisor. By 'reflective', in this context, we mean that the citizen is supported and encouraged to think about their own situation in response to suggestion presented by the system. In this way the later interaction between the citizen and the advisor can be made more effective, more efficient, or even maybe not necessary at all. The prototype began with the aim of simply capturing some of the simple personal data used in the existing face-to-face interview process. However, during the course of the research, it evolved to supporting the use of scenarios to help the user in this reflective process.

The context of this research was the services offered by Centrelink – a large federal government agency responsible for delivering employment-related payments and services to facilitate citizens' involvement in the workforce. The participants in the research were existing Centrelink customers who were currently seeking work.

In this paper we present the background to this work, introduce the underpinning theory of 'flow', describe the design, development and testing of the software system, and then describe how this has led to developing innovative ideas for facilitating online scenario-planning in an engaging and enjoyable way to obtain useful outcomes.

OZCHI 2006, November 20-24, 2006, Sydney, Australia.

OZCHI 2006 Proceedings ISBN: 1-59593-545-2

THEORETICAL BACKGROUND

The primary aim of this project was to design an engaging Web experience by allowing customers to play with and explore different screen elements using a *dynamic query* approach (Ahlberg, Williamson & Schneiderman, 1992). The characteristics of dynamic query facilitate change and adjustment of different scenarios as the customer explores the impact of decisions that can potentially be made. This differs from entering data into an online form in that it does not force the customer into a linear path of query followed by results display. Instead, it allows different exploration paths to be explored that might suit better the customer's needs and preferences.

A conceptual underpinning to this research is the notion of 'flow'. 'Flow' is a term coined by sociologist Mihalyi Csikszentmihalyi resulting from a study in which he explored the range of experiences we have in everyday life and identified some that give a strong sense of well-being or happiness (Csikszentmihalyi, 1975). Flow describes the experience someone has when they are deeply engaged in a task – 'in the zone' – experiencing something that, on reflection, was enjoyable. It is often associated with intense physical activities such as skiing, athletic training or rock climbing, but also with more intellectual activities such as computer programming, surgery or Web exploration (see, for example, Chen et al., 1999; Csikszentmihalyi, 1975; Csikszentmihalyi, 1995).

The flow experience can be categorised into three stages: 'antecedents', 'experiences' and 'effects' (Chen et al., 1999). It is the antecedents that are most relevant to designing for a flow experience. They tell us much about conditions that might motivate a person to engage in a task and persist with it. The antecedents for flow are (i) a clear set of *goals*, (ii) timely and appropriate *feedback*, and, importantly, (iii) a perception of *challenges* that are well matched to the person's *skills*.

The goals of a task are clearly important in that the person needs to know what they are expected to do, and feedback gives continual information about how well they are achieving these goals. However, the matching of challenge to skills is not so obvious. If a task is too challenging for a person's skills, then they are likely to get anxious and frustrated and give up. On the other hand, if the task is perceived as too easy, they are likely to get bored and also give up. This behaviour has been observed in a wide range of studies including some looking at the behaviour of people visiting websites in order to purchase goods (Novak et al., 2000) – a situation not too dissimilar from the context of this research. Providing an online environment that offers appropriate challenges to match a person's skills, and also presents clear goals together with feedback as to how well they are achieving those goals, is essential if one is to maintain that person's interest and engagement with the site.

A full discussion of flow, and the underlying concepts, is presented in Pearce, 2004.

The relevance of flow to this research lies in what it tells us about focusing a person's attention on a task and maintaining their interest in it. For tasks with a reasonable degree of complexity the challenge is to strike a balance between engaging with the task itself and engaging with the elements of the user-interface that present the interactive opportunities to the user (Pearce & Howard, 2004). By drawing on the flow research in the areas of Web use, marketing and HCI we are able to use this theory to inform the design of engaging customer experiences.

The design of the software for this project benefited from flow theory in two ways. Firstly, flow offered suggestions about the design of online experiences that would maintain a customer's engagement during specified tasks. The tasks needed to present challenges appropriate to the experience of the customer, and to provide continual feedback on the customer's interaction. The tasks also needed to have an exploratory or playful nature since flow is closely related to 'play' – a playful nature to the customer's interactions will help foster a flow experience (Webster & Martocchio, 1992).

Secondly, the experience of flow is a positive one that should leave the customer wanting to return for more. The research question here is not so much one of how can we entice a customer to stay 'in the zone' for hours while entering data on the Web, but rather can we give them an experience that is sufficiently engaging and enjoyable so that they are encouraged to explore freely and yet maintain a focus on the task? Will the customer leave with a positive emotion and consider returning to explore further at another time? An engaging experience of this nature should leave the customer with a positive feeling about Centrelink as an organisation and impact on the sense of identity that the customer forms about Centrelink.

AIMS OF THE STUDY

The project aimed to explore ways of designing a more 'engaging' online experience for older unemployed Centrelink customers as an alternative to existing simple and relatively 'non-interactional' online form-filling processes. The study used as a focus the current Centrelink customer process of determining and exploring a customer's 'readiness for work'.

We needed to design an interface to obtain data similar to that collected via the current process, but also to allow the customer to interact with the data in a way that would be helpful to them in developing a better understanding of their personal situation in relation to job readiness. The data collected were not intended as a substitute for the current data collection process, but rather to form a preliminary step that would begin the customers in a process of thinking about themselves and allow them to explore the parameters involved and observe their impact.

To address this aim we used the idea of 'scenario-planning'. This combines scenarios with online dynamic query to form a powerful mechanism for educating people about complex situations. In this case, they were also used to encourage Centrelink customers to explore the different factors involved in getting back into the workforce by considering the individual factors

constituting work-readiness, as well as the overall context, in an exploratory fashion. Scenarios are described as 'informal narrative descriptions' (Carroll, 2000) and are a powerful design tool based on storytelling. They have become a standard technique in human computer interaction work and are used in a multitude of ways from envisioning potential designs to constructing usability tests. In this case we sought to encourage the users themselves to create scenarios to plan out their future in relation to returning to work. The project adopted this approach by asking the participants first to explore their own scenario regarding their readiness for work through the use of a computer prototype, and later to consider the scenarios of other people. They were put in an environment in which they could make continuous shifts between entering their own data and examining the options presented. The immediate feedback received as a result of their actions was expected to trigger more reflection and further exploration of the scenarios presented.

For this study, 'engaging' was defined at three levels. Firstly, a user interface designed according to user-centred design principles to support Centrelink customers informational needs, clear visualisation, navigation, input and feedback of data. Secondly, interaction designed to support exploration and planning of scenarios reflecting the participants' current experiences and supporting them to envision various future situations. Thirdly, and most subtly, creating a user experience involving 'flow' as discussed above.

In essence, the idea was to move customers away from a form-filling exercise towards one of using the Internet to prompt reflective thinking about themselves.

The next section describes how these ideas were implemented and tested.

DESIGN AND DEVELOPMENT OF SOFTWARE

The design of the software aimed to invoke within the customers a sense of exploration, while at the same time, allow them to enter personal data about themselves. To achieve these aims, the software had to be graphically rich, enable a reasonably large amount of personal data to be entered and viewed, allow the customer to see the impact of these data at different levels of granularity, and present a set of suggested options to the customer that might entice further exploration.

The intended use of the software was similar in nature to the 'mortgage calculator' that one often finds on banking websites. These calculators allow one to investigate the effects of interest rates, loan periods, repayment methods, etc. on the repayment of a loan. The bank receives none of the customer's data, but the customer becomes better informed to later meet a bank manager and discuss a loan. In a similar way, the software described here allowed the customers to investigate parameters affecting their chance of obtaining work, explore and think about their impact, and later possibly discuss these issues with a Centrelink employee.

To encourage exploratory user interaction, we drew on our understanding of the concepts of 'flow' in aspects of the design. To achieve flow in a computing environment one needs to have clear goals, and receive timely and appropriate feedback as to one's success in achieving these goals. One needs to experience a feeling of being in control. The environment needs to be interesting and 'playful' – often achieved by rich interactions or a sense of novelty. This combination of interest and playfulness in a supportive environment should encourage the users to explore, consider 'what-if' questions, and feel a sense of immersion with the experience. Through these interactions customers should develop a better understanding of the issues that might be important (from a Centrelink viewpoint) to getting a job.

Design process

The design of the software had to incorporate the exploratory environment with an underlying mathematical model that related a user's personal situation to their readiness for work. The process to achieve this involved searching for novel ways to present the input and output data, as well as a method to communicate requirements to both an interaction designer as well as to a programmer.

Ideas for the visual design of the screen were modified from 'treemaps', a concept pioneered to visualise large information spaces by Shneiderman in 1992. The use of these has been adapted to various settings including a representation of the New York stock exchange by SmartMoney.com (www.smartmoney.com/marketmap/). Treemaps use shapes to represent components of an information space, and use the properties of the shape's size, colour and relative location to support a user in quickly gaining an overall understanding of the space. We adopted this concept to support a Centrelink customer understanding the relative importance of the factors involved in work readiness.

The process of communicating with designer and programmer involved presenting each with as close as possible to a working model in each of their respective domains: detailed wire-frame mock-ups in PowerPoint for the designer, and a detailed working mathematical model developed in Excel for the programmer. This was a very successful way for each of them to understand our needs and to test their work.

User interaction

Macromedia Flash was chosen as a programming environment since it allowed rapid prototyping and can provide a highly interactive user experience. Although Flash has improved its accessibility features in recent years, it was not necessarily assumed that a deployed version would be programmed using this technology. The design comprised three screens, allowing the user to move freely between them once the initial information on the first screen had been entered.

The first screen allowed the user to enter information that was unlikely to be changed through the course of the session, namely: gender, age, time since last employment

and number of recent address changes (Figure 1 shows the input section of this screen).

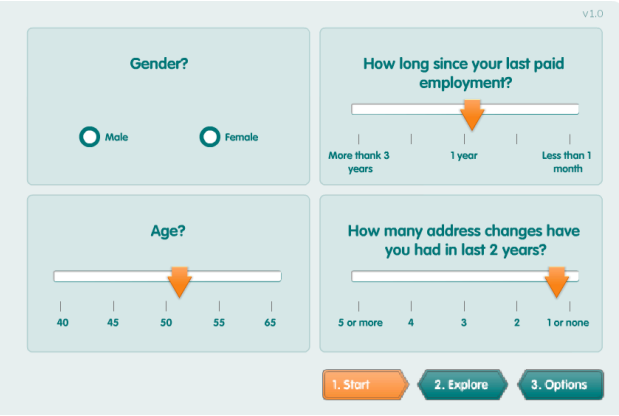

Figure 1 Input section of first screen of program

The second screen ('Explore screen') allowed the user to change the values of 13 parameters relating to factors that impact on readiness for work (Figure 2). For example, "what is the level of your education?"; "how do you rate your writing and speaking skills?"; "how confident are you in an interview?"; and so on.

Each of the 13 parameters was represented on the screen by a coloured square that displayed a slider when clicked on (Figure 2). Using a slider for input helped to alleviate any feeling of precision in the responses users might give, as well as giving the software a more engaging, interactive feel. A description of each parameter was displayed with the slider. The size of the coloured square represented the importance of the parameter (a weighting factor); the colour of the square strengthened as the user moved the slider to the right-hand end of its scale.

After these parameters had been set, the user moved on to the third screen, which represented their readiness for work by the intensity of the colour of an 'average' image of the whole irregular squared pattern (Figure 3). The more intense the colour of this pattern, the more ready they were for work. The relationship between the 13 parameters and this 'output' image was loosely based on prior workforce research.

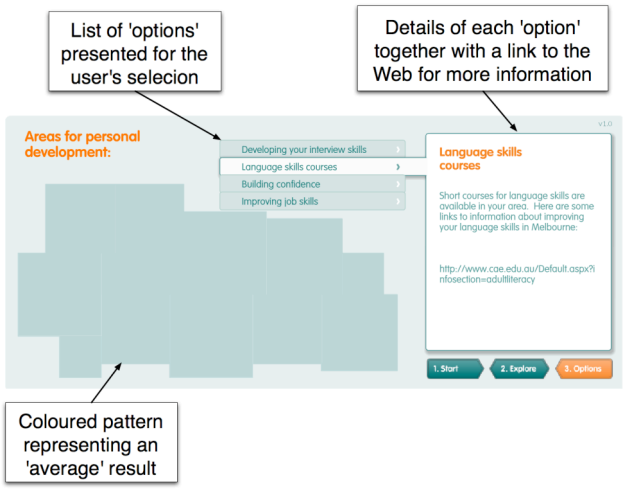

Figure 3 Annotated third screen of program: 'Options'

The right-hand side of this screen displayed 'options' comprising a short message and a link to an appropriate website. These links were not active for the purpose of testing the software.

Having looked at these options, the user was free to return to screen 2, or screen 1, and makes changes and observe the effects. This iterative process could continue for as long as the user wanted.

Software design – the underlying model

A mathematical model was used to calculate a customer's readiness for work and to determine which of the options

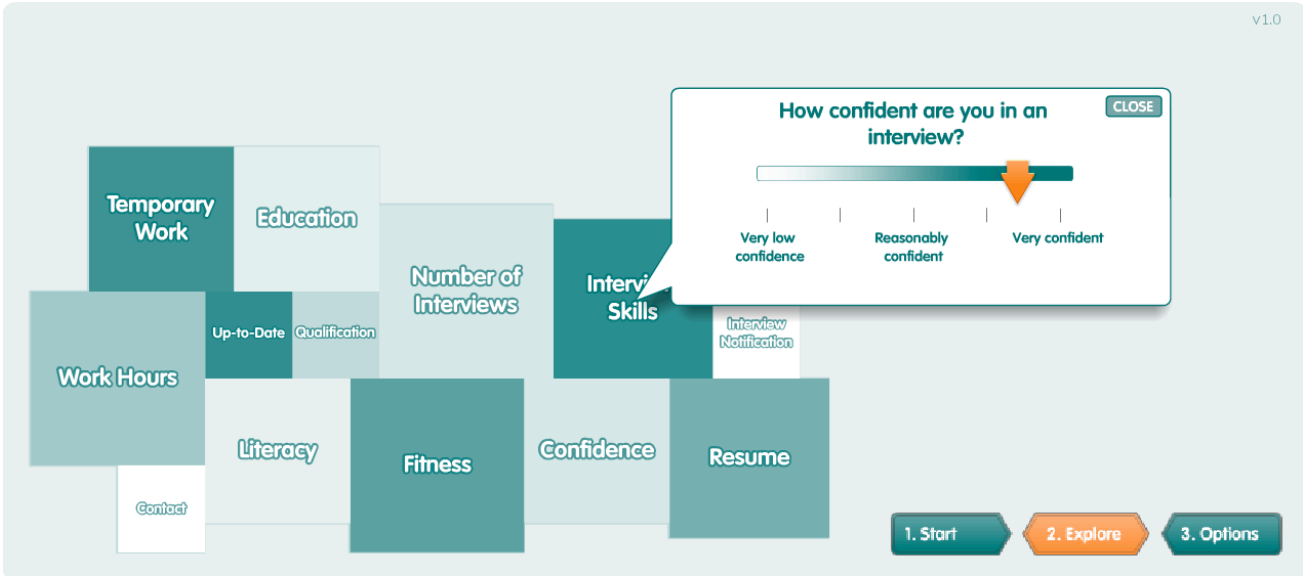

Figure 2 Second screen of program: 'Explore'

should be displayed.

Readiness for work was calculated from a weighted sum of the 17 parameters. The exceptions to this were three parameters that had dependencies on other parameters (these pairs were: fitness and age; education and language skills; confidence and recency of finding work). These dependencies made the model slightly more complex and less likely to be seen as too simplistic by the users.

Which options to display on the third screen was determined by certain parameters being set below a threshold value. Again, to make the model less predictable, some options required the combination of two parameters to drop below a threshold before they would be displayed (these pairs were: résumé skills and recency of interviews; age and qualifications; age and education).

Technical design

Whereas the program is presented as a Flash movie that can be run from within a browser or standalone, all the text data and mathematical weightings were stored in an XML file and loaded at run time. This makes the program highly flexible and very adaptable through simply editing the XML file with a text editor. For example, the descriptions of each parameter presented to the user can be edited, as can their weightings, scale markings and the threshold of triggering the options display.

USER TESTING

The software was evaluated using surveys and focus groups within a usability lab. Four groups of six Centrelink customers were invited to explore the system. These users completed an introductory survey relating to their prior experience with Centrelink; worked through several rich scenarios describing differing personal situations; completed an 'experience' questionnaire probing their understanding of the program and their experience with it; participated in a focus group discussion about their experience; then completed a final questionnaire relating to the scenarios that they had worked through.

The 'experience' questionnaire was the main instrument used to gauge experiences of flow during the session. It comprised, in part, eleven Likert scale questions seeking responses on the participants' feelings of control, engagement and enjoyment. This questionnaire, and similar, has been used in other studies in measuring flow (Pearce, 2004; Trevino & Webster, 1992).

The variety of data from these sessions was analysed to provide feedback on the design of the system as well as information about the users' interaction with it from an affective point of view.

OUTCOMES AND DISCUSSION

The application successfully showed the potential to help customers take an active role in planning a pathway towards self-sufficiency in several ways. Firstly, the prototype enabled customers to understand all the factors contributing to readiness for work and their relative importance; secondly, it allowed customers to rate themselves on each of these factors and cumulatively provide themselves with an overall rating

Less experienced online users were able to effectively engage with and explore the prototype with minimal or no training, demonstrating the potential accessibility of the approach for customers who are less familiar with the Web environment.

The analysis of the user-testing provided valuable information in three areas: the design of the software application, its use to support exploration of scenarios, and its ability to encourage flow. We address each of these in turn below.

Evaluation of the software application

As with any usability testing, numerous useful and detailed comments were received regarding interactions with the software. We were interested specifically in the interface design and how it supported the understanding and manipulation of the interface. Two particular issues arose that are of general interest to note.

First, the use of colour and size of squares to represent the value and weighting of each parameter entered had mixed success. The changing *colour* of the squares was noticed by most participants as it mapped directly onto the position of the moving sliders. Some, however, interpreted this as simply an indication of the status of the system changing rather than recognising the relation between colour and parameter value. Few participants recognised that the *size* of the squares indicated the importance of each parameter to the final outcome. This was a non-trivial task since it required constant comparing of the size of one square with another in order to assess which had more or less impact on their overall readiness for work. The fact that the 'average' pattern presented in the final screen had a colour representing a weighted average of all their settings (and hence represented how well prepared they were for work) was not picked up by many participants at all.

Second, the irregular shape of the pattern of squares was found by some participants as messy and unclear. Some suggested that a more conventional list-based display would facilitate the navigation and the easy identification of particular parameters. The freedom to select parameters in a random order was perceived as unnecessary.

Whereas both of the above issues suggest design problems that need addressing, they were indicators of a subtle underlying reluctance on the part of the participants to become immersed in the system and explore. We attribute this, in part, to the prior experiences of the customers that we had chosen. The participants had been customers of Centrelink for quite some time and may have formed expectations about that the nature of the interaction that they were likely to have with Centrelink. For example, they were perhaps anticipating, and even seeking, a straightforward sequence of actions to follow towards a specific goal (for example, a recommendation to follow a course of action, a suggestion as to what to do next, maybe even a referral as an outcome). Theirs was an

approach of 'lead me through the steps to provide the information you want, then tell me what I should do next'. Our aim, however, was to encourage participants to 'enter your data in any order you wish, look at what the system suggests, then go back and make some changes and see what the impact is'. We clearly have to work harder to provide an affordance of exploration when dealing with people who have reasonably strong preconceived ideas about the nature of the interaction that an organisation might provide.

Supporting exploration of scenarios

Participants successfully used the prototype tool to interactively describe their own situation and envision other situations. This confirmed to us that one can design an online interaction around 'form-filling data' that is significantly more engaging and valuable for users in the context of interacting with e-government.

However, as we modified the tasks during the experiment sessions, we became more aware of the powerful application of this idea as an 'interactive scenario-planning tool'. Tools for scenario and 'what-if' planning have been successfully used for very limited financial applications such as online 'loan calculators'. By privately exploring options for structuring and repaying loans, a user can become informed and prepared for the actual process of the loan application. In a follow up discussion with the bank, the user would be in a better position to ask questions and interpret meaningfully the responses.

Such a tool offers a user benefits in two ways. First, an interactive scenario can be used to support individual reflection. Scenarios, based on storytelling, are an effective mechanism for educating people about complex situations. Combining a scenario with user-inputted dynamic queries and rapid feedback provides a mechanism for the user to explore that scenario and come to understand the significance of, and relationships between, the various parameters. In this context we see this kind of application as supporting a user to reflect on their own situation and become better informed before moving on to the next step in a process of enquiry (for example, preparing for an interview by first spending time exploring a scenario in order to sort out which aspects they might valuably discuss at the interview).

Second, the data entered by the user while using such a tool can help sort and prioritise further information that they might need access to. In the context of our experiment, the 'further information' comprised the short pieces of text on the third screen (Figure 3) that were essentially annotated links to web-based information. However, there could be a vast amount of information relevant to the user, and it might be scattered throughout a Web site or, even if it's accessible from one Web page, it might not be sorted to the particular user's priorities. The challenge here is to support users to navigate effectively this large amount of semi-relevant and non-relevant information. Scenarios, combined with dynamic queries implemented in software, provide a way of integrating the information search process with the reflective process of understanding conceptual links between the information they are searching.

Ability to encourage flow

An indication of whether participants experienced flow during their exploration with the software can be gauged by examining their response to the 'experience' questionnaire recording indication of control, engagement and enjoyment (Pearce, 2004; Trevino & Webster, 1992). Table 1 shows the average response to each set of questions (on a Likert scale of 1 to 5, with 5 representing 'strongly agree') for each of the four groups of participants, together with average responses.

Table 1 Indications of flow

	Grp 1	Grp 2	Grp 3	Grp 4	All
Control	*3.8*	*3.0*	*3.1*	*3.3*	*3.3*
Engagement	*3.7*	*3.2*	*3.7*	*3.6*	*3.5*
Enjoyment	*4.1*	*3.3*	*3.4*	*3.6*	*3.6*
Average	3.9	3.1	3.4	3.5	3.5

The values in the last column of the table, 'All participants', do not indicate strong positive responses to any of the three indicators. Although the group as a whole exhibited moderate perceptions of control, engagement and enjoyment, there were individuals who indicated disagreement, or strong disagreement, to the statements presented.

Although the number of participants in each group was too small to look for any statistical significance between the groups, it is interesting to note the difference between the first group and the others. This group has higher average scores on each of the indicators, yet they were a group who expressed significant criticism of the software during the focus group discussions. They made comments such as "The facts are the facts ... once you have done it, that's it" and "Once we have done it... we have done it, our circumstances aren't going to change, not very useful for an ongoing thing". This group tended to resist any urge to explore. Whilst critical of the aims and design of the software, they nevertheless indicated a very positive response to it and had a relatively engaging interaction with it.

It was in response to the reaction of this group, and the one following, that we revised the tasks allocated to the final two groups. Although the first group's reactions were positive, there was a clear reluctance to explore freely. Hence in the revised tasks we presented the participants with more detailed scenarios that placed them (or the person whose role they were to play) in the situation of preparing to attend a Centrelink interview. They were told to use the software to help prepare for the interview by exploring where their weaknesses lay, how they might improve, what Centrelink might offer them. The purpose was to give them an experience that would help them think of questions that they might want to raise in an interview, or possible outcomes that they might like to discuss.

It is unlikely that any of these participants experienced a significant sense of flow during the experiment sessions. This is commensurate with the reluctance of many of them to freely explore the environment. Part of the reason for this could be their preconceived expectation that Centrelink deals with *processes,* and that their desire was to complete what appeared to be an information-gathering process. Also contributing was the design of the software that gave them the expectation of an 'end point', a result that they could take away with them. Whereas we had hoped to see a cyclic process of setting values, reflecting on outcomes and modifying values, there was a tendency to arrive at the final screen and want to move on (or get further information) rather than go back and explore. This was indicated by comments like "I just want to get it done, it is not a game". Together, the above factors appear to have stifled the opportunity to become deeply engaged and immersed within the environment.

CONCLUSION AND FUTURE WORK

The aim of this project was to design an engaging online experience to support and enhance a specific Centrelink interaction with older unemployed customers. 'Engaging' was defined at the levels of software design, ability to support the task of scenario exploration, and the more subtle level of encouraging the emotive experience of flow. There is a complex relationship between each of these three levels of engagement that is beyond the scope of this paper. However, the prototype was found to support participants exploring various scenarios through dynamic query, experimenting with the effect of their current and future actions in relation to workforce participation, and answering various 'what-if' questions. This type of interaction is not supported through current online forms yet is a significant part of the interaction in face-to-face and telephone interviews.

Against the background of an ageing workforce and consequent rising demand for Centrelink services, and the evolution of new technologies supporting stronger interaction on the Internet, we believe this concept has a strong potential to support and enrich many self-service interactions. In this way it can help cope with the anticipated increased load on such government services.

Future Work

This research project is a pilot project for further research and development work. This work will firstly be directed towards strengthening the level of engagement of the user experience. Three main areas of revision of the software are addressed below.

First, we will focus on encouraging the user to develop a deeper sense of engagement with the software and lead them to a more exploratory pattern of use. Our approach will be to reduce the software to just two screens, with the users spending most of their time on the second screen. This screen would integrate the current 'Explore' and 'Options' screens into one, rather than letting the user progress to a third screen.

Our original design was intended to allow users to make various settings representing their current situation, then deliberately elect to 'move on' and see what options were available to them. Having viewed the options, they would move back and explore the effect of making changes to their settings. Such exploratory behaviour was not adopted by the users partly because the their expectations of a Centrelink 'process' being one of inputting data, observing a 'result', and then finishing.

By following the introductory screen with just a *single* revised screen will provide a stronger affordance for exploration by allowing users to both make changes and to simultaneously observe the effect as a dynamically changing list of options. This will present a tighter coupling between input parameters and outcomes, as well as providing more rapid and appropriate feedback that is essential for flow.

A second area of revision will relate to the design of the manner in which users interact with the input variables. Whilst the idea of a pattern of squares has been successfully used by others to *display* large sets of data, this program used it to *input* sets of data as well. However, the lack of clear structure to the layout of the input choices made the input process awkward – there was no obvious structure to the layout of the parameters. A redesign of this interface, whilst retaining the use of sliders to make adjustments to personal parameters, is required. Incorporated into this new design could be a facility for the user to vary the weighting of each parameter and hence explore what is important to them and how varying the importance might offer different outcomes.

The third area of revision relates to exactly which options are presented to the user as they explore the program. Originally, only the options that were considered relevant to an individual's particular parameter settings were presented. However, participants expressed interest in seeing options even if they were not deemed particularly relevant to them. They not only wanted to see what was recommended for them, but also what they were 'missing out on'. In the revised program a complete list of options will be displayed, dynamically sorted as the user changes the sliders. Options particularly relevant to the user will float to the top of the list, but all others will still be active and available for all users to view. Seeing these options re-sorting in an animated fashion will add to the appeal and playfulness of the software and hence add to its potential to engage the user in a flow experience.

CONCLUSION

This research has advanced the concept of scenario-planning beyond that of the loans calculator – limited to applying numeric data and within the narrow mathematical domain of the concept of a loan – to that of using rich, qualitative, personal data to determine outcomes that advise and present links to further information resources. Further development of this tool will focus more strongly on scenario-planning and in exploring the benefits that an individual can obtain through a self-exploration process.

The revised tool will require an interface which is even stronger in invoking exploration than the one developed

here and which will leave the user better informed on issues relating to the context, and well primed to follow up the experience in another mode, such as a face-to-face discussion.

The challenge in the next stage of this research is to seek automated algorithms to make logical relationships between qualitative input data and characteristics of the Web resources that will become the 'output options' presented by the program. Various techniques to support visualisation of relationships, states and outcomes need to be explored.

Applications to further this research work are currently in progress through an Australian Research Council grant.

ACKNOWLEDGMENTS

The authors wish to acknowledge the valuable support of Costa Kapantais (General Manager, Government Business Unit at Novell) and Ian Brooks (Business Manager, Customer Experience at Centrelink) who contributed to this research. We appreciate very much the funding support from both Novell and Centrelink.

REFERENCES

Accenture, (2005). Leadership in Customer Service: New Expectations, New Experiences. Available from http://www.accenture.com/NR/rdonlyres/F45CE4C8-9330-4450-BB4A-AF4E265C88D4/0/leadership_cust.pdf

Ahlberg, C., Williamson, C. & Schneiderman, B. (1992) Dynamic Query for Information Exploration: An Implementation and Evaluation. ACM Press.

Carroll, J. M. (2000). Introduction to the special issue on "Scenario-Based Systems Development," Interacting with Computers, 13(1), 41-42.

Chen, H., Wigand, R. T., & Nilan, M. S. (1999). Optimal Experiences of Web activities. Computers in Human Behavior, 15(5), 585-608.

Csikszentmihalyi, M. (1975). Beyond Boredom and Anxiety. San Francisco: Jossey-Bass Publishers.

Csikszentmihalyi, M. (1997). Finding flow: the psychology of engagement with everyday life (1st ed.). New York: Basic Books

Department of Communications, Information Technology and the Arts (2005). Trust and Growth in the Online Environment. This report is available from http://www.dcita.gov.au/ie/benchmarking/trustandgrowth

Novak, T. P., Hoffman, D. L., & Yung, Y. F. (2000). Measuring the Customer Experience in Online Environments: A Structural Modeling Approach. Marketing Science, 19(1), 22-42.

Pearce, J. M. (2004). An investigation of interactivity and flow: student behaviour during online instruction. PhD thesis, The University of Melbourne. Available from http://eprints.unimelb.edu.au/archive/00000892/

Pearce, J. and S. Howard (2004). Designing for Flow in a Complex Activity. 6th Asia-Pacific Conference on Computer-Human Interaction, New Zealand.

Shneiderman, B. (1992). Tree visualization with treemaps: a 2-d space-filling approach. ACM Transactions on Graphics, 11(1), 92-99.

Trevino, L. K., & Webster, J. (1992). Flow in Computer-Mediated Communication. Communications Research, 19(5), 539-573.

Webster, J., & Martocchio, J. J. (1992). Microcomputer Playfulness: Development of a Measure With Workplace Implications. MIS Quarterly, June, 201-217.