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December 2006

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### Recommended Citation

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<http://aisel.aisnet.org/amcis2006/374>

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# **An actor-network theory perspective of online banking in Australia**

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## **ABSTRACT**

Only 25% of bank customers currently use online banking in Australia. The banks want more people to use their online services, not just for transaction histories and transfers, but also for other services such as loan and credit card applications. This paper discusses the use of actor-network theory as a lens to view online banking practices in Australia. We explore the heterogeneous user groups and their varying needs for interacting with the bank. This theory allows us to explore the relationship between technology and people, whilst giving insight into the changes enacted through interactions between them and the bank. The user is an essential player in this network and this discussion presents the users perspective that is drawn from a qualitative study involving fifty-six participants.

## **Keywords**

Actor-network theory, online banking, e-commerce

## **INTRODUCTION**

Only 25% of bank customers currently use online banking in Australia. With the closure of many regional and some city branches in an attempt to move existing customers online, the number of online customers has barely increased. For obvious reasons, the bank has interests in encouraging online banking; the main advantage being the low cost of transactions. Currently bank customers using the online services do so to view transaction histories, to make transfers to their personal accounts and to pay bills through the BPay function. The bank is keen to encourage existing bank customers not already online to use these services. The bank also want to encourage existing online banking customers to use the online system for services such as loan and credit card applications. This paper presents a discussion of actor-network theory as a lens to view these online banking practices in Australia.

The study of the relationship between organisations and technology involves the study of actions and their effects, the causal relationships between those actions and effects, and the relation of particular consequences to particular agents and their action, hence agency (Rose, Jones and Truex 2005). Thus we need to study not only people and their interactions with the technology of the domain, but also the material objects and organisations involved.

The relationship between technology and organizations has traditionally been understood in terms of technological and social determinism (Markus and Robey 1988); an issue central to the IS research endeavor, that is the relationship between the technical and social aspects of IS. One way of characterizing this discussion is through the study of agency (Rose et al. 2005), 'Agency' refers to outcomes or consequences resulting from actions; in Giddens' (1984) terms "the capability to make a difference". Thus an agent is "something that produces an effect or change" (Oxford English Dictionary) or in this context, "the participant of a situation that carries out an action" (Wikipedia). There is an implied causal relationship between the action and the outcome (Rose et al. 2005).

A motivation for using actor-network theory as a possible emerging theory for this research is to understand its' usefulness and applicability for this type of project. This theory may also be used in subsequent projects if we find significant benefits to using this approach. In this study we are exploring the heterogeneous user groups and their varying needs for interacting with the bank. The application of actor-network theory allows us to explore the relationship between technology and people, whilst giving insight into the changes enacted through interactions between them and the bank. The user is an essential player in this network and this discussion presents the users perspective that is drawn from a qualitative study involving fifty-six participants.

Through investigating this sensitive balance between the technical and social aspects of online banking, we clarify the actions of each of those present in the network. Using actor-network theory in this exploratory study gives us a clear description of online banking activities in Australia (see Figure 1), and going through this process also allows us to recognize the contribution that both technological and social factors have in influencing the way in which banking customers approach and interact with online banking in Australia.

## LITERATURE REVIEW

Actor-network theory (ANT) is a constructivist theory originally developed by two leading French scholars Michel Callon and Bruno Latour, and British anthropologist John Law. ANT differs from other theories in that it views people and technology equally in the network. In ANT terms, all contributors to the formation of the network are treated in the same way. Thus "the term actant is symmetrical, it applies indifferently to both humans and non-humans" (Latour 1991, p179). Here action is defined in the context of one particular type of consequence: a role in a socio-technical network and particularly the historical development of those networks (Rose et al. 2005).

In technology development, it is impossible for designers of the machines of the future to foresee, or in many cases even understand, all the sets of conditions that a piece of technology will be used under, or the decisions of the humans who supervise and work with them; this implies machine agency. According to (Rose et al. 2005), agency cannot be understood in isolation from the situational conditions which both make it possible, and frame its subsequent interpretation. They concur with Giddens (1984) that social structures made up of individuals' personal experiences are important.

Actor-network theory is an interdisciplinary approach to studying issues of technology and society. It is an established approach in information technology and sociology disciplines highlighted by a special issue discussing ANT and Structuration Theory published in 2005 the *Scandinavian Journal of Information Systems*. This articles in this issue contribute to the long-standing debate in the IS literature between technology and organisation: does technology cause effects in organisations, or is it humans that determine how technology is used? (Rose et al. 2005).

A central tenet of actor-network theory is an assumption of general symmetry between the technical and social worlds. Thus in actor-network theory, agency is not restricted to humans, but is also attributed to technologies (machines) and to material objects (Rose et al. 2005). "Technology is an actor because it has been endowed with the ability to act through its position in the network" (Holmstrom and Stalder 2001).

Technological determinism is frequently a latent assumption in IT research and can be defined as a focus on the technical system and its success rather than the social system that must operate it (Archer-Lean, Clark and Kerr 2005). Archer-Lean et al., reinforce many other researchers in rejecting the overly simplistic notion that technology is an autonomous force that determines the course of society (Smith and Marx 1994). The Archer-Lean et al., study in Enterprise Resource Planning (ERP) systems provides a good example. The first author of this paper also has research experience in the study of these systems, which may help to shed some light.

To illustrate, Enterprise Resource Planning Systems are enterprise-wide systems designed to encompass all business processes within an organisation. These systems are traditionally determinist in nature i.e. they can significantly influence the culture and work practices within an organisation (Beekhuyzen 2001).

Hanseth and Braa (2000) speak of 'infrastructures as actors', of the agency of SAP, and point out that in their study SAP was a 'powerful actor' and an 'ally' in 'getting the change process moving' in the company they studied. As a more complex infrastructure emerges, SAP becomes 'an independent actor'; one that is increasingly resistant to control" (Rose et al. 2005). At the other end of the technology spectrum, Internet search systems have evolved to be socially deterministic. For instance, Google, the world's largest information management system, customizes each search result in their system with relevant, unobtrusive advertising from their sponsors. Concurrent with Hanseth and Braa's experience, Monteiro and Hanseth (2000, p. 83) argue that large systems like the Internet 'appear as independent living actors'.

For our research on online banking in Australia, we use ANT to analyze technology (computer systems) as actants equal to people. ANT has appeal for IS researchers wishing to avoid determinism, but also to take technology seriously (Monteiro and Hanseth 1996). In principle at least, actor-network theory seeks to position itself firmly in the middle of the spectrum between technological and social determinism (Rose et al. 2005). The actor-network theory perspective has its limitations; whilst technology becomes an independent actor in its own right, no distinction is made between the agency of technology and people.

## METHODOLOGY

This paper presents the interim results of a qualitative study on banking, personal communications and financial decision-making. This research is part of a wider project focusing on Security, Trust, Identity and Privacy in the Smart Internet Technology Cooperative Research Centre. We are studying these issues from the users' perspective so that users can be central to the design of financial services and bank strategy.

We conducted a qualitative study between April 2005 and March 2005, with fifty-six participants across two capital cities in Australia: Melbourne and Brisbane. The people were accessed through personal and professional networks. In choosing our sample for the qualitative interviews, we were careful to include bank customers that do engage in online banking as well as those who don't. Our sample had:

- Twenty men and thirty-six women. This dominance of women was partially explained because women were found to manage money in the household, particularly in the lower income households.
- A distribution across ages (see Appendix A – List of Participants);
- A range of annual household income levels: thirteen had an income below \$25,000; twelve between \$25,000-49,999; seven between \$50,000-\$74,999, eight between \$75,000-\$100,000 and fourteen had over \$100,000 a year. Two participants did not want to disclose their household income.

The qualitative approach suits our study; it allows us to understand how people manage their financial information across life stages. The study had at its centre the perspectives of user-centered design where the users' activities within their social and cultural context are at the centre of design (Vredenburg, Isensee and Righi 2002; Beekhuyzen, von Hellens, Morley and Nielsen 2003; Singh, Zic, Satchell, Bartolo, Snare and Fabre 2004). It is a 'grounded' study in that there was a fit between data and emerging theory, rather than a testing of hypotheses (Glaser and Strauss 1967). The data was not collected with actor-network theory in mind. This theoretical perspective has been applied to the data to providing an alternate, although complimentary, perspective to the User-Centred Design approach that underlies this study. The application of actor-network theory provides a fresh insight into the interactions between the various symmetrical 'actors': the machines, the humans and the material objects. We suggest that ANT is an emerging theory to explain and understand our data.

Each face-to-face interview lasted between one and two hours, being tape recorded with permission from the participant. The interviews were then transcribed. The project team used QSR's N6, a computer program to assist with qualitative analysis. The use of this software helped to keep all project data in one location and accessible, as well capturing themes, thoughts and general ideas arising from the data during analysis. Each team member was involved in the coding of interviews. We approached this by first broadly coding the data, then organizing the data into matrices to check emerging themes in a transparent manner. We also used the N6 software to identify negative cases so that the study was rigorous. As Morse and Richards (2002) say,

The key to rigorous qualitative inquiry is the researcher's ability ... of being constantly aware and constantly asking analytic questions of data, which, in turn, constantly address the questions asked. Qualitative inquiry constantly challenges assumptions, constantly challenges the obvious, reveals the hidden and the overt, the implicit and the taken for granted, and shows these in a new light (p. 170).

Once we developed an understanding of the different facets of money and banking; we explored the concepts of privacy, security, trust and identity. We found that customer control over information and transactions is the crucial element linking these concepts. Once agreed, we then translated our understandings into scenarios and personas, a key process of User-Centred Design. We have and continue to use these scenarios and personas in discussion with the technologists and the bankers to help explain our findings. These scenarios and personas are instrumental in moving forward with the development of the Privacy Rights Management systems in the Smart Internet Technology Cooperative Research Centre.

## DISCUSSION

An Information Systems focused resolution of the problem of agency acknowledges both the agency of machines and the agency of humans, but also recognizes that they are different (Rose et al. 2005). Material objects are also an important component of this symmetry, and need to be treated accordingly.

Adopting an actor-network theory approach gives us the tools to investigate the sensitive balance between the technical and social aspects of online banking. We do this by recognizing each of the actants, as well as clarifying the actions of each of those present in the network. Using actor-network theory, Figure 1 gives us a clear description of the complex practices of

online banking activities in Australia. This figure contributes to our understanding of these interactions by mapping out these relationships in a transparent manner. The following discussion outlines the benefits of using this approach.

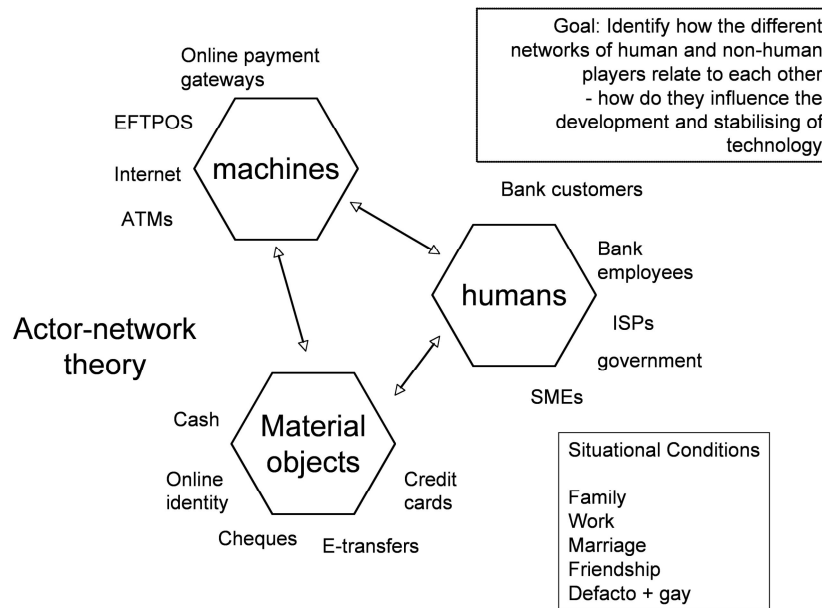


Figure 1. Actor-network theory in banking

The project so far has yielded some interesting results concerning the way in which bank customers perceive security, privacy, identity and trust in an online banking world. We have found that changes in life stages, residence and relationship status motivate people to share more personal information with the bank than they usually would. They are confident that by giving this information, they will receive more personalized services (Singh, Jackson, Beekhuyzen and Caabral 2006). The discussion that follows focuses on perceptions of security and privacy within the banking context, and limited space in this paper confines this dialogue to the machines and one part of the human interaction, that of bank customers. The material objects represented in figure 1 motivate the argument.

**Machines and bank customers**

There are many machines represented in the banking network. These primarily include the Internet, Automatic Teller Machines (ATMs), Electronic Funds Transfer at the Point of Sale (EFTPOS), telephone and online payment gateways. We found that there are four main functions that people use these modes for - accessing their transaction history, transferring money, paying for goods or bills, and withdrawing money.

In considering these interactions, we need to consider the voluntaristic or deterministic nature of the human and technology interaction being studied (namely the ‘machines’). With the present state of online banking in Australia, bank customers currently have a choice to or not to use the bank’s online services. Even though banks are encouraging their customers to use their online services, uptake has been slow, and customers still have the option of using other mediums for banking. Our study does include bank customers who do not use online banking however these participants are not discussed in this paper; the results will be published elsewhere. Bank customer and their options for banking are evolving, as are their attitudes and behaviors to online banking in Australia.

Banking itself is a deterministic practice in Australia in most cases, however we did have one participant who didn’t have any form of bank account. This seems to be an isolated case. Almost all salaries and government benefits are paid through a person’s bank account, creating a difficult situation if a recipient doesn’t have the obligatory bank account.

**Internet**

Customers want to control the information that the bank has about them. At present, there is no real way for customers to do this. The closest thing the bank offers is the viewing of most personal details online, however these are fairly unchangeable. Privacy is important to customers; it is represented by the control over the sharing of information. Customers want the ability to override the privacy policies that they are bound to with the bank, particularly in the case of joint accounts and primary and secondary holders on credit card accounts. The privacy policy that currently binds them enforces restrictions for accessing information, while providing even fewer options for making changes to the account details.

Identity is related to this view of privacy. Identity to our participants is control over representing who you are in different contexts. In the banking context, there were identity and privacy issues in regard to joint accounts. Erin, a personal assistant, discusses her experiences with the bank;

We have had issues with them; there have been quite a few. The main one was (husband) had a joint home loan account with his dad, he changed his details for our banking but they (the bank) changed everything off his fathers. So they were sending us all of their information, their personal information.

Some find privacy ‘annoying’ when they want to speak with someone at the bank. Greg, a student and small business owner, also has close money connections with his dad:

Even if I am ringing up for my dad, they cant prove that I’m that person, so sometimes I say that I am him, give them dad’s date of birth ... and I know dad’s credit card number off by heart....they ask “what are the last four digits” and I am like, here they are, you just roll it off the tongue.

With the changing infrastructure of the banking network (physical and online) in Australia, convenience and ease of use often override the fear of the technological aspects of security. The closing of branches and the limited opening hours of the branches have opened up the possibility for working mothers and fathers to do their banking outside of office hours. Even though the possible negative consequences of a security breach are acknowledged, they are often put in the bank of the user’s mind. Henry, a father of two working in the IT field reflects:

In a sense, we have been forced through convenience to use those services, in light of going to physical branches that are closing. So for us, it is really easy that we can do the banking twenty-four hours a day... I don’t have to wait until five o’clock to race and leave work early to get to the bank ... before it closes. So in a sense, it is the convenience of using it albeit I am aware of the risks associated with it.

However there are still serious concerns about online banking security. Bridgette refuses to do online banking because of the abundance of phishing scams, and she is happy with her regular routine that takes her to the post office once a week to pay her bills. The physical evidence of her paid bill is also important to her:

...there is still a lot of fraud going on via the Internet. Now I know that it is sort of random, but I have little random events in my life and I don’t want to be subject to that one...the reason for paying at the post office is that it is quite easy because when I go out shopping once a week, I just do all of that at the same time...there’s that solid material evidence which is very appealing to elderly people. The receipt.

### **Online payment gateways**

Credit cards are used on the Internet to pay for goods or services. In doing this, we found that security is still a great concern. Those who do engage in these practices, often adopt strategies for coping with gaps or unknowns in security. Olivia refuses to do her banking online, however she uses her mother’s credit card to shop online. Gillian, a postgraduate student and mother of two, relies heavily on online transactions, however is very careful in her use of the Internet:

We also have a credit card that we just use for online purchases so it has got a very low limit so if something does go wrong they can’t touch very much, I have got a four hundred dollar limit so we are very aware of the risks of internet banking but we try, the convenience of it outweighs the risk.

Peter uses his credit card online but stays with the large, well-known companies...

I renew my software subscriptions online again only with largely and more reputable companies like Microsoft, Symantec. Everyone hates Microsoft but they have got enough money they don’t need to rip you off...

Terry was waiting for a computer to arrive that he had purchased on E-bay when interviewed, “I love E-bay, I think it’s easy, I think the way you can easily transfer funds to users ... makes it perfect!” Even Bridgette, who refuses to bank online, uses her credit card for online purchases,

Apart from the occasion of buying airline tickets and things like that on the web, and cinema tickets, but that's such a limited amount of money....it is a credit card that is very, very limited, so I only buy very small things online on one of those credit cards that have a very low limit on them. And I don't use my EFTPOS card, which my main salary comes into.

BPay (or BillPay) is a function used for paying bills to certain agreeing companies through the bank's website. This process is seen as no less secure than online banking in general, and most of those engaging in online banking use this function regularly. In fact, many of the online banking participants indicated the convenience of this service and it seems that this type of transaction is responsible for getting many customers to their bank's online system. It is one of the most used functions of online banking, and it is viewed as a huge time-saver.

### **ATMs and EFTPOS**

Automatic teller machines and EFTPOS are still used regularly; cash is still very real for most however there is a move to more credit based transactions. For example, Alice rarely uses these services, she opts to use her credit card to pay for purchases, "I can't be bothered going out into the main street to get money, I can't be bothered doing that". Amber couldn't tell where her money was going each week after she would withdraw it from an ATM,

I used to be a big ATM person, I'd take out a certain amount of money and I would spend that. But then I wouldn't have any idea where that money had gone. Like I'd spend it...but then I wouldn't remember...I had \$100, where has it gone? ...so I started paying things just with the swipe card, like my savings account, so that I can see where everything goes.

Ingrid has two young children and controls the finances in her household; she prefers to use cash sparingly:

We do still use some cash but it really is minimal, pretty much everything goes onto the credit card. I generally try to carry cash around with me for the things where you suddenly get somewhere and go oh my god you don't take visa, because you just take it for granted. I can't see any difference really in the next five years.

Some are comfortable depositing cash in an ATM, but this is not a common practice. Jac is an exception to this (he and Greg are Generation Y). Jac confesses he has been into his bank's branch about 10 times in the past 5-6 years. He comments on how his bank has downsized recently, even closing down ATMs and that has made it difficult for him to deposit funds (which he comfortably does through the ATM) but now it is the main reason he goes into the branch. Greg deposits cheques through the 'quick deposit' box in his branch, though he doesn't feel comfortable depositing through the ATM just outside the bank. Peter runs a small business and also doesn't like to deposit in ATMs so he mails his cheques to his bank branch and they deposit them for him.

ATMs are used mostly for withdrawing money. Terry, a also generation Y'er, never uses EFTPOS for purchases, only his credit card, but he regularly uses 'other bank's ATMs' when he goes out with friends in the city at night. When asked why, he commented, "I couldn't be stuffed finding my bank's ATM and if I'm in some sort of drunken state I don't care, I just want some cash...if it is a time restraint or something like that, I'm just like 'stuff it', I just get the money out". He complained about the large fees he accumulates from his bank in doing this, but this doesn't deter him or encourage him to change his practices.

### **Issues for Design**

Holmstrom & Stalder (2001) argue that in order for a socio-technical system to stabilize, it must drift from a single-purpose network which reflects the interests and agenda of its designers, to a multi-purpose network; one that reflects the interests of the social actors that interact with it. This transformation is reinforced through the re-creation of agency. This multi-purpose banking network joins with existing network to form part of the situation in which agency is exercised. Rose et al., (2005) explain this well:

The exercise of agency, through its intended and unintended consequences, partially constitutes the set of conditions under which the future exercise of agency is carried out. In this emergent process, machine and human agency can be found inextricably intertwined: a double dance of agency ice. Machines facilitate and enable some parts of the human exercise of agency, but constrain other parts. Outcomes are emergent from the interaction of both forms of agency, not from one alone.

Each actor is dependent on the entire network; different interests, or requirements, can be translated into technical and social arrangements (Holmstrom and Stalder 2001). The general requirements for a secure online banking system can be translated into hardware (secure terminals), software (network encryption), and social conventions such as privacy laws.

Actors can be unfaithful to their assigned roles, Holmstrom and Stalder (2001) talk about this in the context of an e-cash system and it applies here. Within the bank's online system, there is a very real danger of privacy breaches. Accountability is taken for granted, and individuals feel the bank is and will continue to 'do the right thing' by them, even in the event of a breach. However banks will no longer 'do the right thing' by small business in Australia, with the onus for their electronic transactions now on them rather than the bank. There have been few reported cases where the bank hasn't taken on the cost of breaches for an individual bank customer. Some of our participants reported fraudulent transactions on their or a friend/family members bank accounts, however all funds were reimbursed.

This study gives us a basis for understanding the activities of online banking in Australia. Our next stage is to keep exploring the data using actor-network theory and translating our findings into design. We are now continuing to complete the 80 (total) planned interviews, and to develop and distribute a quantitative survey of 2000 members of the public.

This discussion contributes to the development of Privacy Rights Management (PRM) systems. PRM systems protect and enable management of the rights of consumers within a privacy context, such as the bank. These systems are similar to Digital Rights Management systems, which protect and manage the rights of digital content owners and creators. To date, these systems have been very effective in their approach to protecting digital information.

The Privacy Rights Management system proposed would allow bank customers to do the following:

- Changing personal details such as contact details
- Establishing and changing privacy overrides for accounts
- Creating rules about which third parties have access to their personal information

## CONCLUSION

This paper presents the use of actor-network theory as a lens to view online banking practices in Australia. We explore the heterogeneous user groups and their varying needs for interacting with the bank. This theory guides our investigation of the relationship between technology and people, providing insight into the changes enacted through interactions between them and the bank.

We have used actor-network theory to help us to discuss the phenomena of online banking, with this being our first attempt at using this theory to help us to explain our study. Adopting a grounded theory approach, we collected our data without having a specific theory in mind. However, given the role technology plays in on-line banking, actor-network theory was found appropriate to illustrate the interplay between the various actants. The literature discusses a number of limitations of using ANT and these are acknowledged in formulating the argument presented in this paper. ANT has given us a solid basis for a more detailed investigation and interpretation of the data.

The findings presented in this paper help us to understand why only 25% of bank customers in Australia currently use online banking. The recent changes in the banking infrastructure in Australia have contributed to the trend for banks to move their existing customers online, whilst still trying to attract new customers. Moving customers online will enable banks to reduce fees and maintain the minimum amount of branches that they currently have.

Privacy, trust, security and identity are at the core of this project. The discussion presented in this paper leads to the understanding of the interrelatedness of these concepts, while providing a grounding to explore these four issues further. Using actor-network theory has helped to make sense of this large data set in the first instance, while providing a path to further explore these ideas.



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## APPENDIX A – LIST OF PARTICIPANTS

Pseudonym	Gender	Age group	Household Income
Anita	F	55-64	\$50 - 74
Bridgette	F	55-64	\$75 - 99
Callie	F	55-64	\$50 - 74
Dora	F	35-44	\$100k+
Ellen	F	35-44	\$100k+
Erin	F	25-34	\$75
Fred	M	45-54	\$100k+
Gillian	F	35-44	\$75 - 99
Henry	M	45-54	\$75 - 99
Ingrid	F	35-44	\$75 - 99
Kevin	M	45-54	\$100k+
Laura	F	25-34	N/A
Nancy	F	35-44	\$75 - 99
Olivia	F	25-34	\$75 - 99
Peter	M	25-34	\$100k+
Rita	F	35-44	\$100k+
Theresa	F	45-54	\$50 - 74
Annie	F	45-54	25-49
Barbara	F	35-44	Under 25
Cathy	F	45-54	25-49
Donna	F	35-44	Under 25
Emily	F	35-44	Under 25
Frank	M	65+	25-49
Gina	F	45-54	Under 25
Hanna	F	55-64	Under 25
Ivan	M	25-34	25-49
Ian	M	55-64	\$100k+
Alice	F	55-64	50-74

Geraldine	F	45-54	25-49
Bela	F	35-44	25-49
Tom	M	35-44	\$100k+
Kate	F	25-34	25-49
Amber	F	25-34	25-49
Betty	F	25-34	Under 25
Kelly	F	25-34	25-49
Shane	M	25-34	N/A
Celia	F	45-54	\$100k+
Zoe	F	25-34	Under 25
Victor	M	25-34	\$25-49
Bud	M	25-34	50-74
Wally	M	25-34	50-74
Wendy	F	25-34	\$25-49
Liz	F	25-34	\$25-49
Jen	F	25-34	\$100+
Fran	F	35-44	75-99
Robin	M	25-34	50-74
Lena	F	45-54	Under 25
Renate	F	18-24	Under 25
Harry	M	65+	Under 25
Thomas	M	45-54	\$100k+
Julian	M	35-44	Under 25
Tina	F	25-34	\$100k+
Terry	M	25-34	\$100k+
Greg	M	18-24	Under 25
Jac	M	18-24	Under 25
Hester	M	55-64	\$100k+