

A Solution to Privacy Violation Problem in Korean Ubiquitous Government Service

Sungbin Cho, Jinhwa Kim* and Byung-Chun Ha

School of Business, Sogang University, South Korea; jinhwakim@sogang.ac.kr

Abstract

The u-government services become more personalized and intelligent. For the successful implementation of personalization, individual's privacy must be respected and taken care of. Based on an empirical survey, this research investigates the reluctance to the government's use of private information in six categories. We measure people's psychological distance toward e-government using four intimacy levels suggested by the Proxemics. Since a positive correlation is identified between people's psychological intimacy toward e-government and their tolerance to the use of private information, the amount and types of private information should be sequentially used in designing a personalization system. Beginning with the least intolerable private information such as information on one's occupation, personalized systems should additionally use next tolerable private information such as health information or service request/interest information, as people's psychological distance toward government services becomes shorter.

Keywords: Intimacy, Keywords4, Personalization of Service, Privacy, Ubiquitous Government

1. Introduction

Governments have developed new types of civilian services with the development of Information Technology (IT). The evolution of the Internet – from Web 2.0 to Web 3.0 – is upgrading the online government service environments from electric (i.e., e-government) era into ubiquitous (i.e., u-government) era. The services are becoming more customized and intelligent. That is, the new government services, armed with newer information technologies, are now targeting individual customers' needs rather than providing undifferentiated services to the public. Under such service environments, in addition to the provision of clear visions and strategic roadmaps and management of enormously growing civilian databases, governments must be able to determine the fair and reasonable level of personal information disclosure meanwhile protecting individual privacy for the successful implementation of u-government systems.

The personalized service, a key feature in u-government systems, inevitably carries more or less privacy problems. Such problems may be partly resolved in a legal way or a technical way^{8,24,47}. Another way to

deal with privacy problems would be a methodological approach, which will be proposed in this paper. The purpose of our study is to propose a solution to privacy violation problem that might occur in the course of personalized government service. We introduce the concept of "psychological distance" that an individual might feel toward the u-government and assess it with the Proxemics. To understand and analyze this in u-government systems, the research develops a distance estimation model and suggests a distance-based personalization model.

2. Related Studies

2.1 Ubiquitous Government

The word "ubiquitous" comes from a Latin word, meaning omnipresent or existing everywhere. The word has been popularly used in the information technology area since Palo Alto Research Center used the term, "ubiquitous computing." Due to Internet revolution and application development based on ubiquitous technology, the idea of u-government arose. The ubiquitous government is the

* Author for correspondence

one that provides personalized and continuous services anywhere and at any time using various devices and thus creates added values⁶.

For example, Korean electronic government has been undergoing paradigm shift in parallel with the evolution of the Internet. Lee²³ introduced the main characteristics of three electric government generations with respect to web evolution, focus, service level, information disclosure, communication, channel, and accessibility (see Table 1). The u-government is different from the e-government in several aspects. In e-government systems, government services are focusing on citizens in general. However, the u-government systems aim at providing customized intelligent services. They make various types of valuable public information available on a real time basis. They integrate wired, wireless, and mobile networks to present individually customized communication services through individual-based government service portals.

The Gartner Group¹⁵ presented four possible scenarios of future governments. Figure 1¹⁵ illustrates the types of future governments which are determined by the two driving forces, the degree of government intervention in economy and citizen's attitude to privacy and surveillance. Based on these two driving forces, future governments are classified into one of four categories: status quo development, governing phantoms, free-enterprise government, and the good big brother. In consideration of the services in u-Life 21, the Korean government can be classified into the good big brother, in which the government heavily involves community activities while citizens must be permissive to private information disclosure and surveillance.

The Korean government gradually increases its good big brother's role in the u-Life system and directly provides services to the customers utilizing all possible

IT technologies. The Korean u-government system has been and will be performing selected service activities. For example, the electric identification systems will be integrated. The system stores a wide range of physical information such as finger prints and iris. Individually customized services will also be provided. The services incorporate the Customer Relationship Management (CRM) strategy that has been vastly adopted by the private sector. The most recent individual medical and health information will be stored in electronic files as well as in smart cards which provides real-time data reading and writing capabilities. People who are in need of continuous medication monitoring or solitary aged persons will wear a smart bracelet or transplanted micro chips within their bodies for seamless health condition monitoring and calling for help in case of emergency. The ubiquitous system even allows the government to efficiently manage the data about the resident's commercial activities, tax filing, address changes, motor vehicle locations, and so on.

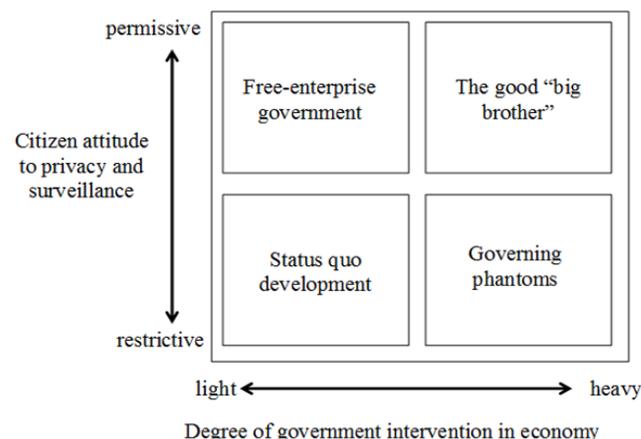


Figure 1. Four possible scenarios of future government.

Table 1. Paradigm shift in the Korean electronic government

Key Word	Government 1.0	Government 2.0 (e-government)	Government 3.0 (u-government)
Web evolution	World wide web	Web 2.0	Real-world web (Web 3.0)
Focus	government	citizen	Individual
Service level	Service provider oriented	Government-private sector cooperative service	Intelligent, customized service
Information disclosure	Restrictive	Expanded	Real time
Communication	One-way	Two-way	Individually customized
Channel	Wired Internet	Wireless and mobile Internet	Integration of wired, wireless, and mobile Internet
Accessibility	First-stop-shop (by portal)	One-stop-shop (by intermediate government service)	My government (by individual-based government service portal)

2.2 Personalization and Privacy Concern

A common idea about web personalization is that web pages must be designed to meet individual visitor's needs and preference. Various technologies such as rule-based personalization, collaborative filtering, and learning agent are utilized in the implementation stage. Most successful commercial websites such as Yahoo.com and Amazon.com have recommended their products and services based on the analysis of users' interests and purchasing history. Commercial personalization plays an essential role under such personalized business circumstances because using personal information such as customers' interests and needs would bring benefits to both firms and users. One-to-one marketing helps firms to build a strong relationship with customers, whereas customers can expect better services³⁵.

2.3 Psychological Distance and Intimacy in Cyber Space

Many have sought to discover the meaning of psychological distance between individuals and interpersonal distance in the Internet environment. Ickinger and Morris²¹ analyzed the underlying meaning of interpersonal distance detected in their behavioral game. They found that people use interpersonal distance as a means of defense against another person's negative characteristics, rather than a positive system that interacts with others. In the virtual experiment by Bailenson et al.⁵, psychological distance between a human and a cyber system is examined. The reaction toward a virtual human is observed. People tend to keep more distance when an unfamiliar virtual human is approaching from the front compared to the case when approaching from the back. People try to keep a certain distance when the virtual human steps into their personal territories.

The concept of intimacy can be expanded and applied into the relationship between a human and cyber space. Although the degree of intimacy is weaker than that in face-to-face environment, intimacy between a human and the cyber system exists in the virtual world⁴⁵. While citizens use and interact with government services, they can develop psychological intimacy or psychological distance toward e-government. While McKenna²⁶ was investigating the critical success factor for the Philip's case, he discovered that virtual intimacy, electronic collegiality, and instant familiarity are important factors in the virtual world.

2.4 Proxemics

The Proxemics theory by Hall¹⁷ explains how human beings use space within the context of culture. Human perception of space is molded and patterned in the cultural environment and has a significant influence on the success or failure of communication. Hall claimed that people tend to put themselves in a bubble and then keep proper distance not to burst the bubble. Depending on the degree of social interactions, the interpersonal distances are classified into four categories: intimate distance, personal distance, social distance, and public distance. The physical distances for the four categories are suggested as follows: 0 to 1.5 feet for intimate distance, 1.5 to 4 feet for personal distance, 4 to 12 feet for social distance, and 12 or more feet for public distance, respectively.

Communication between objects that belong to intimate distance is similar to the one that is made in a very close relationship such as family and lovers. The level of formality is minimal. Intimate distance would be the minimal private space for the self defense, so it must not be trespassed impolitely. In personal distance, the relationship between objects is characterized by close relationship with a moderate level of formality. In social distance, people make a light conversation and a third party freely joins and leaves in the middle of the talk. In this space, conversation is more official than personal. Public distance is found when someone delivers a lecture. The psychological distance between objects is the farthest and personal conversation is not allowed.

3. Privacy Management in Personalized Government Services

3.1 Tolerance to using Private Information

The first task of this paper is to classify various types of private information into several categories and then investigate how tolerable people are to the government's use of their private information. Andrade, Kaltcheva, and Weitz³ used three dimensions for classifying private information:

- ID information: e-mail address, phone number, and name.
- Sensitive information: Social security number and medical information.
- General habits information: Product preferences and interests/hobbies.

They claimed that privacy problem must be taken good care of because these privacy concerns ultimately reduce the benefits of personalization that firms deliver to customers.

For the purpose of more detailed analysis of privacy issues in u-government systems, six categories are used in this study for the classification of private information:

- ID information (e.g., name, social security number, phone number, address, e-mail address, etc.).
- Family information (e.g., marital status, spouse, children, parents, sibling, etc.).
- Wealth and credit information (e.g., yearly income, real estate, credit rate, etc.).
- Service request and interest information (e.g., history of inquiry and submitting petitions, preference and tastes, frequently surfing categories, interests, etc.).
- Health information (e.g., health condition, medical treatment history, allergy, genetics, etc.).
- Occupation information (e.g., company man, professional, own business, student, housewife, unemployed, etc.).

A total of 230 respondents have participated in the survey. 71.3% of them are male and 28.7% are female. People in their 20's account for 38.7%, 36.1% are in their 30's, 24.4% are in their 40's, and 0.8% are in other age groups. Respondents are asked to rank their reluctance if the government use the above six types of private information for personalizing government services. Ranks are recorded from 1 to 6, where rank 1 indicates the most reluctant to using private information and rank 6 indicates the least reluctant.

Table 2. Intolerance order to the government's use of private information

Order	Kind of private information	Average rank	Standard deviation
1	ID information	1.99	1.62
2	Family information	2.90	1.29
3	Wealth and credit information	3.04	1.55
4	Service request and interest information	3.64	1.28
5	Health information	4.34	1.52
6	Occupation information	6.01	1.16

Table 2 shows the survey results. The average rank for ID information is 1.99, which is the highest. It turns out that

people are most reluctant for using their ID information for personalization. The second most sensitive group is about the family and wealth/credit. The average ranks for these two categories are not substantially different: 2.90 for family information and 3.04 for wealth/credit information. The rest of other categories were ranked in this order: service request and interest information, health information, and occupation information.

3.2. Distance Estimation Model

This paper attempts to apply the concept of psychological distance to the relationship between u-government systems and users. People repetitively visit and interact with u-governments to make inquiries, to submit petitions, and to receive feedbacks. As a result, their psychological distance toward u-government systems shortens. As people gradually develop intimate relationships with the virtual world⁴⁵, it is necessary to measure the degree of intimacy (i.e., psychological distance) toward the e-service system. Like the Proxemics, the current study uses the four levels of psychological distances to measure the degree of intimacy. The higher the degree of intimacy, the closer the psychological distance is. Decrease of the distance implies that people feel intimate to the u-government. As the degree of intimacy is weakened, the psychological distance is classified in the order of personal distance, social distance, and public distance.

On the survey, respondents are asked to rate their psychological distance (or intimate feeling) toward the electric government. Since ubiquitous system is in its early developing stage and many are not ready to answer, people's experience with e-government system is investigated. The question used to measure the psychological distance is:

- Q1: I feel intimate or psychologically close to the electric government in terms of trust, respect and care, communication, and coping with my request.

We tried to understand psychological distance or intimacy with the dimensions of trust^{13,20}, respect and care^{13,46}, communication^{12,13,20, 46}, and coping with request^{13,18,46}, based on the following studies.

- Trust.
- Respect and care.
- Communication.
- Coping with request.

Each respondent answered Q1 on a four-point scale: 1 = highly intimate (i.e., intimate distance), 2 = intimate (i.e., personal distance), 3 = somewhat intimate (i.e., social distance), and 4 = not intimate (i.e., public distance).

The research measures if there is a statistical association between people's psychological distance toward e-government and their tolerance to the use of private information. Then, this research seeks a way to estimate the psychological distance of the survey respondent. At this stage, the research uses independent variables that might explain/predict the psychological distance of a user. The research asks the respondents to answer the following questions.

- Q2. I am tolerant to the government's use of my private information for personalization.
- Q3. I think that e-government knows about me and my interests.
- Q4. I think that e-government has a good reputation from citizens.
- Q5. I think that e-government faithfully responds to my request and complaint.
- Q6. I want to recommend e-government to my acquaintances.
- Q7. Most recent visit/use.
- Q8. Frequency of visit/use.
- Q9. Duration of visit/use.
- Q10. Number of inquiries and interactions during the last quarter.
- Q11. Age.
- Q12. Gender.

Questions Q2 to Q10 are measured on a five-point scale: for Q2 to Q6, 1 = strongly agree, 5 = strongly disagree; for Q7 to Q10, 1 = most, 5 = least.

The Pearson's correlation coefficient test is performed on the variables Q1 and Q2. The correlation coefficient of Q1 and Q2 is 0.5323 and its associated p -value is less than 0.0001. Therefore, a positive dependence exists between a user's psychological intimacy toward e-government and his/her willingness to accept the use of private information for personalization.

The next task is to introduce a set of psychological distance predictor variables, Q3 to Q12. The independent variables consist of psychological variables (Q3 to Q6), recency and frequency variables (Q7 to Q10) and demographic variables (Q11 and Q12).

A stepwise logistic regression is carried out to figure out which independent variables are statistically significant in explaining the psychological distance. The overall model

is statistically significant with the Chi-Square value for the covariates of 302.394, with the degrees of freedom of 16, and p -value of less than 0.0001. The analysis result shows that four variables (Q3, Q5, Q6, and Q7) are significant (see Table 3). Psychological variables are all significant except Q4. If a user's perception about the government is positive with respect to knowing (Q3), response (Q5), and recommendation (Q6), the survey participant's psychological distance is intimate. Among the recency/frequency variables, most recent visit/use variable is the only significant one. Neither of the demographic variables is significant.

The correct classification ratio of the proposed logistic regression model is computed. Table 4 summarizes the actual distance and the estimated distance of the 230 survey respondents. The correct classification ratio of the estimated model is 76.96% (177/230), which is about three times more accurate than 25% (1 out of 4 levels) in case of total random judgment.

With the four statistically significant independent variables, we can reasonably estimate the psychological distance of a user toward e-government.

Table 3. Analysis result of the stepwise logistic regression

Covariate	Degrees of freedom	Wald Chi-Square	p-value
Q3	4	43.1651	<0.0001
Q5	4	8.9456	0.0625
Q6	4	45.8701	<0.0001
Q7	4	22.3161	0.0002

Table 4. Contingency table for the four levels of psychological distance

		Estimated distance			
		1	2	3	4
Actual distance	1	8	3	0	0
	2	3	33	11	0
	3	0	7	75	10
	4	0	0	19	61

3.3 Distance-based Personalization Model

In the previous section, a user whose psychological distance toward e-government is close is likely to be more tolerable to the government's use of his/her private information for offering customized services. Concerning this, government should differentiate the level of personalization by taking into account the

estimated psychological distance. By initiating a short survey or asking a few questions about the government, people’s perception about the government with respect to knowing, response, and recommendation can be measured. Besides, the most recent visit/use can be simply checked. With these four variables, we can reasonably estimate a user’s psychological distance toward the government.

Now, we propose a distance-based personalization model for u-government system. Depending on the four levels of psychological distance, the amount and the kinds of private information used for customized service must be adjusted. Figure 2 illustrates the sequential use of private information in the personalized government service.

For a person like a first time visitor/user whose psychological distance is estimated the lowest level (level 4), only public information should be used. Personalization is not applied for this group of people because they may perceive the use of private information as a serious privacy violation. They may feel uncomfortable and embarrassed if the government pretends to know about themselves and approach to them very closely, which is unanticipated at all. Thus, they are likely to keep a certain distance from the government service.

For the users with distance level 3, personalization should be applied with a minimum use of private information. An adequate approach might be offering a customized service using the least intolerable information such as occupation or health information (recall Table 2).

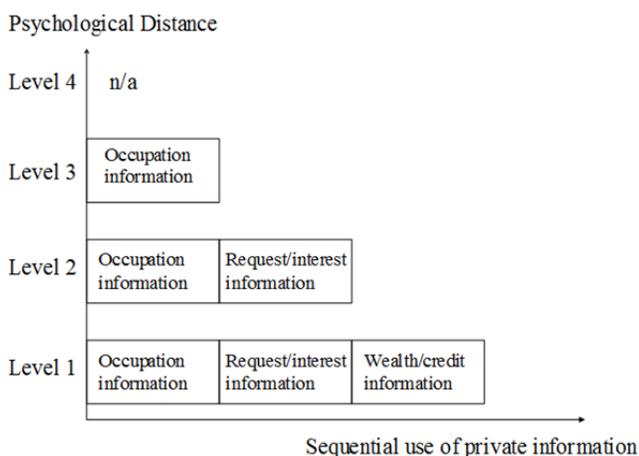


Figure 2. Sequential use of private information in personalized government service.

The personalized service offering inevitably conveys privacy violation problem, but the absence of web personalization might cause inconvenience and tremendous transaction cost. Citizens can reduce the transaction cost with personalized government system because they can easily figure out and use the service that they want with less searching effort and time. Therefore, it is worthwhile to offer customized services with the acceptable use of private information.

4. Conclusion and Discussion

This study suggested a solution for the privacy violation problem that might be a major obstacle in implementing customized service in the u-government environment. As Bailenson et al.⁵ and Scott, Mottarella, and Lavooy⁴⁵ noted, human beings naturally develop a psychological distance toward an online environment that they feel comfortable. This paper attempts to model this psychological distance by applying Hall’s Proxemics¹⁷, in which the distance is classifiable into four levels. The research empirically identified that people have different levels of psychological intimacy toward e-government service. Since it is not practical to directly ask every single visitor/user about his/her psychological distance toward the government, this paper developed the distance estimation model based on some key factors. Finally, the paper suggested the distance-based personalization model. The customized services should differentiate the amount and the types of private information in the personalization process depending on the psychological distance.

5. References

1. Alford J. Defining the client in the public sector: A social-exchange perspective, *Public Administration Review*. 2002; 62(3):337–46.
2. Allen C, Kania, D. Yaeckel B. *Internet world guide to one-to-one web marketing*. New York: John Wiley and Sons; 1998.
3. Andrade EB, Kaltcheva V, Weitz B. Self-disclosure on the web: The impact of privacy policy, reward, and company reputation. *Advances in Consumer Research*. 2002; 29(1):350–53.
4. Anttiroiko AV. Towards ubiquitous government: The case of Finland. *e-Service Journal*. 2005; 4(1):65–99.
5. Bailenson JN, Blascovich J, Beall AC, Loomis JM. Interpersonal distance in immersive virtual environments. *Personality and Social Psychology Bulletin*. 2003; 29(7):819–33.

6. Belanger F, Carter LD, Schaupp LC. U-Government: A framework for the evolution of e-government. *Electronic Government-Inderscience*. 2005; 2(4):427–45.
7. Berners-Lee T, Hendler J, Lassila O. The semantic web. *Scientific American*. 2001.
8. Cederquist JG, Corin RJ, Dekker MAC, Etalle S, den Hartog JI, Lenzini G. Audit-based compliance control. *International Journal of Information Security*. 2007; 6(2-3):133–51.
9. Chellappa R.K, Sin R.G. Personalization versus privacy: An empirical examination of the online consumer's dilemma. *Information Technology and Management*. 2005; 6:181–202.
10. Clarke RA. Information technology and dataveillance. *Communications of the ACM*. 31(5):498–512.
11. Culnan MJ. Protecting privacy online: Is self-regulation working? *Journal of Public Policy and Marketing*. 2000; 19(1):20–6.
12. Emmers-Sommer TM. The effects of communication quality and quantity indicators on intimacy and relational satisfaction. *Journal of Social and Personal Relationships*. 2004; 21(3):399–411.
13. Fletcher GJO, Kininmonth LA. Measuring relationship beliefs: An individual differences scale. *Journal of Research in Personality*. 1992; 26(4):371–97.
14. Friedman B, Kahn PH, Howe DC. Trust online. *Communications of the ACM*. 2000; 43(12): 34–40.
15. Gartner. Government in 2020: Taking the long view; 2005 Dec.
16. Gartner. Case study: Florida court are first to integrate criminal justice information statewide; 2007 May.
17. Hall ET. *The hidden dimension*, Garden City, New York: Doubleday; 1966.
18. Hansen H. Antecedents to consumers' disclosing intimacy with service employees. *Journal of Services Marketing*. 2003; 17(6):573–88.
19. Ho ATK. Reinventing local governments and the e-government initiative. *Public Administration Review*. 2002; 62(4):434–44.
20. Hook MK, Gerstein LH, Detterich L, Gridley B. How close are we? Measuring intimacy and gender differences. *Journal of Counseling and Development*. 2003; 81(4):462–72.
21. Ickinger WJ, Morris S. Psychological characteristics and interpersonal distance. Tulane University; 2001.
22. ITU. Ubiquitous network societies: The case of Japan. International Telecommunication Union (ITU). Document UNS/07; 2005 Apr.
23. Lee HJ. Future ubiquitous government evolution: Government 3.0. Ubiquitous Society Research Series (Korean). 2007; 29:1–15.
24. Li N, Mitchell J, Winsborough W. Design of a role-based trust-management framework. In: Abadi M, Bellovin SM, editors. *Proceedings of the Symposium on Research in Security and Privacy*. IEEE Computer Society Press; 2002. p. 114–30.
25. Manber U, Patel A, Robison J. Experience with personalization on Yahoo! *Communications of the ACM*. 2000; 43(8):35–9.
26. McKenna R. Real-time marketing. *Harvard Business Review*; 1995 Jul-Aug. p. 87–95.
27. McMillen D. Privacy, confidentiality, and data sharing: issues and distinctions. *Government Information Quarterly*. 2004; 21:359–382.
28. Miline GR, Gordon ME. Direct mail privacy-efficiency trade-offs within an implied social contract framework. *Journal of Public Policy and Marketing*. 1993; 12(3):206–15.
29. Moon YM. Intimate exchange: Using computers to elicit self disclosure from consumers. *Journal of Consumer Research*. 2000; 26:323–39.
30. Moon YM. Don't blame the computer: When self-disclosure moderates the self-serving bias. *Journal of Consumer Psychology*. 2003; 12(1 and 2):125–37.
31. Oden TC. *Game free: A guide to the meaning of intimacy*. New York: Harper and Row; 1974.
32. O'Neil D. Analysis of Internet users' level of online privacy concerns. *Social Science Computer Review*. 2001; 19(1):17–31.
33. Osborne D, Gaebler T. *Reinventing government: How the entrepreneurial spirit is transforming the public sector*. Massachusetts: Addison-Wesley; 1992.
34. Pang LC, Norris DF. Applying Customer Relationship Management (CRM) to government. *Journal of Government Financial Management*. 2002; 51(1):40–4.
35. Peppers D, Rogers M. *The one to one future: Building relationships one customer at a time*. New York: Doubleday; 1997.
36. Perlman D, Fehr B. The development of intimate relationships. In: Perlman D, Duck S, Editors. *Intimate Relationships. Development, dynamics, and deterioration*. Newbury Park, California: Sage; 1987. p. 13–42
37. Phelps J, Novak G, Ferrell E. Privacy concerns and consumers willingness to provide personal information. *Journal of Public Policy and Marketing*. 2000; 19:27–41.
38. Pieterse W, Ebbens W, Dijk J. Personalization in the public sector: An inventory of organizational and user obstacles towards personalization of electronic services in the public sector. *Government Information Quarterly*. 2007; 24:148–64.
39. Reis HT, Shaver P. Intimacy as an interpersonal process. In: Duck S, Editors. *Handbook of personal relationships: Theory, Research, and Interventions*. Chichester, New York: John Wiley and Sons; 1988. p. 367–90.
40. Rennhard M, Rafaeli S, Mathy L, Plattner B, Hutchinson D. Towards pseudonymous e-commerce. *Electronic Commerce Research*. 2004; 4:83–111.
41. Rezzgui A, Bouguettaya A, Eltoweissy MY. Privacy on the web: facts, challenges, and solutions. *IEEE Security and Privacy Magazine*. 2003; 1(6):40–9.
42. Roy Morgan Research. *Privacy and the Community*; 2004.
43. Schedler K, Felix J. Quality in public management: the customer perspective. *International Public Management Journal*. 2000; 1(3):125–43.

44. Schedler K, Summermatter L. Customer orientation in electronic government: Motives and effects. *Government Information Quarterly*. 2007; 24:291–311.
45. Scott VM, Mottarella KE, Lavooy MJ. Does virtual intimacy exist? A brief exploration into reported levels of intimacy in online relationships. *Cyberpsychology and Behavior*. 2006; 6:759–61.
46. Stern BB. Advertising intimacy: Relationship marketing and the services consumer. *Journal of Advertising*. 1997; 26(4):7–19.
47. Volokh E. Personalization and privacy. *Communications of the ACM*. 2000; 43(8):84–8.
48. Wang H, Lee MKO, Wang C. Consumer privacy concerns about internet marketing. *Communications of the ACM*. 1998; 41(3):63–70.
49. White TB. Deciding to reveal: Consumer disclosure management in consumer/seller relationship [Doctoral Thesis]. Duke University; 1999.