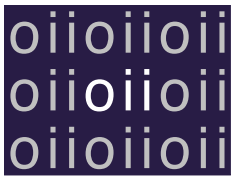

# Trust in the Internet: The Social Dynamics of an Experience Technology

William H. Dutton and Adrian Shepherd
Oxford Internet Institute
University of Oxford

* Paper prepared for the Foresight Directorate of the Office of Science and Technology. Earlier versions were presented at the Information, Communication, Society Symposium at the Oxford Internet Institute, Oxford, 17-20 September 2003 and the Society for Social Studies of Science (4S) Conference, Atlanta, Georgia, 15 October 2003. The authors thank Miles Yarrington, Robin Mansell, Richard Rose, Malcolm Peltu and several anonymous reviewers for their comments.

 

## Summary

Trust in the Internet and related information and communication technologies (ICTs)—'cybertrust'—could be critical to the successful development of e-services ranging from electronic public service delivery to e-commerce. This paper is anchored in a study conducted in the summer of 2003 that explored trust in cyberspace. This Oxford Internet Survey (OxIS) was conducted by the Oxford Internet Institute, based on a multi-stage random sample of the population of Great Britain aged 14 and upwards that was designed to be projectable to the nation as a whole. It provides important new evidence that helps to illuminate the concept of trust and the determinants of its relationship to the Internet.

The paper begins with an overview of these concepts. After describing the methodology and findings of the OxIS survey, analyses of the survey are drawn on to explore and refine key cybertrust issues. The potential for its findings to assist in shaping future directions for research and cross-disciplinary collaboration is discussed in the concluding section.

The paper argues that cybertrust should be seen as referring to the everyday view of trust in general, as a confident expectation. In the case of cybertrust, this relates to expectations about the reliability and value of the Internet and related ICTs, such as the equipment, people and techniques essential to the use of online services.

The OxIS survey reveals wide variations in cybertrust between individuals in Britain. Few exhibit a blind faith in the Internet and all that it offers, but most people are reasonably confident—if guarded—in the information and people they are able to access over the Internet. Well over half (59%) of the respondents to OxIS use the Internet, suggesting that there is sufficient trust to support the continued diffusion of this technology, despite a general awareness of the potential risks entailed in exposure to unwanted mail, viruses and other potential risks.

Variation across individuals in their levels of cybertrust supports the view that the Internet is an 'experience' technology. Generally, experience on the Internet tends to engender a higher level of cybertrust. There are two general categories of cybertrust, which we have labelled 'Net-confidence' and 'Net-risk', that can assist in analyses of cybertrust. Specifically, they have helped this analysis of survey data show that:

- Users of the Internet have more certainty and more confidence in the information and people they can access through the technology than do non-users, with many non-users having no opinion about its trustworthiness.

- Greater proximity to the Internet tends to instill more trust, to some extent (where 'proximity' is indicated by the use of the Internet over more years, in more ways and with greater expertise).

Trust appears to shape use of the Internet. Specifically:

- The presence of cybertrust is positively associated with the use of the Web for e-commerce.

- However, those who use the Internet more, for example for online shopping, are somewhat more likely to expose themselves to ‘spam’ e-mail and other bad experiences, which tends to undermine trust in the Internet and raise concerns over the risks.

Individuals with more formal education tend to be somewhat more sceptical of the information and people accessible on the Internet, but also somewhat less concerned over the risks entailed with Internet use. Therefore, education and exposure to the Internet might offer a general strategy for coping with the risks and threats to the trustworthiness of the technology. However, since education and exposure to the Internet and ICTs are skewed towards higher socioeconomic groups, these strategies could reinforce the ‘digital divide’ in access to the Internet over time. This threat is somewhat diminished by the fact that the Internet is becoming so widely accessible in Britain, but advances such as broadband Internet will continue to raise issues of the digital divide in access and trust.

The manner in which bad experiences on the Internet can undermine cybertrust suggests that initiatives to enhance the trustworthiness of the Internet are warranted. However, these efforts will create a tension, competing against other values, such as privacy or access, which could be threatened by some trust-enhancing services.

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# Trust in the Internet: the social dynamics of an experience technology

## The social dynamics of cybertrust

The Internet, World Wide Web and related ICTs 'reconfigure access' to information, people, services, and technologies (Dutton 1999; Dutton et al. 2003).[1] The use of the Internet, for example, not only enables people to get information, communicate with others, obtain services, and use technologies in new ways, but it also reconfigures what users know, who they know and stay in touch with, what knowhow they need, what they consume—and when and where they acquire and consume it.

This paper is based on the Oxford Internet Institute's OxIS national survey of Great Britain, which focused on the use and non-use of the Internet. Conducted in May and June 2003, it found that nearly 60% of a probability sample of individuals (14 years or older) said they used the Internet.[2] This represents a substantial increase over previous estimates of Internet access in Britain, suggesting that trust in the Internet remains high enough to continue supporting its diffusion. Trust in this new online cyberspace might well shape a person's decision to go online. It is also likely to shape what is done online, such as whether a person shops, banks electronically or cyberchats with others (Urban and Sultan 2000). In turn, users' experiences on the Internet might then raise or lower their level of 'cybertrust'.

However, there are many unanswered questions related to cybertrust:

- How much (dis)trust does the public place in cyberspace—the Internet's world of information, people, services and technologies?
- How does cybertrust shape use of the Internet?
- Does use of the Internet enhance or undermine that trust over time and with what effect on subsequent patterns of (non)use?
- How do different social contexts (e.g., generational, educational and geographical) affect issues of trust and the design and use of trust-enhancing products, services and frameworks?
- How do skills in accessing, managing and interpreting information on the Web, and engaging in social interactions through the Internet, affect trust outcomes in relation to e-commerce?

## Cybertrust and its determinants

Trust is a broad concept with application across many disciplines and subject areas but with no commonly agreed definition. A review of the economic literature on trust found that the existence of uncertainty was one factor present in most definitions of trust (Guerra et al. 2003).

For example, a strict definition by economists states: 'a person trusts someone to do X if she acts on the expectation that he will do X when both know that two conditions obtain: if he fails to do X she would have done better to act otherwise, and her

acting in the way she does gives him a selfish reason not to do X' (Bacharach and Gambetta 2001). Within this definition, the people displaying or acting in trust—the trustors—must put themselves in a position where they would be worse off should their trust be violated. Furthermore, the people they trust—the trustees—should have some temptation to violate that trust. This creates uncertainty about the behaviour of both parties, providing economists with an interesting case of decision-making under uncertainty.

However, conventional definitions of trust do not entail all of these conditions of uncertainty, exposure and temptation. The most conventional usage defines trust as '[…] a firm belief in the reliability or truth or strength etc. of a person or thing. [...] a confident expectation. […] reliance on the truth of a statement etc. without examination' (*Oxford English Dictionary*). For example, when someone says they do not trust a story in the newspaper, they might mean that they are uncertain about its truthfulness, or they might be certain that it is biased or otherwise misleading. People define trust to suit their own perceptions and needs, not as economists, sociologists, political scientists or other social scientists might wish to define it. For this reason, survey research on trust needs to adopt the broad, conventional conceptual definition of a 'confident expectation', and specify it operationally by responses to particular survey questions. This definition has therefore been adopted for the study reported here.

On the assumption that ICTs might undermine the trust of their users, and prevent people from obtaining services over the Internet, many current and potential technology producers, providers, and publishers are putting effort into technical, legal, and social approaches to enhancing trust in online products and services, such as in devising e-commerce 'trustmarks' (Guerra et al. 2003). It is therefore important to understand the factors that shape trust in cyberspace in order to assess the merit of these initiatives and determine whether they are aimed at the right problems.

*Trust deficits*

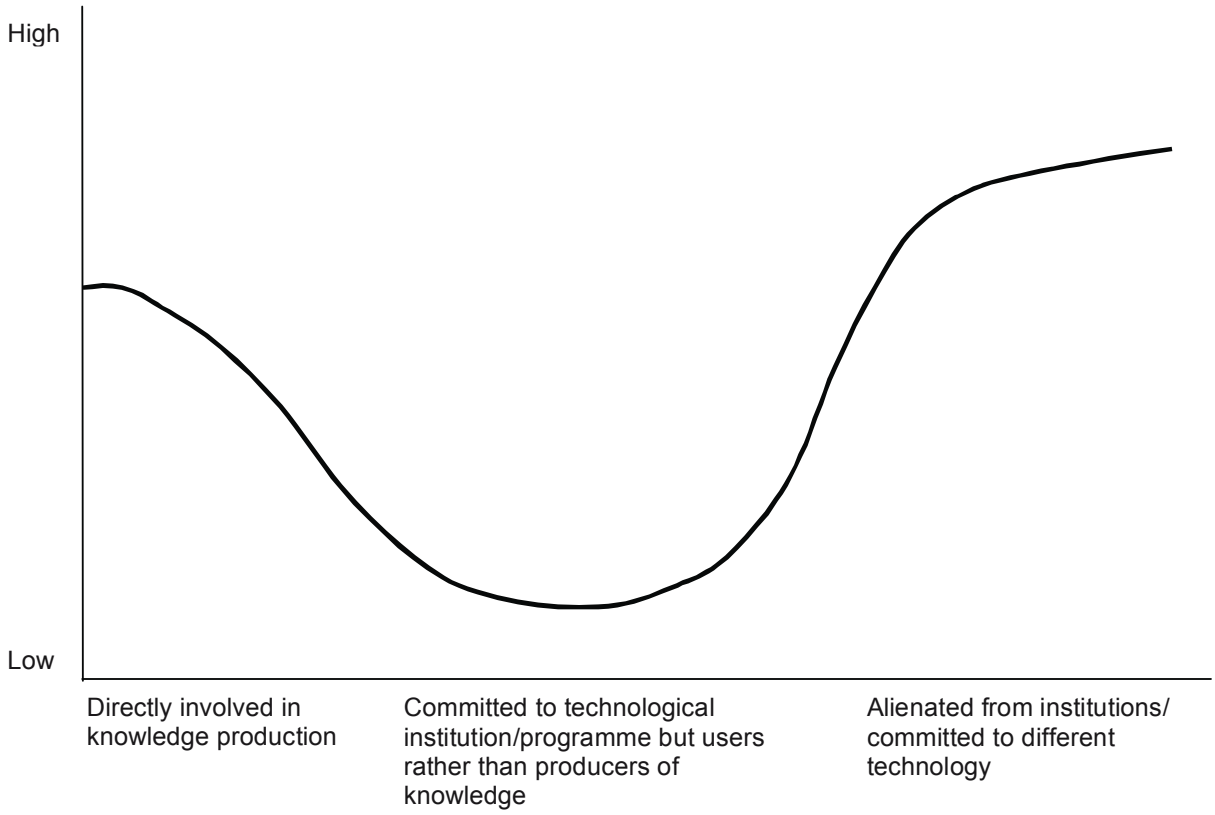
A key assumption is that computer-mediated communication, such as over the Internet, will undermine trust because it eliminates face-to-face interaction. However, empirical evidence relating to the impact of ICTs on trust is still sparse and contradictory. For instance, some researchers (e.g. Wallace 2001) argue that trust might be undermined in electronic interactions and transactions because the reduced communication channel makes it harder to observe vital non-verbal physical cues, such as facial expressions and body language, which have traditionally been viewed as the prime means used by people to detect deceit. On the other hand, despite decades of research, there is no definitive research on the impact of different media—audio-only, video, computer-mediated communication and a mix of media—on one's trust in another person involved in interpersonal communication.[3] Moreover, there are strong arguments that trust can be enhanced by making effective use of the vast amount of information and new forms of online social networks available through Internet-based interactions (e.g. Ben-Ner and Putterman 2002).

*Factors shaping trust in the Internet: the certainty trough*

As features of online communication could erode or enhance trust, it would be valuable to understand what factors, if any, can ensure that users place the appropriate level

of trust in this technology. Trust as conventionally defined is closely connected with a greater level of certainty or confidence in the reliability and security of the Internet, so it is likely that trust will be enhanced as a person learns more about the technology. However, information can create, rather than reduce, uncertainty. Donald MacKenzie's (1999: 43–46) research posited a curvilinear relationship between information and certainty, which he called a 'certainty trough' (Figure 1).

**Figure 1. The certainty trough**




*Source: Adapted from MacKenzie (1999: 43)*

At one extreme in Figure 1, those most socially distant from the Internet, with no knowledge of the technology or its use, are likely to be alienated from the technology and least certain about its role (MacKenzie 1999). Those people who learn more about the Internet, such as by becoming a user, might obtain a higher level of certainty and trust in the technology. At the opposite extreme, those who are socially closest to the Internet—for example Web developers and content producers and other ICT professionals—are likely to gain knowledge from which they have learned to have a higher level of uncertainty, as they understand the complex issues surrounding online reliability, security and privacy.[4]

The concept of a certainty trough not only challenges linear notions of the relationship between proximity and trust, but also raises questions about the appropriate level of trust. The most informed users and the producers might be less rather than more trusting. Scepticism or uncertainty can be positive. Of course, total trust or blind faith in technology could be risky.

However, proximity is one of many social and institutional factors that could play an important role in determining perceptions of trust.[5] So it is essential to understand how perceptions of trust might be modified or explained by different social backgrounds and contexts, whether generational, educational or geographical, which might yield patterned responses to the same technology or technological risks in general.

It is critical that government, industry, business and other organized groups respond to concerns over trust with an understanding anchored in empirical research. Debate over cybertrust is long on speculation and competing conventional wisdom, but short on real data on the public's actual perception of the Internet and trust in cyberspace. For example, one Luxembourg Minister argued: '... consumers are still reluctant to purchase on the net and want these virtual transactions to have the same level of guarantee as those carried out in traditional commerce'.[6] He goes on to posit that: '... trustmarks, certificates, labels, online disputes resolution ... will re-establish consumer confidence.'

Much additional evidence and analysis is needed to gain more reliable insights into how Internet users and non-users differ in their levels of cybertrust, and how that shapes their involvement in e-commerce and other online activities. These and related issues are developed in this analysis within the broader context of research and understanding of the personal, social, institutional and economic changes tied to the growing use of the Internet and related ICTs.

## Trust in cyberspace: learning lessons from experience online

### *Research on trust in the Internet*

Although the Internet emerged in the 1970s, as the ARPANET, its widespread use and the growing interest in e-commerce and cybertrust are much more recent phenomena. Few robust, in-depth and long-term studies of trust in the Internet are therefore available. However, some recent studies—mainly based on the US case—are developing an empirical base for grounding speculation about the use and implications of the technology (Lohse et al. 2000; Lunn and Suman 2002). We are not aware of any systematic survey research on cybertrust in the UK, other than the OxIS study reported here.

### *The Oxford Internet Survey (OxIS)*

This paper addresses the cybertrust questions raised above through an analysis of the OxIS study: a current and comprehensive investigation of public attitudes in Britain toward the Internet. This examined levels of trust in various aspects of the Internet, including the reliability of information on the Web and opinions about people's perceived exposure to risks when online, such as a loss of personal privacy. Key questions included: Does experience generate more or less trust in the people and information accessed online? To what degree do people 'trust' online contexts more, or less, than other environments? How can ICTs be deployed to enhance rather than diminish trust? And how does trust shape the use of the Internet?

The study entailed face-to-face interviews with its nationally representative random sample.[7] Personal interviews were conducted through household visits, based on a

multi-stage sampling technique designed to provide a sample that could yield estimates for the population as a whole. A probability sample of households was drawn up as the basis for visits. Field staff then randomly sampled individuals within households to determine whom to interview. The aim was to obtain 2,000 completed interviews. An excellent response rate of 66% of those contacted yielded 2,030 respondents from England, Wales and Scotland (Northern Ireland was not included in the population sampled). Appendix 1 provides a detailed explanation of the sample design.

The interviews lasted 30 to 35 minutes on average, covering a wide range of topics related to the Internet and Web, as well as the background of the respondent. Non-users as well as Internet users were interviewed. Interviews began with general questions, such as attitudes about the Internet and technology in general, before proceeding to detailed questions about patterns of (non)use. The full interview questionnaire is available online.[8]

The key concepts developed in this analysis, such as proximity to the Internet, were all defined operationally by how the respondents answered one or more specific questions in the survey. These operational definitions are explained here and when describing the results. A variety of multivariate statistical techniques have been used to determine how individual questions should be grouped and whether differences reported are meaningful and statistically significant. The details of these analyses are discussed in Appendix 2, with respect to measurement, and Appendix 3, concerning issues of statistical significance.

## Dimensions of cybertrust

The study identified, and described in some detail, wide variations in public perceptions in Great Britain of the trustworthiness of the Internet. This helped to show how levels of trust are related to an individual's patterns of (non)use of the Internet over time. Several social background characteristics of users were related to their trust in the Internet, such as age. However, most predispositions to trust or distrust the Internet associated with these characteristics tend to be mitigated over time, and can be accounted for by the lessons learned from experience online.

Patterns of responses to the OxIS survey formed the basis for our definition of two general categories related to broad conceptions of trust, which we have labelled 'Net-confidence' and 'Net-risk'.[9] These two types of trust are distinct. For example, a person can have very little confidence in the value of information on the Internet, but see few risks entailed in its use, or vice versa.[10]

### *Net-confidence*

Users of the Internet have more confidence in the technology, and in the people they can communicate with on the Internet, than do non-users. They were also significantly more likely to think that information on the Internet is reliable.

This can be seen primarily through answers to three specific questions that operationally define Net-confidence (also see Appendix 2). One question asked respondents to rate the quality of information on the Internet on a scale of 1 to 10, where 10 is 'totally reliable' and 1 is 'totally unreliable'. (As discussed below, respondents were also

asked to rate the information found in newspapers and on television on the same scale.) Responses varied across the full range of the scale, but those who do not use the Internet were much more likely to say they did not know whether the information on the Internet was reliable or not (Figure 2). About one-third (32%) of non-users said they 'don't know' how reliable information is online. Former users express more certainty, but are significantly less certain than are current narrowband or broadband Internet users (Figure 2). The validity of attributing a higher level of uncertainty to those answering 'don't know' is reinforced by the patterns of responses from those who express an opinion.

**Figure 2. Uncertainty over the reliability of information on the Internet (*n* = 2,029)**

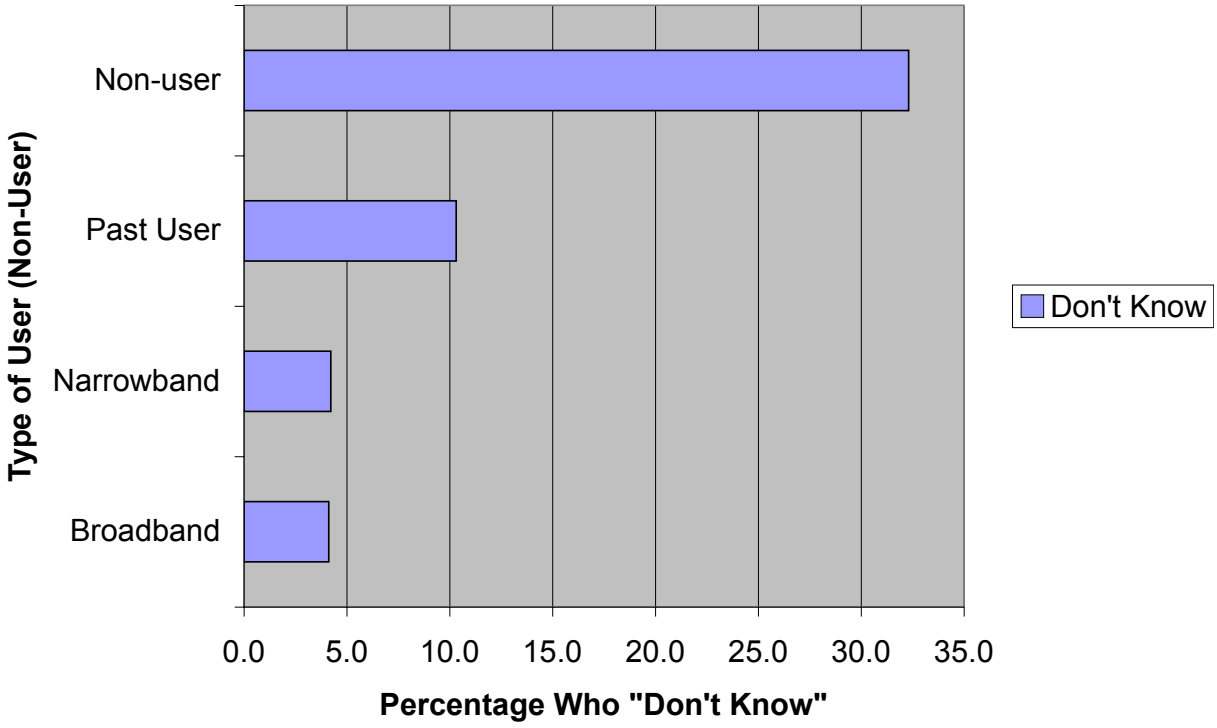
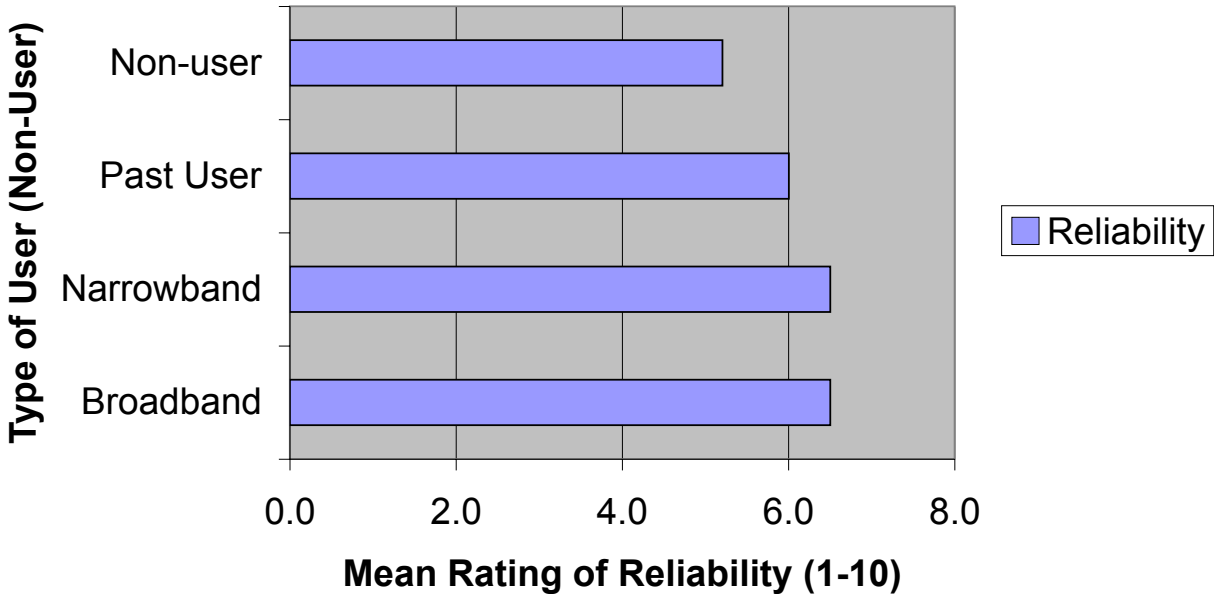



**Figure 3. Reliability of information on the net (*n* = 2,029)**



Among those respondents who have an opinion, non-users are more likely to rate information on the Internet as less reliable than current users. Past users fall in between these two ratings (Figure 3). There is no difference between narrow and broadband Internet users in the reliability they attribute to information on the Internet. Those who use the Net are therefore more confident in the reliability of online information. At the same time, Internet users are not blindly trusting of information on the Net. Their ratings average just over 6 on a 10 point scale, suggesting that they tend to be mindful of the potential for biased information, misinformation or weak sources.

A second indicator of Net-confidence is institutionally anchored. On this basis, users tend to be more institutionally trusting of the 'people' associated with the Internet. Respondents were asked: 'Now I'd like to ask you about some institutions. Please tell me how much confidence you have in the people running each. Use a 5 point scale where 1 means you have no confidence at all and 5 means you have total confidence.' The institutions (major companies; the Government; television news; newspapers; and the Internet) were then read out. The order was rotated across interviews.

On this question, as in the case of confidence in information, non-users displayed far more uncertainty about the Internet, with just over one-third (35%) saying they 'don't know' if they have confidence or not (Table 1). Those non-users who had an opinion were also more likely to have no confidence in 'the people running' the Internet (Table 1).[11] Internet users were more confident, with broadband users being the most confident.

**Table 1. Confidence in the people running the Internet by type (*n* = 2,030)**

| Level of confidence | Broadband | Narrowband | Past user | Non-user | Total |
|---|---|---|---|---|---|
| Don't know | 3% | 8% | 15% | 35% | 17% |
| 1. No confidence | 4 | 5 | 8 | 23 | 11 |
| 2 | 16 | 14 | 15 | 15 | 15 |
| 3 | 33 | 36 | 34 | 20 | 30 |
| 4 | 35 | 30 | 20 | 6 | 22 |
| 5. Total confidence | 9 | 7 | 8 | 1 | 5 |
| Total percent | 100 | 100 | 100 | 100 | 100 |
| Number of respondents | 232 | 978 | 117 | 703 | 2030 |

A third indicator concerns the people to whom users can gain access over the Internet, and vice versa. Parallel with the patterns above, users are more confident than non-users in the people they can communicate with on the Internet. Respondents were given a card, and asked: 'Now I'd like to ask you about different groups of people. Please tell me how much confidence you have in the following groups of people. Use

a 5 point scale where 1 means you have no confidence at all and 5 means you have total confidence.' The groups (scientists, doctors, most people I know, most people in this country, most people you can communicate with on the Internet) were read out, with the order rotated across interviews.

Once again, uncertainty is greatest among non-users, with about one-third (35%) saying they 'don't know' what level of confidence they have in people online (Table 2). Non-users who have an opinion are less confident 'in people you can communicate with' online than are users, with current users being more confident.

That said, most users are not naive. No category of user was likely to say they had total confidence in people they could communicate with online. Only 3% of all respondents expressed total confidence, suggesting that concerns in the press over meeting 'strangers' and 'bad people' online have created a healthy scepticism among nearly all users.

**Table 2. Confidence in most people you can communicate with on the Internet, by type of (non)user (*n* = 2,030)**

| Level of confidence | Broadband | Narrowband | Past user | Non-user | Total |
|---|---|---|---|---|---|
| Don't know | 3% | 8% | 11% | 35% | 17% |
| 1. No confidence | 14 | 13 | 22 | 26 | 18 |
| 2 | 27 | 26 | 31 | 16 | 23 |
| 3 | 35 | 33 | 29 | 19 | 28 |
| 4 | 18 | 17 | 4 | 2 | 11 |
| 5. Total confidence | 3 | 3 | 3 | 1 | 3 |
| Total percent | 100 | 100 | 100 | 100 | 100 |
| Number of respondents | 232 | 978 | 117 | 703 | 2030 |

*Net-risks: a second dimension of cybertrust*

A separate dimension or category of trust-related issues concerns risks to which Internet users might be exposed, such as losing their privacy, buying the wrong products, or not being able to secure personal information (Appendix 2).

Generally, Internet users had more confident expectations—that is, they were less concerned over risks. They were less likely to think that people who went online put their privacy at risk, and were less likely to think it was difficult to assess product quality online. They were also less likely to think that the Internet allows people to get personal information about them. As in the case of Net-confidence, Internet users were significantly more trusting—less concerned over Net-risks—than were non-

users. Past users were generally positioned between current and non-users in terms of their concern over risks on the Internet.

Respondents were read a number of comments 'that people make about buying products or services through the Internet.' They were shown a card, which had a set of response categories, so that they could indicate how much they agreed or disagreed with each of the statements. The statements included risks to their personal privacy as well as risks in shopping online, such as being deceived about the quality of a product. Respondents tended to agree that people who go online: (a) put their privacy at risk, and (b) that being online could enable others to get personal information about them, and (c) that it is difficult to judge the quality of a product online (Table 3).

However, individuals vary in their perceptions of perceived risks, depending on their experience with the Internet (Figure 4). When read: 'People who go online put their privacy at risk', one-third (33%) of users said they did not know, but non-users were also significantly less likely to disagree with this statement (Figure 4). Almost half of non-users (46%) did not know if 'the Internet permits people to get personal information about you', but those non-users with an opinion were less likely to disagree with this statement. Likewise, nearly half (48%) of non-users did not know if 'it's difficult to assess product quality online', while nearly half of those with an opinion said they agreed with this statement. Broadband users were most likely to disagree (Figure 4).

**Table 3. Agreement to statements about risks on the Internet (*n* = 2,030)**

| Question | Strongly disagree | Disagree | Neither | Agree | Strongly agree | Don't know |
|---|---|---|---|---|---|---|
| 'Going online puts privacy at risk' | 2% | 13% | 15% | 44% | 10% | 16% |
| 'Permits people to get information about you' | 3% | 13% | 19% | 34% | 7% | 24% |
| 'Its difficult to assess product quality' | 2% | 11% | 16% | 38% | 10% | 23% |

*Diffuse trust and trust in the Internet*

Some have argued that people who are more trusting, in general, are more trusting in the Internet (Katz and Rice 2002). For example, in an essay on perceptions of risk in technical and environmental dangers, Douglas and Wildavsky (1982) argue that there are types of individuals with general responses to risks, such as fatalism, shaped by the social and cultural setting in which they are located. A study drawing from US survey data found that individuals who are less trusting of people in general are more likely to perceive the Internet as threatening (Uslaner 2000).[12]

The OxIS research, however, indicates that Internet users in Britain are not more trusting in the Internet simply because they are more trusting of all institutions. First, Internet users are not significantly more confident in other media than are either non-users or past users. Confidence in the people running newspapers and television is the same for non-users and current Internet users (see Appendix 3). This reinforces

the view that Internet users are not just more trusting in institutions generally, although broadband users were found by OxIS to be somewhat more trusting than non-users. For example, broadband users are slightly more confident in the reliability of information published in newspapers than are non-users and slightly more confident in the reliability of information broadcast on television as well (Figure 5), but these differences are quite minor and not statistically significant (Appendix 3). Broadband and narrowband Internet users are, however, distinctive primarily in the reliability they assign to information on the Internet, which they rate almost as highly as they rate information on television, and higher than they rate newspapers (Figure 5).

**Figure 4. Net risks**

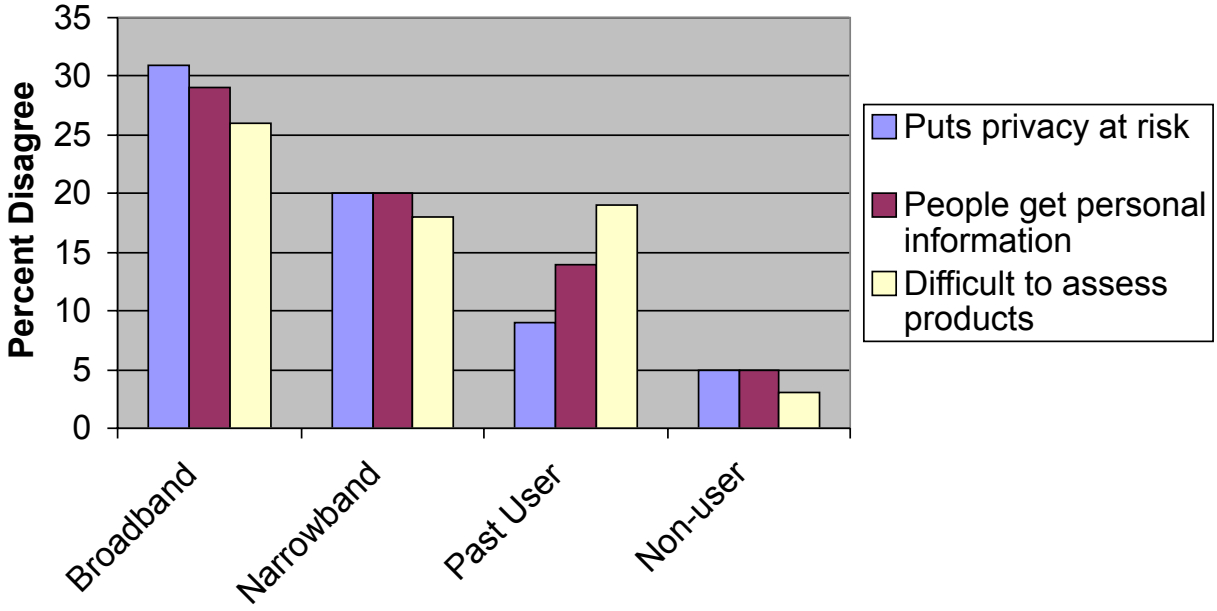
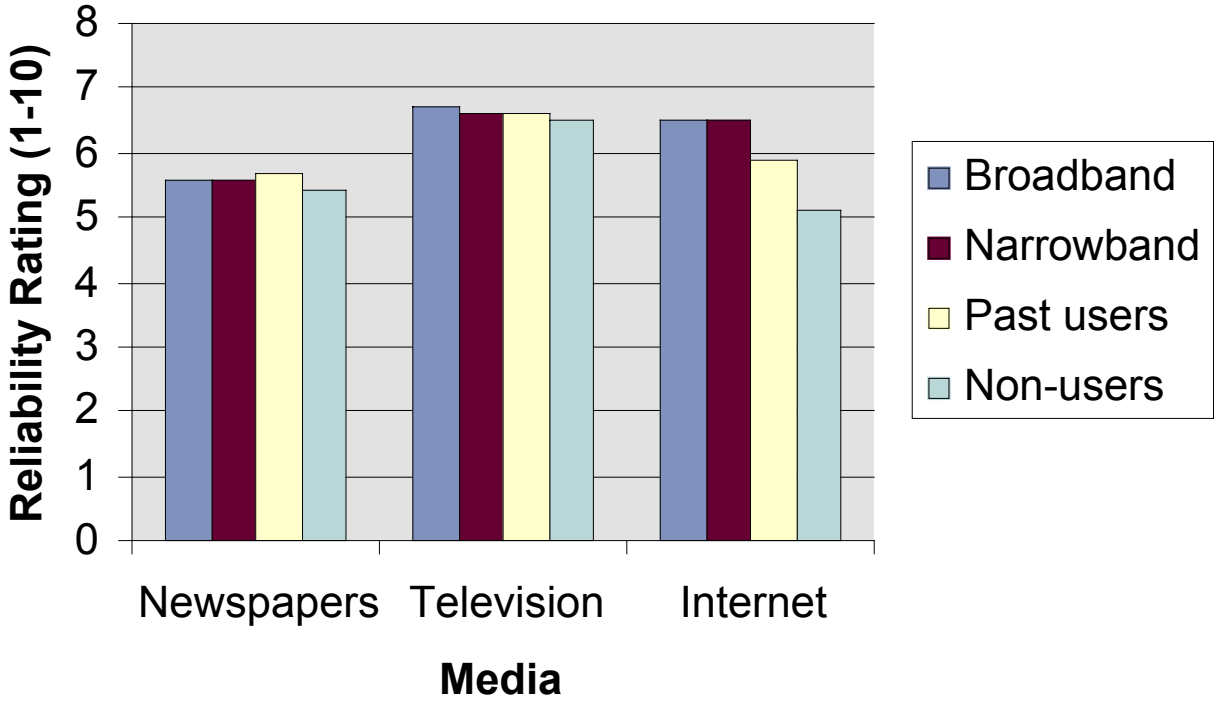



**Figure 5. Reliability of information**



This potential of general attitudes shaping trust in the Internet was pursued in a variety of other analyses. Scales were created of trust in institutions, trust in the media, trust in other people, and concerns over privacy. In each case, respondents who were more confident in institutions, the media, and other people, and less concerned over privacy violations, tended to be more trustful of the Internet.

However, these relationships did not account for the associations between use of the Internet and cybertrust.

*Factors shaping cybertrust*

These patterns of relationships support the broad generalization that use of the Internet tends to engender cybertrust, as they are associated with higher levels of Net-confidence and diminish a sense of Net-risk. It might be that use diminishes social distance and creates a higher level of certainty and confidence in the value of the Internet.

However, many factors are related to use of the Internet. For example, if more educated individuals are more likely to use the Internet, and are more trusting, it could be that relationships between use and trust are spurious—explained by education. It is therefore important to control statistically for a variety of variables that might explain levels of trust.

**Table 4. Regression coefficients on 'Net-confidence' scale (*n* = 2,026)**

| Variable | B* | Std. Error* | Beta** | t | Sig. |
|---|---|---|---|---|---|
| Constant | –0.34 | 0.12 | | –2.78 | 0.01 |
| Gender (female) | 0.01 | 0.06 | 0.00 | 0.11 | 0.91 |
| SES | –0.02 | 0.02 | –0.03 | 1.20 | 0.23 |
| Age | 0.00 | 0.00 | 0.02 | 0.62 | 0.54 |
| Education | –0.04 | 0.02 | –0.05 | –2.20 | 0.03 |
| Broadband | 0.71 | 0.08 | 0.23 | 8.87 | 0.00 |
| Narrowband | 0.71 | 0.06 | 0.36 | 12.78 | 0.00 |
| Past user | 0.39 | 0.10 | 0.09 | 4.02 | 0.00 |

*Unstandardized coefficients.

**Standardized coefficients.

Table 4 provides the results of a regression analysis of factors related to Net-confidence. A large proportion of the variance in Net-confidence is not explained by any combination of these variables. However, the analysis suggests that gender,

socioeconomic status (SES)[13] and age are unrelated to Net-confidence, once use of the Internet is controlled. The most interesting background variable of relevance is education[14]. There is a statistically significant negative association between education and Net-confidence. That is, controlling for use of the Internet, more educated people tend to be more sceptical of the information online, the people online and the institution of the Internet than are individuals with less schooling.

However, the stronger association is between use of broadband or narrowband Internet services and Net-confidence. Put simply, those exposed to the Internet gain more trust in the technology. Even past users—so called Internet dropouts—have more confidence in the Internet than do non-users, who have no experience with the technology.

A similar pattern emerges with respect to perceived Net-risk, a scale combining perceptions that the Internet poses risks to privacy, the securing of personal information, and to judging the quality of products online (Table 5). As in the case of Net-confidence, the gender, socioeconomic status and age variables are not significantly related to perceived risks, once other factors are controlled statistically.

**Table 5. Multivariate regression coefficients on 'Net-risks' scale (*n* = 2,026)**

| Variable | B* | Std. Error* | Beta** | t | Sig. |
|---|---|---|---|---|---|
| Constant | 0.24 | 0.13 | | 1.90 | 0.06 |
| Gender (female) | 0.11 | 0.06 | 0.04 | 1.76 | 0.08 |
| SES | –0.03 | 0.02 | –0.04 | –1.50 | 0.14 |
| Age | 0.00 | 0.00 | 0.01 | 0.44 | 0.66 |
| Education | –0.04 | 0.02 | –0.05 | –1.91 | 0.06 |
| Broadband | –0.53 | 0.08 | –0.17 | –6.35 | 0.00 |
| Narrowband | –0.16 | 0.06 | –0.08 | –2.83 | 0.00 |
| Past user | 0.15 | 0.10 | 0.04 | 1.50 | 0.13 |

*Unstandardized coefficients.

**Standardized coefficients.

Education has a non-significant association with trust, in the case of Net-risks, with more educated individuals being somewhat less concerned about these risks. Proximity to the Internet—measured by the use of narrow or broadband Internet services—is inversely associated with perceived risks. That is, those using the Internet tend to be less worried about the risks conventionally associated with Internet use. However, in this case, past users are more concerned about the risks than non-users. This

relationship is not statistically significant, but it suggests that trust might be one factor that could explain why some users become Internet dropouts (Table 5).

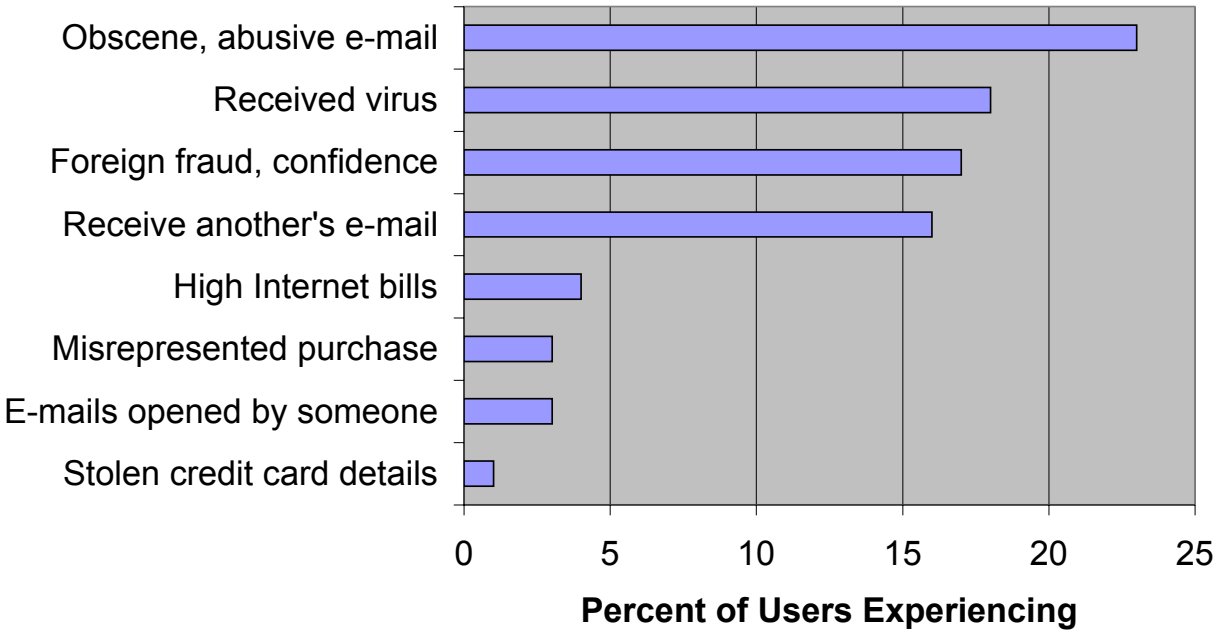
**Shaping trust among users: bad experiences online**

There remains a great deal of unexplained variation in trust among those who use the Internet. Will bad experiences when using the Internet diminish trust, as suggested by the fact that dropouts tend to perceive greater risks?

Unwanted commercial e-mail or spam is one of the most frequently cited problems tied to the use of e-mail, and about half (47%) of the e-mail users in Britain say they receive 'too many' spam messages.[15] The longer a person uses the Internet, the more likely they are to have experienced one or more problems, such as with spam, a computer virus or fraudulent solicitations.

We asked users of the Internet to indicate whether they had problems with some of the negative Internet experiences that are frequently mentioned by others (Figure 6). 23% of British e-mail users said they have received obscene or abusive e-mail. Receiving a computer virus is cited by 18% of users, and being contacted by someone from a foreign country suggesting an arrangement to make money, such as the infamous 'Nigerian fraud', was cited by 17% of users (Figure 6). Another problem rated as highly, but still only mentioned by 16% of users, was receiving mail 'not intended for you' (Figure 6). A worrisome but relatively small percentage of users indicated problems with excessive online bills, online purchases that were misrepresented, e-mails opened by someone else, or the theft of credit card details over the Internet. Less than one percent of e-mail users said that their credit card details were stolen by someone over the Internet. Just over half (54%) of users did not experience any one of the problems listed in Figure 6.

**Figure 6. Bad experiences on the Net (*n* = 1,045)**




Given news coverage about spam, obscene mail and viruses, for example, it is surprising that so many users do not have bad experiences. It is critical to remember

that many use the Internet in a far more limited way than the heaviest users, such as in academia and the computer industry. Survey research can correct some impressions driven by Internet commentators, who are among the heavy users. That said, those who use the Internet more might be a bell-wether for the problems likely to beset other users in due course. Therefore, these limited experiences with problems are not necessarily a reason for complacency.

Furthermore, if experience with the Internet engenders trust, might it also be that bad experiences over time tend to erode that trust, creating a countervailing trust dynamic? Again, it is useful to look at the independent role of multiple factors that might explain differential levels of trust, as we do in the next section.

**Trust among users of the Internet**

Does more experience with the Internet, such as measured by years of experience, and the range of uses, both of which relate to social proximity, help explain levels of trust? Is trust undermined by bad experiences online? Or is cybertrust anchored in more fundamental social determinants? For example, educational and other social factors might lead to higher or lower levels of trust. In an attempt to isolate the independent role of a number of plausible factors, we conducted a multivariate statistical analysis.

For this analysis, broadband use was used as a dichotomous (yes or no) variable, capturing whether the respondent is currently using broadband Internet technology. The study included basic demographic variables, such as gender, age, socioeconomic status, and education. We also constructed a measure of involvement with, or proximity to, the Internet, which combines years of experience, a self-rating of expertise, and the number of online activities, such as e-mail, that a user engaged in for one hour or more per week. These three indicators were highly associated (see Appendix 2), supporting their use in a single scale. In addition, we have created an index of ‘bad Internet experiences’ which is based on a simple count of the number of bad experiences, incorporating all of the items in Figure 6.

Table 6 shows the results of a multivariate regression analysis of Net-confidence on these variables, only for e-mail users. Just two variables have a statistically significant independent association with Net-confidence: education and bad experiences. Users with higher levels of education or schooling are likely to be somewhat less confident in the Internet—more sceptical (Table 6), which is consistent with the findings across the entire sample (see Table 4). And those users who have had more bad experiences on the Internet are likely to be somewhat less confident (Table 6).

Proximity is not strongly associated with Net-confidence in a simple way (Table 6). There is a statistically significant negative association that suggests proximity tends to lower levels of Net-confidence, which makes those users more involved in the Internet more sceptical about it. This is in line with the concept of a certainty trough.

However, there is also a significant interaction between proximity to the Internet (more years of experience, a greater range of uses and more expertise) and socioeconomic status (Table 6). For those in higher socioeconomic groups, proximity to the Internet tends to diminish Net-confidence disproportionately. For those in lower socioeconomic groups, proximity tends to increase confidence. Overall, it appears that proximity tends

to undermine predispositions, whether positive or negative, and move all users closer to a learned level of confidence.

**Table 6. Regression coefficients on 'Net-confidence' for users (*n* = 1,045)**

| Variable | B* | Std. Error* | Beta** | t | Sig. |
|---|---|---|---|---|---|
| Constant | 0.28 | 0.15 | | 1.88 | 0.06 |
| Gender (female) | –0.06 | 0.08 | –0.02 | –0.78 | 0.43 |
| SES | 0.01 | 0.03 | 0.01 | 0.28 | 0.78 |
| Age | 0.00 | 0.00 | 0.04 | 1.40 | 0.16 |
| Education | –0.06 | 0.02 | –0.09 | –2.58 | 0.01 |
| Broadband | 0.03 | 0.07 | 0.01 | 0.39 | 0.69 |
| Proximity | –0.20 | 0.10 | –0.21 | –2.11 | 0.04 |
| SES*Proximity | 0.07 | 0.03 | 0.27 | 2.72 | 0.01 |
| Bad Net experiences | –0.07 | 0.03 | –0.08 | –2.55 | 0.01 |

*Unstandardized coefficients.

**Standardized coefficients.

A different combination of factors is associated with Net-risk (Table 7). Those with a higher level of schooling are likely to be less concerned over Net-risk than those who use broadband Internet and have more proximity to the Internet.[16] This suggests that experience engenders trust. But there is a countervailing influence of bad experiences with the Internet, which tend to increase concern—Net-risk—as one would expect from other findings (Table 7).

## Experience technology or certainty trough

The concept of a certainty trough led to an exploration of proximity to the Internet as a factor shaping cybertrust. However, the findings are not entirely consistent with an explanation based on MacKenzie's notion of the certainty trough. First, those alienated from the technology, the Internet dropouts, who have rejected the Internet, are more certain and more trusting than those with no experience with the Internet. This suggests that social proximity—experience—might be a more straightforward explanation of low certainty than alienation or a rejection of the technology. Secondly, we found no clear rise of uncertainty among the most experienced users, except as it might be connected with bad experiences online. This may be because we did not move to a high level of use, and look at actual producers—those closest to the technology.

**Table 7. Regression coefficients on 'Net-risks' scale for users (*n* = 1,045)**

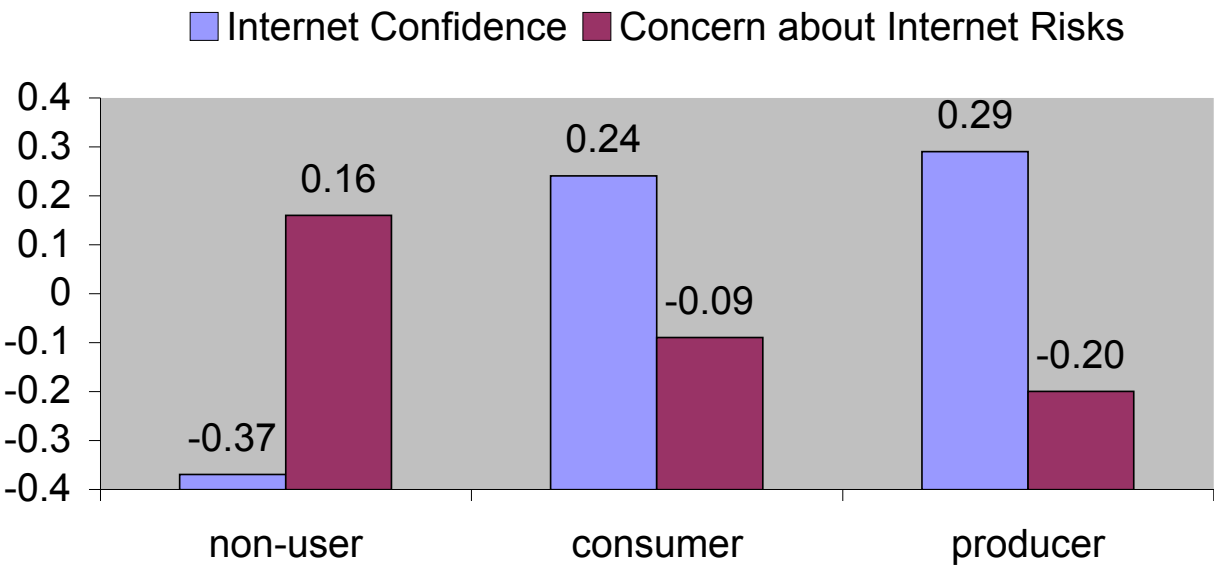
| Variable: | B* | Std. Error* | Beta** | t | Sig. |
|---|---|---|---|---|---|
| Constant | –0.09 | 0.17 | | –0.53 | 0.59 |
| Gender (female) | 0.07 | 0.09 | 0.02 | 0.84 | 0.40 |
| SES | –0.02 | 0.03 | –0.02 | –0.50 | 0.61 |
| Age | 0.00 | 0.00 | 0.02 | 0.57 | 0.57 |
| Education | –0.045 | 0.02 | –0.07 | –2.16 | 0.03 |
| Broadband | –0.34 | 0.08 | –0.13 | –4.20 | 0.00 |
| Proximity | –0.15 | 0.04 | –0.13 | –3.89 | 0.00 |
| Bad experiences | 0.16 | 0.03 | 0.18 | 5.57 | 0.00 |

*Unstandardized coefficients.

**Standardized coefficients.

We therefore developed a combined indicator of Internet non-users, consumers, and producers to better represent MacKenzie's categories of those alienated (non-users and drop-outs), users, and those directly involved, defined as those who have produced a Web page (Figure 7).

**Figure 7. Trust by Internet non-users, consumers and producers**




It is useful to compare levels of confidence and risk across these categories of proximity. We compared the mean scores for 'Internet confidence' and 'Internet risk' across categories of non-users, users who have never produced their own web-

site, and users who have created their own web-site. Figure 7 shows that Web-site producers have slightly more confidence than Internet users, not less, which is a minor exception to the pattern expected by a certainty trough, but consistent with an experience technology. There is absolutely no evidence of a trough when it comes to concern about Internet risks. Instead, there is a monotonic decline in concern the more proximate the person is to the Internet, with producers significantly less concerned. Website producers are less concerned than Internet users, who are less concerned than non-users.

Thus, within the range of respondents surveyed, there is more evidence for the Internet as an experience technology—with proximity promoting more cybertrust—than as a curvilinear certainty trough. It might be that at the highest end of expert producers, such as in the case of computer scientists, there might be a diminishing level of trust or greater uncertainty. However, this is not the case in this more representative cross-sectional sample of Britain.

**The impact of trust on Internet use**

Does trust matter in the subsequent use of the Internet? The analyses reported above found that Internet dropouts perceived somewhat greater risks in the use of the Internet, so distrust might help explain why some people stop using the Internet. The relationships found between use of the Internet generally and levels of Net-confidence and Net-risk are also likely to be, in part, two directional. That is, use could engender trust, but trust could reinforce decisions to get online.

Therefore, there is some evidence to support the commonsense view that trust is an important factor in the future of the Internet. To explore this, Table 8 shows the degree to which trust is related to the use of the Internet for online shopping, one use of the Internet that has been associated with experience and trust (Lunn and Suman 2002). Respondents who use e-mail were asked to indicate the approximate number of online purchases they made per month. Using this indicator as a dependent variable, Table 8 shows the results of a multivariate regression analysis, which isolates the independent role of Net-confidence and Net trust in whether a person shops online.

Most variance in Table 8 is unexplained. However, in line with findings in the US, the strongest relationship is with proximity to the Internet (Lunn and Suman 2002). Those who have used the Internet for more years, who use it for more types of activities, and have a higher level of expertise, are more likely to shop online. Those with more confidence in the reliability of information and people online (Net-confidence) are somewhat more likely to shop online, but this relationship is not statistically significant. However, perceived Net-risks are significantly and negatively associated with online shopping (Table 8). In short, it appears, as many suspect, that distrust of the Internet undermines e-commerce. Specifically, those who perceive greater risks on the Internet are less likely to shop online. In turn, perceptions of risks are associated with bad experiences online.

Thus, two countervailing trends are shaping the future of e-commerce and, quite likely, other online services. As people get closer (more proximate) to the Internet—using it over more time, in more ways, and gaining expertise—they tend to gain, or learn, an educated level of cybertrust. However, with experience can come bad experiences

with such problems as viruses, spam, and obscene mail, which tends to increase one's sense of risks entailed in the use of the Internet, and which undermines trust and use of the technology.

**Table 8. Regression for 'Online Shopping' among users (*n* = 1,045)[a]**

| Variable | B* | Std. Error* | Beta** | t | Sig. |
|---|---|---|---|---|---|
| Constant | –0.14 | 0.39 | | –0.37 | 0.71 |
| Gender (female) | 0.25 | 0.21 | 0.04 | 1.17 | 0.24 |
| SES | 0.13 | 0.08 | 0.06 | 1.75 | 0.08 |
| Age | 0.01 | 0.00 | 0.04 | 1.32 | 0.19 |
| Education | 0.10 | 0.06 | 0.06 | 1.76 | 0.08 |
| Broadband | 0.30 | 0.20 | 0.05 | 1.47 | 0.14 |
| Proximity | 0.42 | 0.08 | 0.16 | 4.87 | 0.00 |
| Net-confidence | 0.09 | 0.08 | 0.03 | 1.07 | 0.29 |
| Net-risks | –0.25 | 0.07 | –0.10 | –3.38 | 0.00 |

[a]Online shopping measured by number of purchases per month.

*Unstandardized coefficients.

**Standardized coefficients.

## Discussion and future directions

A developing literature on trust and risk associated with information and communication technologies is most often anchored in case studies and ethnographic approaches, which highlight the subtle but no less real complexities of expert and pubic perceptions. Survey research can complement these studies in a variety of ways. First, they enable us to identify explanations that could evade case research, such as experience, which emerges by comparisons across many users at different stages of involvement. A number of more conventional explanations of public perceptions of risk, such as those tied to particular social groups, are not well supported by this study. Likewise, the certainty trough did not provide a valid interpretation of our findings, although it led us toward an alternative explanation, more consistent with our results. Secondly, survey data permits generalization to a wider population of the public. Nevertheless, there are limitations to surveys, particularly cross-sectional survey research, that are important to recall.

*Limitations of a cross-sectional analysis*

The OxIS study highlights issues concerning cybertrust for which more evidence and analysis is needed to gain a better understanding of the underlying social dynamics. Survey research is one of the few ways available to provide an indication of patterns and trends across a large population, like Great Britain. Also, by enabling multivariate statistical controls, survey data permits the exploration of underlying patterns impossible with small samples and qualitative observations. However, while it offers analytical advantages and provides a means to project to a larger population, surveys are weak in providing detailed contextual knowledge, and in unravelling the full complexity of individual beliefs, motivations and actions. Therefore, these analyses could be complemented by more qualitative research.

The OxIS survey is also a snap-shot at one point in time. Longitudinal surveys would enable stronger conclusions to be drawn about any causal relationships suggested by the associations identified in this paper. For example, it is clearly important to follow changes in cybertrust over time, particularly given the degree to which trust appears to be anchored in experiences online. Will more users have more frequent negative experiences online, or will contemporary problems, such as with spam, diminish as they are taken more seriously and anticipated?

These limitations are mitigated to some degree by a degree of replication across surveys, some of which have relied on longitudinal data. For example, the findings of this survey analysis generally reinforce the findings of the major longitudinal study in the US (see Lunn and Shuman 2002). Other studies within the World Internet Project[17] hold out the potential for further replication across nations and over time.

**General patterns and themes: experience technology and the certainty trough**

Most generally, experience with the Internet over time tends to shape trust, as indicated by perceptions of Net-risk and Net-confidence outlined earlier. As people use the Internet, they gain experience and skills and are more socially proximate—less distanced from—the technology. This tends to undermine distrust. However, those who are engaged in Internet use over more time and in more ways are likely to become more aware of the risks and more likely to be exposed to negative experiences, such as unwanted e-mail, which can undermine trust.

This illuminates the view that the Internet can be called an ‘experience’ technology, as it is difficult for people to understand how the Internet and Web work until they use them. Non-users are among the more distrustful of the Internet. They have less confidence in information and people online, and in the institution of the Internet. They are also more concerned about the potential risks. Distant from the technology, they are most uncertain of its value.

Experience—use of the Internet—tends to shore one’s trust, including boosting confidence in the Internet and undermining concerns over risks to privacy and security. In fact, the risks experienced in using the Internet are most often less than the risks imagined by non-users. As people use the Internet and gain expertise and capabilities and gain greater access to Internet resources, such as with the use of broadband, they are also likely to be less concerned over the risks of Internet use. That is not to say

that they become naive or exhibit blind faith. Most people perceive risks attached to Internet use. However, people anticipate greater risks than they appear to encounter once they gain experience. Similarly, non-users often underestimate the benefits of the Internet, leading users to have more confidence than non-users. A number of patterns discovered in this analysis support this general theme.

However, it may also be difficult to appreciate the risks of Internet use until one experiences them. With experience will come bad experiences online that can undermine trust and diminish the value of the Internet to the wider community of users. Time and involvement with the Internet brings some bad as well as good experiences, which do undermine confidence in the technology and increase users' uncertainty over whether they can avoid the risks entailed.

In 2003, a significant but surprisingly small percentage of users had bad experiences on the Internet. This may account for the rather guarded but trusting attitude of most users. It might also suggest that it is timely, before problems with Internet use, such as with spam, become more widespread, to undertake initiatives to reduce the likelihood of more users experiencing greater difficulties.

A closely related pattern is the degree to which there is lower trust of the technology among categories of users, such as the less affluent, who have less access to the Internet. It is within these groups that real experience in using the Internet has a particularly disproportionate positive impact, increasing their trust in the Internet and lessening their preconceived concerns over risks.

These general findings fit key aspects of the certainty trough. Trust in the Internet shows some evidence of a curvilinear pattern, although our survey instruments lack the precision to trace that precisely. Non-users, distant from the technology, are the most distrustful. When people first become users, they gain trust, and become more convinced of the Internet's value. Time and experience can temper this trust as they experience problems and become more sceptical. Over time, it may be that most users gain a more realistic view of the Internet, question the sources and credibility of information and are watchful in order to avoid the pitfalls of the Net.

Experience also provides a better interpretation than explanations anchored in categories of users, such as suggested by literature on risk cultures (Douglas and Wildavsky 1982). Proximity variables and levels of use, such as indicated by broadband use, were consistently significant in all the analyses while demographic variables—which might relate to cultural settings—were not. While social network and cultural settings might help account for differences in attitudes among non-users, such as across age groups, this does not help interpret findings across categories of users. The main influence on perceptions of trust in the Internet is experience with the technology.

*Social issues of a 'trust tension'*

The OxIS findings about the ways in which social distance and knowhow relates to social inequities, suggest that cybertrust might reinforce the digital divide in the use of ICTs. People with the appropriate skills and resources to get online and to collate and interpret online information could enhance their ability to authenticate the value of

products, services and information, thereby protecting themselves against cyber fraud and crime. However, others with less expertise remain offline, fail to experience the Internet and are more likely to distrust the technology.

The value to e-business and e-government of finding effective means of establishing identity and trustworthiness to overcome these fears has stimulated the development and application of many privacy-enhancing tools and services (Guerra et al. 2003), as well as interest in privacy regulations (e.g. OECD 2002) and cybercrime legislation. To the degree that these initiatives are effective in diminishing bad experiences online, they might help shore levels of cybertrust.

However, these methods confront a tension between privacy concerns and the need to gather data to help confirm e-identities (Guerra et al. 2003). Finding an appropriate framework to address this 'trust tension', by balancing consumer protection with the free flow of traffic on e-networks involves many interrelated uncertainties: economic, psychological, institutional, technical and legal. Unravelling and gaining a better understanding of these requires social and economic research with a broad perception of the co-evolutionary nature of human, organizational and technological systems.

*Future directions for cross-disciplinary collaboration and research*

Many other significant social issues require investigation and clarification in developing effective policies towards cybertrust, including:

- Learning global lessons from local contexts. While acknowledging the importance of examining key influences on local contexts, policy makers also need advice on how to apply what works in one context or country to other situations. Such insights of global relevance often emerge by joining together and comparing analytically sophisticated and richly descriptive studies of local processes, which are then analysed using theoretically powerful concepts and frameworks that integrate the discussion of issues and policy. For instance, OxIS is associated with research underway in other nations involved in the World Internet Project. It will be important to explore the robustness of the findings reported here in other national settings.

- Assessing the effectiveness of trust-enhancing products, services and regulations. Survey research is unlikely to shed light on the impact of particular interventions, such as new trust-enhancing products and services, unless it is targeted at the most sophisticated and experienced users. However, qualitative and experimental research could address the role of these new technologies.

In each of the above areas, assessments need to be made both of the relevance to e-networks of past research, and of the effectiveness of actual policies and techniques that have been applied in search of appropriate solutions to important social and economic challenges.

All technologies are inherently social, in that they are designed, produced, used and governed by people (e.g. Dutton 1999). This is particularly significant for complex technologies such as the Internet, Web and the other ICTs that pervade most aspects

of modern society. Understanding relevant social and institutional dimensions is therefore a key priority in addressing the way these technologies affect trust, crime and related issues.

# Appendix 1. Oxford Internet Survey (OxIS) methodology

### The two-stage sampling design

The Oxford Internet Institute's 2003 OxIS survey was based on a two stage sampling design. In the first phase, a random sample of 175 paired Enumeration Districts (EDs), stratified by region, were selected. Within each selected ED, a random sample of 10 addresses were selected from the Postal Address File.

The selection of ED sample points was based on the following process:

1. Sampling points were allocated to each of the ten Government Regions in proportion to the population in each region. These regions (with proportion of sample achieved) were: North East (4%), North West (11%), Yorkshire and Humberside (10%), East Midlands (5%), West Midlands (8%), Eastern (8%), London (15%), South East (12%), South West (8%), Wales (6%) and Scotland (13%).

2. In each Government Region all EDs were paired with an adjacent ED that is most similar in terms of its ACORN type.[18]

3. Within step 2 above, all paired EDs with a combined population of 60 or more people were listed in descending order of ACORN type, the most affluent pair at the top of the list and the poorest pair at the bottom.

4. The populations of each set of paired EDs were accumulated down this list. Using a random start and fixed sampling interval the required number of paired EDs were selected. This gave each ED a probability of selection proportionate to its size.

In the second stage, interviewers within each selected ED were issued with 10 randomly selected addresses from which they were expected to achieve a 60% response rate. A further three addresses were issued to be used only if six interviews could not be achieved with the original ten addresses.

Out of a total of 3,500 addresses issued, 74 lay in areas where interviewers felt unable to work, such as very deprived inner-city areas with significant drugs problems. In all, 3,426 addresses were visited by ICM staff. The outcome of these visits is shown in Table A1-1.

In cases where the selected addresses proved to be vacant, demolished, or were commercial property, interviewers were allowed to go to the closest inhabited dwelling. In all, out of 3,426 addresses visited by interviewers for the purpose of this research, 276 were substitute addresses used because the original address proved to fall into one of these categories.

**Table A1-1. Outcomes of tracking addresses**

| | | |
|---|---|---|
| Address occupied | 90% | 3077 |
| Property vacant/no longer a dwelling/new building not occupied | 2% | 80 |
| Commercial property | 1% | 51 |
| Interviewer unable to locate address | 6% | 200 |
| Not stated | 1% | 18 |
| Total | 100% | 3426 |

## Selection of respondent at household address

At each address, respondents for interview were selected by asking the person who answered the door if it would be possible to interview the person normally resident at that household whose birthday (aged 14 or over) is the next one in the household. A 'person normally resident' was defined as someone living in the household who is related to the person answering the door or living with someone in the household as a partner. In cases where the person answering the door did not know which household member had the next birthday, a respondent was selected according to the alphabetic position of the first letter of their first name. On the initial occasion this was encountered by the interviewer, the person with a starting letter nearest the beginning of the alphabet was selected; next time, a person with a first name starting with a letter nearest the end of the alphabet; and so on. In all, only 244 respondents were selected by the alphabet rule, rather than by birthday.

## Outcomes of interviews

The results of the contacts made at each address are shown in Table A1-2.

**Table A1-2. Interview outcomes at selected addresses**

| | | |
|---|---|---|
| Addresses visited | 100% | 3077 |
| Productive interview obtained | 66% | 2030 |
| Refusal by person answering the door | 18% | 547 |
| Refusal by selected respondent (including four interviews begun but terminated) | 4% | 126 |
| Unable to contact after repeated visits to address during fieldwork period | 11% | 348 |
| Not stated | 1% | 22 |

The high response rate achieved in this survey was aided by the fact that respondents understood that the research was being conducted for Oxford University and by the promise that the Red Cross would receive £1 for every successful interview. Reasons for the 674 refusals included: lack of interest or no wish to participate (63%); too busy (22%); ill or not feeling well (4%); inadequate English (4%); and absent or away for duration of fieldwork (1%). Other reasons accounted for 4%. No clear reason was given for only 2%.

## Appendix 2. Indicators and indexes of key concepts

### Dimensions of Internet trust

In order to move beyond a bivariate analysis to a more multivariate one, we attempted to reduce the number of indicators by collapsing items into more meaningful clusters of highly correlated indicators. Any single item or question includes considerable noise, such as errors due to a respondent misunderstanding the question in idiosyncratic ways. By using several highly related items to form an scale or index, it is possible to reduce the level of noise in the underlying variable, as systematic covariance is identified in creating dimensions, and random noise is reduced.

**Table A2-1. Dimensions of trust: factor analysis of component items**

| | Dimension | |
|---|---|---|
| **Questionnaire item** | **Net-confidence** | **Net-risk** |
| Reliability of information on the Internet | **0.76** | –0.08 |
| Confidence in Internet | **0.84** | –0.04 |
| Confidence in people you can communicate with on the Internet | **0.73** | –0.10 |
| Puts privacy at risk | –0.06 | **0.81** |
| Internet permits people to get personal information about me | –0.08 | **0.77** |
| Difficult to assess product quality | –0.07 | **0.67** |

Factor analysis, using varimax rotation, was used to identify these underlying factors. For this analysis, ‘don’t knows’ and missing cases were given the median value on the scale. The analysis produced two clear dimensions with an eigenvalue of greater than one (Table A2-1). The factor analysis produces scores that locate each respondent on each of the dimensions. A high figure on dimensions 1 and 2 means that the respondent has high levels of trust. A high figure for dimensions 4 and 6 means that the respondent has high levels of concern about privacy.

*Net-confidence*

The first dimension loads heavily on: confidence in the Internet, confidence in people you can communicate with on the Internet, and confidence in the reliability of information provided on the Internet. This defines the items we have called Net-confidence.

*Net-risk*

The second dimension is Net-risk as it loads heavily on: whether the Internet endangers privacy, allows personal information to be obtained by someone else, and causes concern that the respondent cannot ascertain product quality online.

**Other dimensions of trust and privacy concerns**

A number of other closely related indicators of trust emerged from the survey. They are defined by the factor analysis in Table A2-2 and include:

*Institutional trust*

The first dimension, called institutional trust, loads heavily on questions regarding confidence in companies, government, television news, scientists, and doctors, albeit somewhat less on newspapers.

*Media trust*

The second dimension, called media trust, loads heavily on the reliability of information on television and in newspapers. It also loads on confidence in people running television and newspapers.

*Social trust*

Social trust, a third dimension, loads heavily on variables capturing ‘confidence in people I know’ and ‘confidence in most people in this country’. It also loads somewhat on confidence in scientists, doctors, and other people you can communicate with on the Internet.

*Privacy concerns*

The fourth dimension loads heavily on concerns about privacy in Britain today, and about whether information about the respondent is kept in a file somewhere. This ‘privacy concern’ dimension does not relate to the Internet specifically.

*Social proximity: experience, time, and expertise*

Three variables were found to be highly correlated, and therefore used to create an indicator of social involvement with the Internet. One is a measure of expertise, based on a self-rating of ability, which ranged from a low score of 5 for ‘very bad’ to a high score of 1 for ‘excellent’. Another is a measure of the respondent’s diversity of use, based on the number of activities for which they spend at least an hour a week, such as e-mail. The third is an indicator of experience, based on the number of years that a person says they have used the Internet.

**Table A2-2. Factor analysis of general trust items: four dimensions**

| Item | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Confidence in major companies | **0.64** | | | |
| Confidence in government | **0.61** | | | |
| Confidence in TV News | **0.58** | 0.46 | | |
| Confidence in newspapers | 0.44 | **0.58** | | |
| Confidence in scientists | **0.53** | 0.40 | | |
| Confidence in doctors | **0.55** | 0.47 | | |
| Reliability of information in newspapers | | **0.84** | | |
| Reliability of information on television | | **0.77** | | |
| Confidence in most people I know | | | **0.75** | |
| Confidence in most people in this country | | | **0.70** | |
| Concerned about threats to personal privacy | | | | **0.83** |
| Information about me is being kept in a file | | | | **0.82** |
| You should only trust what you verify yourself | 0.40 | –0.27 | –0.26 | |
| Eigenvalues | 2.10 | 2.03 | 1.55 | 1.48 |

**Table A2-3. Factor analysis of items composing social proximity scale**

| Item | Loading on factor |
|---|---|
| Self-rated ability | –0.78 |
| Number of activities online | 0.72 |
| Experience | 0.68 |

# Appendix 3. Notes on statistical significance

## Strategy for initial analyses and tests

The initial analysis employs a bivariate approach to determine whether use of the Internet is associated with different attitudes towards the technology. We test whether Internet users are more likely to have an opinion (versus responding 'Don't know' to a question) on Internet-specific items. This test is carried out using a Pearson Chi-Squared test of significance, which determines whether the mean response (where the data are binary in nature) differs significantly across groups. We also test whether, for those who gave a substantive response to the question, Internet users, on average, had a more or less trusting response than non-users. This test is carried out using an Independent Samples t-test, which is used to ascertain whether the mean response (where the data are continuous in nature) to a question differs significantly across different groups. These analyses show that Internet users are more likely to give a substantive response indicating greater trust in the Internet than non-users.

For questions that are on similar topics, such as the reliability of information, but which do not pertain to the Internet, users respond very similarly to non-users. This shows that differences in levels of Internet trust between users and non-users are not part of a broader pattern of differences regarding trust, but are Internet-specific.

## Detailed findings

*Confidence in the reliability of information on the Internet*

Average evaluation of Internet information reliability on a scale of 1–10, where 10 indicates total confidence:

Broadband users = 6.5
Narrowband users = 6.5
Past users = 5.9
Non-users = 5.1

The differences were all significant at the 0.05 level between: Broadband and Past uses, Broadband and Non-users, Narrowband and Past users, Narrowband and Non-users, and Past Users and Non-users.

Percent responding 'Don't know'

Broadband users = 4.3%
Narrowband users = 3.1%
Past users = 15.8%
Non-users = 36.3%

The differences were significant at the 0.05 level for the likelihood of saying 'Don't know' between Broadband and Past users, Broadband and Non-users, Narrowband and Past users, Narrowband and Non-users, and Past and Non-users.

*Confidence in the Internet*

Average confidence in the Internet on a scale of 1–5, where 5 indicates total confidence:

Broadband users = 3.3
Narrowband users = 3.2
Past users = 3.1
Non-users = 2.2

The differences in evaluation were significant at the 0.05 level between: Broadband and Narrowband users, Broadband and Past users, Broadband and Non-users, Narrowband and Non-users, and Past and Non-users.

Percent responding 'Don't know'

Broadband users = 2.6%
Narrowband users = 8.8%
Past users = 15.8%
Non-users = 36.0%

The differences in likelihood of saying 'Don't know' between all groups were significant at the 0.05 level.

*Confidence in the people you can communicate with on the Internet*

Average confidence in people you can communicate with on the Internet on a scale of 1–5, where 5 indicates total confidence:

Broadband users = 2.7
Narrowband users = 2.7
Past users = 2.3
Non-users = 2.0

The differences in evaluation were significant at the 0.05 level between: Broadband and Past users, Broadband and Non-users, Narrowband and Past users, and Narrowband and Non-users, and Past and Non-users.

Percent responding 'Don't know'

Broadband users = 3.4%
Narrowband users = 9.6%
Past users = 10.7%
Non-users = 37.8%

The differences were significant at the 0.05 level for the likelihood of saying 'Don't know' between: Broadband and Narrowband users, Broadband and Past users, Broadband and Non-users, Narrowband and Non-users, and Past and Non-users.

*Putting privacy at risk on the Internet*

Average agreement that going on the Internet puts privacy at risk on a scale of 1–5, where 5 indicates strong agreement:

Broadband users = 3.1
Narrowband users = 3.4
Past users = 3.7
Non-users = 3.9

The differences in evaluation between all groups were significant at the 0.05 level.

Percent responding 'Don't know'

Broadband users = 5.2%
Narrowband users = 5.7%
Past users = 9.9%
Non-users = 34.2%

The differences were significant at the 0.05 level for the likelihood of saying 'Don't know' between: Broadband and Non-users, Narrowband and Non-users, and Past and Non-users.

*Accessing personal information on the Internet with the individual's permission*

Average agreement that going on the Internet permits people to get personal information about me on a scale of 1–5, where 5 indicates strong agreement:

Broadband users = 3.0
Narrowband users = 3.3
Past users = 3.7
Non-users = 3.8

The differences in evaluation were significant at the 0.05 level between: Broadband and Narrowband users, Broadband and Past users, Broadband and Non-users, Narrowband and Past users, and Narrowband and Non-users.

Percent responding 'Don't know'

Broadband users = 4.7%
Narrowband users = 10.6%
Past users = 22.5%
Non-users = 48.1%

The differences in likelihood of saying 'Don't know' between all groups were significant at the 0.05 level.

*Difficulties in assessing product quality and descriptions when shopping online*

Average agreement that it is difficult to assess product quality when shopping online on a scale of 1–5, where 5 indicates strong agreement:

Broadband users = 3.2
Narrowband users = 3.4
Past users = 3.7
Non-users = 4.0

The differences in evaluation between all groups were significant at the 0.05 level.

Percent responding 'Don't know'

Broadband users = 6.0%
Narrowband users = 10.9%
Past users = 13.3%
Non-users = 48.1%

The differences were significant at the 0.05 level for the likelihood of saying 'Don't know' between: Broadband and Narrowband users, Broadband and Past users; Broadband and Non-users, Narrowband and Non-users, and Past and Non-users.

In the above items, which related specifically to the Internet, there was a consistent pattern of Broadband users being more confident in the Internet than Narrowband users, who, in turn, were more confident than Past users, who were more confident than Non-users. There was also a consistent pattern in the way Broadband users were more likely than Narrowband users to give a substantive answer to the question (as opposed to saying 'Don't know'). In turn, Narrowband users were more likely to give a substantive response than Past users, who were more likely to do so than Non-users.

By contrast, on questions that do not relate to the Internet, Internet users and Non-users show similar levels of trust, as Figure 5 showed.

*Confidence in the reliability of information in the newspapers*

Average evaluation of newspaper information reliability on a scale of 1–10, where 10 indicates total confidence.

Broadband users = 5.6
Narrowband users = 5.6
Past users = 5.7
Non-users = 5.4

The differences in evaluation between all groups were not significant at the 0.05 level.

Percent responding 'Don't know'

Broadband users = 2.2%
Narrowband users = 1.3%
Past users = 3.3%
Non-users = 2.1%

The differences in likelihood of saying 'Don't know' between all groups were not significant at the 0.05 level.

*Confidence in the reliability of information on the television*

Average evaluation of television information reliability on a scale of 1–10, where 10 indicates total confidence:

Broadband users = 6.7
Narrowband users = 6.6
Past users = 6.6
Non-users = 6.5

The differences in evaluation between all groups were not significant at the 0.05 level.

Percent responding 'Don't know'

Broadband users = 5.6%
Narrowband users = 2.3%
Past users = 5.8%
Non-users = 2.8%

Broadband users were significantly more likely to say 'Don't know' to the above question than were Narrowband users or Non-users, and Past users were significantly more likely to say 'Don't know' than were Narrowband users. Although there are significant differences between the groups, they show a very different pattern of significance than do the equivalent Internet-specific question, where Non-users were most likely to say 'Don't know', Past users the next likely, and so on.

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## Notes

[1] The concept of 'reconfiguring access' or 'shaping access' is developed in a synthesis of research on ICTs in Dutton (1999). A recent application of this concept to the context of broadband Internet is discussed in Dutton et al. (2003).

[2] OxIS asked individuals: 'Do you yourself use the Internet at home, work, school, college or elsewhere or have you used the Internet anywhere in the past?' In response, 59% said they currently use the Internet; 6% said they had used it in the past; and 35% said they have never used the Internet. A discussion of Internet adoption is provided by Rose (2003).

[3] A growing literature is devoted to comparing the impact of alternative media on interpersonal communications. Early experiments comparing face-to-face with mediated communication failed to substantiate many conventional expectations about the superiority of face-to-face interpersonal communication (Short et al. 1976). The debate has continued since (see, for example, Rice 1984; Johansen 1988; Ben-Ner and Putterman 2002; and Riegelsberger et al. 2003). Work is focused often on the social implications of computer-mediated communication (CMC), generating a huge body of research as well as journals dedicated to the topic, such as the *Journal of Computer Mediated Communication*. This literature conveys the contingency of any impacts and counters overly simplistic views that Internet or other computer-mediated communication is trusted less that face-to-face communication.

[4] For example, early survey research on privacy attitudes tended to find that managers and professionals who simply use ICTs were less concerned about threats to privacy than those most informed about ICTs, such as computer experts, or those least well informed, such as the poor (Dutton and Meadow 1987).

[5] A comprehensive overview of research on the factors related to the perception of risk generally is provided by Jackson et al. (2003). Also see Douglas and Wildavsky (1982).

[6] Henri Grethen, Minister of the Economy of the Grand Duchy of Luxembourg, quoted in the preface to a 17–19 September 2003 Luxemburg conference on 'e-commerce trustmarks', see: www.e-trsutmarks.lu

[7] Dutton is a co-principal investigator of the Oxford Internet Survey with Professor Richard Rose, director of OxIS at the Oxford Internet Institute. The sample design and field research were subcontracted to the London-based ICM Research (www.icmresearch.co.uk), which provided valued input on question wording and survey design. The OII's work on it was supported by public and private sources, including sponsorship by the Broadcast Standards Commission and Freeserve.com. Sponsors of the Oxford Internet Surveys are provided a copy of the database at an early date. The OII retains full control over the design of the survey, sample, and the wording of all questions.

[8] The OxIS questionnaire and additional information about the survey are available at: www.oii.ox.ac.uk/research/?rq=oxis

[9] These two dimensions of trust were defined through a factor analysis of items judged most closely related to the study's broad conceptual definition of cybertrust (see Appendix 2).

[10] These two dimensions of trust were defined through a factor analysis of items judged most closely related to the broad conceptual definition (see Appendix 2).

[11] This question is designed to conform with a traditional set of questions concerning trust in institutions. It is arguable, however, that there are no people who 'run' the Internet in the same way people run newspapers or the media. However, in pre-tests conducted prior to the study and in the survey interviews, this question did not cause confusion, and seemed to fit within the general scheme of institutional trust.

[12] Respondents tended to agree that 'you can't be too careful in dealing with people'.

[13] Socio-economic status was captured by the standard British social profile, which was coded 1–6, where 1 was assigned for the high socioeconomic status, and 6 to those who rely on state income for support. Income was not used in the analysis as we had too many missing cases for this item. However, for those who answered the income question, we found a high correlation with our SES scale.

[14] Education was coded 0 if the respondent had no qualification; 1 if they had a GCSE; 2 a vocational qualification; 3 an A-level; 4 a Bachelor's degree or equivalent; and 5 if they had higher than a Bachelor's degree.

[15] Respondents who use e-mail were asked: 'Which of the following most closely describes your attitude to receiving unsolicited e-mail from people trying to sell you something, sometimes called SPAM?'.

[16] Given press attention to inappropriate content for children and to paedophiles attempting to meet children online, one might expect people living in households with children to be more concerned about risks or less confident in the Internet. We asked if there is anyone under 18 living in the person's household, and found this variable to be unrelated statistically within any of our models. Experience diminishes such concerns.

[17] Recent WIP reports include one by UCLA's Center for Communication Policy (CCP 2003). For information about WIP centers and reports, see: http://www.worldinternetproject.net/published.html

[18] For a description of ACORN and other classifications of socioeconomic status, see: http://www.businessballs.com/demographicsclassifications.htm