Internet diffusion not divide: a proximity model of Internet take off in Russia

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The digital divide is a doubly flawed description of Internet use in a society. It dichotomizes the population into those who are users and those who are not, ignoring the intermediate categories of those who are closer to one or another of these two extremes. In addition, the digital divide is a static model; it projects into the future statistics that are increasingly out of date as a description of current usage, because of a time lag of up to several years between the collection of usage data and publication in official sources (cf. ITU, 2003).

Whereas a static model cannot account for the spread of Internet use within a society, a diffusion model can (see Rogers, 1995). Diffusion is a process that begins when a new technological innovation appears in the market place, for example, television sets or the automobile. The first move in the diffusion process is the adoption of the innovation by a small group of leaders. Once this has occurred, the innovation then spreads among those in closest social, economic or geographical proximity to the innovators, turning more and more people into adopters until a limit is reached.

In retrospect, it is obvious that describing the diffusion of a commodity such as television as dividing society into ‘haves’ and ‘have nots’ would be misleading. It is more accurate to speak of individuals or even societies that are leaders or laggards in the adoption of innovations. At any given point in time a population can be differentiated by proximity to an innovation, ranging from those who have adopted an innovation; those who know people who have adopted the innovation and may be vicarious users; those who have heard of an innovation; and those who are ignorant of it.

Diffusion maps the process by which laggards catch up with leaders. It is a process in which individuals move through each stage until they stop moving. The limit to diffusion is 100 percent engagement by a population. Like any limit, it is unlikely to be totally achieved; the point at which adoption of an innovation levels off may be 99 per cent, as in the case of television, or the limit may be 80 to 90 percent of households, as appears to be the case with automobile ownership. The reasons for not becoming a car-owner are likely to be multiple, from physical infirmity, living in a big city handy to public transport, lack of money, or using taxis or getting a lift from a friend when motor transport is needed.

The rhetoric of Internet promotion emphasizes a goal of 100 percent diffusion. Operationally this is defined in terms of access to the Internet rather than use of the Internet, for there is no suggestion that Internet use should be compulsory, in the way that education is compulsory. Since the Internet can be accessed free in places such as schools or public libraries or at work, individual circumstances and choice will be important in establishing the saturation point for the diffusion of Internet use. Since usage will be significantly short of 100 percent, the population can be divided into leaders in Internet use, laggards, and informed non-users, that is, people who know about the Internet and may well know people on line but have chosen not to become users themselves.

A diffusion model is especially appropriate for understanding the global development of Internet use. It postulates that countries that have been leaders in
the initial spread of the Internet will be first to reach saturation and level off in the percentage of the population who are Internet users. There are signs of this happening in Britain at a level far below 100 percent Internet use by adults (OxIS, 2005). In countries where an innovation has levelled off, the principal future development is likely to involve more intensive use by early and late adopters, thanks to such technological innovations as the diffusion of broadband and wireless connections.

As the diffusion of the Internet reaches its limit in leading countries, then countries that have been laggards have the opportunity to catch up with leaders. Understanding the diffusion process is especially important in the current decade, because the small number of leading countries are approaching limits to further growth while Internet use shows signs of taking off in a number of countries where a big majority of the population is not yet on line. To understand the changing global composition of Internet users, differences between countries in population as well as percentage usage is important, since many late adopting countries, such as China and India, are far more populous than the largest European Union country (Rose, 2005a).

Russia is a good example of a laggard country that is beginning to catch up in Internet use. By the conventional measure of Internet use, the percentage of the population on line in Russia appears unimportant by comparison with its Nordic neighbours. Only one-sixth of Russian adults are Internet users compared with half to two-thirds of Finns, Norwegians, Swedes, or Icelanders. Yet in terms of the total number of Internet users, Russia’s 18 million adults on line are more numerous than the combined population of these four Nordic countries. Furthermore, because Russia’s 140 million people are educated and technically competent, Russia is a country that has been lagging in the diffusion of the Internet rather than being excluded by an imagined divide. As long as diffusion of Internet use continues in Russia, it is only a matter of time before there are five and then ten times more Russian Internet users than in the average European Union country and up to double the number of British users. To understand how Russia could become the country with the most Internet users in a wider Europe, we first need to model the stages of diffusion, and then marshal survey data to chart the stages by which Russians are increasing their proximity to the Internet.

1. From static divide to stages of diffusion

Technological invention is insufficient to encourage the initial adoption and diffusion of the Internet within a society. There are both top-down societal barriers to diffusion and bottom-up barriers facing individuals. In the earliest stages of development, users were not leaders that many people wanted to follow, but geeks isolated in laboratories. Moving the Internet out of the laboratory and networking a country requires an adequate telecommunications infrastructure. It also requires a price structure that makes Internet use affordable. Concurrent with
the creation of the Internet, developments in telecommunications technology and the deregulation of telecommunications by national governments have enabled these conditions to be met not only in OECD societies but also in many developing countries. In low income countries there remain cost obstacles, but from Brazil to China there are many examples of networks of public and private actors that have been able to create the infrastructure for a take off in Internet use (cf. Wilson, 2005).

From individual ignorance to becoming a user

Given the necessary infrastructure, the tempo and extent of Internet diffusion in a society depends on individual adoption. At a given point in time, individuals in a society can be grouped into four categories according to their proximity to the Internet: ignorant; aware of its existence; knows someone who is an Internet user; or user (Figure 1). From a dynamic perspective, the four categories can be considered four stages in the process of the Internet. Leaders in adoption rush through the four stages at a rapid rate, while laggards follow more slowly until such time as the great bulk of the population consists of individuals who are either users or who know someone who is a user but not signed on themselves.

Figure 1. Stages in the adoption of Internet use

The step from ignorance to awareness can be taken without engaging in an active search for information, as long as television and print media turn whatever is new into a buzz word. However, awareness of the Internet as a buzz word is not proof of knowing what the Internet may be used for. Even if a person understands that the Internet is about communicating between computers, he or she may not realize that it has such varied uses as sending messages via email and looking up information on the WorldWideWeb. Until such knowledge is acquired, a person is unlikely to move from being vaguely aware to becoming a user of the Internet.

The next step in the process—knowing someone who has become an Internet user—is important because it brings an individual into proximity to the Internet. In order to understand this novel invention on one’s own requires a prior understanding of telecommunications technology and computing confined to a minority of adults within a society. By contrast, there are much lower barriers to gaining an understanding of the Internet through face-to-face discussions with friends, employers and workmates, teachers or fellow pupils. The basis of
proximity may be the workplace; for example, business executives will know secretaries and clerical workers accustomed to using keyboards, the initial adopters in many types of offices. It can be a school, where young people can learn about the Internet from their peers as well as or instead of from their teachers. It can also be found in the household: a young person learning to use the Internet at school can socialize parents and grandparents.

Proximity to the Internet turns the Internet into a familiar object, different from the telephone yet like the telephone in that it can be used to send messages to other people more cheaply than long distance or international calls and with more information than leaving a message on an answering machine. Proximity to a network of Internet users is especially relevant to taking advantage of email, since a person can only use email if there are other people with whom one wants to exchange emails. Familiarity also creates an understanding that information can be looked up on the WorldWideWeb, just as it can be looked up by turning to the yellow pages of a phone book, dialling an automated telephone inquiry system or going to a local library.

Once an individual learns what can be done on the Internet, he or she can become a proxy user, asking a friend to send or receive emails on their behalf or to get information from the WWW to assist in planning a holiday or buying goods at a bargain price. Becoming a proxy user is a half-step to becoming a user; it can be argued that an individual who gets information from the WWW is a user, whether or not he or she has an email address. In diffusion terms, the important point is that a proxy user is moving even closer to becoming a user.

An individual becomes an Internet user through a series of steps. The first step, moving from ignorance to awareness of the Internet, is a logical necessity, whether it occurs at age six or sixty. The second step, knowing someone who is an Internet user already, even if it is only a dealer selling computers, is empirically very important in showing an individual what the Internet can be used for, and thus motivating a person to become a user. Stated negatively, a person who becomes an Internet user without knowing what it is for and without knowing anyone to whom to exchange emails is less likely to remain a user than a person who has gone through each of the steps in Figure 1.

From a society off line to a society on line

At the societal level, the proximity model can be interpreted as a stages of growth model according to the distribution of a country’s population between the four groups in Figure 1.

At the first stage, a society is united in its ignorance; no one is aware of the existence of the Internet because it does not exist. However, that did not mean that the populations of the OECD countries were waiting for the invention of the Internet to communicate with friends and family or track the weather, sports scores or stock market prices. The recency of the development of the Internet
means that by the time it was introduced many OECD societies had already become information societies. People were accustomed to communicate through international STD telephones, fax, the use of jet airplanes, couriers and home computers, as well as face-to-face. When the bulk of a society is ignorant of the Internet, the earliest adopters are best characterized as pioneers, since they have gone beyond established electronic conveniences to explore what is happening on the frontiers of innovation. They are not leaders, because in a population in which ignorance is the dominant mode there has yet to emerge a mass of potential followers.

In an information society, the proportion of people who are aware of the Internet will grow rapidly until it becomes a majority. Once a majority of people has become aware of the Internet, then the conditions for take off in usage have been reached, for even if a small percentage of those who are aware become users, they will be less atypical of their society than geeks, and more likely to be in leadership positions, whether within a school or a profession. Even more important, the growth in the number of adopters from two or three percent to six or ten percent will have a disproportionate multiplier effect on the proportion of people who know someone who is an Internet user.

The third stage of Internet diffusion is reached when a majority of the society achieve proximity to the Internet, knowing someone who is on line, or even themselves being a user or a proxy user. If the multiplier effect is 10, then this position can be reached with only five percent on line; if the multiplier effect is discounted to five because of multiple acquaintances, the multiplier effect may become closer to five. By the time between five and ten percent of the population is on line, this multiplier effect will result in the majority of a society having achieved proximity to the Internet because they know someone on line even if not on line themselves.

When the median adult in a society knows someone on the Internet, a tipping point has been reached. The much larger number of users and potential users encourages supply-side changes, such as an increase in information available commercially, through e-governance, and from NGOs, and a fall in price in response to competition in a market with rising demand. Most importantly, when half or more of the population are able to communicate directly or indirectly through email, this produces an exponential increase in the network of contacts that are available on line—an important stimulus for people to convert from being an informed ‘spectator’ or proxy user to going on line themselves.

A diffusion model makes becoming an Internet user simply the final stage in a step-by-step process from being ignorant of this innovation to becoming a routine user. Leaders are differentiated from laggards by the speed with which they move through these stages. Once take off has commenced, the increase from a small minority to a majority of users will require that the majority of persons labelled ‘have nots’ in terms of a digital divide will have to be reclassified as ‘have not yet’ signed on the Internet, because they are in the process of becoming late adopters.
A diffusion model can also indicate when Internet use has reached a ceiling. Once a majority of the population has reached the stage of being online, the percentage rate of growth will necessarily decelerate, as additional users will be a declining proportion of existing users. Even more important, the minority of non-users will include informed non-users, people who can give cogent reasons for not going online, such as older people who do not want to learn how to use a computer; people who do not think email would be useful in their personal circumstances (including those who prefer voice-to-voice cell phone communication); proxy users; and ex-users who have dropped out. While changes in the population of users can continue, once the number of new users is matched by the number of drop outs, then the diffusion process has levelled off. Subsequent changes will involve churning, in which an equilibrium is maintained by the number of new users recruited from youths or adults being offset by some existing users dropping out through death, emigration, a change of residence or job, or deciding there is no utility in remaining a user.

Because a diffusion model is about the dynamics of Internet adoption, it can be used as a forecasting device to identify societies where Internet use is taking off. Notwithstanding up to 90 percent of adults being on the wrong side of the digital divide, take off has commenced when a majority of adults know someone online if not online themselves. This is evidence that Internet use is no longer confined to technical specialists or wealthy households and enterprises but is beginning to become diffused throughout a society. Once this point has been reached, then the extent of growth depends on the speed with which those who have a friend who is a user follow that friend and go online, and laggards acquire friends who are online, thus demonstrating that they have the capacity to be late adopters of the Internet rather than being confined permanently to the wrong side of a digital divide.

2. The take off of the Internet among Russians

When the Internet was introduced in the mid-1990s Russia had already met the technological requirements for adoption. Except for the elderly, the great majority of the population had a secondary or higher education, and Russian education stressed the acquisition of technical skills specially suitable for encouraging Internet use. Computers were also familiar objects, though the economic costs of transformation made home PCs extremely expensive, a problem that has been reduced by the substantial fall in the cost of computers and the post-1998 boom in the Russian economy. However, to treat ownership of a computer as tantamount to Internet access is a categoric error. The diffusion of the Internet does not start with more people acquiring a computer to go online, but with more people using existing computers to go online. A single computer in a school, a library, an Internet cafe or an office can provide online access to dozens or even hundreds of different users in a week.
The best way to determine the number of individual users in a society is through a nationally representative sample survey; it can also provide information about the socio-demographic characteristics of people at different stages in the process of becoming users. When the Levada Centre (formerly VCIOM, the All-Russian Centre for Public Opinion) first began asking nationwide samples of the population about Internet use in November, 2000, Russia was a society where the Internet was virtually non-existent: only three percent of adults said that they used the Internet (Table 1). However, in terms of the diffusion of awareness, a majority said that they had heard of the Internet. Given the very small percentage of people actually on line, the odds were very much against knowing anyone. If a multiplier of five is applied to the percentage of Internet users to estimate the proportion who knew a user, then an additional 15 percent had reached this stage in the diffusion process (Table 1).

Table 1. Trends in Russian Internet use, awareness and ignorance (2000-2005) Q. Do you have access to the internet? If YES: is at home or at work? At home only? At work only? At home and at work? If NO: does that mean you know practically nothing about the internet?

<table>
<thead>
<tr>
<th>Year</th>
<th>User (%)</th>
<th>Aware (%)</th>
<th>Knows nothing (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3</td>
<td>76</td>
<td>21</td>
</tr>
<tr>
<td>2001</td>
<td>7</td>
<td>81</td>
<td>12</td>
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<tr>
<td>2002</td>
<td>9</td>
<td>82</td>
<td>9</td>
</tr>
<tr>
<td>2003</td>
<td>11</td>
<td>78</td>
<td>11</td>
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<tr>
<td>2004</td>
<td>12</td>
<td>80</td>
<td>8</td>
</tr>
<tr>
<td>2005</td>
<td>15</td>
<td>76</td>
<td>9</td>
</tr>
<tr>
<td>2006</td>
<td>17</td>
<td>78</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Levada Centre (formerly VCIOM: www.levada.ru), nationwide representative samples of more than 2000 respondents, carried out in November of each year, and May 2006.

The dynamics of diffusion have created a structural shift in Russian society. ROTsIT (2002) estimated that between 1998 and 2002, Internet use increased at rates between 48 and 79 percent annually in Russia, often double the rate in the United States at that time, because America had already achieved a high level of Internet use. Between November 2000 and May 2006 the percentage of Russian Internet users increased more than five times. It more than doubled between 2000 and 2001 and in the next four years it almost doubled again. While sampling error reduces the reliability of estimates of very small groups in the population, the increase in Russian Internet users from a very low base to one-sixth of the adult population is indisputable. An increase in Internet use has been accompanied by a decrease in ignorance of the Internet. The proportion unaware of the Internet has fallen from one in five to one in twenty.

The 2005 New Russia Barometer (NRB) survey conducted by the Centre for the Study of Public Policy and the Levada Centre confirms that Internet use in Russia has now taken off (for more details, see www.abdn.ac.uk/cspp). It used the

1 VCIOM did not ask if respondents knew anyone who was an Internet user. Cf. Figure 2, where this question is introduced.
proximity model in Figure 1 to formulate questions about the Internet. In addition to asking about use and awareness, it also asked whether people knew anyone on the Internet.

Although five-sixths of Russians are not on the Internet themselves, a majority are in proximity to the Internet, because they know someone who is on line even if they are not on line themselves. The extent to which proximity has diffused within Russian society is shown by the fact that of those knowing an Internet user, three-fifths know several people who are on the Internet. Likewise, those who know about the Internet without having a friend on line outnumber those who are ignorant of the innovation by three to two (Figure 2).²

**Figure 2. Proximity of Russians to the Internet (2005)**

![Proximity of Russians to the Internet](source)

Leaders in signing on the Internet are well placed to encourage others to sign on or become proxy users, because most users go on line in a social setting, where they can discuss what they are doing with others rather than going on line in the isolation of a room at home. The 2005 NRB survey found that two-fifths of

² The percentage of NRB respondents saying they have not heard of the Internet in Figure 2 (20%) is higher than in Table 1 (9%) because of differences in the sequencing of questions. The NRB survey first asks people whether they have heard of the Internet, whereas the standard Levada Centre question first asks people whether they are an Internet user.
Russian Internet users sign on from at least two different places: 45 percent sign on at work or school; 27 percent gain access from a friend’s home; and 17 percent from an Internet cafe, compared with 38 percent at home. Decades of repression by public authorities have encouraged strong ties between Russians at the face-to-face level, including sharing of goods and information (see Shlapentokh, 1989; Rose, 1995).

Whereas a usage rate of only 15 percent would place Russia on the wrong side of the digital divide, the proximity model shows that Russian society today is at a tipping point: a majority of Russians can now make use of the Internet either as users in their own right or through friends. Whereas this reduces the scope for a Russian to forward emails to friends, as would happen in a society where Internet use is already high, Russians can print out a document from a website and pass it around at school, or among friends, or tell their friends about it in an informal conversation.

3. Who is closest to the Internet?

When Internet use has yet to take off, then all social groups of any size are on the wrong side of the digital divide, because a big majority of the group will not have access to the Internet. In 2000, for example, any group constituting at least seven percent of the population could not have a majority within it being Internet users, and with 15 percent users, it is impossible for the Internet to be used by almost everyone in such relatively favoured groups as the middle class or the employed. At the first stages of Internet adoption, social groups differ only in the degree to which they are non-users.3 Because a proximity model is discriminating, analysis of Internet use is not confined to the static analysis of who is and who is not on line at a given moment. Instead, it can classify the population into four ordinal categories—users, knowing someone on line, aware and ignorant.

The influence of individual resources

Given a supply of Internet facilities within a country, it would be expected that those who have the most social resources will be closest to the Internet, either as users or as friends of users. The term social resources can be interpreted in many different ways, for education, income, age or gender are resources that influence what individuals can and cannot do (cf. Verba et al., 1995). The logic of a

3 In a complementary manner, at the high levels of societal use found in the United States and Scandinavia, in almost all sizeable social categories a majority will be Internet users. The point is inadvertently made by Mossberger et al. (2003) in an American study entitled ‘Virtual Inequality: Beyond the Digital Divide’. It found at the time of the fieldwork that the Internet was already so widely diffused in the United States that differences between social groups in the percentage on line were simply differences in the size of the majorities on line in each group.
dynamic model is that those with the most social resources will tend to be leaders in the adoption of the Internet or at least have friends who are using the Internet. In a complementary manner, those with the least resources will tend to be laggards, not knowing any Internet users or not having heard of the Internet.

The proximity of social groups in relation to the Internet is shown in Table 2 with an asterisk marking the median group. The table makes clear that while there are differences in proximity to the Internet within every social group, there is no digital divide in Russian society, inasmuch as a majority of people in all social groups are in the same category: they are not Internet users.

While using familiar household goods does not require a higher education—for example, most people using a telephone or driving a car could not explain the scientific principles that make these devices work—using unfamiliar goods is likely to be easier for people with more education, especially when the task at hand is communicating through a computer. In Russia, education is the readiest indicator of capacity to cope with the Internet. There is a difference in the level of education between a university degree and an academic secondary education and there are differences between the more abstract secondary academic education and vocational training in skills and technical instructions. At the bottom of the educational hierarchy are those Russians with a minimum of elementary education, often because they left school before the universal provision of secondary education. In all education strata a majority of Russians do not use the Internet. Even though university graduates are the smallest educational group within the society, they cannot muster a majority on line. However, the proximity model makes clear that there are differences in the central tendency according to education (Table 2). Among university graduates and those with an academic secondary education, the central tendency is for people to know someone who uses the Internet. Among those with a vocational education, the largest group consists of the two-fifths who are Internet users. However, because few vocational school graduates now use the Internet, the median group are the 33 percent who have heard of the Internet but do not know any users. Among those with only a minimum education, half have not even heard of the Internet.

In every society young people are more likely to use the Internet than old people, but when the diffusion process is taking off, a majority in all age groups will not be on line. Among Russians under the age of 30 just over one-quarter are on line and this is the case of one in seven of middle-aged Russians. Among both age groups, proximity to the Internet is high, for three in seven know people who are on the Internet. It is only Russians age 60 or over who are distant from the Internet, with just over half saying they have never heard of it and more than one-quarter not knowing anyone on line. The difference between the minority of young and old users is substantially less, 26 percentage points, than the 41 percentage point difference between the minority of university graduates and uneducated Russians (Table 2).
### Table 2. Internet proximity by social resources

<table>
<thead>
<tr>
<th>(%)</th>
<th>Education</th>
<th>Ignorant (%)</th>
<th>Knows of (%)</th>
<th>Friend uses (%)</th>
<th>User (%)</th>
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<tbody>
<tr>
<td>19</td>
<td>University</td>
<td>4</td>
<td>13</td>
<td>40*</td>
<td>43</td>
</tr>
<tr>
<td>28</td>
<td>Academic secondary</td>
<td>10</td>
<td>26</td>
<td>52*</td>
<td>12</td>
</tr>
<tr>
<td>32</td>
<td>Vocational</td>
<td>19</td>
<td>33*</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>21</td>
<td>Minimum</td>
<td>50*</td>
<td>32</td>
<td>16</td>
<td>2</td>
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<table>
<thead>
<tr>
<th>(%)</th>
<th>Age</th>
<th>Ignorant (%)</th>
<th>Knows of (%)</th>
<th>Friend uses (%)</th>
<th>User (%)</th>
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<tr>
<td>24</td>
<td>Young: 18-29</td>
<td>6</td>
<td>22</td>
<td>44*</td>
<td>28</td>
</tr>
<tr>
<td>53</td>
<td>Middle: 30-59</td>
<td>12</td>
<td>28</td>
<td>46*</td>
<td>14</td>
</tr>
<tr>
<td>23</td>
<td>Old: 60+</td>
<td>54*</td>
<td>29</td>
<td>16</td>
<td>1</td>
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<tr>
<th>(%)</th>
<th>Number of consumer goods: Car, colour TV, VCR</th>
<th>Ignorant (%)</th>
<th>Knows of (%)</th>
<th>Friend uses (%)</th>
<th>User (%)</th>
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<tbody>
<tr>
<td>14</td>
<td>Three</td>
<td>5</td>
<td>20</td>
<td>44*</td>
<td>31</td>
</tr>
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<td>9</td>
<td>20</td>
<td>51*</td>
<td>20</td>
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<tr>
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<td>One</td>
<td>27</td>
<td>33*</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>None</td>
<td>48</td>
<td>32*</td>
<td>13</td>
<td>7</td>
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<thead>
<tr>
<th>(%)</th>
<th>Gender</th>
<th>Ignorant (%)</th>
<th>Knows of (%)</th>
<th>Friend uses (%)</th>
<th>User (%)</th>
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<td>Male</td>
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<td>29</td>
<td>36*</td>
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<td>54</td>
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<td>26</td>
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<tr>
<th>(%)</th>
<th>Urban/rural residence</th>
<th>Ignorant (%)</th>
<th>Knows of (%)</th>
<th>Friend uses (%)</th>
<th>User (%)</th>
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<tr>
<td>6</td>
<td>Moscow</td>
<td>10</td>
<td>19</td>
<td>42*</td>
<td>29</td>
</tr>
<tr>
<td>21</td>
<td>Big cities</td>
<td>11</td>
<td>23</td>
<td>41*</td>
<td>25</td>
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<td>Small towns</td>
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<td>33</td>
<td>29</td>
<td>32</td>
<td>6</td>
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*Median category. Source: Centre for the Study of Public Policy, New Russia Barometer XIV. Fieldwork by Levada Centre, 3-23 January 2005, number of respondents: 2107. For further details, see: [www.abdn.ac.uk/cspp](http://www.abdn.ac.uk/cspp)
Using the Internet can cost a significant sum of money if a person does so with a home computer and a telephone line for which a monthly charge must be paid, and hourly charges at an Internet cafe can be significant in relation to a young student’s resources. However, NRB data shows that two-fifths of Internet users avoid costs by using the Internet at work, where their employer pays for the equipment and time online. Furthermore, more Russians sign on the Internet at a friend’s home than at an Internet cafe. Yet given the association between income and education, it would be expected that people with more income are more likely to be Internet users.

The dislocations arising from the transformation of the Russian economy challenge attempts to assess income through rouble measures which, even if accurately reported, are problematic in their significance for an individual’s discretionary income. Therefore, the New Russia Barometer has developed an alternative measure, household ownership of durable goods such as colour television, a Video-Cassette Recorder or DVD, and a car. This index is especially appropriate for Internet use, inasmuch as a home computer is likely to be purchased by a household that already owns other consumer durables. While this is the case, even in the most prosperous Russian households less than one-third are Internet users today (Table 2). Among Russian households higher in the possession of consumer goods, the median group has a friend who uses the Internet, and among Russians in the two lower strata the median person has heard of the Internet but does not know any users. When the analysis is re-run using income quartiles, a similar pattern is found.

Diplomats and journalists reporting about Russia normally concentrate on Moscow, but the city cannot be considered representative of Russian society. Not only is it much larger in population, but also the national capital is cosmopolitan, attracting foreign goods, ideas and people. It also attracts ambitious and educated Russians from other parts of the Russian Federation. Thus, Internet use could well be higher in Moscow than in other cities. The Russian countryside represents the other extreme, for villages are unlikely to support Internet cafes, large offices or schools with computer access to the Internet, and few residents will be younger university graduates.

Town size does affect Internet use, although less than education, age or household purchasing power. While the minority signing on the Internet in Moscow is a higher proportion than elsewhere, the gap between Muscovites and rural dwellers is 23 percentage points compared with a 41 point gap between the most and least educated Russians. Furthermore, it does not require a population in the millions and disproportionately educated for the Internet to diffuse. In lesser as well as larger cities, the median group has friends who access the Internet. In small towns and rural areas, however, the median group consists of people who have heard of the Internet but who do not know any users.

Feminist theories emphasize the influence of gender on participation in many forms of everyday life, often to the disadvantage of women. This implies that women are less likely to be Internet users than men. While there is a difference, it is much less than the association between Internet use and other influences.
examined above: four-fifths of men as well as nine-tenths of women are not (or
not yet) users of the Internet. While Internet use shows a nine percentage point
difference in favour of men, knowing someone who is an Internet user shows a
five percentage point difference in favour of women (Table 2).

A multi-variate approach to Internet diffusion

While tables showing a simple correlation between one social characteristic and
Internet proximity have descriptive uses, they are analytically misleading insofar
as bivariate correlations exaggerate influences or show a spurious relationship
due to the inter-correlation of social differences, for example, younger people are
more likely to be educated than older Russians and older Russians are
disproportionately female. To answer the question—Who is closest to the
Internet?—requires multivariate analysis with Ordinary Least Squares regression
statistics. It can also test additional influences besides the limited number
discussed above.

The proximity model identifies four degrees of involvement in the Internet, ranging
from being a user or knowing a user to knowing about the Internet or not having
heard of the Internet. The results show an extremely good fit: a total of 46.3
percent of the variance in Internet proximity is accounted for (Table 3).

<table>
<thead>
<tr>
<th>Table 3. A multiple regression analysis of Internet proximity</th>
</tr>
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<tbody>
<tr>
<td>Variance accounted for ($R^2$) 46.3%</td>
</tr>
<tr>
<td>b</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Number consumer goods</td>
</tr>
<tr>
<td>Town size</td>
</tr>
<tr>
<td>In labour force</td>
</tr>
<tr>
<td>Gender: female</td>
</tr>
<tr>
<td>Trusts most people</td>
</tr>
<tr>
<td>Social status</td>
</tr>
</tbody>
</table>

P is a two-tailed significance test. **P < 0.001, *P < 0.01.
Source: Centre for the Study of Public Policy. New Russia Barometer XIV. Fieldwork by Levada
Centre, 3-23 January 2005, number of respondents: 2107. For further details, see:
www.abdn.ac.uk/cspp
After controlling for all other influences, education (Beta: 0.31) and age (Beta: – 0.28) are the most important influences on Internet proximity. Moreover, the influence of each is independent of the other. Thus, a young person who has only a vocational education will be more likely to have a friend online than an older person with a vocational education, but not as close to being an Internet user as a young person who is also a graduate.

While there is a simple correlation between economic differences and Internet proximity, controlling for the effect of age and education shows that a household’s economic circumstances are not the primary determinant of how close a person is to the Internet. Discretionary income, as measured by household durable goods, is significant but its influence is substantially less than that of education and age (see Tables 2 and 3). This can be explained by the fact that many Russians are drawn close to the Internet cost free, because it is available at work, at school or in a friend’s house.

Employers can have economic incentives to invest in Internet facilities. If one person in an office uses the Internet, this will have a multiplier effect on Internet proximity, for everyone in the office will thereby know someone online and this makes it possible for a workmate to become a proxy user or even a personal user by borrowing the machine during a lunch break or when it is not being used for business purposes. While there is a significant association between being in work and being online, the extent of the influence is limited. More detailed analysis finds that different types of employers also influence proximity to the Internet: Russians in private sector firms started since the introduction of the market in the early 1990s are twice as likely to use the Internet as those employed in firms or public sector institutions created in Soviet times.

While class differences were nominally abolished in the Soviet Union, the Communist Party *nomenklatura* system institutionalized the uneven distribution of social status, economic privileges and political power within society. Russians remain status-conscious today. When asked to assess their social status on a seven-point scale, less than one percent is unable to do so. However, in multivariate regression analysis subjective social status has no significant influence on proximity to the Internet. After controlling for other influences, people who feel that they are below-average in status in Russian society are just as likely to know others who go online, or to be users themselves, as are Russians of above-average status.

Town size is a contextual resource with a secondary influence on Internet access in Russia. Even though distance from major urban centres could be considered an incentive for Russians in small towns and rural areas to use a facility that can overcome barriers of distance, even after controlling for the fact that big city residents tend to be younger and more educated than small town and rural dwellers, the latter are significantly less likely to use the Internet (Tables 2 and 3).

Since Russian women have a much longer life expectancy than Russian men, a disproportionate number of women are older; the social group most distant from the Internet. After controlling for age and education, being a woman has a very
limited effect on proximity to the Internet. Gender does not have as high a significance level as the influences described above and its impact is less than one-fifth that for education or age.

Internet use, especially email, is about networking and social capital is about individual integration in social networks (cf. Coleman, 1990). Russians are involved with many informal face-to-face networks. However, Internet use involves virtual communication with people you have never met and with impersonal web sites; it thus requires a degree of trust in other people and institutions. Putnam’s (2000) definition of social capital emphasizes that trust is a key indicator of individual social capital. The implications for Russia are problematic, inasmuch as the Communist party-state generated a high level of distrust even by the standards of other Communist regimes (see Rose, 1999; Rose 2005b). The regression analysis shows that the extent to which a Russian does or does not trust people they know has no significant influence on proximity to the Internet (Table 3).

4. Diffusion widens differences before catching up

The extent to which social groups differ in their proximity to the Internet changes at each stage in the process of diffusion. Before the Internet is introduced in society there is no divide, since all social groups are non-users. Before take off commences, upwards of nine-tenths of all social groups will be distant from the Internet; the chief difference will be between those who are ignorant of it and those who have heard of the Internet. Once take off has commenced, differences in proximity to the Internet will widen between those who know someone on the Internet and those who do not.

Dynamics of diffusion in Russia, 2001-2005

The diffusion theory predicts that when take off commences, the importance of education, age and other significant social differences for early adoption will increase, and this has occurred in Russia (Table 1). Regression analyses of the tenth New Russia Barometer survey in June-July 2001 and the fourteenth in January 2005 show the extent to which the take off stage widened differences between social groups. Since the 2001 survey classified respondents into three groups: users, those who had heard of the Internet, and those who were ignorant, to ensure comparability, the 2005 measure of proximity has likewise been made into a three-point measure by combining in a single group those who had friends using the Internet and those who had heard of it. The extent to which a given social characteristic such as age or education affects proximity to the Internet, net of all other social differences, can be calculated by multiplying the unstandardized regression coefficient (b) by the arithmetic difference between the minimum and the maximum value of that characteristic. The product shows how much the
Internet proximity index changes if a person moves, for example, from having a minimum education to a university degree.

The results confirm the theory that diffusion increases differences in proximity to the Internet. Before take off commenced, there was much less opportunity for differentiation; thus, the regression analysis accounted for 25.3 percent of the variance in proximity to the Internet. With take off, opportunities for differentiation increased, and so did the amount of variance accounted for; it rose to 40.2 percent of the variance.4

When Internet use was minimal, the most educated Russians were less than one-third of a point (0.29) higher on the three-point Internet proximity index than the least educated Russians. By 2005, the difference in proximity resulting from education, net of all other influences, had increased to more than half a point (Figure 3). Similarly, in 2001, when all ages were relatively distant from the Internet, the oldest Russians were one-third of a point behind the youngest Russians in proximity. Today, age also increases the difference by more than half a point. When the two effects are combined, they show that the gap between young educated Russians and older, uneducated Russians has widened to more than a full point on the three-point Internet proximity scale.

The influence of economic circumstances is not so strong as age and education, but differences have similarly widened with the take off in Internet use. The impact of having more household durable goods has almost increased by one-sixth of a point and being in employment has increased by a lesser amount.

Although town size showed a statistically significant influence on Internet proximity five years ago, its substantive impact was slight. The diffusion of the Internet has increased proximity to the Internet in the countryside but, because it has increased much more in big cities, the impact of town size has quadrupled. For the time being, it is now greater than the impact of a household’s ownership of consumer goods.

In 2001 there was gender equality, in the sense that there was no significant difference between men and women in their distance from the Internet. The take off in Internet use has made gender significant, albeit its impact is small compared with other significant influences. Take off has not made social status or trust in other people grounds for differentiation: each failed to achieve statistical significance in both the 2001 and the 2005 regression analyses.

**Continuing diffusion: laggards catching up with leaders**

Continuing diffusion of the Internet within a society is a process of widening and then narrowing differences in the percentage of a social group that is on line. The

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4 The proportion of variance accounted for is slightly less than that reported in Table 3, which made use of the more differentiated four-point measure of Internet proximity.
Internet proximity model explains why this is so. Once take off starts, a person who knows someone on the Internet need only take one step to go on line. By contrast, for those who are simply aware of the Internet, a one-step change results in having friends on line. While this is a degree of progress, an individual remains a laggard because not yet on line.

Figure 3. Internet takeoff initially increases differences in proximity

![Diagram showing changes in Internet proximity]

*On three-point scale: 0, no knowledge; 1, heard of internet; 2, user

Source: Impact for independent variables significant at the 0.01 level is calculated by multiplying the maximum range of independent variables, as reported in Appendix Table 1, by the unstandardized regression coefficient for Internet proximity as calculated from comparable regression analyses of New Russian Barometer surveys in 2001 and 2005. Responses in the latter survey have been adjusted to a three-point scale for comparability with the earlier survey. Fieldwork by VCIOM/Levada Centre: 17 June-3 July 2001, number of respondents: 2000; 3-23 January 2005, number of respondents: 2107.

In principle, the distance between groups could continue widening, but this cannot go on indefinitely. Sooner or later, those groups close to the Internet will maximize their take up, with four-fifths or nine-tenths going on line. However, laggard groups can continue moving forward since they are not yet at saturation. Extreme laggards can move from ignorance to awareness and those who are aware gain
friends on the Internet. In a proximity model of the Internet, each step taken by an individual is an advance in the process of the adoption of the Internet.

Once take off commences, the number of users is likely to expand rapidly. Paradoxically, the absolute number of users can increase while the percentage rate of growth can fall. For example, after the doubling of the proportion of users from five to ten percent of the population an increase of two-thirds will produce a greater absolute increase. If the next step is an increase in use of one-half, the absolute number of new users will again be greater than before, thus leading to one-quarter of the population being on line.

The rate of adoption is likely to accelerate as the barriers to becoming a user are lowered with each forward step in the stages of diffusion. There is a network effect as the more people who are on line the easier it is to make Internet communication with others, and the more information will be loaded on the WorldWideWeb for users. As take off progresses, more businesses and all secondary schools and then all primary schools and libraries will acquire Internet facilities, and each will have multiple users. Moreover, the cost of going on line is likely to drop with economies of scale and an increase in competition between Internet providers.

5. International implications

Identifying countries such as the United States, Finland and Japan as leaders in the Internet implies that other countries may emulate them in a dynamic process of diffusion. As leading countries reach a limit for adoption of the Internet, followers will find it easier to catch up, since they will be aiming at a saturated target. Just as the dynamics of diffusion within a society involve the initial widening of differences and then their narrowing, so countries that are currently lagging behind in Internet use have not failed; they are catching up.

Because leaders are always relatively few and followers numerous, Russia is more representative of the world of Internet users today than is the United States, Japan or Finland. In Russia the median person has proximity to the Internet but is not yet a user. The same is true of more than half the 25 member states of the European Union (www.itu.int/ITU-D/ict/statistics, accessed 2 February 2006). However, countries where Internet users are a minority should not be labelled as ‘have not’ countries. Differences in Internet proximity are a consequence of making comparisons at one point in time of countries at different stages of the diffusion process. In the leading countries, the majority are already users; in the catching up countries the median person is one step away, knowing someone on

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5 This does not mean that nothing is changing in leading countries where most people are already users. For example, technological innovations such as broadband and WiFi are rapidly spreading and people are finding new uses for the Internet (OxIS, 2005).
line; while in the most backward parts of the Balkans, where Internet use has not
taken off, the median adult is two or even three steps from becoming a user.

When population size as well as the percentage of users is taken into account,
Russia already has a major displacement in the Internet world. While its
proportion of Internet users is relatively low, its absolute number of Internet users
is greater than in 21 of the 25 EU member states, and twelfth in the world.
Moreover, if the dynamics of diffusion continue to the point that it reaches the
average European level, by virtue of its population, it will have more people on
line than any EU country and have one of the world’s largest concentrations of
Internet users, along with the United States, Japan, China and India.

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Internet diffusion not divide: a proximity model of Internet take off in Russia


Appendix

Appendix Table 1. Variables in regression analyses

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>St.dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to internet</td>
<td>0 (never heard)</td>
<td>3 (user)</td>
<td>1.47</td>
<td>0.97</td>
</tr>
<tr>
<td>Proximity to internet: 3 point scale</td>
<td>0 (never heard)</td>
<td>2 (user)</td>
<td>0.95</td>
<td>0.59</td>
</tr>
<tr>
<td>Education</td>
<td>1 (elementary)</td>
<td>8 (university)</td>
<td>4.82</td>
<td>2.20</td>
</tr>
<tr>
<td>Age (years)</td>
<td>18</td>
<td>76</td>
<td>45</td>
<td>17</td>
</tr>
<tr>
<td>Number consumer goods: TV, VCR, car</td>
<td>0 (has none)</td>
<td>3 (has all three)</td>
<td>1.51</td>
<td>0.85</td>
</tr>
<tr>
<td>In labour force: employed or self-employed</td>
<td>0 (no)</td>
<td>1 (yes)</td>
<td>0.51</td>
<td>0.50</td>
</tr>
<tr>
<td>Social status</td>
<td>1 (lowest)</td>
<td>7 (highest)</td>
<td>3.04</td>
<td>1.28</td>
</tr>
<tr>
<td>Town size</td>
<td>1 (rural)</td>
<td>5 (capital)</td>
<td>2.55</td>
<td>1.25</td>
</tr>
<tr>
<td>Gender: female</td>
<td>0 (no)</td>
<td>1 (yes)</td>
<td>0.45</td>
<td>0.50</td>
</tr>
<tr>
<td>Trusts most people s/he knows</td>
<td>1 (no trust)</td>
<td>7 (great trust)</td>
<td>4.90</td>
<td>1.61</td>
</tr>
</tbody>
</table>

Source: Centre for the Study of Public Policy, New Russia Barometer XIV. Fieldwork by Levada Centre, 3-23 January 2005, number of respondents: 2107. For further details, see: www.abdn.ac.uk/cspp