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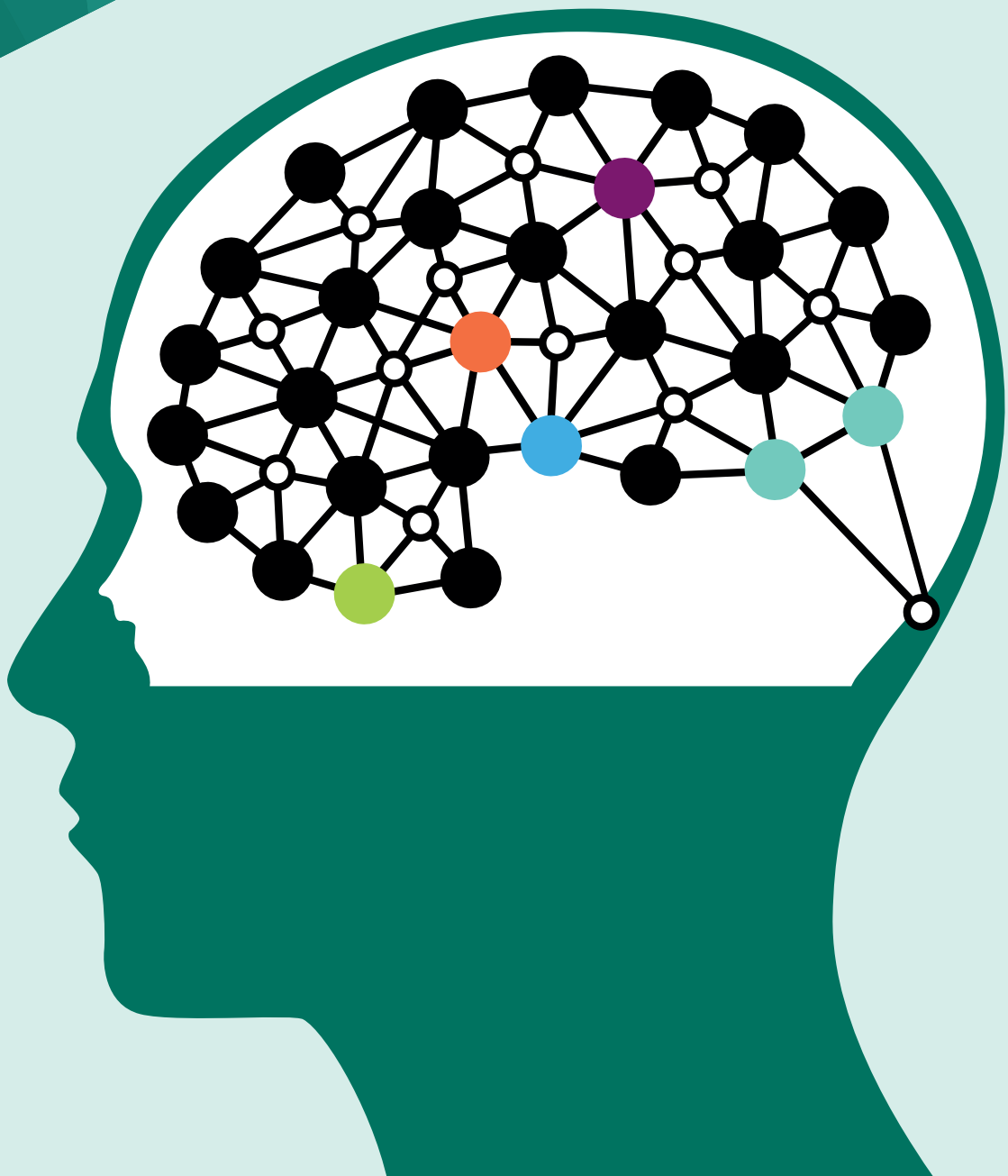
THE RISE AND IMPACT OF DIGITAL AMNESIA

Why we need to protect what we no longer remember



Executive summary

The internet and internet-enabled devices have transformed our everyday lives and relationships. We entrust them with our precious personal information including contacts and images and rely on them to connect us to a vast repository of knowledge, anytime, anywhere.

As part of its commitment to help people protect what matters most in their online-enabled world, Kaspersky Lab wanted to better understand how digital devices and the internet affect the way consumers recall and use information today – and what, if anything, they are doing to protect it.

We commissioned research firm Opinion Matters to survey 6,000 consumers, aged between 16 and 55+, split equally between male and female, with 1,000 from each of the UK, France, Germany, Italy, Spain and Benelux.

The results suggest a direct link between data available at the click of a button and a failure to commit that data to memory. Kaspersky Lab has termed this phenomenon Digital Amnesia: the experience of forgetting information that you trust a digital device to store and remember for you.

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Among other things, the study found that:

- Across Europe, more than half of adult consumers (up to 60%) could phone the house they lived in aged 10; but not their children (53%), or the office (51%) without first looking up the number. Around a third couldn't call their partners.
- The study also shows that one in three European consumers is happy to forget, or risk forgetting information they can easily find – or find again - online. When faced with a question, a third (36%) of European consumers would turn to the internet before trying to remember and a quarter (24%) would forget an online fact as soon as they had used it.
- Contrary to general assumptions, Digital Amnesia is not the preserve of younger digital natives – the study found that it was equally and some times more prevalent in older age groups.
- The loss or compromise of data stored on digital devices, and smartphones in particular, would cause immense distress, particularly among women and younger people. Four in ten (44%) women and almost the same number of 16 to 24 year-olds (40%) say it would fill them with sadness, since there are memories stored on their connected devices that they would never get back. One in four women (25%) and 38% of younger respondents say they would panic: their devices are the only place they store images and contact information.
- Worryingly, despite this growing reliance on connected devices, the study found that consumers across Europe are failing to adequately protect them with IT security. Just one in three (34.5%) installs extra IT security, such as an anti-malware software solution on their smartphone and only a quarter (23.4%) adds any to their tablet. One in five (20.9%) doesn't protect any of their devices with additional security.

Connected devices enrich our lives but they have also given rise to the potentially risky phenomenon of Digital Amnesia. Many people underestimate just how exposed their externally-stored memories can be, rarely thinking about the need to protect them with IT security, such as anti-virus software. Kaspersky Lab is committed to helping people understand the risks their data could be exposed to, and empowering them to tackle those risks.

ACKNOWLEDGEMENTS
Kaspersky Lab is grateful to Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, London for her detailed review of this paper and her expert insight and commentary. Kaspersky Lab would also like to thank Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham, for her expert comments.

Introduction

Digital technologies are not just transforming the way we live and work; they are changing the way we think, learn, behave – and remember.

The long term effects of digital device and internet use are being actively investigated by cognitive neuroscientists, psychologists and many others. Large-scale studies are still in their infancy (10), results can be contradictory, and their interpretation contentious (4) (8). Considerable attention is currently focused on the potential effect of technologies such as gaming on brain development, behaviour and cognitive skills (6) (7) , particularly among young people (1) (2).

Other studies have looked at the impact on brain functionality of always-on access to the internet's vast repository of information. A seminal paper published in Science in 2011 (12) detailed research by Harvard and the Universities of Columbia and Wisconsin into memory and internet use. The study showed that the way young people in the US remembered information was changing as a result of being able to find information online: they retained fewer facts but could readily recall where the information was stored. The researchers called this 'the Google effect'.

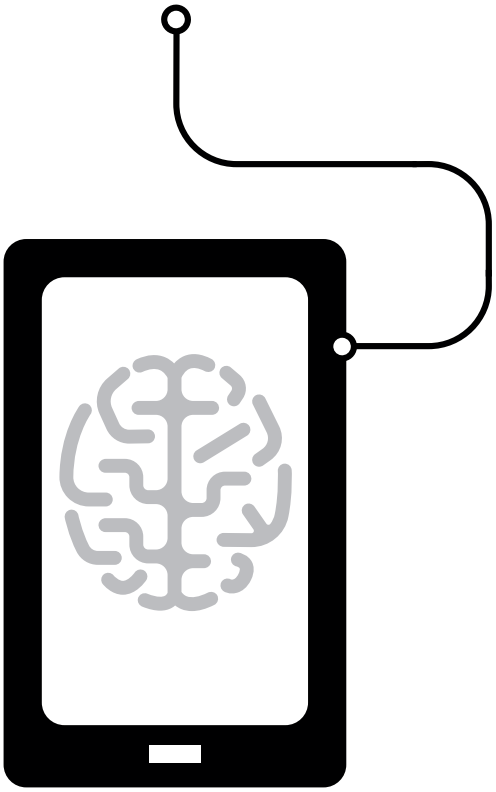
Using this as a starting point, Kaspersky Lab wanted to better understand how digital devices and the internet affect the way ordinary people of all ages recall and use information today – and what, if anything, they are doing to protect the most critical information and ensure they and their families can enjoy the best of the internet's intelligence without risk.

Previous Kaspersky Lab studies[i] have shown that many people underestimate just how exposed their externally-stored memories can be. They don't consider themselves a target and rarely think about the need to protect their memories with IT security, such as anti-virus software.

As part of its commitment to help people protect what matters most in their online-enabled world, Kaspersky Lab commissioned research to explore these issues across Europe.

Research methodology

The quantitative research was undertaken by research firm Opinion Matters, which surveyed 6,000 consumers, aged between 16 and 55+, split equally between male and female, with 1,000 from each of the UK, France, Germany, Italy, Spain and Benelux . The survey was undertaken online in February/March 2015.



The research findings

The results reveal that the 'Google Effect' likely extends beyond online facts to include important personal information.

For many people, particularly younger consumers, connected devices have become not just the primary source of knowledge, but the default storage space for their most important personal information, including contacts and images . Around half of smartphone-owning 16 to 34 year olds and 40% of those aged 35 to 44 surveyed for the study admit that their phone holds almost everything they need to know or recall.

The study findings, discussed in more detail below, show that the majority of these digital consumers are unable to recall critical contact details for those closest to them; and suggest a direct link between data available at the click of a button and a failure to commit that data to memory.

Kaspersky Lab has termed this phenomenon Digital Amnesia: the experience of forgetting information that you trust a digital device to store and remember for you.

The study found evidence of Digital Amnesia equally among both men and women and across all age groups. Contrary to general perception, it is surprisingly prevalent among older respondents. For example, respondents aged 45 and older are more likely to head straight for the internet for the answer to a question, and to forget an online fact once they've used it on the assumption that it will always be out there somewhere. The data is discussed in more detail below.

"The overall trend seems worrying to some degree. In contrast to general knowledge that will always be retrievable from the internet, personal information seems indeed very vulnerable if it is stored solely on one electronic device, and if this device is used as a replacement for our autobiographical memory. Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham

"One of the reasons consumers might be less worried about remembering information is because they have connected devices that they trust. In many societies, having access to the internet feels as stable as having access to electricity or running water. It would be interesting to explore further whether individuals in places where the internet is unreliable (for instance, in cities where there are information or electricity blackouts or in very remote areas) feel greater need to remember contact details or facts, or have a different perspective on information access."

Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London

The results fall broadly into two categories: the recall of personal information and the recall of knowledge and insight. The data is grouped accordingly.

Mind my memories

The study found that, across Europe, more than half of adult consumers could phone the house they lived in aged 10, but not their children or the office – without first looking up the number. Around a third could not remember their partner's number.

The results show that 53% couldn't call their children's phones, 90% couldn't reach their children's schools and 51% couldn't get hold of their place of work.

Yet up to 60% have perfect recall of their home phone numbers when aged 10 and 15 – often reflecting the needs of an age when connected devices were not the ubiquitous companions they are now, if they existed at all.

These trends hold true across all the European markets surveyed, although there were some variations between them.

Country	Home number aged 10	Home number aged 15	Partner number	Children's number(s)*	Place of work	Children's school(s)
Europe average	56% can recall	60.5% can recall	66.5% can (33.5% can't)	47% can (53% can't)	49.2% can recall (50.8% can't)	10.4% can recall (89.6% can't)
UK	45.4% can recall	50.1% can recall	50.8% can recall (49.2% can't)	29% can recall (71 % can't)	43% can recall (57% can't)	13.2% can recall (86.8% can't)
France	49.9% can recall	51.7% can recall	65.6 % can recall (34.4 can't)	48% can recall (52 can't)	48.5% can recall (51.5% can't)	10.9% can recall (89.1% can't)
Germany	55.3% can recall	61% can recall	61.1 % can recall (38.9% can't)	46% can recall (54% can't)	52.7% can recall (47.3% can't)	9.6% can recall (90.4% can't)
Italy	68.3% can recall	72.3% can recall	79.8 % can recall (20.2% can't)	70% can recall (30% can't)	57.5% can recall (42.5% can't)	9.9% can recall (90.1% can't)
Spain	65.3% can recall	70.3% can recall	80.1% can recall (19.9 can't)	65% can recall (35% can't)	48.6% can recall (51.4% can't)	9.5% can recall (90.5% can't)
Benelux	57.7% can recall	62.6% Can recall	65.6% can recall (34.4% can't)	40% can recall (60% can't)	46.3% can recall (53.7% can't)	8.5% can recall (91.5% can't)

Figure 1 Numbers respondents can remember without looking up:

Samples for each confined to those for whom the category was relevant, such as parents, employed, in a relationship etc.

*Based on parents in the 35–44, 45–54 and 55+ age groups. For the purposes of this study it was assumed that parents in younger age groups were unlikely to have children old enough to own and use a mobile phone

Further, an overwhelming 86% of those surveyed – a figure that remained highly consistent across all countries and age groups – say that in our increasingly hyper-connected world people simply have too many numbers, addresses, handles etc. to remember even if you wanted to.

"Reliance on digital devices, and the trust we place in them, can resemble a human relationship. The feelings are established in the same way – through experience. Repeated experience with a reliable individual builds a 'schema' or association for that individual in our memory, telling us that this person can be depended on. If a digital device is continually reliable then we will build that into our schema of that device."

Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London

Not surprisingly, the study found that the loss or compromise of data stored on digital devices, and smartphones in particular, would cause immense distress, particularly among women and younger people.

Of those surveyed across Europe, four in ten (44%) women and almost the same number of 16 to 24 year-olds (40%) say it would fill them with sadness, since there are memories stored on their connected devices that they would never get back. One in four women (25%) and 38% of younger respondents say they would panic: their devices are the only place they store images and contact information.

Absolute break % respondents	Base	Country					
		UK	Germany	Spain	Italy	France	Benelux
Base	6480	1474	1000	1004	1002	1000	1000
Question 9							
Sad – there are memories stored on those devices that I could never get back	2466 38.1%	582 39.5%	435 43.5%	401 39.9%	361 36.0%	422 42.2%	265 26.5%
Calm – I have memorised the things that matter and keep hard copies of pictures	1888 29.1%	289 19.6%	271 27.1%	286 28.5%	332 33.1%	291 29.1%	419 41.9%
Panic – it's the only place I have my images and contact information	1285 19.8%	330 22.4%	177 17.7%	194 19.3%	226 22.6%	176 17.6%	182 18.2%
I do not have any connected devices to store information on	469 7.2%	205 13.9%	24 2.4%	49 4.9%	36 3.6%	71 7.1%	84 8.4%
Other – please specify	372 5.7%	68 4.6%	93 9.3%	74 7.4%	47 4.7%	40 4.0%	50 5.0%

Figure 2 The emotional impact of losing data or access to data

"One aspect that seems to be a trend in the age of smartphones, is to externally store personal memories in the form of pictures. Pictures are a very powerful reminder, and have the potential to reawaken memories that we would otherwise have forgotten. However, they also carry the risk of dictating which aspects of our past we remember, and the more often people remember the same events, the more likely they forget other relevant memories that are not captured in pictures . There also seems to be a risk that the constant recording of information on digital devices makes us less likely to commit this information to long term memory, and might even distract us from properly encoding an event as it happens."

Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham

INFORMATION ONLINE

The study shows that one in three European consumers is happy to risk forgetting information they can easily find – or find again – online, reinforcing other studies that show how the internet is transforming the way we search for and remember facts.

The vast majority (79.5%) of the European consumers surveyed admit that they use the internet as an extension of their brain – with little variation across the countries and age groups studied (for example: 84.5% UK; 83.5% Germany; 78.9% Spain; 73.8% Italy; 71.8% France; and 81.3% Benelux).

When faced with a question, it is reassuring to note that most consumers (57% across all age groups in Europe) will try to remember first. However, a third (36%) of European consumers would now head online before trying anything else , rising to 40% of those aged 45 and over. It would be interesting to track this trend over time.

Similarly, while two-thirds (67%) of consumers say they would sometimes make a note of something they had found online, (12%) would never record it, confident that it will always be out there somewhere, rising to 14% of those aged 45 and over. A quarter (24%) across all age groups, say that they would forget an online fact as soon as it had been used, rising to 27% of those aged 45 and over.

"There seems to be some evidence that older individuals have trouble retrieving information because they have more information to sort through. In theory, this could mean that 'offloading' some of our information to a digital device could make it easier to recall the information we have retained."

Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London

	EU	UK	Germany	Spain	Italy	France	Benelux
Search online for the answer first	36.0%	52.1%	28.4%	32.8%	39.9%	24.7%	30.2%
Online facts: use it as required then forget about it	23.6%	33.4%	23.3%	26.8%	13.3%	18.7%	21.3%
Don't need to note down – it will always be out there somewhere	12.2%	17.7%	10.1%	6.8%	7.2%	14.2%	14.7%

Figure 3 Behaviour related to internet searches

There are also indications that the internet is changing the kind of things we do consider worth remembering. For example, 61% believe that it's not necessary to remember facts they've found online, but they do need to remember where they found them. This figure drops to 53% of those surveyed in Italy, but is otherwise markedly consistent across all the countries and age groups studied.

This growing dependence on the internet as a source of information we might previously have memorized or looked for elsewhere can reflect impatience or the need for speed in a fast-moving world: 61% say they need answers quickly and simply don't have the time for libraries or books. This rises to 70% of 16 to 24 year olds, with country data including 58.95% UK; 59.4% Germany; 65.7% Spain; 62.4% Italy; 64.4% France; and 53.2% Benelux.

"There is an argument to be made that looking up information online, instead of trying to recall it ourselves, makes us shallower thinkers. Past research (9) has repeatedly demonstrated that actively recalling information is a very efficient way to create a permanent memory. In contrast, passively repeating information (e.g. by repeatedly looking it up on the internet) does not create a solid, lasting memory trace in the same way. Based on this research, it can be argued that the trend to look up information before even trying to recall it prevents the build-up of long-term memories, and thus makes us process information merely on a shallow, moment-to-moment basis."

Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham

UNPROTECTED TREASURES

Worryingly, despite this growing reliance on connected devices as the guardians of our memories and knowledge, the study found that consumers across Europe are failing to adequately protect them with IT security. Smartphones and laptops are particularly poorly secured and women secure everything less than men, a finding consistent with previous Kaspersky lab studies.

The use of digital devices is widespread in Europe. Around two-thirds (64.2%) have connected smartphones – with younger people far more likely to own one than older age groups: 84% of 16–24 year olds compared to 38.2% of those aged 55+; around half (46.6%) have connected tablets – fairly consistent across age groups; three-quarters (73%) have connected laptops – again consistent across age groups, and around half (57.1%) of all ages have connected PCs.

However, just one in three (34.5%) installs extra IT security, such as an anti-malware software solution on their smartphone and only a quarter (23.4%) adds any to their tablet. One in five (20.9%) doesn't protect any of their devices with additional security.

Absolute break % respondents	Base	Male	Female
Base	6441	3221	3220
Question 8			
Laptop computer	3705 57.5%	1905 59.1%	1800 55.9%
PC	2854 44.3%	1673 51.9%	1181 36.7%
Smartphone, such as an iphone or Android phone	2224 34.5%	1224 38.0%	1000 31.1%
Tablet, such as an iPad or Samsung Galaxy Note	1508 23.4%	810 25.1%	698 21.7%
None of these devices	1345 20.9%	531 16.5%	814 25.3%

Figure 4 Consumers who install extra IT security on devices

Absolute break % respondents	Base	Country					
		UK	Germany	Spain	Italy	France	Benelux
Base	6441	1455	997	1003	1001	990	995
Question 8							
Laptop computer	3705	800	646	440	648	573	598
	57.5%	55.0%	64.8%	43.9%	64.7%	57.9%	60.1%
PC	2854	567	531	346	535	449	426
	44.3%	39.0%	53.3%	34.5%	53.4%	45.4%	42.8%
Smartphone, such as an	2224	391	388	361	437	317	330
iPhone or Andoid hone	34.5%	26.9%	38.9%	36.0%	43.7%	32.0%	33.2%
Tablet, such as an iPad or	1508	355	222	202	274	209	246
Samsung Galaxy note	23.4%	24.4%	22.3%	20.1%	27.4%	21.1%	24.7%
None of these devices	1345	320	125	382	135	183	200
	20.9%	22.0%	12.5%	38.1%	13.5%	18.5%	20.1%

The impact of digital devices on how we remember

Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham

Our brains clearly have a capacity limit in terms of how much information is accessible. Old memories do fade and will eventually be forgotten, or overwritten by more relevant memories if we don't use (recall) them.

Given these capacity limitations, one could argue that smartphones can enhance our memory, because they store information externally, and thereby free up capacity in long-term memory. This might be particularly true in the case of elderly people, who seem to be more vulnerable to distraction from irrelevant or outdated information stored in memory, making it more difficult for them to access the relevant information[5].

Even in healthy young people, research shows that being able to forget currently irrelevant or outdated information makes us more efficient at encoding new information. This phenomenon is termed 'directed forgetting'[3], and it has recently been demonstrated that it is relevant with respect to using computerized aids.

For example, Storm and Stone[11] showed that saving previously learned information onto an external device enhanced the encoding and retention of subsequently learned information. Based on this and other research, it can be argued that if smartphones were used in this way – off-loading currently irrelevant data so we can access it again at a later time when required – we can reduce the degree to which this currently irrelevant information interferes with the learning of new information, indeed leaving more space in our brains.

However, storing information externally also carries the risk of forgetting this information. If people use their smartphones to store even the most relevant information (e.g. personal data, important contacts), as the research reported by Kaspersky Lab in this document suggests, this can cause them to not store this information in their own memory any more.

CONCLUSION

Connected devices enrich our lives but they have also given rise to the potentially risky phenomenon of Digital Amnesia. Many people underestimate just how exposed their externally-stored memories can be, rarely thinking about the need to protect them with IT security, such as anti-virus software.

Our growing inability to remember important numbers because they are just a click away leaves us immensely vulnerable should the device be lost or stolen or the data compromised in some way – particularly if we are out and about. Secondly, while the internet offers access to a wealth of insight and intelligence that can enhance every experience, it also leaves us open to unexpected threats and vulnerabilities.

Earlier Kaspersky Lab consumer research found that while three quarters of women and two-thirds of men don't believe they could possibly be a target for cyber-attack or malware, 43% of them were hit by financial malware in 2014. In the same year, 24% of Mac users and 32% of PC users encountered a general virus/malware attack.

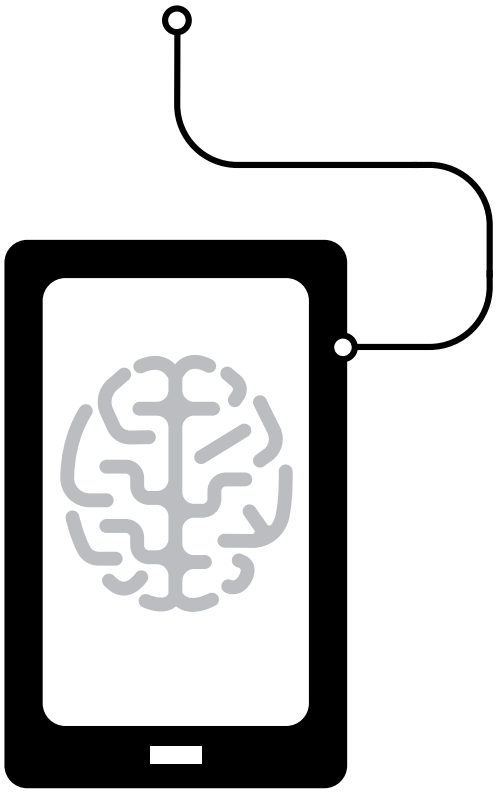
Further, there are dark corners of the internet that contain inappropriate and even illegal information and they are surprisingly easy for unwary consumers to stumble into. The freedom to roam the internet for knowledge requires – ironically – that we can block access to such sites for vulnerable audiences such as the young.

Digital Amnesia is a growing trend among consumers of all ages, not just younger digital natives – and we need to better understand the direction and long term implications of this trend in order to protect the information we no longer store in our minds. Kaspersky Lab is committed to helping people understand the risks their data could be exposed to, and empowering them to tackle those risks. We look forward to a lively debate on the impact and future of Digital Amnesia.

Connected devices enrich our lives but they have also given rise to **Digital Amnesia.** We need to understand the long term implications of this for how we remember and how we protect those memories.

"The act of forgetting is not inherently a bad thing. We are beautifully adaptive creatures, and we don't remember everything because it is not to our advantage to do so! Forgetting becomes unhelpful when it involves losing information that we need to remember. The act of memorization is a skill, and its importance as one the tools in our cognitive toolkit is dependent on how relevant memorization is for us to effectively navigate our world. In other words: being able to memorize is an important skill to have only if we need it."

Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London



"Forgetting is in no way a bad thing! Quite the contrary, forgetting is a highly adaptive way to help our memory retain the information that is truly relevant, and get rid of information that is irrelevant. Our brain seems to work under the premise that the things that we frequently use and remember are the things that are truly valuable for us. Our brain appears to strengthen a memory each time we recall it, and at the same time forget irrelevant memories that are distracting us. This way, we might not be able to remember everything in the long term, but our memory system is adaptive in that it makes sure we remember the most relevant information. There are plenty of memories that have become outdated (e.g. our old bank details as soon as we open a new bank account), or memories we may wish to forget (e.g. traumatic or embarrassing events). In all those instances, our memory becomes more efficient and adaptive because humans are capable of forgetting." (13)

Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham

i The sample was recruited, validated and surveyed through 'double opt-in' online panels to ensure respondents were representative and genuine

ii The Consumer Security Risks Survey 2014 – multi-device threats in a multi-device world', Kaspersky Lab and B2B International, July 2014

iii 82% of the consumers surveyed own and use a smartphone, and all but 0.5% own and use at least one of the following connected devices: smartphone, tablet, laptop or PC/Mac

iv In psychology and cognitive science, a schema (plural schemata or schemas) describes an organized pattern of thought or behaviour that organizes categories of information and the relationships among them

v

Absolute break % respondents		Country					
	Base	UK	Germany	Spain	Italy	France	Benelux
Base	6480	1474	1000	1004	1002	1000	1000
Question 4							
Try to remember	3694 57.0%	525 35.6%	675 67.5%	596 59.4%	552 55.1%	706 70.6%	640 64.0%
Search online	2330 36.0%	768 52.1%	284 28.4%	329 32.8%	400 39.9%	247 24.7%	302 30.2%
Ask a friend who knows about the subject	209 3.2%	66 4.5%	25 2.5%	31 3.1%	29 2.9%	31 3.1%	27 2.7%
Look it up in a book	181 2.8%	93 6.3%	12 1.2%	29 2.9%	14 1.4%	9 0.9%	24 2.4%
Other - please specify	66 1.0%	22 1.5%	4 0.4%	19 1.9%	7 0.7%	7 0.7%	7 0.7%

vi 'Consumer Security Risks Survey 2014 – multi-device threats in a multi-device world', Kaspersky Lab and B2B International, July 2014

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