

Department for Culture, Media & Sport

Research into consumer understanding and management of internet cookies and the potential impact of the EU Electronic Communications Framework



Report

April 2011

In December 2010, the Prime Minister decided that competition issues relating to the media, broadcasting, digital and telecoms sectors would transfer from the Department for Business, Innovation and Skills (BIS) to the Department for Culture, Media and Sport (DCMS) to whom this report will now be issued. The machinery of government change has since taken place and responsibility has been transferred for these areas, which includes telecommunications policy and the implementation of the EU Framework.

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Summary and conclusions

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Requirements set by DCMS

PricewaterhouseCoopers LLP (PwC) was commissioned by the Department for Culture, Media and Sport (DCMS)¹ to undertake research into the potential impact of further regulation of internet cookies as a result of revisions to the EU Electronic Communications Framework (ECF). Internet cookies are small text files that can be saved on an internet user's computer when visiting a website; effectively, they act as a memory of what has happened previously when the computer has interacted with that website.

The two key objectives of our research were:

- to analyse the response of internet users to the proposed changes envisaged as a result of implementing the ECF; and
- to analyse, and where possible quantify, the potential impacts of the changes on business.

The results of our research are intended to inform DCMS' Impact Assessment of the options for implementing changes to the ECF.

Background to the research

Article 2 of Directive 2009/136/EC (the Directive) amends the E-Privacy Directive 2002/58/EC (the E-Privacy Directive) setting out the fundamental rights and freedoms of EU citizens when using electronic communications. Of particular note for our work is the change to Article 5(3) of the E-Privacy Directive: in future, internet users will be expected to give consent when information is stored or accessed on their terminal equipment whenever this is not strictly necessary for a service explicitly requested by the user. The previous requirement was to offer users "the right to refuse".

This amendment affects the use of internet cookies. Internet cookies can expire after a web session or persist and last beyond the current web session. They can also be separately categorised as either first party internet cookies, which originate from the domain being visited by the user, or third party internet cookies, which originate from a domain other than the one visited by the user.

EU Member States are required to adopt and publish the laws, regulations and administrative provisions necessary to comply with the Directive by 25th May 2011.

In September 2010, Government published a consultation paper which set out its proposed approach to implementing the provisions of the revised ECF. The paper, which was accompanied by an interim Impact Assessment, considered two options for implementing the provisions of the amended Directive as they relate to internet cookies:

- A full 'Opt-in' system whereby internet users would have to accept each internet cookie placed on their computer. This would require repeated pop-up windows or other virtual labels on every web page visited by a user where internet cookies are in use. Each pop-up would need to give details about the individual internet cookies in order to help internet users make informed decisions.
- 'Enhanced browser settings' which would provide internet users with enough information and the capability to make an informed decision when deciding which internet cookies their browser should accept. It would mean that browser settings would need to be more visible to internet users who would need to be provided with clear and comprehensive information about internet cookies and how to opt-out of them if they wish. It might also require browser vendors to change the actual options presented

¹ In December 2010, The Prime Minister decided that competition issues relating to the media, broadcasting, digital and telecoms sectors would transfer from the Department for Business, Innovation and Skills (BIS) to the Department for Culture, Media and Sport (DCMS) to whom this report will now be issued. The machinery of government change has since taken place and responsibility has been transferred for these areas, which includes telecommunications policy and the implementation of the EU framework.

(including how distinctions are made between different types of internet cookie or their use) and/or the default option.

The consultation paper indicated that Government's preferred option was 'Enhanced browser settings' because "it allows the UK to be compliant with the E-Privacy Directive without the permanent disruption caused by an 'Opt-in' regime². Subsequently, during the course of our work, a third option has emerged which would involve internet users being provided with increased levels of information and notice regarding individual internet cookies. For example, it might entail the use of a device similar to the 'eye icon' which is currently being tested in the behavioural advertising sector. The icon, which is presented by adverts on online publishers' websites, informs users of the presence of behavioural tracking internet cookies and enables them to access more detailed information on the internet cookies as well as giving them the option to opt-out of each advertising intermediary's internet cookie. Such an 'Enhanced information' option might be implemented as part of a self-regulatory initiative, for example by online publishers, advertisers, online retailers or other cookie users.

Framework used in research

At the outset, we developed an impact framework. This set out the evidence we required to assess the potential costs and benefits of the proposed (or possible) legislative options, both for users of the internet and for those businesses which supply products and services over the internet and which make use of internet cookies. To populate this framework, we undertook consumer research and business case studies. Below, we summarise the results and our assessment of the likely impacts of the three options.

Figure 1: Stakeholders in Impact Assessment



Source: PwC

Consumer research

We conducted an online survey of 1,012 individuals in February 2011. The sample was drawn randomly from Research Now's online panel, drawn from across the UK and all age and socio-economic groups. As might be anticipated, respondents were relatively intensive internet users.

Our survey showed that:

- More than three quarters of the survey respondents (77%) said they were concerned about internet security.
- About one third of respondents (32%) indicated that they had actively changed their privacy settings on their internet browser to give more privacy but 28% did not check the privacy settings at all and another 20% of respondents reviewed their browser settings but did not change them. Only 1% changed their default settings to give them less privacy.
- Respondents who expressed concerns about internet security were most often concerned about catching a virus or other computer infection (88%), incurring a financial loss due to fraudulent payment (82%) or the abuse of personal information sent over the internet (75%).
- The large majority of respondents (85%) were not aware of any of the existing internet cookie 'opt-out' solutions. Only 6% of respondents indicated that they are aware of TACO for Firefox and 9% that they are aware of anonymous browsing. 29% of those respondents who are aware of the 'opt-out' possibilities had not used them.

² <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/i/10-1133-implementing-revised-electronic-communications-framework-impact.pdf>, page 146.

- Most respondents (83%) indicated that they are not aware of forthcoming changes to the way in which use of internet cookies will be regulated.
- Respondents recognised that they had limited knowledge and understanding of internet cookies: only 13% of respondents indicated that they fully understand how internet cookies work and 45% indicated that they had some understanding of them. In contrast, 37% had heard of internet cookies but did not understand how they work and 2% of people had not heard of internet cookies before participating in the survey.
- Testing of respondents' knowledge of internet cookies confirmed their limited understanding: Only for one out of sixteen internet cookies related statements a majority of respondents knew the correct answer with other respondents either selecting the incorrect answer or indicating that they did not know the answer.
- Just fewer than one in five respondents (18%) stated that they accept all internet cookies whilst 36% accept only selected internet cookies and 9% do not accept any internet cookies. Over one third (37%) do not know how they manage internet cookies on their computer.
- Survey respondents who indicated that they only accept selective internet cookies were asked what types of internet cookies they currently accept. The results indicate that they are more likely to accept an individual internet cookie when the site is frequently visited, rejection of the cookie will incur a loss of functionality or the company has a good reputation. Only 17% of respondents indicated that they read the privacy statement of a website.
- Nearly two thirds of respondents (62%) think that it is very important to know the purpose of an internet cookie and 56% think it is very important to know how to delete internet cookies. Roughly 40% of respondents indicate that the contents, issuer and impact on functionality are very important pieces of information when deciding how to manage internet cookies.
- When asked what time they would spend deciding whether or not to accept an internet cookie, almost a quarter of respondents (23%) indicated that they would decide instantly whether to accept the internet cookie. The majority of respondents (59%) said that they would need some time to read the information presented and would then decide whether to accept an internet cookie and 18% said that they would need some time to read the provided information and do additional research and/or ask for help.

Respondents were asked about the impact of the three regulatory options on their decision whether or not to accept internet cookies:

- They generally indicated that the 'Opt-in' option would lead to the largest change in behaviour followed by the 'Enhanced information' approach and the 'Enhanced browser settings' option.
- Roughly one third of respondents indicated that they were unsure how their behaviour with regard to internet cookies would change.
- Overall, most respondents preferred the 'Opt-in' option followed by the 'Enhanced information' approach and, finally, the 'Enhanced browser settings' option. A large number of respondents indicated that they have only limited a priori knowledge of internet cookies.
- Finally, survey respondents were asked about their willingness to pay if their Internet Service Provider could manage the internet cookies delivered to their computer precisely according to their preferences. On average respondents reported that they were willing to pay an amount equivalent to about 5-6% of their total payments for internet services (£0.67-£0.78 per month depending on calculation) for management of internet cookies including 57% of respondents who stated that they would be unwilling to pay anything for this service. On this basis, the overall willingness to pay for the UK adult online population is estimated to be about £300 -£380 million per annum. This estimate however, should be considered as indicative as survey participants were relatively heavy internet users and the figure is based upon stated as opposed to revealed willingness to pay.

Business case studies

In addition to the online survey of internet users, we also conducted a series of 20 case studies with businesses. The choice of case studies was developed in conjunction with DCMS which had previously identified those sectors that are most likely to be impacted by implementation of the proposed changes to the E-Privacy Directive. We also used available data on the pattern of internet use by business to inform our choice of

sectors.³ The sectors identified have been broadly categorised as: hardware vendors; internet browser vendors and other software vendors; the advertising industry (including various kinds of intermediaries between advertisers and online publishers); online retailers; and online publishers (including B2B and B2C in both the private and public sectors).

No interviewed company was able to provide quantitative estimates of the direct costs they would expect to incur in complying with each of the regulatory options. We understand this was due to the following reasons:

- There is ambiguity associated with the wording of the Directive: this has a bearing on the likely costs of compliance because it affects the extent to which firms may need to change their business strategy and operations.
- Few (if any) companies were fully prepared with plans on how to implement potential changes.
- There is no 'leading response': no one firm or sector has stepped forward to lead or coordinate a response and there is a lack of clarity as to where the responsibility lies.
- Costs depend significantly on browser vendors' behaviour and whether they act uniformly. For example, costs for cookie users are likely to increase if browser vendors do not act uniformly.
- The change in user behaviour associated with some of the options is expected to have a significant bearing on some industries and companies (but is itself difficult to predict).

Although no quantification was possible, our discussions showed that business expects four factors to drive costs:

- The precise legislative requirements (the most important factor).
- Whether, and if so, how, browser vendors respond.
- The number of companies which need to implement the changes (which depends on how browser vendors respond).
- The extent to which there are displacement effects and efficiency losses.

Finally, the results of the business case studies fed directly into our (sector specific) assessment of overall impacts (alongside the results of the consumer survey). Some general overarching insights from the business case studies were:

- The 'Enhanced browser settings' option was seen as the least disruptive for the general management of internet cookies. Generally, the view was that this method would be preferable in terms of maintaining the online user experience. The selection of default options is seen as a critical determinant of consumer behaviour.
- Browser vendors are commonly seen as the potential 'first mover' in providing the technical framework for the communication of information and settings with websites. Standardisation in browser settings and format across browsers is seen as desirable to minimise the costs for other businesses.
- It would be desirable to provide consistent presentation of information to end users.
- Enhanced information/'eye icon' for third party behavioural advertising is seen as a special case and greater regulation and information were generally seen as justified.
- The speed of response required for implementation (late May 2011) is extremely challenging for business: interviewees cited the extended planning/implementation period required (typically over six months).

Conclusions

Finally, we draw together the evidence we have from both the business case studies and the consumer survey to compare the expected benefits and costs of the three regulatory options. For the reasons explained above, much of our analysis is necessarily based on qualitative evidence, rather than quantified estimates of the costs.

It is important to consider the potential benefits of the amended E-Privacy Directive for consumers: over three quarters of the respondents in our online survey stated that they are concerned about internet security. Furthermore, 42% respondents stated that there are activities they do not undertake because of internet security concerns. The amended E-Privacy Directive is likely to increase consumer control, trust and

³ E-commerce and ICT activity 2009, Statistical Bulletin, ONS.

confidence. All of these are benefits are likely to transpose into economic benefits (which are however, difficult to measure).

‘Opt-in’

Compared to the other options, the ‘Opt-in’ option is likely to impose the largest total costs on the UK economy for the following key reasons:

- The ‘Opt-in’ option is likely to give rise to direct costs for all cookie users and especially the large number of online publishers.
- Internet users will potentially incur large time costs managing their use of internet cookies. If each user had to manage (only) 200 internet cookies per annum, then the consumer survey suggests that the total cost of would be around £190- £235 million per annum at current prices. Furthermore, their online experience could also be significantly disrupted. However, the results of the online survey in which the ‘Opt-in’ option was ranked first by most consumers contrast these calculations and seem to document a wish for more control with regard to internet cookies. It is, however, unclear whether the above time costs have been fully considered by survey participants.
- The ‘Opt-in’ option is likely to lead to the largest displacement effects as business shifts from online channels to offline channels. Although offline business will benefit from these effects, there will be associated efficiency losses (unrealised sales, additional consumer and business costs) which represent economic costs.

The costs are likely to be non-uniformly distributed across the business community. Businesses with websites which rely most heavily on the use of internet cookies will be most affected. Furthermore, internet cookies are most likely to be accepted if they come from large, well known companies and public sector institutions which are most trusted by consumers.

The ‘Opt-in’ option is likely to increase the overall level of trust of internet users and this might increase the volume of certain online transactions.

The following table summarises the main effects by industry.

Table 1 - ‘Opt-in’ effects by industry

Group	Main effects
Browser vendors	<ul style="list-style-type: none"> • Costs incurred in creating information standards for internet cookies. • Costly reengineering of browser functions might be necessary. • Different technical implementation by vendors increases costs of cookie users.
Online publishers	<ul style="list-style-type: none"> • Information on cookies is readily available, but a large number of companies and bodies in the public sector would need to provide and submit information which would increase total costs. • Reengineering of website functionalities and management of session cookies would increase costs. • Displacement effects would lead to redistribution: traditional publishers (offline) would be likely to benefit whereas internet publishers would be likely to lose business as consumers switch to ‘offline’ media. Costs are incurred as a result of efficiency losses.
Specific industries	
Online advertising	<ul style="list-style-type: none"> • Large reduction of behavioural advertising volume and potentially online advertising volume due to ‘opt-out’. • Displacement effects: traditional forms of advertising would be likely to benefit whereas online advertising would be likely to lose business. Economic costs because of efficiency losses.
Web analytics	<ul style="list-style-type: none"> • Large reduction in web analytics volume and therefore business due to ‘opt-out’.

Group	Main effects
Online retailing	<ul style="list-style-type: none"> Displacement and efficiency losses (see online advertising). Basic web basket functionality of online retailers is likely to stay functional because of 'strictly necessary' provision. Reengineering of other website functionalities and management of session cookies would increase costs. Reduction in user online experience and therefore traffic and sales. Displacement effects: 'high-street shopping' would benefit whereas online retailers would be likely to lose business. Costs are incurred as a result of efficiency losses.
Hardware	<ul style="list-style-type: none"> Potentially costly reengineering of warranty and update processes. Obtaining consent for preloaded cookies might be necessary.

Source: PwC analysis

'Enhanced information'

The 'Enhanced information' option would be likely to lead to relatively small overall economic costs.

- The option is industry specific (targeted towards behavioural advertising and web analytics) and only a limited number of companies would incur direct costs. It seems not feasible to use this option as an overarching approach as is the case for the other two regulatory options.
- Initial trials show that the approach would not lead to large scale consumer reactions.

A general benefit of the 'Enhanced information' approach would be the presentation of information in context, i.e. the user would be able to request additional information on internet cookies when they were in use. This would be likely to have positive implications for users in terms of enhanced trust.

The 'Enhanced information' option does not seem feasible in a wider context for publishers due the large number of companies and associated coordination problems and the diverse use of cookies. Nevertheless, it potentially can be applied in a 'mixed implementation' strategy for behavioural advertising (and web analytics).

Industry specific impacts are summarised in Table 2 below.

Table 2: 'Enhanced information' effects by industry

Group	Main effects
Browser vendors	<ul style="list-style-type: none"> No immediate impact.
Online publishers	<ul style="list-style-type: none"> No immediate impact as it is unlikely to be feasible for large and diversified group of online publishers.
Specific industries	
Online advertising	<ul style="list-style-type: none"> Direct costs incurred for creation of platform and management of cookies. Small displacement effects shifting business from behavioural advertising to other forms of online and offline advertising. Small efficiency losses.
Web analytics	<ul style="list-style-type: none"> If included in approach see online advertising effects.
Online retailing	<ul style="list-style-type: none"> No immediate impact as a cross-industry initiative would be unlikely to be feasible.
Hardware	<ul style="list-style-type: none"> No immediate impact as a cross-industry initiative would be unlikely to be feasible.

‘Enhanced browser settings’

The cost incurred by the ‘Enhanced browser settings’ option would depend significantly on the precise implementation and requirements of the option. For example, if browsers were already deemed to be compatible with the amended E-Privacy Directive then no costs would be incurred by the implementation of this option. However, if browser vendors were required to reengineer their browsers, this would entail direct costs for vendors and potentially associated technology costs for cookie users who must coordinate with the underlying browser technology framework(s). The costs could become substantial. We estimate the economic costs of this option to be in general lower than the costs incurred by the ‘Opt-in’ option for the following reasons:

- ‘Enhanced browser settings’ would concentrate the requirements for regulatory compliance onto a small number of stakeholders; direct costs could be limited to browser vendors.
- The option would generally lead to one-off consumer costs as opposed to recurring costs of the ‘Opt-in’ option.

The consumer response to this option would be dependent on the information provided and the default options (as shown in consumer research) and could have a significant impact on economic costs as business adapted to this response.

Currently internet browsers make a distinction between first party and third party cookies. If browser vendors’ interpretation of ‘Enhanced browser settings’ involved blocking third party cookies by default, this would entail large costs on the advertising and web analytics industries. In addition, costs would be incurred by the advertising industry if users were provided the option to block behavioural tracking cookies⁴ in browser settings, perhaps even by default. Online retailers and hardware vendors rely less critically on these kinds of cookies and are therefore less exposed to changes in browser settings.⁵

Generally, ‘Enhanced browser settings’ could potentially provide a solution for most internet cookies in use. The option could be refined by the ‘Enhanced information’ option or the ‘Opt-in’ options for specific internet cookies uses and/or industries.

Industry specific impacts are qualitatively summarised in Table 3 below.

Table 3: ‘Enhanced browser settings effects by industry

Group	Main effects
Browser vendors	<ul style="list-style-type: none">• Costs would depend on precise requirements: whether browsers are already compliant/it would be necessary to provide additional information/it would be necessary to reengineer browsers?
Online publishers	<ul style="list-style-type: none">• No immediate impact.
Specific industries	
Online advertising	<ul style="list-style-type: none">• Impact dependent on interaction with the ‘Enhanced information’ approach and specified default settings.• If advertisers’ third party or behavioural cookies are blocked effects similar to the ‘Opt-in’ option’.
Web analytics	<ul style="list-style-type: none">• See online advertising.
Online retailing	<ul style="list-style-type: none">• No immediate impact.
Hardware	<ul style="list-style-type: none">• No immediate impact.

Source: PwC analysis

⁴ Behavioural tracking cookies are cookies that track a user’s behaviour across a number of sites such as to display advertisements that are most likely to lead to a sale.

⁵ It is unlikely that ‘Enhanced browser settings’ would require all cookies to be blocked by default.

Overarching conclusion

Having looked at the three options, the implementation of a mixed approach is likely to be sensible. Whereas 'Enhanced browser settings' could be a sensible and time-saving approach for day-to-day management of cookies, consumers' wish for more control could potentially be accounted for by the 'Enhanced information' option or the 'Opt-in' option in specific circumstances.

Main report

1 *Introduction*

Requirements set by DCMS

PricewaterhouseCoopers LLP (PwC) was commissioned by the Department for Culture, Media and Sport (DCMS)⁶ to undertake research into the potential impact of further regulation of internet cookies as a result of revisions to the EU Electronic Communications Framework (ECF). The two objectives of our research were:

- to analyse the response of internet users to the proposed changes envisaged as a result of implementing the ECF; and
- to analyse, and where possible quantify, the potential impacts of the changes on business.

The results of our research are intended to inform the Impact Assessment being prepared by DCMS of the options for implementing changes to the ECF.

Report structure

The rest of our report is structured in four further Sections:

- Section 2 reviews the context for, and objective of, the research and describes our approach to meeting the objectives;
- Section 3 summarises the key results of our consumer research;
- Section 4 describes the key findings from our business case studies; and
- Section 5 draws together the evidence from our research and case studies to assess the overall impact of the different regulatory options.

Three appendices contain further information:

- Appendix A provides the questionnaire which underpins our consumer research;
- Appendix B contains the framework we used to structure the business case studies; and
- Appendix C provides background data on the UK business population potentially affected by the regulation.

⁶ Our work has been undertaken under the engagement letter between PwC and the Department for Business, Innovation and Skills (BIS) dated 22nd December 2010. However, in December 2010, the Prime Minister decided that competition issues relating to the media, broadcasting, digital and telecoms sectors would transfer from BIS to DCMS to whom this report is issued. The machinery of government change has since taken place and responsibility has been transferred for these areas, which includes telecommunications policy and the implementation of the EU Framework.

2 Background

Introduction

In this Section of the report, we set out the background to the project. We start by describing the context for the research and then outline the key elements of the framework within which we have gathered and collated evidence relating to the potential impact of further regulation of internet cookies. We then briefly summarise how we have approached the research and analysis.

Context

We start by considering the proposed changes to EU legislation regarding internet cookies, in particular the requirement for consent from users. We then briefly outline some important distinctions between types of internet cookies, and some typical applications for each. Finally, we summarise the previous Impact Assessment and highlight three key regulatory options which inform the overarching structure of our analysis.

EU Electronic Communications Framework (ECF)

In 2002, EU Member States reached agreement on a regulatory framework for electronic communication networks and services which covers telecommunications (fixed and mobile), e-mail, access to the internet and content related broadcasting. Its aim was to harmonise regulation governing the provision of e-communications across the EU and lead to the creation of an internal EU market.

The ECF contained an in-built review mechanism and, consequently, the European Commission put forward proposals for changes in November 2007. These were agreed in November 2009 and need to be implemented by Member States by 25th May 2011.

One part of the ECF - the E-Privacy Directive 2002/58/EC (the E-Privacy Directive) - sets out the fundamental rights and freedoms of EU citizens when using electronic communications. The E-Privacy Directive was amended by Directive 2009/136/EC (the Directive). The changes to Article 5(3) are especially relevant to internet cookies and strengthen users' rights with regard to information storage and access on their terminal equipment (e.g. their computers).

Change to Article 5(3)

Article 2 of the Directive amends the E-Privacy Directive on privacy and electronic communications. Of particular note are the changes to Article 5(3)⁷. An important change is the requirement for the user to give consent when information is stored or accessed on their terminal equipment whenever this is not strictly necessary for a service explicitly requested by the user. Previously, the requirement was to offer users "the right to refuse".

Recital 66 to the Directive includes some further guidance and clarification of the meaning of Article 5(3). Importantly, it states that:

'Where it is technically possible and effective, in accordance with the relevant provisions of Directive 95/46/EC, the user's consent to processing may be expressed by using the appropriate settings of a browser or other application.'

This change has implications for the use of internet cookies.

⁷ 'Member States shall ensure that the storing of information, or the gaining of access to information already stored, in the terminal equipment of a subscriber or user is only allowed on condition that the subscriber or user concerned has given his or her consent, having been provided with clear and comprehensive information, in accordance with Directive 95/46/EC, inter alia, about the purposes of the processing. This shall not prevent any technical storage or access for the sole purpose of carrying out the transmission of a communication over an electronic communications network, or as strictly necessary in order for the provider of an information society service explicitly requested by the subscriber or user to provide the service.' Article 5(3), Directive 2009/136/EC.

Internet cookies

Internet cookies are small text files that can be saved on a user's computer when visiting a website.⁸ They can be session based and expire after a session or persist beyond the current web session:

- *Session internet cookies* are used to 'maintain state' and allow websites to remember the actions of a user across a website *during a particular session*. For example, an online retailer may use session internet cookies to store information on items that have been added to the 'basket' ready to be purchased together with other items in a single transaction.
- *Persistent internet cookies* are stored on end users' devices beyond the current session. They send information to the webpage (server) whenever the user visits the site until the internet cookies' expiry date. These internet cookies allow websites to remember the actions of a user across a website (or a number of websites) and *across sessions*. For example, persistent internet cookies enable websites to remember settings for personalised content.

Internet cookies can also be separately categorised as either *first party* or *third party*. First party internet cookies are those that originate from the domain being visited by the user. Third party internet cookies are those that originate from a domain other than the one being visited by the user. Advertising companies with adverts on many different websites may use persistent third party internet cookies to allow them to track a user across websites to enable the company to understand consumer behaviour and select the most appropriate adverts.

Internet cookies do not identify an individual user. Rather, they identify a single browser on a single device that was used to access the website. Internet cookies do not read information saved on a user's hard drive; they can only transfer, and only contain, as much information as the user has disclosed to a certain website. Internet cookies are not computer programmes and, therefore, cannot be executed as code and they cannot be used to disseminate computer viruses.

UK implementation plans

In September 2010, the UK Government published a consultation paper setting out its proposed approach to implementing the provisions of the revised ECF⁹, as well as questions for stakeholders on the areas where it has some discretion in implementation.¹⁰ The paper, which was accompanied by an interim Impact Assessment, identified and considered two options for implementing the amended Directive¹¹:

- A full 'Opt-in' system whereby consumers would have to confirm every internet cookie placed on their computer. This would require repeated pop-up windows or other virtual labels on every web page visited by a user. In order to make these decisions informed, each pop-up would need to give users details about the individual internet cookies.
- 'Enhanced browser settings' which provide consumers with enough information for them to make an informed decision about whether to accept internet cookies. It would mean that browser settings would need to be made more visible to users, and users would need to be provided with clear and comprehensive information about internet cookies and how to opt-out of them if they wish.

The consultation paper indicated that Government's preferred option was 'Enhanced browser settings' because "it allows the UK to be compliant with the E-Privacy Directive without the permanent disruption caused by an 'Opt-in' regime"¹². Subsequently, during the course of our work, a third option has emerged which would involve internet users being provided with increased levels of information and notice regarding individual internet cookies ('Enhanced information' option). For example, it might entail the use of a device similar to the 'eye

⁸ Cookies are placed on a user's machine usually by small bits of code.

⁹ <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/i/10-1132-implementing-revised-electronic-communications-framework-consultation.pdf>

¹⁰ The deadline for responses was 3rd December 2010.

¹¹ <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/i/10-1133-implementing-revised-electronic-communications-framework-impact.pdf>

¹² <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/i/10-1133-implementing-revised-electronic-communications-framework-impact.pdf>, page 146.

icon' which is currently being tested in the behavioural advertising sector. The icon, which is presented by adverts on online publishers' websites, informs users of the presence of behavioural tracking internet cookies and enables them to access more detailed information on the internet cookies as well as giving them the option to opt-out of each advertising intermediary's internet cookie. Such an 'Enhanced information' option might be implemented as part of a self-regulatory initiative, for example by online publishers, advertisers, online retailers or other cookie users.

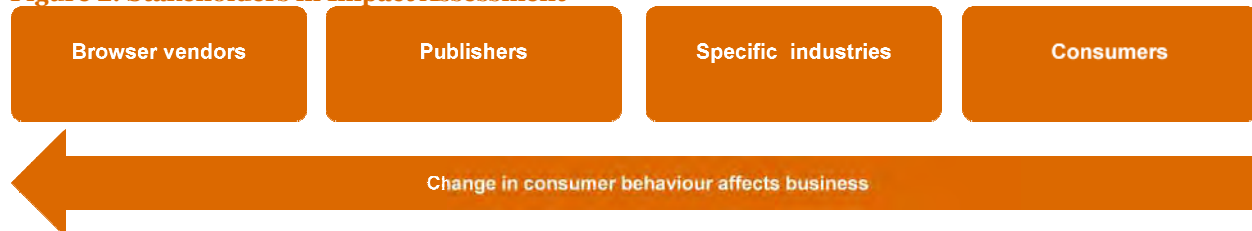
Impact Assessment framework

As we have noted earlier, the primary purpose of our research was to generate evidence which DCMS can use to strengthen Government's initial Impact Assessment which it prepared to support the consultation¹³. In developing our approach, therefore, it was important to take account of the basic principles which underlie robust Impact Assessments and apply them to the proposed (or possible) regulatory changes.

Key principles

At the outset, we developed an impact framework. This set out the evidence we required to assess the potential costs and benefits of the proposed (or possible) legislative options, both for users of the internet and for those businesses which supply products and services over the internet and which make use of internet cookies. To populate this framework, we undertook consumer research and business case studies.

Figure 2: Stakeholders in Impact Assessment



Source: PwC

Impact Assessment guidance¹⁴ recommends that:

"The relevant costs and benefits to the UK economy of all regulatory options should be valued, where it is proportionate to do so, and the net benefits or costs calculated."

The guidance identifies five different levels of analysis which might be expected in an Impact Assessment (see Table 4). The minimum requirement is Levels 1 and 2; whether Level 3 or above is needed depends on the nature and scale of the impacts and is a matter of considering proportionality. It also depends on the stage the proposal has reached: it is expected that the quality and depth of analysis in an Impact Assessment will increase as a (new) regulation moves through the policy making process.

¹³ <http://www.bis.gov.uk/assets/biscore/business-sectors/docs/i/10-1133-implementing-revised-electronic-communications-framework-impact.pdf>

¹⁴ <http://www.berr.gov.uk/files/file44544.pdf>

Table 4: Summary assessment of coverage of existing Impact Assessment

Level	Description of analysis required
Level 1	Describe who will be affected by the proposals - business, public sector and consumers
Level 2	Fully describe the costs and benefits
Level 3	Quantify the costs and benefits
Level 4	Value (some of) the costs but not the benefits; use qualitative, non-monetised costs and benefits to fill gaps
Level 5	Monetise fully all the costs and benefits

Source: PwC based upon Impact assessment guidance.

Based on our discussions with the Department, we understood that our research was intended to enable the Department to produce an updated Impact Assessment which fully describes the expected costs and benefits and, if possible, quantifies them (i.e. moves the evidence base closer to Level 3 than the initial Impact Assessment) and to inform the Government's decision with respect to implementation of Article 5(3).

Defining the baseline

A key feature of an Impact Assessment is that it focuses on those costs and benefits that are additional to those that would have been incurred if no action were taken (i.e. the marginal costs and benefits of the proposed legislative changes). This means that they need to be defined against a baseline or counterfactual.

In the case of the transposition of EU legislation, such as the Directive, the baseline is a notional 'do nothing' scenario in which no additional regulatory action is taken, even though this is not a feasible option (legally). Thus, the marginal costs and benefits of the regulatory options are those over and above a notional baseline of no change to the existing UK law which transposes EU Directive 2002/58/EC. The complexity, however, arises because the baseline or counterfactual will not be static: this is especially relevant in the context of regulation affecting the way in which the internet can be used where the development of the technology is a key factor shaping the underlying market forces and, in turn, driving important changes in the nature and structure of a wide range of markets.

This point can be illustrated by reference to the evolution of internet browsers where new products are already being developed in response to consumers' preferences (as well as regulatory requirements) which offer users the opportunity to adjust their browser settings to determine which and/or how many internet cookies they receive and whether they would like notification of them before they are saved on their computer. Likewise, although information about internet cookies is potentially available to anyone who wishes to find out about them, internet users may not fully understand the benefits and risks of internet cookies with the result that they know little or nothing about how to control their use. As they become more aware and informed, it is quite possible that the way in which they manage internet cookies will also evolve. Both instances point to the need to consider the baseline carefully.

Understanding the relevant impacts

The analysis of the costs and benefits needs to consider how the regulatory options could potentially impact on different sectors and groups within the UK economy, recognising that some may experience beneficial impacts whilst others suffer negative impacts. We have focused on identifying where different regulatory options would impact on different groups and considering whether the options change the distribution within and between groups. In practice, we have considered:

- Which specific industries and firm types (e.g. businesses of different sizes) are likely to be affected by each of the options: this was decided initially by consulting with relevant trade associations such as the Internet Advertising Bureau (IAB) and the British Retail Consortium (BRC);

- Where impacts could be different for different parts of the industry (e.g. internet advertisers and advertisers which use other channels); and
- How markets might be affected by each of the regulatory options.

The relevant costs and benefits that have been covered by our research are those that arise directly from the regulation (i.e. first-round effects) and the indirect impacts (i.e. second-round effects), especially where the latter are significant. In practice, we have considered:

- How much additional cost vendors of internet browsers will incur and how far they will be able to pass the cost onto their customers;
- Costs to other businesses which specifically rely on the internet (for example, online publishers, online retailers and advertisers); and
- Whether certain regulatory options will lead to consumers switching transactions offline: in this case, it will be important to segment internet users based on their likely response to the different options.

We have distinguished two categories of costs and benefits: transition costs and benefits which are transient, or one-off, costs or benefits that normally relate to the implementation of the regulation, and recurring costs and benefits, that arise while the regulation remains in force (and may occur periodically, although the scale of the impact may change over time).

We have focused our analysis around the policy costs. These are the essential costs of meeting or complying with the policy objectives. We recognised, however, that the regulatory options might also give rise to (additional) administrative costs, although we did not anticipate that these would be significant.

Table 5 summarises our a priori assessment of the key potential costs and benefits of the different options. We have used research to understand the significance of the costs and benefits.

Table 5: Potential costs and benefits of regulatory options

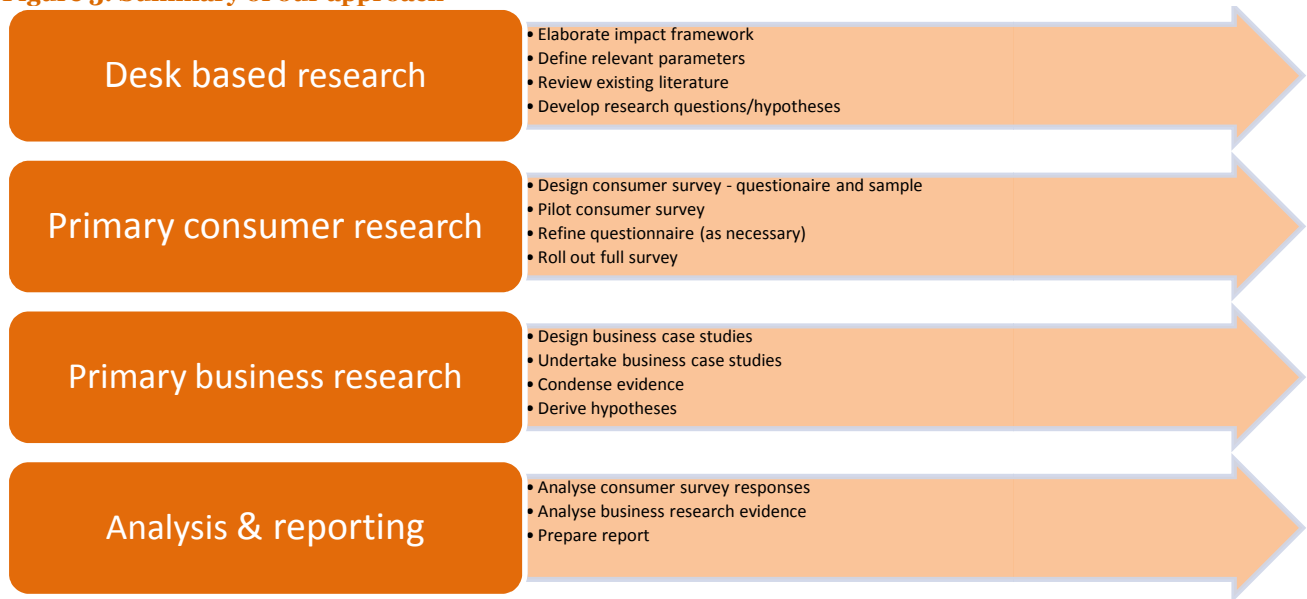
		'Opt-in' system for internet cookies		Consent to the use of internet cookies in browser settings		Industry self-regulation	
		Costs	Benefits	Costs	Benefits	Costs	Benefits
Users	Users of internet	✓	✓	✓	✓	✓	✓
	Non-users of internet		✓		✓		✓
Hardware suppliers		✓		✓		✓	
Browser owners		✓		✓			
Online publishers (including public sector)		✓		✓	✓		
Retailers	Online	✓		✓	✓		
	Offline		✓		✓		
Advertisers	Internet advertisers	✓		✓		✓	
	Other advertisers		✓		✓		✓
Web analytics/Research	Online research	✓		✓		✓	
	Other research		✓		✓		✓

Source: PwC analysis

Approach

Finally, Figure 3 briefly summarises our approach to the research which has involved four key stages. Although the stages are shown as sequential, in practice there have been some important feedbacks between the activities which mean that they have been undertaken in parallel to some extent. In the following two sections, we provide further details of our approach to the consumer and business research.

Figure 3: Summary of our approach



Source: PwC

Desk based research

In conducting our desk based research, we have briefly reviewed existing sources to understand what evidence of the relevant costs and benefits they might provide. Our review has considered:

- Evidence on internet users' understanding of the role of internet cookies and how they can manage them, including the recent US study on internet users' understanding of behavioural advertising¹⁵;
- The importance and value internet users attach to privacy and trust and how it affects their use of the internet and the benefits which use of the internet can bring, including a consumer survey by the Office of Fair Trading¹⁶ investigating consumers' knowledge, experience and views of online targeted advertising;
- ONS statistics on internet usage by households and business¹⁷; and
- Potential sources of evidence on the scale of the markets likely to be affected by the Directive (e.g. the internet advertising market and, to a lesser extent, online sales).

Our review has highlighted some sources which may be potentially useful. These include:

- The various surveys of the reasons why people do and do not use the internet for different purposes;
- Analyses of the benefits of internet access, for example our study for the Digital Champion on the benefits of digital inclusion¹⁸;
- More recent work (by PwC) for the Internet Advertising Bureau on the scale of internet advertising (compared to other media)¹⁹; and
- The publicly available consultation documents.

Overall, however, our review suggests that there are important information gaps which relate to internet users' likely response to the regulatory changes which would result from implementation of the Directive and the consequent impact on businesses.

¹⁵ McDonald, A and Cranor, L, 'Beliefs and Behaviours: Internet Users' Understanding of Behavioural Advertising' (August 2010)

¹⁶ Office of Fair Trading 'Online Targeting of Advertising and Prices – a Market Study (Annexe B – a Consumer survey)' (2010)

¹⁷ ONS, Statistical Bulletin, 'Internet Access 2010'; ONS, Statistical Bulletin, 'E-commerce and ICT activity 2009'.

¹⁸ Champion for Digital Inclusion, 'The Economic Case for Digital Inclusion', http://raceonline2012.org/sites/default/files/resources/pwc_report.pdf

¹⁹ http://www.iabuk.net/media/images/iabresearch_adspend_adspendfctshthh12010_7139.pdf

3 Consumer impacts

Introduction

In this Section, we summarise the results of the consumer survey we have undertaken. We begin by outlining the current pattern of internet use in the UK. We then present the findings from our survey on the use of the internet, attitudes to the internet, understanding of internet cookies, management of internet cookies, impact of the suggested regulatory approaches, awareness of policy changes, the information on cookies perceived as most relevant, decision-making on internet cookies, and potential responses to different policy options. We briefly summarise the main findings in the final part.

Background information

The existing pattern of internet use by adults in the UK is well evidenced. The ONS estimates that 60% of the UK adult population (30.1m people) use the internet every day or almost every day and 77% of the UK adult population (38.3m people) access the internet overall²⁰. Table 6 shows that adults use the internet most often to send and receive e-mail across all age groups (90%)²¹. The second most frequent purpose is finding information about goods and services (75%), followed by using travel and accommodation related services (63%). There are significant differences across age groups: for example, travel and accommodation services are most often used by respondents in the age bands between 45 and 54 and 55 to 64 years of age whereas those aged 16-24 are much more likely to post messages to chat sites, social networking sites and blogs.

Table 6: Internet activities by age group (% , 2010)²²

	16-24	25-44	45-54	55-64	65+	All
Sending/receiving e-mails	88	90	89	91	87	90
Finding information about goods and services	64	76	80	83	72	75
Using services related to travel and accommodation	50	64	70	72	62	63
Internet banking	45	63	54	53	34	54
Reading or downloading online news, newspapers or magazines	52	53	51	47	40	51
Listening to web radio or watching web television	59	47	45	34	24	45
Posting messages to chat sites, social networking sites, blogs	75	49	31	19	8	43
Playing or downloading games, images, films or music	61	43	32	24	17	40
Seeking health related information	27	42	39	44	36	39
Uploading self created content to any website to be shared	50	43	28	29	22	38
Consulting the Internet with the purpose of learning	47	34	34	30	27	35
Looking for information about education, training or courses	47	36	27	19	7	32
Downloading software (other than games software)	35	34	23	27	18	30
Looking for a job or sending a job application	38	32	23	11	1	26
Telephoning or making video calls (via webcam) over the Internet	30	25	22	17	15	23
Selling goods or services over the Internet	16	28	20	18	9	21
Donating to charities online	10	13	15	13	7	12
Doing an online course	11	8	7	5	3	8

Source: *Internet Access 2010, Statistical Bulletin, ONS (August 2010)*.

²⁰ Individuals using the internet in the three months prior to the survey.

²¹ See for example *Internet Access, 2010, Statistical Bulletin, ONS*

²² Base: UK adults who accessed the Internet in the last three months

As can be seen in Table 7, people most often purchase clothes and sports goods over the internet (52%), followed by films and music (47%), holiday accommodation (44%) and household goods (43%). Again, significant age differences are visible: for example, films and music are purchased by 50% of respondents below age 44 and only 25% of the 65 and over.

Table 7: Purchases over the internet by age group, (% , 2010)²³

	16-24	25-44	45-54	55-64	65+	All
Clothes, sports goods	58	45	46	43	38	52
Films, music	50	50	33	27	25	47
Holiday accommodation (e.g. hotels)	46	53	54	47	44	44
Household goods (e.g. furniture, toys)	52	41	46	39	37	43
Books, magazines, newspapers (including e-books)	40	43	39	41	40	39
Other travel arrangements (e.g. transport tickets, car hire)	36	42	48	35	32	36
Tickets for events	37	40	34	21	19	35
Electronic equipment (including cameras)	31	24	22	14	15	25
Food or groceries	32	25	16	17	17	24
Video games software and upgrades	30	20	9	8	8	23
Share purchases, insurance policies and other financial services	24	23	18	13	11	20
Other computer software and upgrades	18	17	23	22	20	18
Telecommunication services	17	14	16	13	13	15
Computer hardware	13	15	14	11	10	13
e-learning material	8	5	2	2	2	6
Medicine	6	6	9	12	10	6
Other	4	6	7	5	5	5

Source: *Internet Access 2010, Statistical Bulletin, ONS (August 2010)*.

Consumer survey

In this part of the Section we describe our approach to the online consumer survey we conducted and the key results.

Sample

In total 1,012 individuals participated in the online survey. The sample was drawn randomly from Research Now's online panel. All respondents are from the UK. Half (51%) of respondents are female and respondents are distributed across all age groups.²⁴ Respondents are from all regions within the UK with most being from London (13%), Scotland and South East (12% each) and North West (11%). Based on the occupation of the household head, 62% of respondents belong to socioeconomic groups ABC1 and 38% to socioeconomic groups C2DE. The survey was conducted in February 2011.

More intensive internet users are overrepresented in the sample compared to the general population given that survey sample was taken from an online panel. In other respects, the sample is broadly representative of the UK population of internet users. Moreover, as frequent internet users represent the majority of UK internet users and these users are likely to be most affected by further regulation of internet cookies, the survey design is consistent with the overall objective of the research. In interpreting the results of the survey, however, it is important to keep in mind that the sample is representative for the population of more frequent UK internet users and not the overall UK population.

²³ Base: UK adults who had bought or ordered online in the last twelve months

²⁴ 14% are between 16-24 years old, 17% between 25-34, 19% between 35-44, 16% between 45-54, 14% between 55-64 and 19% over 65.

Use of the internet

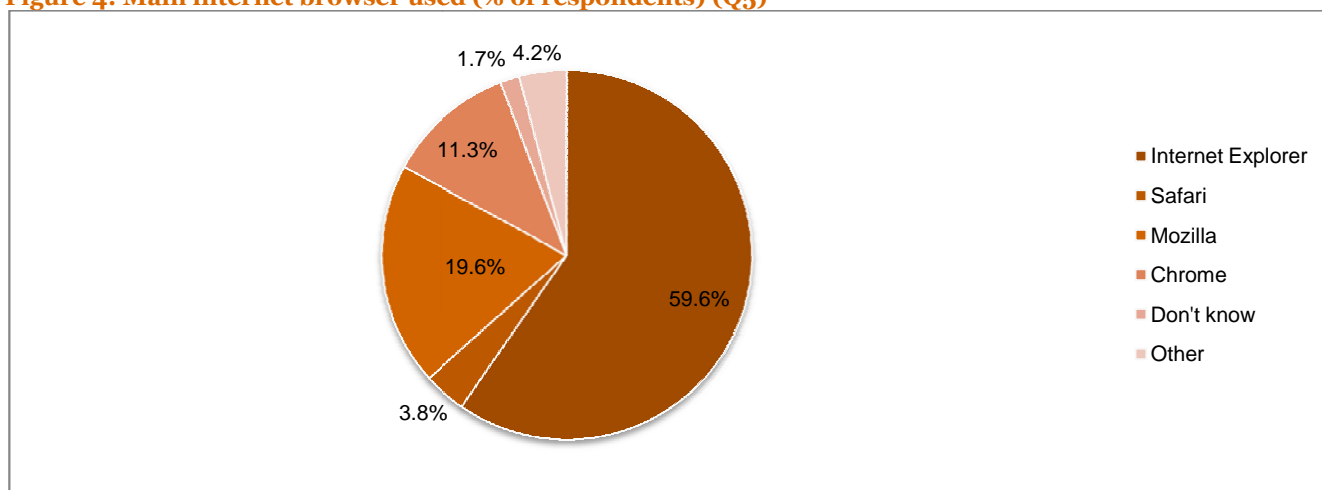
Overall, 95% of respondents in the consumer survey indicated that they use the internet every day or almost every day. This is above the average for UK internet usage and reflects the fact that the survey was conducted online based on an online panel.²⁵

The most popular activities of respondents in the internet are sending and receiving e-mails (93%), finding information on products/services (83%), buying products and services online (82%) and internet banking (74%). This is broadly in line with top activities identified by ONS (2010) and shown in Table 6 above.

The most popular products purchased a few times a month over the internet include food and groceries (20%) and films and music (16%). Respondents state that they buy holiday accommodation (66%) and other travel arrangements (67%) a few times a year.

Nearly all respondents (98%) access the internet using a personal computer whilst 28% indicated that they also use their mobile phone to access the internet. Finally, about 60% of respondents use Internet Explorer as their main browser (see Figure 4) and just under half (43%) use multiple browsers to access the internet.

Figure 4: Main internet browser used (% of respondents) (Q5)



Source: PwC analysis based upon survey results

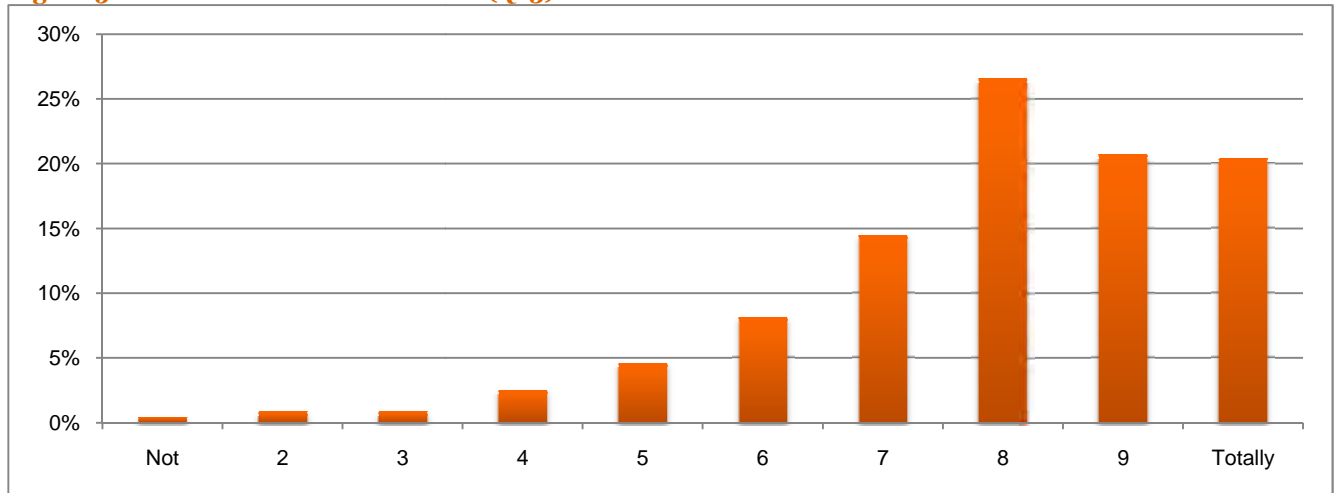
Survey respondents were asked how confident they are as internet users, and to rank their confidence on a scale from 1 (not at all confident) to 10 (totally confident). Most respondents are relatively confident when using the internet as can be seen in Figure 5: The most common response (the mode) was 8.²⁶ This is not altogether surprising given that respondents were frequent internet users. Nonetheless, it is important since the confidence of an internet user is likely to be higher if they perceive themselves as having a higher level of information and, therefore, able to give proper consent.²⁷

²⁵ ONS (2010) reports that 60% of adults aged 16 or over use the internet every day and a further 13% use the internet weekly.

²⁶ This high average confidence level is likely to be influenced by the survey being conducted online.

²⁷ Note also that it might be more difficult to inform individuals if they describe themselves as being confident.

Figure 5: Confidence in use of internet (Q13)

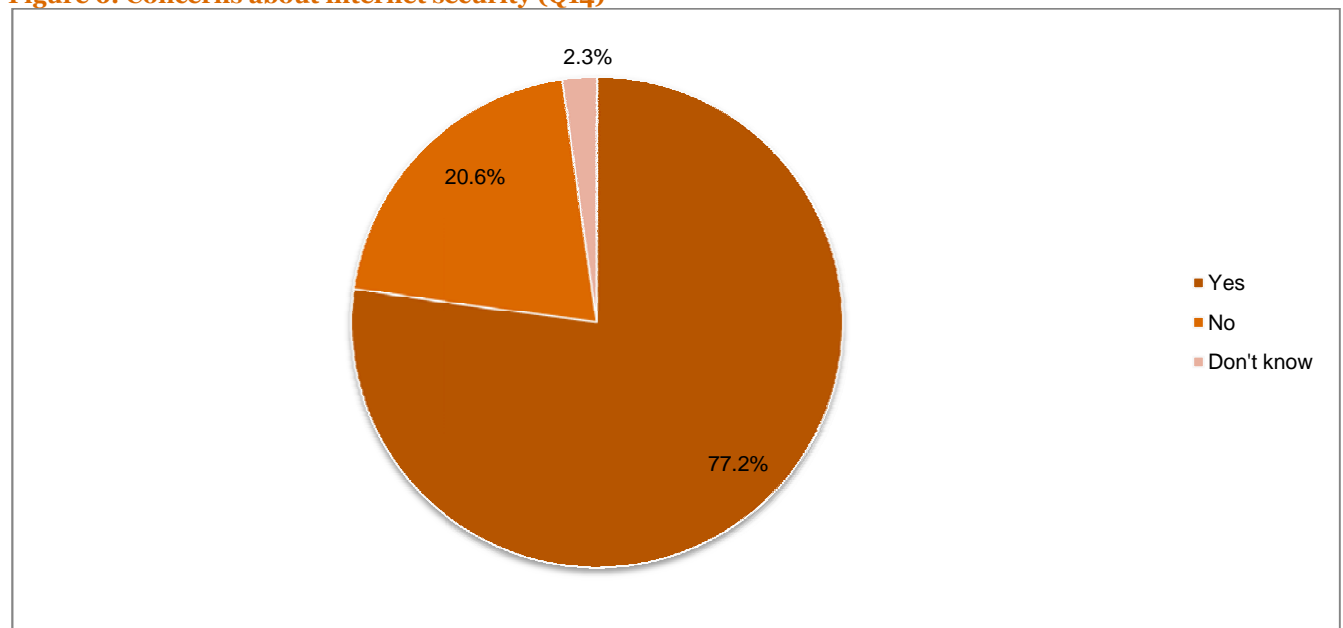


Source: PwC analysis based upon survey results

Attitudes to the internet

Respondents were asked a series of questions about their attitudes to the use of the internet. As can be seen in Figure 6, more than three quarters of the survey respondents (77%) are concerned about internet security. Generally, we would expect that less frequent users are likely to be more concerned about internet security which makes this estimation conservative (i.e. the percentage of people concerned in the UK population is likely to be higher).

Figure 6: Concerns about internet security (Q14)

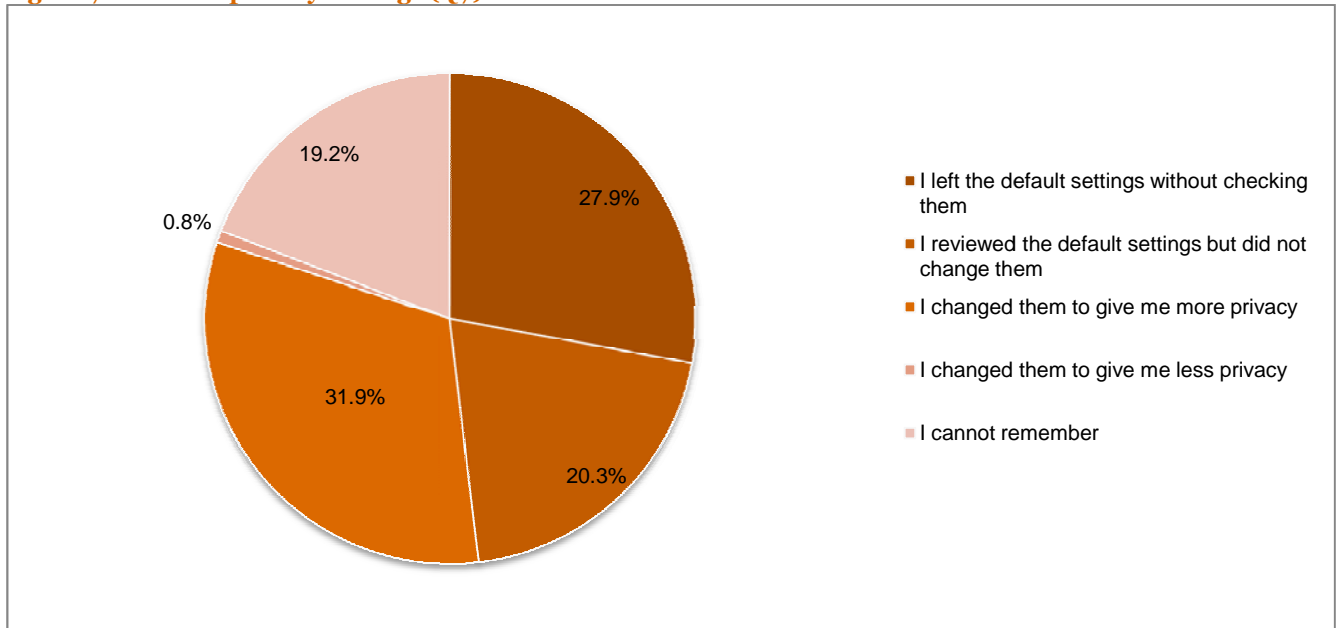


Source: PwC analysis based upon survey results

Only 32% of respondents actively changed privacy settings of their browser to give more privacy (see Figure 7). 28% did not check the privacy settings at all. Another 20% of respondents reported that they reviewed their browser settings but did not change them, 19% could not remember what they had done and only 1% reportedly

changed the default settings to give them less privacy.²⁸ These results suggest that internet security concerns are common although few users adjust default privacy settings actively.²⁹

Figure 7: Browser privacy settings (Q7)



Source: PwC analysis based upon survey results

Interestingly, when split according to main browser in use, nearly one third (32%) of respondents using Internet Explorer indicated that they did not check default settings whereas the respective percentages for users of other browsers were lower: 13% for Safari, 23% for (Mozilla) Firefox and 25% for Chrome (see Table 8)³⁰.

Table 8 : Whether changed privacy settings on internet browser by main browser used (Q7 by Q5)

Browser	Left default settings	Reviewed but did not change	Changed more privacy	Changed less privacy	Cannot remember
Internet Explorer	32.2%	19.7%	29.0%	0.7%	18.4%
Safari	13.2%	31.6%	42.1%	0.0%	13.2%
Firefox	23.2%	21.7%	37.9%	1.0%	16.2%
Chrome	25.4%	22.8%	36.0%	1.8%	14.0%

Source: PwC analysis based upon survey results

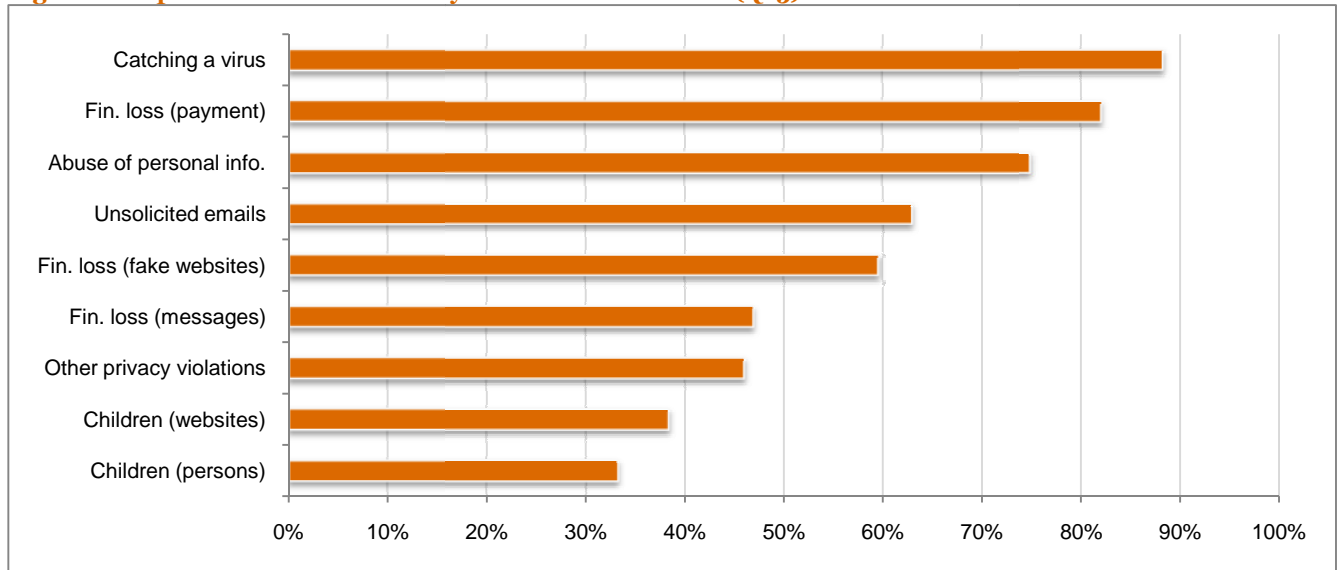
Respondents who expressed concerns regarding internet security were most often concerned about catching a virus or other computer infection (88%), incurring a financial loss due to fraudulent payment (82%) or the abuse of personal information sent over the internet (75%). The results are shown in Figure 8.

²⁸ It seems likely that respondents who 'cannot remember' did not change the settings.

²⁹ When related to internet security concerns we see that people having concerns more often changed settings to obtain more privacy (34% vs. 25% of people not concerned). However, in both groups 28% of people left the default settings without checking. Over one quarter of respondents (27%) who were not concerned reviewed the default settings without changing whereas only 18% of concerned people reviewed and did not change settings. This is consistent with people being more concerned changing settings more often if they decide to review them.

³⁰ This might be explained, for example, by the possibility that those respondents who use (not preinstalled) browsers that have to be downloaded are more likely to be proficient users and, therefore, more likely to check settings.

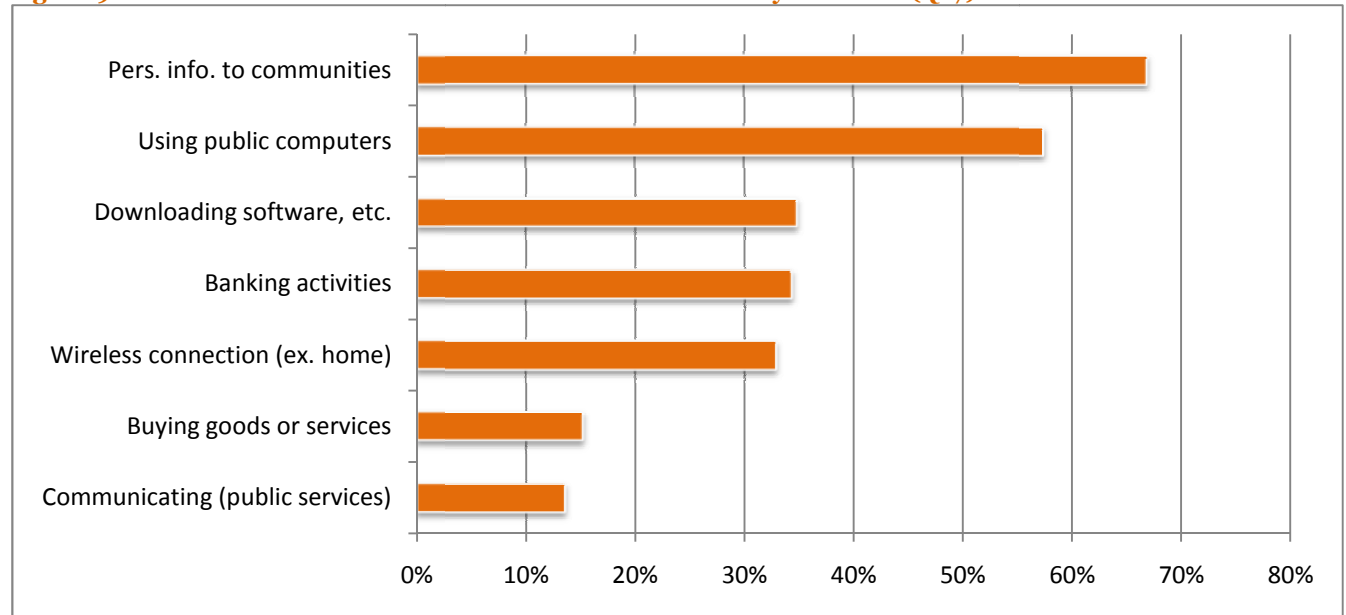
Figure 8: Aspects of internet security which are of concern (Q15)



Source: PwC analysis based upon survey results. Note: Based upon 781 respondents.

Finally, 42% of respondents indicated that they do not undertake certain activities because of internet security concerns. These respondents were asked regarding the respective activities and the results are shown in Figure 9. As can be seen, sharing personal information with communities (67%), the use of public computers and internet cafes for personal transactions (57%) belong to activities most often not undertaken.

Figure 9: Activities not undertaken because of internet security concerns (Q17)



Source: PwC analysis based upon survey results. Note: Based upon 429 respondents.

Survey respondents were presented with a number of statements about their (possible) attitude to data security. The statements are shown in Table 9 together with an indication of the degree to which they agreed with the statement. We have highlighted those statements for which there is a significant level of agreement or disagreement (i.e. where the two most common responses are 'agree somewhat' or 'totally agree' and vice versa).

Table 9: Attitudes towards data security (Q19)

Issue	Totally disagree	Disagree somewhat	Neutral	Agree somewhat	Totally agree
Concerned about companies collecting private data	1%	5%	17%	41%	33%
Happy giving personal information if it helps to increase choice	13%	27%	30%	24%	5%
Happy giving personal information if it helps to get discounts	10%	23%	30%	29%	6%
Happy giving out personal information if it saves time	17%	33%	27%	19%	3%
No clear view about the types of personal data companies are able to collect	3%	12%	24%	38%	19%
Only provide personal information to companies I trust	2%	3%	13%	42%	39%
Only happy for data to be used if it is anonymised	4%	9%	26%	37%	21%
Too much of personal information is stored on the internet	2%	7%	29%	38%	21%
No personal benefit to companies storing personal information	8%	20%	26%	23%	18%
Companies should be punished for breaking privacy laws	2%	1%	6%	16%	73%
Watch what I do online more carefully if companies collect data	2%	6%	24%	39%	28%

Source: PwC analysis based upon survey results. Note: 'Do not know' category is omitted

Two interesting observations can be made based on comparisons of respondents' reactions:

- The five statements for which we observe a high degree of agreement are all 'positive' statements with regard to the protection of privacy: individuals express that they are concerned about collection of private data, that they only provide information online to companies they trust, that companies breaking privacy laws should be punished and that they would watch more carefully what they do online if they knew that companies would collect data.
- Respondents seem generally more neutral or show some degree of disagreement when privacy is traded off against an increase in choice, discount or time savings.

Furthermore, with regard to privacy, 15% of respondents reported that they are very concerned with their online privacy when using the internet, 53% report they are fairly concerned and 28% report that they are not very concerned. Only 4% of respondents are not concerned at all (Q 20).

Question 21 of the survey explicitly asked respondents what they considered to be private data. Five options were considered: personal details, internet protocol (IP) address, the contents of e-mails, the websites that were visited (history) and what respondents did when visiting a website. The respective findings are shown in Table 10. Most respondents attached more importance to the contents of e-mails than to personal details like their name and address. Over 60% of respondents also considered the history and activities on a website as being private. Finally, 54% considered even the IP address as being private³¹.

Table 10: Elements of data considered to be private data (Q21) and importance attributed to each element (Q22)

	Whether or not private (Q21)				Importance attached to privacy (Q22)		
	Yes	No	Don't know	Not at all important			Very important
Personal details (name, address)	70%	24%	6%	1%	7%	25%	66%
Internet protocol (IP) address	54%	31%	15%	3%	15%	35%	40%
The contents of e-mails	88%	8%	4%	1%	4%	22%	73%
The websites I have visited (history)	61%	30%	8%	3%	23%	42%	30%
What I did when visiting a website	68%	24%	8%	3%	18%	42%	36%

Source: PwC analysis based upon survey results. Note: 'Don't know' category is not shown for importance scale.

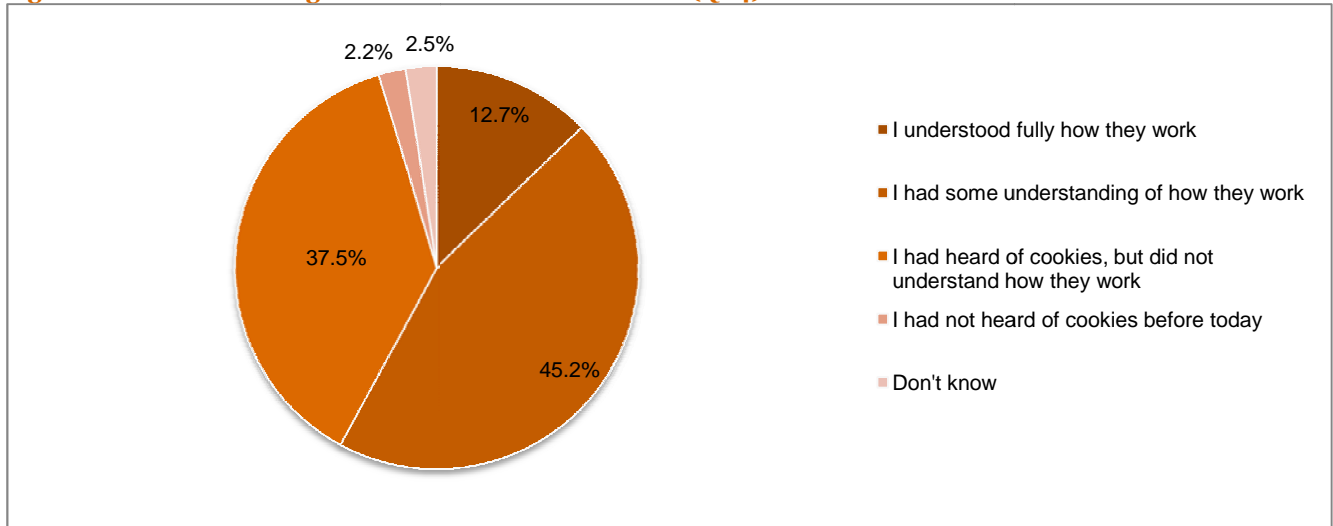
Understanding of internet cookies

Respondents were asked about their understanding of internet cookies. Our expectation was that the better was users' existing knowledge of internet cookies, the more precisely they would be able to evaluate the different regulatory options. On the other hand, if the results indicated that users' understanding of internet cookies was poor, then this would suggest that the challenges and, hence, the costs of informing users such that they are able to properly consent as required by the Directive would be larger.

³¹ This is interesting as the IP address itself does not contain any personal information.

As can be seen in Figure 10, 13% of respondents indicated that they fully understand how internet cookies work, 45% indicated some understanding of internet cookies, 37% had heard of internet cookies but did not understand how they work and 2% of people had not heard of internet cookies before the participating in the survey. These results indicate that – on their own admission - a significant proportion of respondents have only a limited understanding of internet cookies. As our sample consists mainly of frequent internet users, it is likely that understanding of internet cookies is lower across the whole of the UK population.

Figure 10: Understanding of how internet cookies work (Q24)



Source: PwC analysis based upon survey results

To test for internet cookie related knowledge more objectively, respondents were also presented with a number of statements regarding the function and purpose of internet cookies and asked whether they thought that each of the statements was true or false.³² The responses are summarised in Table 11 with the correct answers being shown in bold.

As can be seen, only for one out of the sixteen statements a majority of respondents knew the correct answer. For all but the first statement, only a minority of respondents selected the correct response ('Internet cookies are small bits of data stored on my computer')³³ with other respondents either selecting the incorrect answer or indicating that they did not know the answer.

We conclude from these observations that the majority of respondents have only a (very) limited a priori knowledge and understanding of the function and purpose of internet cookies.

Table 11: Understanding of internet cookies (Q25)

	Yes	No	Unsure
Cookies are small bits of data stored on my computer	63%	6%	31%
Cookies let websites display more quickly	39%	20%	41%
Cookies let me stay logged in over time	41%	16%	43%
Cookies enable personalised advertising...	47%	8%	45%
Cookies are no different to my internet browser history	14%	42%	43%
Advertisers can use cookies on multiple websites to learn which websites I visit	47%	7%	46%
Cookies may be combined with other data that identifies me by name	40%	9%	51%
If I do not accept cookies, websites cannot tell where I am physically located	18%	31%	51%
Cookies enable personalised content...	31%	16%	53%
Cookies contain information from when I first purchased my computer (incl...)	13%	33%	53%
Cookies let browsers forward and backward arrows work correctly	21%	31%	48%

³² The respective statements were extracted from McDonald A. M. And L.F. Cranor (2010), Beliefs and Behaviors: Internet Users' Understanding of Behavioral Advertising.

³³ Interestingly, when compared to the research conducted by McDonald and Cranor, respondents in our survey seem to exhibit a lower knowledge of cookies. In McDonald and Cranor 7 out 16 questions were answered correctly.

	Yes	No	Unsure
Cookies are a type of spyware	37%	26%	38%
A website I visit can read every cookie I have ...	17%	24%	59%
Cookies let people send me spam	32%	24%	44%
Cookies change the colour of hyperlinks to websites I have already visited	21%	21%	58%
By law, cookies may not contain credit or debit card information	34%	9%	57%

Source: PwC analysis based upon survey results, statements based upon McDonald and Cranor (2010). Note: Answers printed in bold are correct.

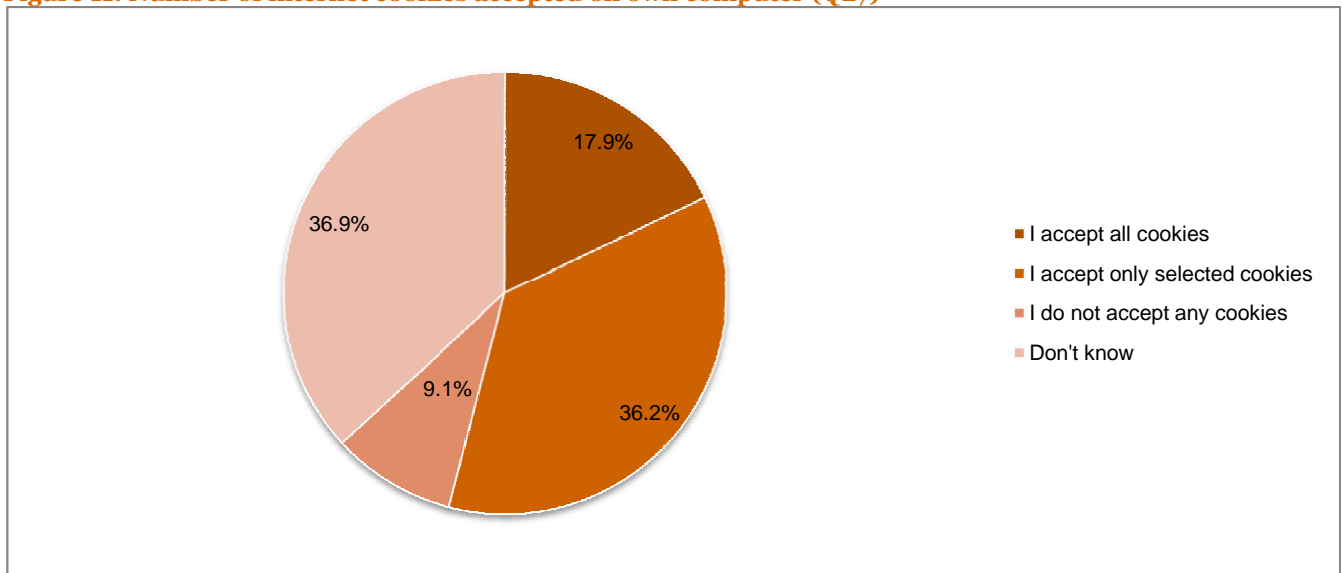
Further analysis of the responses shows that the majority of respondents who indicated that they fully understand the functionality of cookies (N=129) correctly identified whether 11 out of 16 statements were true or false. These respondents, therefore, appear to have a better knowledge of internet cookies.

At this point in the survey, all respondents were provided with some basic information on the functionality of internet cookies. Nevertheless, we believe that some caution is needed when interpreting the responses to the subsequent questions because of respondents' limited a priori knowledge of the topic.

Management of internet cookies

As can be seen from Figure 11, 18% of respondents stated that they accept all internet cookies, 36% accept only selected internet cookies, 9% do not accept any internet cookies and 37% of respondents do not know how internet cookies on their computer are managed. This is consistent with the large proportion of people indicated that they have only a limited or no knowledge of internet cookies. It should be noted, however, that the number of people only accepting selective internet cookies (36%) seems relatively high and could not be confirmed during business case studies where the number was generally estimated to be much lower. The results should, therefore, be interpreted with some caution.³⁴ We note, however, that there is some consistency in the pattern of answers: 55% of people who indicated that they fully understand how cookies work and 45% of people who indicated that they have some understanding of cookies stated that they only accept selected cookies. A much smaller proportion of people who had heard of cookies or never heard of them indicated selective acceptance (21% and 18%, respectively).

Figure 11: Number of internet cookies accepted on own computer (Q27)



Source: PwC analysis based upon survey results

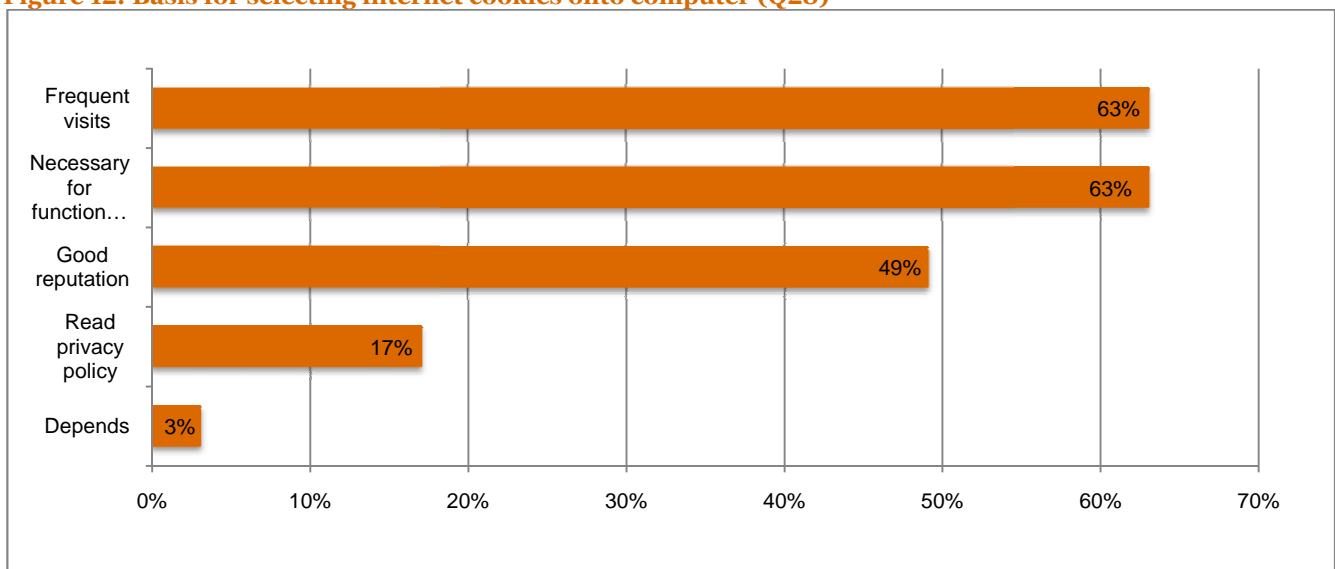
³⁴ The relatively high percentage of people indicating selective acceptance of cookies might, for example, be due to some people not distinguishing between cookie related browser message and other security related pop-ups.

Survey respondents who indicated that they only accept selective internet cookies (N=366) were asked a follow-up question what types of internet cookies they currently accept. The results are depicted in Figure 12 (multiple answers possible):

- 63 % of respondents accept internet cookies from sites they frequently visit;
- 63 % of respondents accept internet cookies necessary for functionality;
- 49% indicated a good reputation of the company is a reason; and
- 17% of the respondents read the privacy policy.

The results indicate that respondents are more likely to accept an individual internet cookie when the site is frequently visited, the company has a good reputation or rejection of the cookie will incur a loss of functionality. This suggests that it might be easier for large and established websites with a high number of visitors to get internet cookies accepted. As only 17% of respondents indicated that they read the privacy statement of a website, internet cookie consent might be more difficult to gain for ‘smaller’ websites where people potentially show a lower initial level of trust.

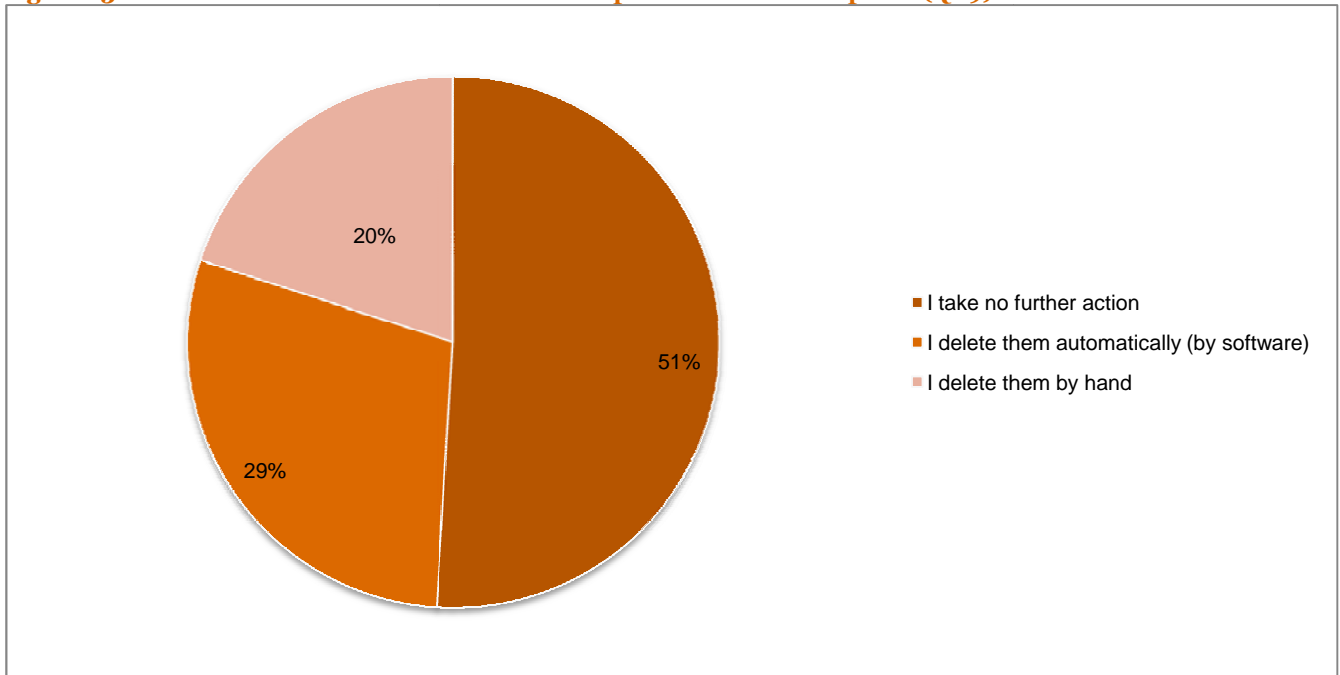
Figure 12: Basis for selecting internet cookies onto computer (Q28)



Source: PwC analysis based upon survey results. Note: Only a subsample of 366 respondents included

Respondents indicating that they accept all internet cookies were asked whether they take any further action regarding the internet cookies they accept on their computer. As can be seen in Figure 13, half of the respondents (51%) take no further action, about 30% stated that they delete them automatically and 20% delete the internet cookies by hand.

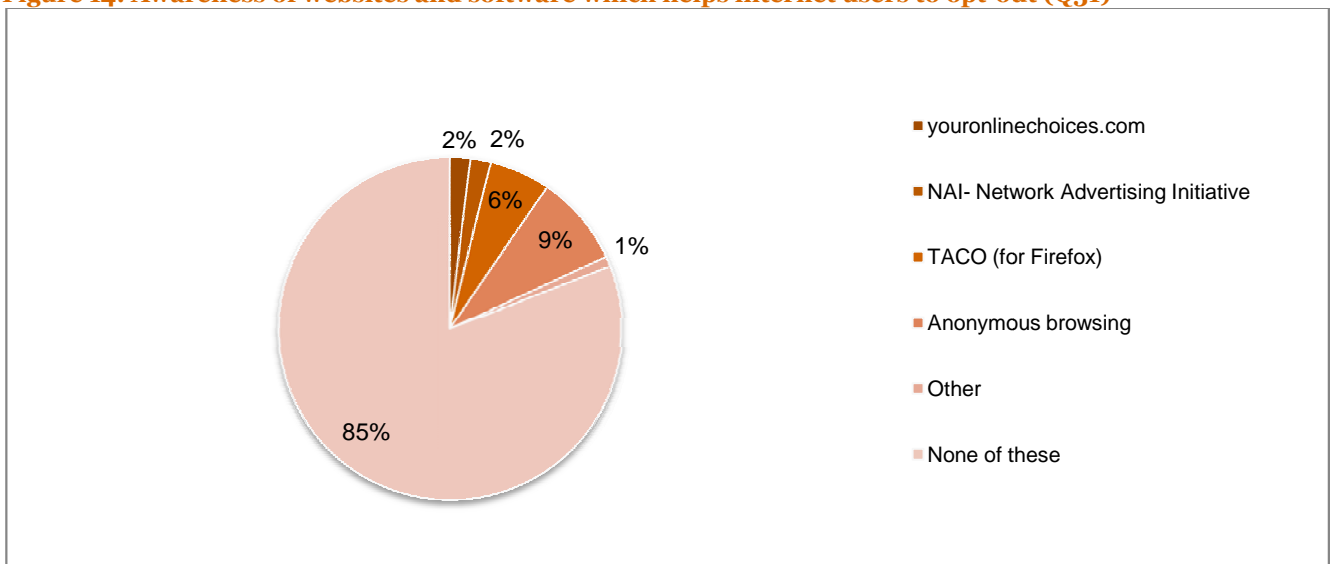
Figure 13: Action taken with internet cookies accepted onto own computer (Q29)



Source: PwC analysis based upon survey results. Note: Only a subsample of 181 respondents included

Finally, there are already 'opt-out' solutions for internet cookies available. Survey respondents were asked whether they are aware of any of these 'opt-out' solutions. As can be seen from Figure 14, 85% of respondents are not aware of any 'opt-out' possibilities. Only 6% of respondents indicated that they know TACO for Firefox and 9% that they are aware of anonymous browsing.³⁵ All other options are only known by 1-2% of respondents. The respondents who are aware of any options most often use anonymous browsing or the TACO add-on for Firefox (see Figure 15) which is in line with the answers to the previous question. Interestingly, 29% of respondents say that they have not used the 'opt-out' possibilities although they are aware of at least one of them.

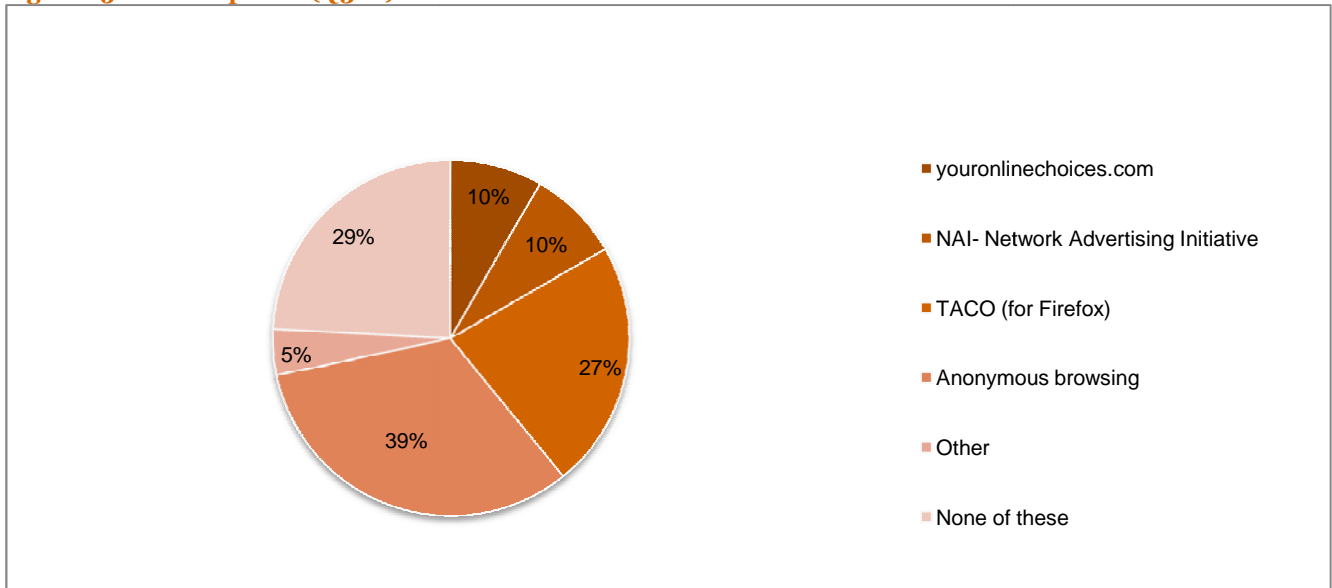
Figure 14: Awareness of websites and software which helps internet users to opt-out (Q31)



Source: PwC analysis based upon survey result.

³⁵ Knowledge of these options is likely to be lower in the overall UK internet population as respondents are mostly frequent internet users.

Figure 15: Use of opt-out (Q31A)



Source: PwC analysis based upon survey result based on 147 respondents

Impact of suggested approaches to regulation

As we discussed in the previous Section, the Government is currently considering changes to the way in which the use of internet cookies is regulated. It has identified three possible elements of its approach:

- **Approach 1 - “Opt-in’ for Individual Internet Cookies’:** this would require internet users to confirm that they wish to accept an internet cookie placed on their computer before the internet cookie is placed there. Under this option, users might see a pop-up window appear on every web page they visit where an internet cookie is about to be used. This pop-up would explain the purpose of the internet cookie, the information it would hold and how this information would be used. It would then give the user the option to accept or reject the internet cookie before it is used.
- **Approach 2 – ‘Enhanced Information about Individual Internet Cookies’:** this would highlight to internet users where internet cookies are being used and enable them to find out more about them. Under this option, users would see an icon appear on every web page they visit where an internet cookie is being used. By clicking on this icon, users would be able find out more about the purpose of the internet cookie, the information it would hold and how this information would be used. It would also explain how the user can accept or reject the internet cookie.
- **Approach 3 - ‘Enhanced Internet Brower Settings’:** this would allow users to consent to the use of internet cookies via their internet browser settings. It would mean that browser settings would need to be made more visible to internet users and they would need to be provided with clear and comprehensive information about internet cookies and how they can use their browser settings to opt-out of them if they wish either on a case by case basis or collectively.

Our survey asked a series of questions to understand respondents’ awareness of potential changes in policy towards internet cookies and the potential impact of the different policy options.

Awareness of policy changes

Survey respondents were first asked whether they are aware of any policy changes with regard to internet cookies: most respondents (83%) indicated that they are not aware of changes to the way in which the use of internet cookies will be regulated and only 9% stated that they are aware of changes.

Relevant information regarding internet cookies

Regarding internet cookie related information, 62% of respondents think that it is very important to know the purpose of an internet cookie, 56% find information on how to delete cookies as very important. Roughly 40% indicate that the contents, issuer and impact on functionality are very important pieces of information.

Table 12: Level of importance attached to different types of information within internet cookies (Q35)

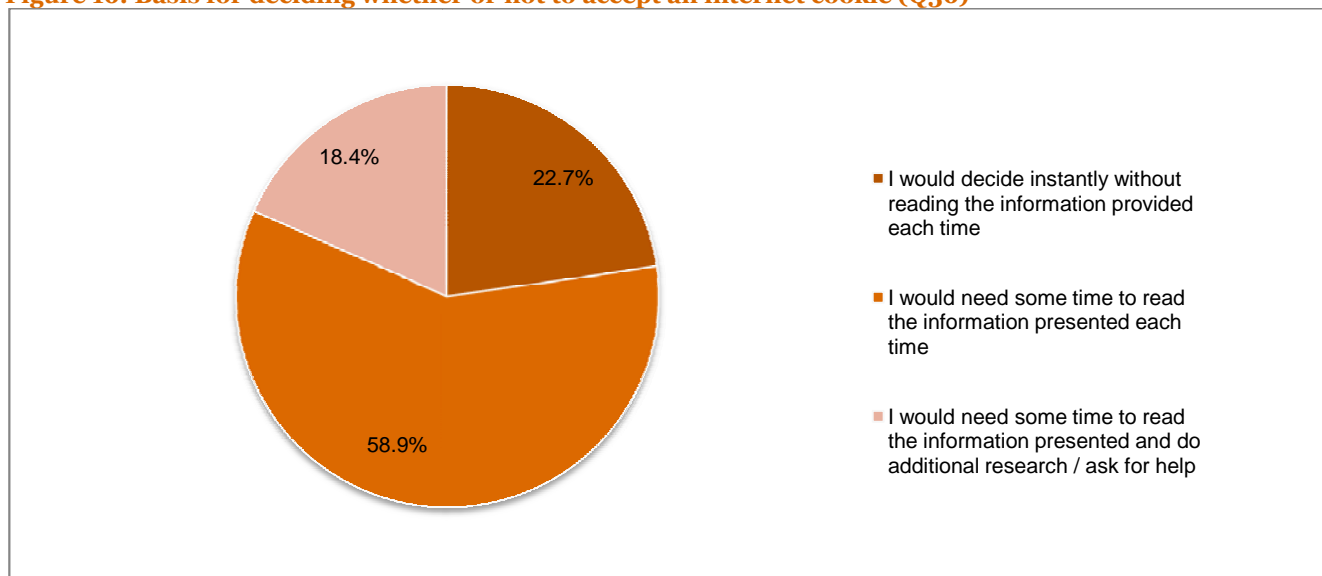
	Not at all important	Not very important	Quite important	Very important
The information contained in the cookie (contents)	2%	4%	40%	43%
The organisation responsible for the cookie (Issuer)	1%	7%	36%	45%
How the information will be used (Purpose)	1%	2%	25%	62%
Impact on functionality	1%	4%	41%	42%
How to delete cookie	1%	4%	28%	56%

Source: PwC analysis based upon survey results. Note: 'Don't know' category not shown

Decision on internet cookies

When asked whether they need time to decide whether or not to accept an internet cookie, the majority of respondents (59%, see Figure 16) say that they would need some time to read the information presented and would then decide whether to accept an internet cookie. Almost a quarter of respondents (23%) indicated that they would decide on internet cookies instantly whereas 18% would need some time to read the provided information and do additional research and/or ask for help.

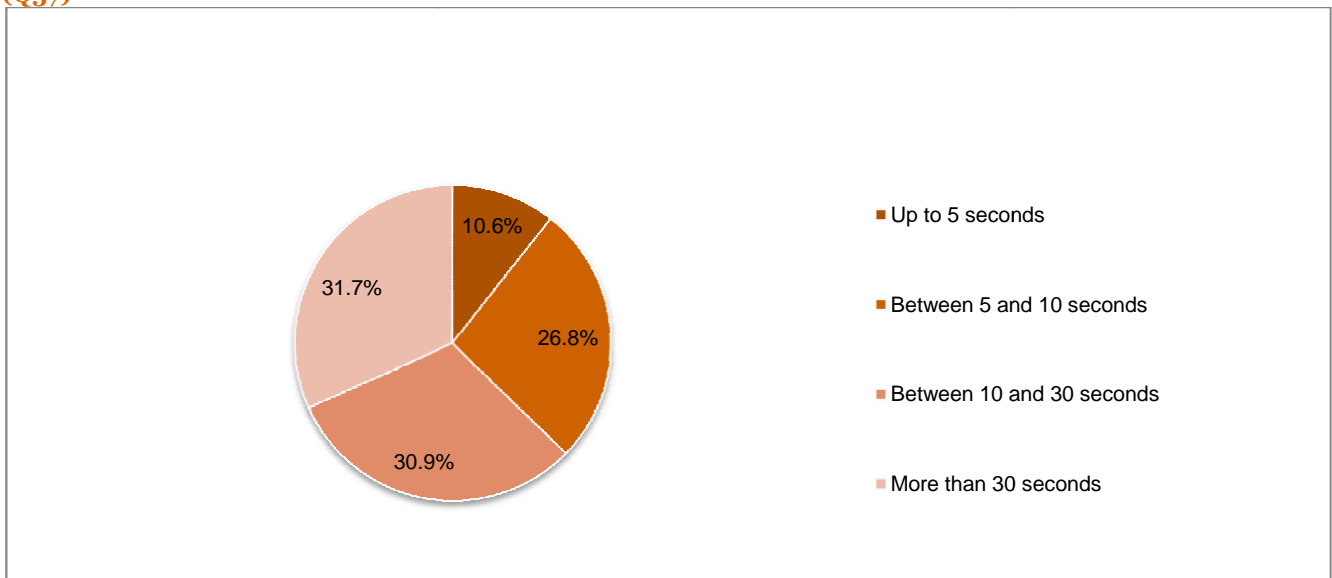
Figure 16: Basis for deciding whether or not to accept an internet cookie (Q36)



Source: PwC analysis based upon survey results

The time respondents would be willing to spend on a decision is roughly uniformly distributed between 5 seconds and more than 30 seconds (Figure 17). Furthermore, if respondents receive internet cookies from the same website they would need less time for subsequent decision (47%) or indicate this would depend on the type of internet cookie (31%, Q 38).

Figure 17: Time internet users prepared to spend deciding whether or not to accept an internet cookie (Q37)



Source: PwC analysis based upon survey results

Based on the survey results, internet users will potentially incur large time costs managing their use of internet cookies. If each user had to manage (only) 200 internet cookies per annum, then, based on the results of the consumer survey, we estimate that the total cost would be around £190- £235 million per annum.³⁶ Note that this estimate is indicative as it is based upon stated (through a survey) as opposed to revealed (through observed data) time requirements and the survey sample consists of frequent internet users.

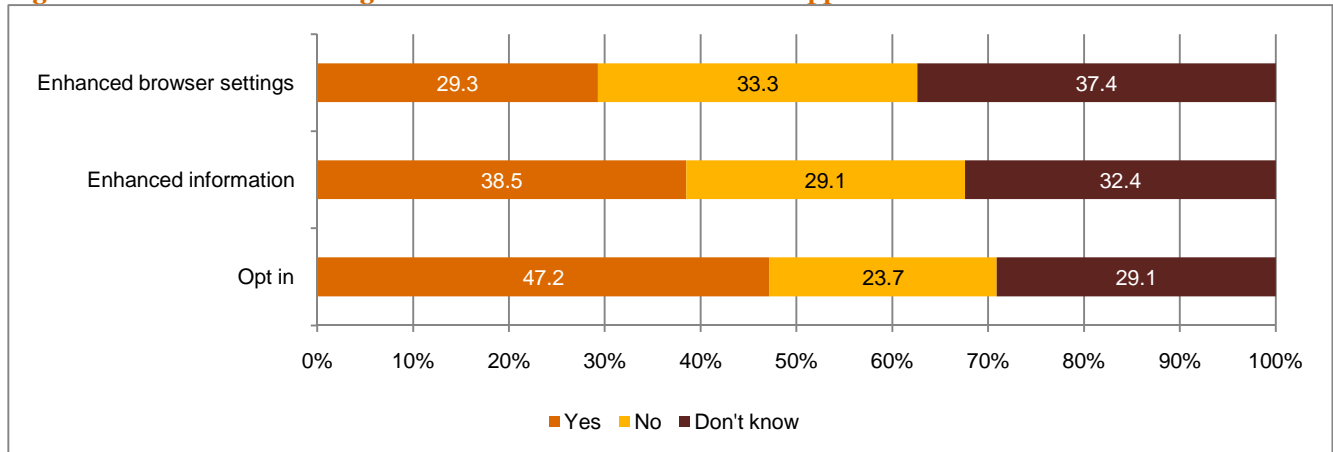
Furthermore, online experience could also be negatively impacted. However, the results of the online survey in which the 'Opt-in' option was ranked first by most consumers contrast these calculations and seems to document a wish for more control with regard to internet cookies. It is, however, unclear whether the above time costs have been fully considered by survey participants.

Potential responses to different policy options

Survey respondents were asked about the impact of the three policy options on their decision whether or not to accept internet cookies. Respondents generally indicated that the 'Opt-in' option would lead to the largest change in online behaviour (see Figure 18). This is followed by the 'Enhanced information' option and the 'Enhanced browser settings' option. However, roughly one third of all respondents indicated that they are unsure how their behaviour with regard to internet cookies would change. Given that many respondents appear to be poorly informed about internet cookies (which is reflected in the large proportion of 'unsure' responses), the different impacts on behaviour of the three options are not pronounced.

³⁶ For the calculations of time requirements we assumed time requirements as bandwidth midpoints (for example for up to 5 seconds we assumed on average 2.5 seconds). The average time requirement in the sample for each internet cookie is therefore 0.0063 hours. We assume 200 internet cookies per year and a value of non-working time of £3.68 per hour at 2002 prices based on Department for Transport Guidance (Source: <http://www.dft.gov.uk/webtag/documents/expert/pdf/unit3.5.6.pdf>). We then multiply by 36.6 million weekly or daily internet users (or 40.1 million if we include all internet users) to generate a value of £170 million (£189 million). Finally, we multiply by 1.23 to adjust the value of time to 2010 prices using the GDP deflator.

Figure 18: Would users change their behaviour with each of the approaches



Source: PwC analysis based upon survey results

When asked whether they would be likely to increase or reduce the number of internet cookies they accepted, respondents did not expect that their behaviours would differ significantly according to the approach to regulation. Table 13 shows the percentage of people agreeing (somewhat or totally) with the statements presented. We observe that for some statements like 'I would feel more secure' differences are larger (67% for agreement for the 'Opt-in' option versus 46% of agreement for 'Enhanced browser settings').

Table 13: Impact of regulatory options (% of respondents agreeing somewhat or totally)

Please indicate how far you agree with the following statement.	Opt in	Enhanced information	Enhanced browser settings
I would feel more secure	67%	57%	46%
I would find it difficult to know how to set my browser without knowing how each internet cookies will be used	-	-	45%
I would think more about privacy issues	68%	60%	50%
My online experiences would be hindered	30%	23%	22%
I would be more willing to perform personal transactions on the web	40%	34%	30%
I would find this approach too time consuming	33%	28%	27%
I would find it more difficult to navigate on websites	27%	19%	19%
I would spend less time on the internet	14%	12%	11%
I would spend more time on the internet	17%	16%	15%
I would find it more difficult to find products I like	15%	14%	16%

Source: PwC analysis based upon survey results

Respondents' overall assessment of the three options is shown in Table 14.³⁷ Most respondents ranked the 'Opt-in' option as preferable to the other two options, followed by the 'Enhanced information' approach and, finally, the 'Enhanced browser settings'.³⁸ Again, it is important to see these results in the context of a large number of respondents indicating that they have only limited a priori knowledge of internet cookies. Taking this into consideration, the differences are not overly pronounced in favour of one of the approaches. We note however, that some of the differences are statistically significant.³⁹

³⁷ Note that respondents were required to answer this question as no do not know category was shown.

³⁸ User confidence does not seem to affect option preference significantly. Furthermore, an analysis of preferences towards options according to the stated understanding of cookies does not reveal significant differences across (most) groups.

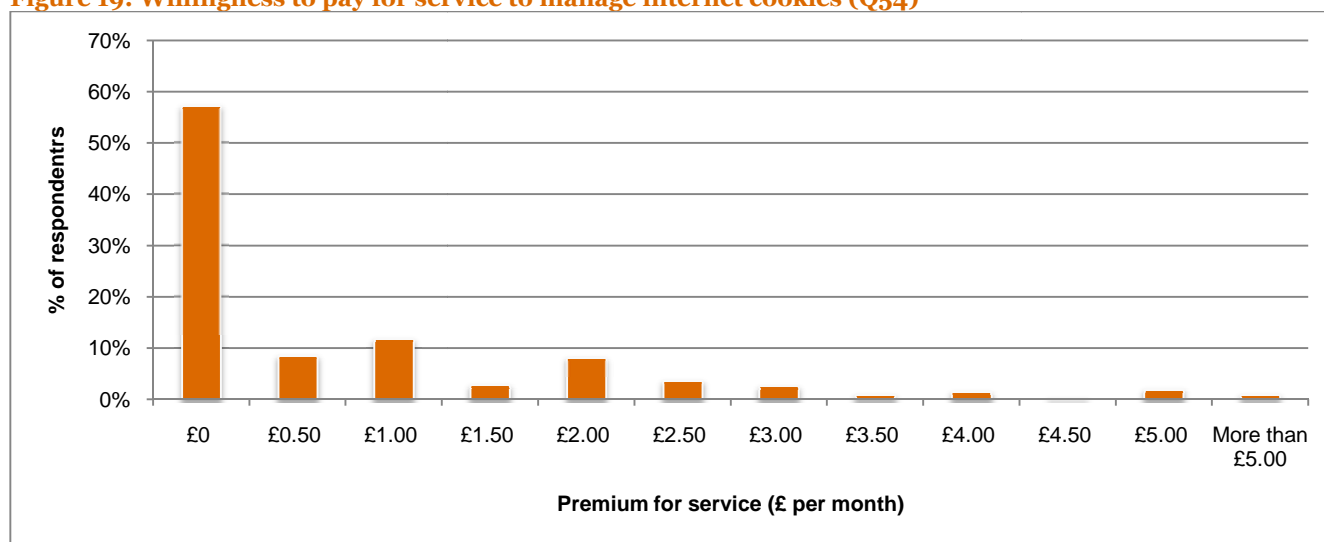
³⁹ For simplicity we calculated a mean rank for each option (1.82 for 'Opt-in', 1.88 for 'Enhanced Information' and 2.3 for 'Enhanced Browser settings') and used a standard t-test to test for mean equality. Mean response for 'Enhanced Browser settings' is significantly different from the other two options (p value below 1%). For 'Opt-in' and 'Enhanced information' options p-value is slightly above 0.1.

Table 14: Overall ranking of policy options (Q53)

	Rank 1	Rank 2	Rank 3
Approach 1 - Opt In for individual internet cookies approach	44%	30%	25%
Approach 2 - Enhanced information about internet cookies approach	34%	43%	22%
Approach 3 - Enhanced browser settings approach	21%	26%	52%

Source: PwC analysis based upon survey results

Finally, survey respondents were asked about their willingness to pay for their Internet Service Provider to manage the internet cookies delivered to their computer precisely according to their preferences (see Figure 19). Interestingly, 57% of respondents indicate that they would not be willing to pay for this service. This tends to indicate that people in general do not attribute much importance to internet cookies. On the other hand, we note that the mean willingness to pay per month is between £0.67 and £0.78⁴⁰ (compared with the mean monthly payment to the Internet Service Provider of £13.01 for the provision of internet access). The willingness to pay for the service is, therefore, on average about 5-6% of total payments.⁴¹ On this basis, the overall willingness to pay for the UK adult online population is estimated to be between £300 million and £380 million per annum.⁴² This estimate, however, should be considered as indicative as survey participants were relatively heavy internet users and the figure is based upon stated (through a survey) as opposed to revealed (through observed data) willingness to pay. Also, our sample consists largely of frequent internet users and willingness to pay for other groups seems ambiguous: Because of less frequent use, average willingness to pay could be lower however, internet security concerns might be more pronounced in this group which tends to increase willingness to pay.

Figure 19: Willingness to pay for service to manage internet cookies (Q54)

Source: PwC analysis based upon survey results

Summary

The main conclusion from the consumer survey are as follows:

- Respondents generally have privacy related concerns.
- Most respondents have no knowledge of changes in UK law.
- Respondents show a low degree of awareness of internet cookies and internet cookie related knowledge.

⁴⁰ If (conservative) bandwidth means (for example £0.25 for the £0 - £0.5 band) are used average monthly willingness to pay is £0.67 whereas if point estimates are used the resulting value is £0.78.

⁴¹ User confidence does not seem to affect willingness to pay for a cookie management service as the percentage of people having a positive willingness to pay does not vary largely by level of confidence.

⁴² The lower band is derived by multiplying annual willingness to pay (£ 0.67 x 12) by 36.6 million weekly or daily internet users. The upper bound is derived by using point estimates and the total number of internet users (including monthly or less use): (£0.78 x 12) x 40.1 million users.

- This low awareness documents the importance of additional information and potentially education campaigns.
- Privacy concerns seem to lead respondents to wishing more control regarding internet cookies ('Opt in') however, results between the three approaches are not clear-cut and difficult to read given respondents background knowledge.
- Willingness to pay for management of internet cookies is about 5-6% of total payments for internet services with 57% of respondents stating that they would be unwilling to pay for this service.
- Consumers potentially underestimate the total time requirements the 'Opt-in' option might lead to which might be due to an underestimation of the number of internet cookies in operation.

4 Business case studies

Introduction

This Section summarises our assessment of the potential business impacts of further regulation of internet cookies based on a series of 20 case studies with business stakeholders. We begin by providing a brief overview of the context for use of the internet, especially as a sales channel, by UK businesses. We then explain our approach to the case studies including the sampling framework we used to target the case studies. The main part of the Section presents our findings from the case studies. The results have been aggregated and anonymised to protect confidentiality.

Context

Overall, in 2009, 76% of UK businesses with 10 or more employees had their own website. There are, however, significant differences according to company size; whereas 99% of all businesses with 100 or more employees had a website, only 72% of businesses with between 10 and 49 employees had a website. The internet presence of companies according to size is summarised in Table 15.

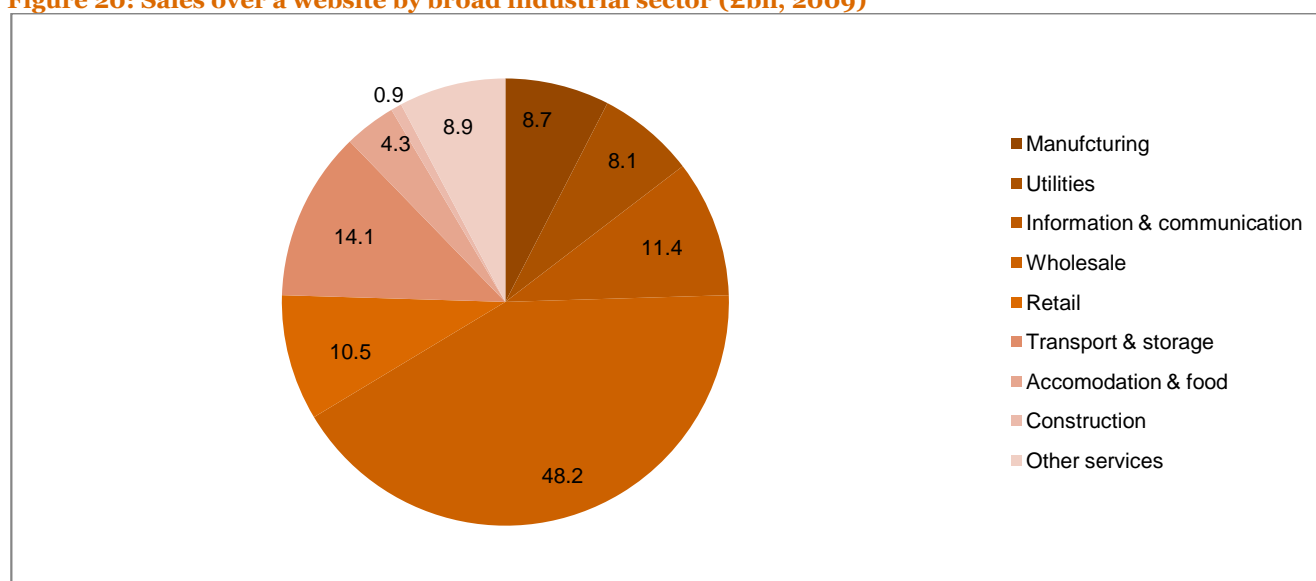
Table 15: % of businesses with a website (2009)⁴³

Employment size	10-49	50-249	250-999	1,000+	All
2005	65	87	95	98	69
2006	66	89	96	98	70
2007 ⁴⁴	66	89	96	98	70
2008	71	91	94	98	75
2009	72	92	97	99	76

Source: *E-commerce and ICT activity 2009, Statistical Bulletin, ONS (November 2010)*.

The proportion of businesses selling products and services using a website reached 14.9 per cent in 2009⁴⁵. Sales between industries vary significantly as can be seen in Figure 20 with most website sales being attributable to the wholesale, transport and storage, information and communication and retail sectors.

Figure 20: Sales over a website by broad industrial sector (£bn, 2009)



⁴³ Coverage: UK businesses with 10 or more employment.

⁴⁴ Estimates since 2007 have been revised.

⁴⁵ E-commerce and ICT activity, 2009, Statistical Bulletin, ONS (November 2010).

Approach to case studies

Our choice of case studies was developed in conjunction with DCMS having a priori identified those sectors that are likely to be most impacted by implementation of the Directive. We used available data on the pattern of internet use by business to inform our choice of sectors. We identified five categories of business:

- hardware suppliers;
- browser vendors and other software vendors;
- the broad set of businesses involved in the advertising industry (including various kinds of intermediaries between advertisers and online publishers);
- online retailers; and
- online publishers (including B2B and B2C, private sector and public sector).

In addition, we aimed to achieve an appropriate spread across smaller and larger organisations. An overview of the respective sample framework can be found in Table 16⁴⁶. Given the number of case studies, the sample is not representative of the UK business population nor is it intended to be.

Table 16: Business case study sampling framework

Category	Targeted	Completed
<i>Hardware/software providers</i>		
Hardware manufacturers	1	2
Browser & related software vendors	2	3
<i>Intermediaries</i>		
Web analytics	1	2
Ad networks	2	2
Other internet services (including web design)	2	1
<i>Cookie users</i>		
Advertising agencies	3	2
B2C e-commerce: Retail, Travel, Banking, etc	4	4
B2B e-commerce	2	1
Online publishers	1	1
Public sector	2	2
Total	20	20

Source: PwC

Our case studies involved interviewing one or more representatives from the relevant organisations in a position to understand both the technical and business implications of regulation of internet cookie use. The framework we used in the discussions is shown in Appendix B. In summary, we sought to understand:

- The scale of the overall business and importance of UK business to the firm.
- The products and services offered which rely on the use of internet cookies and the importance of these to the overall business.
- How internet cookies are used to provide these products and services; the types of internet cookies; the volume of internet cookies; the types of information sought.
- Awareness of the Directive and preparedness for its implementation.
- The general impacts and risks of internet cookie regulation.
- The specific impacts and risks associated with the 'Opt-in', 'Enhanced information', and 'Enhanced browser settings' approaches and businesses preferences as between each of them.

In the following part of the Section, we present our findings for each sector. The information has been aggregated and anonymised to provide an overall view of:

⁴⁶ The names of the organisations selected for case studies have been omitted to maintain their anonymity. This condition was seen as being conducive to gaining detailed and reliable responses from interviewees for the research. In addition, anonymity was explicitly requested by some interviewees.

- The context for internet cookie use in the industry;
- The general impacts associated with regulation of internet cookies; and
- The specific impacts associated with each of the three identified regulatory methods respectively.

Although implementation of the Directive might see various methods employed in conjunction - and interviewees were made aware of this point - their consideration in isolation allows us to gauge the relative impacts of each and the distribution of these impacts across different kinds of businesses.

Case study findings

In the main part of this Section, we present the findings of the cases studies we have conducted. We consider each of the five sectors we have identified in turn.

Hardware suppliers

First, we report our findings with respect to hardware suppliers. Although two hardware suppliers are shown in the business sampling frame, four of the case study companies are involved in the manufacture and sale of computer hardware. Our analysis of the industry context, the general impacts of regulation of cookies and specific impacts for each regulatory option are explained below.

Context

The hardware market - as understood in the context of this report - incorporates computers (including personal computers, laptops and handheld devices), peripherals and storage devices and mobile telecommunication devices (including internet-enabled mobile phones). The size of the UK computer hardware market was estimated to be £3.1bn in sales in 2009, 11% of the EU market⁴⁷.

Hardware suppliers make use of internet cookies in a number of ways:

1. *Pre-loaded “asset tag”*: these are used to identify electronically the asset (i.e. the hardware) and monitor hardware and software changes, including the initial start-up date. Such a tag can be used for:
 - a. Validation of the *hardware warranty*; and
 - b. Provision of *software/firmware/driver updates* that allow the machines to function better in terms of reliability or capability.

Although such tags are not considered to be internet cookies per se by the interviewed suppliers, if they were deemed to fall within the scope of the Directive, businesses in the sector would need sufficient time to plan and implement a suitable response since they are not currently expecting to have to respond.
2. *Pre-loaded first party software applications*: these are software applications that come preinstalled on computer hardware, which may use internet cookies for activation/registration purposes once started. The applications can also be linked to the design of personalised user experience offered as part of specific marketing campaigns (e.g. a personalised laptop may be specialised for a specific sporting event/team).
3. *Pre-loaded third party software*: this includes, for example, operating systems and browsers bundled with the sale of hardware.
4. *E-commerce enablement* (as online retailers): first party session internet cookies are used to ‘maintain state’ across the site. This includes websites for personalised hardware sales and log in facilities (including for example ‘web baskets’). Third party persistent internet cookies may be used for analytics and behavioural advertising.⁴⁸

It is important to note that hardware vendors make use of a number of preloaded internet cookies which present an additional challenge that may require a different regulatory approach from other kinds of internet

⁴⁷ Datamonitor, June 2010; \$4.6bn at \$1.5/£1.

⁴⁸ The impacts on online retailers are covered more fully in the later section, although the emphasis on personalised products and this function of cookies is especially pronounced for hardware manufacturers.

cookie since consumers cannot consent to these kinds of cookies through internet browsers or online publishers (except as part of their agreement to purchase the hardware).

General impacts

Businesses indicated that the major costs of implementation of the Directive would be those associated with the e-commerce enablement and the pre-loaded “asset tag” (to the extent that such devices are subject to the Directive).

In terms of e-commerce enablement, the general costs are those associated with the loss of functionality to the online site and the impact on the user experience caused by request requirements and/or the rejection of internet cookies. One hardware vendor felt that internet cookies were vital to the personalisation of the products being sold online.⁴⁹ This is especially important for online channels where consumers value the convenience of having their preferences matched to the relevant products and services being sold, and consumers face low costs in switching their search efforts to competing online retailers. In fact, the ability to provide personalised products is sometimes a competitive advantage and, therefore, a specifically targeted strategy. Such personalisation makes essential use of internet cookies (e.g. by remembering preferences selected in forms data, allowing for authentication in making transactions, log in/registration procedures etc). A reduction in the rate of acceptance of internet cookies has the potential to undermine the ability of firms to provide such personalisation of products and the website.

Costs may be incurred in terms of the need to redesign the e-retail website to maintain the functionality and user experience in case internet cookies are rejected by a significant portion of customers.

In terms of the impacts regarding pre-loaded third party software, there may be a cost of gaining some kind of specific (and probably prior) consent, since such software including internet cookies might exist on the hardware at the time of purchase, rather than being downloaded later. One case study interviewee suggested that approval could be obtained at the point of sale since this was considered the best time to seek the consumer's acceptance of the cookies. This was seen as unlikely to give rise to a great cost.

The more substantial cost would be the need to replace the existing hardware and software frameworks relating to customer support if the ‘asset tag’ solutions are subject to the Directive and are not approved by a significant portion of the customer base. Alternative offline capabilities relating to hardware support could potentially be needed to service this part of the overall customer base, and this could entail significant costs. Such capabilities aim to maintain customer support standards, for instance by providing better or more extensive hardware support over the telephone, or through onsite and in person hardware support services.

Interviewees also mentioned during the case studies that some innovative technologies which rely on preloaded internet cookies for their effective functioning might not receive investment amidst a backdrop of uncertainty regarding the regulation of preloaded internet cookies. This is because the uncertainty around possible regulation weakens demand for these products/services. As a result, consumers may face more limited choices (especially for innovative products) and hardware manufacturers may lose out on potentially revenue earning opportunities. Such products could, for example, include services relying on a tracking of hardware.

In terms of benefits, hardware manufacturers might benefit from increased consumer trust in internet technology. This might lead people currently not using internet technology to buy the respective equipment. Furthermore, consumers preferring to buy hardware offline might switch to the online channel.

Specific impacts

The specific impacts of each regulatory option are summarised in Figure 21. They include the risks and costs to hardware suppliers that are specific to (or most strongly associated with) one regulatory option over another. Of particular note is the costly impact of the ‘Opt-in’ option for online retail operations. In addition, ‘generic level approval’ (which might be interpreted as a ‘settings’-type approach at the point of sale) was seen as the

⁴⁹ Personal computers, for example, can be bought to a personal specification.

least costly way to gather consent for preloaded internet cookies (to the extent that consent is required by the Directive).⁵⁰

Figure 21: Summary of specific impacts on hardware manufacturers

Opt-in	Enhanced information	Enhanced internet browser settings
<ul style="list-style-type: none"> This would severely restrict the e-retail operation. Consent requirements would severely detract from the user experience in terms of inconvenience caused, which would negatively impact sales. Those who 'opt-out' would be repeatedly asked for consent, since internet cookies are the standard means of remembering the opt-out preference. Small administrative costs incurred if there is a need to gain consent at point of sale for preloaded internet cookies. But major costs would include those associated with the change of existing platforms /infrastructure required to provide essential functions such as customer support and hardware maintenance if a significant portion of customers choose to opt-out. Benefits of increased trust on sale of hardware and online transactions. 	<ul style="list-style-type: none"> The "eye icon" method in behavioural advertising affects the sale of hardware (through advertising). But there was uncertainty as to if/how this would be applied to first party behavioural tracking by hardware vendors' e-retail operations. Perception that if behavioural advertising was singled out for specific regulation (e.g. "eye icon"), it might reduce the burden on and regulatory costs associated with other kinds of more essential internet cookies used by hardware vendors. Improvement of the provision of information on pre-loaded internet cookies at the point of sale was mentioned as a potential strategy for enhancing information. This would incur administrative and technical costs in providing this information. Benefits of increased trust on sale of hardware and online transactions. 	<ul style="list-style-type: none"> This was seen as less costly and less time consuming overall for both consumers and hardware vendors. Allows hardware users to have a better user experience of computer hardware, by removing 'unwanted' internet cookies, without the inconvenience of the 'Opt-in' option. Option of '<i>generic level approval</i>' (in effect a 'settings' approach by internet cookie type/use at point of sale of hardware and across browsers/software) was put forward. But: <ul style="list-style-type: none"> If users consent on a type/use basis, manufacturers would incur legal costs of establishing definitions, and technology costs of recognising internet cookie type/use. End user may not be the purchaser (e.g. hardware gifts, public access computers etc.), so method may not comply with Directive. Benefits of increased trust on sale of hardware and online transactions.

Source: PwC analysis based on case studies

Internet browser and related software vendors

Second, we set out our findings with respect to software suppliers, including both the manufacturers of internet browsers and the vendors of related software. This latter category includes developers of internet browser runtime plug-ins that store data on end users' hardware (i.e. those that use local storage).⁵¹ Although browser vendors are active in this space, this was not true of all case study companies. Below, we explain our understanding of the industry context, the general impacts of regulation of internet cookies and the specific impacts for each regulatory option.

Context

The market for web browser software is relatively concentrated. The top three vendors, Microsoft 'Internet Explorer', Mozilla 'Firefox' and Google 'Chrome', together claim around 90% of the UK market.⁵² 'Internet Explorer' is the market leader, capturing around half the UK market and has more than twice the market share of 'Firefox', its nearest rival. It has, however, lost market share (mainly to Google Chrome) in recent years⁵³.

These browser manufacturers currently present their options and default settings for internet cookies in different ways. Although all major vendors offer the option to block third party internet cookies, to the best of our knowledge Apple's Safari is the only major browser to do so as the default.

⁵⁰ Note that this type of consent would not strictly fit within the three regulatory options considered.

⁵¹ A runtime plug-in is software component that runs alongside and adds specific capabilities to a larger software application (in this case the internet browser).

⁵² StatsCounter, February 2011.

⁵³ This is broadly corroborated with the results of the consumer survey showing 'Internet Explorer', Mozilla 'Firefox' and Google 'Chrome' with 60%, 20% and 11% respectively, although Internet Explorer has a larger share amongst our sample.

The scope to prevent behavioural advertising (e.g. “do not track” options) also differs by browser. Microsoft’s latest version of Internet Explorer 9⁵⁴ will allow users to restrict third party behavioural advertising by importing a list of approved third parties from an independent privacy organisation of choice. For example, TRUSTe⁵⁵ administers a list which allows cookies to be downloaded from parties approved by the Digital Advertising Alliance’s (“eye icon”) self-regulatory program, and will block cookies from all those that do not achieve approved status within 30 days. Mozilla Firefox currently ‘expresses’ a preference (e.g. for a user to not be behaviourally tracked) through a browser header which may or may not be heeded by advertising networks. Google Chrome allows options to permanently opt-out of the 50-odd advertising networks that participate in the self-regulatory regime (through a browser add on that is not pre-installed).

The three major vendors also have significant other business interests besides the production and sale of browsers. These include hardware, e-retail, online publishing, other web based services and advertising.

The relevance of the Directive also extends to other software which is able to “store” or “access” information on end users’ hardware, for example internet browser runtime plug-ins such as Adobe Flash, Microsoft Silverlight and Sun Microsystems Java. The developers and users of such products are likely to be impacted by changes to the Directive. Importantly, these products have historically circumvented browser settings and have user controls which were perceived as less visible by some interviewees.

General impacts

Internet browser vendors are most obviously impacted by the possibility of ‘Enhanced browser settings’. This option could require them to make potentially significant technical changes to their software to better reflect users’ potential preferences regarding internet cookies and/or related types of local storage, to provide information regarding internet cookies and to make these settings generally more visible to end users. The extent to which they are likely to incur costs with this approach depends on the (marginal) changes that would need to be made to ensure compliance. During our discussions, browser vendors generally saw themselves as compliant with the aims of the Directive. Since internet browsers are frequently updated by vendors it seems important to define criteria through which browser vendors can document compliance and to determine whether the Directive explicitly requires an ‘audit trail’ of implemented changes. The costs of implementation (assuming changes are necessary) include the time cost of reprogramming of browsers to incorporate the provision of such ‘Enhanced browser settings’ and information as well as the associated costs of testing and rolling out the changes. In addition, costs would be incurred as the changes to these settings and the underlying technology frameworks would need to be communicated to web developers and other third parties so that they could adapt their systems as necessary.

There may, however, be substantial costs involved for browser vendors also in the ‘Opt-in’ option for example because of the creation of standards and mechanisms for the transmission of information between browsers and cookie users. A particular hurdle for the ‘Opt-in’ approach is that browsers must be able to remember the preferences of end users to prevent the repeat request (e.g. the choice to opt-out of internet cookies from a particular advertising network or website), but this typically relies on the use of a persistent internet cookie. This tends, however, to mean that companies must opt-in for the scheme to work, and end users who delete all internet cookies also delete all memory of their opt-out preferences. In addition, existing technologies have limited ability to recognise internet cookie types and use beyond the crude first party/third party distinction.

Moreover, there are obvious merits for end users in presenting this information in a standardised format, both across web pages and across browsers.⁵⁶

⁵⁴ This is currently available as a beta version.

⁵⁵ TRUSTe is a company that manages a large Privacy Seal programme. The programme has certified more than 3,500 websites, who successfully meet the company’s industry best practices regarding privacy and protecting confidential user information. For more information see http://www.truste.com/about_TRUSTe/index.html

⁵⁶ See, for example, the Platform for Privacy Preferences (P3P) initiative which aims to collect privacy policy information from websites and classify the use/type of cookies on a standardised basis displayed within web browsers: <http://www.w3.org/P3P/implementations.html>. From our interviews, there was a limited knowledge of the initiative. Support amongst those who were aware of the initiative was mixed. The most commonly stated hurdle was the lack of compliance amongst browser vendors.

Importantly, several case studies suggested that it was likely that web developers and online publishers would need to *respond* to the technical framework implemented by browser vendors. This would be difficult and uncertain/costly for online publishers if browsers used different settings and technical approaches.

Browser vendors may thus incur costs of coordination with all regulatory options and were perceived as the 'first movers' by providing the underlying browser framework against which website owners must design their sites.

Vendors of browser runtime plug-ins which provide local storage facilities will also incur costs. Such storage has historically circumvented internet browser privacy settings. Their inclusion in the settings of future versions of internet browsers could undermine the use of runtime facilities (if such internet cookies are rejected by a significant portion of end users). In turn, these could reduce sales of revenue-driving development tools. Browser vendors may incur costs of enhancing browser settings to include these other kinds of local storage. Interviewees were mixed in their assessments of the privacy risks of other kinds of local storage and their inclusion in internet browser settings.

Benefits for browser vendors might be mainly due to an increased browser usage and number of users online because of increased trust.

Specific impacts

The specific impacts of each regulatory option are summarised in Figure 22. They include the risks and costs to software vendors that are specific to, or most strongly associated with, one regulatory option over another.

The regulatory option of 'Enhanced internet browser settings' is perhaps the most costly approach for browser vendors. The inclusion of wider kinds of local storage in these settings will give rise to costs for developers of browser runtime plug-ins. Standardisation in settings and technology across all methods is desirable, but costly to vendors.

Figure 22: Summary of specific impacts on browser vendors

Opt-in	Enhanced information	Enhanced internet browser settings
<ul style="list-style-type: none"> To maintain consistency of user experience, browser vendors would incur costs of 'standardising' information presented in the pop-up window/link to website e.g. on privacy policy, internet cookie use/type etc. Cost would be incurred to browser vendors that do not currently offer an internet cookie-by-cookie request option. Costs would be incurred to runtime developers in providing opt-in facilities. One developer noted that content may crash in attempting to render the user interface for consent if users opt-out. This would incur redesign costs to runtime developers and/or online publishers. It appears that coordination between browser vendors is desirable to achieve uniformity and minimise costs for online publishers. This may require costly negotiations between vendors and regulators. Increased trust might lead to additional browser usage and more online transactions. 	<ul style="list-style-type: none"> Browsers potentially need some technology to remember settings selected in the "eye icon" method and incorporate chosen settings into how internet cookies are filtered whilst browsing. It is desirable that information on behavioural internet cookies is located and presented in some 'standard' format across browsers. Again this may require costly negotiations between vendors and regulators. Enhanced information may compel the standard presentation of 'privacy policy' information in browsers. Costs may be incurred to browser vendors in making these provisions (if necessary). Increased trust might lead to additional browser usage and more online transactions. 	<ul style="list-style-type: none"> (Some) browser manufacturers object that they already comply. Reprogramming costs incurred to browser vendors with the inclusion of broader types of local storage into browser settings. Loss of revenue to browser runtime developers is likely if other kinds of local storage are controlled in browser settings, or even included in the 'cookie' umbrella. To prevent a two-stage decision procedure in end users' choice of privacy settings 1) the choice of browser; and 2) the choice of settings), browsers would need to converge in their presentation of options. Costs are again associated with the coordination and negotiation to this end. In addition, there may be costs of reprogramming and testing software. If browsers implement different solutions, there is the risk of competition between vendors based on privacy settings. Technology cost may be incurred in making settings more visible, e.g. by displaying options/information at installation of software. Potentially provision of additional information to user.

Opt-in	Enhanced information	Enhanced internet browser settings
		<ul style="list-style-type: none"> Increased trust might lead to additional browser usage and more online transactions.

Source: PwC analysis based on case studies

Advertising

This part of the Section explains our findings with respect to the broad and complex set of companies involved in advertising. Although there is some overlap here with subsequent Sections - in particular in relation to 'online retailers' and 'online publishers' - the specific uses of internet cookies by this group warrant special consideration. Our analysis of the industry context, the general impacts of regulation of internet cookies and specific impacts for each regulatory option are explained below.

Context

The advertising industry is characterised by a series of complex interactions. At one end of the spectrum there are the advertisers – those companies that wish to promote their goods and services through advertising. More precisely advertising firms earn revenues through the direct promotion of specific sales ("acquisition media") and the general promotion of their brand ("brand media"), which indirectly promotes sales.

At the other end of this spectrum are the online publishers that are able to provide the valuable 'audience' which advertisers wish to reach. Revenues are earned through the sale of advertising space and are often linked to metrics for the absolute numbers of target audience reached, with some accompanying definition for the relevant demographic.

Between these parties are the intermediaries, which provide a range of services to both online publishers and advertisers, which broadly improve the value of advertising. Such intermediaries include advertising agencies, media agencies, advertising networks, advertising aggregators, behavioural advertising, and web analytics more generally. Often, revenues are earned on a commission basis, as some proportion of advertising spend.

The use of internet cookies has been fundamental to the development of the online advertising industry and especially the role of intermediaries.

The shift from non-targeted to behavioural advertising enabled by internet cookies was seen by one interviewee as a "paradigm shift", which made the value of advertising more transparent and higher in general. Advantages of behavioural advertising give some indication of the net economic impacts of regulation after displacement of advertising from behavioural to non-targeted online (or even offline):

- *Attributive reporting* means returns from advertising can be measured and optimised, reducing the uncertainty for buyers and sellers of advertising. Buyers of advertising space are able to measure actual returns to advertising by linking a 'valuable event' (e.g. interest or purchase) with advertising spend, and sellers are able to justify the internal allocation of resources between online spend and other media. In fact, the trend has been for reallocation of spend towards the digital channels. Note the importance of internet cookies to this end:
 - Internet cookies were used for 90% of performance metrics and optimisation by one media agency,
 - Although other methods are available to measure performance (e.g. 'click through' and 'views' ratios) these seem much inferior to internet cookies, since it was mentioned that very few people actually click ads and those that do click tend to be a narrow demographic (e.g. middle aged men). 8% of internet users represent 85% of clicks⁵⁷.
- *Re-targeting* techniques meant advertising became more effective in reaching interested users. This method involves monitoring and gauging the level of interest in certain goods/services and presenting advertisements to those segments that are identified to be of the relevant cohort group. This reduces the

⁵⁷ Source: Comscore, 2009.

‘wastage’ seen in non-targeted advertising, whereby much of the audience has no intention of making a purchase. One agency commented that behavioural re-targeting was between 3 and 10 times more effective than non-targeted spend. Note the importance of internet cookies to this end:

- It was mentioned that alternatives to behavioural tracking (such as HTML5 server-side data collection and Flash internet cookies⁵⁸) are perceived as inferior and potentially hazardous for end users. Internet cookies were unanimously seen as the lightweight and controllable method of tracking behaviours.
- Internet cookies used in the industry are typically third party (but not always). The information contained in such internet cookies can include, for example, a unique identifier code (anonymous, and with respect to a specific browser on a specific computer), details of the websites visited, sections visited, purchase history etc and IP data or geo location (although not always).

General impacts

The general impacts seem largely related to the potentially reduced ability to track user behaviour, which reduces the revenue earning potential of advertising space and spend. The greater the impediment to the tracking capability enabled by internet cookies, the greater the costs to the industry.

Such impediments are the negative impact to the user experience which may be incurred with regulation (which would likely reduce overall web traffic, the potential ‘audience’) and the potential reduction to the volume of internet cookies in circulation. The two advantages of behavioural advertising over non-targeted forms are then undermined (Attributive reporting and Re-targeting).

Referring to the impacts on specific sections of the value chain, advertisers firms will find online advertising less effective, and more uncertain in terms of returns. Of this online spend behavioural techniques will be most strongly impacted with displacement effects to non-behavioural online advertising and offline channels. Some interviewees expected overall advertising spend to fall across all channels with the constraints on the online behavioural channel. For intermediaries revenues are lost through reduction in online advertising spend (effective volumes fall).

For online publishers’ advertising space becomes less valuable, reducing the scope for this revenue stream. This may be critical for online publishers that rely on advertising revenues for their existence, or the provision of specific content/services.⁵⁹

Specific impacts

The specific impacts of each regulatory option are shown in Figure 23. They include the risks and costs to the broad set of firms involved in the advertising industry that are specific to or most strongly associated with one regulatory option over another. The ‘Opt-in’ approach is likely to be most costly for firms in the industry, whilst ‘Enhanced information’ is seen as most supportive of the existing infrastructure. The impacts of ‘Enhanced browser settings’ depend crucially on the design of settings and default options.

Figure 23: Summary of specific impacts on advertising companies

Opt-in	Enhanced information	Enhanced internet browser settings
<ul style="list-style-type: none"> • This is likely to severely reduce the volume of internet cookies in circulation: <ul style="list-style-type: none"> - Intermediaries cannot maintain the inventory of internet cookies in circulation to reliably target audience, or reach the relevant audience at all. - One agency felt 50% of digital spend would be destroyed. • Time for implementation would be 	<ul style="list-style-type: none"> • Intermediaries we spoke to were most in support of this method, in particular the “eye icon” method for behavioural advertising. • Costs for this method would involve payment to a third party administrator. This may be a government body to prevent excessive fees being charged. But it is likely to be an industry organisation paying licensing fees for the US “eye icon” initiative. • But there are risks: 	<ul style="list-style-type: none"> • Broadly supported, but risks regarding default settings and options. It was noted that if ‘opt-out’ is the default, the costs are much the same as ‘Opt-in’ method. Furthermore there are risks that third party internet cookies are singled out. • Browsers would find it conceptually difficult to identify the internet cookie use. This is a risk, especially in the absence of standardisation across browsers.

⁵⁸ Some interviewees mentioned that some of these techniques would be able to circumvent end users’ browser settings.

⁵⁹ Effects on publishers will be more explicitly discussed in a separate section.

Opt-in	Enhanced information	Enhanced internet browser settings
<p>modest, but greater cost would be strategic shifts:</p> <ul style="list-style-type: none"> - To other (not regulated) forms, - From behavioural to non-behavioural online advertising, - To offline channels. <ul style="list-style-type: none"> • End users' choices could be reduced by loss of online publishers that rely on advertising revenue 	<ul style="list-style-type: none"> - Consumers may not be able to differentiate between the listed agencies. - The method only compels 'do-gooders', so is not robust if regulating all relevant parties. - Must also coordinate with browser technology to 'remember' settings and filter internet cookies accordingly. <ul style="list-style-type: none"> • Research by one intermediary showed that a very small percentage (below 0.1%) of internet cookies is rejected with the "eye-icon" method. 	<ul style="list-style-type: none"> • One advertising agency noted 'ideal settings' might lead to a 5% loss of revenues. These ideal settings would have options: accept all internet cookies; accept none; and, accept internet cookies from first party and 'registered' third party: • Costs of administration paid to 3rd party, who decides 'safe list' • Seen as most robust method, since companies are incentivized to comply

Source: PwC analysis based on case studies

Online retailers

Online retailers are defined in the context of our report as any business which uses the internet to sell its products to consumers. This includes those retailers who use the channel exclusively as well as those more traditional multichannel businesses. Our analysis of the industry context, the general impacts of regulation of internet cookies and specific impacts for each regulatory option are explained below.

Context

Our view of the impacts on online retailers was collected through case studies with an international clothes retailer, an online niche clothes retailer, computer hardware retailers, a general online retailer and a retail bank.

The various uses of internet cookies by online retailers differ importantly in terms of their business importance. In general, first party internet cookies are seen as most important to the functioning of websites, although online advertising - which often makes use of third party internet cookies - was sometimes a major driver of online traffic to online retailers' sites.

In summary, internet cookies are used in a number of functions:

- *E-commerce enablement* (these are vital functions normally reliant on first party internet cookies):
 - "Maintain state" across the site (i.e. session internet cookies for the online basket, log in, language/shipping/size preferences etc.).
 - Customer recognition and personalisation of the website (e.g. language selection, recommendations based on interest, or past purchases).
 - Fraud prevention (monitoring for suspicious behaviours).
 - Authentication (log in).
 - Provision of a single basket/transaction facility across multiple brand sites in an e-retail group.
 - Load testing (for bottlenecks etc.); and
 - A/B and multivariate comparative testing of new features on the website.⁶⁰
- *Third party analytics* (whilst online retailers could run a site without them, it was seen by one retailer as akin to "driving a car without a speedometer")
 - Individual behaviours for site optimisation.
 - Aggregated information for forward looking investments.
 - Relates to consumption of all site information, not just adverts.

⁶⁰ With an A/B comparative test technical change(s) are made to the website and cookies are used to track the marginal improvement (or deterioration) in performance, comparing the website/function with and without the change(s). In the case of multivariate testing, more than one change is tested simultaneously on the same page, often on live content. Such testing is used to improve the website functionality, and achieve the goals of the website owner, e.g. successful registration, content consumption etc.

- *Ad server/media* (“non critical, but drive a lot of traffic”; third party internet cookies):
 - Traffic (Behavioural advertising).

It is important to note that the use of behavioural analytics may relate to both third party internet cookies across an ad network (e.g. retargeting) and first or third party internet cookies used only on the online retailers’ website(s). This distinction is obscured where the category of ‘third party’ internet cookies is conflated with ‘behavioural’ internet cookies.

The general feeling conveyed through the case studies was that concessions may have to be made to single out behavioural advertising and third party internet cookies to protect more vital first party internet cookie use.

Fraud prevention through the use of local storage to identify users and monitor for suspicious behaviours was seen as especially important in financial services. Alternative instruments to internet cookies were said to provide a greater range to the dialogue with the user/computer since storage is not restricted to text files.

It should also be noted that internet cookies may contain only an identifier code. The internet cookie is then used to index the user to more substantial information contained at a secure server.

Benefits for online retailers might especially arise because of additional consumer trust which might lead to:

- More consumers buying products and services online; and
- An increased volume of transactions by consumers already using the internet to buy (some) products.

General impacts

Costs include the technical changes of compliance depending on the method of implementation, but the more significant component of costs is the loss of essential functionality and impact on user experience if consent is repeatedly requested or first party internet cookies are rejected. This may manifest in a number of ways:

- *Reduced traffic:* Users may choose not to use the website in which case the costs are the loss of revenues from the online channel. In addition, for multichannel businesses, the growth in online sales was seen as a driver of offline sales, since online customers are often diverted to retail stores. Reduced traffic online therefore also negatively impacts offline sales. However, displacement effects might be important.
- *Loss of website optimisation capabilities:* retailers felt that alternative tracking devices were inferior in terms of elucidating consumer behaviours and user journeys. Revenues are lost with the inability to carefully optimise the website usability.⁶¹
- *Costs of maintaining functionality associated with personalisation:* retailers would need to reengineer the site, potentially replacing infrastructure associated with personalisation.
- *Customer support costs:* these would increase if end users’ technical difficulties with the website/browser are directed at retailers, and not browser vendors.

One retailer commented that these costs would be greatest for those businesses running a more sophisticated website which makes use of internet cookies that go beyond essential function that qualify as “strictly necessary” in the Directive. We note that impacts may also differ by the nature of the industry and the associated technical knowledge of the user. For instance, one retailer aimed at an older customer segment thought internet cookies were more likely to be rejected by their less tech-savvy customer base.

However, one major issue in the case studies was the uncertainty surrounding the exceptions to the requirement for consent and information in the Directive afforded to “strictly necessary” services that had been specifically requested by the end user. In particular, retailers did not understand which functions of first party internet cookies would fall under this category. This significantly undermined their ability to plan for the necessary changes to the websites and will increase time requirements for implementation.

In addition, online retailers would incur costs *qua* advertisers if third party internet cookies are rejected. One business mentioned that about 50% of online traffic can be directed through third party advertising (although

⁶¹ Lost revenues also affect those third parties that provide such optimisation/analytical services.

not all of this is banner advertising, and not all banner advertising is behavioural, relying on third party internet cookies). This advertising channel is more important for infant or niche businesses that do not have the brand/online presence of more established players. As noted in our earlier analysis of 'Advertising', with the decline in online advertising online retailers benefit less from "brand media" (advertising building general brand awareness) and "acquisition media" (advertising driving a specific sale) which reduces their revenues.

Some retailers claimed that internet cookies and the personalisation of services were inextricably linked to their entire business strategy. The reduced user experience through the inconvenience of the consent process or the rejection of internet cookies by a significant portion of the customer base might rationalise the very costly realignment of strategy, away from personalisation and potentially away from online channels. This would be more significant for those retailers who do not currently use offline channels. In addition, it was claimed costs to online retailers fall disproportionately on more technologically sophisticated, or smaller, or niche online retailers reliant on the online channel.

The fraud prevention function of internet cookies was found to be particularly pronounced in financial services, where other technology which might allow tracking would be pursued in the case regulation saw a significantly reduced ability to track users through conventional internet cookies. One retailer spoke of an "innovation arms race" between retailers and regulators given the business importance of tracking technology.

For multinational businesses the costs of compliance may extend to international websites visited by UK customers, not just those on UK domains.

Specific impacts

The likely effects of the different options on online retailers are shown in Figure 24. The specific impacts and impacts most strongly associated with one method of regulation over another are detailed.

For online retailers, the negative impact on the user experience is likely to be strongest with the 'Opt-in' approach, whilst 'Enhanced internet browser settings' is seen as least intrusive. 'Enhanced information' with respect to behavioural advertising was seen as justified and conceded.

Figure 24: Summary of specific impacts on online retailers

Opt-in	Enhanced information	Enhanced internet browser settings
<ul style="list-style-type: none"> Technical changes would be relatively straightforward, but time consuming with necessary technology standards for information transmission and regulatory implications not yet clear (retailers mentioned a period of 6-8 months) More important, the user experience would be impacted by the multiple requests for consent. Access may not be possible at all without the first party internet cookie(s). One retailer estimated a 5-10% fall in revenues across all channels with this method. Strategy would shift away from personalisation to generic solutions ("the entire ecosystem would be impacted"). Offline sales would be negatively impacted, since sales are often redirected offline. There would be no consistency in user experience, since different sites may implement 'Opt-in' differently. High customer service costs likely as users experience technical difficulties. Benefits because of increased trust and increased sales. 	<ul style="list-style-type: none"> Treatment of behavioural advertising ("eye icon") was seen as appropriate and worthy of a specific initiative. One retailer noted the possibility that each retailer lists the uses of internet cookies on its sites and option to opt-out of each: <ul style="list-style-type: none"> But would rely on an internet cookie to remember settings Only compels 'do gooders' Costs of this method are likely to be small since it was thought not many people would alter behaviour. Provision of standardised privacy policy displayed in browsers would incur costs of transmitting information to browsers, and the costs of uncertain/non-uniform browser frameworks. Interviewed online retailers were divided regarding the method, with some strongly supportive and others seeing benefits only for the browser vendors. Benefits because of increased trust and increased sales. 	<ul style="list-style-type: none"> Current settings emphasising first party/third party distinctions were seen as already compliant and well functioning, since no complaints were received from consumers. One retailer felt that 'trust' and robust privacy settings were part of browsers' brand value and vendors have strong incentives to provide options that protect users' privacy. Some retailers thought there was a risk that settings provide <i>technical</i> definitions of internet cookies, not their <i>use</i>. But the move towards 'use-based' settings was conceptually difficult. Ambiguity /non-standardisation as to internet cookie classification could result in legal costs for clarification and increase cost of website development in complying with competing standards. In addition, costs incurred in trying to 'fit' to certain categories of internet cookies. Risk of no external adjudication; process relies on honesty that is more likely to compel larger, more visible retailers. Significant customer service costs

Opt-in	Enhanced information	Enhanced internet browser settings
		<p>likely. Risk that other forms of locally stored objects (and fraud prevention function) are integrated with the management of internet cookies. Cost of developing alternative tracking/fraud prevention technology (e.g. device fingerprinting) is incurred. One retailer placed the investment cost at £2m.</p> <ul style="list-style-type: none"> • Benefits because of increased trust and increased sales.

Source: PwC analysis based on case studies

Online publishers

Online publishers are defined as (all) those businesses and public sector institutions that publish content on their own website for the purpose of consumption by users of the website.

Context

Our view of impacts on the sector is based on case studies with news media, online B2C portal businesses, B2B websites, and central government and local government online portals. Note that the number of online publishers is, therefore, relatively large. Even if only a fraction has internet cookies in operation this is likely to be relatively large number of companies.

Online publishers make important use of first and third party internet cookies in the following ways:

- *Website design*: to improve website usability;
- *Research*: using aggregated data to inform economic decisions;
- *Fraud prevention*: for example, log in facilities and authentication in transactions;
- *Monetisation of advertising*: internet cookies as a counting device to monitor and optimise returns from online advertising spend;
- *Track consumption of information*: this is especially relevant to public sector organisations, where the primary concern is the dissemination of public information;
- *Content syndication*: to enable content to be displayed from third parties and so allow consumers to reach relevant content without having to switch between websites and permit information to be linked and refreshed as and when it changes;
- *Online search*: to remember, for example, end users' language preferences; and
- Authentication/forms products (memory and recognition of end users):
 - Certain services require authentication (log in) as an essential requirement for provision of the service in the first place (e.g. for user-generated content such as a blog, online videos or photos);
 - Authentication is also used to measure consumption of business development materials (e.g. free 'thought-development' content used to promote sector expertise requires a log in process for access).

In general, online publishers may generate value/revenues from a number of internet cookie dependent streams:

- *Direct sale of content*: this includes subscription charges (e.g. news media);
- *Consumption of information per se*: this is a particular concern for public sector organisations; and
- *Sale of advertising space*: consumption of advertising by relevant end users: this is more applicable to private sector businesses.

General impacts

The main impacts of internet cookie regulation on online publishers are directly related to the extent to which the consumption of information - both primary content and advertising - is impeded or made immeasurable by

the rejection of internet cookies by a significant portion of end users. Such impediments include the negative impact to the user experience of consent requests, and the possibility that internet cookies are rejected entirely, undermining certain important functions. Internet cookie use was also cited by a number of online publishers as essential for attracting online advertising spend, but also in the efficient provision of information more generally.

As highlighted in our previous analysis of ‘Advertising’, online publishers inherit the costs of lost advertising revenues since advertising space becomes less valuable (consumption of advertising becomes less reliably measured and less effective in driving sales given a level of consumption) with the result that advertising space is sold for less. In addition, the decline in users’ experience reduces total website traffic. Revenues from advertising were seen as essential to the continued existence of one online publisher.

The negative impact on user experience means online publishers also suffer from fewer consumers or less frequent consumption of paid for services. It is often the case that certain high value services (such as user uploaded content) rely most strongly on internet cookies so that a reduction in the use of internet cookies by online publishers tends to impact the most ‘profitable’ functionalities.

For some public sector online publishers, the costs are those associated with reduced consumption of public information and the reduced scope for personalised content to be made more relevant (i.e. reach the intended audience). Knowledge may need to be diffused through alternative, potentially more expensive, channels such as offline media.

One specific concern for B2B online publishers is regarding business development materials. If online publishers cannot use internet cookies to track the consumption of ‘thought leadership’ materials⁶², it could be more difficult or more expensive to measure the returns to such publishing. In turn, this could weaken the justification for the initial investment. In addition, consumption of such materials can indicate the level of interest and business opportunities that are more pronounced in some sectors over others. Costs are incurred to the extent that internet cookies may be rejected, although the technical costs of gathering consent are not likely to be great.

Across all online publishers it is important to note that the costs of reduced user experience, internet cookie rejection and technical compliance costs fall disproportionately on those websites that are more sophisticated (i.e. those that make more use of internet cookies). As discussed initially, online publishers not using internet cookies will not be directly affected by the Directive.

Benefits of the different regulatory options for online publishers might arise especially due to enhanced trust and, therefore, a larger number of visitors of the respective websites.

Specific impacts

The specific effects of the different options are shown in Figure 25. These are those impacts most strongly associated with one method of regulation over another are shown detailed below.

For online publishers, the impact on the user experience (and consequently traffic) of the ‘Opt-in’ option is likely to be most costly. In addition, the impacts on advertising revenues are similarly greatest with this method. ‘Enhanced information’ was most strongly supported since it would be least impactful on existing infrastructure.

Figure 25: Summary of specific impacts on web publishers

Opt-in	Enhanced information	Enhanced internet browser settings
<ul style="list-style-type: none"> Would severely reduce the user experience (even if internet cookies are accepted) and in turn reduce visitors and traffic (revenue impact). 	<ul style="list-style-type: none"> The “eye icon” method was seen as most supportive of the existing infrastructure; in targeting behavioural advertising it preserved more essential internet cookie functions. 	<ul style="list-style-type: none"> This method risks impeding counting (attributive reporting or measurement of content consumption more generally) and would thus be costly. It was felt the scope and definition of

⁶² ‘Thought leadership’ materials include reports prepared by professional services firms to demonstrate their sector expertise and insights as part of their business development process.

Opt-in	Enhanced information	Enhanced internet browser settings
<ul style="list-style-type: none"> Reduced internet cookie acceptance would undermine the measurement of consumption of information/advertising. Costs may be incurred in developing other means of tracking. This may include for example 'log in' processes, which are not anonymous. Not seen as feasible due to the volume of internet cookies in use and the importance of their use to the business (e.g. for advertising, for the provision of content). Does not make any distinction between uses of internet cookies. One public sector publisher put the cost of compliance in the £100,000's and requiring 6 months time for planning and implementation. Benefits because of larger number of visitors due to increased trust. 	<ul style="list-style-type: none"> Technical costs of implementation would be relatively small. More broadly, this method was viewed as strategically appropriate in making a distinction between internet cookies that are 'strictly necessary' and other less critical kinds. Given the large number of online publishers the implementation of a web-wide 'Enhanced information' approach for other types of internet cookies was seen as not feasible. Provision of standardised 'privacy policy' displayed in browsers would incur costs of transmitting information to browsers, and the costs of uncertain/non-uniform browser frameworks. Interviewed online publishers did not provide information in this format, since they are not required to currently. Benefits because of larger number of visitors due to increased trust. 	<ul style="list-style-type: none"> internet cookies should distinguish between more and less critical uses (not technical types). Choices should not emphasise data collection per se, but how that information is used (e.g. 'Basket', 'behavioural advertising', rather than 'first party' and 'persistent'). However, one web developer noted that the method would require some coordination between website publishers and browsers (e.g. regarding internet cookie types) that incur costs to all parties in terms of technical implementation. There are risk/costs incurred if different browsers use different technical standards. Benefits because of larger number of visitors due to increased trust.

Source: PwC analysis based on case studies

Summary

Having identified a range of impacts on an industry by industry basis a number of key issues emerge with broad-bearing implications for implementation of the Directive.

- The 'Enhanced browser settings' option was seen as preferred for the general management of internet cookies. Generally, the view was that this method would be preferable in terms of maintaining the online user experience. The selection of default options is seen as critical as a determinant of consumer behaviour.
- Browser vendors are commonly seen as the potential 'first mover' in providing the technical framework for the communication of information and settings with websites. Standardisation in browser settings and format across browsers is seen as desirable to minimise the costs for other businesses.
- It would be desirable to provide consistent presentation of information to end users.
- Enhanced information/'eye icon' for third party behavioural advertising is seen as a special case and greater regulation and information were generally seen as justified.
- The speed of response required for implementation (late May 2011) is extremely challenging for business: interviewees cited the extended planning/implementation period required (typically over six months) especially for the 'Opt-in' option.
- Benefits of the implementation for (online) business are likely to arise because of increased trust and, therefore, potentially a larger online community and larger number of online transactions. These effects could also lead to some displacement if consumers switch from 'offline' to 'online' alternatives.

5 Overall impacts

Introduction

This final Section brings together the evidence from the online survey of internet users and the business case studies to provide research into the impacts of changes in regulation of the use of internet cookies. The combination of insights from both areas of research enables us to develop and apply a consistent framework to the analysis of the relevant effects.

We consider each of the three regulatory options ('Opt-in', 'Enhanced information' and 'Enhanced browser settings') separately. This enables us to analyse the distinct impacts of all three options in detail. We acknowledge, however, that in practice implementation of the Directive may be based on a combination of the three options rather than a single option.

In what follows we analyse each option within the same broad impact assessment framework. First, we focus on the direct effects on those organisations required to comply with the regulatory option. Second, we examine the indirect effects, including those resulting from feedback from consumers' response to the regulatory options. Finally, wherever useful and possible, our framework distinguishes between one-off costs from those which are likely to be recurring. The nature of the effects (direct versus indirect or induced by consumer) means that it is difficult to draw precise a priori conclusions on the likely size of the effects as will become clear in the discussion.

In the remainder of this Section, we first briefly discuss measurement issues and then analyse the likely impacts of each regulatory option. We start by describing their nature and then examine the available data to understand the potential scale of the impacts. We consider each of the regulatory options in turn: we start with the 'Opt-in' approach, we then discuss the 'Enhanced information approach' and, finally, we analyse the 'Enhanced browser settings' approach.

Scale of impacts

No interviewed company was able to provide quantitative estimates of the direct costs they would expect to incur in complying with each of the regulatory options. We understand this was due to the following reasons:

- There is ambiguity associated with the wording of the Directive: this has a bearing on the likely costs of compliance because it affects the extent to which firms may need to change their business strategy and operations.
- Few (if any) companies were fully prepared with plans on how to implement potential changes.
- There is no 'leading response': no one firm or sector has stepped forward to lead or coordinate a response and there is a lack of clarity as to where the responsibility lies.
- Costs depend significantly on browser vendors' behaviour and whether they act uniformly. For example, costs for cookie users are likely to increase if browser vendors do not act uniformly.
- The change in user behaviour associated with some of the options is expected to have a significant bearing on some industries and companies (but is itself difficult to predict).

Although no quantification was possible, our discussions showed that business expects four factors to drive costs:

- The precise legislative requirements (the most important factor).
- Whether, and if so, how, browser vendors respond.
- The number of companies which need to implement the changes (which depends on how browser vendors respond).
- The extent to which there are displacement effects and efficiency losses.

Table 17 shows the number of UK businesses (2010) split by size as well as the total turnover and estimated number of websites based on data from ONS (2009). The total number of enterprises included is 1.9 million based on the Annual Business Survey 2009. A more detailed analysis by sector can be found in Appendix C.

Table 17: Analysis of number of UK businesses with websites

	Number of enterprises (ABS 2009)	Turnover of enterprises (£m)	Number of VAT based enterprises (2010)	Number of VAT based enterprises (10-49)	Number of VAT based enterprises (50-249)	Number of VAT based enterprises (250-999)	Number of VAT based enterprises (1000+)
Total	1,886,475	2,809,384	2,100,370	196,525	33,605	6,120	2,530
Estimated number of websites				142,088	30,849	5,955	2,492
% of businesses with a website				72%	92%	97%	98%

Source: PwC analysis based on ONS

As can be seen in Table 17, whereas 98% of all businesses with more than 250 employees have websites, only 72% of businesses with between 10 and 49 employees have their own website. All of these companies publish to some extent and a significant subgroup will also engage in online retailing: In total, roughly 181,000 companies with more than 10 employees engage in some form of publishing activity^{63,64}.

Table 18 indicates website sales in total and as percentage of turnover. As can be seen, website sales amount to roughly £115 bn for the UK economy⁶⁵. In terms of totals website sales are largest for wholesale, transport and storage (incl. postal) and information and communication. 14.9 % of UK businesses sold over a website (further 6.9% over ICTs other than a website) in 2009. A more detailed analysis by sector can be found in Appendix C.

Table 18: Analysis of website sales

	Number of enterprises (ABS 2009)	Turnover of enterprises (£m)	Website sales (2009, £m)	Website sales as % of turnover	ICT sales (2009, £bn)	% sales over website (2009)	% sales over ICT (2009)
Total	1,886,475	2,809,384	115,100	4%	319.4	15%	7%

Source: PwC analysis based on ONS

The following parts of the Section highlight the impact of the different options on the various groups of business. Given the complexity of the various effects and the difficulties obtaining quantitative cost data from businesses, it is not possible to estimate the scale of the costs and benefits of regulation. Instead, the analysis which follows should be seen as a piece of qualitative research which provides a framework for assessing the various effects of different regulatory options.

The different regulatory options

This part of the Section discusses the main effects and impacts we expect to arise from implementation of each of the three potential regulatory options.

It is important to consider the potential benefits of the amended E-Privacy Directive for consumers: over three quarters of the respondents in our online survey stated that they are concerned about internet security. Furthermore, 42% respondents stated that there are activities they do not undertake because of internet security concerns. The amended E-Privacy Directive is likely to increase consumer control, trust and confidence. All of these are benefits are likely to transpose into economic benefits (which are however, difficult to measure). The nature of these economic benefits to business is likely to be long term as opposed to costs

⁶³ Note that this excludes businesses with less than 10 employees. We expect, however, that a significant fraction of these businesses is also engaged in online publishing making our estimates conservative.

⁶⁴ Note that if we were to focus on publishers in a narrower sense (i.e. publication of articles, etc.) the number of companies becomes significantly smaller. The UK Annual Business Survey shows that in 2009 10,465 businesses focused on publishing activities of various types.

⁶⁵ Based upon annual survey into e-commerce and ICT activity (businesses with 10 or more employees). The statistic will, therefore, underestimate total website sales.

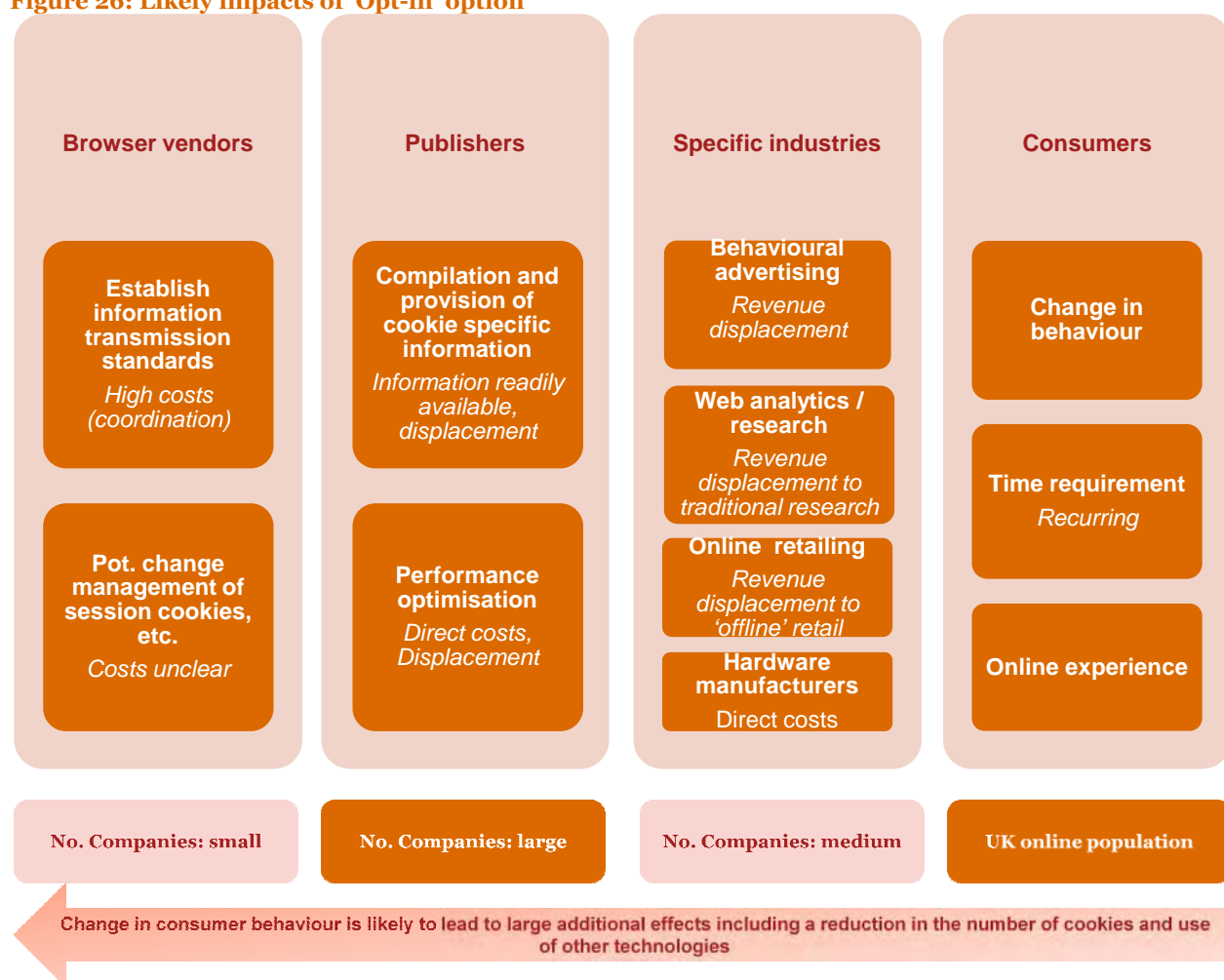
which are generally incurred immediately. However, the view of businesses interviewed as part of the case studies was generally much more focused on costs with benefits often not immediately perceived.

‘Opt-in’

Figure 26 shows the framework we have used to assess the likely effects of the different options. Essentially, we seek to distinguish the impacts on the business side between those on internet browser vendors, online publishers, specific industries (behavioural advertisers, web analytics/research, online retailing and hardware manufacturers).⁶⁶

The likely requirements of each of the regulatory options on each respective group are shown in bold in Figure 26 whereas the respective costs that potentially are incurred are shown in each box below: for specific industries, only the industry is shown. Note that not all effects are shown and a full discussion is provided in the text below. The overall effect of each option will be the aggregate effect from the business side (including browser vendors, online publishers and specific industries) and the consumer side.

Figure 26: Likely impacts of ‘Opt-in’ option



Source: PwC analysis

⁶⁶ Note that the specific industries considered were identified in business interviews and various discussion but do not claim to be exhaustive.

Browser vendors

Main browsers in use are according to the conducted consumer survey are Internet Explorer (60%), Firefox (20%), Chrome (11%) and Safari (4%).⁶⁷ Other statistics show that Opera also belongs to the most common browsers in use.

Browser vendors are not only active in browser development. Research suggests for example that Google, Microsoft, and Apple sites belong to the top 20 most visited UK websites⁶⁸. Furthermore, browser vendors are also significantly engaged in the online advertising industry. The Directive is, therefore, likely to affect browser vendors in various ways.

The 'Opt-in' option would require establishing information transmission standards:

- Status quo: internet cookie acceptance message is generic; there is no information on the internet cookie provided.
- For consent the online publisher would need to submit relevant information on purpose, contained information etc. and the browser would need to display this information (for example through a pop-up or link to a different web page). It is likely that the creation of standards would be costly as all browser vendors would need to agree on a single standard to ease compliance for online publishers. This is a one-off cost which would affect all browser vendors.

During a case study it was mentioned that the browser creates session internet cookies even before the website's code runs: browser vendors would then probably need to reengineer this mechanism. This change in internet cookie management might, however, lead to coordination issues and high costs for online publishers later on depending on the implemented solution. It is unclear to what extent the browser technology itself depends on this session internet cookie and how it could be replaced.

Online publishers

We apply a relatively wide definition of online publishers: All companies and public sector institutions with their own website are defined as being online publishers. Publishing might, therefore, serve for example the dissemination of information on product and services, provision of services or building a relationship with the customer. Some statistics on publishers have already been presented in the Scale of impacts section.

Linkages between certain online publishers and specific industries (like behavioural advertising) might be strong as for example some contents might be funded through them.

We have no estimate of the number of businesses operating internet cookies on their website. Based on our discussions with business, however, we believe that session internet cookies are widely in use. We further assume that any website exceeding a certain size or functionality will need to rely on internet cookies to a certain degree.

Regarding the 'Opt-in' option, online publishers should generally have the relevant privacy and other technical information on internet cookies readily available. However, submission to the browser or a link to a privacy website would need to be established.

As browser vendors might be required to alter the mechanisms with regard to session internet cookies, online publishers might incur significant additional costs. Again, this depends on the new standards - the option which is most in line with the current handling of internet cookies is likely to be the most easily acceptable for online publishers as this option will entail smallest changes for them. The costs for online publishers are likely to depend on the importance of session internet cookies for the functionality and performance of a website.⁶⁹ Generally, we expect that the cost of complying with the regulatory option will tend to increase with:

⁶⁷ Note that depending on the calculation of market shares these might vary. Other statistics show a somewhat lower share for Internet Explorer and a larger share for Firefox (for example http://en.wikipedia.org/wiki/Usage_share_of_web_browsers).

⁶⁸ Mintel (2009).

⁶⁹ Note that there can be significant differences between the importance and volume of cookies.

- the size of the website (i.e. more information);
- the number and sophistication of functionalities (for example, a blog or chat function, search facilities, login);
- universality (for example, recognition of territory); and
- handling of any necessary changes by browser vendors in a common or different way (i.e. handling in different ways would make it necessary to adapt websites for each browser separately).

Selective industries

Online advertising

Online advertising has continued to grow, including through the recession. It rose by nearly 13% since 2009 and has reached £4,097 million in 2010. The majority of this (around 60%) is paid-for search but other categories, such as targeted and behavioural advertising, are becoming more significant⁷⁰. The UK is the biggest online advertising market in the EU. Behavioural advertising represents only a small proportion of total online advertising⁷¹.

The (behavioural advertising) industry is highly specialised with a limited number of companies (or networks) operating the respective platforms. Youronlinechoices.com lists 12 partner networks from which the consumer is able to 'opt-out'.⁷² This industry structure makes a coordinated approach possible.

As targeting and tracking of consumers will become more difficult under the 'Opt-in' option and consumers are unlikely to opt-in (see consumer survey results), the behavioural advertising industry is likely to be significantly impacted and risks losing market share to more traditional forms of advertising (i.e. displacement). In the most severe scenario, this could result in behavioural advertising being largely displaced by traditional forms of advertising (online and offline). Moreover, it is likely that due to losses in advertising efficiency (and reduced scope for measuring success), some buyers of advertising may scale down their advertising spend.

Web analytics

Web analytics and online research are generally reliant on internet cookies, for example to analyse the behaviour of individuals and deliver input for website optimisation. It is likely that large parts of industry revenue would be displaced by more traditional forms of research like consumer surveys and testing campaigns which will benefit. As with behavioural advertising, however, we expect significant efficiency losses to occur and a reduction in revenue.

We expect the effects on the web analytics sector generally to be similar to those on behavioural advertisers. Unlike the internet advertising sector, we have not identified an industry body which is capable of coordinating the sector's response to an 'Enhanced information option'. It is, however, possible that the internet advertisers' response could be integrated with that of the web analytics sector.⁷³

We think it is likely that online market research could lose some market share to traditional market research techniques although, in some cases, online research without resorting to the use of internet cookies could be possible. Likewise, web analytics companies will not be able to gather and use large amounts of consumer data (other than behavioural advertising networks).

Online retailing

We assume that the operation of a basic web basket facility is likely to remain possible without end user consent for online retailers as this use of internet cookies is likely to be deemed 'strictly necessary' for the service provided. Based on the business case studies however, other areas of e-commerce enablement (personalisation, recommendation, etc.) which are important for the generation of online revenue might be subject to consent. Online retailers however, were not able to quantify the respective impacts.

⁷⁰ IAB Online Adspend Study, prepared by PwC (2010).

⁷¹ Display advertising accounts for around 21% of total online spend. Behavioural advertising is a part of display advertising. (PwC Research).

⁷² Accessed on 29 March 2011.

⁷³ Research companies are listed on www.evidon.com.

Regarding linkages with other sectors we learned from retailers that large parts of their sales are attracted by online advertising which might significantly reduce the number of visitors and ultimately customers. Furthermore, as the website functionality might become reduced (for example, due to required log in processes, etc.), people might shift back to high street retailers.

It is likely that (consumer focused) online retail with sales of £10.5 bn in 2009 would be central to these effects.⁷⁴ Significant reductions are likely to occur based on retailer's views in business case studies.

Hardware

Sales of computers amounted to £ 3.1 billion in 2009. This was equivalent to 62.9% of the UK hardware market's overall value⁷⁵.

As we have noted, it is not yet clear to what extent the use of internet cookies (and other asset tagging) by hardware manufacturers will fall within the scope of the E-Privacy Directive. If they did, the required changes could lead to significant additional costs for hardware manufacturers: for example, the business processes which underpin warranty and update processes would potentially need to be reorganised. To the extent that this increases manufacturers' and distributors' costs, these cost increases are likely to be passed through to consumers in the form of higher product prices. The risks of displacement appear to be very small.

A summary of the main industry specific effects is shown in Table 19 below.

Table 19: 'Opt-in' effects by industry

Group	Main effects
Browser vendors	<ul style="list-style-type: none"> Costs incurred in creating information standards for internet cookies. Loss incurred because reengineering of browser functions might be necessary. Different technical implementation by vendors increases costs of cookie users.
Online publishers	<ul style="list-style-type: none"> Information on cookies is readily available, but a large number of companies and bodies in the public sector would need to provide and submit information which would increase total costs. Reengineering of website functionalities and management of session cookies would increase costs. Displacement effects would lead to redistribution: traditional publishers (offline) would be likely to benefit whereas internet publishers would be likely to lose business as consumers switch to 'offline' media. Costs are incurred as a result of efficiency losses.
Specific industries	
Online advertising	<ul style="list-style-type: none"> Large reduction of behavioural advertising volume and potentially online advertising volume due to 'opt-out'. Displacement effects: traditional forms of advertising would be likely to benefit whereas online advertising would be likely to lose business. Economic costs because of efficiency losses.
Web analytics	<ul style="list-style-type: none"> Large reduction in web analytics volume and therefore business due to 'opt-out'. Displacement and efficiency losses (see online advertising).
Online retailing	<ul style="list-style-type: none"> Basic web basket functionality of online retailers is likely to stay functional because of 'strictly necessary' provision. Reengineering of other website functionalities and management of session cookies would increase costs. Reduction in user online experience and therefore traffic and sales. Displacement effects: 'high-street shopping' would benefit whereas online

⁷⁴ See Appendix A for details.

⁷⁵ Datamonitor 2009

Group	Main effects
	retailers would be likely to lose business. Costs are incurred as a result of efficiency losses.
Hardware	<ul style="list-style-type: none"> • Potentially costly reengineering of warranty and update processes. • Obtaining consent for preloaded cookies might be necessary.

Source: PwC analysis

Consumer behaviour

The constant requirement to opt-in will reduce consumers' online experience and consumers are likely to change their behaviour (this includes more or less trust): as consumers will be required to opt-in they might access fewer websites or only those websites of large companies (see consumer survey). This change in behaviour could lead to a bias favouring large and well established companies or companies operating outside the UK (or EU) as there might be no 'Opt-in' requirements.

Additionally, consumers are likely to need more time online to achieve the same 'success' as before: responses to the consumer survey indicated that internet users would read the respective information and then decide what to do. This would involve a significant total time requirement – which they have probably underestimated – and, therefore, costs for consumers (approaching £190-235 million per annum if they have to deal with 200 internet cookies per annum). The time requirement would be recurring whenever a new website is visited (and the purpose of an internet cookie is changed).

These effects are likely to lead to significant and large indirect effects for business. The effects are likely to be larger than the direct costs and result in significant displacement effects. They might include for example:

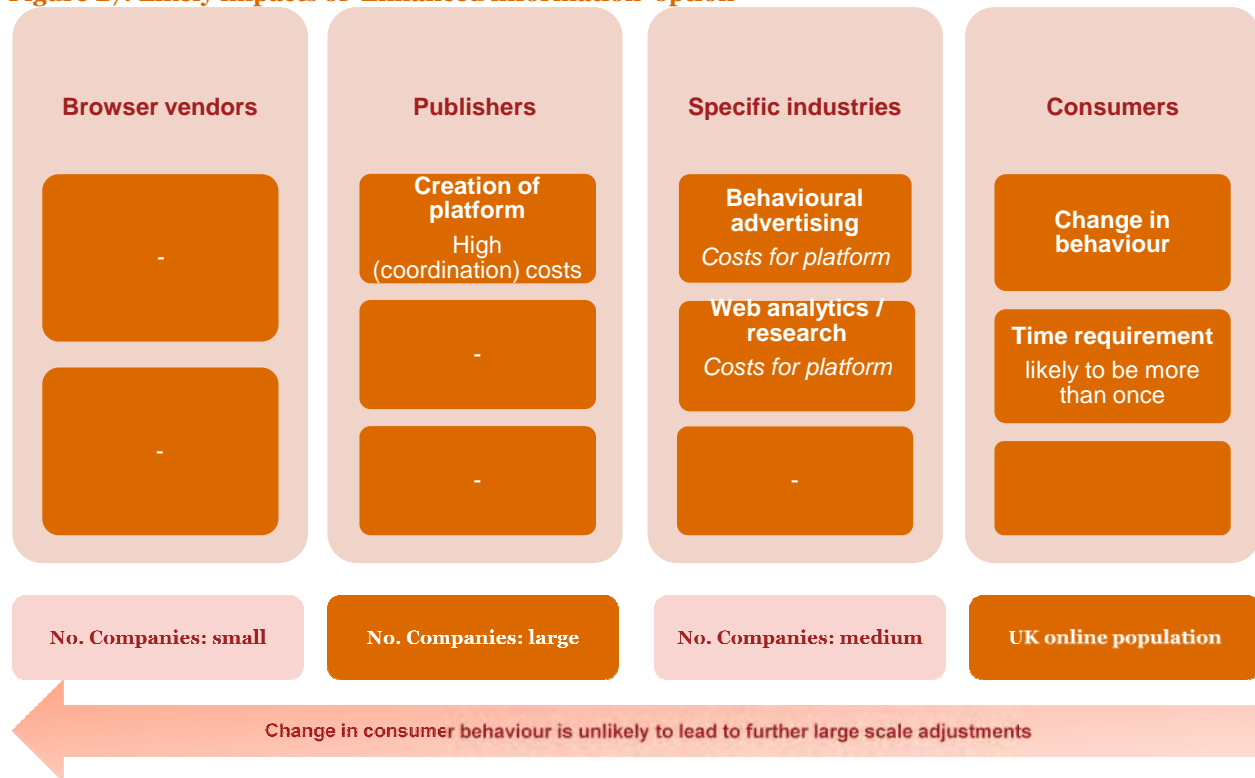
- Less online retailing (consumers decide to buy offline or do not receive appropriate recommendations): traditional retailers would benefit from this effect given that we assume that overall level of consumer spending will remain largely unaffected. However, there will be efficiency losses in terms of increased consumer time and effort to buy a specific good. This effect is likely to be non-uniformly distributed amongst business.⁷⁶ As consumers indicated they might feel more secure with the 'Opt-in' approach there might also be a countervailing effect and increased online shopping by a certain subgroup of consumers.
- Potentially, there will be some impact on online publishing which would become less convenient for consumers because of fewer visitors.
- Online transactions: Likely to be the same impact as online retailing (less functionality and additional time needed).
- Use of less internet cookies and/or new technologies: Companies might enter a 'race to the bottom' by reducing the use of internet cookies significantly or switching to new technologies altogether because of consumer response. Use of new techniques will lead to significant reengineering costs and selectively favour certain companies over others. 'Favoured companies' might already use alternative non-cookie based techniques and/or have significant resources available for the implementation of changes. As the revenue of some companies might directly be linked to the amount of web traffic the websites generate there is a high incentive to maintain functionality and performance by switching to alternative technologies.

'Enhanced information' option

Figure 27 depicts the main effects we expect resulting from the 'Enhanced information' option.

⁷⁶ The consumer survey indicates that users accepting only selected cookies are mostly likely to accept cookies from websites they visit frequently (63%), cookies which are necessary for functionality (63%) and from companies having a good reputation (49%).

Figure 27: Likely impacts of ‘Enhanced information’ option



Source: PwC analysis

Business costs

Compared to the status quo, the ‘Enhanced information’ approach (as proposed for behavioural advertising) is likely to lead to relatively small overall costs for the UK economy. Rather, the businesses (or industry) organising such platforms would incur costs for:

- Creation and maintenance of a general platform managing the use of internet cookies;
- Standardisation and industry agreement; and
- Testing the approach.

The option is industry specific (targeted towards behavioural advertising and web analytics) and only a limited number of companies would incur direct costs. It seems not feasible to use this option as an overarching approach as is the case for the other two regulatory options. If it were to be implemented by a large number of online publishers, significant coordination costs would be incurred. Also, as internet cookie use between online publishers can be expected to differ significantly, it seems unlikely that such a platform would be able to deal with and manage different uses of internet cookies. The approach is, therefore, much more focused on behavioural advertising and potentially web analytics.

With regard to specific industries, we assume the following effects of the ‘Enhanced information’ option:

- ‘Enhanced information’ is likely to have no significant impact on vendors.
- Implementation of a standardised ‘Enhanced information’ approach seems unlikely and would lead to large coordination costs between online publishers. This solution is likely to be more cost-effective in a specific industry context.
- The implementation of a general standardised ‘Enhanced information’ option seems not possible given the large number of companies and different use of internet cookies for online retailing.
- Implementation in behavioural advertising and web analytics seems possible.
- Implementation of the approach by a single company could be difficult – it would be necessary to provide information about internet cookie usage in a meaningful way to the consumer such that she or he can

give consent. It seems unlikely that the current practice of listing a websites privacy policy in a designated place is by itself sufficient to obtain a user's consent in accordance with the Directive.

A summary of the respective effects can be found in Table 20 below.

Table 20: 'Enhanced information' effects by industry

Group	Main effects
Browser vendors	<ul style="list-style-type: none"> No immediate impact.
Online publishers	<ul style="list-style-type: none"> No immediate impact as it is unlikely to be feasible for large and diversified group of online publishers.
Specific industries	
Online advertising	<ul style="list-style-type: none"> Direct costs incurred for creation of platform and management of cookies. Small displacement effects shifting business from behavioural advertising to other forms of online and offline advertising. Small efficiency losses.
Web analytics	<ul style="list-style-type: none"> If included in approach see online advertising effects.
Online retailing	<ul style="list-style-type: none"> No immediate impact as a cross-industry initiative would be unlikely to be feasible.
Hardware	<ul style="list-style-type: none"> No immediate impact as a cross-industry initiative would be unlikely to be feasible.

Consumer behaviour

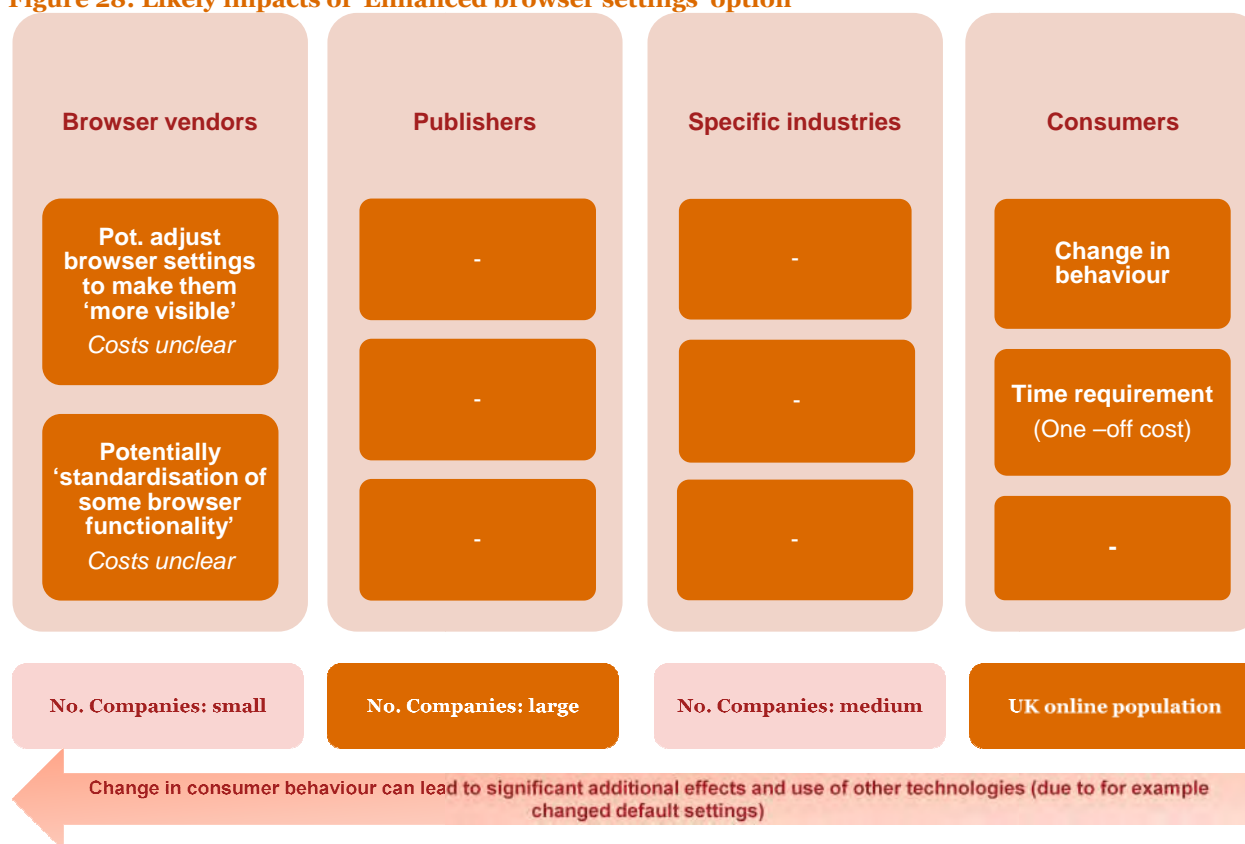
This approach would provide users with 'information in context'. This would be welcomed by some businesses. It was also mentioned that some evidence from the US, where the approach for behavioural advertising is being tested, shows that consumer behaviour (i.e. 'opt-out') does not change significantly as the online experience seems not significantly affected. Generally, the 'Enhanced information' option seems to have only a small impact on consumers.

The main costs of this option are, therefore, expected to be direct costs and to be incurred in the respective industry for setting up and managing a platform for cookie management. It should be noted however, that this option is not independent from the other options as for example 'Enhanced internet browser settings' might interfere with it.

‘Enhanced browser settings’ option

Figure 28 depicts the main effects we expect resulting from the ‘Enhanced information’ option.

Figure 28: Likely impacts of ‘Enhanced browser settings’ option



Source: PwC analysis

Browser vendors

Browser vendors are likely to be required to make ‘opt-out’ settings more visible and, potentially, more specific (first vs. third party internet cookies, etc.). (Most of) the necessary technologies, however, are (already) implemented in browsers in different ways. We assume, therefore, that making settings ‘more visible’ would not involve significant additional reengineering costs for browser vendors.⁷⁷ The approach to implementation would potentially need to be standardised to avoid a two stage selection process by the consumer (in which they first choose the browser with the preferred settings and then the settings). If this was necessary, it could lead to significant additional costs.

‘Enhanced browser settings’ might lead to the following specific effects:

- Although only a limited number of companies are active in browser development and production, changes to browser technology (i.e. ‘Enhanced browser settings’) might entail reengineering browser technology. This would be costly for vendors: significant development costs might be incurred, products might need to differ with regard to country to be compliant, etc. It is not yet clear what exactly would need to be implemented in ‘Enhanced browser settings’.
- ‘Enhanced browser settings’ is likely to have a small immediate impact on most online publishers.
- ‘Enhanced browser’ settings would not entail immediate direct effects on most online retailers.

The view was expressed during some case studies that browsers (which are constantly reengineered and updated) are already compliant. This however poses a legal question. Furthermore, it is unclear whether the

⁷⁷ The inclusion of new functionalities might lead to significant costs. Making functions more visible might also include help functionalities to inform users.

Directive requires an 'audit trail' of (technology) changes to document a browser's compliance or how otherwise compliance can be established by vendors.

The industry specific effects are summarised in Table 21 below.

Table 21 - 'Enhanced browser' settings approach by industry

Group	Main effects
Browser vendors	<ul style="list-style-type: none"> Costs would depend on precise requirements: whether browsers are already compliant/it would be necessary to provide additional information/it would be necessary to reengineer browsers?
Online publishers	<ul style="list-style-type: none"> No immediate impact.
Specific industries	
Online advertising	<ul style="list-style-type: none"> Impact dependent on interaction with the 'Enhanced information' approach and specified default settings. If advertisers' third party or behavioural cookies are blocked effects similar to 'Opt-in'.
Web analytics	<ul style="list-style-type: none"> See online advertising.
Online retailing	<ul style="list-style-type: none"> No immediate impact.
Hardware	<ul style="list-style-type: none"> No immediate impact.

Source: PwC analysis

Consumer behaviour

A change in consumer behaviour might be largely due to a 'status quo bias' created by default settings. Our consumer research suggests that many users (at least 28%, additional 20% if 'cannot remember' is included as well) do not review default internet cookie settings. This might then lead to a significant permanent impact on their online performance or (more likely) a change in settings by the consumer later on.

The time spent by the consumer would be best characterised by one-off costs (although later adjustments are likely to occur).

Importantly, the indirect effects of this option are likely to materialise especially through default settings which might change consumers' web experience. This could lead to industry impacts by increasing the proportion of internet users which do not accept internet cookies when being online. Depending on these settings, specific industries like behavioural advertising might be significantly impacted.

Conclusion

We have used the results from our consumer survey and business case studies to investigate the likely costs and benefits of the three regulatory options. It should be stressed that these options are not strictly comparable as some only apply to specific industries and the nature of the incurred costs differs largely.

'Opt-in' option

Compared to the other options, the 'Opt-in' option is likely to impose the largest total costs on the UK economy for the following key reasons:

- The 'Opt-in' option is likely to give rise to direct costs for all internet cookie users, especially the large number of online publishers.
- Internet users will potentially incur large time costs managing their use of internet cookies. If each user had to manage (only) 200 internet cookies each year, then our consumer survey suggests that the total cost would be around £190- £235 million per annum. Furthermore, users' online experience is likely to be negatively impacted. However, the results of the online survey in which the 'Opt-in' option was

preferred by most consumers contrast these calculations suggest a preference for more control with regard to internet cookies. It is, however, unclear whether the above time costs have been fully considered by survey participants.

- The 'Opt-in' option is likely to increase the overall level of trust of internet users and this might increase the volume of certain online transactions.
- The 'Opt-in' option is likely to lead to the largest displacement effects as business shifts from online channels to offline channels. Although offline business will benefit from these effects, there will be associated efficiency losses (unrealised sales, additional consumer and business costs) which represent economic costs.

The costs are likely to be non-uniformly distributed across the business community. Businesses with websites which rely most heavily on the use of internet cookies will be most affected. Furthermore, internet cookies are most likely to be accepted if they come from large, well known companies and public sector institutions which are most trusted by consumers.

'Enhanced information' option

The 'Enhanced information' option would be likely to lead to relatively small overall economic costs for the following reasons:

- The option is industry specific (targeted towards behavioural advertising and web analytics) and only a limited number of companies involved in providing browsers would incur direct costs. It is not likely to be feasible to use this option as an overarching approach as is the case for the other two regulatory options.
- Initial trials show that the approach would not lead to large scale consumer reactions.

A general benefit of the 'Enhanced information' approach would be the presentation of information in context (i.e. the user would be able to request additional information on internet cookies when they were in use). This would be likely to have positive implications for users in terms of enhanced trust.

The 'Enhanced information' option does not seem feasible in a wider context for publishers due to the large number of companies and associated coordination problems and the diverse use of cookies. Nevertheless, it potentially can be applied in a 'mixed implementation' strategy for behavioural advertising (and web analytics).

'Enhanced browser settings' option

The costs incurred by the 'Enhanced browser settings' option would depend significantly on the precise implementation and requirements of the option. For example, if existing browsers were already deemed to be compatible with the amended E-Privacy Directive then no costs would be incurred by the implementation of this option. However, if browser vendors were required to reengineer their browsers, this would entail direct costs for vendors and potentially associated technology costs for cookie users who must coordinate with the underlying browser technology framework(s). The costs could become substantial. We estimate the economic costs of this option to be in general lower than the costs incurred by the 'Opt-in' option for the following reasons:

- 'Enhanced browser settings' would concentrate the requirements for regulatory compliance onto a small number of stakeholders; direct costs could be limited to browser vendors.
- The option would generally lead to one-off consumer costs as opposed to recurring costs of the 'Opt-in' option.

The consumer response to this option would depend on the information provided and the default options (as shown in consumer research) and could have a significant impact on economic costs as business adapts to this response.

Currently internet browsers distinguish between first party and third party cookies. If browser vendors' interpretation of 'Enhanced browser settings' involves blocking third party cookies by default, this would entail large costs on the advertising and web analytics industries. In addition, costs would be incurred by the

advertising industry if users were provided with the option to block behavioural tracking cookies⁷⁸ in browser settings, perhaps even by default. Online retailers and hardware vendors rely less critically on these kinds of cookies and are, therefore, less exposed to changes in browser settings.⁷⁹

Generally, 'Enhanced browser settings' could potentially provide a solution for most internet cookies in use. The option could be refined by the 'Enhanced information' option or 'Opt-in' options for specific internet cookies uses and/or industries.

Overarching conclusion

Internet cookies are fundamental to the success of many of the businesses we spoke to. The implementation of the Directive needs careful thought because of this importance, the associated costs with regard to changes in internet cookie handling, and because of the substantive lead times for implementation that were generally reported. Importantly, the number of businesses affected and lead times depend on the design and implementation of the regulatory options. The 'Opt-in' option, in particular, would lead to substantive costs for business.

Whereas the businesses interviewed were generally in favour of the 'Enhanced browser settings' option, evidence from the consumer survey revealed user concerns with regard to internet security and, specifically, a preference for the 'Opt-in' option. However, given survey respondents' limited knowledge of internet cookies, it is unclear whether consumers' views adequately reflect the total time requirements of this regulatory option. Overall, enhanced consumer trust is likely to have (long-term) benefits for online business and to increase online transactions.

The implementation of the Directive will need to strike a balance between the costs and benefits likely to be incurred by consumers (i.e. internet users) and those imposed on businesses given the legal framework and requirements. Having researched three different regulatory options, we believe that the implementation of a mixed approach might be most sensible as this would enable different approaches to be applied to different types of cookie whilst minimising the number of businesses potentially affected by the regulation. Whereas 'Enhanced browser settings' could be a sensible and time-saving approach for day-to-day management of cookies, consumers' wish for more control would potentially be addressed for by the 'Enhanced information' option or the 'Opt-in' option in specific circumstances. Such an approach is also likely to reduce the overall costs for business as further requirements for regulatory compliance would be concentrated on a small number of business stakeholders.

⁷⁸ Behavioural tracking cookies are cookies that track a user's behaviour across a number of sites such as to display advertisements that are most likely to lead to a sale.

⁷⁹ It is unlikely that the 'Enhanced browser settings' option would require all cookies to be blocked by default.

Appendix A: Consumer survey questionnaire

Introduction

Thank you for opening this survey which is being undertaken on behalf of the Department for Culture, Media and Sport.

The results of the survey will be used to assess the potential impacts of policy changes being considered by the Department.

Results of interviews will be combined in our analysis, and you will remain anonymous. Neither the Department nor anyone who sees reports of the survey results will know who has participated.

The questions will take about 20 minutes to answer.

Internet use - background information

Explain that focus of survey is private use of internet

1. Before today, when did you last use the internet for private use? (Please mark the one that applies)

Within the last week
Within the last month
Within the last three months
More than three months ago
Never used it

2. How often do you use the internet for private use? (Please mark the one that applies)

Every day or almost every day
At least once a week (but not every day)
Once a month or less

3. Where do you access the internet for private use? (Please mark all that apply)

Home
Another person's home
Place of education
Hotspot (wi-fi)
Place of work
Public library
Whilst travelling between locations (e.g. on the train)
Other (please specify)

4. How do you access the internet? (Please mark all that apply)

Personal computer (PC)/laptop
Handheld computer
Tablet computer (like an iPad)
Mobile phone
Portable media player (like an iPod Touch or Archos)
None of the above

5. What is the main internet browser you use? (Please mark the one that applies)

Internet Explorer
Safari
Mozilla
Chrome
Other (please specify)
Don't know

6. Do you use more than one internet browser? (Please mark the one that applies)

Yes
No
Don't know

7. When you first started to access the internet with the device you are currently using, how were the privacy settings established? (Please mark the one that applies)

I left the default settings without checking them
I reviewed the default settings but did not change them.
I changed them to give me more privacy
I changed them to give me less privacy
I cannot remember

8. What activities do you undertake when using the internet? (Please mark all that apply)

Send/receive e-mails
Get information on hobbies and personal interests
Get information on products/services thinking of buying
Buy products/services online (not groceries)
Internet banking
Social networking sites
Download music or streaming music
Play games online
Grocery shopping online
Download movies or watch web television
Read or download online news, newspapers or magazines
Upload self created content to any website to be shared (e.g. photos, music, videos)
Make voice or video calls (via webcam) over the Internet
Sell goods or services over the Internet

9. Which online communities, if any, are you part of? (Please mark all that apply)

Facebook
MySpace
Twitter
LinkedIn
Little Gossip
Last.fm
Other (please specify)
None

10. How often do you purchase each of these items using the internet? (Please mark the one that applies)

	A few times a month	A few times a year	Never
Clothes, sports goods			
Films, music			
Holiday accommodation (e.g. hotels)			
Household goods (e.g. furniture, toys)			
Books, magazines, newspapers (including e-books)			
Other travel arrangements (e.g. flights, transport tickets, car hire)			
Tickets for events			

Electronic equipment (including cameras)			
Food or groceries			
Video games or computer software and upgrades			
Other (besides those specified above)			

11. How often do you purchase items in response to adverts you see on the internet? (Please mark the one that applies)

A few times a month	
A few times a year	
Never	

12. How often do you purchase items in response to e-mails you receive? (Please mark the one that applies)

A few times a month	
A few times a year	
Never	

Attitudes to the internet

13. Overall, how confident are you as an internet user?

Scale from 1 to 10; (1: I am not confident at all; 10: I am totally confident I can do everything I wish to do)

14. Are you concerned about internet security? (Please mark the one that applies)

Yes (go to question 13)
No (go to question 16)
Don't know (go to question 16)

15. What aspects of internet security are of concern to you? (Please mark all that apply)

Catching a virus or other computer infection
Receiving unsolicited e-mails
Abuse of personal information sent on the Internet
Other privacy violations (abuse of pictures, personal data uploaded on community websites)
Financial loss due to responding to fraudulent messages
Financial loss due to getting redirected to fake websites asking for personal information
Financial loss due to fraudulent payment (credit or debit) card used
Children accessing inappropriate websites
Children connecting with potentially dangerous persons from a computer within the household
Other (please specify)

16. Are there any activities you do not undertake because of internet security concerns? (Please mark the one that applies)

Yes (go to question 15)
No (go to question 16)
Don't know (go to question 16)

17. Which internet activities do you not undertake because of internet security concerns? (Please mark all that apply)

Ordering or buying goods or services for private use
Carrying out banking activities
Providing personal information to online communities for social or professional networking
Communicating with public services or administrations
Downloading software, music, video files, games or other data files
Using the Internet with mobile device (e.g. laptop) via a wireless connection from places other than home
Using internet cafes or public computers for writing e-mails and other personal transactions

Other (please specify)

18. On a scale from 1 (totally disagree) to 5 (totally agree), please indicate how far you agree with the following statements about the internet

	1 – Totally disagree	2 - Disagree somewhat	3 – Neither agree or disagree	4 - Agree somewhat	5 – Totally agree	Don't know
Buying through the internet is as safe as any other way						
I worry about the dangers the internet poses to children						
The internet is my main source of entertainment in my free time						
Through the internet I can find information I need fast						
I find the internet too complex						

19. On a scale from 1 (totally disagree) to 5 (totally agree), please indicate how far you agree with the following statements about data security

	1 – Totally disagree	2 - Disagree somewhat	3 – Neither agree or disagree	4 - Agree somewhat	5 – Totally agree	Don't know
I am concerned about companies collecting my private data						
I am happy giving out my personal information if it helps companies give me more choice/options						
I'm happy giving out my personal information if it helps companies give me relevant discounts/deals						
I'm happy giving out my personal information if it saves me time						
I don't have a clear view about the types of personal data companies are able to collect from me						
I only provide my personal information to companies who I know I can trust						
I am only happy for my data to be used if it is anonymised						
Too much of my personal information is stored on the internet						
There is no personal benefit to companies storing my personal information						
Companies should be punished for breaking privacy laws						
I would watch what I do online more carefully if I knew companies were collecting data						

20. When you use the internet, how concerned, if at all, are you about your online privacy generally? (Please mark the one that applies)

Very concerned
Fairly concerned
Not very concerned
Not at all concerned
Don't know

21. When you use the internet, do you consider these data private? (Please mark the one that applies)

	Yes	No	Don't know
Personal details (name, address)			
Internet protocol (IP) address			
The contents of e-mails			
The websites I have visited (history)			
What I did when visiting a website			

Other (please specify)	
------------------------	--

22. On a scale from 1 (not at all important) to 4 (very important), please indicate how much importance you attach to each of the privacy of the following data?

	1 – Not at all important	2 - Not very important	3 – Quite important	4 – Very important	Don't know
Personal data (name, address)					
IP address					
The contents of e-mails					
The websites I have visited (history)					
What I did when visiting a website					

23. On a scale from 1 (totally agree) to 5 (totally disagree), please indicate how far you agree with the following practices

	1 – Totally disagree	2 - Disagree somewhat	3 – Neither agree or disagree	4 - Agree somewhat	5 – Totally agree	Don't know
I like advertising which is tailored to my interests						
I like discounts which are tailored to my interests						
I like news that is tailored to my interests						
I like being automatically recognised on a webpage						
I use the “remember me / auto login” facility of webpages so I do not need to remember all my passwords						

Understanding of internet cookies

The next section of the questionnaire asks about your understanding of internet cookies

24. Which one of these best describes how aware you were of how cookies work before today? (Please mark the one that applies)

I understood fully how they work
I had some understanding of how they work
I had heard of cookies, but did not understand how they work
I had not heard of cookies before today
Don't know

25. Please indicate whether each of these statements about internet cookies is true or false?

	True	False	Don't know
Cookies are small bits of data stored on my computer			
Cookies let websites display more quickly			
Cookies let me stay logged in over time without needing to enter my password every time I visit a website			
Cookies enable personalised advertising based on my previous behaviour online			
Cookies are no different to my internet browser history			
Advertisers can use cookies on multiple websites to learn which websites I visit			
Cookies may be combined with other data that identifies me by name			
If I do not accept cookies, websites cannot tell where I am physically located			
Cookies enable personalised content like colour schemes or what type of information I want to see on a website			
Cookies contain information from when I first purchased my computer, including my name and home address			
Cookies let browsers forward and backward arrows work correctly			
Cookies are a type of spyware			
A website I visit can read every cookie I have no matter which website the cookie if from			

Cookies let people send me spam			
Cookies change the colour of hyperlinks to websites I have already visited			
By law, cookies may not contain credit or debit card information			

26. Please refer to the images and descriptions below to answer the following question.

Imagine you are using a web browser to view an online news website which has adverts as depicted in the diagram. There are no other non-visible components to the webpage.

[Presentation of diagrams]

For each diagram, how confident are you that each of the following situations could happen?

		Certain it could happen	Probably could happen	Probably can't happen	Certainly can't happen	Don't know
Diagram A	The news web server sets and reads cookies for all elements on the webpage, including cookies associated with specific adverts.					
Diagram B	Multiple web servers set and read cookies from news web page					
Diagram C	Only the news web server can set and read cookies on the news web page.					
Diagram D	Different servers set and read cookies from different parts of the news web page.					

Explanation of internet cookies

Cookies are small text files that are saved on a computer when a user visits certain websites. They effectively act as a memory of what has happened previously when the user's computer has interacted with that website.

Cookies have a number of uses: for example, they facilitate internet session management and personalisation of web use. They are also used by some advertising firms to tailor their advertising campaigns.

For example, if an internet cookie is issued by an advertising company with adverts on many different websites, this might allow a user to be followed across websites as the cookie will be sent whenever the user visits these websites. Alternatively, an online retailer may use cookies to store information on items that have been added to the 'basket', ready to be purchased together with other items in one transaction.

Cookies can be session based and expire after a session or be persistent and last beyond the current web session. If an internet cookie is persistent, it will be sent to the webpage (server) again whenever the user visits the site until the cookie's expiry date.

Cookies do not identify an individual user, but rather the computer that was used to access the website.

Cookies do not read information saved on a user's hard drive; they can only transfer, and only contain, as much information as the user has disclosed to a certain website.

Cookies are not computer programmes and, therefore cannot be executed as code.

Cookies cannot be used to disseminate computer viruses.

Management of cookies

27. How many cookies do you currently accept on your computer? (Please mark the one that applies)

I accept all cookies		go to Q29
I accept only selected cookies		go to Q28
I do not accept any cookies		go to Q30
Don't know		go to Q30

28. Which selected cookies do you currently accept on your computer? (Please mark all that apply)

Cookies from companies or websites I visit frequently	
Cookies from companies that have a good reputation	
Cookies that are necessary for the functionality of a webpage I would like to visit	
I read the privacy policy of a company and then decide	
Depends on circumstances (please explain)	

29. What do you mainly do with those cookies that you accept onto your computer? (Please mark the one that applies)

I take no further action
I delete them automatically (by software)
I delete them by hand

30. How do these factors impact on your decision to accept cookies? (Please mark the one that applies)

	No impact on my decision	Will change my decision to accept
A transparent privacy policy of the webpage		
The possibility of getting additional information on the cookie (purpose, how to delete, etc.)		
The website performance & functionality would be impacted otherwise		
Personalisation of a webpage would be lost otherwise		
Stored cookies provide evidence of web pages I have visited		

31. Are you aware of any of the following websites and software which help users to “opt out” of receiving internet cookies from certain websites? Which of them have you used? (Please mark all the ones that apply)

	Aware (Yes or no)	Use (Yes or no)
youronlinechoices.com		
NAI- Network Advertising Initiative		
TACO (for Firefox)		
Anonymous browsing		
Other (please specify)		

32. Do you use software that helps you to protect your privacy when you use the internet?

Yes
No
Don't know

33. How much do you currently pay each month for your internet services? (Please mark the one that applies)

£0-£2.50	
£2.51-£5.00	
£5.01-£7.50	
£7.51-£10.00	
£10.01-£12.50	
£12.51-£15.00	
£15.01-£17.50	
£17.51-£20.00	

£20.01-£22.50	
£22.51-£25.01	
£25.01-£27.50	
£27.51-£30.00	
More than £30.00	

Impact of suggested approaches to regulation

34. Are you aware that the Government is considering changes to the way in which the use of internet cookies is regulated as part of implementing revisions to the European Union's Electronic Communications Framework? (Please mark the one that applies)

Yes
No
Don't know

The Government is currently considering changes to the way in which the use of internet cookies is regulated. It has identified three possible elements of its approach:

- **Approach 1 - 'Opt-in' for Individual Internet Cookies**: this would require internet users to confirm that they wish to accept an internet cookie placed on their computer before the internet cookie is placed there. Under this option, users might see a pop-up window appear on every web page they visit where an internet cookie is about to be used. This pop-up would explain the purpose of the internet cookie, the information it would hold and how this information would be used. It would then give the user the option to accept or reject the internet cookie before it is used.
- **Approach 2 - 'Enhanced Information about Individual Internet Cookies'**: this would highlight to internet users where internet cookies are being used and enable them to find out more about them. Under this option, users would see an icon appear on every web page they visit where an internet cookie is being used. By clicking on this icon, users would be able find out more about the purpose of the internet cookie, the information it would hold and how this information would be used. It would also explain how the user can accept or reject the internet cookie.
- **Approach 3 - 'Enhanced Internet Browser Settings'**: this would allow users to consent to the use of internet cookies via their internet browser settings. It would mean that browser settings would need to be made more visible to internet users and they would need to be provided with clear and comprehensive information about internet cookies and how they can use their browser settings to opt-out of them if they wish either on a case by case basis or collectively.

35. On a scale from 1 (not at all important) to 4 (very important), please indicate how much importance you attach to the following types of information to enable you to make informed choices about whether or not to accept an internet cookie?

		1 – Not at all important	2 - Not very important	3 – Quite important	4 – Very important	Don't know
Contents	The information contained in the cookie					
Issuer	The organisation responsible for the cookie					
Purpose	How the information provided by the cookie will be used					
Impact	How acceptance of the cookie will impact on the functionality of the webpage					
How to delete them	Information on how the cookie can be deleted in future					

36. How would you decide whether or not to accept an individual internet cookie? (Please mark the one that applies)

I would decide instantly without reading the information provided each time	
I would need some time to read the information presented each time	
I would need some time to read the information presented and do additional research / ask for help	

37. How much time would you be willing to spend the first time you use a website deciding whether or not to accept an individual internet cookie? (Please mark the one that applies)

Up to 5 seconds	
Between 5 and 10 seconds	
Between 10 and 30 seconds	
More than 30 seconds	

38. If you receive subsequent internet cookies from the same website, would you expect to spend more or less time before deciding whether or not to accept the internet cookie? (Please mark the one that applies)

More time	
Less time	
Would depend on the type of internet cookie	
Not sure	

39. For each of the following possible types of internet cookie, please indicate which statement you agree with

	I prefer to have to opt-in to accept the internet cookie	I prefer to be able to find out about the internet cookie and then decide whether to accept it	I do not mind what approach is used
A persistent internet cookie that remains on your computer after your session			
A temporary internet cookie that is deleted when you close your internet browser			
An internet cookie originating from the website you wish to use			
An internet cookie originating from a different website to the one you wish to use			
An internet cookie which is used to manage and personalise your web use			
An internet cookie which is used to target advertising			

40. Overall, would you change the number of internet cookies you accept if Approach 1 - the 'Opt in' approach - were implemented? (Please mark the one that applies)

Yes, I would change my online behaviour	Go to Q41
No, I would not change my online behaviour	Go to Q42
I do not know	Go to Q42

41. How would you change the number of internet cookies you accept if Approach 1 - the 'Opt in' approach - were implemented? (Please mark the one that applies)

I would accept more internet cookies than I do currently	
I would accept fewer internet cookies than I do currently	
I do not know	

42. How many internet cookies would you accept if Approach 1 - the 'Opt in' approach - were implemented?
(Please mark the one that applies)

I would accept all cookies	
I would accept more than half of the cookies but not all	
I would accept less than half of the cookies but I would accept some	
I would reject all cookies	

43. On a scale from 1 (totally disagree) to 5 (totally agree), please indicate how far you agree with each of the following statements if Approach 1 - the 'Opt in' approach - were implemented?

	1 – Totally disagree	2 - Disagree somewhat	3 – Neither agree or disagree	4 - Agree somewhat	5 – Totally agree	Don't know
I would feel more secure						
I would think more about privacy issues						
My online experience would be hindered						
I would be more willing to perform personal transactions on the web						
I would find this approach too time consuming						
I would find it more difficult to navigate on websites						
I would spend less time on the internet						
I would spend more time on the internet						
I would find it more difficult to find products I like						

44. Overall, would you change the number of internet cookies you accept if Approach 2 - the enhanced information about individual cookies approach - were implemented? (Please mark the one that applies)

Yes, I would change my online behaviour	Go to Q45
No, I would not change my online behaviour	Go to Q46
I do not know	Go to Q46

45. How would you change the number of internet cookies you accept if Approach 2 - the enhanced information about individual cookies approach - were implemented? (Please mark the one that applies)

I would accept more internet cookies than I do currently	
I would accept fewer internet cookies than I do currently	
I do not know	

46. How many internet cookies would you accept if Approach 2 - the enhanced information about individual cookies approach - were implemented? (Please mark the one that applies)

I would accept all cookies	
I would accept more than half of the cookies but not all	
I would accept less than half of the cookies but I would accept some	
I would reject all cookies	

47. On a scale from 1 (totally disagree) to 5 (totally agree), please indicate how far you agree with each of the following statements if Approach 2 - the enhanced information about individual cookies approach - were implemented?

	1 – Totally disagree	2 - Disagree somewhat	3 – Neither agree or disagree	4 - Agree somewhat	5 – Totally agree	Don't know
I would feel more secure						
I would think more about privacy issues						
My online experience would be hindered						
I would be more willing to perform personal transactions on the web						
I would find this approach too time consuming						
I would find it more difficult to navigate on websites						
I would spend less time on the internet						

	1 – Totally disagree	2 - Disagree somewhat	3 – Neither agree or disagree	4 - Agree somewhat	5 – Totally agree	Don't know
I would spend more time on the internet						
I would find it more difficult to find products I like						

48. If Approach 3 - the 'Enhanced browser settings' approach - was implemented, how much time would you be willing to spend deciding how to set your browser? (Please mark the one that applies)

Up to 2 minutes		
Between 2 and 5 minutes		
Between 5 and 10 minutes		
More than 10 minutes		

49. On a scale from 1 (totally disagree) to 5 (totally agree), please indicate how far you agree with the following statements if Approach 3 - the 'Enhanced browser settings' approach - were implemented?

	1 – Totally disagree	2 - Disagree somewhat	3 – Neither agree or disagree	4 - Agree somewhat	5 – Totally agree	Don't know
I would feel more secure						
I would find it difficult to know how to set my browser without knowing how each internet cookies will be used						
I would think more about privacy issues						
My online experience would be hindered						
I would be more willing to perform personal transactions on the web						
I would find this approach too time consuming						
I would find it more difficult to navigate on websites						
I would spend less time on the internet						
I would spend more time on the internet						
I would find it more difficult to find products I like						

50. Overall, would you change the number of internet cookies you accept if Approach 3 - the 'Enhanced browser settings' approach - were implemented? (Please mark the one that applies)

Yes, I would change my online behaviour	Go to Q51
No, I would not change my online behaviour	Go to Q52
I do not know	Go to Q52

51. How would you change the number of internet cookies you accept if Approach 3 - the 'Enhanced browser settings' approach - were implemented? (Please mark the one that applies)

I would accept more internet cookies than I do currently	
I would accept fewer internet cookies than I do currently	
I do not know	

52. How many internet cookies would you accept if Approach 3 - the 'Enhanced browser settings' approach - were implemented? (Please mark the one that applies)

I would accept all cookies	
I would accept more than half of the internet cookies but not all	
I would accept less than half of the internet cookies but I would accept some	
I would reject all internet cookies	

53. Overall, please rank the three approaches in order of preference? (Please add rank from 1 to 3 where 1 is the preferred approach and 3 is the least preferred)

	Rank
Approach 1 – Opt In for individual internet cookies approach	

Approach 2 - Enhanced information about internet cookies approach	
Approach 3 - Enhanced browser settings approach	

54. If it was possible to provide a service which could manage the internet cookies delivered to your computer on your behalf to reflect your preferences, how much would you be willing to pay per month? (Please mark the one that applies)

£0	
£0.50	
£1.00	
£1.50	
£2.00	
£2.50	
£3.00	
£3.50	
£4.00	
£4.50	
£5.00	
More than £5.00	

Demographic information

To finish the survey, here are a few questions about you.

55. What is your age? (Please mark the one that applies)

16-24
25-44
45-54
55-64
65+

56. Are you male or female? (Please mark the one that applies)

Male
Female

57. Where in the UK do you live? (Please mark the one that applies)

North West
North East
Yorkshire & Humberside
East Midlands
West Midlands
South West
South East
London
East
Scotland
Wales

58. What is your marital status? (Please mark the one that applies)

Single
Married
Widowed
Divorced

59. What is your highest educational qualification? (Please mark the one that applies)

Degree
A-Level or Highers
ONC / BTEC
O-Level or GCSE (A-C)
GCSE (D-G)
Other qualification (foreign qualification below degree)
No formal qualifications

60. Last week, were you mainly (Please mark the one that applies):

Working as an employee
On a government sponsored training scheme
Self-employed or freelance
Working paid or unpaid for your own or your family's business
Away from work ill, on maternity leave, on holiday or temporarily laid off
Doing any other kind of paid work
Actively looking for any kind of paid work
Waiting to start a job already obtained
Retired (whether receiving a pension or not)
A student
Looking after home or family
Long-term sick or disabled
Other

61. Do you have a long-standing illness, disability or infirmity (i.e. anything that has troubled you over a long period of time or that is likely to affect you over a period of time). (Please mark the one that applies)

Yes
No

62. Which of these ethnic groups do you consider that you belong to? (Please mark the one that applies)

White
Asian or Asian British
Black or Black British
Mixed ethnic background
Prefer not to say

63. Are you the bill-payer in your household for internet services? (Please mark the one that applies)

Yes
No

64. How many internet users are there in your household? (Please mark the one that applies)

1
2
3
4
5
More than 5

65. What is your total yearly household income from all sources before tax and other deductions? (Please mark the one that applies)

£6,000 or less
£6,001 to £15,600
£15,601 to £26,000
£26,001 to £41,600
£41,601 to £56,600

£56,601 or more
Prefer not to say
Don't know

66. Sometimes it is helpful to re-contact people to find out more about their views or to see what their views are in the future. Would it be acceptable to contact you again to discuss topics similar to those covered in this survey? (Please mark the one that applies)

Yes
No

Appendix B: Business case study framework

Hardware manufacturers & browser vendors

Respondent

- What is the respondent's role in the company and his position?

Company

- How many full time employees does the company have in the UK? And how many elsewhere in the EU? And the RoW?
- What was the company's annual revenue last year (if public)? Again, how does this breakdown by geography?
- When was the company founded?
- What products/services does the company provide which rely on the use of internet cookies (hardware/software (including web browsers)? What are they used for? How are they used?
- How important is the supply of products and services which use internet cookies (i.e. sales) for the company (percentage of annual revenue)?

Market position

- For what is the product/service used (description)? Are there substitutes? What are these?
- What are the company's main markets?
- Who are the company's customers (profile; downstream businesses, customers, etc)? How many are there?
- Who are its main competitors? Where are they located - in the UK or abroad (EU vs. non-EU)?
- What is company's market share?
- How large is this sector/market (total revenue, # companies)? How has it changed over the last five years?
- What is the size profile of companies in the industry (small / medium / large)? What drives this profile (e.g. existence of economies of scale and other entry barriers)?

Role of internet cookies

- How are the company's products and services used by internet users to manage the way in which they make use of internet cookies? What options do they have? How much information/other help is provided to customers?
- What skills/technical knowledge do internet users need to manage their use of cookies?

E-privacy Directive

- Is the company aware of the European Communications Framework and the changes required/envisaged to the E-privacy Directive?
- Has the company publicly expressed its views?
- How well informed does the company feel about the potential changes?

Regulatory options – Opt in

'Opt-in' Approach: this would require internet users to confirm that they wish to accept every internet cookie placed on their computer before the internet cookie is placed there. Under this option, users might see a pop-up window appear on every web page they visit where an internet cookie is about to be used. This pop-up would explain the purpose of the internet cookie, the information it would hold and how this information would be used. It would then give the user the option to accept or reject the internet cookie.

- What (if anything) would the company need to do to ensure that its use products/services enable internet cookies to be used in a way which complies with the regulatory option?
- What (technical) changes / solutions would need to be implemented to comply with the Directive?
- How long would it take to comply?
- How large would be the associated direct costs? Would they be one-off or recurring costs? What would they involve? What determines their scale? Would there be any indirect costs? What would these be? What determines their scale?
- What would this imply for internet users already using a certain browser? Would an update or a new installation be required?
- What would this imply for new users of your browser? Would the new product satisfy the Directive or would you provide an add-in?
- How far would you be able to pass any additional costs onto browser users? How much more expensive would your product be?
- Would there be issues with browser compatibility (EU ROW)? Would there be different browsers depending on a consumers' location (EU and ROW)? How might competition between browser vendors change (for example the browser which is closest to the status quo might be preferred by some groups)?

Regulatory options – Enhanced browser settings

- **‘Enhanced Internet Browser Settings’ Approach:** this would allow users to consent to the use of internet cookies via their internet browser settings. It would mean that browser settings would need to be made more visible to internet users and they would need to be provided with clear and comprehensive information about internet cookies and how to opt-out of them if they wish.
- What (if anything) would the company need to do to ensure that its use products/services enable internet cookies to be used in a way which complies with the regulatory option?
- What (technical) changes / solutions would need to be implemented to comply with the Directive?
- How long would it take to comply?
- How large would be the associated direct costs? Would they be one-off or recurring costs? What would they involve? What determines their scale? Would there be any indirect costs? What would these be? What determines their scale?
- What would this imply for internet users already using a certain browser? Would an update or a new installation be required?
- What would this imply for new users of your browser? Would the new product satisfy the Directive or would you provide an add-in?
- How far would you be able to pass any additional costs onto browser users? How much more expensive would your product be?
- Would there be issues with browser compatibility (EU ROW)? Would there be different browsers depending on a consumers' location (EU and ROW)?
- How might competition between browser vendors change (for example the browser which is closest to the status quo might be preferred by some groups)?

Regulatory options – Comparison

- How would you compare the two regulatory options in terms of their impact on your company? How would you summarise your views and preferences?

Intermediaries

Respondent

- What is the respondent's role in the company and his position?

Company

- How many full time employees does the company have in the UK? And how many elsewhere in the EU? And the RoW?
- What was the company's annual revenue last year (if public)? Again, how does this breakdown by geography?
- When was the company founded?

- What products/services does the company provide which rely on the use of internet cookies (web design, web analytics, ad networks, other intermediary services)? What are they used for? How are they used?
- How important is the supply of products and services which use internet cookies (i.e. sales) for the company (percentage of annual revenue)?

Market position

- For what is the product/service used (description)? Are there substitutes? What are these?
- What are the company's main markets?
- Who are the company's customers (profile; downstream businesses, customers, etc)? How many are there?
- Who are its main competitors? Where are they located - in the UK or abroad (EU vs. non-EU)?
- What is company's market share?
- How large is this sector/market (total revenue, # companies)? How has it changed over the last five years?
- What is the size profile of companies in the industry (small / medium / large)? What drives this profile (e.g. existence of economies of scale and other entry barriers)?

Role of internet cookies

- How dependent is the company's products and services on internet cookies (gathering of information, personalisation)?
- Is acceptance of internet cookies necessary to use the products / services?
- Is the company using a single or multiple internet cookies? If multiple, how many are currently in operation (stock)?
- How many new internet cookies were created last year (i.e.2010)? How many times were they downloaded (flow)? What percentage of users accepted / did not accept internet cookies from the company? What categories of customer/target did not accept them? Do you know the reasons why users chose not to accept internet cookies? Has the company done any research in this area?
- For what purpose are these internet cookies used (personalisation, functionality of online shopping, other)? What type of internet cookies are they (session based / persistent; first / second /third party internet cookies)?
- Has the company undertaken any research that assesses and quantifies these impacts?
- Does the company have a privacy policy which describes how and why internet cookies are used by the company, what they do and how one could opt-out?
- Has the company ever received complaints regarding the use of internet cookies? How many? On what grounds? How have they responded?

Overall impact of internet cookies

Business model

- From a technical perspective, can you provide your product /service without using internet cookies? If not, explain why not? Are there alternatives to internet cookies?
- How does the use of internet cookies shape your business model (for example advertising, customer loyalty, performance)?
- Can you estimate what proportion of your revenue arises from products/services which directly or indirectly depends on internet cookies? Is your revenue directly linked to internet cookies (for example targeting and web analytics)?

Costs

- How (if at all) does the use of internet cookies affect your costs (creation of product, providing services)?

Prices

- Does the use of internet cookies enable you to offer your products/services at lower (more competitive) prices?
- Do internet cookies enable you to provide services which provide a source of revenue (for example through behavioural ads)?

Overall

- Have any of these questions been examined quantified from an industry perspective?

E-privacy Directive

- Is the company aware of the European Communications Framework and the changes required/envisaged to the E-privacy Directive?
- Has the company publicly expressed its views?
- How well informed does the company feel about the potential changes?

Regulatory options – Opt in

‘Opt-in’ Approach: this would require internet users to confirm that they wish to accept every internet cookie placed on their computer before the internet cookie is placed there. Under this option, users might see a pop-up window appear on every web page they visit where an internet cookie is about to be used. This pop-up would explain the purpose of the internet cookie, the information it would hold and how this information would be used. It would then give the user the option to accept or reject the internet cookie.

- What (if anything) would the company need to do to ensure that its use products/services enable internet cookies to be used in a way which complies with the regulatory option?
- What (technical) changes / solutions would need to be implemented to comply with the Directive?
- How long would it take to comply?
- How large would be the associated direct costs? Would they be one-off or recurring costs? What would they involve? What determines their scale? Would there be any indirect costs? What would these be? What determines their scale?
- Does the company see any problems with this approach (legal / technical)? If so, what are these? How might they be overcome?
- What would be the implications if 10% of consumers rejected the companies’ internet cookies (where previously/currently they would have accepted them)? (Reduced web visits, time spend on web site, less convenient, impact on sales)? What evidence is there to support this view?
- Would your competitors be affected differently (for example because they use internet cookies differently)? What would be the consequences of this? Can you quantify them?
- Would/could there be a competitive advantage / disadvantage in comparison to larger / smaller companies? How significant would this be? And for companies based/operating overseas? Why? How significant could this be?
- Overall, how significant would be the impact of this option be on the company’s business (no impact/ minor impact/ significant impact)?
- What would be the overall industry impact?

Regulatory options – Enhanced browser settings

‘Enhanced Internet Brower Settings’ Approach: this would allow users to consent to the use of internet cookies via their internet browser settings. It would mean that browser settings would need to be made more visible to internet users and they would need to be provided with clear and comprehensive information about internet cookies and how to opt-out of them if they wish.

- What (if anything) would the company need to do to ensure that its use products/services enable internet cookies to be used in a way which complies with the regulatory option?
- What (technical) changes / solutions would need to be implemented to comply with the Directive?
- How long would it take to comply?
- How large would be the associated direct costs? Would they be one-off or recurring costs? What would they involve? What determines their scale? Would there be any indirect costs? What would these be? What determines their scale?
- Does the company see any problems with this approach (legal / technical)? If so, what are these? How might they be overcome?
- What would be the implications if 10% of consumers rejected the companies’ internet cookies (where previously/currently they would have accepted them)? (Reduced web visits, time spend on web site, less convenient, impact on sales)? What evidence is there to support this view?

- Would your competitors be affected differently (for example because they use internet cookies differently)? What would be the consequences of this? Can you quantify them?
- Would/could there be a competitive advantage / disadvantage in comparison to larger / smaller companies? How significant would this be? And for companies based/operating overseas? Why? How significant could this be?
- Overall, how significant would be the impact of this option be on the company's business (no impact/ minor impact/ significant impact)?
- What would be the overall industry impact?

Regulatory options – Comparison

- How would you compare the two regulatory options in terms of their impact on your company? How would you summarise your views and preferences?

Industry self-regulation

- Are you aware of any industry led, self-regulatory responses (e.g. IAB initiative)? [IAB approach – Explain: Icon for each ad containing a link to more detailed information the possibility to influence settings.]
- Do you view (industry) self-regulation as a possible response given the environment the company operates (industry / use of internet cookies)?
- What self-regulatory options can you envisage?
- Who would you envisage needing to drive this? Is there a central industry body which could deliver such a solution? Would you be supportive of such an initiative? Under what conditions? Do you think others would?
- What would be the nature of the benefits (in relation to the regulation)? Would there be any additional costs and, if so, what form would they take?

Internet cookie users

Respondent

- What is the respondent's role in the company and his position?

Company

- How many full time employees does the company have in the UK? And how many elsewhere in the EU? And the RoW?
- What was the company's annual revenue last year (if public)? Again, how does this breakdown by geography?
- When did the company start doing business online – distinguish between having an online presence and transacting online?
- How important is online business (i.e. sales) for the company (percentage of annual revenue)?

Market position

- What are the company's main markets?
- Who are its main competitors? Where are they located - in the UK or abroad (EU vs. non-EU)?
- What is company's market share?
- How large is this sector/market (total revenue, # companies)?
- What is the size profile of companies in the industry (small / medium / large)? What drives this profile (e.g. existence of economies of scale and other entry barriers)?

Online activities

- What is the scope of the company's online business?
- What parts of the companies' value chain are handled online?
- Are distinct generic online services provided to customers or one integrated service (for example a large company might offer search, e-mail and an online shop)?
- How many visitors, customers have these services / the webpage per day?

- What is the profile of online customers (age band, gender, etc.)?

Internet cookies

- Are internet cookies used by the company? What are they used for? How are they used?
- How dependent is the company on internet cookies (website functionality / online experience)?
- How many internet cookies have been downloaded from the company's website? How many of these are currently in operation (i.e. stock)?
- How many new internet cookies were downloaded last year (i.e. 2010 – the flow)?
- What percentage of users accept / do not accept internet cookies from the company? What categories of customer/target do not accept them? What is the consequence for their online experience? Do you know the reasons why users choose not to accept internet cookies? Has the company done any research in this area?
- For what purpose are these internet cookies used (personalisation, functionality of online shopping, other)? What type of internet cookies are they (session based / persistent; first / second / third party internet cookies)?
- Has the company undertaken any research that assesses and quantifies these impacts?
- Is a privacy policy online which describes how and why internet cookies are used by the company, what they do and how one could opt-out?
- Has the company ever complaints regarding the use of internet cookies? How many? On what grounds? How have they responded?

Overall impact of internet cookies

Costs

- Do internet cookies reduce your costs (website programming, order processing)?

Prices

- Do internet cookies enable you to offer at lower (more competitive) prices?
- Do internet cookies provide a source of revenue (for example through behavioural ads)?

Volume

- Do internet cookies help to alert customers to interesting products/ special needs according to their profile?
- Do internet cookies help to provide more tailored choice / options to visitors?
- Do internet cookies increase sales / temptation to buy?

Experience

- Do internet cookies affect the probability that individuals visit your site?
- Do internet cookies make navigation and browsing easier?
- Do internet cookies make a 'log-in' easier?
- Do internet cookies reduce/ increase a visitors' time on your website? If so, for what?
- Do internet cookies increase customer loyalty?

Overall questions

- Overall, what is the impact of these factors (cost, price, volume, experience) on value added and revenue?
- Can you attach overall weights to cost /price/ volume/ experience (sum=10)?
- Overall, to what extent does your company's ability to generate business depend on the use of internet cookies? Can you please scale (0-10)?
- Have any of these relationships been quantified (own studies, estimates, industry studies)?

E-privacy Directive

- Is the company aware of the European Communications Framework and the changes required/envisaged to the E-privacy Directive?
- Has the company publicly expressed its views?
- How well informed does the company feel?

Regulatory options – Opt-in

‘Opt-in’ Approach: this would require internet users to confirm that they wish to accept every internet cookie placed on their computer before the internet cookie is placed there. Under this option, users might see a pop-up window appear on every web page they visit where an internet cookie is about to be used. This pop-up would explain the purpose of the internet cookie, the information it would hold and how this information would be used. It would then give the user the option to accept or reject the internet cookie.

- What would the company need to do to ensure that its use of internet cookies complies with the option?
- What (technical) changes / solutions would need to be implemented to comply with the regulation?
- How long would it take to comply?
- How large would be the associated direct costs? Would they be one-off or recurring costs? What would they involve? What determines their scale? Would there be any indirect costs? What would these be? What determines their scale?
- What would be the implications if 10% of consumers rejected the companies’ internet cookies (where previously/currently they would have accepted)? (reduced visits, time spend on site, less convenient, impact on sales)? What evidence is there to support this view?
- Does the company see any problems with this approach (legal / technical)? If so, what are these? How might they be overcome?
- Would your competitors be affected differently (for example because they use internet cookies differently)?
- What would be the consequences of this? Can you quantify them?
- Would/could there be a competitive advantage / disadvantage in comparison to larger / smaller companies? How significant would this be?
- Would/could there a competitive advantage / disadvantage in comparison to companies based/operating overseas? Why? How significant could this be?
- What would be the overall industry impact (no impact on market size,...)?
- Overall what would be the impact of this option on the company’s business (no impact/ minor impact/ significant impact?

Regulatory options – Enhanced browser settings

‘Enhanced Internet Brower Settings’ Approach: this would allow users to consent to the use of internet cookies via their internet browser settings. It would mean that browser settings would need to be made more visible to internet users and they would need to be provided with clear and comprehensive information about internet cookies and how to opt-out of them if they wish.

- What would the company need to do to ensure that its use of internet cookies complies with the option?
- What (technical) changes / solutions would need to be implemented to comply with the regulation?
- How long would it take to comply?
- How large would be the associated direct costs? Would they be one-off or recurring costs? What would they involve? What determines their scale? Would there be any indirect costs? What would these be? What determines their scale?
- What would be the implications if 10% of consumers rejected the companies’ internet cookies (where previously/currently they would have accepted)? (reduced visits, time spend on site, less convenient, impact on sales)? What evidence is there to support this view?
- Does the company see any problems with this approach (legal / technical)? If so, what are these? How might they be overcome?
- Would your competitors be affected differently (for example because they use internet cookies differently)?
- What would be the consequences of this? Can you quantify them?
- Would/could there be a competitive advantage / disadvantage in comparison to larger / smaller companies? How significant would this be?
- Would/could there a competitive advantage / disadvantage in comparison to companies based/operating overseas? Why? How significant could this be?
- What would be the overall industry impact (no impact on market size,...)?
- Overall what would be the impact of this option on the company’s business (no impact/ minor impact/ significant impact?

Regulatory options – Comparison

- Can you please briefly compare both options and summarise your views and preferences?

Appendix C: Business statistics

Table 22 provides a sectoral analysis of the UK business population, and estimates the overall number of businesses with their own websites.

Table 22: Number of businesses by sector and size

	Number of enterprises (ABS 2009)	Turnover of enterprises (£m)	Number of VAT based enterprises (2010)	Number of VAT based enterprises (10-49)	Number of VAT based enterprises (50-249)	Number of VAT based enterprises (250-999)	Number of VAT based enterprises (1000+)
Agriculture, forestry & fishing	10,205	4,132	137,135	3,890	265	25	0
Production							
Mining, quarrying & utilities	1,223	47,898	7,610	1,290	260	65	45
Manufacturing	127,993	456,917	127,370	23,080	6,115	1,045	230
Construction	273,241	192,655	274,415	17,535	2,140	235	70
Wholesale and retail; repair of motor vehicles	356,557	1,170,382	359,380	33,940	4,525	730	295
Motor trades				5,310	850	140	35
Wholesale			104,465	14,595	2,280	310	80
Retail			188,320	14,035	1,395	280	180
Transport & storage (inc. postal)	67,267	126,567	67,530	6,975	1,285	230	120
Accommodation & food services	128,713	65,567	129,740	21,505	2,320	305	110
Information & communication	143,759	178,259	144,890	6,985	1,280	230	85
Finance & insurance			41,800	3,295	805	215	110
Property	73,753	44,125	75,110	3,855	565	175	35
Professional, scientific & technical	320,734	189,404	324,015	19,420	2,960	455	130
Business administration and support services	150,730	147,426	147,370	12,825	3,460	705	225
Public administration and defence			2,805	260	100	255	150
Education	29,494	29,217	31,140	4,560	2,040	575	375
Health	52,552	37,662	79,935	24,340	3,835	525	480
Arts, entertainment, recreation and other services	150,254	119,173	150,125	12,770	1,650	350	70
Total	1,886,475	2,809,384	2,100,370	196,525	33,605	6,120	2,530
Estimated number of websites				142,088	30,849	5,955	2,492

Source: PwC analysis based on ONS

Table 23 provides an analysis of website sales by sector in 2009.

Table 23: Analysis of website sales by sector (2009)

	Number of enterprises (ABS 2009)	Turnover of enterprises (£m)	Website sales (2009, £bn)	Website sales as % of turnover	ICT sales (2009, £bn)	% sales over website (2009)	% sales over ICT (2009)
Agriculture, forestry & fishing	10,205	4,132					
Production							
Mining, quarrying & utilities	1,223	47,898	8.1	17%	7.4	21.6	3
Manufacturing	127,993	456,917	8.7	2%	117.2	14.1	11.5

	Number of enterprises (ABS 2009)	Turnover of enterprises (£m)	Website sales (2009, £bn)	Website sales as % of turnover	ICT sales (2009, £bn)	% sales over website (2009)	% sales over ICT (2009)
Construction	273,241	192,655	0.9	0%	3.2	3.8	3.6
Wholesale and retail; repair of motor vehicles	356,557	1,170,382	58.7	5%	119.3		
<i>Motor trades</i>							
Wholesale			48.2	---	116.9	22.9	14.5
Retail			10.5	---	2.4	25.2	4.2
Transport & storage (inc. postal)	67,267	126,567	14.1	11%	27.5	21.3	7.4
Accommodation & food services	128,713	65,567	4.3	7%	27.5	10.9	5
Information & communication	143,759	178,259	11.4	6%	10.9	28.2	9
<i>Finance & insurance</i>							
Property	73,753	44,125					
Professional, scientific & technical	320,734	189,404					
Business administration and support services	150,730	147,426					
Public administration and defence			8.9	20%	6.4	11.4	3.2
Education	29,494	29,217					
Health	52,552	37,662					
Arts, entertainment, recreation and other services	150,254	119,173					
Total	1,886,475	2,809,384	115.1	4%	319.4	15%	7%

Source: PwC analysis based on ONS

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