



EVIDENCING THE COST OF THE UK GOVERNMENT'S PROPOSED REGULATORY INTERVENTIONS FOR CONSUMER IOT

Technical report: 2020

CONTENTS

1.	METHODOLOGY	3
	Introduction	3
	Stage 1	3
	Stage 2	5
	Limitations	6
2.	MARKET STUDY: PRODUCT CATEGORY DESCRIPTIONS	7
3.	MARKET STUDY: PRICE DISTRIBUTIONS	10
4.	MARKET STUDY: MANUFACTURER DETAILS	17
	Additional information on population of manufacturers	18
5.	MARKET STUDY: RETAILER DETAILS	20
6.	CONSUMER SURVEY: QUESTIONNAIRE	21
7.	CONSUMER SURVEY: ADDITIONAL TABLES	57
	Consumer IoT devices per household	57
	Consumer rate of replacement of devices	74
	Devices used by businesses	86
8.	MANUFACTURER SURVEY: QUESTIONNAIRE	87
9.	MANUFACTURER SURVEY: ADDITIONAL TABLES	120
10.	RETAILER SURVEY: QUESTIONNAIRE	124
11.	RETAILER SURVEY: ADDITIONAL TABLES	138
12.	IMPACT ON INTERNATIONAL TRADE	140
	Review of relevant literature	140
	Methodological considerations	146
	Preliminary Summary	146
	Annex 1: Overview of 2019 UK import trade flows in consumer IoT product sectors	157

1. METHODOLOGY

Introduction

A mixed-methods approach to conducting this research has been used, including primary and secondary research, comprising:

- desk research on the consumer Internet of Things (IoT) sector in the UK and the literature on vulnerabilities;
- stakeholder consultations with experts in industry and academia;
- a market study to gain information on the products available to UK consumers;
- a consumer survey, conducted by YouGov, on ownership of IoT devices; and
- surveys of manufacturers and retailers for evidence on the specific costs of regulation.

In many cases, information from multiple sources was combined to contribute to the evidence base for the research objectives.

Stage 1

The outcome of the Stage 1 research was to establish the scale of the UK consumer IoT market, the prevalence of insecure IoT devices sold in the UK market, and the potential impacts of this. The methodological steps are discussed in more detail below.

Literature review

We reviewed literature focusing on: existing cyber security policy and guidelines; existing research into IoT cyber security and vulnerabilities; case studies of relevant cyber-attacks; the current levels of security information provided by manufacturers and retailers of consumer IoT devices.

The literature review included:

- government policy literature including the UK National Cyber Security Strategy 2016-2021¹, the UK Code of Practice (CoP) for Consumer IoT Security², and The Internet of Things: making the most of the Second Digital Revolution³;
- research and policy papers from the PETRAS IoT research hub, the IoT Security Foundation, ENISA, and AIOTI; and
- articles from a wide range of academic journals looking at IoT, cyber security and vulnerabilities, and the effects of regulation.

Consultation with stakeholders

We conducted telephone interviews for expert advice and sector consultation to confirm the design of the research and seek information on wider benefits to consumers, businesses and society which could be realised as a result of a mandatory security baseline for consumer IoT devices. These discussions were used to confirm the potential vulnerabilities by product type that the regulation of IoT security is being designed to address. They also established additional contacts for businesses, industry groups, and other stakeholders for further consultation later in the research programme and helped identify published data and reports for desk research.

¹ HM Government (2016) '[National Cyber Security Strategy 2016 to 2021](#)'

² DCMS (2018) '[Code of Practice for Consumer IoT Security](#)'

³ Walport (2014) '[The Internet of Things: making the most of the Second Digital Revolution](#)' Government Office for Science

Market study

The market study involved a review of the consumer IoT marketplace through a variety of methods. We have completed rigorous online investigations into the three product category groups and their subcategories, as well as visiting high street retailers of consumer IoT products to examine product packaging in person. We have also undertaken a brief review of relevant research in this area and have found one highly relevant paper which analyses the communication of security features of consumer IoT products in manuals and support pages.

Our research included online searches of popular retailers, such as Amazon, Currys PC World, John Lewis, Argos, Very, B&Q, and Electrical Showroom, for smart devices within each of the product category groups. In total, we found products from 15 different online retailers, which were selected by searching for devices online and finding the most common/popular retailers within search results. We used these searches to find a range of products within each subcategory, collecting data on the product name, model number, price, manufacturer, product size (where relevant), and security information available on the retailers' websites.

A total of 348 different products were identified online and we recorded any security information that was available directly on retailers' websites. For 21 products (or 6% of the sample) the retailers' website also provided the user manual for the product, which were analysed for details of security information. In all 21 cases where the user manuals were provided, these were provided on Amazon.

We then also researched the manufacturers of these products directly, searching for what security information is available to consumers online through their websites. A total of 164 different global manufacturers were found and reviewed as part of this market study. This analysis consisted of checking for any details of the top three CoP guidelines, as well as any other relevant security information such as security notices and privacy policies.

The product descriptions, which outline what the product is used for and its key features for each subcategory, can be found in Chapter 2.

As well as online research, we also investigated the security information available to consumers in physical high street retailers. We were able to investigate seven different retail stores and the packaging of 25 different consumer IoT products. These products included: smart home assistants, smart thermostats, smart speakers, smart doorbell, smart alarms and sensors, household appliances, smart security cameras, smartphones, smart tablets, smart watches and health monitors. The details of any security policies found on physical packaging have been included in the security information section for each product type, however relevant security details were rare.

Survey of consumers

A large-scale, representative⁴ survey of consumers was the only way to provide robust quantitative answers to the research questions on IoT ownership by product category.

⁴ All figures are from YouGov Plc. Total sample size was 5,421 adults. Fieldwork was undertaken between 12th - 14th February 2020. The survey was carried out online. The figures have been weighted and are representative of all UK adults (aged 18+). The national representative quotas are derived from a range of sources and are all based on data from 2017 onwards. Sources include: ONS data (age, gender, region), annual population survey (to provide details of education level), national readership survey (to provide detail of social grade), census data (education level and social grade are both cross referenced with this). This survey has been conducted using an online interview administered to members of the YouGov Plc UK panel of 1,000,000+ individuals who have agreed to take part in surveys. Emails are sent to panellists selected at random from the base sample. The e-mail invites them to take part in a survey and provides a generic survey link. Once a panel member clicks on the link they are sent to the survey that they are most required for, according to the sample definition and quotas. The responding sample was weighted to provide a representative reporting sample of the UK population aged 18+. The profile for this is derived from census data. All results are based on a sample and are therefore subject to statistical errors normally associated with sample-based information.

YouGov conducted a survey of 5,421 UK consumers. The aim of the survey was to provide reliable quantitative data on the number of consumer IoT devices per household by brand and product group; replacement/upgrade rates of devices; perceptions of security and the use of internet connectivity functionality.

The survey included questions to allow us to estimate the average rate at which UK-based consumers upgrade or replace their consumer IoT devices, broken down by the above three categories of device, and explored the extent to which the decision to replace IoT products is driven by price or other factors. The survey was also used to estimate the average number of consumers in the UK who, after purchasing a consumer IoT device opt out or switch off the internet connection function of the device, and the reasons for doing so.

The full consumer survey can be found below.

Stage 2

The outcome of stage 2 was to provide clear evidence of the impacts of the Government's proposed regulatory approach of mandating a minimum cyber security baseline for consumer IoT products.

Surveys of manufacturers and retailers

The majority of the information presented in Stage 2 derives from surveys of manufacturers and retailers. Participants for the manufacturer survey were identified through internet research and consultation with manufacturers associations and DCMS. In total, 147 manufacturers were identified as being eligible to take part in our research, meaning that they produce at least one consumer IoT product which is currently available to UK consumers and had publicly available contact details. Manufacturers were contacted by phone and email wherever possible prior to commencement of the survey in order that they could be prepared for the survey by locating the most appropriate respondent(s) and the relevant information. Respondents could carry out the survey online, or could arrange to be taken through the questionnaire by phone by a member of the RSM team. Following the initial contact and piloting, fieldwork ran for 2 weeks from 16-30 March 2020. In total, 22 responses were achieved. The full questionnaire can be found below.

Potential retailers of consumer IoT goods were identified through two methods. A shortlist of 100 retailers was identified from information in the market study and from internet searches for each of the product groups. Subsequently, the business database Fame was used to identify a much longer list of retailers that had been identified as potentially selling at least one consumer IoT product in the UK by their Standard Industrial Classification code (such as electronics retail, audio-visual retail etc). In total, 1,886 retailers were directly invited to take part in this survey. In addition, two retailer umbrella bodies were contacted and asked to share the survey with their members, as well as publicising the survey through our social media channels. Fieldwork ran for 2 weeks from 17-30 March 2020. The survey received 12 valid responses. This is likely due to COVID-19 and many businesses focusing on their response to the situation, as well as several retail stores closing operations. The full questionnaire can be found below.

Standalone research: security research, environmental impacts, international trade impacts

Three of the research objectives required additional research. These included: evidencing whether a manufacturer publishing a point of contact would impact on the ability of IoT security professionals to effectively report vulnerabilities; estimating costs associated with disposing of non-compliant stock; and evidencing the short, medium, and long-term impacts of a proposed ban on non-compliant products for UK trade and investment.

Investigations into these requirements involved building on questions asked in the manufacturer, retailer, and consumer surveys, and augmenting this with additional reviews of literature and industry publications, led by our academic advisory team. Estimations of costs of disposing of

non-compliant stock also involved input from RSM's Green Book cost appraisal team. Evidencing the impacts of a proposed ban on non-compliant products required involved detailed specialist analysis of the consumer and business survey data on current market activity and expected responses to any change in regulations, leading to a model-based simulation of the impacts of higher costs of production brought about by the regulations, and a proposed full import ban for non-compliant products. This section was developed by an international trade economics team from the European Centre for International Political Economy.

Limitations

Limitations of this research chiefly concern the availability of primary data from businesses. Fieldwork took place during the early days of the COVID-19 novel coronavirus pandemic and its associated lockdown, during which companies were focused on core business activities and less willing to respond.

The 22 responses from manufacturers are known to be skewed towards larger companies; they are probably more likely already to be compliant to the Code of Practice guidelines than the population of manufacturers at large, and can bear the costs of necessary changes more efficiently. However, this skewness does mean that the results are representative of a large fraction of UK consumer IoT purchases by turnover; much larger than the 13% suggested by the response rate of 22 companies from an estimated population of 170.

The 12 responses from retailers are of unknown representativeness, as there is a "long tail" of independent retailers in the population which may or may not sell IoT goods. The contact list, and our achieved responses, are likely skewed towards larger retailers and chains.

2. MARKET STUDY: PRODUCT CATEGORY DESCRIPTIONS

Smart TVs

A smart TV is a television that is internet-connected and can access other applications in a similar format to a smartphone. Smart TVs use your home network to stream video and music services, as well as a wide range of other applications. Smart TV's are available in any size that non-connected TVs are available. They have become popular due to the ability to use them to stream popular applications like Netflix and Amazon Prime, and also connecting them to home assistance products such as Alexa and Google Home, allowing the user to control using voice commands.

Smart White Goods

Smart white goods are traditional large electrical domestic goods, such as refrigerators or freezers, washing machines, tumble driers, dishwashers and air conditioners, that are connected to the internet. This allows the user remote control of the device by connecting it to another internet-connected device. For example, a user could remotely start another cycle of their washing machine using their phone. Unlike smart TVs, the majority of white goods on the market are not 'smart', as these are not in great demand.

Smart Kitchen Appliances

Smart kitchen appliances include smaller electrical kitchen appliances that are not categorised as white goods. This category covers items such as coffee machines, kettles, and cooking aids such as precision cookers and thermometers. These smart appliances are internet-connected, meaning that they can be controlled remotely by smart devices via easily downloadable applications. As is the case with white goods, these types of appliances are not typically 'smart' devices, and those without internet connection are still in high demand.

Smart Thermostat

Conventional boilers can be transformed into smart boilers through the installation of smart thermostats. These are internet connected in order to allow for remote access to your boiler, giving consumers more control over their central heating and helping to reduce energy usage, therefore reducing environmental impact as well as lowering energy bills. These thermostats are controlled via applications that can be easily downloaded onto smartphones or tablets and mean that heating can be controlled even when the consumer is not at home.

Smart Home Assistants

Smart home assistants are used to connect the home through voice control, which can be used for several different functions. These include playing music and news, searching the internet, setting timers and alarms, checking the weather, ordering take-away food, checking your calendar, controlling lights and temperature, controlling other IoT devices and sending messages.

Smart Speakers

Smart speakers are wireless, internet-connected speakers, with many of the newer models featuring voice-activated digital assistants. These speakers can be connected to mobile devices such as smartphones and tablets and can therefore be controlled remotely. It is important to note that home assistants are included as a separate category to smart speakers; although similar, the purpose of a smart speaker is primarily as a piece of audio equipment rather than as a smart

device to connect the home. Smart speakers are usually Hi-Fi, referring to a high-quality reproduction of sound.

Smart Security Cameras

Smart security cameras are compact, wireless, internet-connected home security cameras which can be monitored remotely, usually via an application downloaded to the users' smartphone or tablet. Some smart security cameras come with additional features, such as infrared night filming, automatic motion sensors that can send an alert to your phone, internal alarm systems, and face recognition technology. Smart security cameras can be used both inside the home and outdoors.

Smart Doorbells

A smart doorbell is an internet-connected doorbell that notifies the home owner via smartphone or other electronic device when there is a visitor at their door. It is either activated when a visitor presses the button, or alternatively can work in a similar way to smart security cameras by notifying the home owner when there is movement detected by built-in motion sensors. The smart doorbell not only notifies the owner of visitors but can also allow them to use a downloaded application to view and interact with the visitor via built-in camera and microphone. Some smart doorbells also include a feature which allows the user to open the door remotely if they also have a smart lock installed.

Smart Door Locks

Smart locks enable users to have control over their door locks remotely via applications which can be downloaded to smartphones or other handheld devices. Once connected, a smart lock can be locked and unlocked without a key. Depending on the model, this can be done by waving or turning your smartphone on in front of the lock, touching the lock with your finger, tapping a control in the app, approaching your door, or even by voice control. Smart locks also mean that users can grant access for a specified period of time to third parties such as family, friends, visitors, or service workers, by sending them a virtual key. These can usually be sent via text message or email. The app can also alert users about who is using the door, as well as keeping a history of who goes in and out, and when.

Smart Alarms and Sensors

Smart alarm systems can include a range of safety alarms such as motion detector/ burglar alarms, smoke alarms, and water leak detectors. These are internet-connected in order to provide users with instant notifications on their smartphone or other electronic device if the product is triggered. This means that users will be made aware of issues at home even when they are not present to hear an alarm.

Smart Baby Monitors

Smart baby monitors allow for remote observation of a users' child as the internet-connected device can be controlled and monitored via smartphone or tablet. The products can come with a range of features including watching and recording live video, night vision mode, remote adjustment of the camera, two-way audio communication, and connection with smart home assistants.

Additional Household Appliances

This category covers a wide range of miscellaneous smart products which are used around the house. These include vacuum cleaners, wireless projectors, printers, lamps and lighting, essential oil diffusers, and clocks. This wide range of products can all be found on the consumer market as internet-connected smart devices that can be controlled remotely via downloaded application.

Smartphones

A smartphone is a type of mobile phone which has far more extensive software, internet, and multimedia functionality than feature phones. They have internet browsing capabilities, include high quality camera and video equipment, allow for music, gaming, and streaming, as well as the traditional core phone functions of voice calls and text messaging. Smartphones support wireless communications protocols such as Wi-Fi and Bluetooth, and typically have large touch screens rather than physical keyboards. The majority of mobile phones available on the consumer market today are smartphones.

Smart Tablets

Smart tablets are compact and portable tablet computers which are internet-connected for convenient and mobile communication, information, and entertainment. Modern tablets typically resemble smartphones, with touchscreen displays, but are relatively larger and usually do not have access to cellular networks. Tablets computers have similar capabilities to personal computers, but many do not have physical keyboards, with inputs instead being entered by virtual keyboard. Most tablets can connect to an independent physical keyboard by Bluetooth or USB. Tablets have become a large product category within smart technology, used for personal, educational, and workplace applications.

Smart Watches and Health Monitoring

There are a range of smart watches and health trackers which are internet-connected to allow users to measure and keep track of different aspects of their health. These devices can have a variety of functions with the most complex and prevalent device being smart-watches, which can measure user activity (such as steps, heartrate, sleep), pay for goods/services, make calls, search the internet, and provide smartphone notifications. Some health trackers act similarly to smart watches but simply measure user activity statistics. Other smart health monitoring technology includes scales and thermometers. These devices allow users to easily store and keep track of their health statistics.

Smart Toys

Smart toys can be connected to a smartphone or handheld device, often to control the toy or transfer the information from the toy to the user's device. The market for smart toys is relatively small compared to other 'consumer lifestyle' smart products, consisting mainly of drones, although other items such as robots/action figures, and kids' digital cameras are present on the consumer market.

3. MARKET STUDY: PRICE DISTRIBUTIONS

The graphs in this section show the typical price ranges of the products in the market study.

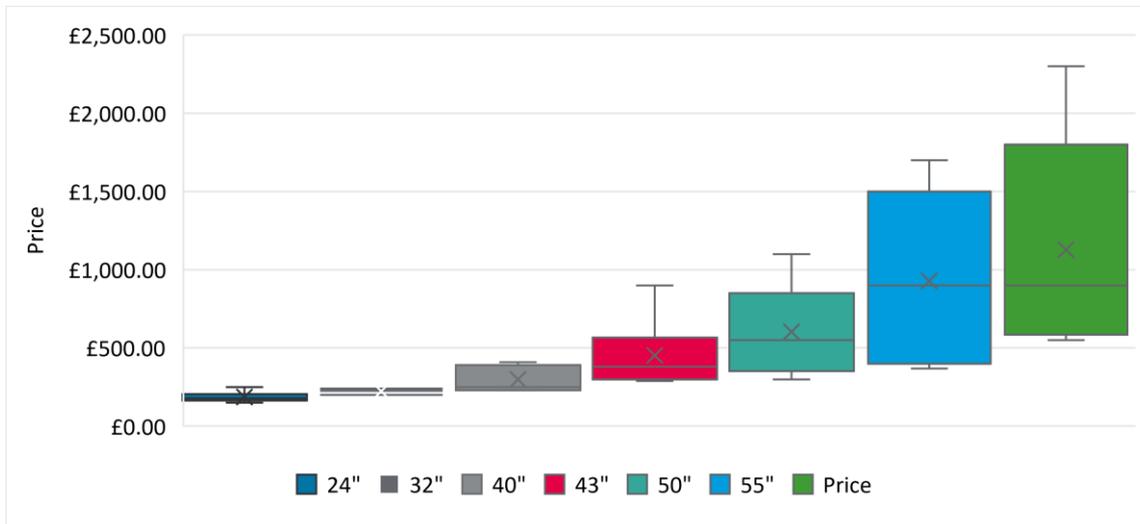
Where a product is available in different varieties, as in Figure 1 below (Smart TVs of different sizes), a “box and whisker” plot is used. In each case, the mean price is denoted with an X, and the median price with a horizontal line. The coloured box shows the range between the lower quartile (the price of the item one-quarter of the way along a list from cheapest to most expensive product in that category) and upper quartile (the price of the item three-quarters of the way along that list). The box (the “inter-quartile range”) therefore contains half of the products in each category. The outer “whiskers” show the maximum and minimum prices in each category, except in cases where there is an outlier price (defined as lying outside 1.5 times the inter-quartile range); outliers are indicated with small dots.

Where there is only one type of product, as in Figure 4 below (smart thermostats), a histogram is used. These show the number of products in each price range. Price ranges are denoted with brackets; a square bracket shows that the price is included in the range, a round bracket is exclusive. For example, in Figure 4, the price ranges should be read as follows:

- [£20,£60]: £20 to £60 inclusive
- (£60,£100]: Over £60 and up to £100 inclusive
- (£100, £140]: Over £100 and up to £140 inclusive
- (£140,£180]: Over £140 and up to £180 inclusive

Smart TVs

Figure 1: Smart TVs price distribution

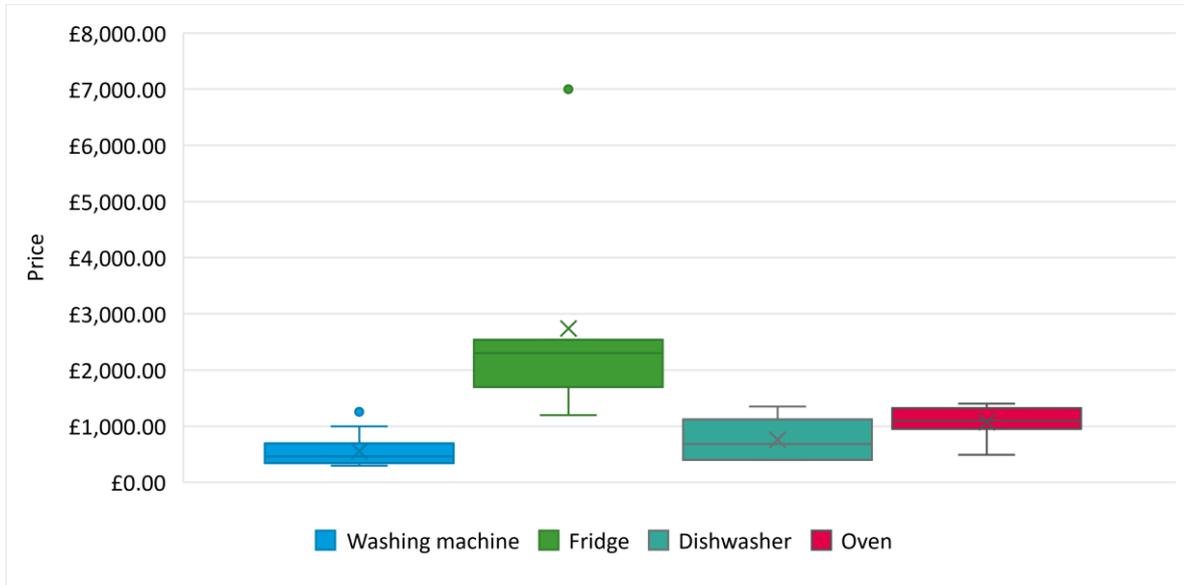


Source: Market Study of Consumer IoT Products (n=60)

Key: Outer bars mark maximum and minimum price; inner box marks upper and lower quartile range; horizontal line denotes the median; X denotes the mean.

Smart White Goods

Figure 2: Smart white goods price distribution

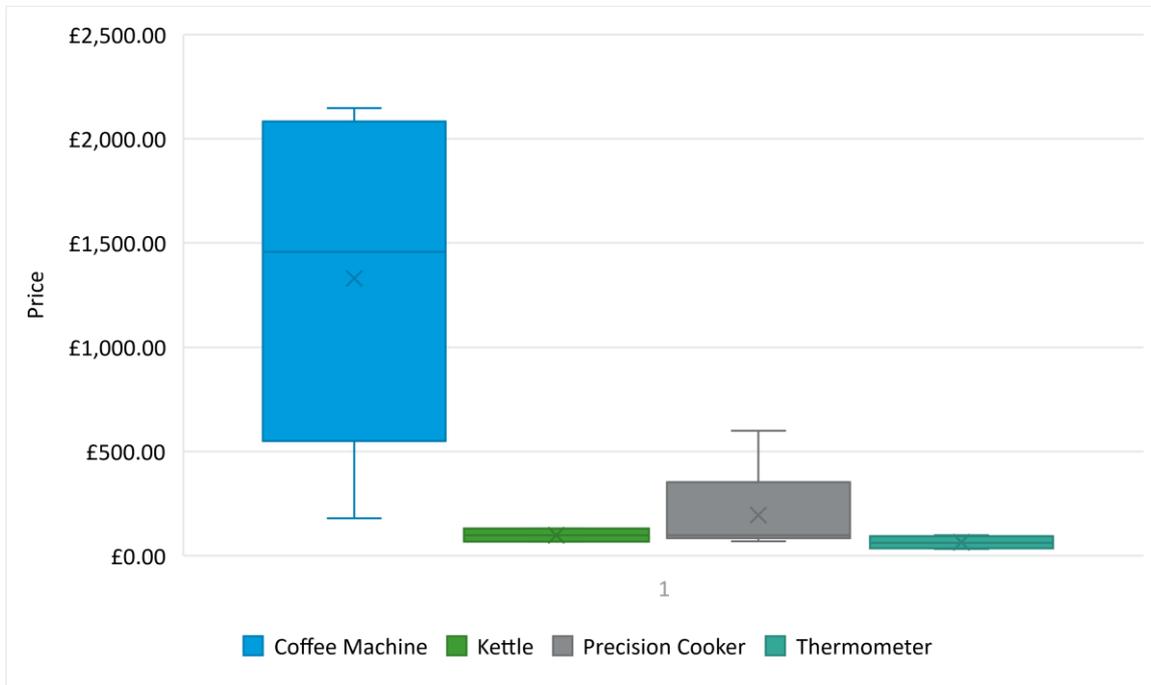


Source: Market Study of Consumer IoT Products (n=40)

Key: Inner box marks upper and lower quartile range; horizontal line denotes median; outer bars mark maximum and minimum price excluding outliers (defined by Excel as lying outside 1.5x the inter-quartile range), which are indicated instead by dots; X denotes the mean (including outliers).

Smart Kitchen Appliances

Figure 3: Smart kitchen appliances price distribution



Source: Market Study of Consumer IoT Products (n=18)

Key: Outer bars mark maximum and minimum price; inner box marks upper and lower quartile range; horizontal line denotes the median; X denotes the mean.

Smart Thermostats

Figure 4: Smart thermostats price distribution

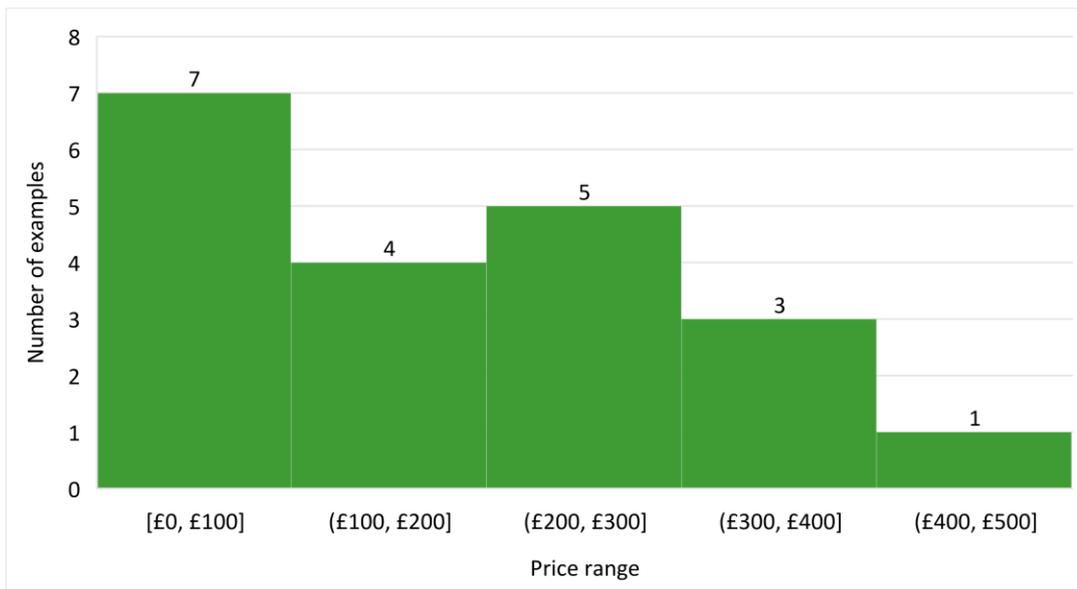


Source: Market Study of Consumer IoT Products (n=12)

Key: Price ranges are denoted by brackets; square brackets are inclusive, round brackets are exclusive eg (£60, £100] is over £60 and up to £100 inclusive

Smart Speakers

Figure 5: Smart speakers price distribution

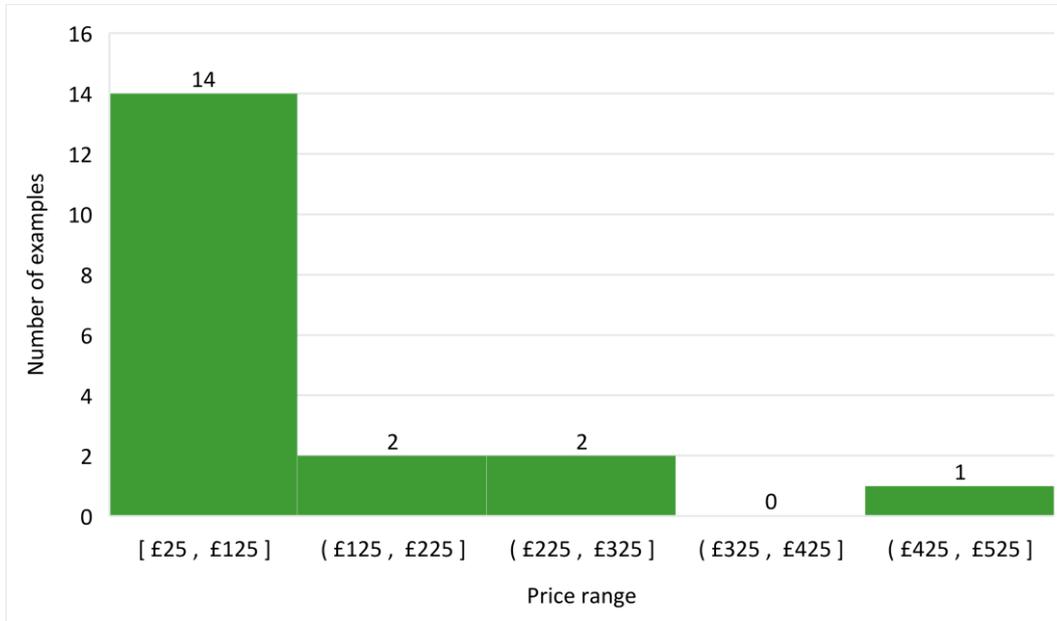


Source: Market Study of Consumer IoT Products (n=20)

Key: Price ranges are denoted by brackets; square brackets are inclusive, round brackets are exclusive eg (£100, £200] is over £100 and up to £200 inclusive

Smart Security Cameras

Figure 6: Smart security cameras price distribution



Source: Market Study of Consumer IoT Products (n=19)

Key: Price ranges are denoted by brackets; square brackets are inclusive, round brackets are exclusive eg (£125, £225] is over £125 and up to £225 inclusive

Smart Alarms and Sensors

Figure 7: Smart alarms and sensors price distribution

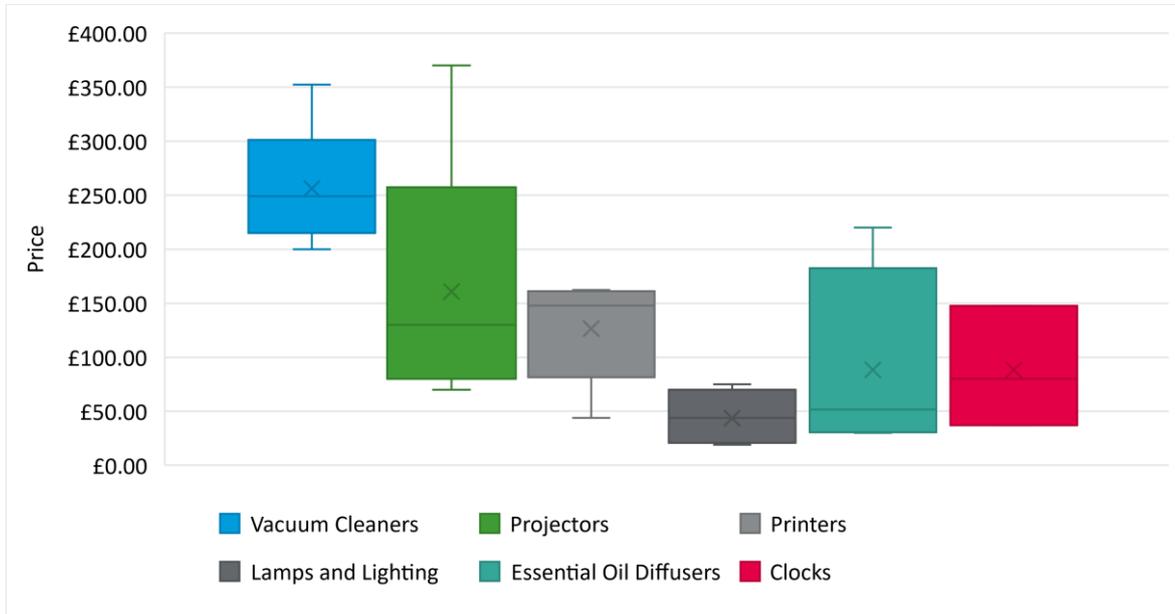


Source: Market Study of Consumer IoT Products (n=11)

Key: Outer bars mark maximum and minimum price; inner box marks upper and lower quartile range; horizontal line denotes the median; X denotes the mean.

Additional Household Appliances

Figure 8: Smart household appliances price distribution



Source: Market Study of Consumer IoT Products (n=29)

Key: Outer bars mark maximum and minimum price; inner box marks upper and lower quartile range; horizontal line denotes the median; X denotes the mean.

Smartphones

Figure 9: Smartphones price distribution

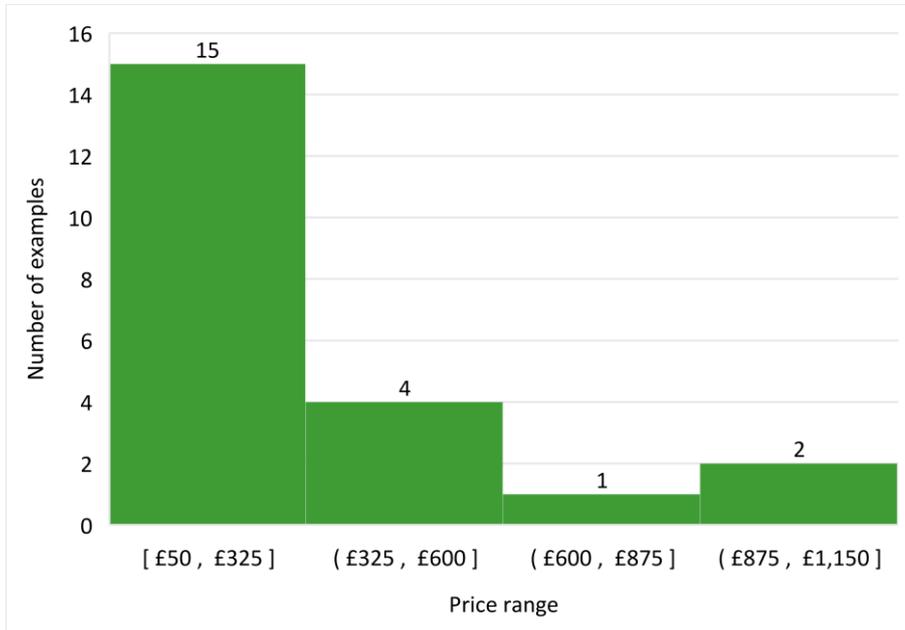


Source: Market Study of Consumer IoT Products (n=20)

Key: Price ranges are denoted by brackets; square brackets are inclusive, round brackets are exclusive eg (£310, £560] is over £310 and up to £560 inclusive

Smart Tablets

Figure 10: Smart tablets price distribution

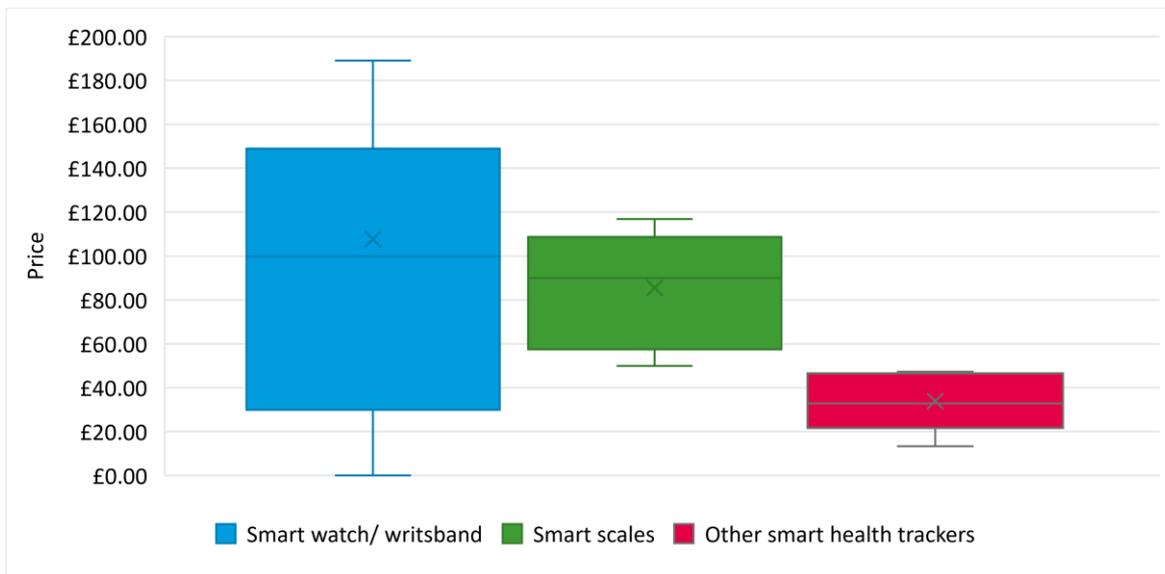


Source: Market Study of Consumer IoT Products (n=22)

Key: Price ranges are denoted by brackets; square brackets are inclusive, round brackets are exclusive eg (£325, £600] is over £325 and up to £600 inclusive

Smart Watches and Health Monitoring

Figure 11: Smart watches and health monitors price distribution

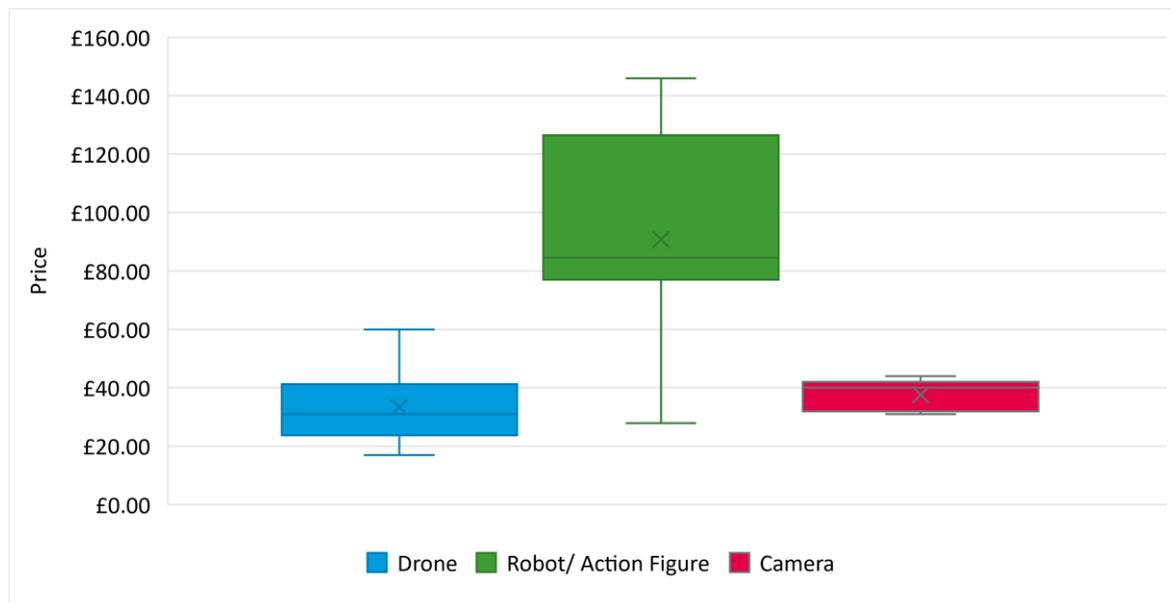


Source: Market Study of Consumer IoT Products (n=11)

Key: Outer bars mark maximum and minimum price; inner box marks upper and lower quartile range; horizontal line denotes the median; X denotes the mean.

Smart Toys

Figure 12: Smart toys price distribution



Source: Market Study of Consumer IoT Products (n=11)

Key: Outer bars mark maximum and minimum price; inner box marks upper and lower quartile range; horizontal line denotes the median; X denotes the mean.

4. MARKET STUDY: MANUFACTURER DETAILS

In total this market study included 348 different products from 164 different manufacturers. The table below shows which manufacturers were included as part of our research, and the number of products made by each manufacturer included in the study's sample.

Table 1: Market study manufacturers

Manufacturer	Number of Products
Samsung	40
LG	14
Apple	12
Panasonic	10
Bosch	9
Hoover	8
Sony	8
Google	7
Huawei	7
Toshiba TV	6
Amazon	6
Ring	6
Victure	6
Sharp	5
Anki	4
Bose	4
Lenovo	4
Motorola	4
Sonos	4
Wansview	4
Arlo	3
Fitbit	3
Hive	3
JVC	3
Siemens	3
Sphero	3
Withings	3
Yale	3

Anova Culinary, ASAKUKI, Beko, CANDY, Epson, Garmin, Hotpoint, HP, ieGeek, MEATER, Melitta, MIELE, Nuki, Philips, Smarter, TP-LINK, Upgrow, Vtech, Wärme, Yamaha Electronics	2 per manufacturer
--	--------------------

360, Accfly, Adax, AllAT, ANCwear, Anykit, APEMAN, AppKettle, ATOYX, August Home, Awow, AZATOM, Bagotte, BELLING, Blackview, Blaupunkt, Blink, Blurams, BOMAKER, BT, Burg-Watcher, CACAGOO, Canon, Cello, COAYU, Comper, CrazyFire, DEPSTECH, DLT, Dragon Touch, Drayton, EACHEN, Electriq, ELEPHAS, ELINKUME, Eufy, Eve, Flyfan, FreeLeben, Freenove, Govee, HASAKEE, HeimVision, HiSense, Honeywell home, HONOR, Igenix, InkBird, Innens, Innotic, iRobot, JBL, Jinhoo, Kamep, Kinsa, KitSound, Kiwiset, KWASYO, LaMetric, Lefun, LENGDO, Lightswim, Lintelek, Linx, LOFTer, Lollipop, maisi, Majority, Mibao, Microsoft, MOES, NAPATEK, Neato, Nebula, NEFF, Neos, Nest, Netamo, NETVUE, Nokia, Nooie, Onvis, Padgene, Potensic, Qardio, RCA, RGBS, Richgv, Roberts Radio, Sage, Salus, SIMREX, Smartwares, SNAPTAIN, SONOFF, SousVideTools, tado°, TCP, TECKIN, TENDOMI, UBTECH, Ulefone, Ultion, UniBot, Uzone, VicTsing, Wasserstein, WE.LOCK, Westinghouse, Yamay, YEELIGHT, YIEYE, Yinxn, Yiroka, ZKTeco, ZOLO	1 per manufacturer
--	--------------------

Additional information on population of manufacturers

In 2019 RSM undertook a desk review of data from a number of sources (chiefly databases compiled by IoT Nation and the IoT Security Foundation) to build a sector profile of UK manufacturers of consumer IoT devices. The companies identified in this exercise were verified and incorporated into the manufacturer list for this study.

We developed the 2019 database of manufacturers by matching the known companies' details with records on two online databases: Bureau Van Dijk's ORBIS database and RSM's own proprietary Tracker system. These company data resources are themselves based on aggregations of publicly accessible information on private companies from sources such as Companies House, backed up with primary research and data modelling. This list was then filtered using information on each company's activities (as declared in their Companies House listing) or Standard Industrial Classification⁵ (which distinguishes between manufacturers, retailers, service companies etc) where available. This approach allowed us to create a database of 100 IoT manufacturers which were believed to be active in the UK market; they had an incorporated entity and sales in the UK, although manufacture may have occurred elsewhere.

Full Companies House financial information, or an indicator of a company's size, was available for 60 of the 100 companies. Among these, the distribution of the firms in the database by overall turnover is as follows:

⁵ The Standard Industrial Classification (SIC) is a hierarchical coding scheme for the main activities of companies. It is used in Government statistics and included in Companies House data: see <https://www.gov.uk/government/publications/standard-industrial-classification-of-economic-activities-sic> for Government guidance on its use

Table 2: Distribution of known UK consumer IoT companies by size

Organisation size	Percentage of companies
Small (under £10.2m)	65%
Medium (£10.2m to £49.9m)	8%
Large (£50m and over)	27%
Base	60

Source: RSM/ORBIS

A significant fraction of the overall turnover is provided by a small number of large multinational manufacturers (with significant UK employment) that do not specialise in IoT products and for whom IoT is a relatively minor component of their overall business; these operate in more “traditional” sectors such as TVs and white goods.

There is also a significant “long tail” of small and medium-sized manufacturers which are more likely to provide IoT goods in more innovative sectors which do not have a “non-smart” equivalent. Any estimates of future developments in consumer IoT technology and uptake is necessarily speculative.

5. MARKET STUDY: RETAILER DETAILS

In total this market study included 348 different products from 164 different manufacturers. These products were found and analysed across 15 different retailers' websites and in seven different stores.

Table 3: Market study retailers

Retailer	Online/ In store
Amazon	Online
John Lewis	Online
Currys PC World	Online
UKAppliances.com	Online
B&Q	Online
Bosch Home	Online
Siemens Home	Online
Samsung	Online
Harts of Stur	Online
Neff UK	Online
Sous Vide Tools	Online
Meater Store	Online
Electrical Showroom	Online
Toolstation	Online
Safe	Online
Dixons	In store
House of Fraser	In store
Apple	In store
EE	In store
Game	In store
Cex	In store
Independent store	In store

6. CONSUMER SURVEY: QUESTIONNAIRE

Background

{page introstart}

Welcome to this survey about technology, devices & gadgets, which we hope you will find interesting. The results will be used to inform our clients.

Your YouGov account will be credited with 50 points for completing the survey.

We have tested the survey and found that, on average it takes around 15 minutes to complete. This time may vary depending on factors such as your internet connection speed and the answers you give.

Please click the forward button below to continue.

{end page introstart}

#All respondents – note to scripter, please format this page as per below

{page definition}

The “Internet of Things” (IoT, also known as ‘internet-connected’ or ‘smart’ products) refers to devices that are connected to the internet or your home network, and associated services that make them work.

Consumer IoT devices are network-connected (and network-connectable) devices that have relationships to associated services and are used by the consumer typically in the home or as electronic wearables. These devices are often available to purchase in retail environments.

These products could include internet connected domestic appliances like washing machines or fridges, lighting and/or electronic devices such as smart speakers, or smart thermostats that can be controlled by the owner, often via a smartphone or by voice commands using the internet.

The ‘smart home’ is a term that refers to homes that have these sorts of products. Smart home-enabled devices can also operate together with other devices in the home and communicate information to other smart devices. Smart home devices that you may have heard of are smart TVs, smart home assistants/ speakers, smart thermostats, smart lighting, smart security systems, connected children’s toys and baby monitors, and smart domestic appliances.

{end page definition}

#All respondents

[Q1]{multiple order=randomize columns=2} Which, if any, of the following devices do you currently have in your household? Please tick all that apply

<1> Smartphones

<2> Smart TVs

<3> Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.

<4> Smart home thermostats e.g. Hive, Nest etc.

<5> Smart lighting e.g. Philips Hue, Hive bulbs etc.

<6> Smart security system (smart video door bells, smart video cameras etc.) e.g. Ring, Hive Hello etc.

<7 fixed> Wearable health trackers

<8 fixed> Smartwatch

<9> Tablet

<10> Smart or connected children’s toys and baby monitors

<11> Connected domestic appliances (e.g. washing machines, fridges)

<12 fixed> Other internet connected device, please specify [open]

<98 fixed xor> None of these

#All respondents who have devices in their household at Q1 (Q1=any codes 1-12). Please mask each grid row off the corresponding code at Q1.

[Q2]{grid roworder=randomize} And of these smart devices that you have in your household... which of these do you...

- [Q2_1] Smartphones
- [Q2_2] Smart TVs
- [Q2_3] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- [Q2_4] Smart home thermostats e.g. Hive, Nest etc.
- [Q2_5] Smart lighting e.g. Philips Hue, Hive bulbs etc.
- [Q2_6] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- [Q2_8] Wearable health trackers
- [Q2_9] Smartwatch
- [Q2_10] Tablet
- [Q2_11] Smart or connected children's toys and baby monitors
- [Q2_12] Other internet connected device

<98> Don't know

<1> Own and use currently

<3> Own and use, but the device is not connected to the internet

<2> Own but no longer use

#All respondents that own & use these devices Q1=any codes 1-12

Please only show the grid rows for which codes 1 or 3 were selected at Q2.

[Q3] {grid} And how many of each of the following devices do you currently own and use?

- [Q3_1] Smartphones
- [Q3_2] Smart TVs
- [Q3_3] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- [Q3_4] Smart home thermostats e.g. Hive, Nest etc.
- [Q3_5] Smart lighting e.g. Philips Hue, Hive bulbs etc.
- [Q3_6] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- [Q3_8] Wearable health trackers
- [Q3_9] Smartwatch
- [Q3_10] Tablet
- [Q3_11] Smart or connected children's toys and baby monitors
- [Q3_12] Other internet connected device

<1> 1

<2> 2

<3> 3

<4> 4

<5> 5 or more

<6> Don't know/ can't recall

#All respondents that own more than 5 smartphones (Q3_1=5)

[Q3a] {open} You said that you owned and used more than 5 smartphones. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 smart TVs (Q3_2=5)

[Q3b] {open} You said that you owned and used more than 5 Smart TVs. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 Smart home assistants/ speakers (Q3_3=5)

[Q3c] {open} You said that you owned and used more than 5 Smart home assistants/ speakers. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 Smart lighting (Q3_5=5)

[Q3d] {open} You said that you owned and used more than 5 smart lights. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 Smart security (Q3_6=5)

[Q3e] {open} You said that you owned and used more than 5 smart security systems. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 wearable health trackers (Q3_8=5)

[Q3f] {open} You said that you owned and used more than 5 wearable health trackers. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 smartwatches (Q3_9=5)

[Q3g] {open} You said that you owned and used more than 5 smartwatches. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 tablets (Q3_10=5)

[Q3h] {open} You said that you owned and used more than 5 tablets. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents that own more than 5 Smart or connected children's toys and baby monitors (Q3_11=5)

[Q3i] {open} You said that you owned and used more than 5 Smart or connected children's toys and baby monitors. In the box please type in how many you own and use? Please only use numbers rather than words

#All respondents

[Q4] {multiple order=randomize} A smart domestic appliance e.g. fridges, washing machines etc. uses the internet to connect to other devices. They are connected via a smartphone or other device where the user can change or monitor things relating to the appliance e.g. turn the washing on, change the fridge temperature etc. remotely.

Which, if any, of the following smart domestic appliances do you own and use? Please tick all that apply.

- <1> Smart oven
- <2> Smart fridge/freezer
- <3> Smart microwave
- <4> Smart cooker
- <5> Smart dishwasher
- <6> Smart washer/dryer
- <7> Smart toaster
- <8> Smart coffee machine
- <9> Smart kettle
- <96 fixed> Other smart appliance, please specify [open]
- <98 fixed xor> Don't know
- <99 fixed xor> Not applicable, I don't own a smart domestic appliance

#All respondents that own a smart DA (Q4= any codes 1-96)

[Q5] {single} You said that you own smart domestic appliances. How many smart domestic appliances do you own and use in total?

- <1> One
- <2> Two
- <3> Three
- <4> Four
- <5> Five
- <6> Six
- <7> More than 6 (please state how many) [open]

<98> Don't know

#All respondents that have smart devices (Q1=any codes 1-12)

[Q6] {multiple order=randomize} Which, if any, of the following are reasons why you purchased smart devices, including smart appliances? Please tick all that apply.

- <1> I like keeping up with the newest in technology and gadgets
- <2> I got a smart device for free when I bought another product
- <3> It's more convenient to check or change things in my house (e.g. playing music, changing temperature, turning lights on/off etc.)
- <4> Better functionality than non-smart version of the product
- <5 fixed> I got a smart device when it was on offer as part of Black Friday, Cyber Monday or post-Christmas sales
- <6 fixed> I got a smart device when it was on offer at other times of the year (i.e. NOT part of Black Friday, Cyber Monday or Christmas sales)
- <7> It was better value than the non-smart version of the product
- <8> My smart device(s) can synchronise easily with other devices (e.g. smartphone etc.)
- <9> I can keep an eye on my home and how different services are used
- <10> I feel more secure (i.e. feeling safe inside my home etc.)
- <11> I got a smart device to make things easier in my routine (e.g. preheat my oven, monitor my babies' activity, observe my health)
- <12 fixed> I was given the device as a gift/or part of a bundle
- <95 fixed> Other [Q6_other]{open}
- <97 fixed xor> Don't know

#All respondents that have devices (Q1=any codes 1-12)

[Q7] {single order=randomize} Thinking back to when you got your first smart device, what was it?

- <1> Smart TV
- <2> Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- <3> Smart home thermostats e.g. Hive, Nest etc.
- <4> Smart lighting e.g. Philips Hue, Hive bulbs etc.
- <5> Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- <6> Smart or connected children's toys and baby monitors
- <7> A smart domestic appliance/connected domestic appliances (e.g. washing machines, fridges)
- <8 fixed> Other internet connected device,{please specify} [open]
- <98 fixed> Don't know

#All respondents that have devices (Q7=any codes 1-8)

[Q8] {single order=randomize} You said your first smart device was the following: **[FIRST DEVICE]**. When did you get this device?

- <1> Before 2015
- <2> 2015
- <3> 2016
- <4> 2017
- <5> 2018
- <6> 2019
- <7> 2020
- <98 fixed xor> Don't know

#All respondents that have devices (Q1=any codes 1-12). Please only show grid rows corresponding to codes selected at Q1.

[Q9] {grid roworder=randomize} Thinking about the following devices that you have in your household... how long have you had them for?

Please think about the first one of each type of device you may have had, rather than the existing device (i.e. if you have owned more than one smart home assistant/speaker – please think about how long you have had them in your household).

- [Q9_1] Smart TVs

- [Q9_2] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- [Q9_3] Smart home thermostats e.g. Hive, Nest etc.
- [Q9_4] Smart lighting e.g. Philips Hue, Hive bulbs etc.
- [Q9_5] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- [Q9_6] Smart or connected children's toys and baby monitors
- [Q9_7] A smart domestic appliance/connected domestic appliances (e.g. washing machines, fridges)
- [Q9_8] Other internet connected device

<98> Don't know

<1> Before 2015

<2> Since 2015

<3> Since 2016

<4> Since 2017

<5> Since 2018

<6> Since 2019

<7> Since 2020

Purchase behaviour

{page reminder}

Just to remind you that smart domestic appliance e.g. fridges, washing machines etc. uses the internet to connect to other devices. They are connected via a smartphone or other device where the user can change or monitor things relating to the appliance e.g. turn the washing on, change the fridge temperature etc. remotely.

{end page reminder}

#All respondents that have smart home (Q1=2,3,4,5,6,10,12) or (Q4=any codes 1-96).

Please only show grid rows corresponding to the codes above at Q1 or Q4 (see below).

[Q10] {grid roworder=randomize} Thinking about the most recent smart devices that you own and currently use in your home... were these bought to replace a device in the same category, bought in addition to devices from this category, or did you buy the device from this category for the first time?

- [Q10_1] Smart TVs **#show if Q1=2**
- [Q10_2] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc. **#show if Q1=3**
- [Q10_3] Smart home thermostats e.g. Hive, Nest etc. **#show if Q1=4**
- [Q10_4] Smart lighting e.g. Philips Hue, Hive bulbs etc. **#show if Q1=5**
- [Q10_5] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc. **#show if Q1=6**
- [Q10_6] Smart or connected children's toys and baby monitors **#show if Q1=10**
- [Q10_7] A smart domestic appliance/connected domestic appliances (e.g. washing machines, fridges) **#show if Q4=codes 1-96**
- [Q10_8] Other internet connected device **#show if Q1=12**

<98> Don't know

<3> Replaced this device with a newer one (upgraded)

<2> Bought additional devices from this category

<1> Bought this device for the first time

#All respondents that have replaced and upgraded (Q10=3 in any grid row). Please only show the equivalent rows for which code 3 was selected at Q10 (e.g. show Q11_1 if Q10_1=3)

[Q11] {grid roworder=randomize} You said that you have replaced devices from the following categories... When was the last time you replaced/upgraded each of the following devices?

- [Q11_1] Smart TVs

- [Q11_2] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- [Q11_3] Smart home thermostats e.g. Hive, Nest etc.
- [Q11_4] Smart lighting e.g. Philips Hue, Hive bulbs etc.
- [Q11_5] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- [Q11_6] Smart or connected children's toys and baby monitors
- [Q11_7] A smart domestic appliance/connected domestic appliances (e.g. washing machines, fridges)
- [Q11_8] Other internet connected device

<98> Don't know

<4> Replaced and upgraded within the last 3 years or a longer period

<4> Replaced and upgraded within the last 2 to 3 years

<3> Replaced and upgraded within the last 1 to 2 years

<4> Replaced and upgraded within the last 6 to 12 months

<3> Replaced and upgraded within the last 3 to 6 months

<2> Replaced and upgraded within the last 3 months

<1> Replaced and upgraded within the last month

For the following questions if you have replaced/upgraded a device multiple times, please answer about the most recent time you upgraded/replaced each device

#All respondents that have replaced and upgraded smart tvs (Q10_1=3)

[Q12] {single order=randomize} Which of the following did you do with your older **smart TV**?

<1> Traded it in as part of a deal for the new one

<2> Passed it on to somebody I know

<3 fixed> Kept it as a spare

<4 fixed> Continue to use it

<5> Threw it away

<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)

<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)

<8> Gave to charity

<96 fixed> Other [Q_other] {open}

<98 fixed> Don't know

#All respondents that have replaced and upgraded Smart home assistants/ speakers (Q10_2=3)

[Q13] {single order=randomize} Which of the following did you do with your older **smart home assistants/ speakers**?

<1> Traded it in as part of a deal for the new one

<2> Passed it on to somebody I know

<3 fixed> Kept it as a spare

<4 fixed> Continue to use it

<5> Threw it away

<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)

<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)

<8> Gave to charity

<96 fixed> Other [Q_other] {open}

<98 fixed> Don't know

#All respondents that have replaced and upgraded smart thermostat (Q10_3=3)

[Q14] {single order=randomize} Which of the following did you do with your older **smart home thermostat**?

<1> Traded it in as part of a deal for the new one

- <2> Passed it on to somebody I know
- <3 fixed> Kept it as a spare
- <4 fixed> Continue to use it
- <5> Threw it away
- <6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
- <7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
- <8> Gave to charity
- <96 fixed> Other [Q_other] {open}
- <98 fixed> Don't know

#All respondents that have replaced and upgraded smart lighting (Q10_4=3)

[Q15] {single order=randomize} Which of the following did you do with your older **smart lighting**?

- <1> Traded it in as part of a deal for the new one
- <2> Passed it on to somebody I know
- <3 fixed> Kept it as a spare
- <4 fixed> Continue to use it
- <5> Threw it away
- <6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
- <7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
- <8> Gave to charity
- <96 fixed> Other [Q_other] {open}
- <98 fixed> Don't know

#All respondents that have replaced and upgraded smart security (Q10_5=3)

[Q16] {single order=randomize} Which of the following did you do with your older **smart security system** (smart video door bells, smart video cameras etc)?

- <1> Traded it in as part of a deal for the new one
- <2> Passed it on to somebody I know
- <3 fixed> Kept it as a spare
- <4 fixed> Continue to use it
- <5> Threw it away
- <6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
- <7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
- <8> Gave to charity
- <96 fixed> Other [Q_other] {open}
- <98 fixed> Don't know

#All respondents that have replaced and upgraded smart or connected children's toys and baby monitors (Q10_6=3)

[Q17] {single order=randomize} Which of the following did you do with your older **smart or connected children's toys and baby monitors**?

- <1> Traded it in as part of a deal for the new one
- <2> Passed it on to somebody I know
- <3 fixed> Kept it as a spare
- <4 fixed> Continue to use it
- <5> Threw it away
- <6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
- <7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
- <8> Gave to charity
- <96 fixed> Other [Q_other] {open}
- <98 fixed> Don't know

#All respondents that have replaced and upgraded smart Domestic Appliances (Q10_7=3)

[Q18] {multiple order=randomize} You said that you had replaced and upgraded smart domestic appliances... which if any of the following smart domestic appliances did you replace and upgrade?

- <1> Smart oven
- <2> Smart fridge/freezer
- <3> Smart microwave
- <4> Smart cooker
- <5> Smart dishwasher
- <6> Smart washer/dryer
- <7> Smart toaster
- <8> Smart coffee machine
- <9> Smart kettle
- <96 fixed> Other smart appliance please specify [open]
- <98 fixed xor> Don't know

#All respondents that have replaced and upgraded smart oven (Q18=1)

[Q19] {single order=randomize} Which of the following did you do with your older **smart oven**?

- <1> Traded it in as part of a deal for the new one
- <2> Passed it on to somebody I know
- <3 fixed> Kept it as a spare
- <4 fixed> Continue to use it
- <5> Threw it away
- <6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
- <7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
- <8> Gave to charity
- <96 fixed> Other [Q_other] {open}
- <98 fixed> Don't know

#All respondents that have replaced and upgraded smart fridge (Q18=2)

[Q21] {single order=randomize} Which of the following did you do with your older **smart fridge/freezer**?

- <1> Traded it in as part of a deal for the new one
- <2> Passed it on to somebody I know
- <3 fixed> Kept it as a spare
- <4 fixed> Continue to use it
- <5> Threw it away
- <6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
- <7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
- <8> Gave to charity
- <96 fixed> Other [Q_other] {open}
- <98 fixed> Don't know

#All respondents that have replaced and upgraded smart microwave (Q18=3)

[Q22] {single order=randomize} Which of the following did you do with your older **smart microwave**?

- <1> Traded it in as part of a deal for the new one
- <2> Passed it on to somebody I know
- <3 fixed> Kept it as a spare
- <4 fixed> Continue to use it
- <5> Threw it away
- <6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
- <7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
- <8> Gave to charity
- <96 fixed> Other [Q_other] {open}

<98 fixed> Don't know

#All respondents that have replaced and upgraded smart cooker (Q18=4)

[Q23] {single order=randomize} Which of the following did you do with your older **smart cooker**?

<1> Traded it in as part of a deal for the new one

<2> Passed it on to somebody I know

<3 fixed> Kept it as a spare

<4 fixed> Continue to use it

<5> Threw it away

<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)

<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)

<8> Gave to charity

<96 fixed> Other [Q_other] {open}

<98 fixed> Don't know

#All respondents that have replaced and upgraded smart dishwasher (Q18=5)

[Q24] {single order=randomize} Which of the following did you do with your older **smart dishwasher**?

<1> Traded it in as part of a deal for the new one

<2> Passed it on to somebody I know

<3 fixed> Kept it as a spare

<4 fixed> Continue to use it

<5> Threw it away

<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)

<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)

<8> Gave to charity

<96 fixed> Other [Q_other] {open}

<98 fixed> Don't know

#All respondents that have replaced and upgraded smart washer/dryer (Q18=6)

[Q25] {single order=randomize} Which of the following did you do with your older **smart washer/dryer**?

<1> Traded it in as part of a deal for the new one

<2> Passed it on to somebody I know

<3 fixed> Kept it as a spare

<4 fixed> Continue to use it

<5> Threw it away

<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)

<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)

<8> Gave to charity

<96 fixed> Other [Q_other] {open}

<98 fixed> Don't know

#All respondents that have replaced and upgraded smart toaster (Q18=7)

[Q26] {single order=randomize} Which of the following did you do with your older **smart toaster**?

<1> Traded it in as part of a deal for the new one

<2> Passed it on to somebody I know

<3 fixed> Kept it as a spare

<4 fixed> Continue to use it

<5> Threw it away

<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)

<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)

<8> Gave to charity
<96 fixed> Other [Q_other] {open}
<98 fixed> Don't know

#All respondents that have replaced and upgraded smart coffee machine (Q18=8)

[Q27] {single order=randomize} Which of the following did you do with your older **smart coffee machine**?

<1> Traded it in as part of a deal for the new one
<2> Passed it on to somebody I know
<3 fixed> Kept it as a spare
<4 fixed> Continue to use it
<5> Threw it away
<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
<8> Gave to charity
<96 fixed> Other [Q_other] {open}
<98 fixed> Don't know

#All respondents that have replaced and upgraded smart kettle (Q18=9)

[Q28] {single order=randomize} Which of the following did you do with your older **smart kettle**?

<1> Traded it in as part of a deal for the new one
<2> Passed it on to somebody I know
<3 fixed> Kept it as a spare
<4 fixed> Continue to use it
<5> Threw it away
<6> Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)
<7> Sold it via a high street store (e.g. CEX, Cash Converters etc.)
<8> Gave to charity
<96 fixed> Other [Q_other] {open}
<98 fixed> Don't know

Brand ownership and purchase

The next set of questions are about your specific devices, the brands that you own, and how you got them...

#All respondents that have Smart speakers (Q1=3)

[Q29] {multiple order=randomize} You said that you own and use a smart home assistant/ speakers. Which of the following brands of smart assistant/ speakers do you use at home?

Please tick all that apply

<1> Amazon Echo
<2> Google Nest/Home
<3> Sonos (e.g. Beam, One)
<4> Apple HomePod
<5> Bose (e.g. Home speaker)
<6> Lenovo
<7> LG (e.g. Smart Clock)
<8> Facebook Portal
<96 fixed> Other [open]
<98 fixed xor> Don't know

#All respondents that have more than one brand of Smart speaker (Q29= more than one code). Please force code those who only selected one code at Q29 into the equivalent code in this list.

[Q30] {single order=randomize} You said that you own and use more than one brand of smart home assistant/ speakers ... which of these do you use **most often**?

- <1> Amazon Echo
- <2> Google Nest/Home
- <3> Sonos (e.g. Beam, One)
- <4> Apple HomePod
- <5> Bose (e.g. Home speaker)
- <6> Lenovo
- <7> LG (e.g. Smart Clock)
- <8> Facebook Portal
- <96 fixed> Other **#please pipe in answer from Q29**
- <98 fixed> Don't know

#All respondents that have Smart speakers (Q1=3)

[Q31] {grid roworder=randomize} Thinking of the [MAIN BRAND] smart home assistant(s)/ speaker(s) that you own, where did you purchase it from and how? (if you own more than one MAIN BRAND smart home assistant/ speaker, please answer about the one which you use most often)

- [Q31_1] Directly from the manufacturer/brand
- [Q31_2] Argos
- [Q31_3] Amazon
- [Q31_4] Currys PC World
- [Q31_5] Carphone Warehouse
- [Q31_6] Halfords
- [Q31_7] John Lewis
- [Q31_8] Maplin
- [Q31_9] AO.com
- [Q31_10] Charity shop
- [Q31_11] Second hand shop e.g. CEX, Cash Converters
- [Q31_12] Auction site e.g. eBay, Gumtree
- [Q31_13] Supermarket
- [Q31_14] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have Smart speakers purchased from elsewhere (Q31_14=1,2,3)

[Q31a] [open]You said that you purchased your [MAIN BRAND] smart home assistant/ speaker from somewhere else. In the box please type in where you got this from

#All respondents that have Smart speakers (Q1=3)

[Q32] {single} And still thinking of your [MAIN BRAND] smart home assistant(s)/ speaker(s), was this purchased...

(again, if you own more than one MAIN BRAND smart home assistant/ speaker, please answer about the one which you use most often)

<1> First hand as new

<2> Second hand

<3> Given as a gift

<4> Given as part of a deal/bundle with another device

<98> Don't know

#All respondents that have Smart speakers (Q1=3)

[Q33] {single} And thinking about the last 12 months... how much do you think you have spent on smart home assistant(s)/speaker(s)?

<1> Nothing - it was free (e.g. bundled in with another device, gifted etc.)

<2> Under £50

<3> £51 to £99

<4> £100 to £149

<5> £150 to £199

<6> £200 to £249

<7> £250 to £299

<8> £300 to £349

<9> £350 to £399

<10> £400 to £449

<11> £450 to £499

<12> £500 or more

<98> Don't know

#All respondents that have Smart speakers (Q1=3)

[Q34] {single} And how much do you think you have spent on smart home assistant(s)/speaker(s) for your home in total?

<1> Nothing - it was free (e.g. bundled in with another device, gifted etc.)

<2> Under £50

<3> £51 to £99

<4> £100 to £149

<5> £150 to £199

<6> £200 to £249

<7> £250 to £299

<8> £300 to £349

<9> £350 to £399

<10> £400 to £449

<11> £450 to £499

<12> £500 or more

<98> Don't know

#All respondents that have a smart thermostat (Q1=4)

[Q35] {single order=randomize} You said that you have a smart home thermostat. Which of the following brands is this thermostat?

<1> Hive

<2> Nest

<3> Tado

<4> Wave

<5> Netatmo

<6> Honeywell

<7> Heat Genius

<8> Heatmiser

<95 fixed> Other [other] {open}

<99 fixed> Don't know

#All respondents that have smart thermostat (Q1=4)

[Q36] {grid roworder=randomize} Where did you purchase your [SMART THERMO] smart home thermostat from and how?

- [Q36_1] Directly from the manufacturer/brand
- [Q36_2] Argos
- [Q36_3] Amazon
- [Q36_4] Currys PC World
- [Q36_5] Carphone Warehouse
- [Q36_6] Halfords
- [Q36_7] John Lewis
- [Q36_8] Maplin

- [Q36_9] AO.com
- [Q36_10] Charity shop
- [Q36_11] Second hand shop e.g. CEX, Cash Converters
- [Q36_12] Auction site e.g. eBay, Gumtree
- [Q36_13] Supermarket
- [Q36_14] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have Smart thermostat purchased from elsewhere (Q36_14=1,2,3)

[Q36a] {open} You said that you purchased your [SMART THERMO] smart home thermostat from somewhere else. In the box please type in where you got this from

#All respondents that have smart thermostat (Q1=4)

[Q37] {single} And still thinking of your [SMART THERMO] smart home thermostat, was this purchased...

<1> First hand as new

<2> Second hand

<3> Given as part of a deal e.g. with boiler etc./bundle with another device

<4> Given as a gift

<98> Don't know

<99> Not applicable – was already in the home

#All respondents that have smart thermostat (Q1=4)

[Q38] {single} And how much, approximately, did your [SMART THERMO] smart thermostat cost?

<1> Nothing - it was free (e.g. bundled in with boiler etc.)

<99> Not applicable – it was already in the home

<2> Under £50

<3> £51 to £99

<4> £100 to £149

<5> £150 to £199

<6> £200 to £249

<7> £250 to £299

<8> £300 to £349

<9> £350 to £399

<10> £400 to £449

<11> £450 to £499

<12> £500 or more

<98> Don't know

All that own a smart lighting (Q1=5)

[Q39] {single order=randomize} You said that you have smart lighting. Which of the following brands is this smart lighting? If you have multiple ones, please use the one you consider the MAIN one in use

<1> Hive

<2> Nest

<3> Philips

<4> LIFX

<5> Nanoleaf

<6> TP-Link

<7> Elgato

<8> Mipow

<9> Belkin

<95 fixed> Other [other] {open}
<99 fixed> Don't know

All that own a smart lighting (Q1=5)

[Q40] {grid roworder=randomize} Where did you purchase your [SMART LIGHT] smart lighting from and how? (Again, if you have multiple brands, please answer about the MAIN one in use)

- [Q40_1] Directly from the manufacturer/brand
- [Q40_2] Argos
- [Q40_3] Amazon
- [Q40_4] Currys PC World
- [Q40_5] Carphone Warehouse
- [Q40_6] Halfords
- [Q40_7] John Lewis
- [Q40_8] Maplin
- [Q40_9] AO.com
- [Q40_10] Charity shop
- [Q40_11] Second hand shop e.g. CEX, Cash Converters
- [Q40_12] Auction site e.g. eBay, Gumtree
- [Q40_13] Supermarket
- [Q40_14] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase
<98> Don't know
<3> Purchased via telephone
<2> Purchased in a shop
<1> Purchased online

#All respondents that have Smart lighting purchased from elsewhere (Q40_14=1,2,3)

[Q40a] [open] You said that you purchased your [SMART LIGHT] smart lighting from somewhere else. In the box please type in where you got this from

#All respondents that have smart lighting (Q1=5)

[Q41] {single} And still thinking of your [SMART LIGHT] smart lighting, was this purchased...

<1> First hand as new
<2> Second hand
<3> Given as part of a deal/bundle with another device
<4> Given as a gift
<98> Don't know
<99> Not applicable – was already in the home

All that own smart lighting (Q1=5)

[Q42] {single} And how much, approximately, did your [SMART LIGHT] smart lighting system cost?

<1> Nothing - it was free (e.g. bundled in with thermostat etc.)
<99> Not applicable – it was already in the home
<2> Under £50
<3> £51 to £99
<4> £100 to £149
<5> £150 to £199
<6> £200 to £249
<7> £250 to £299
<8> £300 to £349
<9> £350 to £399
<10> £400 to £449
<11> £450 to £499
<12> £500 or more
<98> Don't know

All that own a smart security system (Q1=6)

[Q43] {single order=randomize} You said that you have a smart security system. Which of the following brands is this smart security system? If you have multiple systems, please use the one you consider the MAIN one in use

- <1> Hive
- <2> Nest
- <3> Ring
- <4> Eufy
- <5> Wisenet
- <6> August
- <7> Remo
- <8> ADT
- <9> SWANN
- <10> TP-Link
- <11> Philips
- <12> Blink
- <13> Ezviz
- <14> Samsung
- <15> Motorola
- <16> Yale
- <95 fixed> Other [other] {open}
- <98 fixed> Don't know

All that own a smart security system (Q1=6)

[Q44] {grid roworder=randomize} Where did you purchase your [SMART SEC] smart security system from and how?

- [Q44_1] Directly from the manufacturer/brand
- [Q44_2] Argos
- [Q44_3] Amazon
- [Q44_4] Currys PC World
- [Q44_5] Carphone Warehouse
- [Q44_6] Halfords
- [Q44_7] John Lewis
- [Q44_8] Maplin
- [Q44_9] AO.com
- [Q44_10] Charity shop
- [Q44_11] Second hand shop e.g. CEX, Cash Converters
- [Q44_12] Auction site e.g. eBay, Gumtree
- [Q44_13] Supermarket
- [Q44_14] Bought from trade/business
- [Q44_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have smart security purchased from elsewhere (Q44_15=1,2,3)

[Q44a] [open] You said that you purchased the [SMART SEC] smart security system from somewhere else. In the box please type in where you got this from

#All respondents that have smart security system (Q1=6)

[Q45] {single} And still thinking of [SMART SEC] smart security system, was this purchased...

<1> First hand as new

- <2> Second hand
- <3> Given as part of a deal/bundle with another device
- <4> Given as a gift
- <98> Don't know
- <99> Not applicable – was already in the home

All that own a smart security system (Q1=6)

[Q46] {single} And how much, approximately, did your total smart security system cost? Please include all other smart security systems that you may have

- <1> Nothing - it was free (e.g. bundled in with another device etc.)
- <99> Not applicable – it was already in the home
- <2> Under £50
- <3> £51 to £99
- <4> £100 to £149
- <5> £150 to £199
- <6> £200 to £249
- <7> £250 to £299
- <8> £300 to £349
- <9> £350 to £399
- <10> £400 to £449
- <11> £450 to £499
- <12> £500 to £549
- <13> £550 to £600
- <14> £600 to £649
- <15> £650 to £700
- <16> £700 to £750
- <17> £750 to £999
- <18> £1,000 or more
- <98> Don't know

#All that own smart DAs (Q4=any of codes 1-96). Please only show grid rows according to corresponding codes selected at Q4 (e.g. only show Q47_1 if Q4=1)

[Q47] {grid roworder=randomize colorder=randomize} Earlier you said that you have smart domestic appliances... Thinking of each smart appliance that you own, which brands are they? If you own more than one appliance in a smart domestic category (e.g. multiple smart fridges), please think of the main one that you use.

- [Q47_1] Smart oven
- [Q47_2] Smart fridge/freezer
- [Q47_3] Smart microwave
- [Q47_4] Smart cooker
- [Q47_5] Smart dishwasher
- [Q47_6] Smart washer/dryer
- [Q47_7] Smart toaster
- [Q47_8] Smart coffee machine
- [Q47_9] Smart kettle

- <1> AEG
- <2> Bosch
- <3> Neff
- <4> Samsung
- <5> Hotpoint
- <6> Indesit
- <7> Logit
- <8> Miele
- <9> LG
- <10> Beko
- <11> Russell Hobbs
- <96 fixed> Other
- <98 fixed> Don't know

All that own a smart oven (Q4=1)

[Q48] {grid roworder=randomize} Where did you purchase your [SMART OVEN] smart oven from and how?

- [Q48_1] Directly from the manufacturer/brand
- [Q48_2] Argos
- [Q48_3] Amazon
- [Q48_4] Currys PC World
- [Q48_5] Carphone Warehouse
- [Q48_6] Halfords
- [Q48_7] John Lewis
- [Q48_8] Maplin
- [Q48_9] AO.com
- [Q48_10] Charity shop
- [Q48_11] Second hand shop e.g. CEX, Cash Converters
- [Q48_12] Auction site e.g. eBay, Gumtree
- [Q48_13] Supermarket
- [Q48_14] Bought from trade/business
- [Q48_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have smart oven purchased from elsewhere (Q48_15=1,2,3)

[Q48a] [open]You said that you purchased your [SMART OVEN] smart oven from somewhere else. In the box please type in where you got this from

All that own a smart oven (Q4=1)

[Q49] {single} And still thinking of your [SMART OVEN] smart oven, was this purchased...

<1> First hand as new

<2> Second hand

<3> Given as part of a deal/bundle with another device

<4> Given as a gift

<98> Don't know

<99> Not applicable – was already in the home

All that own a smart fridge (Q4=2)

[Q50] {grid roworder=randomize} Where did you purchase your [SMART FRIDGE] smart fridge/freezer from and how?

- [Q50_1] Directly from the manufacturer/brand
- [Q50_2] Argos
- [Q50_3] Amazon
- [Q50_4] Currys PC World
- [Q50_5] Carphone Warehouse
- [Q50_6] Halfords
- [Q50_7] John Lewis
- [Q50_8] Maplin
- [Q50_9] AO.com
- [Q50_10] Charity shop
- [Q50_11] Second hand shop e.g. CEX, Cash Converters
- [Q50_12] Auction site e.g. eBay, Gumtree
- [Q50_13] Supermarket

- [Q50_14] Bought from trade/business
- [Q50_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase
 <98> Don't know
 <3> Purchased via telephone
 <2> Purchased in a shop
 <1> Purchased online

#All respondents that have Smart fridge purchased from elsewhere (Q50_15=1,2,3)

[Q50a] [open]You said that you purchased your [SMART FRIDGE] smart fridge/freezer from somewhere else. In the box please type in where you got this from

All that own a smart fridge (Q4=2)

[Q51] {single} And still thinking of your [SMART FRIDGE] smart fridge freezer, was this purchased...

<1> First hand as new
 <2> Second hand
 <3> Given as part of a deal/bundle with another device
 <4> Given as a gift
 <98> Don't know
 <99> Not applicable – was already in the home

All that own a smart microwave (Q4=3)

[Q52] {grid roworder=randomize} Where did you purchase your [SMART MICRO] smart microwave from and how?

- [Q52_1] Directly from the manufacturer/brand
- [Q52_2] Argos
- [Q52_3] Amazon
- [Q52_4] Currys PC World
- [Q52_5] Carphone Warehouse
- [Q52_6] Halfords
- [Q52_7] John Lewis
- [Q52_8] Maplin
- [Q52_9] AO.com
- [Q52_10] Charity shop
- [Q52_11] Second hand shop e.g. CEX, Cash Converters
- [Q52_12] Auction site e.g. eBay, Gumtree
- [Q52_13] Supermarket
- [Q52_14] Bought from trade/business
- [Q52_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase
 <98> Don't know
 <3> Purchased via telephone
 <2> Purchased in a shop
 <1> Purchased online

#All respondents that have smart microwave purchased from elsewhere (Q52_15=1,2,3)

[Q52a] [open]You said that you purchased your [SMART MICRO] smart microwave from somewhere else. In the box please type in where you got this from

All that own a smart microwave (Q4=3)

[Q53] {single} And still thinking of your [SMART MICRO] smart microwave, was this purchased...
 <1> First hand as new

- <2> Second hand
- <3> Given as part of a deal/bundle with another device
- <4> Given as a gift
- <98> Don't know
- <99> Not applicable – was already in the home

All that own a smart cooker (Q4=4)

[Q54] {grid roworder=randomize} Where did you purchase your [SMART COOK] smart cooker from and how?

- [Q54_1] Directly from the manufacturer/brand
- [Q54_2] Argos
- [Q54_3] Amazon
- [Q54_4] Currys PC World
- [Q54_5] Carphone Warehouse
- [Q54_6] Halfords
- [Q54_7] John Lewis
- [Q54_8] Maplin
- [Q54_9] AO.com
- [Q54_10] Charity shop
- [Q54_11] Second hand shop e.g. CEX, Cash Converters
- [Q54_12] Auction site e.g. eBay, Gumtree
- [Q54_13] Supermarket
- [Q54_14] Bought from trade/business
- [Q54_15] Other **#please fix at the bottom of the list**

- <99> Not applicable did not purchase
- <98> Don't know
- <3> Purchased via telephone
- <2> Purchased in a shop
- <1> Purchased online

#All respondents that have Smart cooker purchased from elsewhere (Q54_15=1,2,3)

[Q54a] [open]You said that you purchased your [SMART COOK] smart cooker from somewhere else. In the box please type in where you got this from

All that own a smart cooker (Q4=4)

[Q55] {single} And still thinking of your [SMART COOK] smart cooker, was this purchased...

- <1> First hand as new
- <2> Second hand
- <3> Given as part of a deal/bundle with another device
- <4> Given as a gift
- <98> Don't know
- <99> Not applicable – was already in the home

All that own a smart dishwasher (Q4=5)

[Q56] {grid roworder=randomize} Where did you purchase your [SMART DISH] smart dishwasher from and how?

- [Q56_1] Directly from the manufacturer/brand
- [Q56_2] Argos
- [Q56_3] Amazon
- [Q56_4] Currys PC World
- [Q56_5] Carphone Warehouse
- [Q56_6] Halfords
- [Q56_7] John Lewis

- [Q56_8] Maplin
- [Q56_9] AO.com
- [Q56_10] Charity shop
- [Q56_11] Second hand shop e.g. CEX, Cash Converters
- [Q56_12] Auction site e.g. eBay, Gumtree
- [Q56_13] Supermarket
- [Q56_14] Bought from trade/business
- [Q56_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have Smart dishwasher purchased from elsewhere (Q56_15=1,2,3)

[Q56a] [open]You said that you purchased your [SMART DISH] smart dishwasher from somewhere else. In the box please type in where you got this from

All that own a smart dishwasher (Q4=5)

[Q57] {single} And still thinking of your [SMART DISH] smart dishwasher, was this purchased...

<1> First hand as new

<2> Second hand

<3> Given as part of a deal/bundle with another device

<4> Given as a gift

<98> Don't know

<99> Not applicable – was already in the home

All that own a smart washer (Q4=6)

[Q58] {grid roworder=randomize} Where did you purchase your [SMART WASH] smart washer/dryer from and how?

- [Q58_1] Directly from the manufacturer/brand
- [Q58_2] Argos
- [Q58_3] Amazon
- [Q58_4] Currys PC World
- [Q58_5] Carphone Warehouse
- [Q58_6] Halfords
- [Q58_7] John Lewis
- [Q58_8] Maplin
- [Q58_9] AO.com
- [Q58_10] Charity shop
- [Q58_11] Second hand shop e.g. CEX, Cash Converters
- [Q58_12] Auction site e.g. eBay, Gumtree
- [Q58_13] Supermarket
- [Q58_14] Bought from trade/business
- [Q58_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have Smart washer purchased from elsewhere (Q58_15=1,2,3)

[Q58a] [open]You said that you purchased your [SMART WASH] smart washer/dryer from somewhere else. In the box please type in where you got this from

All that own a smart washer (Q4=6)

[Q59] {single} And still thinking of your [SMART WASH] smart washer/dryer, was this purchased...

- <1> First hand as new
- <2> Second hand
- <3> Given as part of a deal/bundle with another device
- <4> Given as a gift
- <98> Don't know
- <99> Not applicable – was already in the home

All that own a smart toast (Q4=7)

[Q60] {grid roworder=randomize} Where did you purchase your [SMART TOAST] smart toaster from and how?

- [Q60_1] Directly from the manufacturer/brand
- [Q60_2] Argos
- [Q60_3] Amazon
- [Q60_4] Currys PC World
- [Q60_5] Carphone Warehouse
- [Q60_6] Halfords
- [Q60_7] John Lewis
- [Q60_8] Maplin
- [Q60_9] AO.com
- [Q60_10] Charity shop
- [Q60_11] Second hand shop e.g. CEX, Cash Converters
- [Q60_12] Auction site e.g. eBay, Gumtree
- [Q60_13] Supermarket
- [Q60_14] Bought from trade/business
- [Q60_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have Smart toaster purchased from elsewhere (Q60_15=1,2,3)

[Q60a] [open]You said that you purchased your [SMART TOAST] smart toaster from somewhere else. In the box please type in where you got this from

All that own a smart toaster (Q4=7)

[Q61] {single} And still thinking of your [SMART TOAST] smart toaster, was this purchased...

- <1> First hand as new
- <2> Second hand
- <3> Given as part of a deal/bundle with another device
- <4> Given as a gift
- <98> Don't know
- <99> Not applicable – was already in the home

All that own a smart coffee machine (Q4=8)

[Q62] {grid roworder=randomize} Where did you purchase your [SMART COFFEE] smart coffee machine from and how?

- [Q62_1] Directly from the manufacturer/brand
- [Q62_2] Argos
- [Q62_3] Amazon
- [Q62_4] Currys PC World

- [Q62_5] Carphone Warehouse
- [Q62_6] Halfords
- [Q62_7] John Lewis
- [Q62_8] Maplin
- [Q62_9] AO.com
- [Q62_10] Charity shop
- [Q62_11] Second hand shop e.g. CEX, Cash Converters
- [Q62_12] Auction site e.g. eBay, Gumtree
- [Q62_13] Supermarket
- [Q62_14] Bought from trade/business
- [Q62_15] Other **#please fix at the bottom of the list**

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have Smart coffee purchased from elsewhere (Q62_15=1,2,3)

[62a] [open]You said that you purchased your [SMART COFFEE] smart coffee machine from somewhere else. In the box please type in where you got this from

All that own a smart coffee machine (Q4=8)

[Q63] {single} And still thinking of your [SMART COFFEE] smart coffee machine, was this purchased...

<1> First hand as new

<2> Second hand

<3> Given as part of a deal/bundle with another device

<4> Given as a gift

<98> Don't know

<99> Not applicable – was already in the home

All that own a smart kettle (Q4=9)

[Q64] {grid roworder=randomize} Where did you purchase your [SMART KETTLE] smart kettle from and how?

- [Q64_1] Directly from the manufacturer/brand
- [Q64_2] Argos
- [Q64_3] Amazon
- [Q64_4] Currys PC World
- [Q64_5] Carphone Warehouse
- [Q64_6] Halfords
- [Q64_7] John Lewis
- [Q64_8] Maplin
- [Q64_9] AO.com
- [Q64_10] Charity shop
- [Q64_11] Second hand shop e.g. CEX, Cash Converters
- [Q64_12] Auction site e.g. eBay, Gumtree
- [Q64_13] Supermarket
- [Q64_14] Bought from trade/business
- [Q64_15] Other

<99> Not applicable did not purchase

<98> Don't know

<3> Purchased via telephone

<2> Purchased in a shop

<1> Purchased online

#All respondents that have Smart kettle purchased from elsewhere (Q64_15=1,2,3)

[Q64a] [open] You said that you purchased your [SMART KETTLE] smart kettle from somewhere else. In the box please type in where you got this from

All that own a smart kettle (Q4=9)

[Q65] {single} And still thinking of your [SMART KETTLE] smart kettle was this purchased...

- <1> First hand as new
- <2> Second hand
- <3> Given as part of a deal/bundle with another device
- <4> Given as a gift
- <98> Don't know
- <99> Not applicable – was already in the home

#All that own smart DAs (Q4= any codes 1-96)

[Q66] {single} And thinking about the last 12 months... how much do you think you have spent on all smart domestic appliances that you own? Please think of all the devices including smart fridges/freezers, smart ovens, smart dishwashers etc.

- <97> Nothing
- <1> Under £500
- <2> £500 to £749
- <3> £750 to £999
- <4> £1,250 to £1,499
- <5> £1,500 to £1,749
- <6> £1,750 to £1,999
- <7> £2,000 to £2,999
- <8> £3,000 to £3,999
- <9> £4,000 to £4,999
- <10> £5,000 or more
- <98> Don't know
- <99> Not applicable – it was already in the home

#All that own smart DAs (Q4= any codes 1-96)

[Q67] {single} And how much have you spent in total on all your smart domestic appliances that you own? Please think of all the devices including smart fridges/freezers, smart ovens, smart dishwashers etc.

- <1> Under £500
- <2> £500 to £749
- <3> £750 to £999
- <4> £1,250 to £1,499
- <5> £1,500 to £1,749
- <6> £1,750 to £1,999
- <7> £2,000 to £2,999
- <8> £3,000 to £3,999
- <9> £4,000 to £4,999
- <10> £5,000 or more
- <98> Don't know
- <99> Not applicable – it was already in the home

#All respondents that have smart home (speakers/thermostats/security/lighting/DA) (Q1=3,4,5,6 OR Q4=any codes 1-96)

[Q68] {single} And thinking about the last 12 months... how much do you think you have spent on all smart devices that you use? Please think of all your smart home devices (smart speakers, thermostats, security, lighting & domestic appliances)

- <12> Nothing
- <1> Under £50
- <2> £51 to £99
- <3> £100 to £149
- <4> £150 to £199

- <5> £200 to £249
- <6> £250 to £299
- <7> £300 to £349
- <8> £350 to £399
- <9> £400 to £449
- <10> £450 to £499
- <11> £500 to £549
- <12> £550 to £599
- <13> £600 to £649
- <14> £650 to £699
- <15> £700 to £749
- <16> £750 to £999
- <17> £1,000 to £1,249
- <18> £1,250 to £1,499
- <19> £1,500 to £1,749
- <20> £1,750 to £1,999
- <21> £2,000 to £2,499
- <22> £2,500 to £2,999
- <23> £3,000 to £3,999
- <24> £4,000 to £4,999
- <25> £5,000 to £5,999
- <26> £6,000 to £6,999
- <27> £7,000 or more, please specify [open]
- <98> Don't know

**#All respondents that have smart home (speakers/thermostats/security/lighting/DA)
(Q1=3,4,5,6 OR Q4=any codes 1-96)**

[Q69] {single} And much have you spent in TOTAL on all your smart devices that you use?
Please think of all your smart home devices (smart speakers, thermostats, security, lighting, domestic appliances)

- <12> Nothing
- <1> Under £50
- <2> £51 to £99
- <3> £100 to £149
- <4> £150 to £199
- <5> £200 to £249
- <6> £250 to £299
- <7> £300 to £349
- <8> £350 to £399
- <9> £400 to £449
- <10> £450 to £499
- <11> £500 to £549
- <12> £550 to £599
- <13> £600 to £649
- <14> £650 to £699
- <15> £700 to £749
- <16> £750 to £999
- <17> £1,000 to £1,249
- <18> £1,250 to £1,499
- <19> £1,500 to £1,749
- <20> £1,750 to £1,999
- <21> £2,000 to £2,499
- <22> £2,500 to £2,999
- <23> £3,000 to £3,999
- <24> £4,000 to £4,999
- <25> £5,000 to £5,999
- <26> £6,000 to £6,999
- <27> £7,000 or more, please specify [open]
- <98> Don't know

Internet and connection

#All respondents that have devices (Q1=3,4,5,6 OR Q4=any codes 1-96)

[Q70] {grid roworder=randomize} Thinking of the smart devices that you own and use... have you decided to disconnect them from the internet, opt out of or disable their internet connectivity, or did you never connect them to the internet in the first place?

- [Q70_1] Smartphones **#show if Q1=1**
- [Q70_2] Smart TVs **#show if Q1=2**
- [Q70_3] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc. **#show if Q1=3**
- [Q70_4] Smart home thermostats e.g. Hive, Nest etc. **#show if Q1=4**
- [Q70_5] Smart lighting e.g. Philips Hue, Hive bulbs etc. **#show if Q1=5**
- [Q70_6] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc. **#show if Q1=6**
- [Q70_7] Wearable health trackers **#show if Q1=7**
- [Q70_8] Smartwatch **#show if Q1=8**
- [Q70_9] Tablet **#show if Q1=9**
- [Q70_10] Smart or connected children's toys and baby monitors **#show if Q1=10**
- [Q70_11] Smart oven **#show if Q4=1**
- [Q70_12] Smart fridge/freezer **#show if Q4=2**
- [Q70_13] Smart microwave **#show if Q4=3**
- [Q70_14] Smart cooker **#show if Q4=4**
- [Q70_15] Smart dishwasher **#show if Q4=5**
- [Q70_16] Smart washer/dryer **#show if Q4=6**
- [Q70_17] Smart toaster **#show if Q4=7**
- [Q70_18] Smart coffee machine **#show if Q4=8**
- [Q70_19] Smart kettle **#show if Q4=9**

- <1> Always connected to the internet
- <2> Disconnected them from the internet
- <3> Intermittently disconnect/connect them to the internet
- <4> Never connected them to the internet
- <5> Don't know

#All respondents that have devices not connected/intermittently/never connected (any grid row at Q70= codes 2,3,4)

[Q71] {multiple order=randomize} You said that some of the smart devices that you own and use are not always connected to the internet... which of the following are reasons for this? Please tick all that apply

- <1> It's not necessary for me to connect the device to the internet all the time
- <2> Want to save power/it's not always plugged in/turned on
- <3> I want to conserve internet usage because I have a cap or quota
- <4> I'm worried about my security (e.g. unauthorised access to my device)
- <5> I'm worried about my privacy (e.g. device tracking me, listening in on me etc.)
- <96 fixed> Other [please specify]
- <98 fixed xor> Don't know

#All respondents that have devices not connected/intermittently/never connected and worried about security (any grid row at Q70= any codes 2,3,4 AND Q71= 4)

[Q72] {multiple order-randomize} You said that security concerns were reasons why some devices that you own are not always connected to the internet. Which, if any, of the following would convince you in connecting the device to the internet? Please tick all that apply

- <1> If there was information assuring me about my security
- <2> Assurance from manufacturers about my security
- <3> Assurance from retailers about my security
- <4> Knowing that security updates would be applied or provided
- <96 fixed> Other, please specify [open]

<98 fixed xor> Don't know
<99 fixed xor> None of these would convince me

#All respondents that want assurances (Q72=any codes 1,2,3)

[Q73] {single order=randomize} You said that information assuring you about the security of the device could potentially convince you to connect devices to the internet... Where would you expect to find this security information?

- <1> Security information on the packaging
- <2> Security information online
- <3> Security information in the store
- <4> Security information on the device itself
- <98> Don't know

Future

We would now like to ask you about the next 12 months and your purchase habits.

Just to remind you that smart domestic appliance e.g. fridges, washing machines etc. uses the internet to connect to other devices. They are connected via a smartphone or other device where the user can change or monitor things relating to the appliance e.g. turn the washing on, change the fridge temperature etc. remotely.

#All respondents

[Q76] {grid roworder=randomize} Thinking now about the next 12 months... using a scale of 1 to 10 where 1 is 'not at all likely' and 10 is 'extremely likely', how likely do you think you are to buy any of the following in the next 12 months?

- [Q76_1] Smart TVs
- [Q76_2] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- [Q76_3] Smart home thermostats e.g. Hive, Nest etc.
- [Q76_4] Smart lighting e.g. Philips Hue, Hive bulbs etc.
- [Q76_5] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- [Q76_6] Smart or connected children's toys and baby monitors
- [Q76_7] Smart oven
- [Q76_8] Smart fridge/freezer
- [Q76_9] Smart microwave
- [Q76_10] Smart cooker
- [Q76_11] Smart dishwasher
- [Q76_12] Smart washer/dryer
- [Q76_13] Smart toaster
- [Q76_14] Smart coffee machine
- [Q76_15] Smart kettle

- <98> Don't know
- <1> 1= Not at all likely
- <2> 2
- <3> 3
- <4> 4
- <5> 5
- <6> 6
- <7> 7
- <8> 8
- <9> 9
- <10> 10= Extremely likely

#All respondents that are likely to purchase (any grid row at Q76=codes 7-10)

[Q77] {grid roworder=randomize. You mentioned that you are likely to buy the following device(s)... Approximately when do you expect to buy each of the following device(s)?

- [Q77_1] Smart TVs
- [Q77_2] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- [Q77_3] Smart home thermostats e.g. Hive, Nest etc.
- [Q77_4] Smart lighting e.g. Philips Hue, Hive bulbs etc.
- [Q77_5] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- [Q77_6] Smart or connected children's toys and baby monitors
- [Q77_7] Smart oven
- [Q77_8] Smart fridge/freezer
- [Q77_9] Smart microwave
- [Q77_10] Smart cooker
- [Q77_11] Smart dishwasher
- [Q77_12] Smart washer/dryer
- [Q77_13] Smart toaster
- [Q77_14] Smart coffee machine
- [Q77_15] Smart kettle

<1> Within the next month

<2> Between 1 and 3 months

<3> Between 3 and 6 months

<4> Between 6 and 9 months

<5> Between 9 months and a year

<98> Don't know

All that will get a smart speaker that already own (Q1=3 AND Q76_2=7,8,9,10)

[Q78] {single} Earlier you said that you already own a smart home assistant/ speaker in your household and that you intend to purchase another. Will this new smart home assistant/ speaker

...

<1> Be purchased in addition to your existing smart assistant/speakers

<2> Be to replace your older smart speaker(s) (i.e. intend to sell/no longer use your old one)

<98> Don't know

All that will get a smart speaker that already own and will replace (Q78=2)

[Q79] {single} And how long have you had your existing smart home assistant/ speaker that you are replacing?

<1> Less than 12 months

<2> Between 12 and 18 months

<3> Between 18 and 24 months

<4> Between 2 years and 3 years

<5> Between 3 years and 4 years

<6> 4 years and older, please specify [open]

<98> Don't know

All that will get a smart speaker that don't already own (Q1<>3)

[Q80] {single} You said that you will get a smart home assistant/ speaker... will this...

<1> Be purchased in addition to a non-internet connected version of the device

<2> Replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)

<3> Be purchased instead of a non-internet connected version of the device (e.g. music system)

<98> Don't know

All that will get smart thermo that already own (Q1=4 AND Q76_3=7,8,9,10)

[Q81a] {single} Earlier you said that you already have a smart home thermostat in your household and that you intend to purchase another. Will this new smart home thermostat...

- <1> Be purchased in addition to your existing smart thermostat (e.g. for another property)
- <2> Be to replace your older smart thermostat
- <98> Don't know

All that will get a smart thermostat that already own (Q81a=2)

[Q81] {single} Earlier you said that you already own a smart home thermostat in your household and that you intend to replace it with another. How long have you had your existing smart thermostat that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get a smart thermostat that don't already own (Q76_3=7,8,9,10 and Q1<>4)

[Q82] {single} You said that you will get a smart home thermostat... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> Replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get smart lighting that already own (Q1=5 AND Q76_4=7,8,9,10)

[Q83] {single} Earlier you said that you already own smart lighting in your household and that you intend to purchase more. Will this new smart lighting ...

- <1> Be purchased in addition to your existing smart lighting
- <2> Be to replace your older smart lighting (i.e. intend to sell/no longer use your old ones)
- <98> Don't know

All that will get smart lighting that already own & are replacing old lighting (Q83=2)

[Q84] {single} And how long have you had your existing smart lighting that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get smart lighting that don't already own (Q76_4=7,8,9,10 AND Q1<>5)

[Q85] {single} You said that you will get smart lighting... will this...

- <1> Be purchased in addition to a non-internet connected version of the device(s)
- <2> To replace an older non-internet connected version of the device(s) (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device(s)
- <98> Don't know

All that will get a smart security that already own (Q1=6 AND Q76_5=7,8,9,10)

[Q86] {single} Earlier you said that you already own a smart security system in your household and that you intend to purchase another. Will this new smart security system ...

- <1> Be purchased in addition to your existing smart security system
- <2> Be to replace your older smart security system (s) (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get a smart security that already own and will replace (Q86=2)

[Q87] {single} And how long have you had your existing smart security system that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [Open]
- <98> Don't know

All that will get a smart security that don't already own (Q76_5=7,8,9,10 AND Q1<>6)

[Q88] {single} You said that you will get a smart security system ... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get a smart oven that already own (Q4=1 AND Q76_7=7,8,9,10)

[Q89] {single} Earlier you said that you already own a smart oven in your household and that you intend to purchase another. Will this new smart oven ...

- <1> Be purchased in addition to your existing smart oven
- <2> Be to replace your older smart oven(s) (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get a smart oven that already own & are replacing their existing one (Q89=2)

[Q90] {single} And how long have you had your existing smart oven that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get a smart oven that don't already own (Q76_7=7,8,9,10 AND Q4<>1)

[Q91] {single} You said that you will get a smart oven ... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get a smart fridge that already own (Q4=2 AND Q76_8=7,8,9,10)

[Q92] {single} Earlier you said that you already own a smart fridge/freezer in your household and that you intend to purchase another. Will this new smart fridge/freezer ...

- <1> Be purchased in addition to your existing smart fridge/freezer
- <2> Be to replace your older smart fridge/freezer(s) (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get a smart fridge/freezer that already own and will replace (Q92=2)

[Q93] {single} And how long have you had your existing smart fridge/freezer that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get a smart fridge that don't already own (Q76_8=7,8,9,10 AND Q4<>2)

[Q94] {single} You said that you will get a smart fridge/freezer... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get smart microwave that already own (Q4=3 AND Q76_9=7,8,9,10)

[Q95] {single} Earlier you said that you already own a smart microwave in your household and that you intend to purchase another. Will this new smart microwave ...

- <1> Be purchased in addition to your existing smart microwave
- <2> Be to replace your older smart microwave) (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get smart microwave that already own & will replace (Q95=2)

[Q96] {single} And how long have you had your existing smart microwave that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get smart microwave that don't already own (Q76_9=7,8,9,10 AND Q4<>3)

[Q97] {single} You said that you will get a smart microwave... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get a smart cooker that already own (Q4=4 AND Q76_10=7,8,9,10)

[Q98] {single} Earlier you said that you already own a smart cooker in your household and that you intend to purchase another. Will this new smart cooker ...

- <1> Be purchased in addition to your existing smart cooker
- <2> Be to replace your older smart cooker (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get a smart cooker that already own & will replace (Q98=2)

[Q99] {single} Earlier you said that you already own a smart cooker in your household and that you intend to replace it with another. How long have you had your existing smart cooker that you are replacing?

- <1> Less than 12 months

- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get a smart cooker that don't already own (Q76_10=7,8,9,10 AND Q4<>4)

[Q100] {single} You said that you will get a smart home cooker... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get smart dishwasher that already own (Q4=5 AND Q76_11=7,8,9,10)

[Q101] {single} Earlier you said that you already own a smart dishwasher in your household and that you intend to purchase another. Will this new smart dishwasher ...

- <1> Be purchased in addition to your existing smart dishwasher
- <2> Be to replace your older smart dishwasher (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get smart dishwasher that already own & will replace (Q101=2)

[Q102] {single} And how long have you had your existing smart dishwasher that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get smart dishwasher that don't already own (Q76_11=7,8,9,10 AND Q4<>5)

[Q103] {single} You said that you will get a smart dishwasher... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get smart washer that already own (Q4=6 AND Q76_12=7,8,9,10)

[Q104] {single} Earlier you said that you already own a smart washer/dryer in your household and that you intend to purchase another. Will this new smart washer/dryer...

- <1> Be purchased in addition to your existing smart washer/dryer
- <2> Be to replace your older smart washer/dryer (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get smart washer/dryer that already own & will replace (Q104=2)

[Q105] {single} And how long have you had your existing smart washer/dryer that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years

<6> 4 years and older, please specify [open]
<98> Don't know

All that will get smart washer/dryer that don't already own (Q76_12=7,8,9,10 AND Q4<>6)

[Q106] {single} You said that you will get a smart washer/dryer... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get smart toaster that already own (Q4=7 AND Q76_13=7,8,9,10)

[Q107] {single} Earlier you said that you already own a smart toaster in your household and that you intend to purchase another. Will this new smart toaster...

- <1> Be purchased in addition to your existing smart toaster
- <2> Be to replace your older smart toaster (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get smart toaster that already own & will replace (Q107=2)

[Q108] {single} And how long have you had your existing smart toaster that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get smart toaster that don't already own (Q76_13=7,8,9,10 AND Q4<>7)

[Q109] {single} You said that you will get a smart toaster... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get smart coffee that already own (Q4=8 AND Q76_14=7,8,9,10)

[Q110] {single} Earlier you said that you already own a smart coffee machine in your household and that you intend to purchase another. Will this new smart coffee machine ...

- <1> Be purchased in addition to your existing smart coffee machine
- <2> Be to replace your older smart coffee machine (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get smart coffee that already own & will replace (Q110=2)

[Q111] {single} And how long have you had your existing smart coffee machine that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get smart coffee that don't already own (Q76_14=7,8,9,10 AND Q4<>8)

[Q112] {single} You said that you will get a smart coffee machine... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get smart kettle that already own (Q4=9 AND Q76_15=7,8,9,10)

[Q113] {single} Earlier you said that you already own a smart kettle in your household and that you intend to purchase another. Will this new smart kettle...

- <1> Be purchased in addition to your existing smart kettle
- <2> Be to replace your older smart kettle (i.e. intend to sell/no longer use your old one)
- <98> Don't know

All that will get smart kettle that already own & will replace (Q113=2)

[Q114] {single} And how long have you had your existing smart kettle that you are replacing?

- <1> Less than 12 months
- <2> Between 12 and 18 months
- <3> Between 18 and 24 months
- <4> Between 2 years and 3 years
- <5> Between 3 years and 4 years
- <6> 4 years and older, please specify [open]
- <98> Don't know

All that will get smart kettle that don't already own (Q76_15=7,8,9,10 AND Q4<9)

[Q115] {single} You said that you will get a smart kettle... will this...

- <1> Be purchased in addition to a non-internet connected version of the device
- <2> To replace an older non-internet connected version of the device (i.e. intend to sell/no longer use your old one)
- <3> Be purchased instead of a non-internet connected version of the device
- <98> Don't know

All that will get a smart devices and that already own and will replace (Q78=2 OR Q81a=2 OR Q83=2 OR Q86=2 OR Q89=2 OR Q92=2 OR Q95=2 OR Q98=2 OR Q101=2 OR Q104=2 OR Q107=2 OR Q110=2 OR Q113=2)

[Q116] {multiple order=randomize} Which of the following are reasons why you are upgrading some of your smart devices? Please tick all that apply

- <1> A new generation of the device has updated features
- <2> A new generation of the device has enhanced security features
- <3> I can upgrade by trading in my existing device for a better one
- <4> I like having the latest devices
- <5> My older device no longer supports software patches and security updates
- <6> My older device's internet-connected features are no longer working
- <7> My older device has stopped working properly
- <96> Other [please specify]
- <98 fixed xor> Don't know

#All respondents unlikely to be purchasing any devices of smart home ((Q76_2 =1,2,3,4 AND Q76_3=1,2,3,4 AND Q76_4=1,2,3,4 AND Q76_5=1,2,3,4 AND Q76_6=1,2,3,4 AND Q76_7=1,2,3,4 AND Q76_8=1,2,3,4 AND Q76_9=1,2,3,4 AND Q76_10=1,2,3,4 AND Q76_11=1,2,3,4 AND Q76_12=1,2,3,4 AND Q76_13=1,2,3,4 AND Q76_14=1,2,3,4 AND Q76_15=1,2,3,4) AND ((Q1 is NOT any of 3,4,5,6) AND (Q4 is NOT any of codes 1-96))

[Q117] {multiple order=randomize} You've said that you are unlikely to purchase any of the following smart home devices in the next 12 months:

- Smart speaker
- Smart thermostat
- Smart lighting
- Smart security

- Smart domestic appliances (e.g. ovens, fridges etc.)

Which, if any, of the following are reasons for this? Please tick all that apply.

- <1 fixed xor> I will get smart home devices but not in the next 12 months
- <2> I am not interested in the smart home
- <3> I think smart devices are still in their infancy and would rather wait until they are more developed
- <4> I am concerned about privacy of smart devices (e.g. device tracking me, listening in on me etc.)
- <5> I am concerned about how smart devices work (e.g. access the internet, what they do etc.)
- <6> I am concerned about the quality of smart devices
- <7> I've heard bad things about some smart devices
- <8> I am concerned about the security of smart devices (e.g. unauthorised access to my device)
- <9> There are not enough reasons for me to get any smart devices
- <10> Smart devices are not stylish enough/ I don't like their designs
- <11> I don't know enough about smart devices
- <12> Smart devices are too expensive
- <95 fixed> Other [Q_other]{open}
- <97 fixed xor> Don't know

#All respondents unlikely to be purchasing any devices because of cost (Q117=12)

[Q118] {grid roworder=randomize} You said that you were unlikely to consider purchasing smart devices because they are too expensive... What is the maximum you would be willing to pay for each of the following devices ?

- [Q118_2] Smart home assistants/ speakers e.g. Amazon Echo, Google Home/Nest speaker etc.
- [Q118_3] Smart home thermostats e.g. Hive, Nest etc.
- [Q118_4] Smart lighting e.g. Philips Hue, Hive bulbs etc.
- [Q118_5] Smart security system (smart video door bells, smart video cameras etc) e.g. Ring, Hive Hello etc.
- [Q118_6] Smart or connected children's toys and baby monitors
- [Q118_7] Smart oven
- [Q118_8] Smart fridge/freezer
- [Q118_9] Smart microwave
- [Q118_10] Smart cooker
- [Q118_11] Smart dishwasher
- [Q118_12] Smart washer/dryer
- [Q118_13] Smart toaster
- [Q118_14] Smart coffee machine
- [Q118_15] Smart kettle

- <98> Don't know
- <1> £50 or less
- <2> £51 to £99
- <3> £100 to £149
- <4> £150 to £199
- <5> £200 to £249
- <6> £250 to £299
- <7> £300 to £349
- <8> £350 to £399
- <9> £400 to £449
- <10> £450 to £499
- <11> £500 or more

#All respondents are unlikely to be purchasing any devices because of privacy, security, quality etc. (Q117=4,5,6)

[Q119] {multiple order=randomize} Consumer smart devices are network-connected devices that are available for consumers to purchase in shops or on the Internet, and that are typically used in

the home or as electronic wearables. [We are not thinking of industrial smart devices such as smart security systems that are designed and installed by a security company and are not typically available in high street shops].

You said that you were unlikely to consider purchasing consumer smart devices because you are concerned about security, privacy and the quality.... Which, if any of the following would influence you to purchase a smart home device? Please tick all that apply

- <1> Security information at point of sale
- <2> Assurances from manufacturers on adherence to a minimum security standard
- <3> Independent certification/assurance scheme of adherence to a minimum security standard
- <4> Transparency on the length of time that security updates will be provided
- <5> Assurance that every device has a unique password
- <6> Assurance that any security issue or vulnerability can be reported to the manufacturer
- <96 fixed> Other [please specify]
- <98 fixed xor> Don't know

Work and consumer IOT

And finally we have a few questions about consumer IoT devices at work.

#All respondents

[Q120] {single} Which of the following best applies to you?

- <1> Working full time (30 or more hours per week)
- <2> Working part time (8-29 hours a week)
- <3> Working part time (Less than 8 hours a week)
- <4> Full time student
- <5> Retired
- <6> Unemployed
- <7> Not working
- <8> Other
- <98> Prefer not to say

#All that work (Q120=1,2,3)

[Q121] {single} What kind of organisation do you work for?

- <1> Private sector – profit-seeking (e.g. public limited company, partnership)
- <2> Public sector – government owned or funded (e.g. civil service, local government, NHS, university)
- <3> Third sector – non-profit, non-governmental (e.g. charity, social enterprise)
- <98> Don't know

#All that work (Q120=1,2,3)

[Q122] {single} Including yourself, approximately how many full-time employees are employed by your organisation in total in the UK?

- <1> 1 (just me)
- <2> 2
- <3> 3 to 5
- <4> 6 to 9
- <5> 10 to 19
- <6> 20 to 34
- <7> 35 to 49
- <8> 50 to 99
- <9> 100 to 249
- <10> 250 to 499
- <11> 500 to 999
- <12> 1,000 or more
- <13> Don't know

#All that work (Q120=1,2,3)

[Q123] {multiple order=randomize} Thinking of the following smart devices... does the organisation you work for use any of these consumer Internet of Things devices? Please tick all that apply

- 
- <1> Smart TVs
 - <2> Smart speakers
 - <3> Smart thermostats
 - <4> Smart lighting
 - <5> Smart security system
 - <6> Smart domestic appliances
 - <7> Smart tablet
 - <8> Smartphones
 - <9> Smart printers (e.g. Desktop rather than Multi Functional Device)
 - <96 fixed> Other
 - <98 fixed xor> None of these – don't use any of these

7. CONSUMER SURVEY: ADDITIONAL TABLES

Consumer IoT devices per household

Table 4: Number of devices owned and used

Device	One	Two	Three	Four	Five or more	Don't know/ can't recall	Base
Smart TVs	69%	22%	7%	1%	1%	0%	2885
Connected domestic appliances (e.g. washing machines, fridges)	52%	13%	12%	12%	9%	2%	385
Smart home thermostats	90%	4%	2%	1%	3%	1%	533
Smart home assistants/ speakers	57%	21%	11%	6%	5%	0%	1579
Smart security system (smart video door bells, smart video cameras etc.)	65%	16%	10%	3%	5%	1%	392
Smart lighting	25%	24%	13%	10%	27%	2%	494
Smartphones	68%	21%	6%	3%	2%	0%	4449
Tablet	71%	20%	6%	2%	1%	0%	3243
Smartwatch	84%	12%	3%	1%	1%	0%	724
Wearable health trackers	81%	16%	3%	1%	0%	0%	1000
Smart or connected children's toys and baby monitors	56%	19%	7%	8%	7%	3%	113

Source: Consumer Survey Q3: (For those owned and used) How many of each of the following devices do you currently own and use? (Base for each row=owners of this device type)

Type of smart domestic appliance

Table 5: Smart domestic appliance ownership in relation to other smart domestic appliances

Device	Smart oven	Smart fridge freezer	Smart micro wave	Smart cooker	Smart dishwasher	Smart washer/dryer	Smart toaster	Smart coffee machine	Smart kettle
Smart oven	100%	34%	45%	46%	39%	13%	53%	22%	27%
Smart fridge freezer	50%	100%	36%	44%	46%	17%	47%	28%	34%
Smart microwave	44%	25%	100%	42%	33%	12%	59%	22%	40%
Smart cooker	37%	24%	34%	100%	29%	11%	46%	23%	33%
Smart dishwasher	34%	28%	29%	32%	100%	16%	39%	22%	28%
Smart washer/dryer	41%	39%	41%	45%	59%	100%	43%	24%	33%
Smart toaster	36%	22%	41%	39%	30%	9%	100%	21%	39%
Smart coffee machine	22%	20%	23%	30%	25%	7%	32%	100%	29%
Smart kettle	26%	23%	40%	40%	31%	10%	56%	28%	100%
Base	59	86	58	47	52	192	40	60	58

Source: Consumer Survey Q4: Which, if any, of the following smart domestic appliances do you own and use? (Base for each column=owners of multiple of each device type)

Popular brands and channels for purchase

Brand: Smart Domestic Appliances

Table 6: Ownership of smart domestic appliances by brand

	Smart oven	Smart fridge/freezer	Smart microwave	Smart cooker	Smart dishwasher	Smart washer/dryer	Smart toaster	Smart coffee machine	Smart kettle
AEG	2%	6%	0%	4%	4%	0%	2%	0%	2%
Bosch	9%	7%	13%	10%	14%	6%	0%	19%	5%
Neff	9%	2%	4%	10%	4%	2%	5%	4%	4%
Samsung	11%	28%	14%	18%	10%	23%	9%	10%	12%
Hotpoint	8%	9%	9%	8%	6%	12%	23%	11%	7%
Indesit	2%	1%	6%	9%	6%	7%	0%	3%	1%
Logit	3%	1%	4%	3%	3%	2%	2%	0%	2%
Miele	14%	4%	6%	4%	14%	5%	5%	9%	10%
LG	15%	20%	18%	16%	6%	9%	6%	7%	13%
Beko	3%	4%	4%	2%	4%	3%	10%	8%	7%
Russell Hobbs	7%	4%	7%	6%	2%	2%	19%	2%	11%
Other	7%	5%	5%	2%	14%	22%	9%	21%	20%
Don't know	10%	8%	9%	9%	14%	7%	10%	4%	6%
Base	59	86	58	47	52	192	40	60	58

Source: Consumer Survey Q47 Thinking of each smart appliance that you own, which brands are they? (Base for each column=owners of this device type)

Brand: Smart Thermostats

Table 7: Ownership of smart thermostats by brand

Brand	Percentage of respondents who own this brand
Hive	55%
Nest	17%
Tado	4%
Wave	3%
Netatmo	1%
Honeywell	5%
Heat Genius	1%
Heatmiser	1%
Other	5%
Don't know	8%
Base	546

Source: Consumer Survey Q35 You said that you have a smart home thermostat. Which of the following brands is this thermostat? (n=546 – all who own a smart thermostat)

Brand: Smart Home Assistants/Speakers

Table 8: Ownership of smart home assistants/speakers by brand

Brand	Percentage of respondents who own this brand
Amazon	78%
Google	22%
Sonos	7%
Apple	2%
Bose	4%
Lenovo	2%
LG	2%
Facebook	1%
Don't know	2%
Base	1685

Source: Consumer Survey Q29 You said that you own and use a smart home assistant/ speakers. Which of the following brands of smart assistant/ speakers do you use at home? (n=1685 – all who own a smart home assistant/speaker) NB this includes answers written in by respondents who ticked “other” but which have been recoded to fit the brands mentioned here

Table 9: Most commonly used smart home assistant/speaker brand where multiple are owned

Brand	Percentage of respondents who own this brand
Amazon Echo	72%
Google Nest/Home	17%
Sonos	4%
Apple HomePod	1%
Bose	1%
LG	1%
Lenovo	0%
Facebook Portal	0%
Base	1685

Source: Consumer Survey Q30: You said that you own and use more than one brand of smart speaker. Which of these do you use most often? (n=1685– all who own a smart home assistant/speaker)

Table 10: Brand of secondary smart home assistants/speakers

Brand	Amazon Echo	Google Nest/Home	Sonos	Apple Home Pod	Bose	Lenovo	LG	Facebook Portal
Amazon Echo	1,211	28	29	3	11	1	4	0
Google Nest/Home	59	291	4	1	2	1	3	0
Sonos	33	6	64	0	1	1	1	1
Apple HomePod	4	1	1	14	2	0	3	1
Bose	27	3	3	2	23	0	1	1
Lenovo	14	5	2	1	1	6	1	1
LG	8	3	1	2	1	0	10	1
Facebook Portal	7	0	1	1	1	1	2	5
Other	7	1	1	0	0	0	0	0

Source: Consumer Survey Q29 & 30 (You said that you own and use more than one brand of smart home assistant/ speakers ... which of these do you use most often?) (n=1685– all who own a smart home assistant/speaker)

Brand: Smart Security Systems

Table 11: Ownership of smart security systems by brand

Brand	Percentage of respondents who own this brand
Ring	32%
Nest	6%
Hive	6%
Samsung	4%
SWANN	4%
Blink	3%
Philips	2%
Ezviz	2%
Yale	2%
TP-Link	1%
ADT	1%
Eufy	1%
August	1%
Motorola	1%
Wisenet	0%
Remo	0%
Other	18%
Don't know	15%
Base	407

Q43 You said that you have a smart security system. Which of the following brands is this smart security system? (n=407 – all who own a smart security system)

Brand: Smart Lighting

Table 12: Ownership of smart lighting by brand

Brand	Percentage of respondents who own this brand
Philips	41%
Hive	18%
TP-Link	8%
LIFX	3%
Nest	2%
Nanoleaf	1%
Elgato	1%
Belkin	1%
Other	7%
Don't know	18%
Base	522

Source: Consumer Survey Q39 You have said that you have smart lighting. Which of the following brands is this smart lighting? If you have multiple ones, please use the one you consider the main one in use. (n=522 – all who own smart lighting)

Sources of purchase

Table 13: How smart devices were purchased

Device	Online	In a store	Via telephone	Don't remember	Base
Smart oven	55%	37%	7%	1%	51
Smart fridge/freezer	54%	39%	6%	1%	80
Smart microwave	49%	36%	15%	0%	49
Smart cooker	62%	26%	12%	0%	42
Smart dishwasher	62%	27%	9%	2%	42
Smart washer/dryer	64%	31%	3%	1%	170
Smart toaster	66%	23%	9%	3%	38
Smart coffee machine	66%	26%	6%	1%	55
Smart kettle	62%	32%	2%	4%	50
Smart thermostat	58%	13%	12%	17%	4
Smart home assistant/speaker	83%	16%	0%	1%	1254
Smart security system	76%	16%	5%	2%	342
Smart lighting	79%	14%	4%	2%	436

Source: Consumer Survey Q31/Q36/Q40/Q44/Q48/Q50/Q52/Q54/Q56/Q58/Q60/Q62/Q64 How did you purchase your [smart device]? (Base for each row = all who have purchased each device type)

Table 14: How smart devices were acquired by owners

Device	First hand as new	Second hand	Given as a gift	Given as part of a deal/bundle with another device	Don't know	Not applicable – was already in the home	Base
Smart oven	56%	15%	11%	12%	4%	1%	59
Smart fridge/freezer	73%	6%	8%	6%	6%	1%	86
Smart microwave	54%	14%	8%	10%	8%	5%	58
Smart cooker	60%	3%	17%	13%	6%	1%	47
Smart dishwasher	56%	12%	13%	5%	11%	3%	52
Smart washer/dryer	87%	3%	4%	1%	3%	2%	192
Smart toaster	54%	11%	22%	5%	8%	0%	40
Smart coffee machine	64%	5%	16%	13%	2%	1%	60
Smart kettle	65%	9%	11%	9%	0%	6%	58
Smart thermostat	77%	1%	15%	2%	3%	2%	546
Smart home assistant/speaker	76%	1%	17%	4%	2%	0%	1685
Smart security system	85%	1%	5%	5%	3%	2%	407
Smart lighting	86%	1%	3%	5%	3%	0%	522

Source: Consumer Survey Q32/Q37/Q41/Q45/Q49/Q51/Q53/Q55/Q57/Q59/Q61/Q63/Q65 Was your smart device purchased... (Base for each row = all who own each device type)

Table 15: Most common retailer by device type

Where devices purchased from	Smart oven	Smart fridge/freezer	Smart microwave	Smart cooker	Smart dishwasher	Smart washer/dryer	Smart toaster	Smart coffee machine	Smart kettle	Smart thermostat	Smart home assistant/speaker	Smart security system	Smart lighting
Directly from the manufacturer/ brand	8%	10%	5%	10%	10%	5%	6%	10%	4%	23%	6%	8%	8%
Argos	9%	9%	8%	5%	11%	11%	12%	11%	16%	1%	5%	6%	4%
Amazon	15%	10%	14%	5%	11%	3%	24%	16%	22%	1%	48%	35%	49%
Currys PC World	7%	19%	12%	5%	11%	28%	8%	7%	7%	3%	6%	6%	4%
Carphone Warehouse	1%	2%	2%	4%	1%	1%	2%	2%	0%	0%	1%	1%	0%
Halfords	2%	2%	3%	2%	0%	0%	2%	1%	0%	0%	0%	1%	0%
John Lewis	8%	11%	13%	4%	2%	8%	4%	10%	6%	2%	3%	3%	2%
Maplin	4%	1%	0%	5%	0%	1%	0%	4%	0%	1%	0%	3%	2%
AO.com	3%	9%	6%	12%	8%	18%	6%	8%	8%	0%	0%	2%	1%
Charity shop	6%	1%	0%	6%	3%	0%	3%	2%	6%	1%	0%	0%	1%
Second hand shop eg CEX, Cash Converters	8%	2%	2%	4%	4%	2%	5%	0%	3%	1%	0%	1%	0%
Auction site eg eBay, Gumtree	2%	5%	3%	11%	5%	4%	9%	6%	1%	1%	1%	4%	2%
Supermarket	7%	5%	9%	9%	3%	1%	8%	2%	3%	1%	1%	1%	2%
Bought from trade/business	5%	2%	6%	7%	8%	3%	4%	3%	6%	0%	0%	5%	0%
Other	2%	4%	2%	0%	4%	4%	0%	9%	4%	25%	4%	10%	9%
Not applicable (eg it was a gift, came built in)	6%	0%	5%	5%	5%	1%	0%	5%	7%	17%	22%	8%	8%
Don't know	7%	7%	10%	6%	13%	10%	5%	4%	7%	10%	4%	8%	9%
Base	59	86	58	47	52	192	40	60	58	546	1685	407	522

Source: Consumer Survey Q31/Q36/Q40/Q44/Q48/Q50/Q52/Q54/Q56/Q58/Q60/Q62/Q64 Where did you purchase your smart device? (Base for each row = all who own each device type)

Expenditure: Smart domestic appliances

Table 16: Spending on smart domestic appliances in the last year and in total

Price	How much have you spent on smart domestic appliances in the last year?	How much have you spent on smart domestic appliances in total?
Nothing	12%	0%
Under £500	29%	18%
£500 to £999	25%	22%
£1,000 to 1,499	7%	17%
£1,500 to £1,999	9%	13%
£2,000 to £2,999	3%	6%
£3,000 to £3,999	2%	3%
£4,000 to £4,999	1%	1%
£5,000 or more	1%	4%
Don't know	7%	12%
Not applicable – it was already in the home	3%	3%
Mean	£1,018	£1,353
Base	385	385

Source: Consumer Survey Q66 In the last 12 months how much do you think you have spent on all smart domestic appliances that you own? and Q67 How much have you spent in total on all your smart domestic appliances that you own? (n=385 – all who own smart domestic appliances)

Expenditure: Smart Thermostats

Table 17: Total spend on smart thermostat

Price	Percentage of respondents
Nothing - it was free (e.g. bundled in with boiler etc.)	21%
Under £50	2%
£50 to £99	5%
£100 to £149	16%
£150 to £199	13%
£200 to £249	8%
£250 to £299	3%
£300 to £399	3%
£400 to £499	0%
£500 or more	2%
Not applicable – it was already in the home	3%
Don't know	25%
Base	546
Mean	£175

Source: Consumer Survey Q38 How much, approximately, did your smart thermostat cost?
(n=546 – all who own a smart thermostat)

Expenditure: Smart Home Assistants/Speakers

Table 18: Spending on smart home assistants/speakers in the last year and in total

Price	How much have you spent on smart home assistants/speakers in the last year?	How much have you spent on smart home assistants/speakers in total?
Nothing - it was free (e.g. bundled in with another device, gifted etc.)	28%	24%
Under £50	26%	19%
£50 to £99	16%	15%
£100 to £149	6%	9%
£150 to £199	4%	6%
£200 to £249	2%	3%
£250 to £299	1%	2%
£300 to £399	2%	4%
£400 to £499	1%	2%
£500 or more	1%	3%
Don't know	12%	12%
Mean	£93	£140
Base	1685	1685

Source: Consumer Survey Q33 Thinking about the last 12 months, how much do you think you have spent on smart home assistant(s)/speaker(s)? and Q34 How much do you think you have spent on smart home assistant(s)/ speaker(s) for your home in total? (n=1685 all who own a smart home assistant/speaker)

Expenditure: Smart Security Systems

Table 19: Total spend on smart security system

Price	Percentage of respondents
Nothing - it was free (e.g. bundled in with another device etc.)	4%
Under £100	17%
£100 to £199	24%
£200 to £299	11%
£300 to £399	7%
£400 to £499	5%
£500 to £599	3%
£600 to £699	1%
£700 to £999	2%
£1,000 or more	3%
Not applicable – it was already in the home	1%
Don't know	21%
Base	407
Mean	£260

Source: Consumer Survey Q46 How much, approximately, did your total smart security system cost? Please include all other smart security systems that you may have. (n=407 – all who own a smart security system)

Expenditure: Smart Lighting Systems

Table 20: Total spend on smart lighting system

Price	Percentage of respondents
Nothing - it was free (e.g. bundled in with thermostat etc.)	6%
Under £50	31%
£50 to £99	12%
£100 to £149	11%
£150 to £199	5%
£200 to £299	5%
£300 to £399	3%
£400 to £499	1%
£500 or more	1%
Not applicable – it was already in the home	0%
Don't know	24%
Base	522
Mean	£102

Source: Consumer Survey Q42 How much, approximately, did your smart lighting system cost?
(n=522 – all who own a smart security system) Consumers who opt out of internet functionality

Table 21: Device ownership and usage

Device	Device owned and used currently	Device owned and used, but not connected to the internet	Device owned but no longer used	Base
Smart TVs	94%	4%	1%	2924
Smart home thermostats	93%	5%	1%	546
Smart home assistants/ speakers	91%	3%	5%	1685
Smart security system (smart video door bells, smart video cameras etc.)	87%	9%	3%	407
Smart lighting	88%	7%	4%	522
Smartphones	98%	1%	0%	4481
Tablet	90%	2%	8%	3550
Smartwatch	84%	4%	9%	819
Wearable health trackers	77%	8%	13%	1176
Smart or connected children's toys and baby monitors	60%	29%	9%	127
Other	98%	2%	1%	343

Source: Consumer Survey Q2: Of these smart devices that you have in your household, which are: owned and used currently; owned and used, but not connected to the Internet; owned but no longer used? (Base for each row = all who own each device type)

Table 22: Use of internet connectivity function on smart devices

Device	Always connected to the internet	Disconnected from the internet	Intermittently disconnect them from the internet	Never connected them to the internet	Don't know	Base
Smart TVs	81%	2%	11%	3%	3%	2,924
Smart oven	29%	32%	20%	12%	7%	59
Smart fridge freezer	40%	17%	22%	16%	5%	86
Smart microwave	18%	16%	32%	24%	11%	58
Smart cooker	17%	16%	40%	14%	12%	47
Smart dishwasher	34%	15%	27%	14%	10%	52
Smart washer/ dryer	24%	15%	21%	31%	9%	192
Smart toaster	20%	22%	32%	16%	10%	40
Smart coffee machine	29%	31%	19%	17%	5%	60
Smart kettle	33%	19%	24%	13%	10%	58
Smart home thermostats	86%	3%	4%	4%	4%	546
Smart home assistants/ speakers	82%	3%	11%	2%	2%	1,685
Smart security system (smart video door bells, smart video cameras etc.)	82%	3%	9%	2%	4%	407
Smart lighting	77%	4%	9%	5%	5%	522
Smartphones	83%	1%	14%	1%	2%	4,481
Tablet	74%	3%	21%	1%	2%	3,550
Smartwatch	65%	4%	21%	5%	4%	819
Wearable health trackers	47%	6%	28%	14%	6%	1,176
Smart or connected children's toys and baby monitors	34%	17%	24%	18%	7%	127

Source: Consumer Survey Q70: Of the smart devices that you own and use, have you decided to disconnect them from the internet, opt out of or disable their internet connectivity, or did you never connect them to the internet? (Base for each row = all who own each device type)

Table 23: Devices disconnected from the internet or never connected

Product Group	Device	Percentage of device owners who had disconnected from the internet at some point, or had never connected the device	Weighted average percentage by group	Base
Group 1: Big ticket items	Smart TVs	17%	26%	2,924
	Smart oven	64%		59
	Smart fridge freezer	55%		86
	Smart microwave	72%		58
	Smart cooker	70%		47
	Smart dishwasher	56%		52
	Smart washer/ dryer	67%		192
	Smart toaster	71%		40
	Smart coffee machine	66%		60
	Smart kettle	57%		58
Group 2: Connecting the Home	Smart home thermostats	10%	15%	546
	Smart home assistants/ speakers	16%		1,685
	Smart security system (smart video door bells, smart video cameras etc.)	14%		407
	Smart lighting	18%		522
Group 3: Consumer lifestyle	Smartphones	16%	24%	4,481
	Tablet	24%		3,550
	Smartwatch	31%		819
	Wearable health trackers	48%		1,176
	Smart or connected children's toys and baby monitors	59%		127

Q70: Of the smart devices that you own and use, have you decided to disconnect them from the internet, opt out of or disable their internet connectivity, or did you never connect them to the internet? (Base for each row = all who own each device type)

Consumer rate of replacement of devices

Table 24: Consumers' first smart device

Device	Percentage of respondents
Smart TV	41%
Smart domestic appliance	1%
Smart home thermostats	3%
Smart home assistants/ speakers	13%
Smart security system	2%
Smart lighting	1%
Smart or connected children's toys and baby monitors	0%
Other	17%
Don't know	20%
Base	5148

Source: Consumer Survey Q7 What was the first device you owned? (n=5148 – all respondents)

Table 25: Date of first smart device purchase

First Purchased	Percentage of respondents
Before 2015	23%
2015	9%
2016	11%
2017	14%
2018	18%
2019	15%
2020	2%
Don't know	8%
Base	4102

Source: Consumer Survey Q8 You said that your first smart device was the following: [smart X]. When did you get this device? (n=4102 – all who know when they purchased their first device)

Table 26: When smart devices were last replaced and upgraded

Device	Within the last 3 years or a longer period	Within the last 2 to 3 years	Within the last 1 to 2 years	Within the last 6 to 12 months	Within the last 3 to 6 months	Within the last 3 months	Within the last month	Don't know	Base
Smart TV	23%	20%	21%	12%	7%	7%	4%	6%	900
Smart domestic appliance	11%	7%	20%	16%	14%	11%	12%	9%	93
Smart home thermostats	12%	16%	22%	21%	6%	14%	5%	5%	59
Smart home assistants/speakers	5%	13%	11%	16%	10%	24%	13%	7%	65
Smart security system	9%	20%	23%	15%	4%	17%	7%	4%	37
Smart lighting	12%	10%	9%	6%	14%	15%	15%	19%	49
Smart or connected children's toys and baby monitors	0%	10%	23%	25%	9%	7%	23%	4%	16
Other	37%	19%	15%	11%	6%	5%	2%	5%	163

Source: Consumer Survey Q11 When was the last time you replaced/ upgraded each of the following devices? (Base for each row = all who are replacing each device type)

Table 27: Likelihood of purchasing these smart devices in the next 12 months

Device	Don't know	1	2	3	4	5	6	7	8	9	10
Smart TVs	7%	48%	6%	6%	5%	10%	5%	5%	3%	2%	4%
Smart oven	6%	77%	5%	3%	2%	3%	1%	1%	1%	0%	1%
Smart fridge freezer	6%	75%	5%	3%	2%	3%	1%	1%	1%	0%	1%
Smart microwave	6%	76%	5%	3%	2%	3%	1%	1%	1%	0%	1%
Smart cooker	6%	78%	5%	3%	2%	3%	1%	1%	1%	0%	1%
Smart dishwasher	5%	80%	4%	3%	1%	2%	1%	1%	1%	0%	1%
Smart washer/ dryer	6%	76%	5%	3%	2%	3%	2%	1%	1%	0%	1%
Smart toaster	6%	79%	5%	2%	2%	2%	1%	1%	0%	0%	1%
Smart coffee machine	5%	78%	4%	2%	2%	3%	2%	1%	1%	0%	2%
Smart kettle	6%	74%	5%	3%	2%	3%	2%	1%	1%	0%	1%
Smart home thermostats	7%	62%	5%	5%	3%	6%	3%	2%	2%	1%	2%
Smart home assistants/ speakers	7%	56%	6%	6%	5%	7%	4%	3%	2%	1%	3%
Smart security system (smart video door bells, smart video cameras etc.)	7%	55%	6%	6%	4%	9%	4%	4%	3%	1%	2%
Smart lighting	7%	56%	5%	6%	4%	7%	4%	4%	3%	1%	2%
Smart or connected children's toys and baby monitors	5%	82%	3%	2%	1%	2%	1%	1%	1%	0%	2%

Q76: Using a scale of 1 to 10, where 1 is 'not likely at all' and 10 is 'extremely likely', how likely do you think you are to buy any of the following in the next 12 months? (n = 5421 for all device types – all respondents)

Table 28: When consumers are likely to purchase smart devices

Device	Within the next month	1 -3 months	3 - 6 months	6 - 9 months	9 months - 1 year	Don't know	Base
Smart TVs	3%	8%	15%	19%	33%	23%	722
Smart oven	3%	5%	16%	14%	20%	41%	201
Smart fridge freezer	3%	6%	14%	15%	25%	37%	224
Smart microwave	4%	7%	12%	19%	18%	40%	203
Smart cooker	3%	4%	18%	15%	18%	42%	175
Smart dishwasher	4%	9%	17%	13%	16%	41%	180
Smart washer/ dryer	3%	4%	15%	19%	20%	39%	205
Smart toaster	4%	7%	20%	11%	13%	45%	158
Smart coffee machine	6%	10%	19%	11%	16%	38%	198
Smart kettle	5%	9%	15%	16%	18%	36%	216
Smart home thermostats	4%	8%	17%	20%	24%	26%	386
Smart home assistants/ speakers	5%	14%	20%	18%	20%	24%	475
Smart security system (smart video door bells, smart video cameras etc.)	3%	11%	23%	18%	20%	24%	540
Smart lighting	3%	12%	22%	20%	18%	26%	546
Smart or connected children's toys and baby monitors	4%	13%	16%	14%	15%	38%	195

Source: Consumer Survey Q77 You mentioned that you are likely to buy the following device(s). Approximately when do you expect to buy each of the following device(s)? (Base for each row = all who intend to purchase this device in the next 12 months)

Table 29: When consumers are likely to purchase smart devices

Device	Average expected months until next purchase	Base
Smart TVs	7.4 months	722
Smart oven	6.9 months	201
Smart fridge freezer	7.1 months	224
Smart microwave	6.8 months	203
Smart cooker	6.8 months	175
Smart dishwasher	6.1 months	180
Smart washer/ dryer	7.0 months	205
Smart toaster	5.9 months	158
Smart coffee machine	5.8 months	198
Smart kettle	6.3 months	216
Smart home thermostats	6.8 months	386
Smart home assistants/ speakers	6.1 months	475
Smart security system (smart video door bells, smart video cameras etc.)	6.3 months	540
Smart lighting	6.2 months	546
Smart or connected children's toys and baby monitors	5.9 months	195

Source: Consumer Survey Q77 You mentioned that you are likely to buy the following device(s). Approximately when do you expect to buy each of the following device(s)? (Base for each row = all who intend to purchase this device in the next 12 months)

Table 30: Purchasing additional devices

Device	Purchased in addition to your existing smart device	Purchased to replace older smart device	Don't know	Base
Smart oven	58%	42%	0%	26
Smart fridge freezer	50%	46%	4%	26
Smart microwave	62%	33%	5%	20
Smart cooker	53%	43%	4%	21
Smart dishwasher	56%	44%	0%	18
Smart washer/ dryer	47%	39%	14%	31
Smart toaster	38%	56%	6%	18
Smart coffee machine	39%	59%	2%	23
Smart kettle	59%	41%	0%	18
Smart home thermostat	60%	30%	10%	49
Smart home assistant/ speaker	81%	13%	6%	199
Smart security system	88%	8%	4%	158
Smart lighting	16%	34%	22%	337

Source: Consumer Survey Q78/ Q81/ Q83/ Q86/ Q89/ Q92/ Q95/ Q98/ Q101/ Q104/ Q107/ Q110/ Q113 You said that you already own a [smart device type] in your household and that you intend to purchase another. Will this new smart device: be purchased in addition to your existing device; be to replace the older device; don't know? (Base for each row = all who own each device type and intend to buy another)

Table 31: How long households have had different types of smart device

Device	Before 2015	Since 2015	Since 2016	Since 2017	Since 2018	Since 2019	Since 2020	Don't know	Base
Smart TV	20%	12%	12%	16%	16%	14%	2%	2%	2924
Smart domestic appliance	5%	6%	11%	9%	19%	28%	7%	15%	385
Smart home thermostats	6%	6%	10%	16%	24%	28%	3%	7%	546
Smart home assistants/ speakers	2%	3%	5%	15%	32%	36%	4%	4%	1685
Smart security system	4%	1%	7%	10%	22%	42%	8%	6%	407
Smart lighting	5%	3%	7%	14%	31%	30%	5%	5%	522
Smart or connected children's toys and baby monitors	10%	5%	9%	13%	24%	26%	3%	9%	127
Other	48%	8%	6%	7%	9%	12%	5%	5%	343

Source: Consumer Survey Q9 How long have you had your devices in your household for?
Please think about the first one of each type of device you may have had, rather than the existing device. (Base for each row = all who own this device type)

Table 32: Reason for most recent device purchase

Device	Replaced this device with a newer one (upgraded)	Bought additional devices from this category	Bought this device for the first time	Don't know	Base
Smart TV	31%	8%	57%	5%	2,924
Smart domestic appliance	24%	19%	48%	9%	385
Smart home thermostats	11%	4%	80%	5%	546
Smart home assistants/ speakers	4%	16%	75%	5%	1,685
Smart security system	9%	11%	76%	4%	407
Smart lighting	9%	21%	65%	5%	522
Smart or connected children's toys and baby monitors	13%	11%	69%	7%	127
Other	47%	6%	38%	8%	343

Source: Consumer Survey Q10 What was the reason for your most recent purchase in each category? (Base for each row = all who own this device type)

Table 33: Length of ownership of devices being replaced

Device	Less than 12 months	Between 12 and 18 months	Between 18 and 24 months	Between 2 years and 3 years	Between 3 years and 4 years	4 years and older	Don't know	Base
Smart oven	14%	19%	35%	32%	0%	0%	0%	11
Smart fridge freezer	16%	25%	54%	0%	5%	0%	0%	12
Smart microwave	13%	18%	42%	27%	0%	0%	0%	7
Smart cooker	23%	11%	16%	19%	20%	0%	11%	9
Smart dishwasher	0%	26%	0%	8%	52%	0%	13%	8
Smart washer/dryer	9%	16%	25%	37%	5%	0%	8%	12
Smart toaster	0%	18%	38%	38%	7%	0%	0%	10
Smart coffee machine	0%	15%	15%	33%	32%	0%	5%	14
Smart kettle	0%	43%	29%	15%	13%	0%	0%	8
Smart home thermostat	6%	28%	5%	41%	8%	7%	4%	15
Smart home assistant/speaker	9%	11%	34%	37%	0%	0%	8%	26
Smart security system	12%	9%	17%	29%	22%	0%	12%	18
Smart lighting	16%	0%	31%	18%	27%	0%	8%	13

Source: Consumer Survey Q79/ Q81/ Q84/ Q87/ Q90/ Q93/ Q96/ Q99/ Q102/ Q105/ Q108/ Q111/ Q114 How long have you had your existing [smart device] that you are replacing? (Base for each row = all who are replacing an existing smart device of this type)

Table 34: How consumers dispose of old devices

	Smart TV	Smart domestic appliances	Smart home thermostats	Smart home assistants/ speakers	Smart security system	Smart lighting	Smart or connected children's toys and baby monitors
Traded it in as part of a deal for the new one	3%	11%	3%	4%	3%	2%	4%
Passed it on to somebody I know	28%	9%	9%	12%	6%	9%	19%
Kept it as a spare	16%	5%	7%	20%	20%	17%	33%
Continue to use it	13%	8%	5%	28%	18%	11%	0%
Threw it away	16%	19%	32%	5%	18%	20%	11%
Sold it via an online third party (e.g. eBay, Gumtree, Amazon, Depop, Facebook Marketplace etc)	8%	20%	5%	11%	17%	6%	10%
Sold it via a high street store (e.g. CEX, Cash Converters etc.)	1%	18%	4%	7%	8%	9%	20%
Gave to charity	5%	4%	2%	5%	2%	5%	0%
Other	5%	4%	11%	4%	5%	6%	0%
Don't know	5%	3%	22%	5%	4%	15%	4%
Base	900	129	59	65	37	49	16

Source: Consumer Survey Q12-Q17 Which of the following did you do with your older device?
(Base for each column = all who are replacing this device type)

Purchasing patterns

Table 35: Purchase of smart devices in relation to non-connected devices

Device	Purchased in addition to a non-internet connected version of this device	Replace an older non-internet connected version of this device	Purchased instead of a non-internet connected version of this device	Don't know	Base
Smart oven	12%	41%	19%	28%	175
Smart fridge freezer	14%	36%	22%	28%	198
Smart microwave	13%	41%	18%	28%	183
Smart cooker	13%	38%	16%	33%	153
Smart dishwasher	10%	33%	25%	32%	163
Smart washer/ dryer	10%	37%	27%	26%	174
Smart toaster	16%	32%	17%	35%	140
Smart coffee machine	19%	28%	28%	26%	175
Smart kettle	13%	36%	25%	26%	197
Smart home thermostat	16%	34%	27%	22%	337
Smart home assistant/ speaker	22%	18%	29%	31%	276
Smart security system	20%	18%	41%	21%	475
Smart lighting	24%	24%	30%	22%	388

Source: Consumer Survey Q80/ Q82/ Q85/ Q88/ Q91/ Q94/ Q97/ Q100/ Q103/ Q106/ Q109/ Q112/ Q115 You said that you will get a [smart device]. Will this: be in addition to a non-internet connected version of the device; be to replace an older non-internet connected version of the device; be purchased instead of a non-internet connected version of the device; don't know? (Base for each row = all who don't own a device of this type and intend to purchase one)

Price sensitivity

Table 36: Maximum willingness to pay for smart devices

Device	£50 or less	£51 - £99	£100 to £199	£200 to £299	£300 to £399	£400 to £499	£500 or more	Don't know
Smart oven	16%	3%	13%	14%	4%	2%	1%	47%
Smart fridge freezer	15%	2%	15%	13%	4%	3%	1%	46%
Smart microwave	34%	12%	10%	1%	0%	0%	0%	41%
Smart cooker	17%	2%	12%	12%	5%	3%	0%	48%
Smart dishwasher	17%	2%	15%	12%	3%	2%	0%	49%
Smart washer/dryer	17%	2%	11%	14%	4%	4%	0%	47%
Smart toaster	55%	4%	1%	0%	0%	0%	0%	39%
Smart coffee machine	39%	13%	4%	1%	0%	0%	0%	44%
Smart kettle	55%	4%	2%	0%	0%	0%	0%	39%
Smart home thermostat	34%	10%	7%	1%	0%	0%	0%	47%
Smart home assistant/ speaker	44%	12%	3%	1%	0%	0%	0%	40%
Smart security system	27%	12%	12%	3%	1%	1%	0%	44%
Smart lighting	45%	6%	3%	1%	0%	0%	0%	45%
Smart or connected children's toys and baby monitors	42%	4%	1%	0%	0%	0%	0%	53%

Source: Consumer Survey Q118 You said that you were unlikely to consider purchasing smart devices because they are too expensive. What is the maximum you would be willing to pay for each of the following devices? (n = 470 for all device types – all unlikely to purchase smart devices as they are too expensive)

Devices used by businesses

Table 37: Respondents' organisation type

Organisation type	Percentage of respondents
Private sector – profit-seeking (e.g. public limited company, partnership)	60%
Public sector – government owned or funded (e.g. civil service, local government, NHS, university)	30%
Third sector – non-profit, non-governmental (e.g. charity, social enterprise)	7%
Don't know	3%
Base	3083

Source: Consumer Survey Q121 What kind of organisation do you work for? (n=3083 – all respondents who work full/part time)

Table 38: Respondents' organisation size

Organisation size	Number of employees	Percentage of people whose organisation is this size	Percentage of people whose organisation is this size
Micro enterprise	1	10%	21%
	2	3%	
	3 to 5	4%	
	6 to 9	3%	
Small enterprise	10 to 19	5%	12%
	20 to 34	4%	
	35 to 49	4%	
Medium-sized enterprise	50 to 99	5%	13%
	100 to 249	7%	
Large enterprise	250 to 499	6%	45%
	500 to 999	6%	
	1,000 or more	33%	
	Don't know	10%	10%
	Base	3083	3083

Source: Consumer Survey Q122 Including yourself, approximately how many full-time employees are employed by your organisation in total in the UK? (n=3083 – all respondents who work full/part time)

8. MANUFACTURER SURVEY: QUESTIONNAIRE

1. Introduction

This survey is being carried out by RSM UK Consulting LLP (RSM) on behalf of the Secure by Design team at the Department for Digital, Culture, Media and Sport (DCMS). All data will be collected, processed and retained for the study's duration in accordance with the General Data Protection Regulation (GDPR). The data will be analysed anonymously and kept confidential. Survey data will be aggregated and used to inform the final report of this study. More information about our privacy policy is available at <https://www.rsmuk.com/privacy-and-cookies/entities-privacy-policy> For the purpose of this survey, RSM will act as both the data processor and controller. Should you have any queries regarding data protection and privacy or the processing of data provided in response to this survey, please contact RSM's data controller for this study, Matt.Rooke@rsmuk.com. RSM's Privacy Officer is David.Punt@rsmuk.com.

1. Please confirm below that you have read and understood this statement, about how your personal data will be collected and used, and agree with its terms. *

Yes

No

2. Please confirm that you have read the information above and you are happy to participate and continue with the survey. *

Yes

No

Many of the questions will be quantitative in nature and we have no way of estimating them other than through surveys. Please provide estimates wherever possible (numbers of people, number of hours, expected costs etc) - even very approximate figures are useful for this exercise.

This survey is for companies that design, manufacture or import consumer Internet of Things (IoT) products for sale to consumers in the UK. For simplicity, we will refer to all this activity as "production" hereafter. Consumer IoT devices are network-connected (and network-connectable) devices that have relationships to associated services and are used by the consumer typically in the home or as electronic wearables. These devices are often available to purchase in retail environments. Some examples include connected domestic appliances (e.g. smart washing machines and fridges); smart home devices (e.g. smart meters, lighting and security); smart TVs and speakers, etc.

3. Are you a producer of Internet of Things products for sale to consumers in the UK ? *

Yes

No

2. Company details

4. What is the name of your company?

5. Which of the following best describes your organisation? (Please select the most appropriate answer below)

- UK only based organisation
- Multinational organisation with UK head office
- UK branch/facility of multinational organisation
- Other (please specify):

6. Which of the following best describes your organisation's activities in the production of consumer IoT in the UK? (Please select all that apply)

- Design consumer IoT products
- Test consumer IoT products
- Manufacture components for consumer IoT products
- Manufacture finished consumer IoT products
- Import components of consumer IoT products
- Import finished of consumer IoT products
- Distribute/sell consumer IoT products
- Export consumer IoT products
- Other (please specify):

3. Organisation size

7. Approximately how many people are employed in the production of consumer IoT products in your organisation in the UK? [please select one]

- 1
- 2
- 3 to 5
- 6 to 9
- 10 to 19
- 20 to 34
- 35 to 49
- 50 to 99
- 100 to 249
- 250 to 499
- 500 to 999

- 1,000 or more (please specify below if known)
- Don't know
- Please specify if more than 1,000

4. Consumer IoT Products

In this research, consumer IoT is split into three groups:

Big ticket items: Smart TVs, smart white goods, smart kitchen appliances etc.

Connecting the home: Home assistants, smart speakers, smart security cameras, smart doorbells, smart thermostats etc

Consumer lifestyle: Smart handheld devices, smart phones, smart toys, smart watches etc.

8. Which of these does your organisation produce, for sale in the UK? (please select all that apply) Big ticket items

- Smart TVs
- Smart washing machine/dryer
- Smart fridge/freezer
- Smart dishwasher
- Smart oven
- Smart microwave
- Other (please specify):

9. Connecting the home

- Smart home assistants
- Smart speakers
- Smart security cameras
- Smart doorbells
- Smart home thermostats
- Smart lighting
- Smart baby monitors
- Other (please specify):

10. Consumer lifestyle

- Wearable health trackers
- Smart watches
- Smartphones
- Tablets

Other smart handheld devices

Smart toys

Other (please specify):

11. How many IoT product lines (including individual versions of the same product) does your organisation currently produce for sale in the UK in total? [please select one]

1

2

3-5

6-10

11-15

16-25

26-35

36-50

Over 50 (please specify below if known)

Please specify if over 50

12. How long have you been producing/selling consumer IoT products in the UK?

Less than 12 months

1-2 years

3-5 years

5-10 years

More than 10 years

5. IoT turnover

13. What was your approximate turnover from selling these consumer IoT products in the UK over the last 12 months?

£0 - £49,999

£50,000 - £99,999

£100,000 - £249,999

£250,000 - £499,999

- £500,000 - £999,999
- £1m - £1.9m
- £2m - £4.9m
- £5m - £9.9m
- £10m - £25m
- Over £25m (please specify below if known)

Please specify if over £25m

5. Suppliers

14. Approximately how many companies do you have in your UK supply chains for the production of consumer IoT devices for sale to UK consumers?

- None
- 1
- 2-3
- 4-5
- 6-9
- 10-15
- Over 15 (please specify below if possible)

Please specify if more than 15:

15. Approximately how many companies do you have in your Non-UK supply chain for the production of consumer IoT devices for sale to UK consumers?

- None
- 1
- 2-3
- 4-5
- 6-9
- 10-15
- Over 15 (please specify below if possible)

16. Which of the following describe the activities of your Non-UK supply chain? Please select all that apply.

- Consumer IoT products are designed outside of the UK
- Components for consumer IoT products are manufactured outside of the UK
- Finished IoT product is manufactured outside of the UK

6. Manufacture abroad

17. Which of the consumer IoT products that your organisation sells to UK consumers are manufactured outside of the UK? Please tick "some" or "all" below where appropriate, and leave blank otherwise.

	Some	All
Big ticket: Smart TVs	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart washing machine/dryer	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart fridge/freezer	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart dishwasher	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart oven	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart microwave	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Other (Please specify)	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart home assistants	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart speakers	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart security cameras	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart doorbells	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart home thermostats	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart lighting	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart baby monitors	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Other (Please specify)	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Wearable health trackers	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Smart watches	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Smartphones	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Tablets	<input type="checkbox"/>	<input type="checkbox"/>

Some All

Consumer lifestyle: Other smart handheld devices

Consumer lifestyle: Smart toys

Consumer lifestyle: Other (Please specify)

Other products or comments

18. In which regions are these consumer IoT products manufactured? Please select all that apply.

- Asia
- Europe
- North America
- South America
- Africa
- Oceania

19. If you have specified Asia above, in which country/countries are these consumer IoT products manufactured? Please select all that apply.

- China
- Japan
- South Korea
- Taiwan
- Singapore
- Other (please specify):

20. How long is the typical product development lifecycle (from the design phase to finished retailed product) for the products that your organisation produces for UK consumers?

	Less than 12 months	12-18 months	18-24 months	2-3 years	4-5 years	More than 5 years
Big ticket: Smart TVs	<input type="checkbox"/>					
Big ticket: Smart washing machine/dryer	<input type="checkbox"/>					
Big ticket: Smart fridge/freezer	<input type="checkbox"/>					

	Less than 12 months	12-18 months	18-24 months	2-3 years	4-5 years	More than 5 years
Big ticket: Smart dishwasher	<input type="checkbox"/>					
Big ticket: Smart oven	<input type="checkbox"/>					
Big ticket: Smart microwave	<input type="checkbox"/>					
Big ticket: Other	<input type="checkbox"/>					
Connecting the Home: Smart home assistants	<input type="checkbox"/>					
Connecting the Home: Smart speakers	<input type="checkbox"/>					
Connecting the Home: Smart security cameras	<input type="checkbox"/>					
Connecting the Home: Smart doorbells	<input type="checkbox"/>					
Connecting the Home: Smart home thermostats	<input type="checkbox"/>					
Connecting the Home: Smart lighting	<input type="checkbox"/>					
Connecting the Home: Smart baby monitors	<input type="checkbox"/>					
Connecting the Home: Other	<input type="checkbox"/>					
Consumer lifestyle: Wearable health trackers	<input type="checkbox"/>					
Consumer lifestyle: Smart watches	<input type="checkbox"/>					
Consumer lifestyle: Smartphones	<input type="checkbox"/>					
Consumer lifestyle: Tablets	<input type="checkbox"/>					
Consumer lifestyle: Other smart handheld devices	<input type="checkbox"/>					

	Less than 12 months	12-18 months	18-24 months	2-3 years	4-5 years	More than 5 years
Consumer lifestyle: Smart toys	<input type="checkbox"/>					
Consumer lifestyle: Other	<input type="checkbox"/>					

21. What is the average length of contracts you have with your suppliers for the production of consumer IoT devices?

	UK suppliers	Non-UK suppliers
Less than 12 months	<input type="checkbox"/>	<input type="checkbox"/>
1-2 years	<input type="checkbox"/>	<input type="checkbox"/>
2-3 years	<input type="checkbox"/>	<input type="checkbox"/>
3-4 years	<input type="checkbox"/>	<input type="checkbox"/>
5 years (please specify below)	<input type="checkbox"/>	<input type="checkbox"/>
More than 5 years	<input type="checkbox"/>	<input type="checkbox"/>

Please state if more than 5 years

7. Security measures

22. What, if any, standards and best practice guidelines are you currently using to design and manufacture your IoT products? These could include national/international standards, platform standards, voluntary codes of practice etc

23. Were you aware of the UK Code of Practice for Consumer IoT Security before we contacted you? [Please select one]

- Yes, well aware
- Yes, aware to some extent
- Not aware

The Code of Practice aims to support all parties involved in the development, manufacturing and retail of consumer IoT with a set of guidelines to ensure that products are secure by design and to make it easier for people to stay secure in a digital world.

The Code of Practice brings together, in thirteen outcome-focused guidelines, what is widely considered good practice in IoT security. It has been developed by the Department for Digital, Culture, Media and Sport (DCMS), in conjunction with the National Cyber Security Centre (NCSC), and follows engagement with industry, consumer associations and academia.

[Click here for full CoP guidelines.](#)

8. Default passwords

24. Thinking of all of the consumer IoT products that your organisation produces for sale to UK consumers, approximately what percentage are sold with a default password that is not unique to each device (e.g. "admin:admin") or uses a non randomised process to generate passwords?

- None (0%)
- 1-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-99%
- All (100%)

9. Products with default passwords

25. Which types of consumer IoT products that your organisation produces for sale to UK consumers contain a default password?

	None (0%)	1-25%	26-50%	51-75%	76-99%	All (100%)	Don't know
Big ticket: Smart TVs	<input type="checkbox"/>						
Big ticket: Smart washing machine/dryer	<input type="checkbox"/>						
Big ticket: Smart fridge/freezer	<input type="checkbox"/>						

	None (0%)	1- 25%	26- 50%	51- 75%	76- 99%	All (100%)	Don't know
Big ticket: Smart dishwasher	<input type="checkbox"/>						
Big ticket: Smart oven	<input type="checkbox"/>						
Big ticket: Smart microwave	<input type="checkbox"/>						
Big ticket: Other (Please specify)	<input type="checkbox"/>						
Connecting the Home: Smart home assistants	<input type="checkbox"/>						
Connecting the Home: Smart speakers	<input type="checkbox"/>						
Connecting the Home: Smart security cameras	<input type="checkbox"/>						
Connecting the Home: Smart doorbells	<input type="checkbox"/>						
Connecting the Home: Smart home thermostats	<input type="checkbox"/>						
Connecting the Home: Smart lighting	<input type="checkbox"/>						
Connecting the Home: Smart baby monitors	<input type="checkbox"/>						
Connecting the Home: Other (Please specify)	<input type="checkbox"/>						
Consumer lifestyle: Wearable health trackers	<input type="checkbox"/>						
Consumer lifestyle: Smart watches	<input type="checkbox"/>						
Consumer lifestyle: Smartphones	<input type="checkbox"/>						
Consumer lifestyle: Tablets	<input type="checkbox"/>						
Consumer lifestyle: Other smart handheld devices	<input type="checkbox"/>						
Consumer lifestyle: Smart toys	<input type="checkbox"/>						
Consumer lifestyle: Other (Please specify)	<input type="checkbox"/>						
Other (please specify)							

10. Impact of default password regulation

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products. One option in this proposal includes mandating that all passwords on consumer IoT products must be unique, and not resettable to any universal factory setting.

26. If this is legislated, how would your organisation respond? Please select all that apply.

Take no action

Redesign SOME consumer IoT products for sale in the UK to have a unique password

Redesign ALL such products for sale in the UK to have unique passwords

Stop producing SOME consumer IoT products in the UK

Stop producing ALL consumer IoT products in the UK

Stop selling SOME consumer IoT products to the UK market

Stop selling ALL consumer IoT products to the UK market

Continue to produce products with default passwords in other markets outside of the UK

Other (please specify):

11. Impacts of having unique passwords

27. If your organisation decides to redesign or change your processes for some or all products in order to comply with the regulations, how might you do this? Please select all that apply.

Redesign existing product lines to comply

Use an alternative method of authentication (eg. remove the use of passwords)

Remotely update passwords so that they are unique

Completely remove any default passwords in IoT devices

Other (please specify):

28. Please estimate the annual cost of staff time to redesign consumer IoT products that your organisation produces so that they didn't have a default password. If you are unable to provide this information, please provide estimates of person-days in the table below.

--

29. What would be the annual cost of redesigning consumer IoT products that your organisation produces so that they don't have a default password in staff time? Please estimate this as a number of person-days.

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
IT or technical director or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT specialist manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT professional or technical role	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-IT professional role (eg legal, accounting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales and marketing professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If more than 10 weeks please specify

30. Please estimate the total annual cost of redesigning products so that they have a unique password? Please include the cost of staff time as set out above, plus details of any additional costs such as external advice, training/hiring new staff, or product testing, new materials.

31. What percentage of the cost would be passed on to the consumer? (e.g. increasing the costs of devices for sale on the UK market) Please use 0% if none of the costs would be passed on by increasing price and 100% if all of the costs would be passed on.

None (0%)

1-10%

11-20%

21-30%

31-40%

41-50%

51-60%

61-70%

71-80%

81-90%

91-99%

All (100%)

12. Impact on Products

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products.

One option in this proposal includes mandating that all passwords on consumer IoT products must be unique, and not resettable to any universal factory setting.

If this is legislated, how would your organisation respond?

32. Which of the following products that your organisation produces for sale in the UK would you stop producing for the UK market? Please select options as appropriate below and leave other rows blank.

	All older versions of the product would be redesigned and newer versions would have unique passwords	Some older versions of the product would be redesigned and newer versions would have unique passwords	Older versions of the product would be discontinued and only newer versions with unique passwords would be produced	No versions of the product (old or new) would have unique passwords and therefore would not be sold in the UK	Don't know
Big ticket: Smart TVs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart washing machine/dryer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart fridge/freezer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart dishwasher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart oven	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Big ticket: Smart microwave	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	All older versions of the product would be redesigned and newer versions would have unique passwords	Some older versions of the product would be redesigned and newer versions would have unique passwords	Older versions of the product would be discontinued and only newer versions with unique passwords would be produced	No versions of the product (old or new) would have unique passwords and therefore would not be sold in the UK	Don't know
Big ticket: Other (Please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart home assistants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart speakers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart security cameras	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart doorbells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart home thermostats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart lighting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Smart baby monitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting the Home: Other (Please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Wearable health trackers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Smart watches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Smartphones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Tablets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consumer lifestyle: Other smart handheld devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	All older versions of the product would be redesigned and newer versions would have unique passwords	Some older versions of the product would be redesigned and newer versions would have unique passwords	Older versions of the product would be discontinued and only newer versions with unique passwords would be produced	No versions of the product (old or new) would have unique passwords and therefore would not be sold in the UK	Don't know
--	--	---	---	---	------------

Consumer lifestyle: Smart toys	<input type="checkbox"/>				
Consumer lifestyle: Other (Please specify)	<input type="checkbox"/>				

33. Approximately how long would it take your organisation to implement this requirement?

- 0-3 months
- 3-6 months
- 6-9 months
- 9-12 months
- 12-18 months (1 - 1.5 years)
- 18-24 months (1.5 - 2 years)
- 24 - 30 months (2 - 2.5 years)
- Don't know

Please explain if more than 2.5 years

13. Default passwords in use

34. If your organisation has not already implemented measures to mitigate the use of default passwords in the consumer IoT product it produces, please tell us why? Please select all that apply.

- Too costly
- Too time consuming
- Not part of our design process
- Was not aware this was an issue
- Don't know
- Other (please specify):

14. Minimum support period for security updates

35. What percentage of consumer IoT products that your organisation produces clearly state to the consumer how long they will receive security updates for?

None (0%)

1-10%

11-20%

21-30%

31-40%

41-50%

51-60%

61-70%

71-80%

81-90%

91-99%

All (100%)

15. Security updates

36. How is the information on security updates presented? Please select all that apply.

On manufacturer website

On retailer website

In-store product description

On product packaging

In product manual

In terms and conditions

Other (please specify):

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products. One option in this proposal includes mandating that all consumer Internet of Things products should explicitly state at the point of sale (for example on the product's packaging, online or in-store at the point of sale) the minimum length of time for which they will receive security updates.

37. If this becomes law, how would your organisation respond? Please select all that apply. When answering this question, please think about the consumer IoT products your organisation produces and/or sells in the UK.

Take no action

Provide information on minimum support period of security updates at the point of sale for SOME consumer IoT products for sale in the UK

Provide information on minimum support period of security updates at the point of sale for ALL consumer IoT products for sale in the UK

Stop producing SOME consumer IoT products in the UK

Stop producing ALL consumer IoT products in the UK

Stop selling SOME consumer IoT products to the UK market

Stop selling ALL consumer IoT products to the UK market

Continue to produce products without stating minimum support periods in other markets outside the UK

38. If other, please specify

16. Cost of implementing minimum support period

39. Please estimate the staff costs of updating your processes to implement and publish a minimum support period for security updates on consumer IoT products that your organisation produces. If you are unable to estimate a cost, please estimate person-days in the table below.

40. What would be the impact on staff time of redesigning your processes and products to implement and publish a minimum support period for security updates on consumer IoT products that you manufacture?

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
IT or technical director or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT specialist manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT professional or technical role	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-IT professional role (eg legal, accounting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales & marketing professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
--------------------------------------	---------------------------------------	--	---------------------------------------	---	--	--

Other (please specify)

Comments

41. Please estimate the total annual cost of implementing a minimum support period in consumer IoT products that your organisation produces? Please include the cost of staff time as set out above, plus details of any additional costs such as external advice, training/hiring new staff, or testing, new materials

42. What percentage of the cost would be passed on to the consumer? (e.g. increasing the costs of devices for sale on the UK market). Please use 0% if none of the costs would be passed on by increasing price and 100% if all of the costs would be passed on.

None (0%)

1-10%

11-20%

21-30%

31-40%

41-50%

51-60%

61-70%

71-80%

81-90%

91-99%

All (100%)

43. Approximately how long would it take your organisation to implement this requirement?

0-3 months

3-6 months

6-9 months

9-12 months

12-18 months (1 - 1.5 years)

18-24 months (1.5 - 2 years)

24 - 30 months (2 - 2.5 years)

If more than 2.5 years, please explain why?

17. Stop making some products due to minimum support period legislation

44. What percentage of the products that do not currently have a stated minimum security support period would you stop making?

0%

1-10%

11-20%

21-30%

31-40%

41-50%

51-60%

61-70%

71-80%

81-90%

91-99%

100%

18. No minimum support period

44. If your organisation does not already implement or display a minimum support period for the consumer IoT products that it produces, at the point of sale please tell us why? Please select all that apply.

Too costly

Too time consuming

Not part of our design process

Was not aware this was an issue

Don't know

Other (please specify):

19. Vulnerability disclosure policy

A vulnerability disclosure policy clearly specifies the process through which security researchers and members of the public are able to report security issues in a product to the manufacturer.

Such policies can be made publicly available and updated as necessary to further ensure transparency and clarity in the dealings of the company with security researchers, and vice versa.

45. Do you have a vulnerability disclosure policy that allows members of the public/security researchers to report vulnerabilities to your company?

Yes

No

Don't know

46. Do you have a public point of contact within your organisation for the public (e.g., general consumers, security researchers, etc.) to report vulnerabilities in your consumer IoT products? [Please tick one]

Yes

No

Don't know

47. How often are vulnerabilities reported to your company?

Never

1-2 times per year

3-5 times per year

6-10 times per year

11-20 times per year

More than 20 times per year (please specify below)

If more than 20, please specify

48. How are these vulnerabilities typically reported?

Public point of contact for reporting vulnerabilities

Customer services

Retailer

Other (please specify):

49. Which channel are vulnerabilities typically reported through?

Always through the public point of contact

Mostly through the public point of contact

Equally likely to be the public point of contact or other methods

Mostly through other methods

Always through other methods

20. No vulnerability disclosure policy

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products. One option in this proposal includes mandating that producers of consumer IoT products should provide a public point of contact, which is part of a vulnerability disclosure policy (VDP) or Common Vulnerability Disclosure policy (CVD).

50. If this proposed regulation becomes law, how would your organisation respond? When answering this question, please think about the consumer IoT products your organisation produces or sells in the UK. Please select all that apply.

Take no action

Introduce a public point of contact and VDP/CVD for SOME consumer IoT products in the UK market

Introduce a public point of contact and VDP/CVD for ALL consumer IoT products in the UK market

Stop producing SOME consumer IoT products in the UK market

Stop producing ALL consumer IoT products in the UK market

Stop selling SOME consumer IoT products to the UK market

Stop selling ALL consumer IoT products to the UK market

Continue to produce these products without a public point of contact in other markets outside the UK

Other (please specify):

51. Approximately how long would it take your organisation to implement this requirement?

0-3 months

3-6 months

6-9 months

9-12 months

12-18 months (1 - 1.5 years)

18-24 months (1.5 - 2 years)

24 - 30 months (2 - 2.5 years)

Please explain why if over 2.5 years

52. Please estimate the overall annual staff cost of providing a public point of contact for vulnerability disclosure reporting? If you are unable to estimate a cost, please provide an estimate of person-days in the table below

53. What would be the cost of providing a public point of contact for vulnerability disclosure reporting , in terms of staff time? Please estimate this as a number of person-days.

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
IT or technical director or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT specialist manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT professional or technical role	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-IT professional role (eg legal, accounting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales & marketing professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

54. Please estimate the total annual cost of implementing a public point of contact for vulnerability disclosure reporting for consumer IoT products that your organisation produces? Please include the cost of staff time as set out above, plus details of any additional costs such as external advice, training/hiring new staff or consultancy.

55. Do you think that providing a point of contact for vulnerability disclosure reporting would increase the amount of vulnerabilities being reported?

Number of vulnerabilities being reported would decrease substantially

Number of vulnerabilities being reported would decrease slightly

No effect

Number of vulnerabilities being reported would increase slightly

Number of vulnerabilities being reported would increase substantially

Don't know

56. How long would it take to respond to a reported vulnerability?

Less than 14 days

15- 30 days

31-45 days

46-60 days

60-90 days

More than 90 days

21. Assess and demonstrating compliance

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products. One option in this proposal is to mandate that the following three security requirements are mandated for consumer IoT products produced, sold or supplied in the UK: All IoT device passwords shall be unique and shall not be resettable to any universal factory default value.

The manufacturer shall provide a public point of contact as part of a vulnerability disclosure policy in order that security researchers and others are able to report issues.

Manufacturers will explicitly state the minimum length of time for which the product will receive security updates

57. If your organisation decides to redesign or change your processes for some or all products in order to comply with the regulations, how might you do this?

All older versions of the product would be redesigned and newer versions of those products would be compliant

Some older versions of the product would be redesigned and newer versions of those products would be compliant

Older versions of the product would be discontinued and only newer versions of the product that are compliant would be produced

No versions of the product (old or new) would be compliant and therefore would not be sold in the UK

Other (please specify):

58. If these requirements are mandated, please estimate the one-off familiarisation costs to your organisation to read and understand proposed legislation, in terms of staff time? If you are unable to provide cost information, please provide an estimate of person days in the table below.

--

59. If these requirements are mandated, please estimate the one-off familiarisation costs to your organisation to read and understand proposed legislation, in terms of staff time? Please express this in person-days or provide a total staff cost estimate.

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
IT or technical director or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT specialist manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT professional or technical role	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-IT professional role (eg legal, accounting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales and marketing professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments

--

60. What would be the total one off cost of familiarisation to your organisation? Please include the cost of the staff time identified above, plus details of any other familiarisation costs such as external advice or consultancy.

61. What is your best estimate of the annual cost of self-assessing your products' compliance with the top three security requirements set out above, and making a declaration of compliance with the top three to retailers, in staff time? Please estimate an overall staff cost.

62. What would be the impact in staff time of self-assessment, using the grid below?

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
IT or technical director or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT specialist manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT professional or technical role	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-IT professional role (eg legal, accounting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales and marketing professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments

63. Would you pay for external assurance or consultancy services for familiarisation or self-assessment?

No

Yes: both

Yes: just familiarisation

Yes: just self-assessment

64. Approximately how much would external assurance cost, and what would it entail?

22. Mandatory security label

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products. One option in this proposal is to mandate an IoT security label that indicates whether the products adhere to the three consumer IoT security requirements. All IoT device passwords shall be unique and shall not be resettable to any universal factory default value.

The manufacturer shall provide a public point of contact as part of a vulnerability disclosure policy in order that security researchers and others are able to report issues.

Manufacturers will explicitly state the minimum length of time for which the product will receive security updates

65. Approximately how long would it take your organisation to implement a mandatory security label?

0-3 months

3-6 months

6-9 months

9-12 months

12-18 months (1 - 1.5 years)

18-24 months (1.5 - 2 years)

24 - 30 months (2 - 2.5 years)

Please explain why if over 2.5 years

66. Please estimate the annual cost of affixing a physical security label/redesigning packaging, which provides information on the top three security guidelines, to consumer IoT products that your organisation produces?

67. What would be the annual cost of affixing a physical security label/redesigning packaging, which provides information on the top three security guidelines, to consumer IoT products that your organisation produces, in staff time? Please estimate this as a number of person-days.

	IT or technical director or equivalent	IT specialist or manager	IT professional or technical role	Non-IT professional role (eg legal, accounting)	Administrative	Sales and marketing professionals	Other (please specify)
--	--	--------------------------	-----------------------------------	---	----------------	-----------------------------------	------------------------

Up to one person-day (up to 8 hours)	<input type="checkbox"/>						
Two or three person-days (9-24 hours)	<input type="checkbox"/>						
Four or five person-days (25-40 hours)	<input type="checkbox"/>						
One to two person-weeks (41-80 hours)	<input type="checkbox"/>						
Three to four person-weeks (81-160 hours)	<input type="checkbox"/>						
Five to ten person-weeks (161-400 hours)	<input type="checkbox"/>						
More than ten person-weeks (more than 400 hours)	<input type="checkbox"/>						

68. Please estimate the total annual cost of affixing a physical security label/redesigning packaging, which provides information on the top three security guidelines? Please include the cost of staff time as set out above, plus details of costs of identifying information to include on the label, external advice, training/hiring new staff or new materials.

69. Approximately how much would it cost your organisation to implement an online security label for websites per product?

70. What percentage of the cost would be passed on to the consumer? (e.g. increasing the costs of devices for sale on the UK market) Please use 0% if none of the costs would be passed on by increasing price and 100% if all of the costs would be passed on.

None (0%)

1-10%

11-20%

21-30%

31-40%

41-50%

51-60%

61-70%

71-80%

81-90%

91-99%

All (100%)

71. On average, how often is the packaging of consumer IoT devices that your organisation produces redesigned?

Less than 6 months

6-12 months

1-2 years

2-3 years

3-5 years

More than 5 years

72. What would be the total one off cost of familiarisation to your organisation? Please include the cost of the staff time identified above, plus details of any other familiarisation costs such as external advice or consultancy.

73. What would be the one off familiarisation costs for the label option to your organisation to read and understand proposed legislation, in terms of staff time?

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
IT or technical director or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IT specialist manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
IT professional or technical role	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-IT professional role (eg legal, accounting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales and marketing professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

23. Costs of disposal

74. The Government will seek to give businesses time to comply with any future regulation, in the form of an implementation period. Would your organisation bear any costs that are associated with the disposal, refurbishment, recycling or reshipping of non-compliant stock after the predetermined implementation period has ended?

	Yes	No	Don't know
Mandatory compliance with top 3 security requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mandatory physical security label	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

75. If your organisation has stock that you would be unable to make compliant, how much would it cost your organisation to dispose, refurbish, recycle or reship non-compliant stock? For cost analysis purposes, please consider the cost that you would incur within a 12 month period.

Disposal of non-compliant products and packaging

Refurbishment of non-

compliant products

Recycling

Re-shipping items back to country of origin or to another country

76. Do you have any policies for the reuse of valuable commodities and components contained in discarded products (i.e. incorporating recycled or secondary inputs in your products)?

Yes

No

Don't know

If yes, please describe these policies

24. Benefits of the proposed legislation

We have been talking exclusively about the costs of the proposed legislation. We would now like to also consider the potential benefits and other impacts to businesses and consumers.

77. Overall, how do you think your organisation will be impacted if the regulatory proposals become law?

	Extremely negatively	Somewhat negatively	No/neutral impact/balanced	Somewhat positively	Extremely positively	Don't know
Mandatory top 3 requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mandatory physical label	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please explain your answer

78. Which of the following, if any, do you think that UK producers would benefit from if the regulatory proposals become law? Please select all that apply.

	Mandatory top 3 requirements	Mandatory physical label
Improved consumer confidence in products	<input type="checkbox"/>	<input type="checkbox"/>
Increase in share price / value	<input type="checkbox"/>	<input type="checkbox"/>
Improved reputation / perception of products	<input type="checkbox"/>	<input type="checkbox"/>
Opportunity for marketing as a selling point	<input type="checkbox"/>	<input type="checkbox"/>
Contribute to Corporate Social Responsibility (CSR)	<input type="checkbox"/>	<input type="checkbox"/>
Improved security for products lines	<input type="checkbox"/>	<input type="checkbox"/>
Improved safety for products lines	<input type="checkbox"/>	<input type="checkbox"/>
Improved privacy for products lines	<input type="checkbox"/>	<input type="checkbox"/>
Reduction in risk of product vulnerabilities	<input type="checkbox"/>	<input type="checkbox"/>
Increased customer loyalty and satisfaction	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

79. Overall, to what extent do you think that consumers would be impacted if either of these regulatory proposals became law?

	Extremely negatively	Somewhat negatively	No/neutral impact/balanced	Somewhat positively	Extremely positively	Don't know
Mandatory top 3 requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mandatory physical label	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please explain your answer

80. Which of the following, if any, do you think that UK consumers would benefit from if the regulatory proposals become law? Please select all that apply.

	Mandatory top 3 requirements	Mandatory physical label
Improved security	<input type="checkbox"/>	<input type="checkbox"/>
Improved safety	<input type="checkbox"/>	<input type="checkbox"/>
Improved privacy	<input type="checkbox"/>	<input type="checkbox"/>
Increased adoption of consumer IoT devices in daily lives	<input type="checkbox"/>	<input type="checkbox"/>
Increased confidence in consumer IoT devices	<input type="checkbox"/>	<input type="checkbox"/>
Improved consumer wellbeing	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

9. MANUFACTURER SURVEY: ADDITIONAL TABLES

Table 39: Number of product lines

	All Respondents	Small Businesses	Medium Businesses	Large Businesses	Unknown size
1	2	1	0	1	0
2	2	1	1	0	0
3-5	3	1	2	0	0
6-10	3	0	1	1	1
11-15	1	0	0	1	0
16-25	0	0	0	0	0
26-35	0	0	0	0	0
36-50	3	1	2	0	0
Over 50	4	1	1	1	1

Manufacturers Survey Q11 (n=18)

Table 40: Staff time estimates to publish a minimum period for security updates

	Up to one person -day	Two or three person -days	Four or five person -days	One to two person -weeks	Three to four person -weeks	Five to ten person -weeks	More than ten person -weeks	Respondents
IT or technical director or equivalent	0	1	2	0	0	0	1	4
IT specialist manager	0	0	1	1	0	0	1	3
IT professional or technical role	0	0	0	3	1	0	1	5
Non-IT professional role (eg legal, accounting)	0	0	1	2	0	0	1	4
Administrative	1	0	1	1	0	1	1	5
Sales and marketing professional	0	1	1	2	0	0	1	5
Other	0	0	0	0	0	0	2	2

Manufacturer Survey Q40 (n = 6)

Table 41: Estimated cost of providing a public point of contact for vulnerability disclosure reporting

	Up to one person -day	Two or three person -days	Four or five person -days	One to two person -weeks	Three to four person -weeks	Five to ten person -weeks	More than ten person -weeks	Respondents
IT or technical director or equivalent	1	1	1	1	0	0	0	4
IT specialist manager	1	0	0	0	1	0	0	2
IT professional or technical role	0	0	0	1	0	0	1	2
Non-IT professional role (eg legal, accounting)	0	2	0	0	0	0	0	2
Administrative	2	0	0	0	1	0	0	3
Sales and marketing professional	0	0	1	0	0	0	0	1
Other (please specify)	0	0	0	0	0	0	0	0

Manufacturer Survey Q53 (n = 4)

Table 42: Estimated familiarisation costs

	Up to one person -day	Two or three person -days	Four or five person -days	One to two person -weeks	Three to four person -weeks	Five to ten person -weeks	More than ten person -weeks	Respondents
IT or technical director or equivalent	2	0	3	0	0	0	0	5
IT specialist manager	0	1	2	0	0	0	0	3
IT professional or technical role	0	0	2	1	0	1	0	4
Non-IT professional role (eg legal, accounting)	1	1	1	0	0	0	0	3
Administrative	2	0	2	0	0	0	0	4
Sales and marketing professional	2	1	2	0	0	0	0	5
Other (please specify)	1	0	1	0	0	0	0	2

Manufacturer Survey Q59 (n= 7)

Table 43: Estimated staff time of self-assessment

	Up to one person -day	Two or three person -days	Four or five person -days	One to two person -weeks	Three to four person -weeks	Five to ten person -weeks	More than ten person -weeks	Respondents
IT or technical director or equivalent	1	3	0	1	1	0	0	6
IT specialist manager	0	2	0	0	0	1	0	3
IT professional or technical role	0	1	0	1	1	0	2	5
Non-IT professional role (eg legal, accounting)	1	1	1	0	0	0	0	3
Administrative	1	3	0	0	0	0	0	4
Sales and marketing professional	2	1	0	0	0	0	0	3
Other	1	0	0	0	0	0	0	1

Manufacturer Survey Q62 (n= 7)

Table 44: Estimated annual cost of affixing a physical security label

	Up to one person -day	Two or three person -days	Four or five person -days	One to two person -weeks	Three to four person -weeks	Five to ten person -weeks	More than ten person -weeks	Respondents
IT or technical director or equivalent	1	0	0	0	0	1	0	2
IT specialist manager	1	0	0	0	0	0	0	1
IT professional or technical role	0	1	0	0	0	0	0	1
Non-IT professional role (eg legal, accounting)	0	2	0	0	0	0	0	2
Administrative	0	1	0	0	0	0	0	1
Sales and marketing professional	0	0	1	0	1	0	0	2
Other (please specify)	0	0	1	0	1	0	0	2

Manufacturer Survey Q67 (n= 4)

Table 45: Estimated familiarisation costs for the label option

	Up to one person-day	Two or three person-days	Four or five person-days	One to two person-weeks	Three to four person-weeks	Five to ten person-weeks	More than ten person-weeks	Respondents
IT or technical director or equivalent	2	0	1	0	0	0	0	1.3
IT specialist manager	0	1	1	0	0	0	0	1.5
IT professional or technical role	0	0	2	1	0	0	0	4.0
Non-IT professional role (eg legal, accounting)	0	0	1	0	0	0	0	1.0
Administrative	0	0	1	1	0	0	0	2.9
Sales and marketing professional	0	0	1	0	0	0	0	1.0
Other (please specify)	0	0	0	0	0	0	0	0.0

Manufacturer Survey Q73 (n = 4)

10. RETAILER SURVEY: QUESTIONNAIRE

1. DCMS Consumer IoT Retailer Survey

This survey is being carried out by RSM UK Consulting LLP (RSM) on behalf of the Secure by Design team at the Department for Digital, Culture, Media and Sport (DCMS). All data will be collected, processed and retained for the study's duration in accordance with the General Data Protection Regulation (GDPR). The data will be analysed anonymously and kept confidential. Survey data will be aggregated and used to inform the final report of this study. More information about our privacy policy is available at <https://www.rsmuk.com/privacy-and-cookies/entities-privacy-policy> For the purpose of this survey, RSM will act as both the data processor and controller. Should you have any queries regarding data protection and privacy or the processing of data provided in response to this survey, please contact RSM's data controller for this study, Matt.Rooke@rsmuk.com. RSM's Privacy Officer is David.Punt@rsmuk.com. If you have any problems accessing this survey please contact Polly Jackson on 01223 455716 or at polly.jackson@rsmuk.com

1. Please confirm below that you have read and understood this statement, about how your personal data will be collected and used, and agree with its terms *

Yes

No

2. Please confirm that you have read the information above and you are happy to participate and continue with the survey. *

Yes

No

2. IoT Retailers

Many of the questions will be quantitative in nature and we have no way of estimating them other than through surveys. Please provide estimates wherever possible (numbers of people, number of hours, expected costs etc) - even very approximate figures are useful for this exercise. This survey is intended for companies that sell consumer Internet of Things (IoT) products to consumers in the UK ("retailers").

For the purposes of this research, consumer IoT is defined as network-connected (and network-connectable) devices and their associated services that are usually available for the consumer to purchase in retail stores; and that the product's purpose is typically for use within the home or as personal electronic wearables.

In this research, consumer IoT is split into three groups:

Big ticket items: Smart TVs, smart white goods, smart kitchen appliances etc.

Connecting the home: Home assistants, smart speakers, smart security cameras, smart doorbells, smart thermostats etc.

Consumer lifestyle: Smart handheld devices, smart phones, smart toys, smart watches etc

3. Are you a retailer who sells consumer IoT products to consumers in the UK? *

Yes

No

If you are also a producer of IoT devices and would like to participate in a separate survey for IoT producers, this is available at <https://smartsurvey.co.uk/s/consumerIoT>

3. Company details

4. What is the name of your company?

5. Which of the following best describes your organisation? Please select the most appropriate answer below

Online retailer based in the UK

Online retailer based outside the UK

High street store

High street store with online presence

6. If your organisation sells consumer IoT products online, which of the following methods do you use? Please select all that apply.

Retailer own website

Third party online marketplaces and platforms

If online third party site, please specify:

7. Do you sell new and or second-hand consumer IoT products? Please select the most appropriate answer below

Exclusively new IoT products

Mostly new, some second-hand IoT products

Mostly second-hand products IoT products

8. If you sell second-hand consumer IoT products, do you currently undertake any checks on security of these devices?

Yes

No

4. Organisation Size

9. Approximately how many people are employed in your organisation in the UK?

1

2

3 to 5

6 to 9

10 to 19

20 to 34

35 to 49

50 to 99

100 to 249

250 to 499

500 to 999

1,000 or more (please specify below if known)

Don't know

If more than 1,000 please specify

5. Consumer IoT products

In this research, consumer IoT is split into three groups:

Big ticket items: Smart TVs, smart white goods, smart kitchen appliances etc

Connecting the home: Home assistants, smart speakers, smart security cameras, smart doorbells, smart thermostats etc

Consumer lifestyle: Smart handheld devices, smart phones, smart toys, smart watches etc.

10. Which of the following consumer IoT products does your organisation sell in the UK? Please select all that apply

Smart TVs

Smart washing machine/dryer

Smart fridge/freezer

Smart dishwasher

Smart oven

Smart microwave

Other (please specify):

11. Connecting the home

Smart home assistants

Smart speakers

Smart security cameras

Smart doorbells

Smart home thermostats

Smart lighting

Smart baby monitors

Other (please specify):

12. Consumer lifestyle

Wearable health trackers

Smart watches

Smartphones

Tablets

Other smart handheld devices

Smart toys

Other (please specify):

13. How many consumer IoT product lines (including individual versions of the same product) does your organisation currently sell in the UK in total?

1

2

3-5

6-10

11-15

16-25

26-35

36-50

Over 50 (please specify below if known)

Please specify if over 50

14. How long have you been selling consumer IoT products in the UK for?

Less than 12 months

1-2 years

3-5 years

5-10 years

More than 10 years

6. IoT turnover

15. What was your approximate turnover from selling these consumer IoT products in the UK over the last 12 months?

£0 - £49,999

£50,000 - £99,999

£100,000 - £249,999

£250,000 - £499,999

£500,000 - £999,999

£1m - £1.9m

£2m - £4.9m

£5m - £9.9m

£10m - £25m

Over £25m

If over £25m please specify

7. Security measures

16. Were you aware of the UK Code of Practice for Consumer IoT Security before we contacted you?

Yes, well aware

Yes, to some extent

Not aware

The Code of Practice for Consumer IoT Security aims to support all parties involved in the development, manufacturing and retail of consumer IoT with a set of guidelines to ensure that

consumer IoT products are secure by design and to make it easier for people to stay secure in a digital world.

The Code of Practice brings together, in thirteen outcome-focused guidelines, what is widely considered good practice by industry and other stakeholders in IoT security. It has been developed by the Department for Digital, Culture, Media and Sport (DCMS), in conjunction with the National Cyber Security Centre (NCSC), and follows engagement with industry, consumer associations and academia.

[Click here for full CoP guidelines](#)

8. Demonstrating compliance

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products. One option in this proposal is to mandate that the following three security requirements are mandated for consumer IoT products produced, sold or supplied in the UK:

All IoT device passwords shall be unique and shall not be resettable to any universal factory default value;

The manufacturer shall provide a public point of contact as part of a vulnerability disclosure policy in order that security researchers and others are able to report issues;

Manufacturers will explicitly state the minimum length of time for which the product will receive security updates.

The producer is responsible for complying to the top three security requirements and the distributor or retailer would be responsible for not selling products that do not comply and would therefore require some assurance of this.

Distributors should not sell products that do not comply with the "Security Requirements".

Distributors should provide consumers with information on the length of time for security updates at the point of sale

17. If these requirements are mandated, please estimate the one-off familiarisation costs to your organisation to read and understand proposed legislation, in terms of staff time? If you are unable to provide cost information, please provide an estimate of person days in the table below

--

18. If these requirements are mandated, please estimate the one-off familiarisation costs to your organisation to read and understand proposed legislation, in terms of staff time? Please express this in person-days or provide a total staff cost estimate.

Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
--------------------------------------	---------------------------------------	--	---------------------------------------	---	--	--

Corporate manager, director or equivalent

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
Manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legal and contract professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commercial and procurement roles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales Advisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Services Representative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please state)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

19. Would you pay for external advice or consultancy services as part of the familiarisation process within your organisation?

Yes

No

Don't know

20. Approximately how much would external advice cost, and what would it entail?

21. What would be the total one off cost of familiarisation to your organisation? Please include the cost of the staff time identified above, plus details of any other familiarisation costs such as external advice or consultancy.

22. Would there be any cost to you in obtaining, requesting or storing any information or assurance from the producer to ensure that any products meet the security requirements?

Yes

No

Don't know

Please explain your answer

23. Would your supply chain face any additional costs as a result of obtaining this information?

Yes

No

Don't know

Please explain your answer

9. Mandatory security label

The UK Government is developing legislative proposals to improve the cyber security of consumer IoT products. One option in this proposal is to mandate an IoT security label that indicates whether the products adhere to the three consumer IoT security requirements.

All IoT device passwords shall be unique and shall not be resettable to any universal factory default value.

The manufacturer shall provide a public point of contact as part of a vulnerability disclosure policy in order that security researchers and others are able to report issues.

Manufacturers will explicitly state the minimum length of time for which the product will receive security updates.

The Producer is responsible for implementing a security label that indicates whether or not the product adheres to the top three security requirements and states the minimum length of time for security updates.

The Distributor is responsible for not selling products that do not have a security label, which states information on the top three security requirements.

24. What would be the one off cost of familiarisation for the label option to your organisation to read and understand the legislation in terms of staff time? If you are unable to provide cost information, please provide an estimate of person days in the table below.

25. What would be the one off familiarisation costs for the label option to your organisation to read and understand proposed legislation, in terms of staff time? Please express this in person-days or provide a total staff cost estimate.

	Up to one person-day (up to 8 hours)	Two or three person-days (9-24 hours)	Four or five person-days (25-40 hours)	One to two person-weeks (41-80 hours)	Three to four person-weeks (81-160 hours)	Five to ten person-weeks (161-400 hours)	More than ten person-weeks (more than 400 hours)
Corporate manager, director or equivalent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legal and contract professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commercial and procurement roles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Administrator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales Advisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer Services Representative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please state)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

26. Would you pay for external advice or consultancy services as part of the familiarisation process within your organisation?

Yes

No

Don't know

27. Approximately how much would external advice cost, and what would it entail?

28. What would be the total one off cost of familiarisation to your organisation? Please include the cost of the staff time identified above, plus details of any other familiarisation costs such as external advice or consultancy.

10. Presenting Security Information at the Point of Sale

29. If individual product labelling was not mandatory, how would you present consumer IoT product security information on the following security requirements at the point of sale? Distributors will explicitly state the minimum length of time for which the consumer IoT product will receive security updates at the point of sale. Please tick all that apply.

- Provide information in product listing online
- Provide information in product description online
- Provide information in product technical specification online
- Provide information in product description in store
- Provide information in product technical specification in store
- Provide information in in-store brochure
- Provide information in-store on pricing/display ticket
- Adding a voluntary label to the product itself
- Other (please specify)

Comments:

30. Would there be any cost to you in obtaining, requesting or storing any information or assurance from the producer on the minimum length of time for which the consumer IoT product will receive security updates?

- Yes
- No
- Don't know

Please explain your answer

31. Please estimate the cost to your organisation of presenting, at the point of sale, the minimum length of time for which a consumer IoT product will receive security updates, per product?

11. Disposal of non-compliant stock

The Government will seek to give businesses time to comply with any future regulation, in the form of an implementation period.

32. Would your organisation bear any costs that are associated with the disposal, refurbishment,

recycling or reshipping of non-compliant stock after the predetermined implementation period has ended?

	Yes	No	Don't know
Mandatory compliance with top 3 security requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mandatory physical security label	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

33. How would your organisation dispose of non-compliant stock once the implementation period has ended? Please select all that apply.

- Reshipping for sale in another country
- Recycle it
- Return to manufacturer
- Dispose in refuse / electrical disposal
- Destroy
- Other (please specify):

34. If your organisation has non-compliant products in stock, how much would it cost your organisation to dispose, refurbish, recycle or reship non-compliant stock? For cost analysis purposes, please consider the cost that you would incur within a 12 month period.

Disposal of non-compliant products and packaging	<input type="text"/>
Return to UK manufacturer	<input type="text"/>
Return to non-UK manufacturer	<input type="text"/>
Recycling	<input type="text"/>
Re-shipping items back to country of origin or to another country	<input type="text"/>

35. Do you have any policies for the reuse of valuable commodities and components contained in discarded products?

- Yes
- No
- Don't know

If yes please describe these policies

12. Benefits of the proposed legislation

We have been talking exclusively about the costs of the proposed legislation. We would now like to also consider the potential benefits and other impacts to businesses and consumers

36. Overall, how do you think your organisation will be impacted if the regulatory proposals become law?

	Extremely negatively	Somewhat negatively	No/neutral impact/balanced	Somewhat positively	Extremely positively	Don't know
Mandatory top 3 requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mandatory physical security label	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please explain your answer

37. Which of the following, if any, do you think that UK retailers of consumer IoT products would benefit from if the regulatory proposals become law? Please select all that apply

	Mandatory top 3 requirements	Mandatory physical label
Improved consumer confidence in products	<input type="checkbox"/>	<input type="checkbox"/>
Increase in share price / value	<input type="checkbox"/>	<input type="checkbox"/>
Improved reputation / perception of products	<input type="checkbox"/>	<input type="checkbox"/>
Opportunity for marketing as a selling point	<input type="checkbox"/>	<input type="checkbox"/>
Contribute to Corporate Social Responsibility (CSR)	<input type="checkbox"/>	<input type="checkbox"/>
Improved security for products lines	<input type="checkbox"/>	<input type="checkbox"/>
Improved safety for products lines	<input type="checkbox"/>	<input type="checkbox"/>
Improved privacy for products lines	<input type="checkbox"/>	<input type="checkbox"/>
Reduction in risk of product vulnerabilities	<input type="checkbox"/>	<input type="checkbox"/>

	Mandatory top 3 requirements	Mandatory physical label
Increased customer loyalty and satisfaction	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

38. Overall, how do you think that consumers would be impacted if either of these regulatory proposals became law?

	Extremely negatively	Somewhat negatively	No/neutral impact/balanced	Somewhat positively	Extremely positively	Don't know
Mandatory top 3 requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mandatory physical label	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please explain your answer

39. Which of the following, if any, do you think that UK consumers would benefit from if the regulatory proposals become law? Please select all that apply.

	Mandatory top 3 requirements	Mandatory physical label
Improved security	<input type="checkbox"/>	<input type="checkbox"/>
Improved safety	<input type="checkbox"/>	<input type="checkbox"/>
Improved privacy	<input type="checkbox"/>	<input type="checkbox"/>
Increased adoption of consumer IoT devices in daily lives	<input type="checkbox"/>	<input type="checkbox"/>
Increased confidence in consumer IoT devices	<input type="checkbox"/>	<input type="checkbox"/>
Improved consumer wellbeing	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>

Comments:



11. RETAILER SURVEY: ADDITIONAL TABLES

Table 46: Number of product lines

	All Respondents	Small Businesses	Medium Businesses	Large Businesses
1	1	1	0	0
2	0	0	0	0
3-5	1	1	0	0
6-10	1	1	0	0
11-15	2	1	0	1
16-25	0	0	0	0
26-35	0	0	0	0
36-50	2	1	0	1
Over 50	4	1	0	3
Total	11	6	0	5

Source: Retailers' Survey Q13, March 2020 (n=11)

Table 47: Estimates of one-off familiarisation costs to read and understand proposed legislation

	Up to one person -day	Two or three person -days	Four or five person -days	One to two person -weeks	Three to four person -weeks	Five to ten person -weeks	More than ten person -weeks	Respondents
Corporate manager, director or equivalent	3	5	1	0	0	0	0	9
Manager	5	2	0	0	1	0	0	8
Legal and contract professionals	2	2	2	1	0	0	0	7
Commercial and procurement roles	3	1	1	0	2	0	0	7
Administrative	5	1	0	0	0	1	0	7
Sales Advisor	5	1	0	0	0	1	0	7
Customer Services Representative	6	1	0	0	0	1	0	8
Other (please state)	1	0	0	1	0	0	1	3

Retailer survey Q18 (n=9)

Table 48: Estimated one off familiarisation costs for the label option

	Up to one person -day	Two or three person -days	Four or five person -days	One to two person -weeks	Three to four person -weeks	Five to ten person -weeks	More than ten person -weeks	Respondents
Corporate manager, director or equivalent	3	1	1	0	0	0	0	5
Manager	4	0	0	1	0	0	0	5
Legal and contract professionals	3	0	0	0	0	0	0	3
Commercial and procurement roles	2	0	1	1	0	0	0	4
Administrative	3	0	0	0	0	0	0	3
Sales Advisor	2	1	0	0	0	0	0	3
Customer Services Representative	3	1	0	0	0	0	0	4
Other (please state)	2	0	0	0	0	0	0	2

Retailer survey Q25 (n=5)

12. IMPACT ON INTERNATIONAL TRADE

This section deals with the following research question on international trade:

- Quantitative and qualitative evidence on the short, medium and long term impacts of a proposed ban on non-compliant products for UK trade and investment, including trade with suppliers in China/South East Asia. This could include existing evidence on impacts in other sectors as a result of similar proposals.

It is based upon:

- a review of published information and data on industry trends and regulatory challenges, and the potential economic implications from the proposed requirements for businesses affected by the regulation;
- a review of industry intelligence regarding the impact of regulatory requirements related to DCMS's current proposals, including impact assessment and studies of comparable regulations;
- analysis of the consumer and business survey data on current market activity and expected responses to any change in regulations; and
- model-based simulation of the impacts of higher costs of production brought about by the regulations, and a proposed full import ban for non-compliant products.

Review of relevant literature

This review of literature aims to provide a basis for understanding industry trends, regulatory challenges and, in particular, the potential economic implications from the proposed requirements for businesses affected by the proposed regulation. It also aims to outline industry intelligence regarding the impact of regulatory requirements related to DCMS' current proposals. The information gathered will contribute to the development of assumptions for our estimations in cases where information data collected from the consumer, manufacturer and retailers' surveys is either incomplete or inconsistent. Accordingly, the information gathered from the available literature will be used for triangulation at different stages of the assessment.

It is divided into three parts:

- Regulatory proposal-related literature and the impact on costs and the implications on trade and investment
- Subject-related literature and the impact on costs and the implications on trade and investment
- Policy intervention-related literature and the impact on costs and the implications on trade and investment.

Policy-intervention-related literature

In the following, we provide a review of existing impact assessments on legislative initiatives that include requirements similar to those proposed by DCMS. We focus on the cost impact of reporting requirements, public points of contact and labelling requirements. It should be noted that the insights from existing assessments can only provide rough indications for the potential impact of the requirements posed by DCMS for secure consumer IoT products. The review of these impact assessments covers potential economic impacts on companies, particularly the costs impacts, and the potential effects on company-level competitiveness, international trade and investment.

Generally, studies of related regulatory measures numerical cost (estimates) differentiate between different types of impacts:

One-time costs:

- Changes to corporate compliance policies, including familiarisation costs
- Changes in production processes, capacity and means of production
- Costs for the set-up and operation of necessary administration procedures and, where necessary, IT systems

Recurring costs:

- Necessary administration
- Data collection and verification of information
- Value chain management, e.g. verification that suppliers are compliant with regulations and provide credible information
- Audits and/or certification
- Filing of necessary forms

Costs are usually expressed in annual numbers on a per company basis. Some studies aggregate these numbers to arrive at a total cost for all companies affected by the respective regulation. The estimates for one-off or recurrent costs are usually expressed in (annual) man-days or as total (annual) cost in the respective currency. It should be noted that the cost estimates per type of cost vary, sometimes significantly, depending on information gathered from individual companies, differences in hourly labour cost estimates and the way these numbers were aggregated.

The EU's Impact Assessment of the Non-financial Reporting Directive⁶

The EU's assessment of the economic impact of the Non-financial Reporting Directive analyses different policy scenarios and options respectively. The regulation itself requires large companies to disclose certain information on the way they operate and manage social and environmental challenges. EU rules on non-financial reporting only apply to large public-interest companies with more than 500 employees. Under Directive 2014/95/EU, large companies have to publish reports on the policies they implement in relation to environmental protection, social responsibility and treatment of employees, respect for human rights anti-corruption and bribery, diversity on company boards. Directive 2014/95/EU gives companies significant flexibility to disclose relevant information in the way they consider most useful.

The study generally suffers from a lack of publicly available industry data and a high variation in the quantitative and qualitative information collected through surveys and consultations. Accordingly, the figures provided should be considered as broad estimates and the results should be interpreted with caution. Cost estimates are taken from companies' replies gathered through consultations and surveys and/or estimated by multiplying a given number of working hours required (when stated by the business respondents) and labour costs per hour (usually based on available industry intelligence), depending on the administrative procedures prescribed by the regulation. Table 49 below provides an overview of the estimated cost impacts for large companies and SMEs.

⁶ See COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Council Directives 78/660/EEC and 83/349/EEC as regards disclosure of non-financial and diversity information by certain large companies and groups. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013SC0127>.

Table 49: Summary of the costs by company for different costs types as estimated for the EU's Non-financial Reporting Directive

Cost	Impact
Training costs	Large companies: Up to 18 days (often also no training or training on the job). Up to 5,000 EUR SMEs: n/a
Collection of New Data (internal staff)	Large companies: 35 to 100 days. 227 EUR per day Between 8,000 EUR and 23,000 EUR SMEs: n/a
Report Drafting (internal staff)	Large companies: 80 to 480 days, costed at 227 EUR per day: Between 18,000 and 109,000 EUR SMEs: 15-20 days, costed at 227 EUR per day: Between 3,000 and 5,000 EUR
Report Design (usual external cost)	Large companies: Between 10,000 and 100,000 EUR. SMEs: Between 1,000 and 2,000 EUR
Report processing (external cost)	Large companies: Up to 97,000 EUR SMEs: Under 20,000 EUR
Report Publication (depending on publishing strategy – internet or printed)	Large companies: 2 to 50 days. Between 1,000 to 192,000 EUR (printed version) Between 10,000 and 35,000 EUR (online) Overall: Between 1,000 and 131,000 EUR SMEs: 2 days, under 1,000 EUR.
External Assurance/Audit	Large companies: Between 22,000 and 114,000 EUR SMEs: n/a
TOTAL	Large companies: up to 135 to 648 days, excluding report design, report processing and external assurance/audit. Between 155,000 and 604,000 EUR. SMEs: 17-22 for report, excluding other areas. Between 8,000 and 25,000 EUR.

Source: CSES (2011) and OECD (2016).

EU Impact Assessment of the EU's Cybersecurity Act⁷

With the initiative to reform the European Union Agency for Network and Information Security (ENISA), the EU aimed to enhance its supporting functions for Member States in achieving cybersecurity resilience. In addition, the EU established a voluntary European cybersecurity certification framework to promote certification schemes for specific ICT products and services.

The Study on "ICT Security Certification and labelling – Evidence gathering and impact assessment" outlines the perspectives of businesses affected by the regulation on cybersecurity certification. Information is drawn from interviews and case studies for three product categories: smart meters, alarm systems and cloud computing services. The study explores the impacts of three policy options:

⁷ See COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on ENISA, the "EU Cybersecurity Agency", and repealing Regulation (EU) 526/2013, and on Information and Communication Technology cybersecurity certification ("Cybersecurity Act").

1. Policy Option 1: Non-legislative “Soft-law” measures
2. Policy Option 2: EU legislative act to extend SOG-IS agreement to all MS⁸
3. Policy Option 3: EU general ICT security certification and labelling framework

Regarding the cost of products’ cybersecurity certification and the impact on trade conditions, the report provides a qualitative and quantitative assessment of the proposed policy options:

Qualitative assessments:

Certification:

- Certification regulations and market conditions are fragmented across the EU, creating challenges for the industry when entering the markets of several EU member states
- In the smart metering industry, the single most important barrier to trade is the cost of certification. One respondent stated that the cost of certification is about 1 million EUR.
- Mandatory certification which may introduce economic/administrative burdens could be limited by relying on voluntary schemes, which provide greater industry flexibility. Voluntary labelling initiatives may avoid some market inefficiencies that arise with regulated certification schemes, particularly for national or regional schemes that define standards and evaluation methodology and only recognise certain certification bodies within their own territory.
- Interviewees from the ICT Certification Authority argue that a mutual recognition agreement of certification schemes existing in different countries have indeed a positive impact on industry costs.
- Interviewees stressed that customers should be divided into companies and end-users. Companies are generally more aware of security requirements of ICT products purchased than the end users are. This is due also to the different nature, cost and complexity of the product that are purchased.

Labelling:

- Several interviewees addressed the issue of information asymmetry. For Semiconductors industry representatives the situation is today polarised between products for public security and consumers’ products. For the former certification is long and costly and only the big company can manage such processes. At consumers’ product level the requirements are lighter, but what is currently needed are solutions that are in between these two extremes. Currently, there is also the need to raise awareness about the importance of security using some forms of labelling schemes. On the other hand, according to some respondents the market problem is not one of fragmentation but rather of awareness and demand.
- Voluntary action on labelling: By letting the industry voluntarily put forward their own labels in coordination with public authorities would allow it to provide information to the users in a cost-efficient way.
- When considering cross-border trade of ICT products, voluntary labelling approaches seem to pose problems. Consumers may have awareness for labels existing at the national level but less so for labels from other countries, which do not abide to a certain degree of cross-country standardisation.
- Voluntary labelling schemes without a sound legal and mandatory framework may lose their purpose in terms of trust and reliability.

⁸ The SOG-IS agreement was produced in response to the EU Council Decision of March 31st 1992 (92/242/EEC) in the field of security of information systems, and the subsequent Council recommendation of April 7th (1995/144/EC) on common information technology security evaluation criteria. See <https://www.sogis.eu>. The full text of the agreement is available at: https://www.sogis.eu/uk/mra_en.html.

- Labelling depends on the user perception and quality of information. For the end-user such labels may lead to more confusion. If the label is too simple, the user could misunderstand the corresponding information. If the label is too complex, the user could be unable to understand it.

Quantitative assessments with regard to time and cost impacts:

The cost of certification varies across member states due to differing requirements/processes. The following information was reported for the cost impact of regulation:

EU level:

- Cost of security certificate requirements: In all EU member states, a security certification is requested in the digital signature context, namely for secure signature/seal devices as defined in EIDAS regulation. The corresponding duration and cost are in the order of 18 months and 100,000 EUR (reply by representative of a National ICT Certification Authority).
- It is stated that Common Criteria and SOGIS are not the right solution for ICS at the moment. Common Criteria costs 50,000 EUR and lasts more than one year. This is a problem for a vendor. Common Criteria is a good approach for some kinds of components and products. In situations where the lifecycle of a product is more than 20 years, it is necessary to find approaches at a system level based on procedures and self-declaration (reply by a representative of the smart meter industry).

France:

- In France, the cost of [smart meter device] certification is somewhere between that of Germany and the UK. The cost is similar to the UK, so it is about 150K euro or more. In terms of cost, it is also important to note that the evaluation processes are different between Member States (reply by representative of smart meter industry).
- The French Certification Authority defined the framework CSPN which is a light version of common criteria that costs about 50,000 EUR and the duration is around 6 months. Behind these costs, there are a number of activities to be performed by the vendor to fulfil CSPN requirements and such activities are estimated to cost around 30,000 EUR (reply by representative of smart meter industry).
- Regarding network devices related to the creation and management of VPNs (Virtual Private Networks), requirements are defined in France and in the EU on certification based respectively on a national approval (which is Common Criteria based), and on a EU approval process: the French national approval process for VPNs lasts from 6 to 9 months and the costs are estimated around 80,000 EUR (reply by representative of a National ICT Certification Authority).

Germany:

- In Germany, for a BSI "Smart Meter Gateway" certificate the cost is more than one million [EUR] as a new product needs to comply with three different certifications. According to meter manufacturers, the price for smart meter certification in the UK is almost 150,000 EUR.

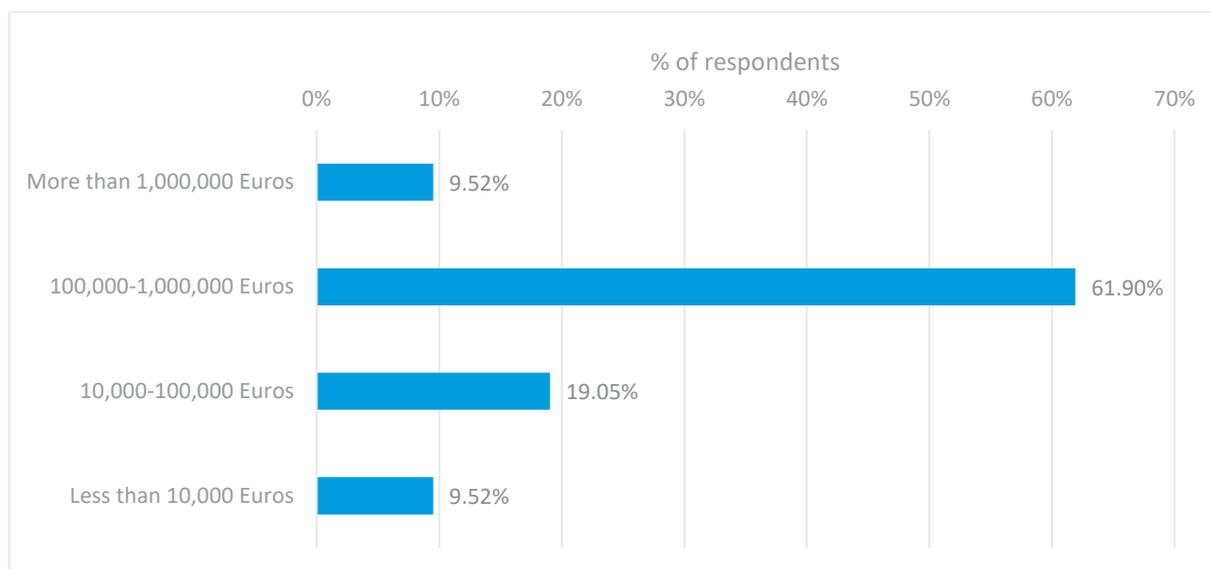
Italy:

- In Italy, a security certification is requested for secure signature/seal devices. Duration and cost can be estimated in about 12 months and in the range of 50,000 - 100,000 EUR (reply by representative of a National ICT Certification Authority).
- In Italy, a public local authority (Provincia di Trento), in a public procurement procedure has recommended the security certification of a video surveillance system according to Common Criteria (low assurance, i.e., EAL 1). Duration and costs of this security certification can be estimated in about 6 months and 20,000 EUR (reply by representative of a National ICT Certification Authority).

With regard to time and cost of certification, 62% of questionnaire respondents indicated that the cost incurred for certifying an ICT service/product is between 10,000 EUR and 100,000 EUR. A smaller percentage of 19% answered that the cost incurred for certifying an ICT service/product are between 100,000 EUR and 1,000,000 EUR and only 10% of respondents indicated 1,000,000 EUR or more for the cost incurred for certification. It is noted that, with respect to the answers provided by the respondents for the time and cost of certification, it is necessary to distinguish the products/services that must be certified. Time and cost depend entirely on the complexity of the product/service and the organisational structure.

The same reasoning applies also to the costs of labelling. Since labelling is a process not yet widely used for ICT products, the questionnaire respondents have not been able to give many examples of labelling time and costs. The only two quantitative answers are: 300,000 EUR and 60,000 EUR and 3-5 months.

Figure 13: On average what is the range of costs for certifying an ICT service/product?

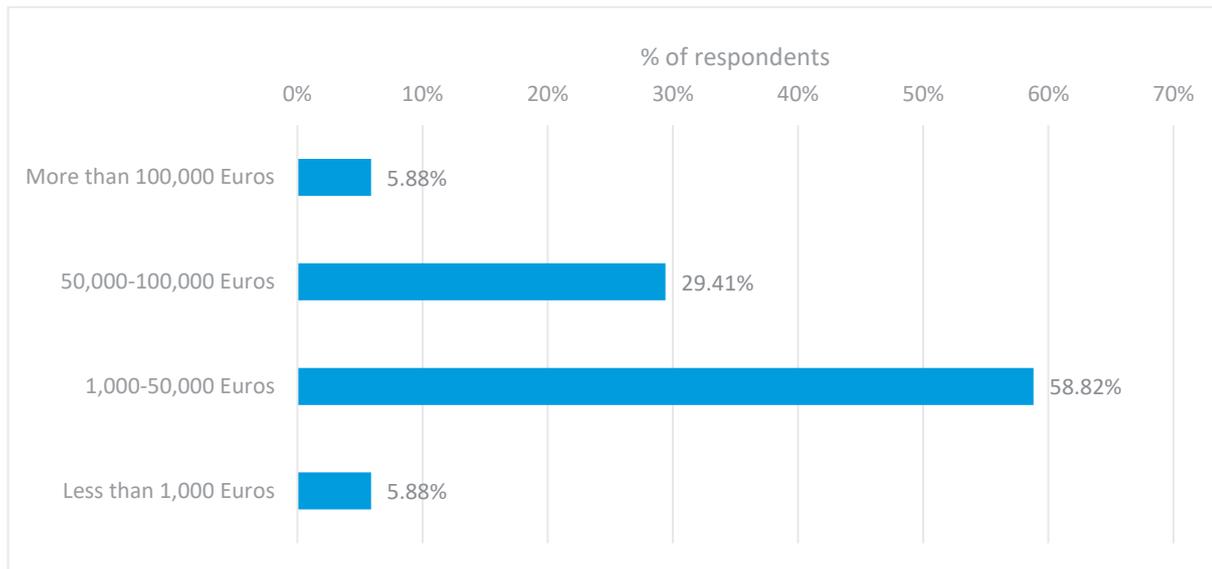


Source: *EU Impact Assessment of the EU's Cybersecurity Act.*⁹

For different types of security-labelling requirements a company had to undertake to access the market of an EU country, the following estimates were given for compliance costs and time.

⁹ See COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on ENISA, the "EU Cybersecurity Agency", and repealing Regulation (EU) 526/2013, and on Information and Communication Technology cybersecurity certification ("Cybersecurity Act").

Figure 14: On average what is the range of costs of labelling of an ICT service/product (excluding any cost related to the certification process)?



Source: EU Impact Assessment of the EU's Cybersecurity Act.

Methodological considerations for modelling trade impact of proposed policy options

This trade analysis aims to provide quantitative and qualitative evidence on the short, medium and long term impacts of the proposed measures for UK trade and investment. The assessment will include trade with major UK suppliers including China/South East Asia. This trade analysis will not model the implications of a partial ban of products from certain jurisdictions. It is assumed that companies indeed face additional familiarisation and substantial compliance costs. Since most importers are large companies (according to trade in enterprise characteristics data), we consider the number of non-compliant foreign companies to be rather low, implying that imports to the UK will mainly be affected by higher compliance costs.

The assessment will be informed by related literature and responses from three surveys: the consumer survey, the retailer survey and the manufacturer survey. The information obtained – qualitative and quantitative – will be linked to industry statistics for:

- Industry characteristics
- SMEs and large company activity in the respective sectors
- International trade
- International investment.

Based on available information, short term, medium term and long term impacts will be assessed for each policy option.

The discussion will consider potential spillover effects on upstream and downstream industries in the UK, e.g. suppliers of manufacturers and traders along the distribution chain, including production, sales, but also innovation in the UK and UK companies' future international competitiveness.

Preliminary Summary

Quantification of Short to Medium Term Effects and Longer-Term Effects

The estimation of medium- and long-term effects is based on a general equilibrium model simulation and conducted on the basis of the GTAP Model by the Global Trade Analysis Project

(GTAP). The model is comparative static. It has been applied frequently in studies about impacts of trade policy, including tariffs and non-tariff barriers to trade. We apply a multi-regional, multi-sector, computable general equilibrium model that is characterised by perfect competition, constant returns to scale and Armington elasticities. The model assumes full mobility and employment of factors of production, i.e. all factors of production including labour will adjust until they are fully absorbed after the policy change.

Our model does not account for endogenous productivity growth and may thus under- or over-predict changes in welfare, investment, economic output and trade volumes that result from trade policy changes. Like any applied economic model, the model is based on a number of assumptions which simplify the complex policy framework governing the national economies and the global economy. The results of the estimations therefore only have indicative character. It should be noted that it is not possible to forecast the precise impact of changes in trade policy variables on macro-economic variables, mainly due to lack of empirical data and real world complexities, i.e. the influence of too many different factors and non-constant causal relationships.

As base data we use the most up-to-date GTAP 10 database, which was released in July 2019. The database contains global trade data for the years 2004, 2007, 2011 and 2014 based on input output tables and trade protection data. The GTAP 10 dataset on the global economy is extrapolated to reflect the “best estimate” of the global economy today. The exogenous variables which are shocked for the extrapolation include the most relevant macroeconomic variables, i.e. population, labour force, total factor productivity and capital endowment.

Sectors

Following discussions with DCMS on the classification of relevant products and product categories using harmonised standard codes¹⁰ (or HS codes), we identified the following products as falling under the scope of the proposed regulations. These were aligned with our model’s sector classification on the basis of concordance tables¹¹ (see Table 50 below).

The countries analysed include the UK’s major trading partners in the identified sectors. Annex 1 provides an overview of 2019 UK import trade flows and the UK’s major import sources for consumer IoT product sectors.

¹⁰ The "Harmonized Commodity Description and Coding System" (HS code) of the tariff nomenclature is an international standardised system of names and numbers for the classification of commodities.

¹¹ The GTAP Data Base (version 10) contains 65 sectors. Concordance tables for HS codes are available at: https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=5111.

Table 50: Sector concordance: GTAP - HS4

"Big ticket items"	HS4 code	GTAP sector
Smart TVs / monitors / projectors	8528	40
Smart washing machine/dryer	8450	41
Smart fridge/freezer	8418	41
Smart dishwashers	8422	41
Smart oven / smart microwave	8516	41
Smart boilers	7323	37
"Connecting the home"	HS	GTAP
Smart home assistants / smart speakers / smart doorbells	8517	40
Smart security cameras / smart baby monitors	8525	40
Smart home thermostats	9032	41
Smart lighting	9405	41
Smart smoke detectors	8531	41
"Consumer lifestyle"	HS	GTAP
Wearable health trackers / smart collars	9029	41
Smart toys	9503	42
Laptops / consumer computers / tablets	8471	40
Video game consoles and machines / articles for funfair	9504	42
Smart watches / smart phones	8517	40

Source: GTAP, UN Comtrade.

Modelling impacts of policy options

The estimation of impacts is based on data provided by respondents to the manufacturer survey, converted into percentage shares of turnover arising from consumer IoT, and weighted to be representative of overall IoT turnover in the sample (that is, companies with higher turnover from consumer IoT contributed more to the calculation of the average). The numbers applied to the model are outlined in Table 51.

Table 51: Costs of various policy elements as share of consumer IoT turnover

Policy element	Small companies	Large companies	Combined
Implementation: default passwords	<0.01%	~0%	~0%
Implementation: vulnerability disclosure policy	0.04%	0.00%	0.00%
Implementation: minimum security update period	0.05%	0.01%	0.01%
All 3 code guidelines: familiarisation	0.10%	0.00%	0.00%
One-off: cost of disposal of non-compliant goods	1.05%	1.4%*	1.32%
Recurring: product self-assessment	0.07%	0.01%	0.01%
Physical label: implementation	0.66%	0.27%	0.27%
Physical label: familiarisation	0.03%	0.00%	0.00%

* Based on only 1 response in this category

Source: RSM survey of manufacturers

We have considered two policy options for this research:

- Policy option 1 (mandating a security label) includes the cost of physical labels, and costs related to recurring self-assessment.
- Policy option 2 (mandating aspects of the top 3 CoP requirements) included costs related to default passwords, vulnerability disclosure policies, minimum security update period, costs related to recurring self-assessment, and costs related to the disposal of non-compliant goods.

In both cases we distinguish between a) short- to medium-term effects (including familiarisation costs and annual recurrent costs) and b) longer-term effects (including recurrent costs only).

It is assumed that companies have to bear additional costs from becoming familiar with new regulations and from setting up new processes respectively. We also assume that in the long-run, a high proportion of substantive compliance costs are integrated into firms' product design cycles.

The numbers stated by the survey respondents are to the largest extent numbers stated by large multinational companies (as the average impact was weighted by consumer IoT turnover). Trade data show that UK trade in "computer, electronic and optical products" and "electrical equipment" is dominated by large companies (both for exports and imports). Measured in terms of total import values, in "computer, electronic and optical products" large companies account for 78% of UK imports. In "electrical equipment", large companies account for 59% of UK imports (see Table 52 and Table 53 below). It should be noted that SMEs account for lower shares of imports in both sectors, but generally face a higher compliance cost burden by unit (evidenced in the literature review and the survey of manufacturers). Costs are modelled as a tariff borne by importers.

Table 52: UK Trade in enterprise statistics, Manufacture of computer, electronic and optical products, 2017 data

Manufacture of computer, electronic and optical products	Number of importing enterprises	Share by size class	Total imports in €m	Share by revenue	Imports per enterprise, in €m
Total	2,440	100%	10,575	100%	4.3
Fewer than 10 employees	1,117	46%	416	4%	0.4
From 10 to 49 employees	905	37%	463	4%	0.5
From 50 to 249 employees	355	15%	1,469	14%	4.1
250 employees or more	63	3%	8,227	78%	130.6

Source: Eurostat.

Table 53: UK Trade in enterprise statistics, Manufacture of electrical equipment, 2017 data

Manufacture of electrical equipment	Number of importing enterprises	Share by size class	Total imports in €m	Share by revenue	Imports per enterprise, in €m
Total	1,314	100%	4,079	100%	3.1
Fewer than 10 employees	435	33%	273	7%	0.6
From 10 to 49 employees	573	44%	402	10%	0.7
From 50 to 249 employees	266	20%	1,001	25%	3.8
250 employees or more	40	3%	2,403	59%	60.1

Source: Eurostat.

Statistics on import volumes for each product group are provided in Annex 1 to this section.

Policy options 1 and 2: Assumptions and Interpretation of Results

The model we apply is comparative static. It compares two equilibria over time. A new equilibrium reflects the state of the economy after a shock unfolded. The imposition of a tariff would increase the price of a commodity and drive a wedge between supply and demand and result in lower trade volumes. Similar considerations apply for the imposition of a regulation that increases the price of a commodity or the price of trading a commodity. The projection horizon is typically 5 to 10 years.

The interpretation of the time horizon for the economy to reach a new equilibrium generally depends on the policy measures modelled and how these measures would likely impact on the economy, i.e. prices, producers and consumers, over time. For example, while the impact on trade from a tariff reduces relatively quickly after its implementation, changes in non-tariff barriers take longer to impact on trade. Spill-over or second round effects, e.g. the substitution of foreign supply (imports) to domestic production, takes longer to materialise. Second round effects also depend on the development of prices, demand and available production capacities.

We estimate the impacts for two policy options for which the projected changes reflect a period of 5 years after the implementation. The economic impacts (changes in production and trade) are

not distributed equally over the whole period, i.e. each year. For example, the combined effect from additional fixed costs induced by the regulation (e.g. familiarisation and implementation costs), and additional variable costs, would impact more on trade in the time period that immediately follows the implementation of a policy. Further into the future, there will be no additional fixed (one-off) costs.

Some of the impacts of policy option 1 (mandating a security label) occur in the short term, corresponding to a period of time in which UK importers and foreign exporters/manufacturers need to become familiar with the new regulations and apply changes to the design/manufacturing of their products and/or customer support processes, e.g. software adjustment and the establishment of points of contact. The costs associated with labelling and self-assessment remain over the medium-to-longer term.

We assume that the familiarisation costs take effect immediately after the measures are implemented and, accordingly, start to impact on UK importers and foreign manufacturers/exporters. In addition, we assume that related compliance costs, both administrative (e.g. documentation) and substantive (e.g. testing for conformity) will also unfold their effects within the first year following the implementation. Due to the model's characteristics, the overall results of policy option 1 (according to our model's output) would materialise within the first 5 years after the implementation of the policy measures, whereby the impact of the familiarisation costs would likely be highest within the first two years after the implementation.

Policy option 2 (mandating aspects of the top 3 CoP guidelines) is most impactful in the short-to-medium term, taking into account that in the long run a high share of firms in the UK and abroad become familiar with the new regulatory requirements. The relative changes under policy option 2 will be higher in the first two years after the policies' implementation; temporary non-compliance would reduce exports to the UK in the short- to medium-term, and companies would bear costs of disposal of non-compliant goods. They would then gradually respond to the new measures to become compliant. However, assuming that a high proportion of companies that still import/export to the UK will manage to become compliant within the first two years after the implementation, the results of policy option 2 are of lower magnitude than the results for policy option 1 after the first two years, as the negative impacts are assumed to gradually phase out. In the longer term, a higher share of companies become more compliant, which is reflected by the annualised reductions in trade volumes becoming lower, particularly in the second half of the 5-year time horizon. By way of comparison, the costs for labelling and self-assessment under policy option 1 persist into the medium and longer-term.

Various caveats should be taken into consideration when reading the summary findings with regard to the impact of additional costs on UK trade in the affected product categories. Firstly, the survey data are not representative. The cost estimates indicated by firms reflect their representatives' perceptions. The numbers are nevertheless broadly in line with those of other studies that addressed the impact of related policies on companies' compliance costs.

Secondly, our model is comparative static. CGE models generally suffer from some shortages with respect to data inputs, the assumptions underlying policy changes and the equational frameworks. It should be noted that the output of any model will never be of higher quality than the data put into it, including data for policy scenarios and the state of the economy. However, as recently discussed by European Commission (2019), for example, alternatives to CGE models have not yet proven to be sufficiently reliable for ex-ante analyses of economy-wide effects of trade policy changes.¹²

The results of the model should not be read as point estimates. The results indicate the direction of the development of economic variables, e.g. changes in domestic production, changes in exports, changes in imports and changes in overall economic activity. The results should also be

¹² European Commission (2019). Reflection on the Economic Modelling of free Trade Agreements. Chief Economist Note. Issue 2, 2019.

benchmarked against the magnitudes of the impacts from other trade policy measures, e.g. high tariff and non-tariff barriers.

That said, for both policy options the estimated changes that result from the policy measures proposed by DCMS are relatively low and often negligible in magnitude. For both policy options, overall economic activity will not be affected, neither in the UK nor in the trading partners' countries. Summaries are provided below. The overall change in UK imports and exports are also very low.

Policy option 1: physical labelling and costs related to recurring self-assessment

For policy option 1, we do not find significant one-off or familiarisation cost. Recurring activities for companies' self-assessment include activities to become familiar with labelling requirements. Accordingly, the results reflect longer-term impacts for a 5-year time horizon after the implementation of the proposed policies.

Under policy option 1, UK domestic industry output slightly increases across the board for the sectors affected by the policy measures. The highest relative increase is recorded for smart electrical equipment (+0.32%), followed by smart computer and electronic products (+0.3%). As the changes materialise over a 5-year period, the annual changes are relatively small.

Table 54: Changes in sectoral output in the UK – policy option 1, in %

Sector	% change
Smart household articles (e.g. smart boiler)	0.18
Smart computer, electronic and optical products	0.3
Smart electrical equipment	0.32
Smart toys, video game consoles	0.22

UK production would be affected by higher regulatory costs, which in turn have an impact on UK suppliers' relative international competitiveness. The negative effects are only marginal though. UK aggregate export volumes in the sectors affected by the policy measures would only marginally decrease. The highest decreases are estimated for the smart computer and electronic products sector and for smart electrical equipment (-0.21%). As the numbers reflect changes for a 5-year time horizon, the annualised numbers are negligible. This is also true for smart boilers and for smart toys and video games.

Table 55: Changes in aggregate UK export volumes – policy option 1, in %

Sector	% change
Smart household articles (e.g. smart boiler)	-0.12
Smart computer, electronic and optical products	-0.21
Smart electrical equipment	-0.21
Smart toys, video game consoles	-0.12

UK aggregate import volumes in the sectors affected by the policy measures would also slightly decrease as importers would have to bear higher costs. The highest relative decrease is estimated for smart toys and video game consoles (-0.63%). As the numbers reflect changes for a 5-year time horizon, the annualised numbers are negligible. This is also true for other sectors affected by the proposed regulations.

Table 56: Changes in aggregate UK imports – policy option 1, in %

Sector	% change
Smart household articles (e.g. smart boiler)	-0.47
Smart computer, electronic and optical products	-0.39
Smart electrical equipment	-0.53
Smart toys, video game consoles	-0.63

Bilateral imports from the UK's key trading partners are estimated to only slightly decrease in all sectors affected by the regulations. Recognising that the changes would materialise over a period of 5 years, the annualised changes are negligible.

Table 57: Changes in UK bilateral imports from key trading partners – policy option 1, in %

	China	EU_27	USA	Japan	Hong Kong	Korea	Thailand	Rest of ASEAN	Rest of World
Smart household articles (e.g. smart boiler)	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19
Smart computer, electronic and optical products	-0.11	-0.11	-0.11	-0.12	-0.11	-0.11	-0.11	-0.11	-0.11
Smart electrical equipment	-0.26	-0.25	-0.26	-0.26	-0.25	-0.26	-0.26	-0.26	-0.26
Smart toys, video game consoles	-0.36	-0.35	-0.36	-0.36	-0.34	-0.35	-0.35	-0.35	-0.35

Policy option 2: Aspects of the top 3 security guidelines mandated, with recurring self-assessment, and costs of disposal of non-compliant goods

The estimates for policy option 2 account for both short- to medium-term and longer-term effects. The relatively significant one-off costs that are related to the disposal of non-compliant goods are reflected by the estimates for short- to medium-term effects. Since we assume that companies increasingly comply with the new regulations over time, and amend products respectively, the costs of disposal of non-compliant products have been excluded from estimates for longer-term effects, which only include recurrent costs.

Under policy option 2, UK industrial output would slightly increase across the board for the sectors affected by the policy measures, relative to the current (pre-regulation) situation. In the model, the increase in UK domestic output results from a temporary lack of competitiveness of companies that import to the UK. In practice, UK production would substitute for non-compliant products that were previously imported to the UK. The highest relative increase is recorded for smart electrical equipment (+1.52%), followed by smart computer and electronic products (+1.42%). It should be noted that the changes would likely materialise within the first two years of the 5-year period modelled under this policy option. However, even for a 2-year time horizon, the annual changes in production volumes would be relatively small. The effects would phase out over the longer term. Over the longer term, the impact of recurrent compliance cost would be marginal, leaving UK production largely unaffected.

Table 58: Changes in sectoral output in the UK – policy option 2, in %

Short- to medium-term (first 2 years)	
Sector	% change
Smart household articles (e.g. smart boiler)	0.85
Smart computer, electronic and optical products	1.42
Smart electrical equipment	1.52
Smart toys, video game consoles	1.06
Longer-term (2-5 years)	
Sector	% change
Smart household articles (e.g. smart boiler)	0.01
Smart computer, electronic and optical products	0.02
Smart electrical equipment	0.02
Smart toys, video game consoles	0.02

For the sectors affected by the policy measures, UK aggregate export volumes would slightly decrease for all product categories. In the short- to medium-term, the decrease in the UK's aggregate export volumes results from temporary lack of competitiveness of companies that import to the UK. UK production would satisfy domestic demand, which results in lower aggregate exports from the UK. It should be noted that these effects would likely materialise within the first two years of the 5-year projection period. However, even for a 2-year time horizon, the annual changes in aggregate export volumes would be relatively small. As with the impacts on domestic output, the effects would phase out over the longer-term, leaving UK exports largely unaffected.

Table 59: Changes in aggregate UK exports – policy option 2, in %

Short- to medium-term (first 2 years)	
Sector	% change
Smart household articles (e.g. smart boiler)	-0.59
Smart computer, electronic and optical products	-0.98
Smart electrical equipment	-0.99
Smart toys, video game consoles	-0.56
Longer-term (2-5 years)	
Sector	% change
Smart household articles (e.g. smart boiler)	-0.01
Smart computer, electronic and optical products	-0.01
Smart electrical equipment	-0.01
Smart toys, video game consoles	-0.01

For the sectors affected by the policy measures, UK aggregate import volumes would slightly decrease across the board of product groups. The impacts are generally less pronounced than decreases in UK exports. In the short- to medium-term, the decrease in the UK's aggregate import volumes results from a temporary lack of competitiveness of companies that import to the

UK, resulting in lower aggregate imports to the UK. It should be noted that these effects would likely materialise within the first two years of the 5-year projection period. However, even for a 2-year time horizon, the annual changes in aggregate import volumes would be relatively small. The effects would phase out over the longer-term. Over the longer term, the impact of recurrent compliance cost would be marginal, leaving import volumes to the UK largely unaffected.

Table 60: Changes in aggregate UK imports – policy option 2, in %

Short- to medium-term (first 2 years)

Sector	% change
Smart household articles (e.g. smart boiler)	-2.23
Smart computer, electronic and optical products	-1.86
Smart electrical equipment	-2.56
Smart toys, video game consoles	-3.01

Longer-term (2-5 years)

Sector	% change
Smart household articles (e.g. smart boiler)	-0.03
Smart computer, electronic and optical products	-0.03
Smart electrical equipment	-0.04
Smart toys, video game consoles	-0.04

Bilateral imports from the UK's key trading partners are estimated to only slightly decrease in all product groups affected by the proposed regulations. With respect to short- to medium-term impacts, the estimated effects would likely materialise within the first two years of the 5-year projection period. However, even for a 2-year projection horizon, the annual changes in bilateral import volumes would be relatively small. The regulations' effects, particularly the cost impact related to the disposal of non-compliant products, would phase out over time, leaving UK imports largely unaffected in the longer-term.

Table 61: Changes in UK bilateral imports to key trading partners – policy option 2, in %

Short- to medium-term (first 2 years)

	China	EU_27	USA	Japan	Hong Kong	Korea	Thailand	Rest of ASEAN	Rest of World
Smart household articles (e.g. smart boiler)	-0.92	-0.89	-0.92	-0.92	-0.89	-0.91	-0.91	-0.9	-0.9
Smart computer, electronic and optical products	-0.54	-0.5	-0.54	-0.55	-0.51	-0.54	-0.52	-0.52	-0.52
Smart electrical equipment	-1.24	-1.2	-1.24	-1.25	-1.19	-1.24	-1.23	-1.22	-1.22
Smart toys, video game consoles	-1.7	-1.66	-1.7	-1.71	-1.65	-1.69	-1.68	-1.68	-1.68

Longer-term (2-5 years)

	China	EU_27	USA	Japan	Hong Kong	Korea	Thailand	Rest of ASEAN	Rest of World
Smart household articles (e.g. smart boiler)	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Smart computer, electronic and optical products	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Smart electrical equipment	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Smart toys, video game consoles	-0.03	-0.02	-0.03	-0.03	-0.02	-0.03	-0.03	-0.03	-0.03

To sum up, for both policy options overall economic activity in the UK will remain largely unaffected by the proposed measures. UK trade volumes will only marginally decrease in response to the implementation of the policy measures. The highest relative impacts would likely result from costs related to the disposal of non-compliant products. These costs are, however, temporary. Foreign suppliers are expected to amend their products and make sure to comply with UK regulations. Given the relatively low additional cost that would result from the proposed measures, including one-off and recurring costs, UK production as well as UK trade would remain largely unaffected.

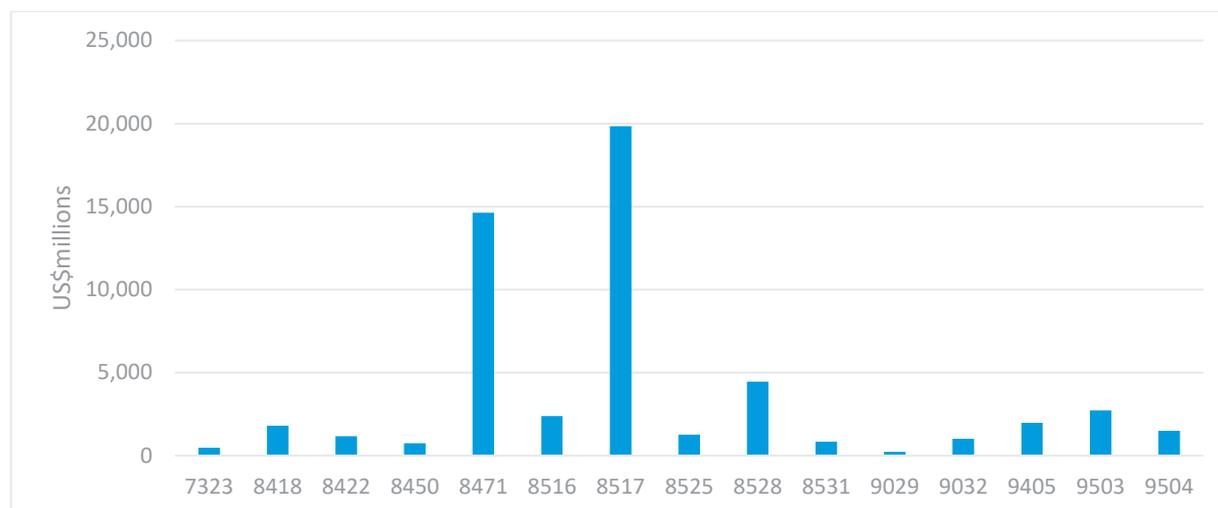
Even though the aggregate impacts are relatively low, often negligible, for the entire UK economy, the costs impacts will be different for different types of companies, depending on their business model, the share of imports, import partners and other characteristics.

Generally, SMEs would be more affected than large companies as they face higher compliance costs per unit of production/imports, which may decrease their domestic and international competitiveness.

Given that the magnitude of the estimated effects is relatively small, we expect the impact of the proposed regulations on product innovation, domestic and international demand and domestic and international supply to be relatively low. As concerns investment in the UK, we neither expect investment to decrease as a result of the regulations, nor do we expect a deterioration of the UK's investment climate because of the regulations.

Annex 1: Overview of 2019 UK import trade flows in consumer IoT product sectors

Figure 15: Overview of global UK imports in consumer IoT product sectors (million USD, 2019)¹³



Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 62: Key UK trading partners in sector HS 7323 according to % of global UK imports, 2019

7323 -- Table, kitchen, other household articles and parts, of iron or steel; iron or steel wool; pot scourers and scouring or polishing pads, gloves and the like, of iron or steel

China	67.8%
EU27	18.8%
India	6.2%
Turkey	1.3%
United States	1.1%
Hong Kong, China	0.7%
Vietnam	0.5%
Thailand	0.4%
Ukraine	0.3%
Singapore	0.2%

Source: UN Comtrade. Note that these product categories also include non-smart products.

¹³ Sectors are at HS4 level (HS2017).

Table 63: Key UK trading partners in sector HS 8418 according to % of global UK imports, 2019

8418 -- Refrigerators, freezers and other refrigerating or freezing equipment, electric or other; heat pumps other than air conditioning machines of heading no. 8415

EU27	49.7%
China	25.1%
Turkey	14.0%
United States	4.8%
Japan	1.5%
Korea, Rep.	1.4%
Thailand	0.8%
Malaysia	0.7%
Philippines	0.4%
Mexico	0.3%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 64: Key UK trading partners in sector HS 8422 according to % of global UK imports, 2019

8422 -- Dish washing machines; machinery for cleaning, drying, filling, closing, sealing, capsuling or labelling bottles, cans, boxes, bags, etc, machinery for aerating beverages

EU27	77.9%
Turkey	10.8%
United States	3.5%
China	2.8%
Switzerland	1.3%
Australia	0.8%
Japan	0.4%
San Marino	0.4%
Israel	0.3%
Thailand	0.2%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 65: Key UK trading partners in sector HS 8450 according to % of global UK imports, 2019

8450 -- Household or laundry-type washing machines; including machines which both wash and dry

EU27	51.4%
China	23.6%
Turkey	22.9%
United States	1.2%
Korea, Rep.	0.6%
Switzerland	0.2%
Singapore	0.1%
Thailand	0.1%
Vietnam	0.0%
Canada	0.0%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 66: Key UK trading partners in sector HS 8471 according to % of global UK imports, 2019

8471 -- Automatic data processing machines and units thereof, magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included

EU27	44.2%
China	42.8%
United States	5.0%
Vietnam	1.3%
Thailand	1.0%
Mexico	0.9%
Japan	0.6%
Hong Kong, China	0.4%
Canada	0.2%
Malaysia	0.2%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 67: Key UK trading partners in sector HS 8516 according to % of global UK imports, 2019

8516 -- Electric water, space, soil heaters; electro-thermic hair-dressing apparatus; hand dryers, irons; electro-thermic appliances for domestic purposes; electro heating resistors, not of heading no. 8545

China	45.8%
EU27	37.2%
Turkey	6.7%
Malaysia	2.9%
United States	1.4%
Korea, Rep.	0.8%
Philippines	0.8%
Thailand	0.8%
Australia	0.7%
Hong Kong, China	0.7%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 68: Key UK trading partners in sector HS 8517 according to % of global UK imports, 2019

8517 -- Telephone sets, including telephones for cellular networks or for other wireless networks; other apparatus for the transmission or reception of voice, images or other data (including wired/wireless networks), excluding items of 8443, 8525, 8527, or 8528

China	46.8%
EU27	30.6%
Vietnam	10.8%
United States	2.8%
Mexico	1.3%
Korea, Rep.	0.6%
Malaysia	0.6%
Hong Kong, China	0.5%
Thailand	0.5%
Japan	0.3%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 69: Key UK trading partners in sector HS 8525 according to % of global UK imports, 2019

8525 -- Transmission apparatus for radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing apparatus; television cameras, digital cameras and video camera recorders

EU27	47.7%
China	28.4%
United States	8.2%
Japan	3.0%
Canada	3.0%
Singapore	2.2%
Hong Kong, China	1.7%
Korea, Rep.	1.3%
Norway	0.7%
Thailand	0.3%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 70: Key UK trading partners in sector HS 8528 according to % of global UK imports, 2019

8528 -- Monitors and projectors, not incorporating television reception apparatus; reception apparatus for television, whether or not incorporating radio-broadcast receivers or sound or video recording or reproducing apparatus

EU27	54.3%
China	22.1%
Turkey	10.2%
United States	7.0%
Japan	3.3%
Korea, Rep.	1.1%
Hong Kong, China	0.4%
Philippines	0.3%
Singapore	0.1%
Malaysia	0.1%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 71: Key UK trading partners in sector HS 8531 according to % of global UK imports, 2019

8531 -- Signalling apparatus; electric sound or visual (e.g. bells, sirens, indicator panels, burglar or fire alarms), excluding those of heading no. 8512 or 8530

EU27	52.0%
China	20.1%
United States	14.5%
Malaysia	3.6%
Hong Kong, China	2.8%
Japan	0.6%
Canada	0.6%
Australia	0.5%
Korea, Rep.	0.5%
Thailand	0.3%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 72: Key UK trading partners in sector HS 9029 according to % of global UK imports, 2019

9029 -- Revolution counter, production counters, taximeters, mileometers, pedometers and the like, speed indicators and tachometers, other than those of heading no. 9015, stroboscopes

EU27	56.0%
China	11.8%
Japan	10.9%
United States	4.7%
India	3.0%
Thailand	1.8%
Vietnam	1.5%
Mexico	1.0%
Switzerland	0.9%
South Africa	0.9%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 73: Key UK trading partners in sector HS 9032 according to % of global UK imports, 2019

9032 -- Regulating or controlling instruments and apparatus; automatic type

EU27	47.3%
United States	23.6%
China	9.1%
Japan	5.4%
Hong Kong, China	4.8%
Canada	1.9%
Turkey	1.3%
Mexico	1.2%
India	1.1%
Singapore	1.0%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 74: Key UK trading partners in sector HS 9405 according to % of global UK imports, 2019

9405 -- Lamps, light fittings; including searchlights, spotlights and parts thereof, n.e.c.; illuminated signs, name-plates and the like, having permanently fixed light source and parts thereof n.e.c. or included

China	58.1%
EU27	32.4%
United States	2.7%
India	1.1%
Hong Kong, China	0.9%
Malaysia	0.4%
Mexico	0.4%
Canada	0.3%
Vietnam	0.2%
Turkey	0.2%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 75: Key UK trading partners in sector HS 9503 according to % of global UK imports, 2019

9503 -- Tricycles, scooters, pedal cars and similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size (scale) models and similar recreational models, working or not; puzzles of all kinds

China	63.3%
EU27	24.4%
Hong Kong, China	3.0%
Vietnam	2.6%
United States	1.9%
Indonesia	1.4%
India	0.5%
Thailand	0.3%
Malaysia	0.3%
Mexico	0.3%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 76: Key UK trading partners in sector HS 9504 according to % of global UK imports, 2019

9504 -- Video game consoles and machines, articles for funfair, table or parlour games, including pintables, billiards, special tables for casino games and automatic bowling alley equipment

China	57.8%
EU27	29.9%
United States	6.2%
Japan	2.2%
Hong Kong, China	0.9%
Kenya	0.6%
Korea, Rep.	0.4%
Canada	0.2%
Australia	0.2%
Indonesia	0.2%

Source: UN Comtrade. Note that these product categories also include non-smart products.

Table 77: UK imports from World (USD), by HS4 category, 2019

HS code	UK imports from World (USD)
7323	466,617,403
8471	14,631,550,959
8517	19,838,847,055
8525	1,266,706,496
8528	4,447,258,171
8418	1,799,557,304
8422	1,171,404,695
8450	740,778,759
8516	2,373,597,618
8531	831,518,074
9029	221,221,594
9032	1,010,162,900
9405	1,981,861,985
9503	2,727,784,123
9504	1,488,538,758

Source: UN Comtrade. Note that these product categories also include non-smart products.

CONTACTS

Jenny Irwin

Partner

Number One,
Lanyon Quay,
Belfast,
Northern Ireland,
BT1 3LG

T 02890 234343

jenny.irwin@rsmuk.co

Matt Rooke

Associate Director

2nd Floor, North Wing East,
City House,
Hills Road,
Cambridge,
CB2 1AB

T 01223 455715

matt.rooke@rsmuk.com

rsmuk.com

The UK group of companies and LLPs trading as RSM is a member of the RSM network. RSM is the trading name used by the members of the RSM network. Each member of the RSM network is an independent accounting and consulting firm each of which practises in its own right. The RSM network is not itself a separate legal entity of any description in any jurisdiction. The RSM network is administered by RSM International Limited, a company registered in England and Wales (company number 4040598) whose registered office is at 50 Cannon Street, London EC4N 6JJ. The brand and trademark RSM and other intellectual property rights used by members of the network are owned by RSM International Association, an association governed by article 60 et seq of the Civil Code of Switzerland whose seat is in Zug.

The matters raised in this report are only those which came to our attention during the course of our review and are not necessarily a comprehensive statement of all the weaknesses that exist or all improvements that might be made.

Recommendations for improvements should be assessed by you for their full impact before they are implemented. This report, or our work, should not be taken as a substitute for management's responsibilities for the application of sound commercial practices. We emphasise that the responsibility for a sound system of internal controls rests with management and our work should not be relied upon to identify all strengths and weaknesses that may exist. Neither should our work be relied upon to identify all circumstances of fraud and irregularity should there be any.

This report is supplied on the understanding that it is solely for the use of the persons to whom it is addressed and for the purposes set out herein. Our work has been undertaken solely to prepare this report and state those matters that we have agreed to state to them. This report should not therefore be regarded as suitable to be used or relied on by any other party wishing to acquire any rights from RSM UK Consulting LLP for any purpose or in any context. Any party other than the Board which obtains access to this report or a copy and chooses to rely on this report (or any part of it) will do so at its own risk. To the fullest extent permitted by law, RSM UK Consulting LLP will accept no responsibility or liability in respect of this report to any other party and shall not be liable for any loss, damage or expense of whatsoever nature which is caused by any person's reliance on representations in this report.

This report is released to our Client on the basis that it shall not be copied, referred to or disclosed, in whole or in part (save as otherwise permitted by agreed written terms), without our prior written consent.

We have no responsibility to update this report for events and circumstances occurring after the date of this report. RSM UK Consulting LLP is a limited liability partnership registered in England and Wales no.OC397475 at 6th floor, 25 Farringdon Street, London EC4A 4AB