

## A.2 Survey Instrument

**Survey description as advertised on Prolific:** In this survey, we would like to learn about how you use smart devices and your general thoughts about such products. It will take approximately 18 minutes to complete. We will ask you some questions about any smart devices you are currently using and show you several descriptions of different smart devices to learn about your thoughts about them. These questions will not test your performance in any way, as we are only interested in your perspective. The survey will also ask for basic demographic information like age, gender, occupation, and country of residence.

**Q1: Introduction** In this survey, we want to learn your opinions on smart devices. There will be no right or wrong answers - we are only interested in your experiences and your opinion of these products. But what exactly are smart devices? A growing number of physical things around us are being equipped with electronic capabilities and connected to the internet and apps. Examples of such devices are smart speakers with voice assistants, smart security cameras, smart thermostats, or smartwatches. These devices have several features in common: They have sensors that collect information around them, like microphones, video cameras, a thermometer, or GPS. They can be connected to the internet, for example, via WiFi or cellular networks. Thus, they can communicate with other devices, mobile apps, or services. They provide features that would not be possible if they were not connected.

**Q2: Device usage** Which of the following types of smart devices do you own and use? Please select from the list below.

*Smartphone, Smartwatch and/ or fitness tracker, Smart TV, Smart speaker with voice assistant (e.g., Amazon Echo or Google Nest), Media streaming device (e.g., Chromecast or music streamer), Smart lighting (smart light bulbs, light switches), Smart hub, Robot vacuum cleaner, Smart washing machine, Smart fridge, Smart baby monitor, Internet connected security camera (indoor and / or outdoor), Smart video doorbell, Smart door-lock, Smart sensor (e.g., smoke detector, motion detector, air quality sensor), Smart thermostat, Wi-Fi solar inverter, Printer with internet / WiFi connection, Internet router, Other(s); None of the above*

**Q2.1: Device model/brand** We selected some of the smart device types you previously indicated to own. For each of them, please indicate the specific device's brand and/or model you are currently using. If you are using multiple devices of the same type (e.g., several different cameras), please pick one and focus your answers on that device.

*Brand and/or model name, I don't know* (For a list of three randomly chosen devices from Q2)

**Q2.2: Start usage** When answering the following questions, please focus on these specific smart device models you just described (e.g., the exact smartphone you are currently using), rather than the general device type (e.g., smartphones in general).

For the particular device you are currently using, when did you start using it, as far as you can recall? Please select the year.  
*2024, 2023, 2022, 2021, 2020, 2019, 2018, 2017, 2016, 2015, 2014 or earlier, I don't know* (For the list of the previous devices)

**Q2.3: Condition** For the particular device you are currently using, was it new or previously owned (second-hand) when you started using it? *New, Previously owned, I don't know* (For the list of the previous devices)

**Q2.4: Purchase channel** Where was the device you are currently

using purchased from?

*Online store, Physical store, I don't know, It wasn't purchased* (For the list of the previous devices)

**Q2.5: Shop** What is the name of the store where the device was purchased?

*Shop name, I don't know* (For the list of the previous devices)

**Q2.6: Future use** Looking ahead, for approximately how many more years do you plan to keep using the particular device you are currently using?

*Less than a year, 1 year, 2 years, 3 years, 4 years, 5 years, 6 - 10 years, More than 10 years, I don't know* (For the list of the previous devices)

**Q2.7: Motivation for planned end of use** You indicated that you are planning to not use some of the devices for much longer. Why do you plan to stop using them soon? Please select the choices that best describe your reasons.

*Experiencing issues and flaws with it, Desire for a newer device, Dissatisfied with brand or manufacturer, Concerns about my data, Concerns about cybersecurity, Software update support ended, Incompatible with other devices and/or services, I don't know, Other reasons* (For the previous devices planned to be used for less than a year)

**Q2.8. Update status** Does the particular device you are currently using still receive software updates, as far as you know? (This refers to updates to the device itself, not any companion app or third-party apps running on the device.)

*Yes, it still receives software updates, No, it no longer receives software updates, I don't know if it still receives software updates* (For the list of the previous devices)

**Q3: Attention check** Please select 'Agree' for both Smart Washing Machine and Smartwatch. This is an attention check.

**Q4: Recently stopped devices** Now we would like to learn about any smart devices that you have recently stopped using, for instance to replace them.

**Q4.1: Devices** Have you recently stopped using any smart devices? Please select the type of the smart device you stopped using. If you haven't, just select "None of the above".

*Smartphone, Smartwatch and/ or fitness tracker, Smart TV, Smart speaker with voice assistant (e.g., Amazon Echo or Google Nest), Media streaming device (e.g., Chromecast or music streamer), Smart lighting (smart light bulbs, light switches), Smart hub, Robot vacuum cleaner, Smart washing machine, Smart fridge, Smart baby monitor, Internet connected security camera (indoor and / or outdoor), Smart video doorbell, Smart door-lock, Smart sensor (e.g., smoke detector, motion detector, air quality sensor), Smart thermostat, Wi-Fi solar inverter, Printer with internet / WiFi connection, Internet router, Other(s); None of the above*

**Q4.2: Past use duration** For approximately how many years did you use the device in total? If you stopped using more than one device of the same type (e.g., several different cameras), please pick one and focus your answers on that device.

*Less than a year, 1 year, 2 years, 3 years, 4 years, 5 years, 6 - 10 years, More than 10 years, I don't know* (For the list of three randomly chosen devices from Q4.1)

**Q4.3: Action with old device** What did you do with the device once you stopped using it? Please select the option that best describes your action.

*Sold it, Returned it, Discarded it, Traded it in, Gifted it, Still have it but not in use, I don't know, Something else* (For the list of the

previous devices)

**Q4.4: Motivation** Why did you stop using the device? Please select the choice(s) that best describe your reasons. Multiple answers are possible.

*It stopped working, Experiencing issues and flaws with it, Desire for a newer device, Dissatisfied with brand or manufacturer, Concerns about my data, Concerns about cybersecurity, Software update support ended, Incompatible with other devices and/or services, I don't know, Other reasons* (For the list of the previous devices)

**Q5: Device vignettes** In the following, you will read short descriptions of three different conventional and smart devices. For each one, we will ask you how long you expect such a device to last. When answering, please imagine you are buying such a device today. Realistically, for how many years would you expect it to last under normal intensity of use until it cannot be used for its intended purpose anymore?

**Q5.1: Vignette conventional device**

A washing machine. It has different washing programs for different textiles that the user can select on the machine's buttons

**Q5.1.1: Expected lifetime** If you had to predict, for how many years do you expect such a device to last? Please write your answer as a number in the field below.

*(Open text field for integer text input)*

**Q5.1.2: Factors considered** What aspects did you take into account when estimating the number of years? *(Open text field)*

**The other devices vignettes:**

A home printer. It can print documents in different formats and colors and can be connected to a computer with a cable to receive print jobs.

A vacuum cleaner. It can be used to clean the home's floor and has different suction strengths for different surfaces, which can be selected on the machine's buttons.

A thermostat. It is installed in the home's heating system and can be used to adjust the home's temperature on the thermostat's controls to set the desired temperature.

A smoke detector. It can continuously monitor the home's air for smoke and potential fire hazards and alert occupants with an audible alarm.

A solar inverter. It is connected to a home's solar panels and converts the energy from the solar panels into electricity for the home.

A smart washing machine. It has different washing programs for different textiles that the user can select on the machine's buttons. It can be connected to the internet via the home Wi-Fi, so the user can check the status of their laundry and control the machine remotely through a companion app on their mobile phone

An internet-connected home printer. It can print documents in different formats and colors and can be connected to a computer with a cable or wirelessly to receive print jobs. It can be connected to the internet via the home Wi-Fi, so the user can send documents to print and check the printer's status remotely.

A robot vacuum cleaner. It can map and clean the home's floor on its own. It is connected to the internet via the home Wi-Fi, so the user can monitor its cleaning progress, set schedules, and control it remotely through a companion app on their mobile phone.

A smart thermostat. It is installed in the home's heating system and can be used to adjust the home's temperature on the thermostat's controls to set the desired temperature. It can be connected to the internet via the home Wi-Fi, so the user can check and control the

temperature settings remotely through a companion app on their mobile phone.

A smart smoke detector. It can continuously monitor the home's air for smoke and potential fire hazards and alert occupants with an audible alarm. It can be connected to the internet via the home Wi-Fi, so the user can receive alerts and check its status remotely through a companion app on their mobile phone.

A Wi-Fi solar inverter. It is connected to a home's solar panels and converts the energy from the solar panels into electricity for the home. It can be connected to the internet via the home Wi-Fi, so the user can track energy production and monitor system performance remotely through a companion app on their mobile phone.

A home router. It keeps up and manages the home Wi-Fi and connects the devices in the home to the internet via a broadband connection. The user can manage connected devices, monitor the activity in the Wi-Fi network, and adjust settings through a web portal.

A smart security camera. It can continuously collect video recordings of the home or its surroundings. It is connected to the internet via the home Wi-Fi, so the user can check the video feed remotely through a companion app on their mobile phone.

A smart door lock. It is installed at the home's entrance door to lock and unlock it. It can be connected to the internet via the home Wi-Fi, so the user can remotely lock or unlock the door, monitor entry logs, or grant or revoke access to guests through a companion app on their mobile phone.

A smartwatch. It can continually track various health metrics of the user, be used for navigation, receiving messages, and can have various apps installed on it. It can be connected to the internet via a cellular network, so the user can use such features directly on the watch or through a companion app on their mobile phone.

A smart speaker. It can continually listen for voice commands to perform features like streaming music, setting reminders, getting weather updates, or controlling other connected devices in the home. It is connected to the internet via the home Wi-Fi, so the user can use these features via the smart speaker or manage the speaker via a companion app on their mobile phone.

**Q6: Attention check** We would like to learn what your favorite device is. Please select Voice assistant from the list below. This is an attention check.

Based on the text you read above, what device have you been asked to enter? *Smartphone, Washing machine –Laptop, Voice assistant, Smart Watch*

**Q7: End of update support expectations** Many smart devices receive software updates for a limited time after purchase. Once a device no longer receives software updates, how do you expect this will impact its use? Please select all that apply.

*Device's performance declines, Some critical features stop working, affecting important functionality, Some non-essential features stop working, affecting 'nice-to-have' aspects, New features are no longer added, Less compatibility with other devices or services, Customer support services are no longer available, Cybersecurity weaknesses in the device are no longer fixed, Potential cybersecurity risks to the device are no longer tracked (new threats may go unnoticed), Other, namely:, I don't expect any changes, I'm not sure*

**Q7.1: Own experience** Have you experienced any of these changes with your own smart devices after software update support ended?

*Yes, No, I don't know* (For the selected answers in Q7)

**Q8: Update support duration** Coming back to the two smart devices you have previously been presented with. For how many years do you expect such a smart device to receive software updates after purchase, if at all? Please write your answer as a number in the left-most column, or select one of the other options.

*Number of years: ( ), I don't know, I don't expect it to receive updates (For the two smart devices seen in the vignettes.)*

**Q8.1: End of update support expectations** You indicated that software updates for the smart device(s) will likely stop before the device's actual end of life. In what ways, if any, do you expect the device to work differently after software updates stop and it is still used?

*(Open text field) (Only shown if response to Q5.1.1 (expected lifetime) was lower than Q8 (expected update support))*

**Q9: Security considerations** Since smart devices can be connected to the internet, they can be exposed to cybersecurity risks. Cybersecurity for smart devices focuses on protecting the devices, users, and their data from potential attacks through online connectivity.

**Q9.1: Concerns** Do you have any cybersecurity concerns regarding the use of your own smart devices? Please select all that apply, if any.

*My personal data being accessed by unauthorized individuals., My devices being hacked and used maliciously without my knowledge., My devices being damaged or made unusable by a cyberattack., Insufficient customer support in case of cybersecurity issues., My personal data being shared with third parties by the manufacturer without my consent., More personal data collected from the device than I expect., Other:, I'm not concerned., I'm not sure.*

**Q9.2: Mitigation actions** Do you take any actions to address your cybersecurity concerns with your smart devices? Please select all that apply, if any.

*Ensure the latest software updates are installed., Replace devices once software update support has ended., Disconnect devices from the network when not in use., Change device settings, such as passwords., Check online for news or warnings about my device., Be cautious about how I use and behave around my device., Choose*

*brands that I trust when buying devices., Others:, None of the above.*

**Q9.3: Prolonged use** Please rate your agreement with the following statement: I would use my smart devices for longer if they continued to receive software updates that fix cybersecurity weaknesses.

*Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree*

**Q10: Demographics** Please answer some final questions about yourself to complete the survey.

**Q10.1: Age** How old are you?

*Under 18, 18-24 years old, 25-34 years old, 35-44 years old, 45-54 years old, 55-64 years old, 65+ years old, Prefer not to say*

**Q10.2: Gender** Which gender do you identify with?

*Male, Female, Non-binary / third gender, Prefer not to say*

**Q10.3: Country** In which country do you currently reside?

*(List)*

**Q10.4: Employment** Which option best describes your current status?

*Employed / self-employed, Unemployed, Student, Retired, Other*

**Q10.5: Employment field** Which option best describes the field you are currently working in?

*Business or sales, Administrative support, Research, Hospitality service – Education, Computer engineer or IT, Engineer in other fields, Medical, Legal, Homemaker, Skilled labor, Art or writing, Government, Other, Prefer not to say*

**Q11: Debriefing** Thank you for your responses! This study was about your expectations of smart device's lifetime and the role that security and privacy play. We did not disclose this explicitly at the beginning of the survey to not influence your responses in any way. Security and privacy is a sensitive topic which becomes increasingly important as the number of different smart devices in our environment grows rapidly. At the same time, regulations increasingly demand a longer time for these devices to receive software updates to protect them from attacks. In this survey, we wanted to measure your expectations about how long such devices will last, as this could affect how long manufacturers will provide such security updates. By reading and responding to the different descriptions of smart devices, you helped us a lot to research this topic.