More than Smart Speakers: Security and Privacy Perceptions of Smart Home Personal Assistants

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SOUPS 2019 [Santa Clara, CA] 12-13 August 2019

Adoption of Smart Home Personal Assistants - SPAs

- Its estimated that 10% of global consumers own a smart home personal assistant
- Amazon Echo and Google Home are the most used SPAs.
  - 2018 (Q1): 3.2M Google Home and 2.5M Amazon Echo
- In the future, its estimated more users will adopt into using smart home personal assistants such as the ones we study.

“41% of voice assistant users have concerns about trust and privacy” Forbes


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Technology

This article is more than **2 months old**

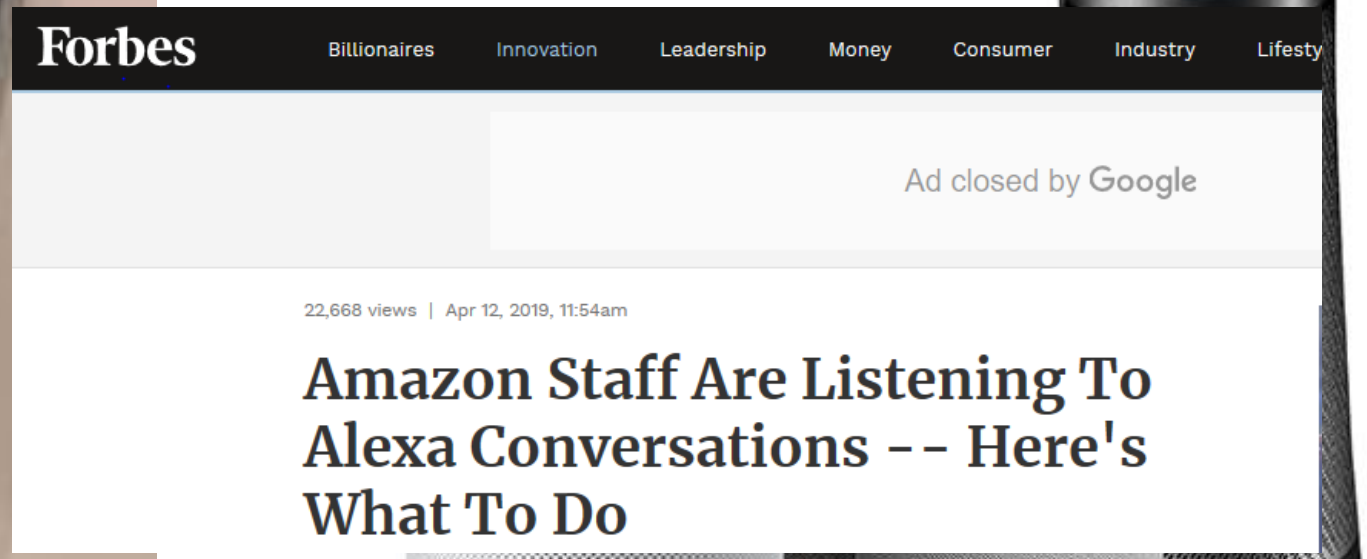
Smart devices may have to carry labels showing how secure they are

Ministers consider proposals aiming to help consumers identify which products are more and which are less secure

Kevin Rawlinson

Wed 1 May 2019 00.01 BST

“More homes are becoming smart… increasing security and privacy risks”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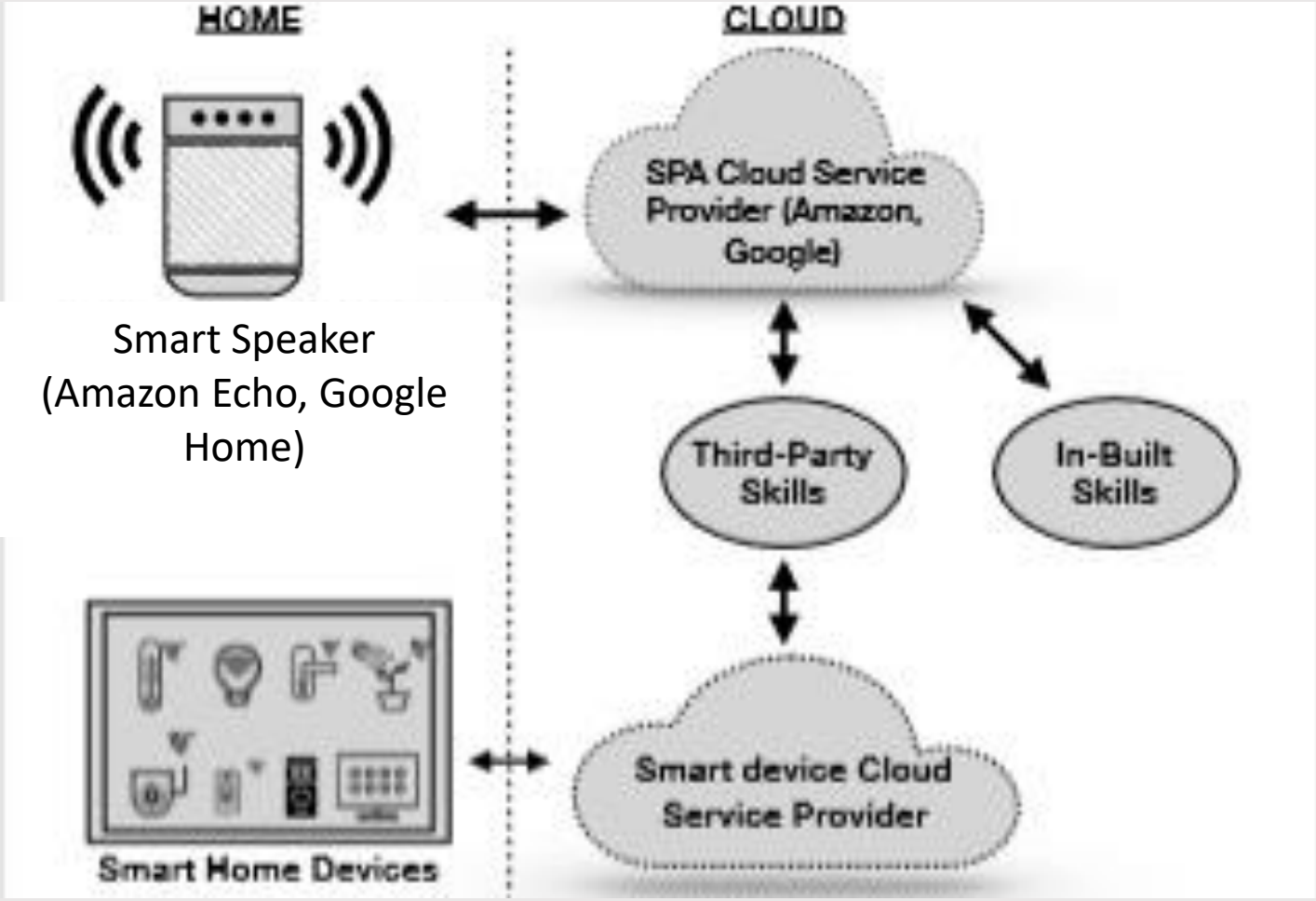
Amazon Staff Are Listening To Alexa Conversations -- Here's What To Do

Not just SMART SPEAKERS…

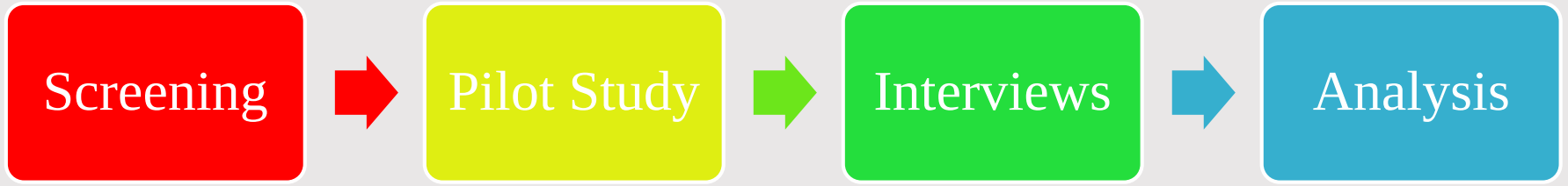
Smart Home Personal Assistant (SPA) Eco-system



Contributions

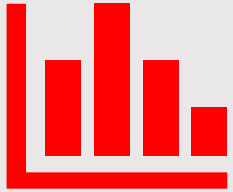
- *We investigate users understanding of the SPA eco-system (Data processing, sharing, storing and learning)*
- *Users particular lack of trust for one feature: shopping*
- *Identify SPA threats*
- *Discuss the coping strategies users implement to deal with threats*
- *We present design implications for better security and privacy mechanisms for SPAs*

Methodology



- We conducted semi-structured interviews with *current SPA users* until saturation was reached.
- Recruitment through Prolific and internally at KCL
- We conducted 5 pre-interviews to refine the script (not used during the analysis)
- We further interviewed 17 Amazon Echo and Google Home users

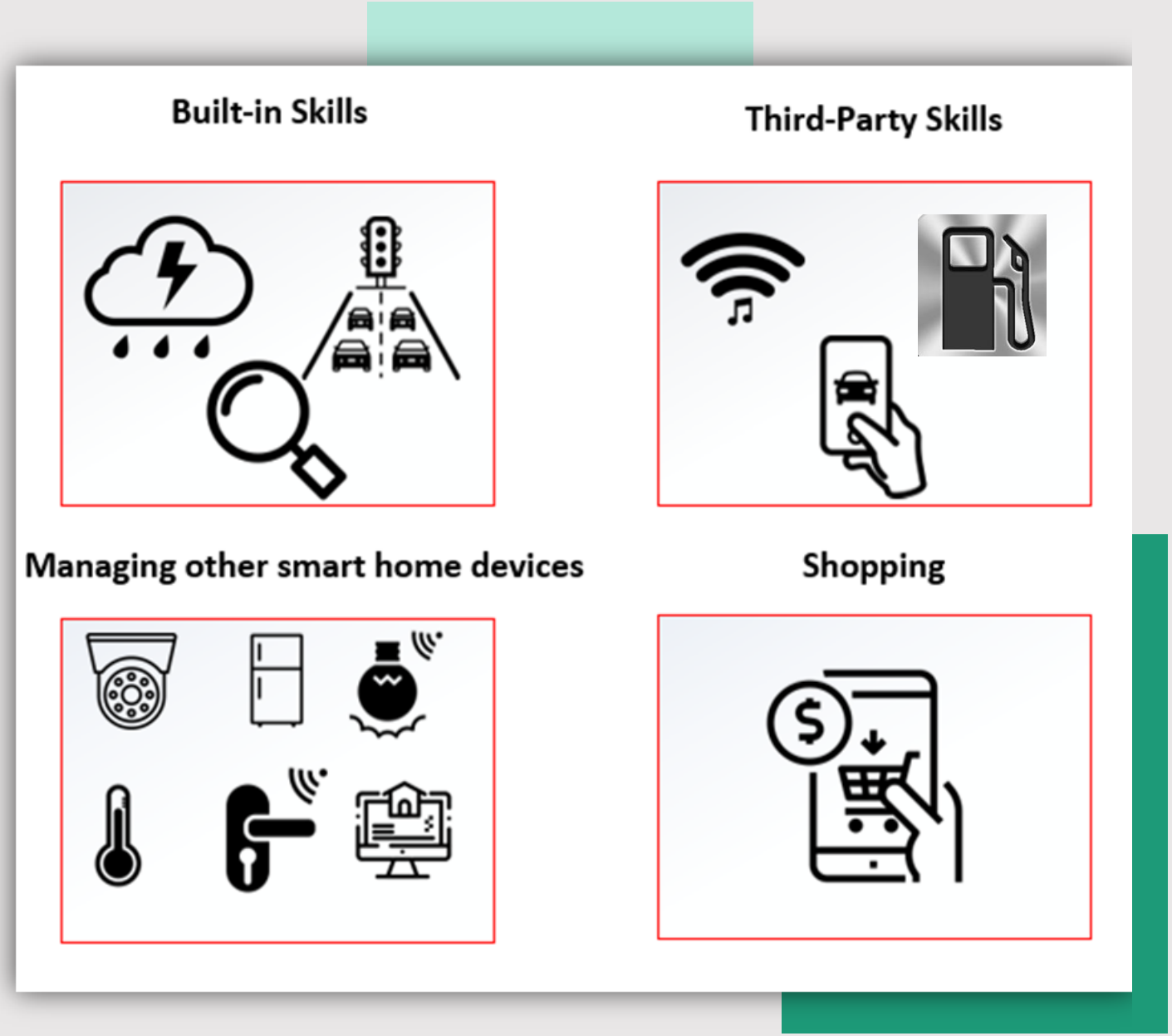
Data Analysis



We analysed data following grounded theory method.

2 researchers- iterative coding [initial coding, Axial coding, selective coding]

Identifying patterns and relationships between the codes.



Usage Scenarios

Findings

- Users setup experience
- What are users perceptions regarding SPA eco-system
- Users reasons for not trusting shopping
- SPA threats and coping strategies

SPA setup

USERS USED AN EXISTING PERSONAL ACCOUNT TO SETUP THEIR SPA.

SPA HAS ACCESS TO THEIR PERSONAL INFORMATION SUCH AS CALENDAR, ADDRESS, BANK DETAILS ETC.

ONLY 2 OUT OF 10 AMAZON USERS REPORTED COMPLETING VOICE RECOGNITION SETUP WHILE ALL GOOGLE HOME USERS HAVE COMPLETED THIS..

Perceptions of SPA eco-system

Overall SPA users have incomplete mental models of their SPA eco-system.

Data limited to the SPA provider only [data processing, data storing and data sharing].

They perceive that their SPA does everything without considering the full eco-system.

SPA is capable to learn personal information about users such as their usage patterns, routines.

Perceptions of SPA eco-system: Processing

Data processed locally in the device

1. Built-in Skills: Locally in the smart speaker
2. Third-party skills: No mention to Skill developers/providers
3. Smart devices: SPA talks directly to smart devices
4. Shopping: participants thought of it as normal online purchases

Perceptions of SPA eco-system: Storage

- Data stored includes, voice recordings, requests and history logs and shopping.

1. Built-in Skills: Mixed response (stored locally or cloud)
2. Third-party skills: No mention to Skill developers/providers
3. Smart devices: No mention to smart home providers
4. Shopping: Only mention shopping history stored but do not mention where

Perceptions of SPA eco-system: Sharing

Participants mental models about data sharing with other third-parties are influenced by stories of data misuse in other domains.

> *Data Sharing….. P3 "so data brokers they would try and influence users purchasing decisions"*

No participant using third-party skills (uber) or smart devices (Philipps bulbs) mentioned data being accessible by them (Uber of Phillips), let alone with whom they might share the data they gather.

Perceptions of SPA eco-system: Learning

- Users describe SPAs as a “small brain” and having a memory with AI
- Capable of learning things about the user i.e. shopping habits, routines, favourite music etc.
- SPA use what they learn about the user: serve them well, recommend things, tailor adds.
- Overall users have a mixed attitude towards learning.
  - Positive as it could simplify their life e.g. morning routines , favourite music, news updates
  - Negative e.g. being scary and sinister, not pleasant for sensitive things like health symptoms.

Shopping concerns

Lack of product visibility i.e. buying wrong products

Insecure connection – including Payment

People hearing orders and/or code

Number and Trustworthiness of vendors

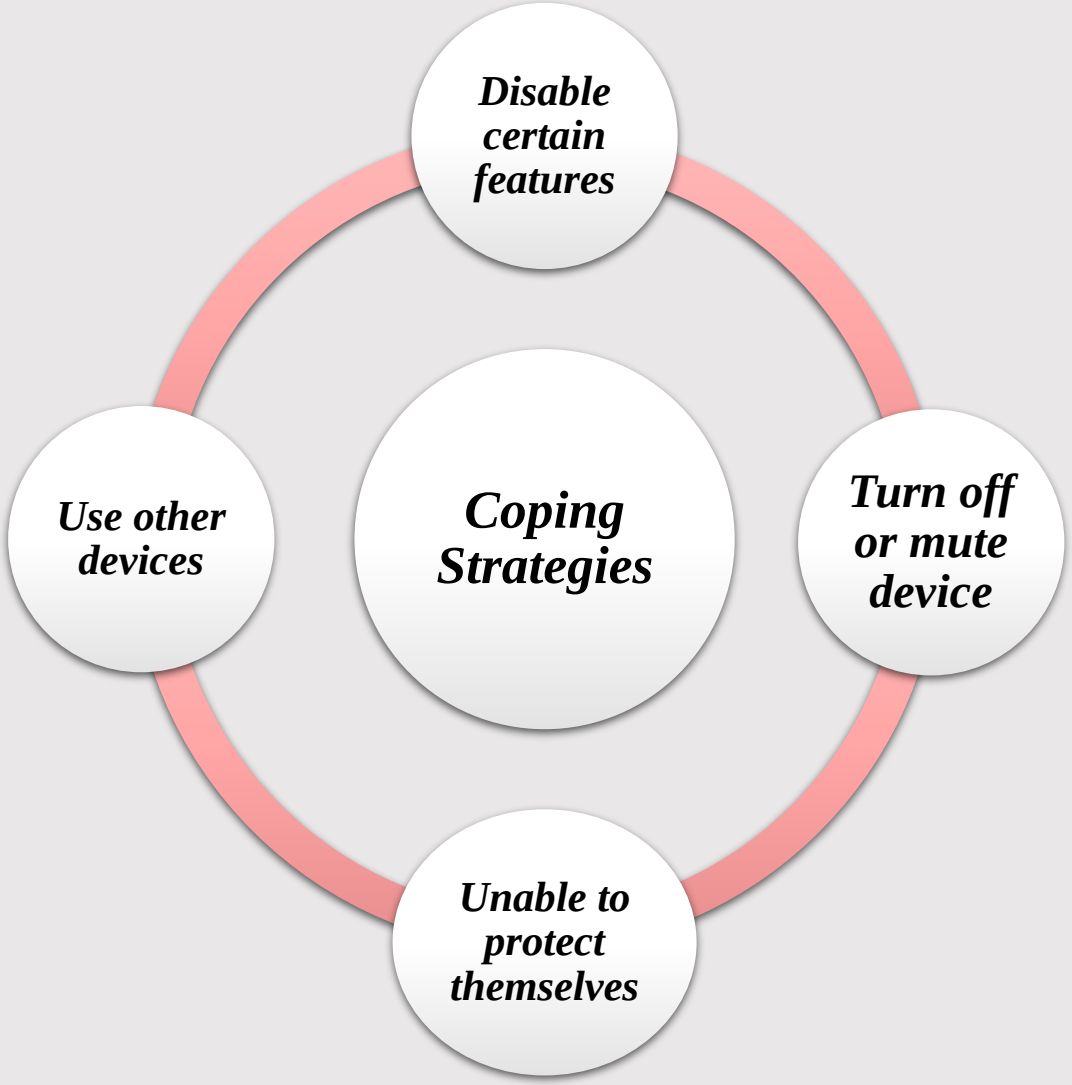
Threats Model

Users concerns in using their devices:

- ***Threat Agents:*** *Hackers, government and data brokers.*

- ***Threat Types:*** *Unwanted listening, network attacks such as hijacking.*

Coping Strategies



Implications/ Future Work

- *Better awareness and transparency mechanisms for SPAs*
- *Usable Control Mechanisms for SPA:*
  - *Personalized intelligent mechanisms*
  - *Voice recognition*

Shopping

To increase users trust in shopping:

- *Provide more information about the products and vendors*
  - *Verbal information and exploring other modalities*

- *Voice recognition as initial setup for Amazon Echo to avoid repeating voice code when purchasing*

Thank you

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