

# 2019 TECHNOLOGY SURVEY & PREDICTIONS

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Yes to More Tech, Yes to AI,  
Yes to Body Odor Detection

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**arm**

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More than half of consumers expect to spend, spend, spend on tech products this holiday season, and they'd be willing to spend even more on devices that are secure.

# INTRODUCTION

Technophobia looks to have taken a backseat to technophilia in 2018 with an average of seven people in ten across the U.S., Europe and Asia telling us technology had become a bigger part of their lives. This may signal a holiday season bonanza for tech, with more than half of consumers we questioned expecting to spend 'a lot more' or 'a bit more' on smart gifts compared to a year ago. The main reason cited was that rapid advances in technologies such as artificial intelligence (AI) meant 'products are better this year'.

These are just a few headline findings from an Arm-sponsored global survey looking at the kind of technology products people are planning to buy—and hoping to receive—over the 2018 holidays, and their tech buying expectations for 2019.

The findings, drawn from a survey of 2,000 people by research firm Northstar, paint a growth picture for the tech sector as people look to buy many more devices for entertainment, work and staying fit. They also expect more smarts in city infrastructure, the medical sector and cars. But despite this trend toward growth, there remains a clear concern over security and privacy, with 73 percent of people saying they'd be willing to pay a premium for smart tech devices that are fully secure. So, while we may now be a technophilic society – we are rightfully cautious believers.

Despite us looking metaphorically over-our-shoulders for cybercriminals, there is a strong desire to keep pushing the boundaries on technology choices. That was evidenced by more than half of the people we surveyed saying they expected to buy at least one AI-powered device in 2019.

## Crystal Ball Gazing:

Alongside the findings of the Northstar study, Arm also asked its own technology experts and futurists what they think will happen to technology over the next year and beyond. Their predictions cut across mobile computing, artificial intelligence and machine learning, 5G, and even how people might turn to technology to detect body odor!

Intrigued? Read on for our predictions and to see the full survey results.

# CONTENTS

01/02	INTRODUCTION
03/04	A MAJOR UPTICK IN TECHNOLOGY CONFIDENCE
05/06	SO, WHAT WAS IN YOUR TECH DRAWER IN 2018?
07/08	WHAT WERE PEOPLE USING TECHNOLOGY FOR IN 2018?
09/10	'TIS THE SEASON TO BE JOLLY... I WOULD LOVE A SMART THERMOSTAT AS A GIFT ... HONESTLY, I WOULD!
11/12	POCKET BOOKS ARE OPENING WIDE FOR HOLIDAY SEASON
13/14	WHAT DOES 2019 TECH SPENDING LOOK LIKE?
15/16	I FEEL THE NEED FOR DATA SPEED!
17/20	THE NOT-SO SWEET SMELL OF SUCCESS FOR AI ...
21/26	HOW TECHNOLOGY WILL CHANGE WHERE WE LIVE, WORK AND SHOP
27/30	2019: SECURITY, SECURITY, SECURITY...AND PRIVACY

# A MAJOR UPTICK IN TECHNOLOGY CONFIDENCE

The last 12 months have seen a general increase in technology adoption with a global average of 66 percent of respondents claiming technology had become ‘more a part of my life’ in 2018, and just 3 percent saying it was ‘less important’ than a year ago.

The breakdown in western countries was reasonably consistent with a range of 50-65 percent of survey respondents citing a tech engagement increase. The most ardent believers were in the U.S. and the least were in France.

Turning East to Asia we found a huge uptick in sentiment in China with 96 percent of people claiming technology was now more interwoven in their lives. That compared to Japan which showed the equal lowest rise in the number of people saying technology was now more a part of their life (52 percent). This is most likely because Japan is seeing more incremental gains compared to China because of how much technology is already deployed.

# TECHNOLOGICAL INVOLVEMENT



66%  
In 2018, technology has become more  
a part of my life

31%  
No change from  
previous years

3%  
In 2018, technology has become less a  
part of my life

EUROPE

58%

NORTH AMERICA

65%

ASIA

75%

% MORE A PART OF MY LIFE					
UK	GERMANY	FRANCE	NORTH AMERICA		JAPAN
60%	61%	52%	65%		52%
TOTAL	58%		TOTAL	65%	TOTAL 75%

# SO, WHAT WAS IN YOUR TECH DRAWER IN 2018?

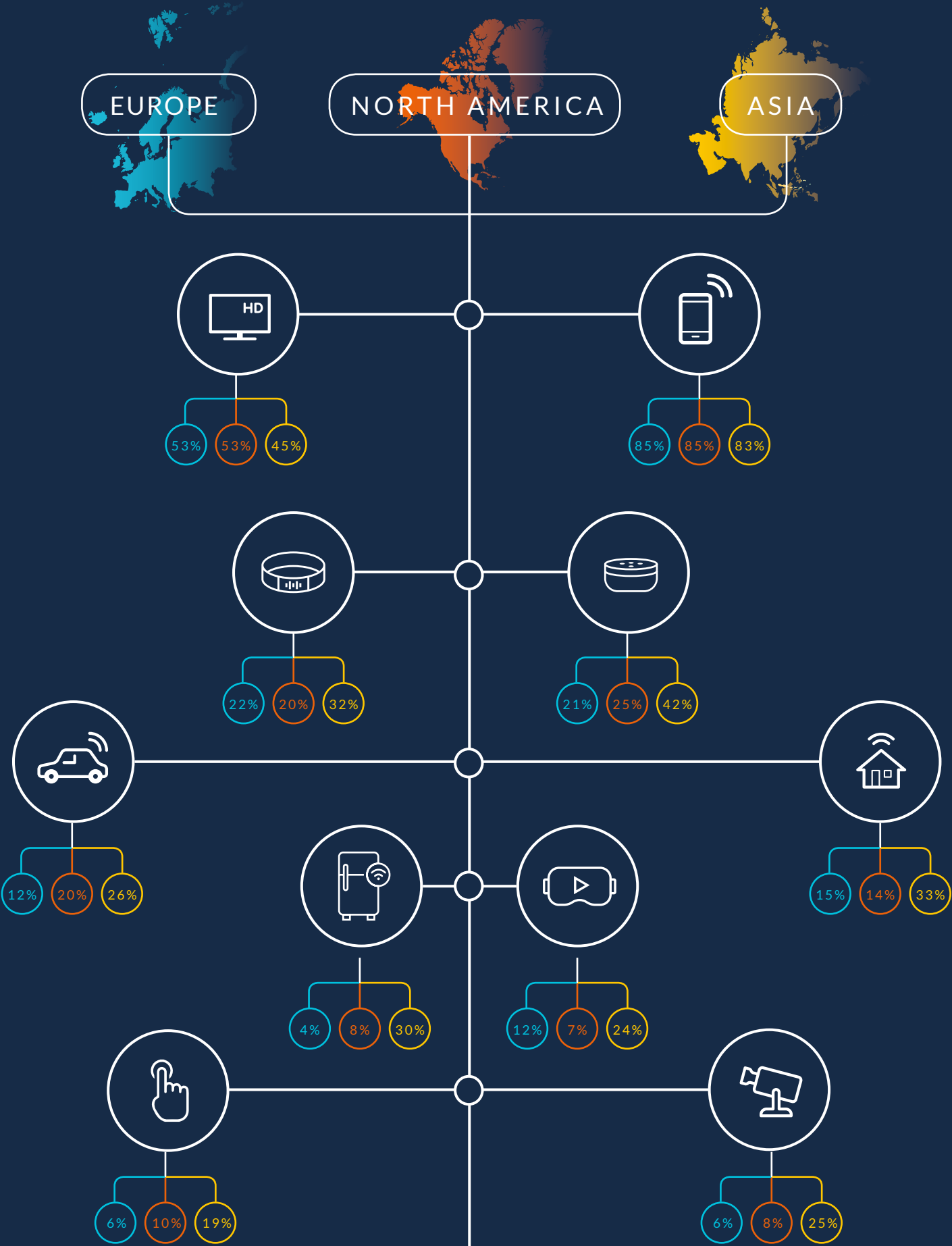
Not surprisingly the smartphone remains king of tech devices, with almost nine in ten people surveyed owning one. Alongside the smartphone, we see a strong move to smart TVs (capable of running apps) with around half of respondents having one in their home.

The results also show a steady growth of new internet of things (IoT) devices, including fitness monitors, burglar alarms and connected doorbells. Since most of them are likely to work with smartphones, the value of both devices increases. In general, the West was slightly behind the East in adoption, with China racing ahead. For example, just 7 percent of U.S. respondents said they owned a virtual or augmented reality (VR/AR) headset, compared to more than 30 percent in China and 17 percent in Japan.

Bolstering the case for more advanced smartphone adoption is the rise of new AR apps which we expect to drive new use cases through 2019 and beyond. martphones.

arm 2019 PREDICTIONS	
SMARTER NAVIGATION	PINPOINT ACCURACY WITH SLAM
"By 2022, mobile navigation apps will use augmented reality (AR) to superimpose route markings on real-world street views so it's easier to follow guidance instructions."	"Also within three years, we expect Simultaneous Localization and Mapping (SLAM) to be widely-used in precision (down to <1cm accuracy) location-based services indoors, particularly by retailers looking to guide shoppers to specific goods."

## SMART DEVICES OWNED BY MARKET



# WHAT WERE PEOPLE USING TECHNOLOGY FOR IN 2018?

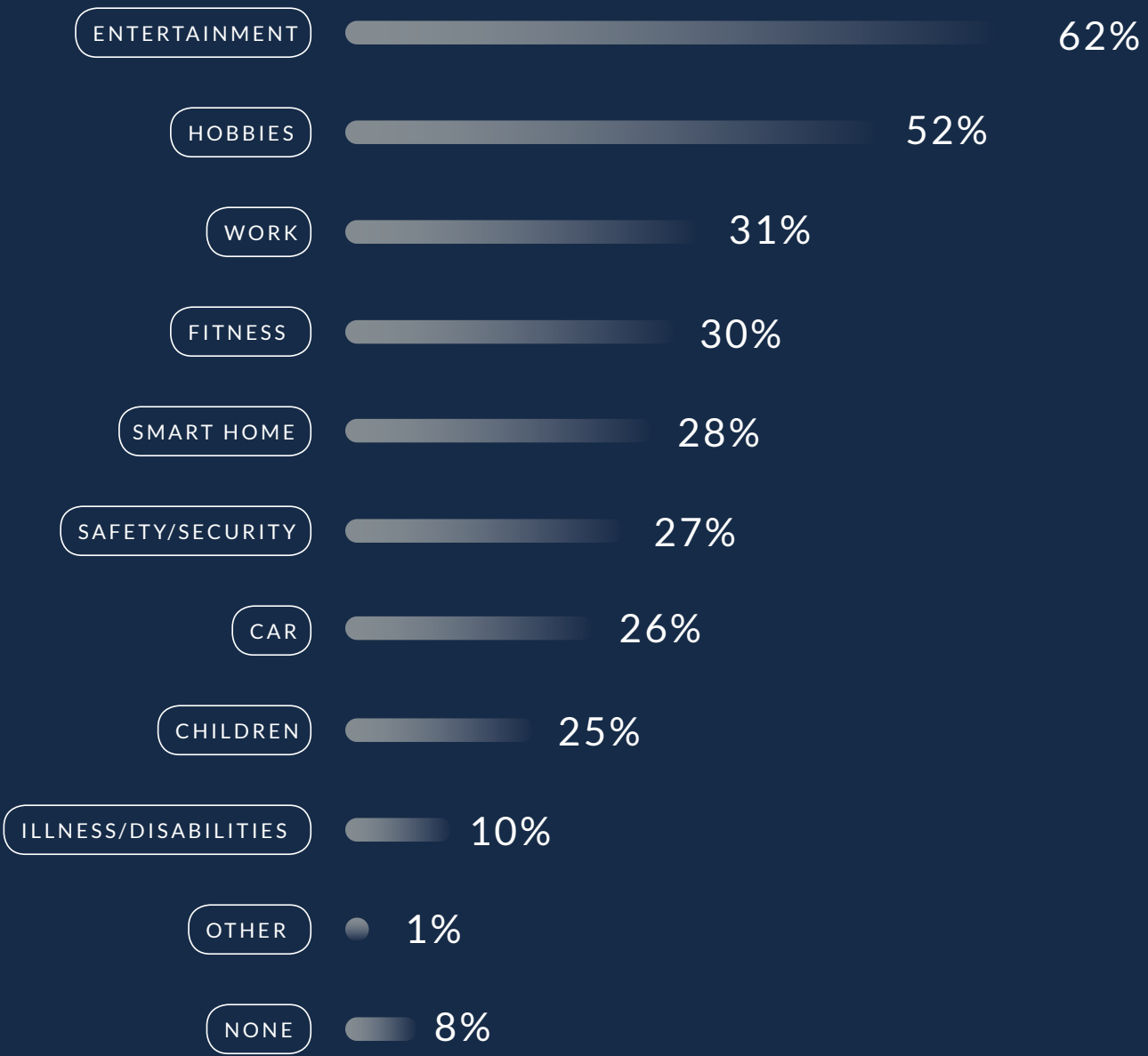
Actor Russell Crowe famously stared into the arena crowd after dispatching his latest opponent in the film *Gladiator* and said: “Are you not entertained?” If that part question/part challenge could be thrown out by tech products, buyers would respond with a resounding YES. Indeed, 72 percent of U.S. respondents say entertainment is the most common reason they use a technology device.

However, despite the generally more positive attitude for technology in the East, preferences there seem slightly different, with a higher percentage of people citing work-related usage above social.

Our survey also showed the progress of the digital revolution with almost one in three people saying they had used smart home control technologies in 2018. We expect this to rise significantly over 2019 as our survey showed smart home style devices appearing in the upper quartile of tech devices people are planning to buy.

armARM'S 2019 PREDICTIONS	
GAMERS NOT TAKING THEIR TABLETS	FAST VIDEO WITH 5G
"Gaming on tablets will be almost obsolete by 2025 as mobile gaming on smartphone takes over thanks to bigger screens and stronger performance."	"By 2020, 5G will enable people to stream 4K video on-the-go to their smartphones with zero lag, allowing the download of a full HD film in less than a second."

## SMART TECHNOLOGY USAGE



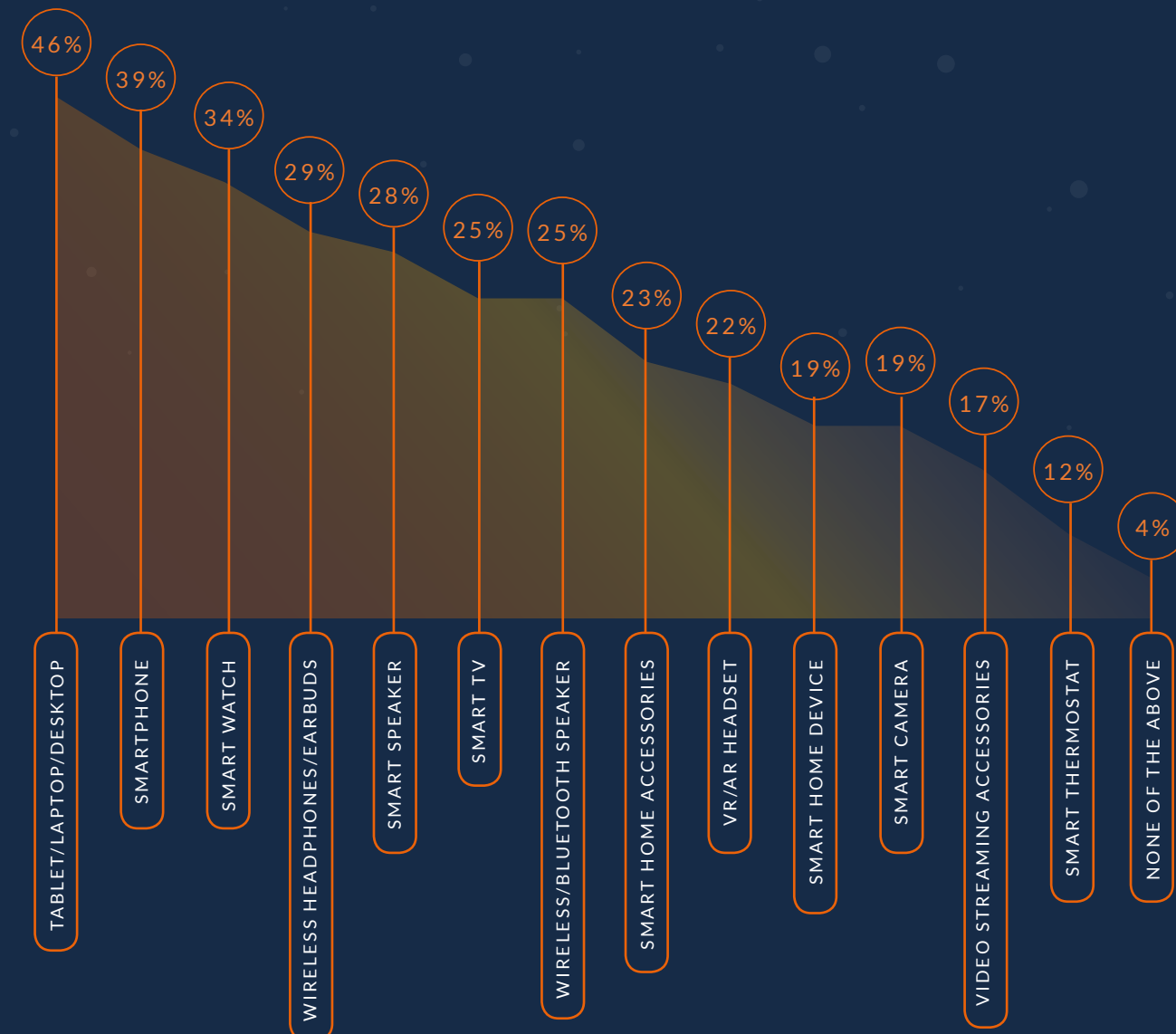
% FOR ENTERTAINMENT						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
66%	69%	61%	72%		58%	46%
TOTAL	66%		TOTAL	72%	TOTAL	53%
% FOR WORK						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
22%	22%	22%	33%		49%	26%
TOTAL	22%		TOTAL	33%	TOTAL	38%

# 'TIS THE SEASON TO BE JOLLY...

When Northstar's research team asked an open question about what people wanted as a tech gift this holiday season, there was a broad spread of responses. King of the device asks was the smartphone (14 percent), followed by the smartwatch (8 percent) and the VR device (5 percent).

When we gave people a list of devices to choose from (aided responses, as shown in the chart below), we saw a broader mix of responses. Smartphones are still the most popular gift request but there was a strong cohort favoring smart TVs (25 percent), smart speakers and wireless headphones. We also saw 22 percent of responders looking for VR/AR devices.

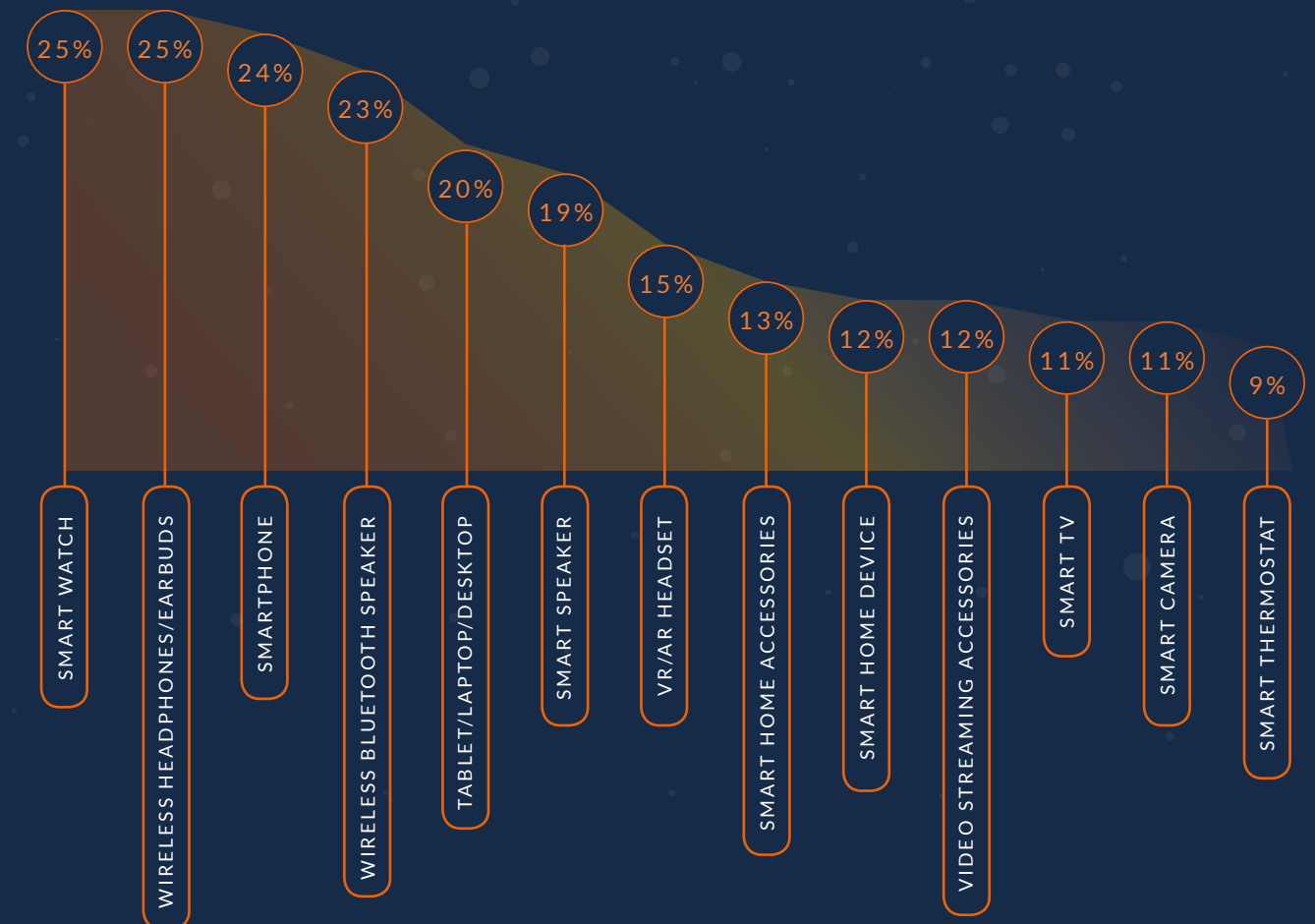
## DESIRED TECHNOLOGY GIFTS TO RECEIVE



I would love a smart thermostat as a gift ... honestly, I would!

The one figure that was surprising was that one in eight people (12 percent) are looking for smart thermostats. The idea of buying someone a thermostat may have suffer from a 'that's far too practical' notion though as only 9 percent of people would consider giving one as a gift.

## DESIRED TECHNOLOGY GIFTS TO GIVE



arm

### ARM'S 2019 PREDICTIONS

#### INTELLIGENT HOME GOES MAINSTREAM

2019 will see a major uptick in smart home products adding IoT intelligent control in areas such as home lighting, irrigation and heating/cooling - increasing the automation and efficiency of everyday tasks.



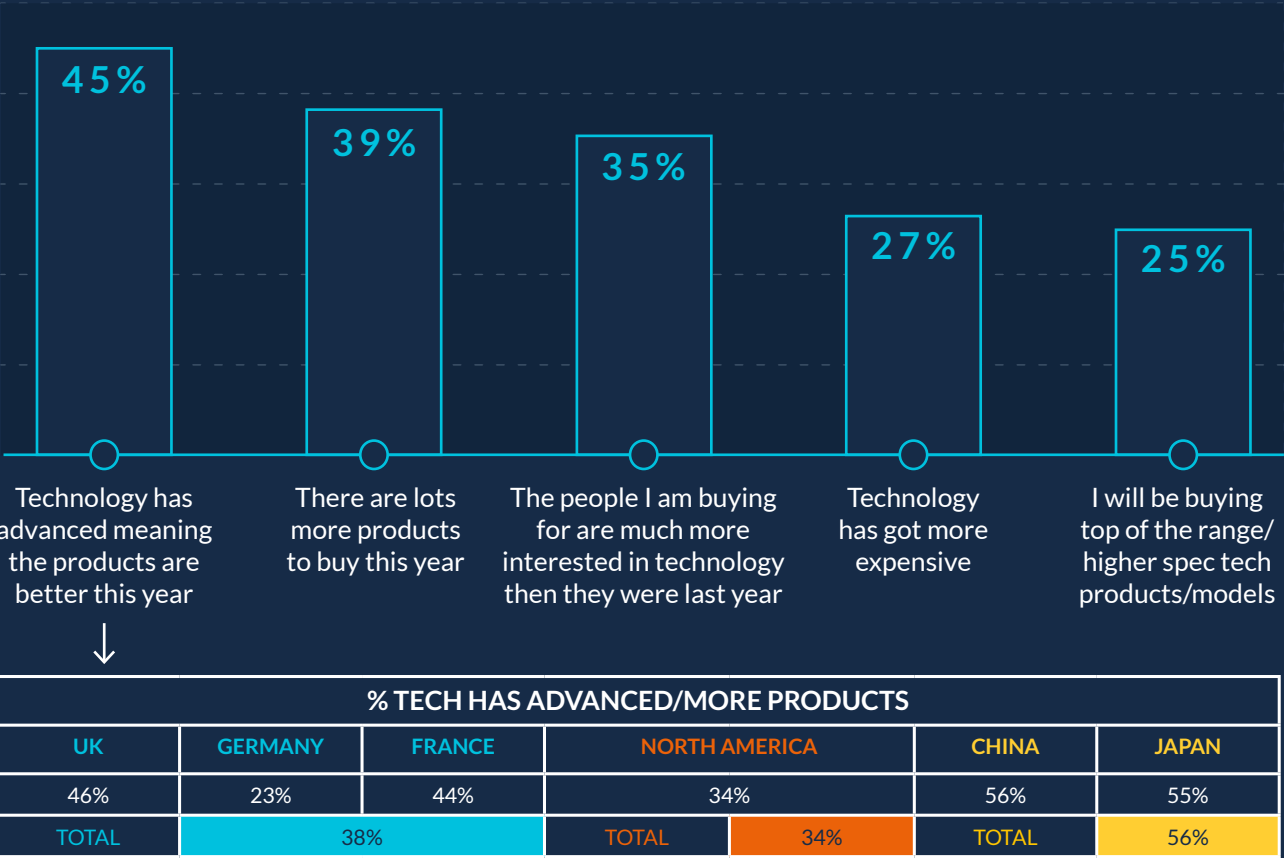
# POCKET BOOKS ARE OPENING WIDE FOR HOLIDAY SEASON

The rapidly-rising quantity and quality of smart technology products is likely to drive a credit card spree this holiday with more than half of people (54 percent) expecting to spend more on tech-based gifts. Almost one in five (18 percent) of people said they would spend ‘a lot more than last year’ and a further 36 percent are looking to spend ‘a bit more’.

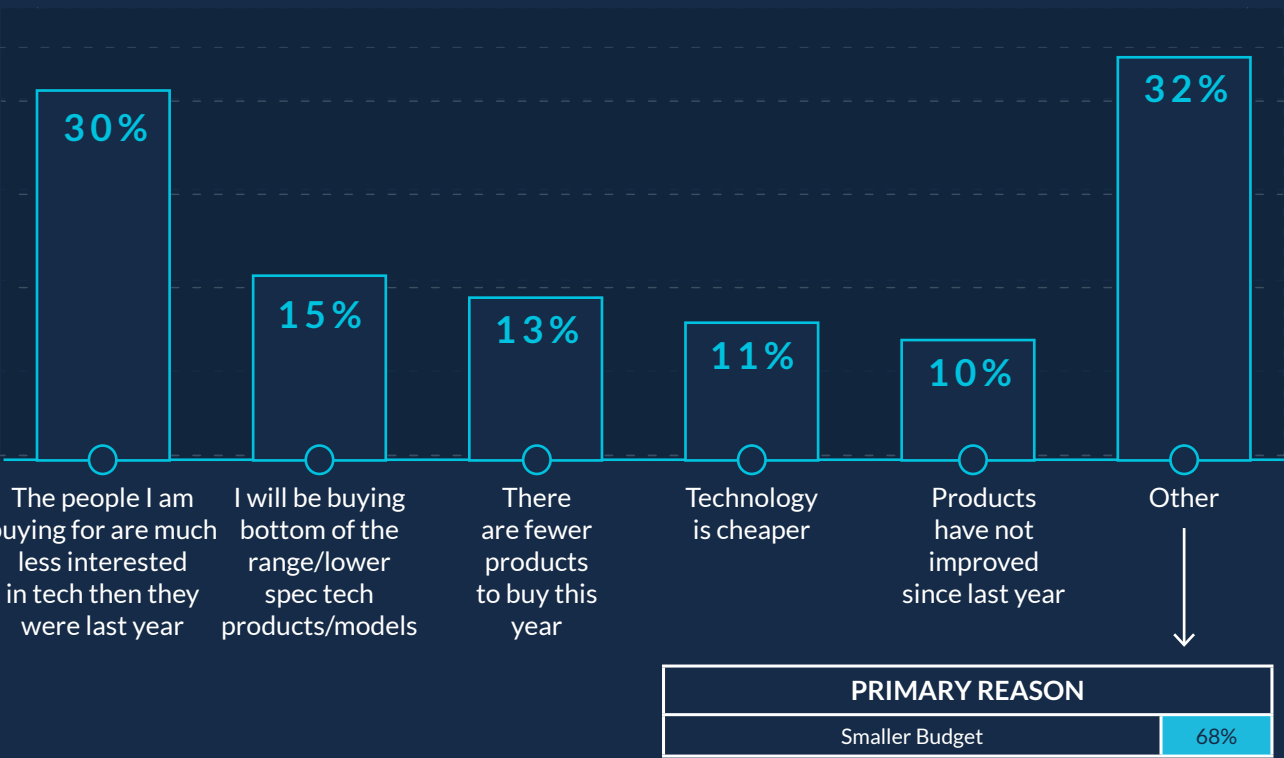
The biggest factor in this drive for more technology appears to be that devices are more capable than ever, with almost half (45 percent) of people citing the availability of more attractive products. A quarter of people also said they’d be looking to buy higher specification models, presumably looking to impress gift-receivers who might benefit from better features. We expect one of the features that will be magnetic to buyers will be artificial intelligence (AI) capability.

arm	ARM'S 2019 PREDICTIONS
	MORE AI-BASED MOBILE APPS
	"In 2019, the average number of global monthly users of AI-based mobile apps, such as GBoard and Socratic, will double to 2 billion people

## REASONS FOR EXPECTING TO SPEND MORE ON TECHNOLOGY GIFTS

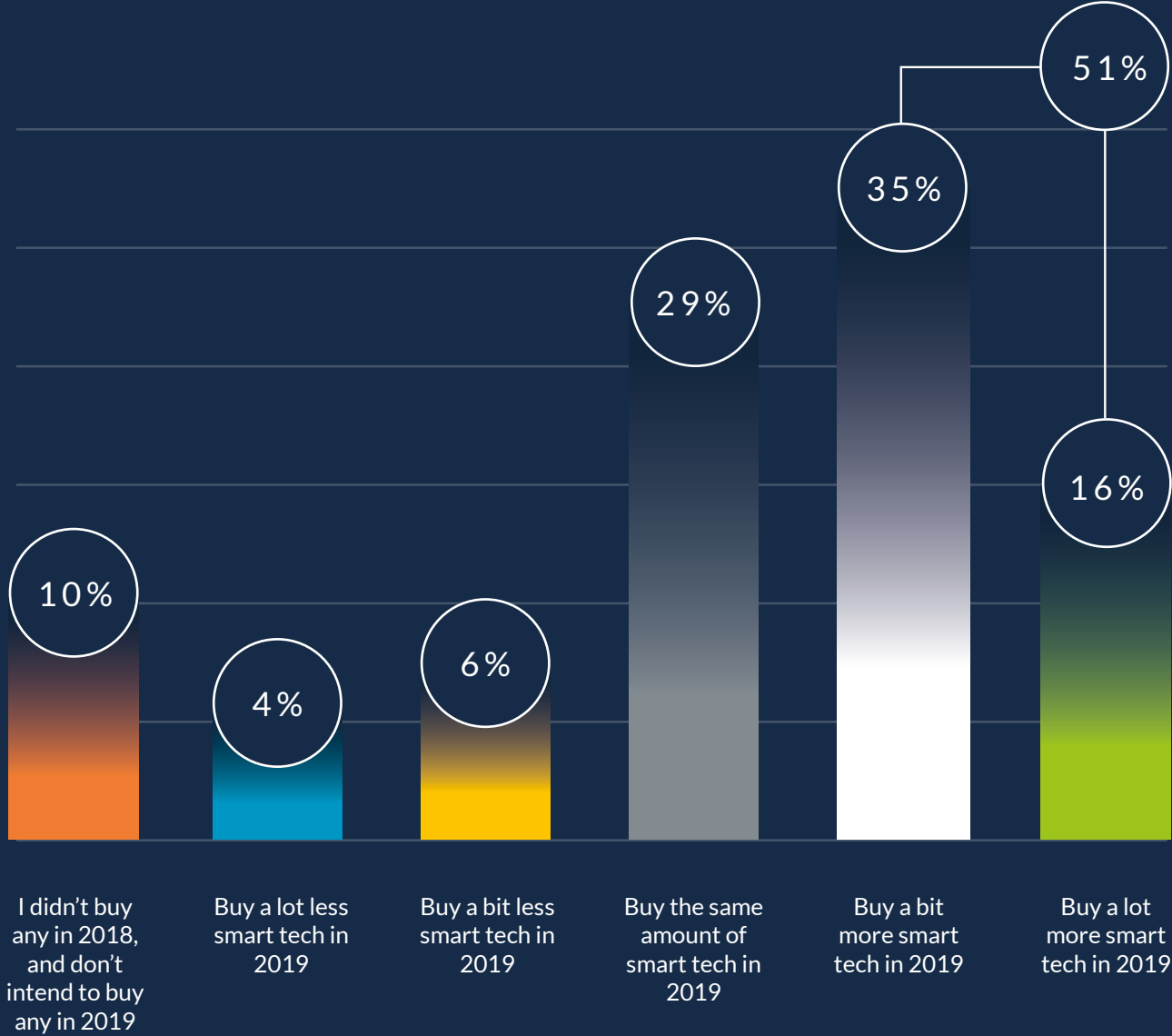


## REASONS FOR EXPECTING TO SPEND LESS ON TECHNOLOGY GIFTS



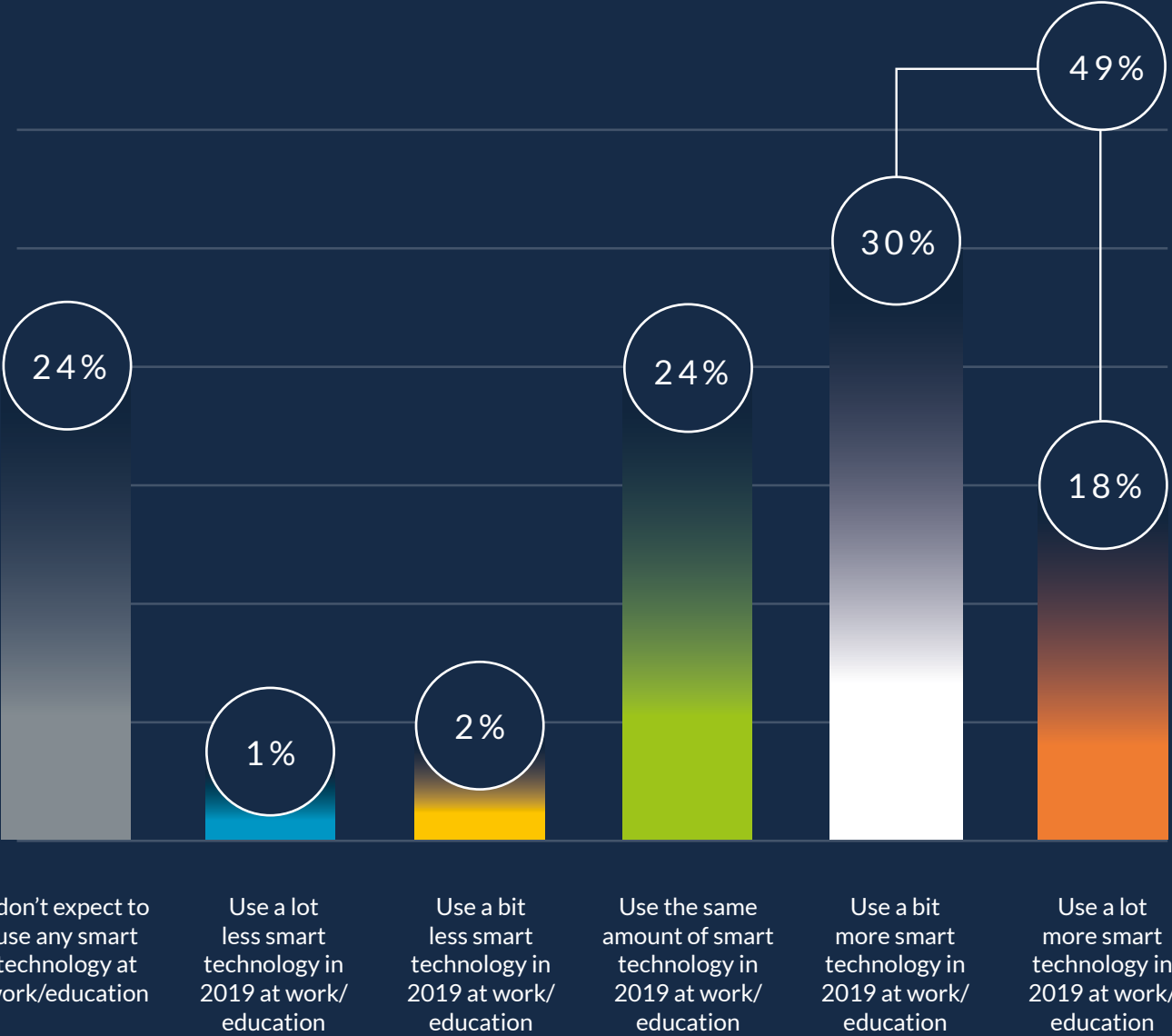
# WHAT DOES 2019 TECH SPENDING LOOK LIKE?

## SPEND EXPECTATIONS ON TECH IN 2019



% MORE					
UK	GERMANY	FRANCE	NORTH AMERICA		JAPAN
40%	42%	46%	44%		86%
TOTAL	42%		TOTAL	44%	TOTAL 65%

## 2019 TECH USAGE EXPECTATIONS - WORK/EDUCATION



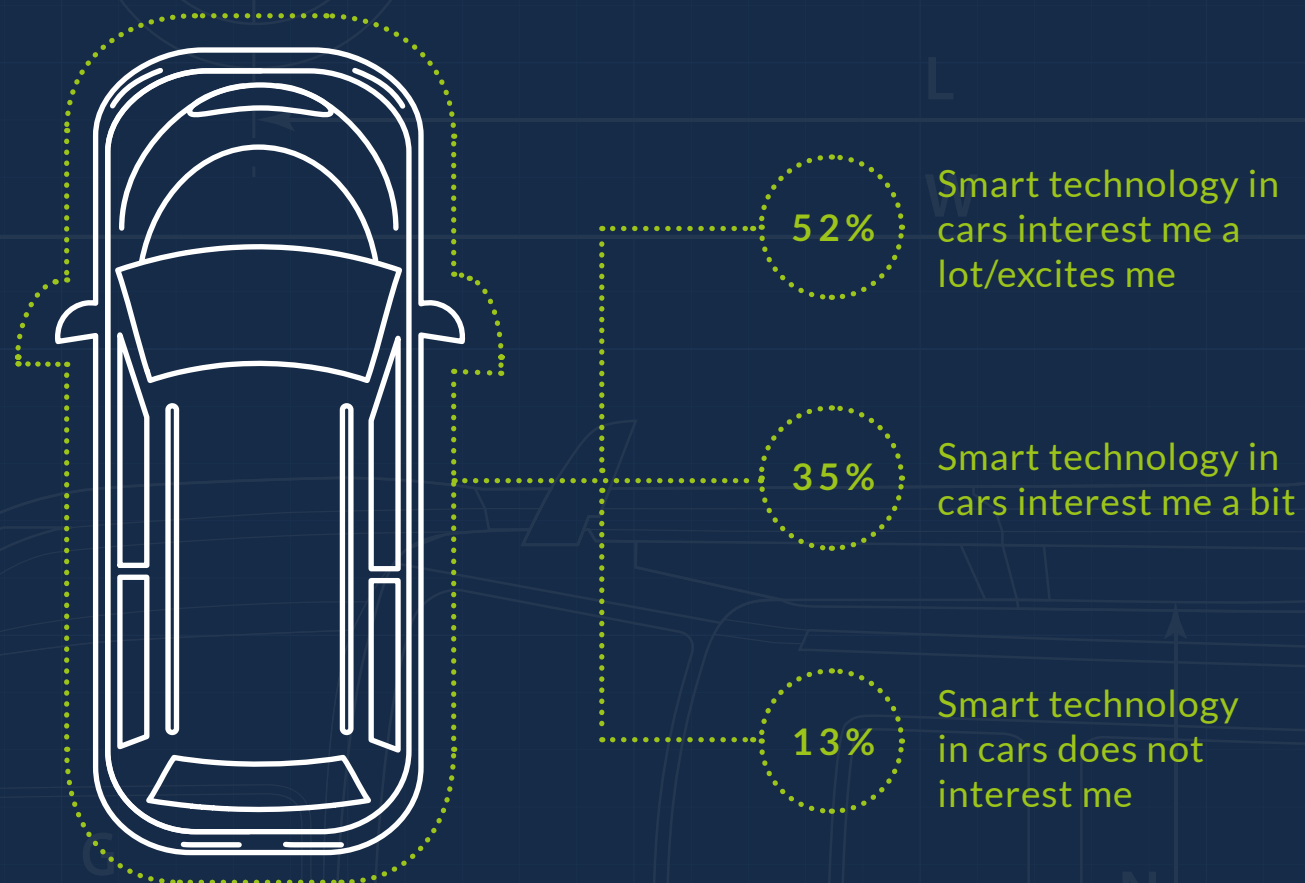
% MORE					
UK	GERMANY	FRANCE	NORTH AMERICA		JAPAN
33%	31%	34%	45%		89%
TOTAL	33%		TOTAL	45%	TOTAL 68%



# I FEEL THE NEED FOR DATA SPEED!

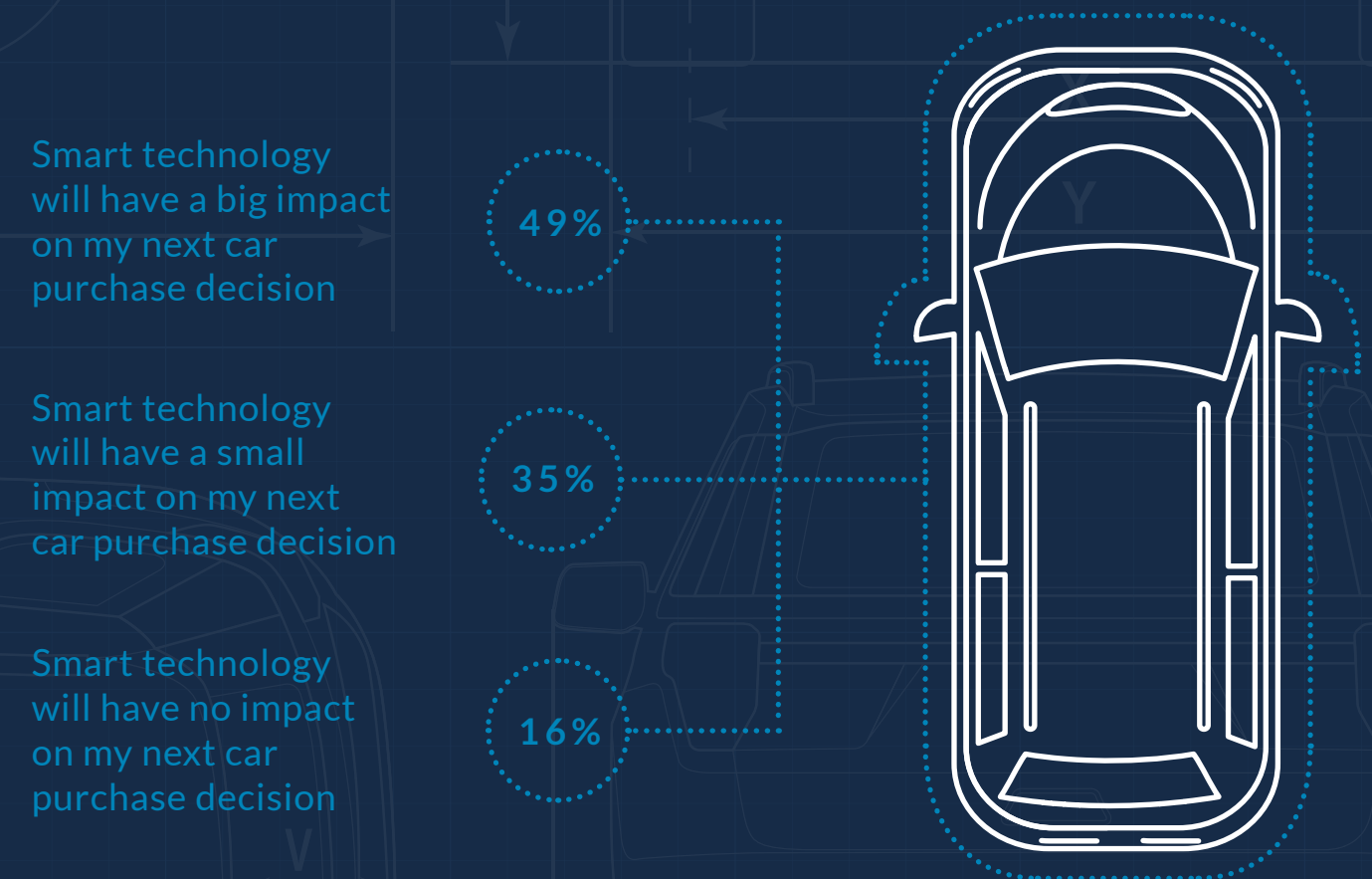
## CARS WITH SMART TECHNOLOGY

### INTEREST IN SMART TECHNOLOGY IN CARS



Mph may be giving way to MHz as our survey shows an increasing interest in more advanced automotive technology, and anyone buying a new vehicle in 2019 will be paying close attention to the tech features. We see a growing trend toward people looking for advanced safety features, such as lane departure warnings and anti-collision technologies, as more autonomous functionality is added to vehicles.

### IMPACT OF SMART TECHNOLOGY IN CARS



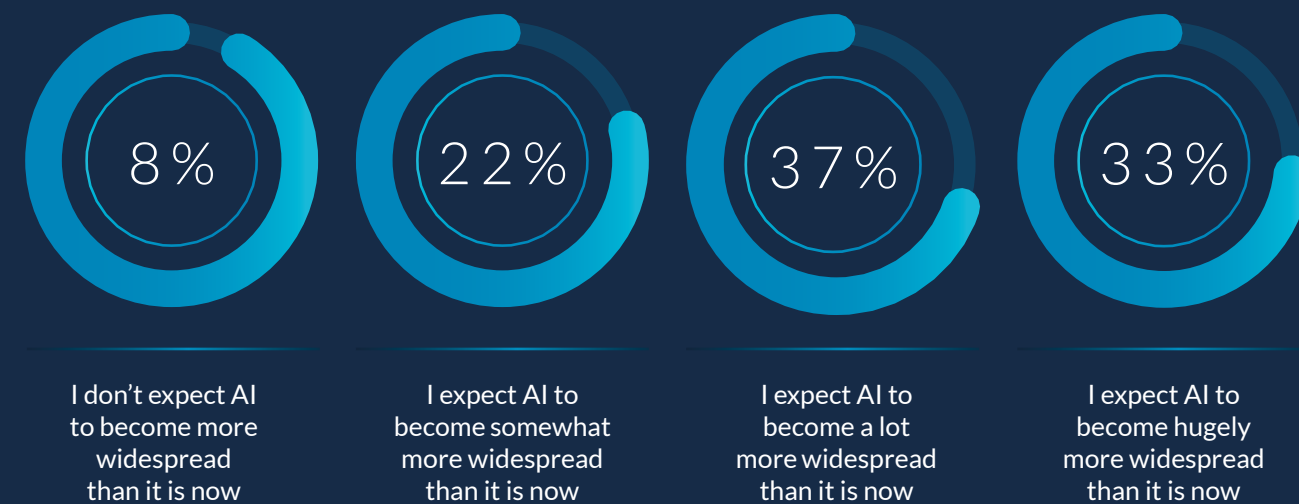
% INTERESTS ME A LOT						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
31%	52%	34%	47%		83%	47%
TOTAL	40%		TOTAL	47%	TOTAL	68%
% BIG IMPACT ON PURCHASE DECISION						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
31%	33%	40%	47%		84%	42%
TOTAL	34%		TOTAL	47%	TOTAL	66%

# THE NOT-SO SWEET SMELL OF SUCCESS FOR AI ...

At Arm, we see a drive to put AI in all sorts of devices, so in 2018 we introduced dedicated machine learning (ML) processors into our technology roadmap.

Many new devices will deploy AI algorithms running on Arm-based chips performing face, voice, and fingerprint recognition or learning behavior patterns to provide greater personalization. This AI capability will increasingly operate in a cloud-independent way so advanced intelligence features are not dependent on network connectivity.

## ANTICIPATED TREND FOR AI IN 2019

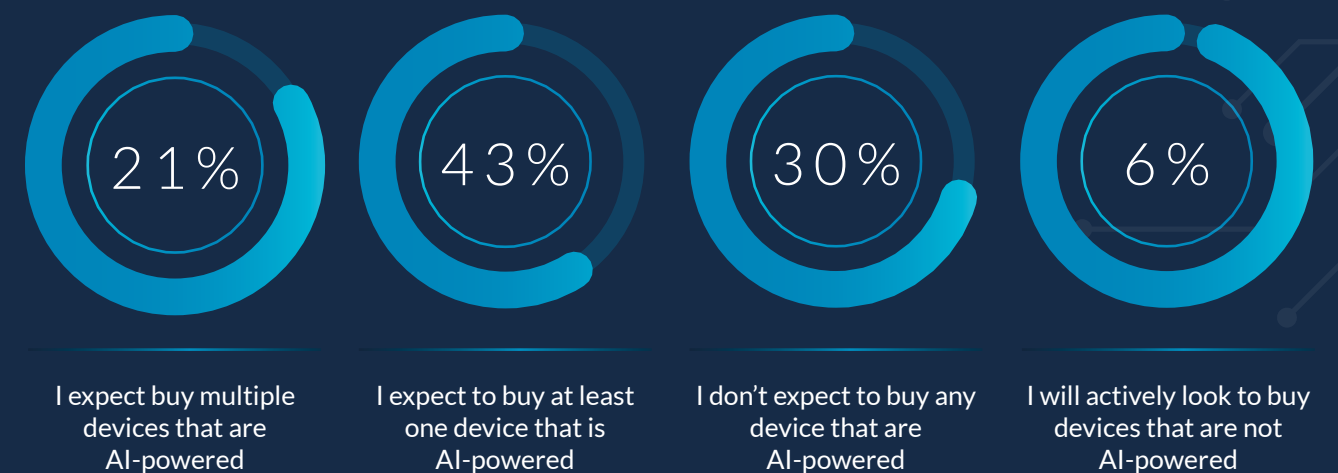


% NET MORE WIDESPREAD						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
89%	95%	93%	87%		99%	92%
TOTAL	92%		TOTAL	87%	TOTAL	96%

The public also foresees AI spreading rapidly in the next 12 months, with a whopping 92 percent of people expecting AI to be more widespread than it is currently.

A significant 64 percent expect to buy at least one AI-powered device in 2019 with one in five saying they intend to purchase multiple devices. Overall, the U.S. and Asia appear the most positive about AI becoming an everyday technology over the next year. And just how 'everyday' that might eventually become is clear in our AI predictions below as our experts look forward to a couple of interesting new use cases.

## LIKELIHOOD OF BUYING A NEW AI POWERED DEVICE IN 2019



% NET BUYING AT LEAST ONE AI-POWERED DEVICE						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
50%	60%	64%	56%		96%	58%
TOTAL	56%		TOTAL	56%	TOTAL	78%

arm 2019 PREDICTIONS	
THE SWEET SMELL OF AI	NEW COMPUTING TECHNOLOGIES
"AI will spread to more unusual applications in 2019, including use in new flexible plastic computer chips embedded in clothes to detect body odor levels."	"By the mid-2020s, flexible chips will be used in food packaging to detect if products are safe to eat. The chips will feature flexible odor and gas sensors and will run machine learning algorithms. They will be mainstream by the mid-2030s, and capable of saving many lives and dramatically reducing food waste."

# REAL FEELINGS ABOUT ARTIFICIAL INTELLIGENCE

There's an even spread of thinking on where AI will go in 2019, with almost half of respondents believing that it is already a mainstream technology. Asia Pacific seems overall the most positive towards the advent of more AI-driven devices, reflecting consumer sentiment we have seen in earlier consumer studies we have carried out.

# GENERAL PERCEPTIONS OF AI - % AGREE OR STRONGLY AGREE

AI is already an everyday technology



EUROPE	43%
NORTH AMERICA	50%
ASIA	56%

Public concern about the implications of widespread AI will increase in 2019



EUROPE	45%
NORTH AMERICA	57%
ASIA	46%

The public will come to realize the benefits and value of AI technology in 2019



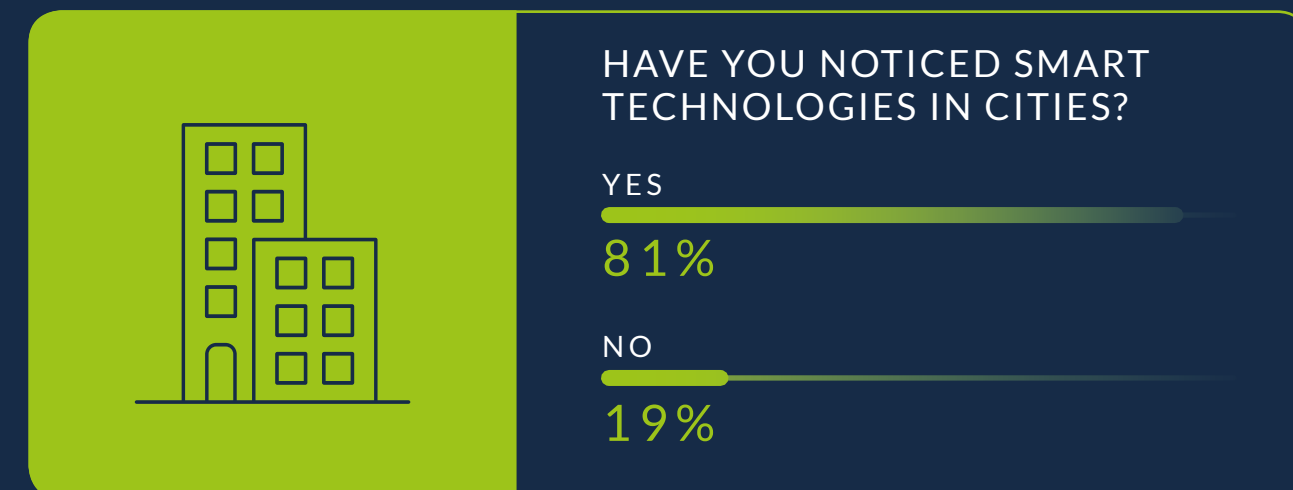
EUROPE	45%
NORTH AMERICA	53%
ASIA	60%

# HOW TECH WILL CHANGE WHERE WE LIVE, HOW WE WORK AND SHOP

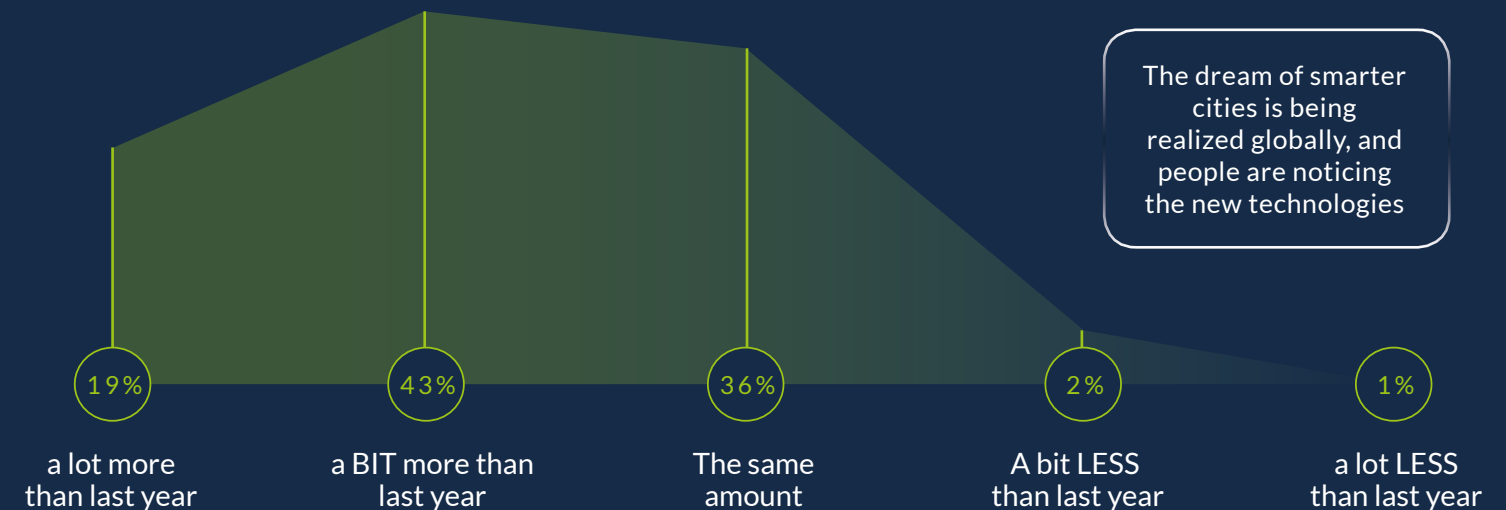
Urbanization is a global trend and while today more than half (55 percent) of the world's population live in major cities, the United Nations expects that number to rise to around 68 percent by the middle of the millennium.

This increasing congestion of people, transportation and infrastructure is leading city governments to draw up smart technology plans. This isn't going unnoticed and according to our study almost two-thirds of people supported the rise of city smart tech.

## TREND OF SMART TECHNOLOGY SEEN IN CITIES



## TREND VS. PREVIOUS YEAR



## % NOTICING ANY SMART TECH IN CITIES

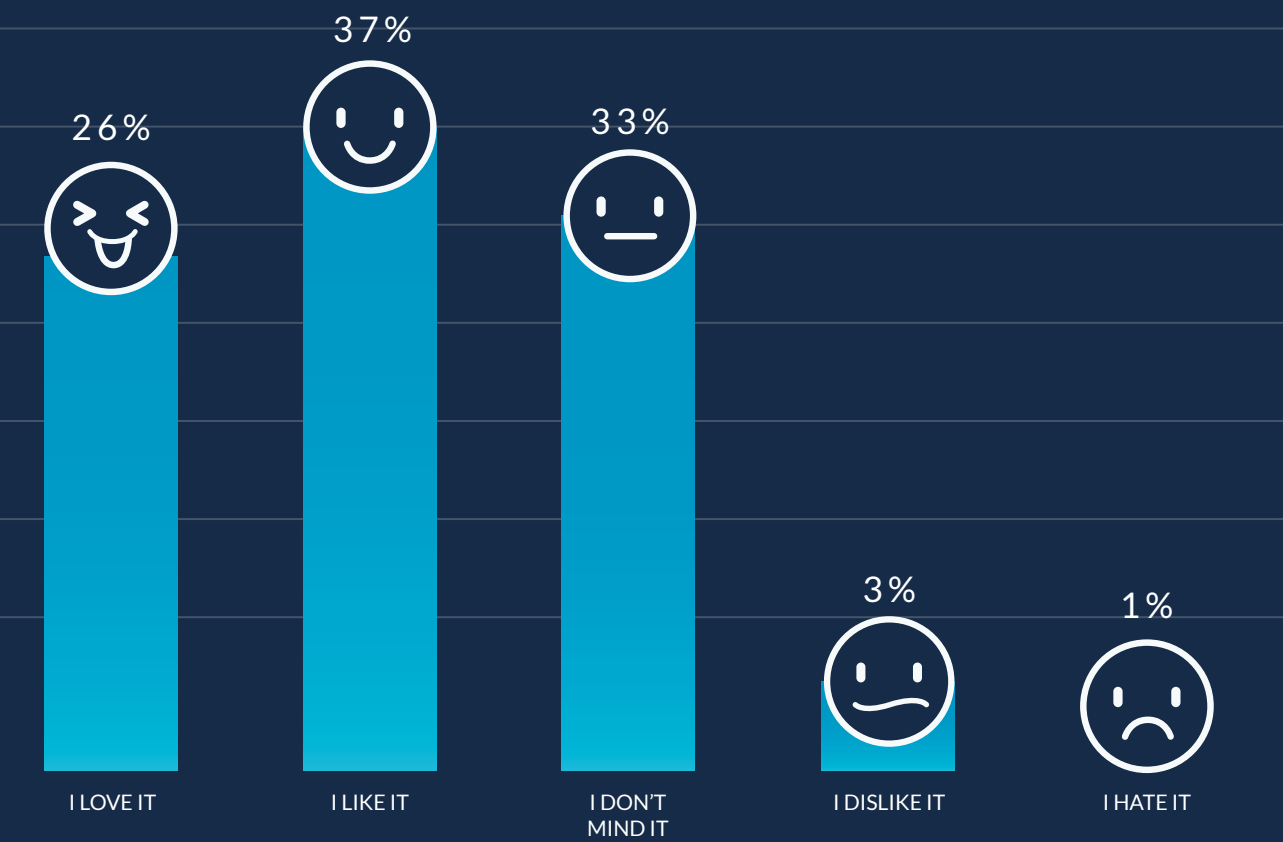


% NOTICING ANY SMART TECH IN CITIES						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
73%	72%	70%	78%		98%	87%
TOTAL	56%		TOTAL	78%	TOTAL	93%

# FEELINGS TOWARDS SMART TECHNOLOGY IN CITIES

The main reason to ‘love’ (26 percent) or ‘like’ (37 percent) smart technology in cities is ‘convenience’ according to our survey, with 20 percent of respondents appreciating what it was doing for their city experience. Many (15 percent) also cited ‘quality of life’ with one in ten (11 percent) stating they feel a smart technology upgrade is the ‘modern/progressive’ thing to do.

Looking forward to 2019, almost three-quarters (73 percent) of people think there will be ‘a bit more’ or ‘a lot more’ smart city technology deployed. Of those, without being prompted, traffic management was the cited as the best use of technology.

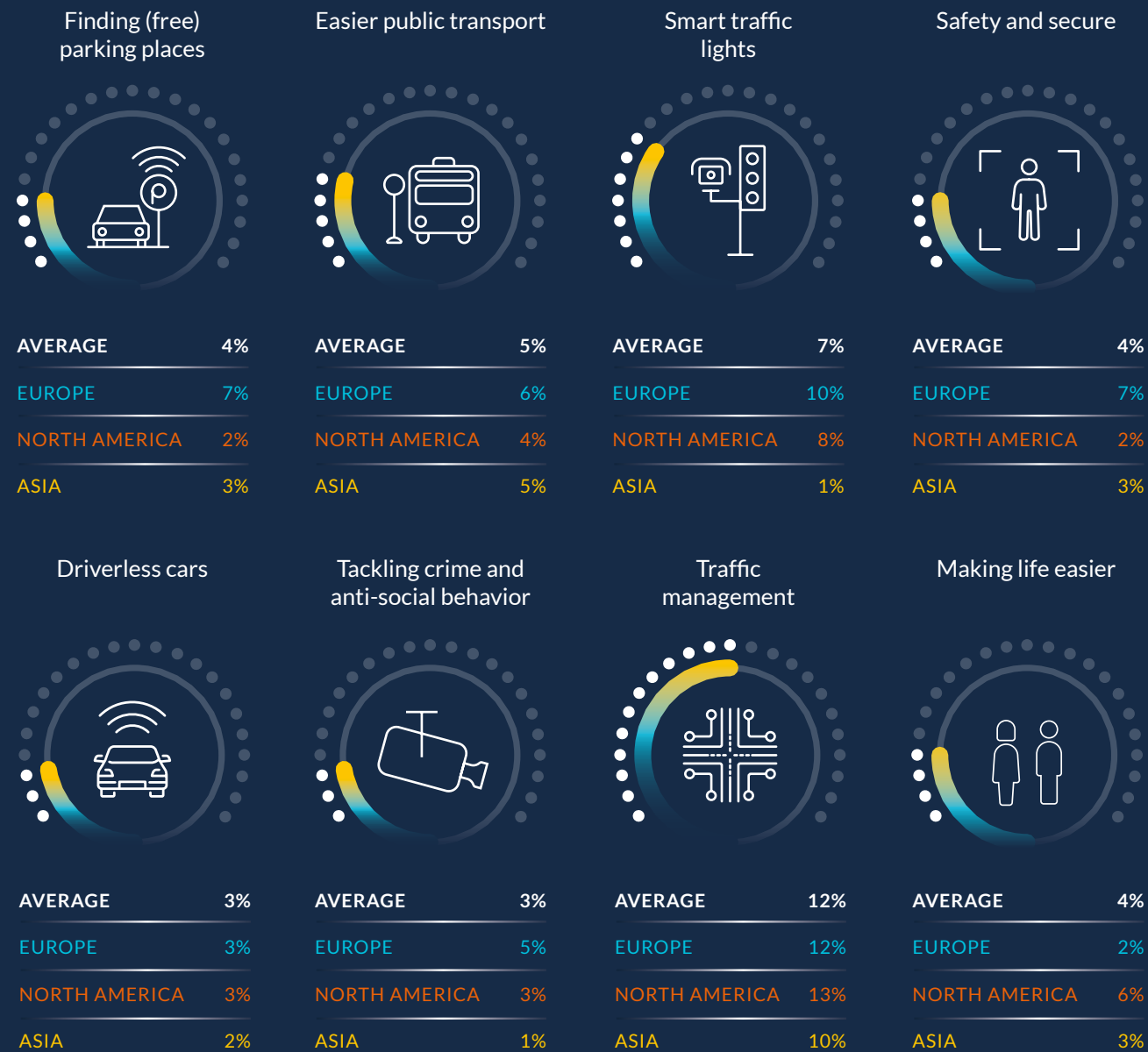


% LOVE IT						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
15%	14%	16%	30%		45%	21%
TOTAL	15%		TOTAL	30%	TOTAL	34%

arm	ARM'S 2019 PREDICTIONS	
SMART CITIES BOOSTING REVENUE AND CITIZEN ENGAGEMENT	SMARTER BUILDINGS	
"The rise of Machine Learning (ML) and Computer Vision (CV) will mean smart city guardians will look beyond cost reduction (e.g. intelligent LED street lighting) to citizen engagement and stronger revenue flows from areas such as red-light violation detection, Wi-Fi hotspot, 5G services, smart towers, crime detection/analysis and information broadcast."		"Energy efficiencies from optimized HVAC and efficient lighting are fast becoming table stakes for all new buildings so smarter owners will look towards space optimization, object detection for safety/security, wayfinding and asset tracking as a way of making buildings work better for users."



## BEST USE OF TECHNOLOGY IN CITES - UNAIDED

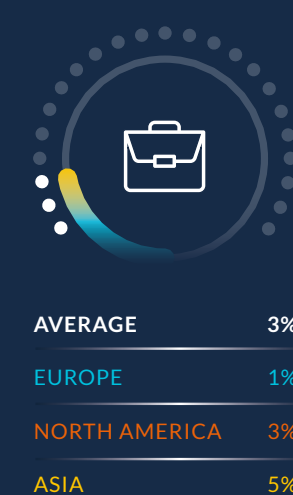


Beyond city infrastructure use, the smart technology opportunity that excites people most is 'medical advancement'. The advent of fully autonomous cars, though highly media-worthy is still relatively low on the public's agenda, with just 5 percent of respondents claiming to be truly 'excited' by the prospect.

## MOST EXCITING APPLICATION OF SMART TECHNOLOGY - UNAIDED



Employment/industry



Alongside city infrastructure, the rise of smart technology is spreading into commercial public spaces such as major stores and retail malls.

arm	ARM'S 2019 PREDICTIONS
IOT TRANSFORMING RETAIL	
By 2020, some 30 billion IoT devices will be in use daily, including leading retailers collecting 'omnichannel' customer data through smart digital signage, infrared foot traffic monitors, RFID inventory tracking chips, beacons, and interactive kiosks. With smartphones and tablets already used widely, customer data will continue to expand in 2019 with retailers streamlining checkout, capturing repeat sales and personalizing shopping experiences	



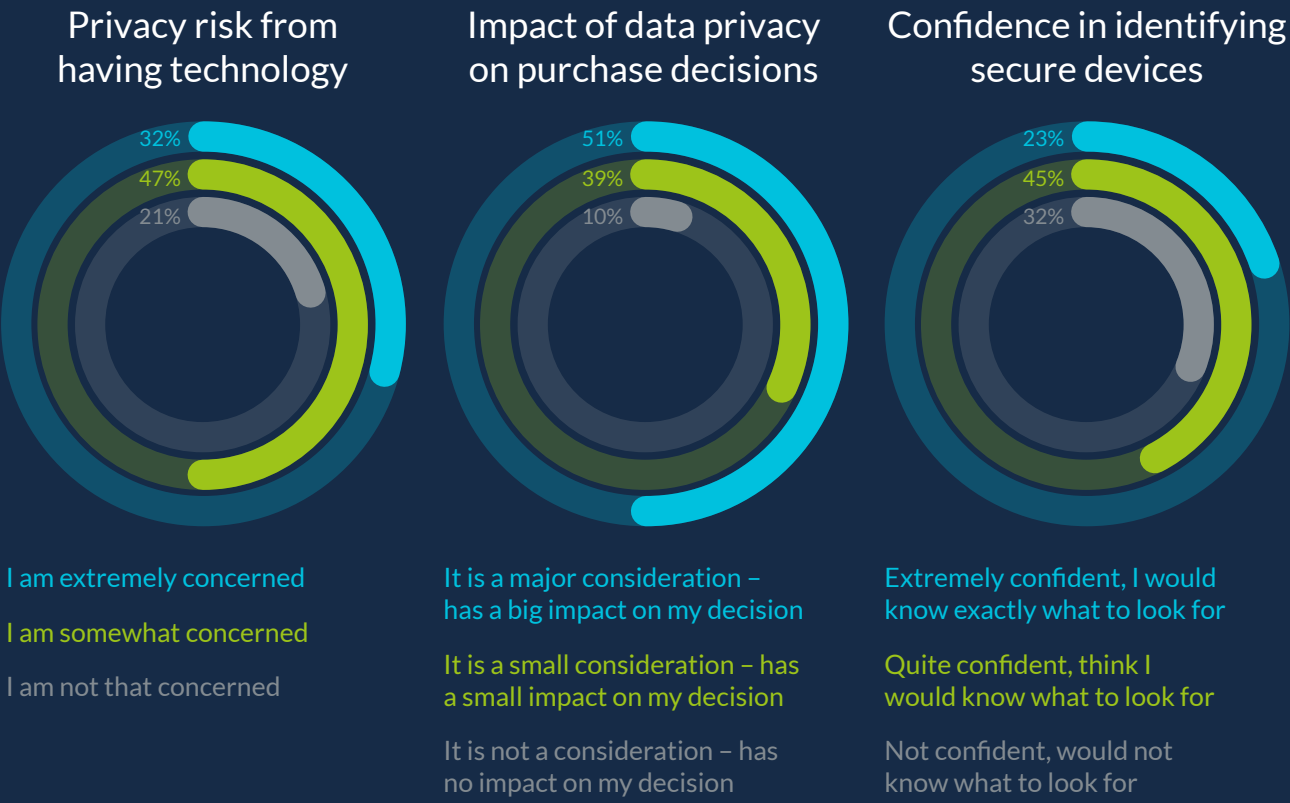
# 2019: SECURITY, SECURITY, SECURITY... & PRIVACY

While technophilia seems to be the order of the day, most people remain concerned about the security of the devices they are buying and the risks to privacy from either cyberthreats or misuse of personal data by companies.

But while people remain concerned, our survey suggests that almost seven in ten consumers think they probably know enough about security to identify a secure device. While this could be read as being positive, it is Arm's view this remains a tough ask for consumers, and the technology industry must do all it can to uphold the digital social contract governing trust between technology makers and technology buyers.

arm 2019 PREDICTIONS	
BUCKLE UP; MORE REGULATIONS AHEAD	THE RISE OF THE DATA TROLL
"The U.S. Congress is likely to enact federal regulations in 2019 to protect consumer data after the implementation of GDPR in the European Union and passage of the California Consumer Privacy Act in 2018 (taking effect January 2020)."	"New data protection rules could be used/abused by individuals to win compensation from companies that are ill-prepared. Like the notorious 'patent trolls' who probe corporate patents for overlaps to exploit in court, 'data trolls' will seek data-access requests and leverage data breaches to make money."

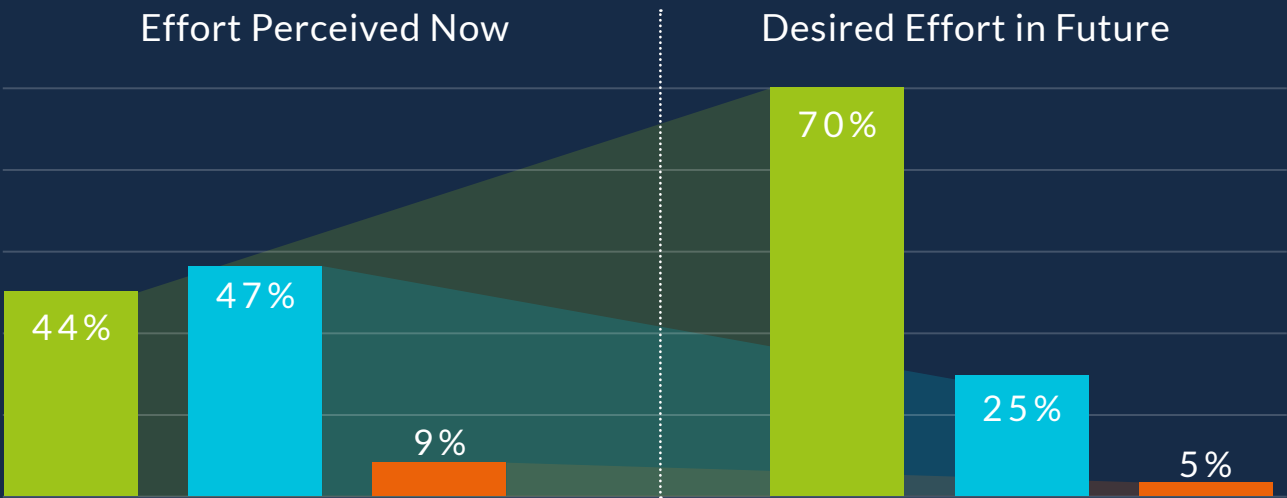
## FEELINGS ABOUT TECHNOLOGY AND PRIVACY



% EXTREMELY CONCERNED ABOUT PRIVACY						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
25%	31%	30%	37%		33%	33%
TOTAL	28%		TOTAL	37%	TOTAL	33%
% SAYING DATA PRIVACY WAS A MAJOR PURCHASING CONSIDERATION						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
41%	51%	56%	48%		63%	48%
TOTAL	48%		TOTAL	48%	TOTAL	56%
% STATING EXTREME CONFIDENCE IN UNDERSTANDING DEVICE SECURITY						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
15%	10%	12%	22%		53%	17%
TOTAL	13%		TOTAL	22%	TOTAL	35%

Opinion is split almost down the middle over whether companies are taking improvements in data security and privacy seriously, though less than 10 percent feel companies are making no effort at all. The majority (70 percent) of respondents want to see this effort increase in future.

## EFFORT FROM COMPANIES TO IMPROVE DATA SECURITY AND PRIVACY



Make SIGNIFICANT effort

Make a SMALL effort

Make NO effort

Makes a significant effort

% EFFORT PERCEIVED NOW						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
30%	29%	40%	46%		71%	40%
TOTAL	33%		TOTAL	46%	TOTAL	56%
% DESIRED EFFORT IN FUTURE						
UK	GERMANY	FRANCE	NORTH AMERICA		CHINA	JAPAN
61%	73%	63%	77%		79%	62%
TOTAL	65%		TOTAL	77%	TOTAL	71%

## ARM STATEMENT ON SECURITY:

We understand consumers’ concerns on security and privacy, and we introduced the Platform Security Architecture in 2017 to help set secure design principles for smart connected devices. We also offer guidance on how companies should approach security thinking in relation to the latest threats in the Arm Security Manifesto, the second in the series. You can read the manifestos and more about Arm’s security products at <https://www.arm.com/solutions/security>

If you want to learn more about Arm’s role in the new technologies that will dominate 2019, visit the following links:

- 5G and network infrastructure
- Advanced vehicle technologies
- Mobile Computing
- Artificial Intelligence and Machine Learning
- The internet of things

[Download: Arm Security Manifesto 2018](#)



[Download: Forrester Opportunity Snapshot: IoT Data Opportunity](#)

