



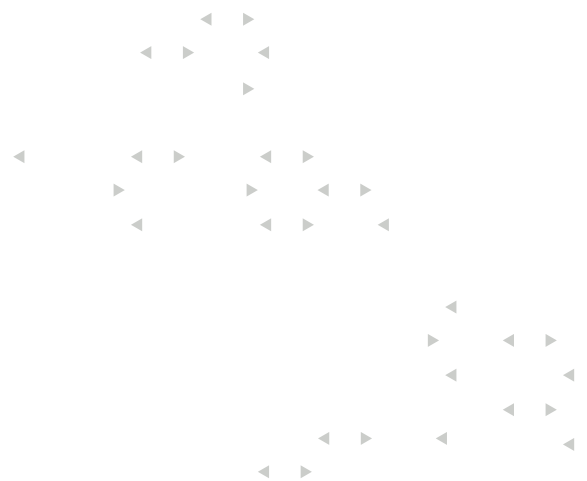
HYPER CONNECTIVITY & You

—
A Roadmap
for the Consumer
Experience

cādence® northstar

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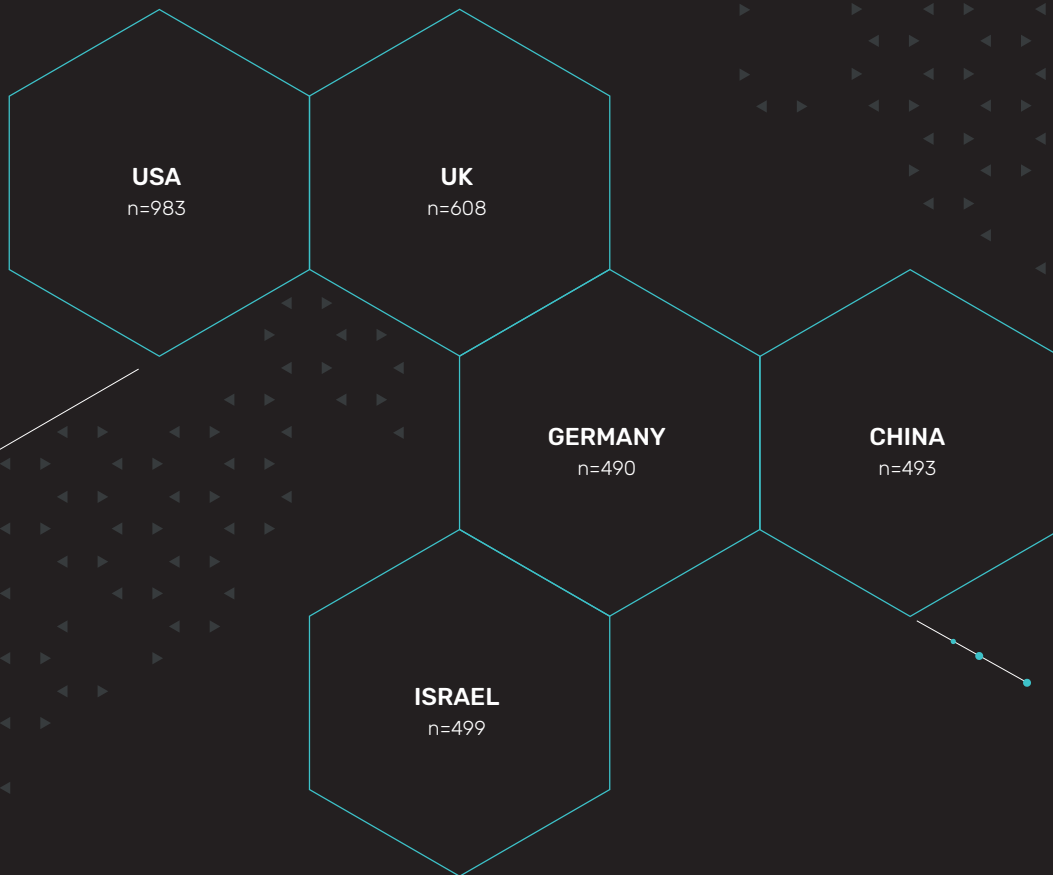
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A note on the research

This report is based upon insights unearthed from a global consumer survey in Q4 2020. The research was conducted by Northstar Research Partners Ltd. on behalf of Cadence. Northstar is an independent insight agency working out of London.

Globally, 3,073 people completed the survey, across five key technology markets. Within each market, people interviewed are representative of the adult population by age and gender.



Foreword:

Why your perspective matters to Cadence



Anirudh Devgan, PhD

President and Chief Executive Officer
Cadence Design Systems, Inc

At Cadence, our mission is to help our customers unleash their product development imagination by enabling the development of disruptive technologies, from 5G to artificial intelligence/machine learning (AI/ML) and from the industrial internet of things (IIoT) to autonomous vehicles. These technologies have helped drive changes in consumer electronics, hyperscale computing, communications, automotive, mobile, aerospace, industrial, and healthcare. To us, “computational software” links the development of these technologies that consumers use daily and makes our “Intelligent System Design” an efficient path to creating electronic chips and systems.

During our journey, we’ve become experts in hyperscale computing, which allows vast amounts of data to be processed in hyperscale data centers. Data volumes are growing at never before seen scale, and hyperconnectivity allows significantly more data to be collected, transported, and analyzed in the cloud, on the network, or on mobile devices. The combination of hyperscale computing and hyperconnectivity results in actionable insights that can substantially improve device performance and user experiences. Developers are doing this by harnessing increased processing power afforded by hyperscale data centers and edge processing, leading to hyperconnected, always-available data. Consequently, smart-converged, more powerful user devices predict what we may need by learning our behaviors more accurately.

But sometimes, when we’re too close to the things we love, it becomes essential to take a step back and get a broader view. We’ve commissioned this research to provide ourselves, and our customers, with a much broader perspective on what hyperscale computing means to everyday people around the world. This perspective is crucial so we and our customers can continue to drive the innovation that end consumers seek.

It’s reassuring to learn that our work has a positive impact. In conjunction with other related technologies, such as AI, most consumers think the effects of hyperscale computing will impact them positively in the next five years. Other insights directly influence our products. For instance, we learned that consumers prefer voice interaction for managing in-car activities. This confirmed our approach of licensing extensible processors so our customers can specifically implement varying audio processing and filtering and speech processing requirements.

The research also confirms that consumers primarily judge devices on battery life, security, and reliability. This supports our tireless efforts to optimize our tools to enable performance and power consumption tradeoffs. We optimize licensable building blocks for low power consumption and allow verification, analog, and digital implementation of hardware and software with energy and power aspects in mind. For the integration of components, our tools let our customers assess thermal system-level effects. While much of this is not visible to the end consumer, it all starts with the computational software that our industry provides.

The emerging fields of autonomous driving, AI, and digital twins are vital aspects of hyperscale computing, but their heavy data usage faces some healthy skepticism. Therefore, it’s right that safety, security, and privacy are top of mind when certifying our tools and their use.

The bottom line is that consumers see hyperscale computing’s value in their life, both today and tomorrow. Cadence and our partners are ready to ring in the hyperconnected era and make user experiences safe, secure, and reliable.

The three Cs of hyperconnectivity

The real-world hyperconnected future is underpinned by confidence, convenience, and collaboration

This research reflects the opinions of more than 3,000 people, representing 1.5 billion people globally, across five leading technology markets: USA, China, UK, Germany, and Israel. The broad insights and implications are applicable across all sectors impacted by hyperconnectivity, with a specific focus on consumer electronics, automotive, and healthcare – worth over a combined \$10 trillion globally.

In speaking to real people about hyperconnectivity and its potential impact on their lives, three key themes consistently came up:



Confidence

Unlocking hyperscale computing's potential

While people have confidence in technologies, including hyperscale computing, people lack confidence in data security and are reluctant to share data. This is a challenge for all businesses operating in a hyperconnected data economy. Hardware and software developers must prioritize data security, while device and car manufacturers must deliver complete transparency in how personal data is used and what the user gets back in return. Without user confidence, the full potential of hyperscale computing cannot be realized.



Convenience

Making people's lives easier

Convenience is a main reason people continue to buy connected devices and share data, despite their lack of confidence in data security. Convenience-related features, such as predictive maintenance and automated software updates, will drive uptake of new hyperconnected technology in the future. By removing tedious tasks, providing a frictionless user experience and delivering a clear and obvious benefit to the user, convenient smart-converged technology can solve consumer confidence issues.



Collaboration

Bringing humans and technology together

Hyperconnected technology is smart enough to make decisions and perform actions for people. However, if you push people into things, they'll push back. People like to retain agency over their actions and relinquishing full control can be scary. The sweet spot is people and technology working collaboratively together, such as human-led robotic surgery, or autonomous features that augment, not replace the driver. With this collaboration, people can feel confident and embrace all the benefits that hyperconnectivity has to offer them.



A glimpse into tomorrow's hyperconnected world



Hello hyperscale computing:

What's known and understood about hyperscale computing and its potential impact on our lives?

Are people aware of hyperscale computing?

2020 saw the construction of more than 100 new hyperscale data centers, increasing the total to almost 600. This number has more than doubled since 2015, and growth is not expected to slow anytime soon. Many of these are run by global technology giants that provide our day-to-day services for social interactions, search, and cloud storage. Everyone knows these brands, and they are increasingly just referred to as "hyperscalers." But only 32% of people globally know what hyperscale computing is. This is far lower versus more established technologies, including artificial intelligence (AI) (72%), 5G (74%), and virtual reality (VR) (75%).

% who say they have at least a basic knowledge of:



75%

Virtual Reality (VR)



74%

5G



72%

Artificial Intelligence (AI)



32%

Hyperscale Computing

Despite hyperscale computing being more of a "behind-the-scenes" technology, a third have at least a basic knowledge of it. This is testament to its recent growth.

What's known about hyperscale computing?

Those aware of hyperscale computing are unlikely to have detailed technical knowledge of how it works. However, many people grasp the concept of "scaling-up" computing resources.

How hyperscale computing is described by those aware of it:

"It's about achieving massive scaling-up in computing"

45-54, Germany

"Have a super large-scale data center to reduce costs and improve efficiency"

25-34, China

"Vertical and horizontal scaling. Upgrade (or downgrade, too) when the demands of the system change accordingly without the need to have major changes to the system"

55-64, Israel

"Mix of hardware and facilities that can scale a distributed computing environment"

35-44, UK

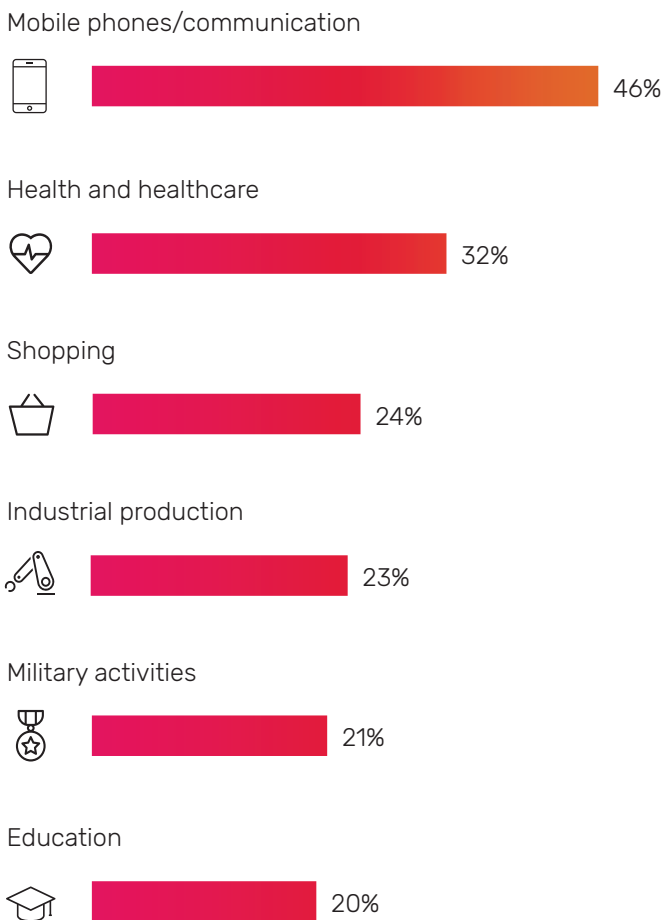


And what's known about impact of hyperconnectivity?

This scaling up leads to hyperconnectivity to make data available everywhere, and therefore looks set to have a far-reaching impact on our lives. And people recognize this.

A wide range of areas are identified as being "most" impacted by hyperconnectivity. These include shopping, industrial production, military, and education. But primarily mobile phones/communication and health/healthcare – functions central to today's society.

% selecting area that hyperconnectivity will have big impact on



Ways in which people think hyperscale computing will impact their lives:

"Big data can guide us to travel, shopping, weather, environmental protection, etc., and all aspects can benefit and improve"

Female, 35-44, China

"I believe it will allow us to collect data for medical research faster and more efficiently"

Female, 25-34, USA

"We can see how/what the majority of people do online and therefore learn how to improve the lives of the majority"

Female, 18-24, Israel

"Better analysis of large-scale activities – e.g., traffic management, queue management"

Male, 55-64, UK

Will the impact of hyperconnectivity be positive?

With hyperconnectivity impacting important areas of our lives, such as mobile phones/communication and health/healthcare, 62% of people believe hyperscale computing will have a positive impact over the next five years. This positive outlook compares similarly to much more established technologies, including VR (58%), AI (67%), and 5G (73%).

% stating technology will have positive impact on our lives over next five years



73%
5G



67%
Artificial Intelligence (AI)



62%
Hyperscale Computing



58%
Virtual Reality (VR)

The positive reaction to hyperscale computing, especially given its relative newness, reflects high consumer confidence in technology more broadly.

Our smart-converged devices:

What will devices need to do to thrive in a hyperconnected world?



People identify mobile phones as the area in which hyperconnectivity will have the greatest impact. How it will have an impact relates to how it can support more powerful and more evolved data-dependent devices that will be a bigger part of people's lives than they are today. More powerful devices will need better batteries. More evolved data-driven devices will need to protect data better. And the increased importance of devices means they need to be more reliable than ever.

Three most important factors determining why people like a device:



Great battery life (39%)

Having a long battery life will be increasingly important in our "always on" hyperconnected world

Optimization for low power consumption, energy, and thermal aspects during development of electronics must span hardware and software, chips, systems, and systems of systems. In an always-on world, some applications cannot afford to be offline. It may be okay to stop collecting heart rate data with a fitness tracker during a shower, but a security camera or a critical medical device cannot afford to run out of power or fail because it is exceeding its thermal limits.



Robust security (38%)

Ensuring our devices are secure and never compromised is central to the hyperconnected data economy, and to overcome widespread data privacy anxiety

Unfortunately, not all agents will use data in the best interest of users, so attack surfaces need to be properly secured and intrusion of hackers must be prevented. It's an industry challenge that needs to be addressed, and software and hardware vendors are already working together to ensure security from data creation through transmission and compute. The efforts to ensure that data is secure must never cease.



Consistent reliability (28%)

Ensuring our devices are reliable and never malfunction will become increasingly important reflecting our increased device dependency

Proper verification is critical, for both hardware and software, to achieve reliable operation of all devices. The hyperconnected world is a complex system of systems, and proper interactions need to be validated. In the case of individual failures, safe modes for recovery need to be created.

But device developments will go beyond how they operate. They will expand into how we communicate with them.



How will device communication methods need to evolve with hyperconnectivity?

Hyperconnected devices will need to expand their range of communication methods.

When asked to think about the future of device communication, current methods, such as touch and voice, garner high levels of preference and seem unlikely to become obsolete overnight.

However, newer, innovative methods, namely using face recognition, gesture, eye movements, and even brain activity, also resonate with people.

With the help of hyperconnectivity and hyperscale computing, these new methods are evolving rapidly. Gartner predicts that by 2030, about 5% of employees in North America will use some form of brain machine interface.

The expanding repertoire of methods to communicate with devices is driven by convenience and optimization of the user experience. Our data suggests a future in which devices must be agile in how they communicate: voice will be used in cars to allow hands-free driving and navigation, while gesture will be used in conjunction with touch to make browsing the internet easier.

Flexible building blocks for vision and audio processing are already key components of the Cadence product portfolio to enable hyperscale computing. And there is more to come!

% preferring method of device communication (average across various human-device interactions)

Voice/speech



Touch/physical interaction



Facial recognition



Gestures/hand movements



Brain activity (e.g., thoughts alone provide instructions)



Eye movement/blinking



How “smart-converged” will devices need to be and how should this be positioned?

Learning new communication languages is just one way in which our devices will become smarter. They’ll also become much smarter in their ability to learn our behavior patterns and proactively make decisions on our behalf. But the reaction to hyperconnected smartness isn’t overly positive.

We tested a series of future smart-device scenarios and collected people’s positive and negative emotional responses.

The more personally “intrusive” scenarios, such as a smart speaker suggesting counseling, or a smart fitness watch removing food from a shopping list, evoke “concern”, “fear”, and a feeling of being “controlled”.

So, how do you get around this? Smartness must have a clear and tangible benefit to the user, often outside of actions they can easily do themselves.

For example, the most positively received scenario — a smart security device that contacts the police if it recognizes an unfamiliar intruder, has a clear benefit: to monitor and protect the user and their home while they are not around.

Tomorrow’s smart-converged devices will need to be positioned in a way that upsells a clear benefit without scaring people.

% positive/negative word associations with each smart technology

■ % of associations that are positive
■ % of associations that are negative

A smart security camera contacting the police on your behalf because it recognizes somebody in the garden who is unfamiliar



A smart security camera contacting the police on your behalf because it recognizes somebody in the house who is unfamiliar



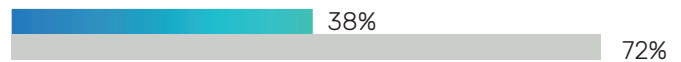
A smart refrigerator ordering you replacement food, so it arrives before the food runs out



A smart wardrobe buying you a new shirt for an upcoming important event you have



A smart fitness watch removing a food or drink item from your automated shopping list because your record shows you are making an unhealthy choice



A smart speaker suggesting that you seek counseling because it heard repeated arguments between you and your partner



How will data security concerns play out in a hyperconnected world?

The full benefits of hyperconnectivity rely on data sharing. After all, hyperscale computing operates in a data economy.

However, people lack confidence in keeping their devices safe from hacking. This is because most people don't know how to protect their data.

Because of this, 41% of people, if given the choice, would rather have entirely on-device data processing. Another 41% would choose a mix of on-device and in-the-cloud processing. Only a 14% would prefer entirely cloud processing.

% stating preferred data processing location for next smartphone

On the device itself, no data leaves the device



Both on the device and in the cloud, some data is sent to the cloud



All in the cloud (locally), cloud servers located in your own country



All in the cloud (globally), cloud servers located outside your country



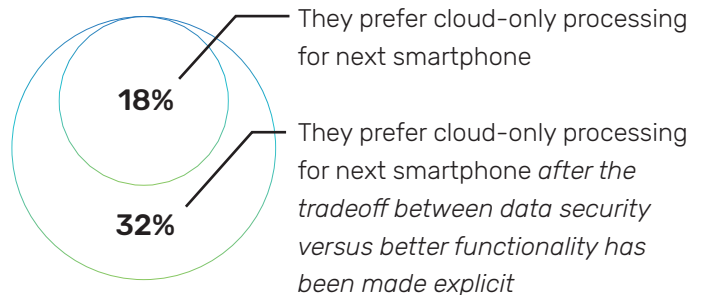
These results, coupled with the context of the global migration to cloud-first processing, imply that many people don't *actually* know where their data is processed and stored.

This lack of transparency by companies using people's data is a direct cause of low consumer confidence. And for the full benefits of hyperconnectivity to be felt, this confidence issue needs to be addressed.

One way to overcome this would be to underline the increased functionality and capability that comes with cloud processing. But we see that people are hesitant to make this tradeoff.

Even after the tradeoff has been made explicit and the user benefit has been understood, only a third of people would prefer cloud-only processing.

% stating...



To take advantage of all that hyperconnectivity has to offer, manufacturers must work towards increasing consumer confidence in data security. This is done by being fully transparent in how people's data is being used and highlighting clearly to the user what they will get back in exchange for sharing their data.

To deserve that trust, devices must be developed from the ground up with safety and security in mind, both key focus areas at Cadence.

Who are people willing to share their data with?

Reflecting this lack of confidence, who people are willing to share their device data with is limited.

Outside of sharing automated meter readings with energy providers, there's little willingness to share energy data with third parties. For example, only 22% are willing to share this data with the government to help track national energy usage and plan environmental initiatives.

And while 45% of people would be willing to share their smart refrigerator data with the manufacturer to receive software updates and diagnose any problems, there is little appetite to share outside of this purpose.

So why are people more willing to share data for some purposes over others?

People like technology that removes tedious tasks from the user, such as automated meter readings or software updates. To the point where the convenience outweighs the negatives of data sharing. Convenience, therefore, is key in overcoming data sharing reluctance.

% stating willingness to share smart energy meter data with...

The energy provider, so no need for meter readings



Other energy providers, so they can offer rates that suit your usage



Government, so they can help track national energy usage and plan environmental initiatives



% stating willingness to share smart refrigerator data with...

The refrigerator manufacturer, so they can send software updates and diagnose any problems



Health insurance companies, so they can better assess how healthy you are by the food you eat



Food retailers, so they can target you with online food offers and discounts





Our intelligent cars:

How will hyperconnectivity redefine our cars for better or for worse, and how will people react to this?



Hyperconnectivity has the potential to impact many devices. However, a car is the ultimate device.

And as cars become more connected, hyperscale computing will enable fundamental changes to the cars we drive in the future, both within the car and how they interact with the environment. They'll become smarter, safer, and more convenient. But they'll also be more in control. How will this make us feel?

Which intelligent car features do people want as part of this future?

When thinking about cars in 2025, the idea of frictionless car maintenance resonates strongly.

The ability to upgrade your car via software updates, have it serviced by IT technicians, rather than mechanics, and order replacement parts when sensors indicate they're about to break, are all positively received due to their convenience merits.

The ability to buy products or services using in-car technology is also positively received. This reflects a desire for 2025's cars to be even more connected, leading to a more convenient driving experience.

% positive/negative word associations with each car feature/functionality

■ % of associations that are positive
■ % of associations that are negative

Ability to upgrade your car via software updates



Options to buy general products or services with in-car technology



Cars being serviced by IT technicians and mechanics



Replacement parts automatically ordered when sensors indicate they're about to break



Autonomous cars that prioritize the safety of groups of pedestrians over the driver in a collision



Autonomous and older, non-autonomous, cars being on the road together



Cars that track and record where you go and store the data in the cloud



What will make a intelligent car feel advanced?

Connectivity will also be important in judging how “advanced” a car will be in 2025. The third and fourth most important factors are both connectivity-related: the car’s ability to follow commands by voice recognition, and the car’s ability to communicate with smart city infrastructure.

But connectivity alone won’t make a car advanced in 2025. In 2025, advanced cars will be defined by autonomy.

Autonomous assisted driving features and the car’s ability to drive fully by itself will be most important in determining how advanced a car will be in 2025.

This is twice as important as brand, traditionally the number one factor in any car purchase. In 2025, brands will be judged on how advanced they are by their level of autonomy and autonomous features.

% stating most important in determining how advanced a car will be in 2025



19%

Car’s ability to assist with driving (e.g., lane adjustments, semi-autonomous)



17%

Car’s ability to drive by itself (fully autonomous)



15%

Car’s ability to understand the driver and follow commands by voice recognition



13%

Car’s ability to communicate with smart city infrastructure (e.g., smart traffic lights)



8%

The manufacturer/brand of the car



Autonomy is advanced – but how does it make people feel?

The momentum towards autonomy is recognized by most people, but that doesn't mean everyone is ready and willing to embrace it.

To some, autonomy is scary. 21% fear the idea of autonomous and older, non-autonomous, cars being on the road together. While another 19% fear autonomous cars prioritizing the safety of pedestrians over the driver in a collision. But there is a bigger challenge for autonomous technology.

While autonomy may offer the ultimate convenience by giving people back what was once hours of driving time, this comes at the expense of relinquishing control, which many people are not willing to do.

Thinking ahead to 2025, only 22% of people would choose a car that's "fully in control" versus 78% choosing a car that "allows the driver to have control". Only 21% would choose a car that "can't have autonomy removed" versus 79% choosing a car "whose autonomy can be turned off". And only 29% would choose a car that "does things for me" versus 71% choosing a car that "advises me what to do".

Ensuring drivers retain some agency over the car's decisions is critical to autonomy's acceptance. Therefore, autonomous technology needs to be positioned as a collaboration between technology and driver, not as one replacing the other.

% stating they would prefer a car that:



22%

Is fully in control

78%

Allows me to have control



21%

Can't have its
autonomy disabled

79%

Can have its
autonomy disabled



29%

Does things for them

71%

Advises them what to do



What will “safety” look like in an intelligent car?

One area where collaboration between the driver and the car will be needed is safety. Autonomous features using driving data to prompt and correct the driver will increase the safety of both passengers and pedestrians.

But as all cars on the road become safer, what determines a safe car will also evolve. And as cars become more like devices and are plugged into the data economy, a car’s data security will become a defining factor.

How hard a car’s software is to hack and the security of the driver’s personal data are the second and third most important factors in determining how safe a car will be in 2025.

Much like handheld devices, cars might become susceptible to data hacking and data misuse. This means car manufacturers will need to prioritize data security and be transparent in how a car’s data is used to ensure confidence remains high.

Without confidence in a car’s data security, drivers won’t be willing to share the data, and as a result, won’t get the full benefits of what an intelligent car can offer them. One more reason why one of Cadence’s focus areas is the enabling of automotive development with safety and security in mind!

% stating most important in determining how safe a car will be in 2025:



21%

How much it prioritizes driver/passenger safety



15%

How hard its driving software is to hack



14%

How secure the driver’s personal data is



12%

Speed of switching between autonomous and driver control



12%

How much it prioritizes pedestrian safety



Our digital health:

How will hyperconnected technology impact healthcare, and are we ready to trust it?



We've seen how technology will make the roads safer. But technology will also have a more direct impact on our long-term health and well-being. From wearables and the rapid increase in health data, to AI and robotic doctors, hyperconnected technology will have a profound impact on our health over the next decade.

But digital health depends on one key question...

Are people willing to share their health data?

Much like sharing data is a barrier in situations where our lives are at risk on the road, some people lack trust about sharing data when doing so can impact their health. This is critical as personal data is central to how technology supports healthcare.

While most people trust physicians (73%) and hospitals (71%) with their personal medical data, a large minority of people don't, meaning not everyone is ready to benefit from the advantages of data-driven healthcare.

We also see far lower levels of trust in employers (45%), the government (40%), or more commercially minded parties – technology brands (41%), healthcare brands (44%), or insurance providers (41%) – having access to our personal medical data.

This reinforces the fact that people are willing to share their data when they're confident it'll make their lives easier. But when they're less sure, they're reluctant to. The tradeoff is less favorable when it comes to sharing medical data with employers, governments, and commercial parties. When this is the case, concern around data security and data misuse rises to the top.

% stating they trust the following with their personal medical data:

Personal physician



Hospital



My employer



Healthcare brands



Insurance providers



Technology brands



Government



But where does the mistrust lie?

Although we see a lack of trust when it comes to data sharing, the distrust is not in the technology itself.

In fact, this data shows that there are high levels of trust in medical technology “thinking” – i.e., examining and diagnosing. But levels of trust in medical technology “doing”, i.e., operating, are lower. When it comes to “doing”, a collaboration between human doctor and technology is the best route forward.



% stating they are comfortable/concerned with getting medical treatment based solely on a wearable device’s diagnosis (with no interpretation by a doctor) for:

A common cold



Sleep issues



Monitoring stress levels



Heart problems



Sexually transmitted disease



Cancer or other serious illness



How comfortable are people with “thinking-technology” diagnosing them?

Many people are largely comfortable with getting medical treatment after a wearable device diagnosing them (with no interpretation by a doctor). The level of comfort or concern with device diagnosis is largely driven by the severity of the illness.

Less serious health issues, like a common cold, sleep issues, or stress levels are less concerning than more serious health issues, such as cancer, sexually transmitted diseases, or heart problems.

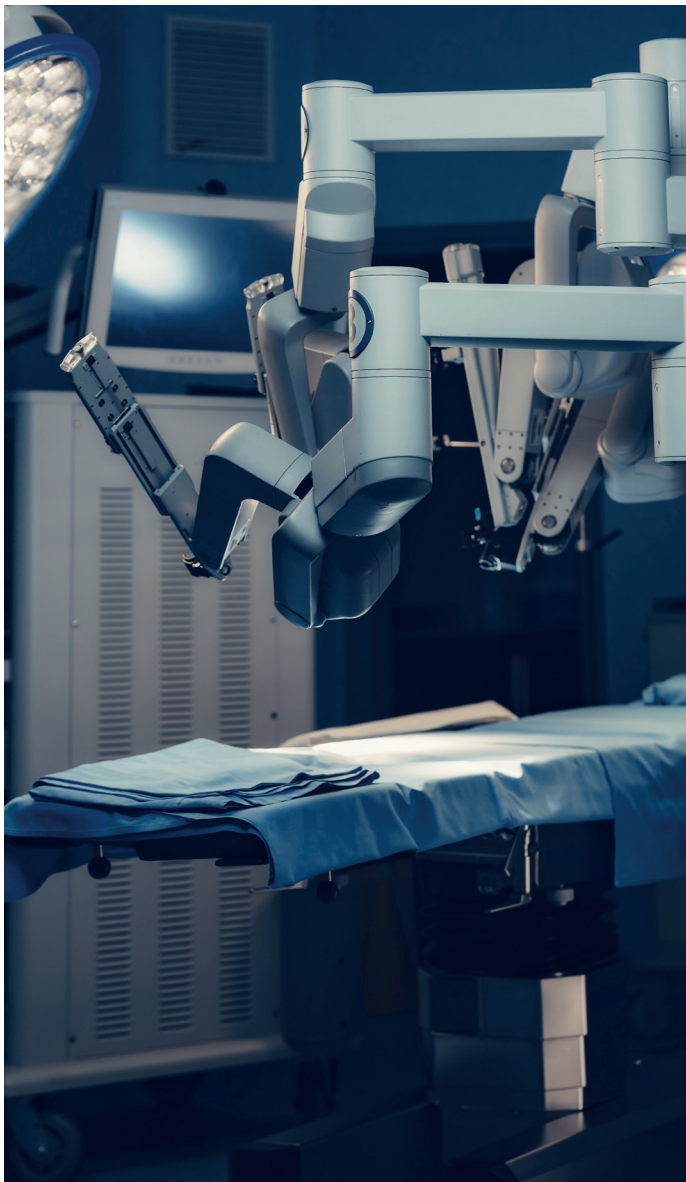
Despite this, 29% of people would be comfortable with receiving medical treatment for cancer based solely on a wearable device’s diagnosis. Although surprising at first, this is supported by technologies that already exist today, such as SkinVision, an app that detects skin cancer, or Breath Biopsy, which uses biomarkers on exhaled breath to detect cancer early.

Outside of wearables, the concept of an AI doctor examining patients for medical conditions is considered “safe” by many people, even without a human doctor present. This is especially true for less serious conditions such as a common cold (62%), and for sleeping issues (55%).

But the additional presence of a human doctor does increase safety perceptions overall.

This is especially true for the more serious conditions, such as cancer, where an AI-alone examination is considered safe by 30% of people, but this increases to 47% with a human doctor present.

This once again highlights the importance of collaboration. Although people place great trust in AI diagnosis, technology should augment, not replace human doctors.



% stating being examined for the following conditions by a form of artificial intelligence is “safe”

Safe - without a human doctor interpreting the data **Safe - with a human doctor interpreting the data**

A common cold



Sleep issues



Monitoring stress levels



Heart problems



Sexually transmitted disease






Cancer or other serious illness



How comfortable are people with “doing-technology” operating on them?

And this collaborative approach is even more important to people when it comes to surgery.

% stating it is “safe” to have minor/major surgery conducted by:

	Safe - Minor surgery	Safe - Major surgery
 A doctor I know with no robot help	76%	71%
 A robot guided by a doctor I know	64%	59%
 A robot with no human intervention	30%	28%

Only 30% of people believe a robot performing minor surgery alone, without a doctor present, is safe. And this number decreases to 28% for major surgery.

However, a robot guided by a human doctor is considered safe by 64% of people for minor surgery and 59% for major surgery.

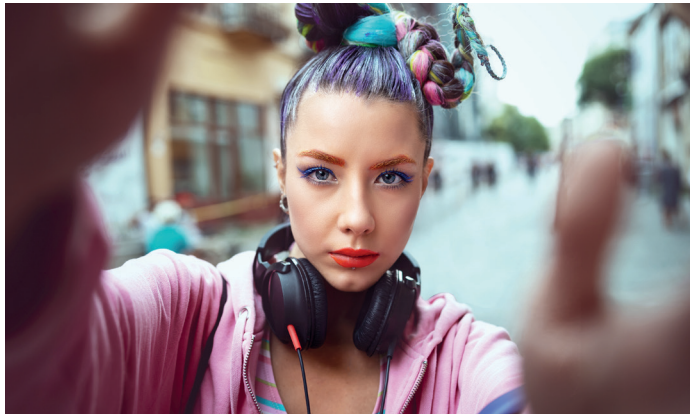
And while people might believe that a human doctor alone is the safest method, this once again underlines the importance of technology and humans coming together, to instill the necessary confidence in people.

Only when people have this confidence can they take full advantage of what hyperconnected technology can offer.



The impact of hyperconnectivity will be vast and wide-reaching. It will impact all generations – from Gen Z through to Baby Boomers. But how does the reaction to hyperconnectivity and its impact differ depending on age?

The generational perspective on hyperconnectivity



Gen Z (aged 18-23)

Progressive skepticism

Gen Z are generally more optimistic than Baby Boomers, but less optimistic than Gen Y and X with regard to the impact emerging technologies are going to have on our lives in the next five years. Perhaps the growing rates of cyberbullying, youth anxiety, and depression are forcing Gen Z to re-evaluate their relationship with technology, pushing their opinions more towards Baby Boomers.

Gen Z sees hyperconnectivity having less of an impact on health and healthcare compared to other generations. This is likely a reflection of fewer interactions/less reliance with healthcare systems compared to their older counterparts.

They are the most progressive when it comes to interaction with technology preferring future methods (such as hand gestures or brain activity) in greater numbers than other generations.



Gen Y (aged 24-39)

Confidently optimistic

Gen Y have the greatest knowledge of new technologies, particularly hyperconnectivity and the internet of things.

They are also the most positive when it comes to future car technology scenarios, particularly in-car data being used to influence insurance costs.

Gen Y is the least likely to want mobile phone data to be processed solely on the device, recognizing the benefits of the cloud.

They are also the most comfortable with receiving medical treatment based on diagnoses by a wearable or AI.





Gen X (40-55)

Tempered optimism

Gen X share many of the same views about technology and hyperconnectivity as Gen Y, with some slight nuance.

They are less knowledgeable about hyperconnectivity than Gen Y, but they are the most confident about protecting their devices from hacking.

Gen X are generally less likely than Gen Y to want to share their data. This is particularly true for brands and government.



Baby Boomers (aged 56+)

Cautiously traditional

Baby Boomers are often unique in their responses. They are by far the most concerned about the privacy of their data. This is coupled with the lowest confidence that their devices won't be hacked.

They value reliability over being able to process lots of tasks at once more than other generations and don't want their data to leave their devices. They dislike the idea of technology taking decisions away from them the most as well as technology tracking where they are.

They are also more likely to want a doctor to double-check any diagnoses from wearable technology or AI. Along with Gen Y and X, Baby Boomers recognize healthcare as one of the areas where hyperconnectivity is going to have the largest impact.



What are the implications of these generational differences?

Hyperconnected technology must cater to all people. But as we've learned, the needs and concerns of people differ significantly by age. This poses some challenges for hyperconnectivity and the technologies it enables.

While older people could benefit greatly from hyperconnectivity via increased convenience and better healthcare, their data security concerns must first be overcome. Investments in security must be a priority, but equally important is the way security is communicated to a group of consumers who are less aware and more naturally cautious of new technologies.


The advocates of hyperconnectivity and early adopters are likely to come from Gen X and Gen Y. Juggling work and family life means even greater device dependency in an "always-on" world. This leads to a greater willingness to let technology into their lives and means convenience messaging typically overrides any data concerns.

But while you might expect this acceptance to grow even further with the youngest consumers, Gen Z bucks the trend. They have a unique perspective on technology. On one hand, they are embracing of innovation, such as communicating with devices via brain activity. But they also exhibit more concern, caution, and skepticism than Gen X and Gen Y.

Will this pose a challenge for technology and hyperconnectivity and hyperscale computing in the long run? Or will Gen Z consumers become more accepting of technologies as they grow older?

Only time will tell.





"Progress lies not in enhancing what is, but in advancing toward what will be." (Khalil Gibran)

Hyperconnectivity already impacts our lives, but its true impact will be felt in the near future. This is because it enables today's technologies to mature, while nurturing the technologies of tomorrow. However, it must be applied sensitively and pragmatically. This is done by listening to the people whom it serves and whose data it uses. With this, we will realize the true contribution that hyperconnectivity can make in advancing the lives of people around the world.



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