

# Internet

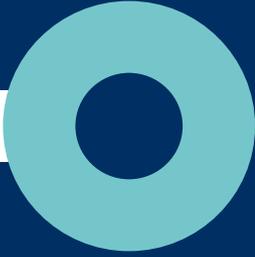
# 4.0

**Insights Report**

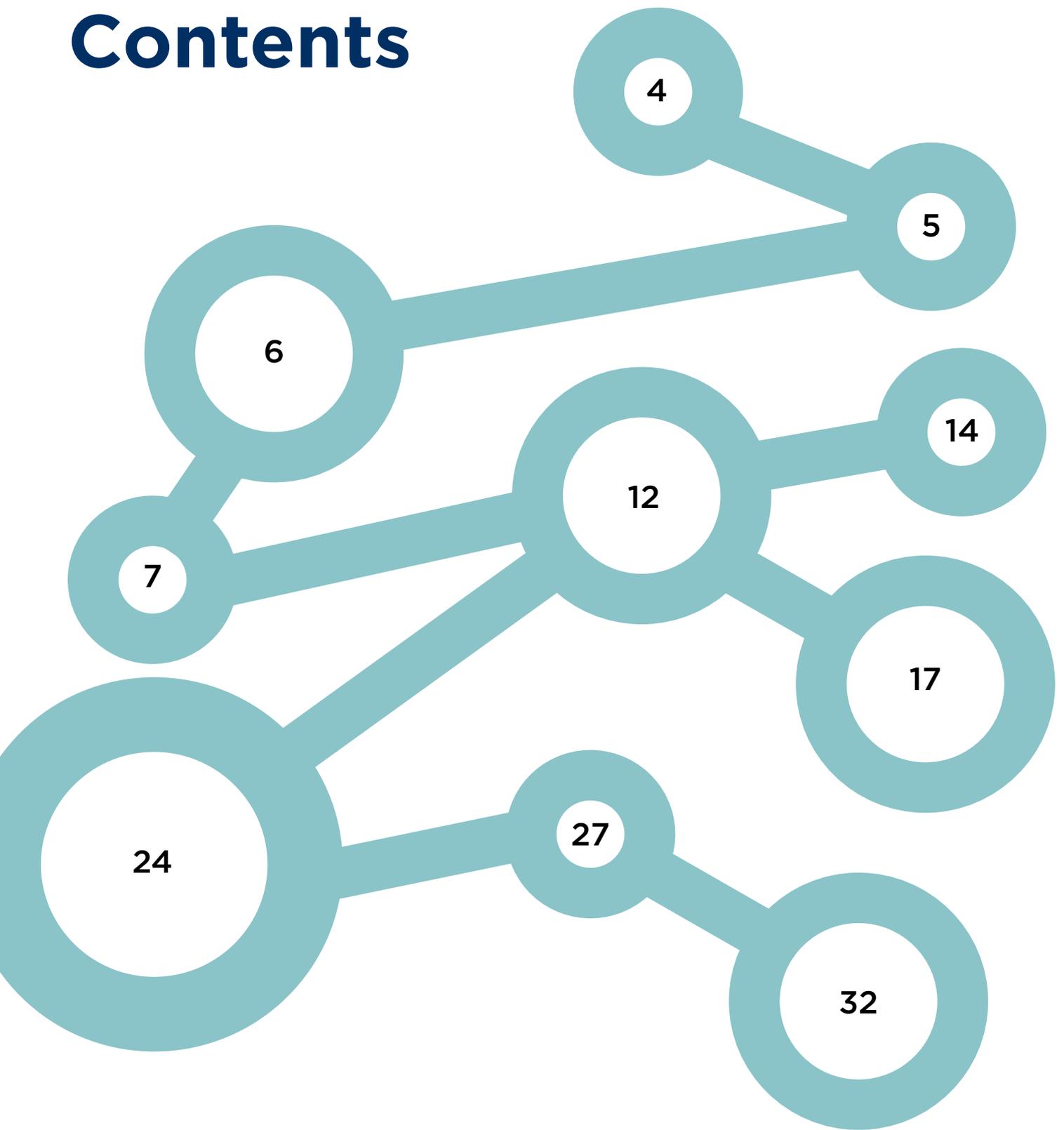
**Explore how graphic communication will utilise Internet 4.0 and how this has an impact across a variety of social and global sectors.**

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**By Matthew Gower**



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# Aims



**What extent is graphic communication used within Internet 4.0.**

**Explore what people know and how they perceive Internet 4.0.**

**To provide a clear explanation of Internet 4.0 across sectors to improve public understanding.**

# Objectives



**Review examples of graphic communication within different areas of Internet 4.0.**

**Investigate perception and attitudes towards internet 4.0 and how people interact with it.**

**Compare Internet 4.0 to previous generations across a variety of areas, e.g. IoT, IoV, public and private.**

**Identify if any improvements or alterations are required to develop the public's understanding on Internet 4.0 on a personal or global level.**

# Methodology



A number of surveys were carried out to gauge people's understanding and point of views, as an initial way to gather basic information and themes. Surveys were chosen because it allows for a wide range of responses to be gathered across a variety of different demographics. This is supported by Susan E. DeFranzo (2012) in the article "4 Main Benefits of Survey Research" which states "No other research method can provide this broad capability, which ensures a more accurate sample".

This impacted on the interview stage of a range of demographics, using themes highlighted in the surveys. With the aim to gather a more in-depth view on the subject matter. Doing interviews allows for more information to be picked up in respects of the interviewee being able to elaborate more than they previously had the opportunity to do so.



The interviews were carried out in a conversational style to allow this to happen. The article “Research Methods Guide: Interview Research” (Virginia Tech, 2018) says:

*“Interviews are most effective for qualitative research: They help you explain, better understand, and explore research subjects’ opinions, behaviour, experiences, phenomenon”.*

Secondary research was then carried out online into a variety of articles and journals looking into the different areas within internet 4.0 because it’s a topic which can move on quickly and books may become outdated faster.

# History of the Internet

The internet was first invented in 1989 by Sir Tim Bernes-Lee and is based around a two pillar system; HTML language, which is the code that allows for the creation of a website and the protocol for exchanging the HTTP hypertext. This is the system that lets the user request and then receive a web page.

With the creation of the website came the first opportunity for design and designers to be introduced into the internet, but the technology at the time meant that these were limited to static images and heavily text based. These sites were mainly used within the businesses sector and the scientific industry. For example, Gil Pres (2015) said in the article *“A Very Short History Of The Internet And The Web”*, *“The first website in the United States goes live, home to the SLAC National Accelerator Laboratory”*.

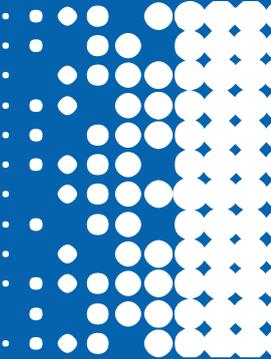
However, in 1996 a piece of software was released called “FutureSplash” which enabled designers to produce animations and upload them to the internet. This software would go on to become what we know now as Flash. This introduced the interactive online experiences to the masses, which meant that rather than just looking at information users were able to interact, enjoy and get more out of the experience.

This was beneficial because it meant that it would attract more people to those websites and the internet as a whole.

Due to the simplicity of the Flash interface, it gave designers the opportunity to create complex animations and integrate them straight into web browsers, without having to use any code. Designers were then able to create visually appealing websites for clients and themselves.



The next step for Flash was to allow videos to be encoded into websites, this dramatically improved the user experience of the internet and made it appealing to all ages.



This was clearly evident when “*Microsoft needed a software capable of showing video on their website, MSN*”, said Will Bedingfield (2019) in “*The rise and fall of Flash, the annoying plugin that shaped the modern web*”.

From here on users expected to have animations or videos in their online experience, as the internet was now so much more than just static images. It gave the users a level interactivity they’ve never seen or had online before, and started a whole new generation of flash animators, whether you were a professional designer or a novice who was experimenting because the software was simple enough to use. It was also instrumental in helping bring visual artists online.

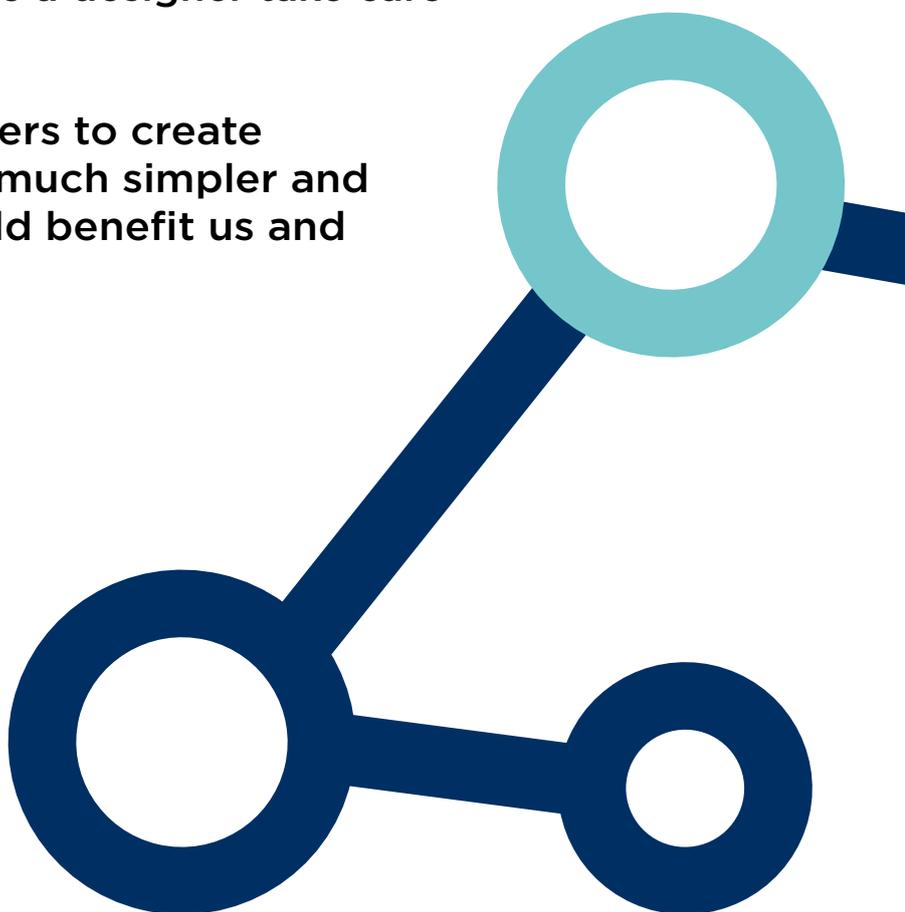


Flash then introduced Actionscript, which allowed designers to create even more dynamic and interactive experiences, as well as insert information from other sources and databases. From a commercial aspect this time also saw the rise of e-commerce, such as eBay and Amazon, and the rise of media-based websites. It was a huge advantage for social media sites such as Facebook, as they were able to create and publish new and more advanced games and GIFs (graphics interchange format) for users. However, this step forward also affected the advertisements and pop-ups throughout websites which were able to entice users more than ever before.

This all changed when Apple released the iPhone, it was the most advanced phone on the market but didn't support Flash. Although Flash did wonders for User Experience (UX) in certain areas, it was also battery draining. This wouldn't work in the mobile generation as this was "about low power devices, touch interfaces and open web standards" wrote Steve Jobs.

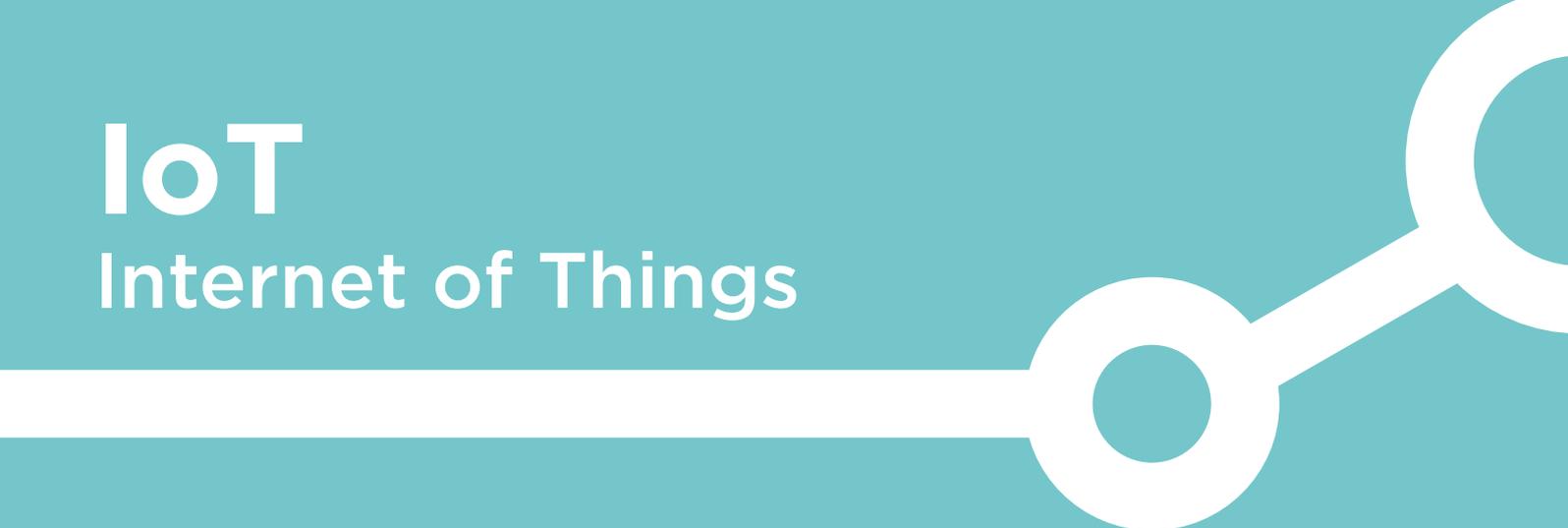
This new mobile era brought around a multitude of new areas for designers to think about, such as a different way to think about UX and User Interface (UI) design within a web site, and the new ways to use responsive or flexible websites. With these advantages it brought about sites such as Wix or Web flow that allow users to create websites based of a selected template. This had its pros and cons from a designer perspective, as it meant that anyone would be able turn out a half decent website and try and sell it off as they were a professional. This meant that lots of businesses ended up having very basic and non-user-friendly sites, so would end up having to spend even more money to get it fixed and have a designer take care of it and keep it updated.

However, it did allow designers to create what a client may want in a much simpler and time effective way that would benefit us and their business.



# IoT

## Internet of Things



Internet 4.0, or the “Ambient Internet” as said by Tristan Louis (2017) in the blog “Internet 4.0: The Ambient Internet is Here”, is the next step forward for the Internet. It is gradually moving away from the social or mobile internet that brought about app stores and mass social network participation, which changed the way how and what information is being shared and stored about us. As people become more aware of what information is being recorded about them by technology leaders, highlighted by the Cambridge Analytica scandal.

This coincides with the launch of many home AI (Artificial Intelligence) assistants, that is one part of the next step, the Internet of Things (IoT).

The Internet of Things is the moving of the internet into physical devices. IoT devices can help with issues across the globe from being in the new smart cities that help monitor air quality, to wearable devices that inform you when your most productive. These devices will help the internet move away from being an asset we have to think about, to being something that is available everywhere, similar to water and electricity. It will be fundamental service that is connected to everything around you.



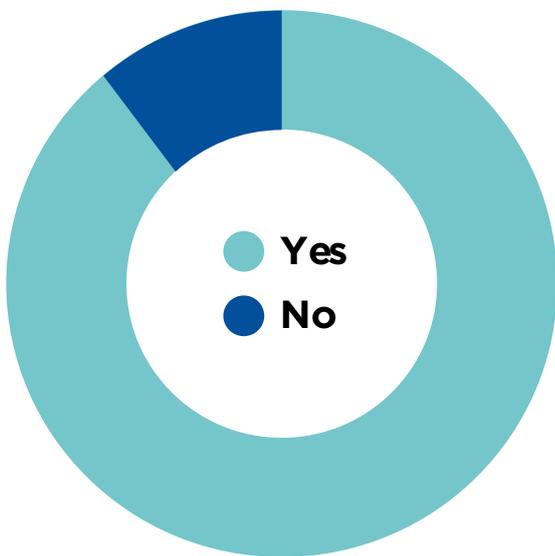
IoT will allow users to have instant data access so that it is easier to get information and make a decision based on this, but it does come with some concerns around what information or data is being recorded about a user. Also, as more and more of our devices become connected to the internet, such as fridges, washing machines and TV screens, it gives more opportunity for hackers to gain confidential information. An article in E&T by Ben Heubl (2019) says:

*“hackers could easily encounter an easy way into our systems and private lives, and perhaps even more worryingly, identify potential access to critical infrastructure systems”.*

As are devices become more connected to each other, which is great for being more efficient and having quality control, it does mean that the network that they use will become even more complex. So, if an issue were to arise it may have huge ramifications and consequences.

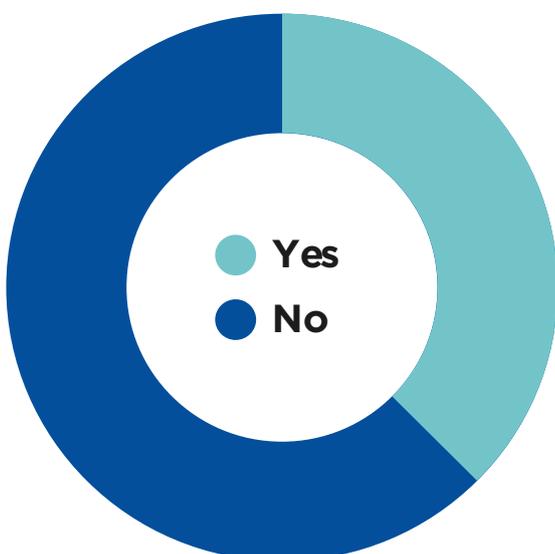
# Survey 1.0

To get a better understanding on the public's knowledge I've conducted a survey of thirty-four people of a range of demographics. I think the survey will show little evidence that the recipients have a grasp on the subject area and therefore may need to be educated in this area.



Do you know how the internet works?

During the survey the question “Do you know how the internet works?” was asked, where the majority of responses said “Yes”. With the result being so compelling, I suspect that the question was not worded in such a way to make people think about how the internet really works. I presume that the recipients think it is just opening a web browser and using a search engine.



Have you heard of the term internet of things?

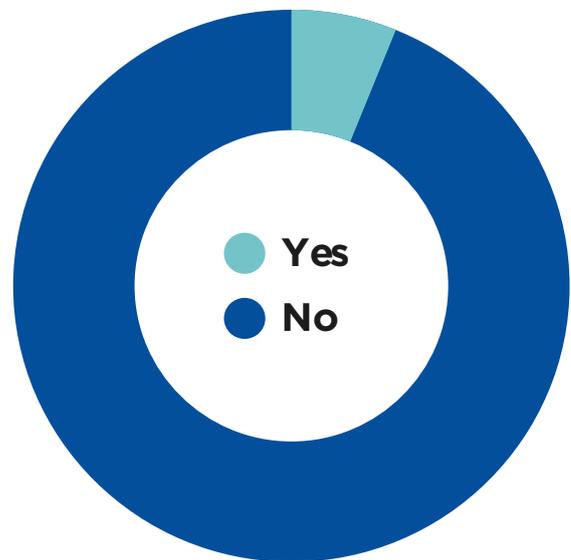
Another question asked was “Have you heard of the term internet of things?”, the results of this were slightly surprising as I expected less people to have heard of the term, as well as this the people that had answered “Yes” were of a younger demographic. This would suggest that people under the age of thirty have a better understanding of new emerging technologies, which would resonate as they tend to be more up to date with trends. 13

Contradictory to this, when the question “Do you know how the Internet of Things works?” a far greater percentage did not know what it actual meant. To me this suggests that IoT technologies are starting to make an impact on people’s lives at a slow pace as they gradually become part of our homes. However, people do not yet have a great understanding of the technologies or the possible impact it may have on their lives in the future.

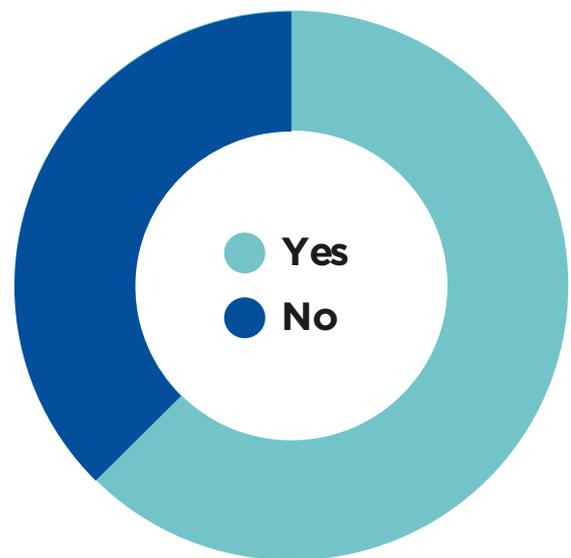
It is clear to see IoT’s are starting to have an influence on people’s lives, mainly through the use of home assistants, and this is supported by the result of my survey. Although it was not by as big of a margin as expected.

The study then went onto ask how people feel interacting with the home assistant using voice recognition on a basic level. With the result showing that its very close between people liking and not liking using voice-controlled devices.

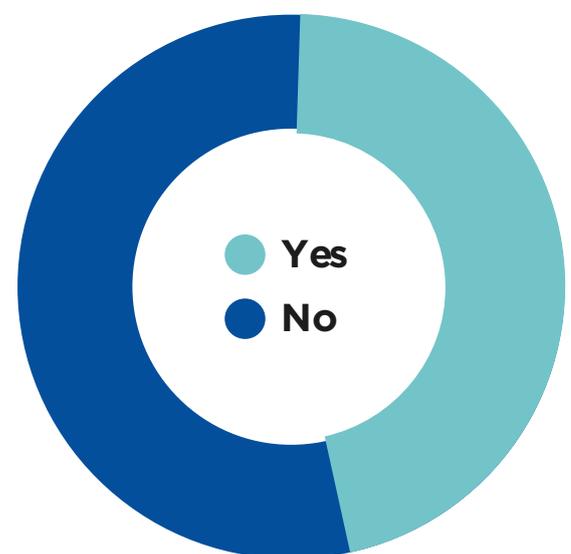
This suggests that these devices still have several hurdles to overcome before becoming part of everyone’s everyday lives. For example, perhaps technology companies need to rethink the user experience and interface of the devices, to make users want to use and interact with them.



Do you know how the Internet of Things works?



Do you own smart home devices?

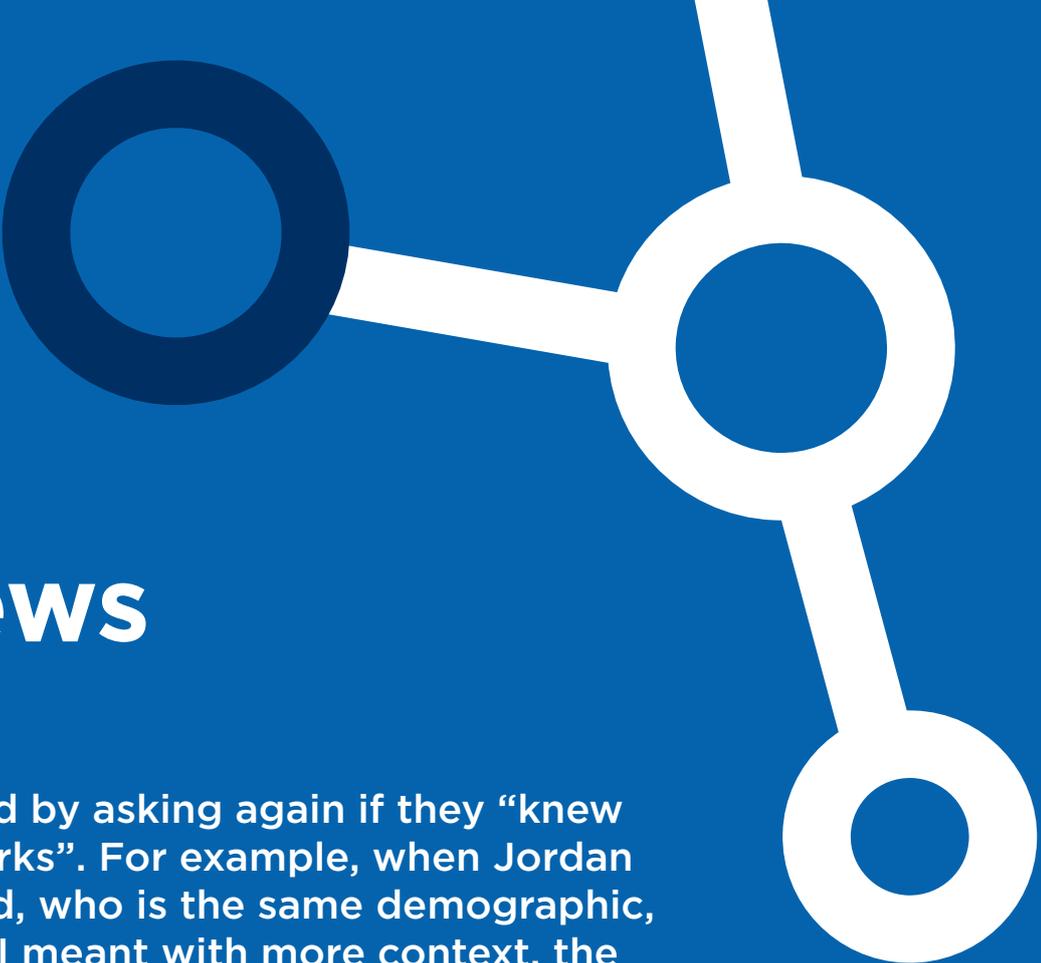


Do you like speaking to devices?

In the next stage interviews of more detailed questions have been asked, to see how people use a home assistant for certain tasks or actions, or whether it's a go to all the time.

# Interviews

Gower, M (2020)



# Interviews

The interview started by asking again if they “knew how the internet works”. For example, when Jordan Hart was interviewed, who is the same demographic, and explained what I meant with more context, the interviewees didn’t know what I was referring to, which shows a lack of understanding on the subject. This perhaps shows the need to educate the public on the internet and how IoT has already impacted their lives.

Then went onto ask “what sort of IoT devices do you have?”, this resonated with my survey results because Rachel Grainger has one IoT device, which is the smart thermostat Hive in her house. To interact with this, she uses the app as she doesn’t own a home assistant with the capability of connecting to it. When asked if she would get an assistant she said “no”, Grainger (2020), as she could not trust them due to the privacy speculation around them. Her reason for having a Hive is that she can base it around her lifestyle and help her save money.

However, when Hart (2020) was asked this question, he said he has a smart watch, smart meter and a Hive device. Again, as he doesn’t have a home assistant, he uses the app to interact with the devices, except for when he’s driving as he can use the speech to text capabilities of his watch to send messages.

Hod Fleishman (2020), who wrote “It’s 2020. Let’s Stop Saying “IoT.” (Part I)” brings to light that even though the term of “Internet of Things” has stuck, in reality we have surpassed what this actually means and that the term is now outdated. He argues that IoT now takes the data that’s been transferred, makes sense of it by putting it into context, then sends this so that an action can be taken. This could be as simple as sending a text alert to say that a shelf is empty and needs to be stocked. This process is a lot more than the original meaning of IoT, so Fleishman says it should have a new name.

During the article he puts forward three areas that are key to IoT’s and its success;

*“Controlling the physical world is a must”*

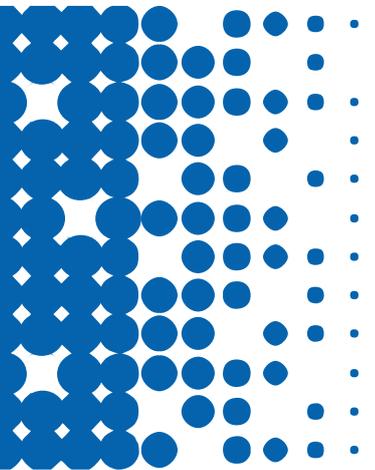
*“Working offline is a must”*

*“Zero-second is a must”*

These are accurate as without them IoT’s would not take off as they won’t be able to match people’s expectations. By the end of this article he goes onto have his final definition of IoT as “Cyber-Physical Edge Computing Enabled Objects” which is not very concise therefore it may have a branding problem and can become difficult when it comes to how we educate people. Making sure that the name of the technology is right is clearly important for the future, as more and more advances are made it could help with the transition into business sectors and how these products are valued when they are combined with other technologies such as AR (Augmented Reality) and VR (Virtual Reality).

With the rise of IoT in recent years designers have had to adapt, mainly about how people have to interact with these new devices and the variety of interfaces they may have. UX design has a wide range of principals that a designer should follow, and each designer may say different ones are the most important, but Katherine Lazarevich (2018) who wrote “5 Keys to Designing Great UX for IoT Products” highlights specific ones regarding IoT. The first which she calls “Simplified Onboarding”, is the way that the design is used to make multi device interaction easier by the use of a simple verification code sent to a centralised app. The next is to make sure you have a consistent user experience across multiple responsive devices, from phones to smartwatches, especially when they are connected to the cloud and update in real time. As well as these, personalisation is a necessity for modern design and technology, but this can’t be achieved without data. Lazarevich says:

*“User experience across IoT systems should be personalized the same way connected devices personalize their performance. In other words, using the data collected along the cross-device use, certain elements should recognize patterns and adjust product behaviour accordingly.”*

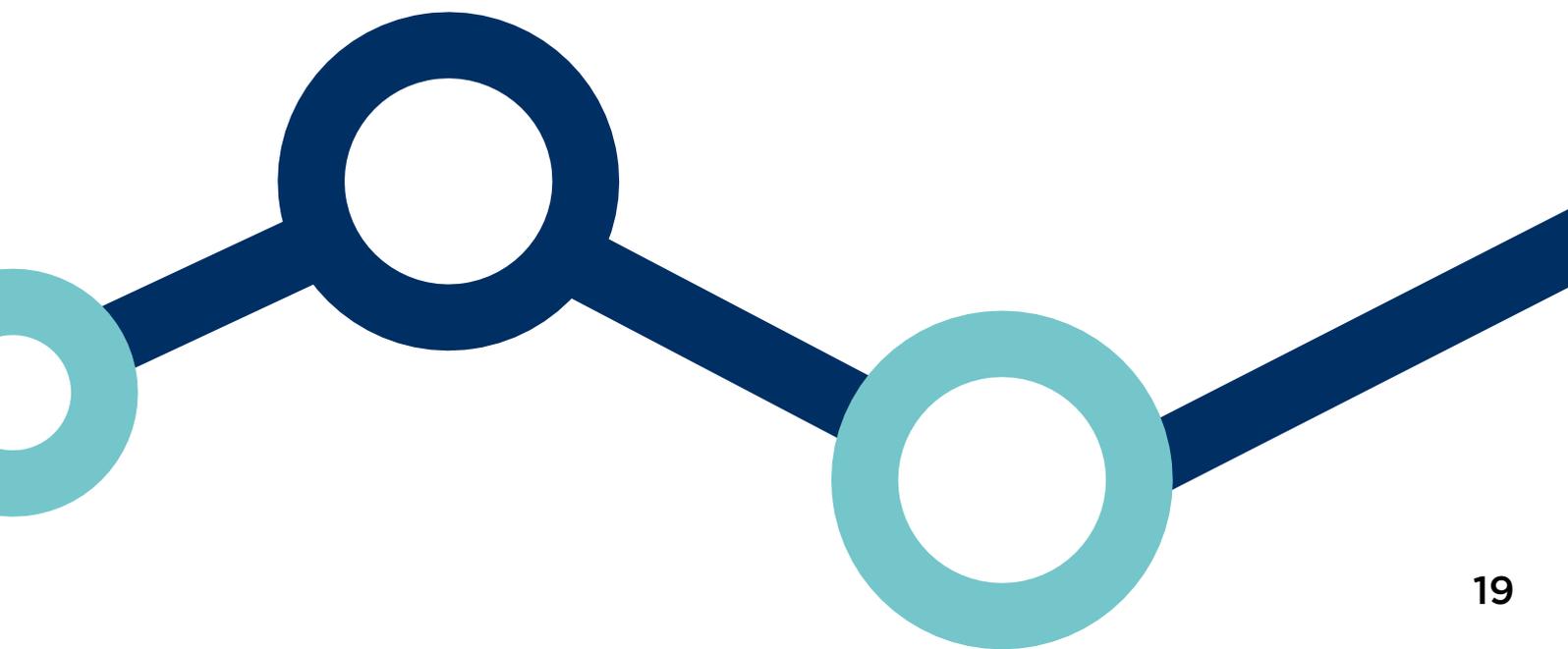


Linked with this she goes onto discuss the “One Space Experience” whereby only necessary data is displayed depending on the device you’re using. For example, a smart watch may only show your heart rate and distance on its small screen but at the same time, on the app it will show a range of more complex data.

The last principal is how to design for new interfaces as the IoT devices become part of our homes, using speech, they are also on the move. As Tesla has now introduced Alexa, which is Amazon’s voice service,into a model of its car.

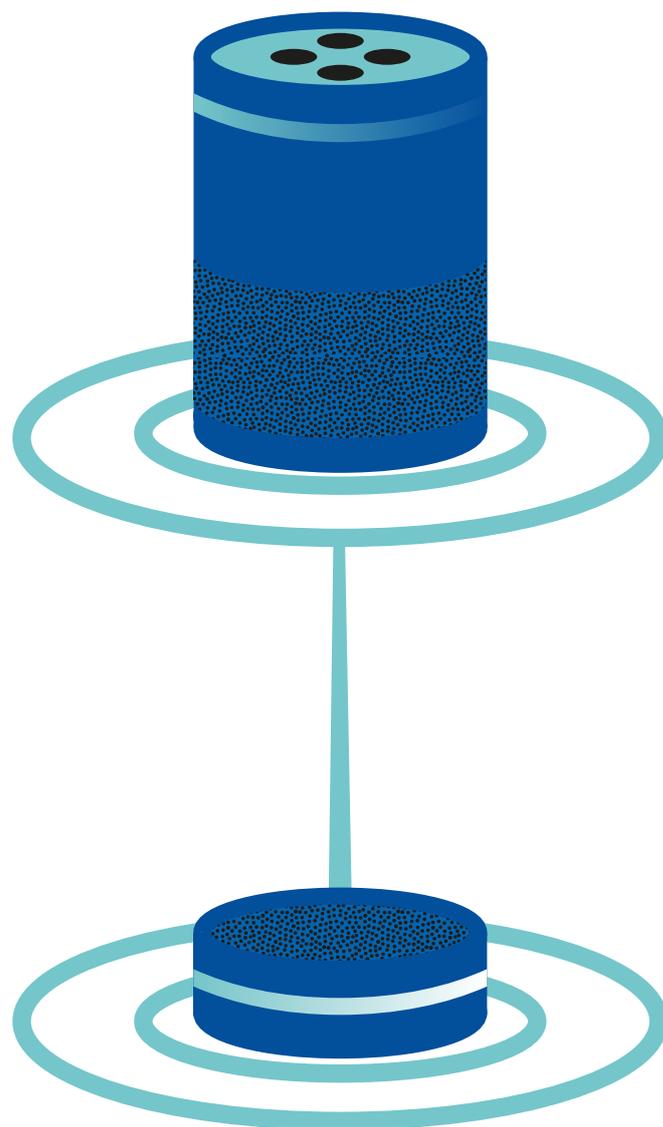
I agree with these findings as they concentrate on a few simple yet significant steps that a designer should be aware of before starting to design for IoT. This is supported by Claire Rowland in the “User Experience Design for the Internet of Things” which says:

“The UX is not just shaped by what the user can see or encounter directly. The basis for a valuable, appealing, usable, and coherent IoT product is created by care for the UX at less visible, systemoriented and strategic levels. This requires a good underlying technical, service, and product framework aligned around user needs. It requires attention to the experience of using the system as a whole.”



Most home assistants for example will use a voice recognition system linked to an AI. But in the future IoT's will be combined with the likes of AR and VR, and designers are going to potentially have to deal with this and keep up with the change that's going to happen. For now, IoT will still need an app as one of the main interfaces, as the public are most used to this and that AR and VR haven't become mainstream yet. This is due to the prices of the headsets, Tom Ffiske (2020) wrote "The standalone headset is

\$400, an acceptable price for the launch of a new games console.", but to make these an everyday device that we can interact with such as an Amazon Echo means the price will have to drop considerably. Yes, he is referring to a games console, but VR gaming is currently and going to be at the forefront of VR technology for many years yet and it may well be the first way it gets brought into the homes of the public on a mass scale.





Another way the user experience of this technology may progress, is with use of gestures and body motion to control a device and connect to the digital world.

For example, Google have introduced Soli, a microchip, into it is phone Pixel 4. It's a "miniature radar that understands human motions at various scales: from the tap of your finger to the movements of your body."

They have designed two apps that allow users to get an understanding of the gestures and figure out how they work. The first of these is the app Pokémon Wave Hello, which has the user wave and swipe in front of the camera to interact with the Pokémon on the screen. While the other is more of a game that makes the user fly a bird using their hand gestures.

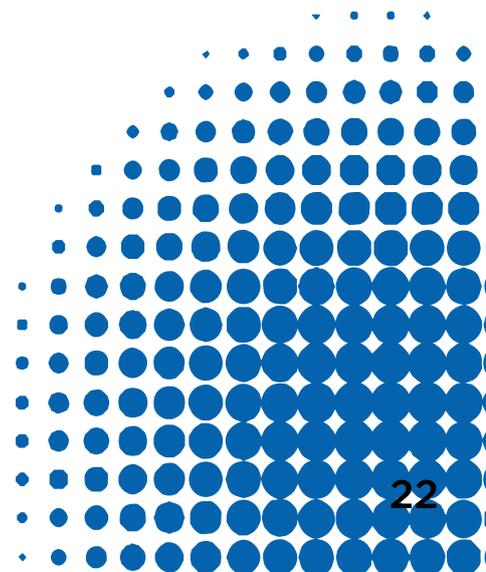
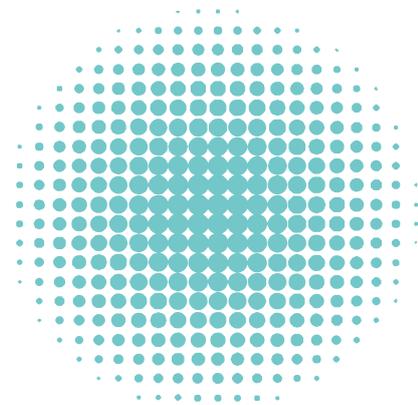
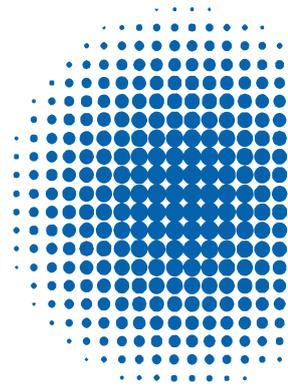
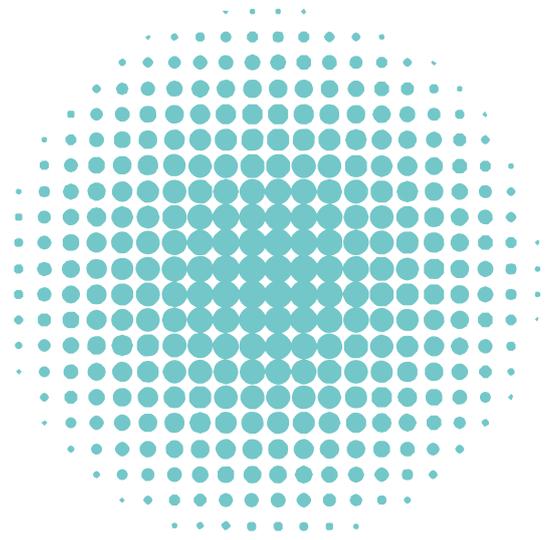
The possibilities within IoT and MR (mixed reality), VR and AR combined offer opportunities for designers, as it's not just a novel or game based experience, which is the stage the author feels it is at. This could be done by merging these technologies and bringing them into a way for people to access information and give commands in their home, so that the products are affordable, and seamlessly integrated into people's lives.

As these technologies grow together it will create useful tools across the globe in a variety of sectors, from engineers using assisted reality to complete a checklist by using hand gestures to say when each task is completed. An important part in the future will be the consistency from UI to UI as people go through their day, this can be from their home assistants which uses voice recognition to using your smartwatch and smart headphones on the way to work, which may use gestures.

An area highlighted in “How to Design Delightful Experiences for the Internet of Things” by Sergio Ortiz (Toptal, no date), is how as designers we may need to rethink how we see and use menus, in the same way burger menus were when mobile phones were introduced. This is already happening especially within the wearable technology industry. This is clearly due to having to work on a considerably smaller screen.

As the UI’s progress with the technology, the output interface will need to be contextualised in that moment, so the IoT will need to know whether a notification is appropriate in that moment or a more intelligent display is needed.

A massive side effect of the progress in these UI’s will be the user experience research that will be needed to make sure that its applicable, from empathy tests and personas to semiotic and ethnographic studies. Companies will need to understand people’s UX at every stage while they develop these in technologies.



# IoV

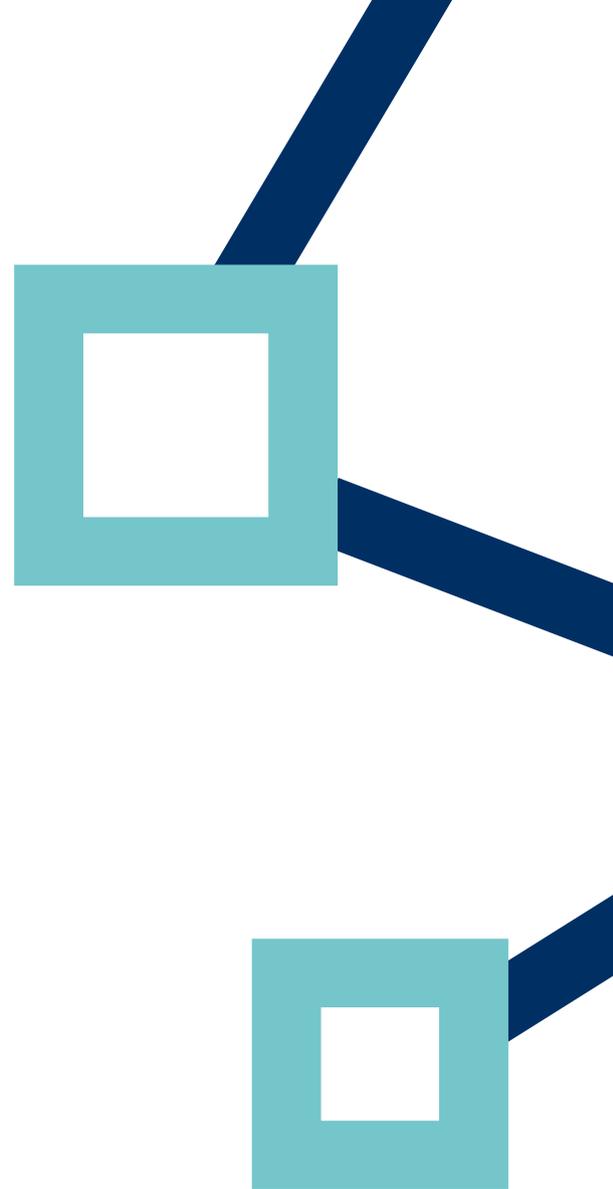
## Internet of Value

Another term that makes up an integral part of the internet 4.0 is Internet of Value. This name was coined by Ripple, a company that specialises in moving money on a global scale. It refers to being able to transfer money as quick as we are now able to transfer information, however not just money, it's anything that has a value to another person. For example; frequent flyer miles, music and stocks.

This next step is all because of Blockchain. Blockchain is decentralised which means that it has no infrastructural central point, as its stored on multiple large computers that are all connected to each other. This technology is also very secure as no single computer can change a protocol of the system, it also has a programmed control system which is unable to be altered without prior agreement, this makes the system trustworthy.

This allows for data to be transferred instantly, as until now when selling or buying an item of value a middleman would have to be involved, such as the bank. However now when you want to transfer an asset of value it is done with no middleman, as its validated by the computers within the network.

Blockchain is currently mainly being used as a way of transferring cryptocurrencies, these are digital currencies like Bitcoin, but one main issue the industry is facing is that each Blockchain system may not be able to connect to each other. This means an asset may not be able to be transferred just like information yet. For this to happen industry standards need to be introduced to bring together each Blockchain.



An article published on the Ripple (2017) website says that:

*“a growing community of financial institutions and payments providers, support Interledger Protocol (ILP), which standardizes how to instantly settle transactions across different ledgers and networks.”*



This ILP would act similar to how HTTP standardised the web browsers.

In Blockchain once a piece of data, such as a transaction, has been validated by the network it cannot be altered or deleted. This has its advantages and disadvantages, for example not being able to change anything provides a level of technological trust previously held by the middleman. On the other hand, it means any errors within the data become impossible to change.

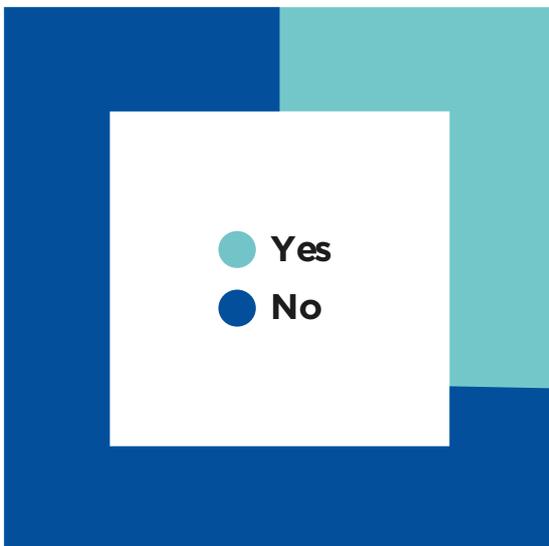
Blockchain is gradually having an impact across a variety of sectors, mainly; healthcare, financial, and banking. However, there is still a lack of understanding surrounding the technology, as supported by the “2019 Trends in Data Management”, Burbank, D. and Knight, M. (2019), report which states:

*“only 7.7% said they would use or were actively using blockchain. This could be due to a lack of understanding, lack of use case necessity, or even security concerns, among many possibilities.”*

With a continued lack of understanding on a global scale it's obvious that this is a key theme to highlight and explore in the next stage.

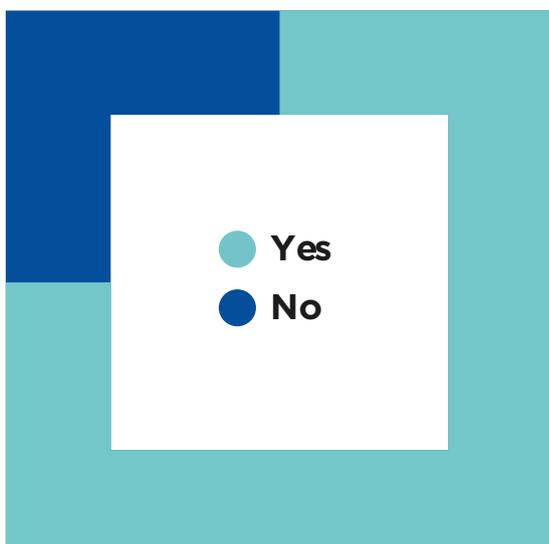
# Survey 2.0

A survey has now been undertaken to see why there is still a lack of understanding, whether it is something people find too hard to understand so don't bother learning, or if its only known within certain sectors where its more prevalent, unlike IoT which is now entering home everywhere so they are more aware.



Have you heard of the term Internet of Value (IoV)?

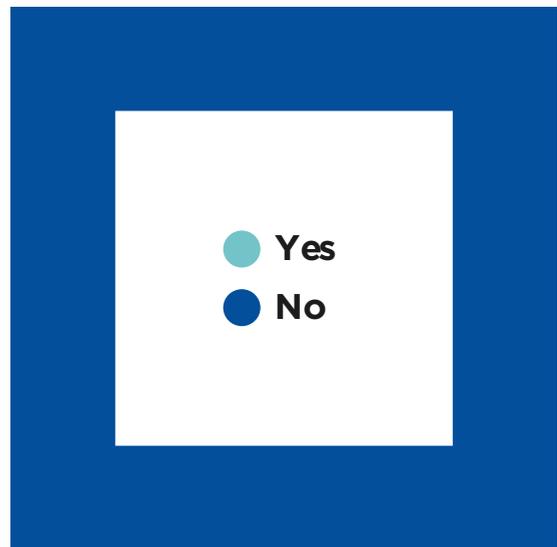
To start the survey, an investigation into if people had heard of the term Internet of Value (IoV) was asked. Which as you can see in the chart to the left, over 65% haven't heard of the term.



Have you heard of the Blockchain?

However, when asked whether people had heard of Blockchain technology these bars switched completely with over 70% saying they had heard of Blockchain. This suggests that people are aware of this development but perhaps only in terms of cryptocurrencies and not the worldwide effect it may have in the future.

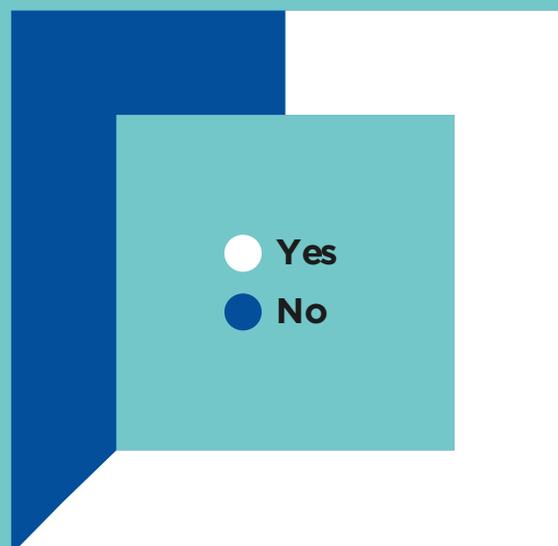
On the other hand, the people who may have heard of Blockchain but everyone who answered the survey didn't know how the technology works, with 100% saying "No".



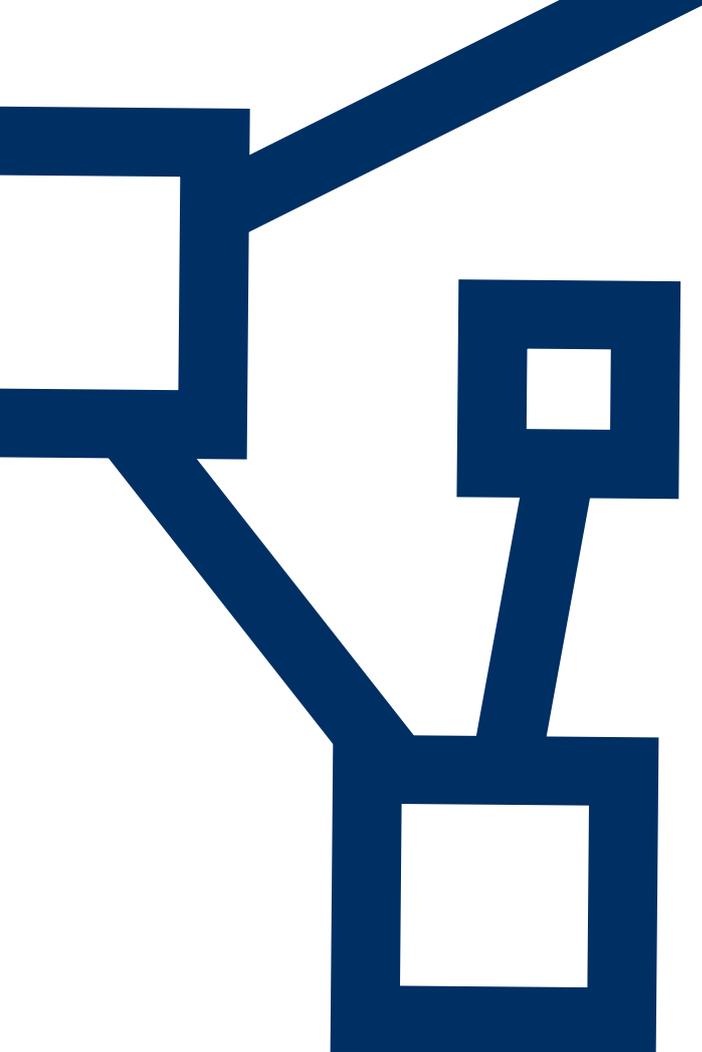
Do you know how Blockchain works?

The survey then went on to ask if people had any experience with Blockchain systems, where again 100% said "No". Along with this the question, "Do you know what cryptocurrency is?", with the result showing that 58% knew what this was. This was asked as a way measure people's participation in this area, as it's currently the biggest public sector that Blockchain operates.

Despite this, when the people that had heard of it were asked, had they gone and bought any and why or why not. With everyone who answered saying no, some of the reasons being they felt it was "untrustworthy" and that they "don't really know how it works". These answers could be an area to explore next after the investigation, such as find a way to get people to trust Blockchain for example.



Do you know what cryptocurrency is?

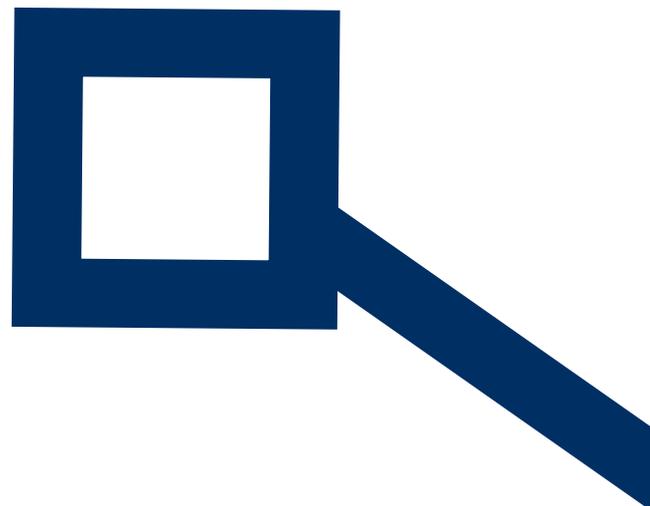


In the future however blockchain will have a massive impact worldwide. Kate Mitselmakher (2018) wrote her predictions in “The Future of Blockchain Technology: Top Five Predictions for 2030”. One of these being that everyone would have a cross border Blockchain identity, this would mean that the population will have an identity platform to have and store legal documentation from government records, employment records, education qualifications and medical records.

When these Blockchain platforms become more of a reality as predicted, it will open up opportunities for designers, they will need to use UX as a way that will gather and simplify the endless amount of potentially complex data that could be available.

One such way that this is currently being embraced is within the gaming industry.

As the popularity of esports continues to grow so does the use of Blockchain within it, for example game developers would be able to use Blockchain to create ledgers where users can track what assets are available and keep track of ownership.



Another use highlighted in “Blockchain Brings The Best Use Case In Gaming Industry”, Blockchain Magazine (2018), is players getting virtual money for uploading assets they’ve created, such as a new world in Minecraft, they could then charge players an entrance fee to experience their world.

When it comes to designing in Blockchain UX design will need at the forefront of every designer’s mind because if it’s not it, the data won’t be aimed and given to the right audiences which would render it irrelevant.

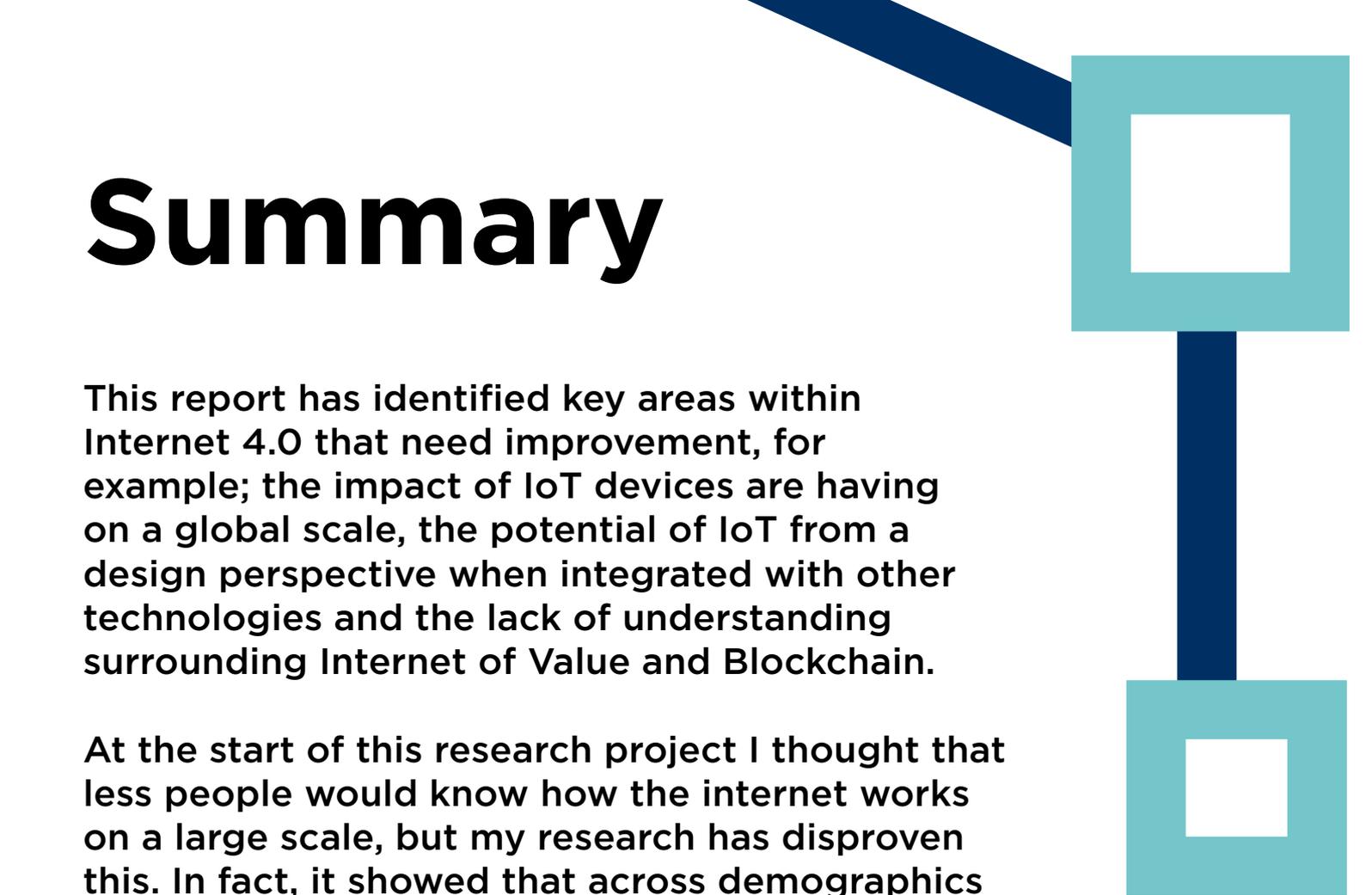
This is mentioned in “Design Thinking for Blockchains” by Engin Erdogan (2018) where he says:

*“the primary role of the designer in a decentralizing world should be to facilitate a creative and inclusive process for system design — otherwise we will end up with beautifully designed applications that serve the benefit of a very small crowd.”*

The article goes onto describe a workshop with the aim of giving participants a better understanding of Blockchain technology but mainly how we can design for it. This workshop had five main activities; draw the ecosystem which identifies trust loops, journey maps to find the needs and priorities, frame opportunities which finds mistakes and turns them into opportunities, design the protocol that looks at what is the motivation to join in and brainstorm applications and implications so what does your protocol achieve?.

Using this sort of technique could be a useful way to explain; Blockchain, IoV, IoT or Internet 4.0 as a whole, through the perspective of a designer or design thinking.

# Summary



This report has identified key areas within Internet 4.0 that need improvement, for example; the impact of IoT devices are having on a global scale, the potential of IoT from a design perspective when integrated with other technologies and the lack of understanding surrounding Internet of Value and Blockchain.

At the start of this research project I thought that less people would know how the internet works on a large scale, but my research has disproven this. In fact, it showed that across demographics there was a more basic understanding than I expected, however when asking about subjects that weren't surface knowledge the level decreased greatly. Even though the terms that were referred to were linked to devices people were starting to have in their homes such as the smart devices, home assistants.

However, from the start of the research I had assumed that people's knowledge surrounding IoV and Blockchain would be lacking and this was backed up with my research. It seems that Blockchain is this big subject that people have heard of but have no grasp of. And highlighted by the survey into this, people who do know about it haven't invested in areas that it's involved in, such as cryptocurrency.

Due to these findings I'm going to rephrase my question to:

**How the Internet of Things could impact issues within today's society?**

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