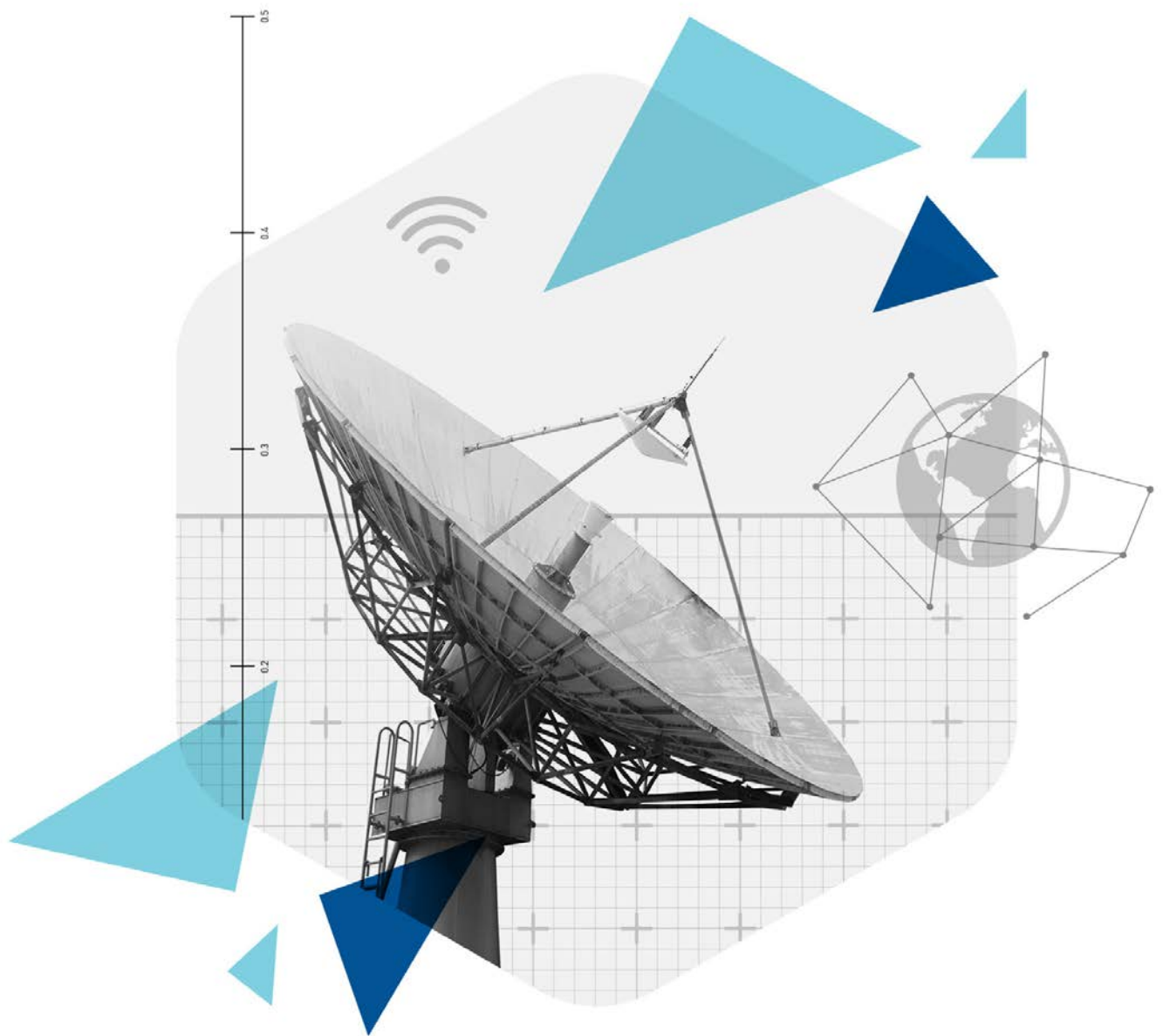


# What the Internet of Things brings to banking

By Dharmesh Mistry, UXP and Digital Product Director, Temenos



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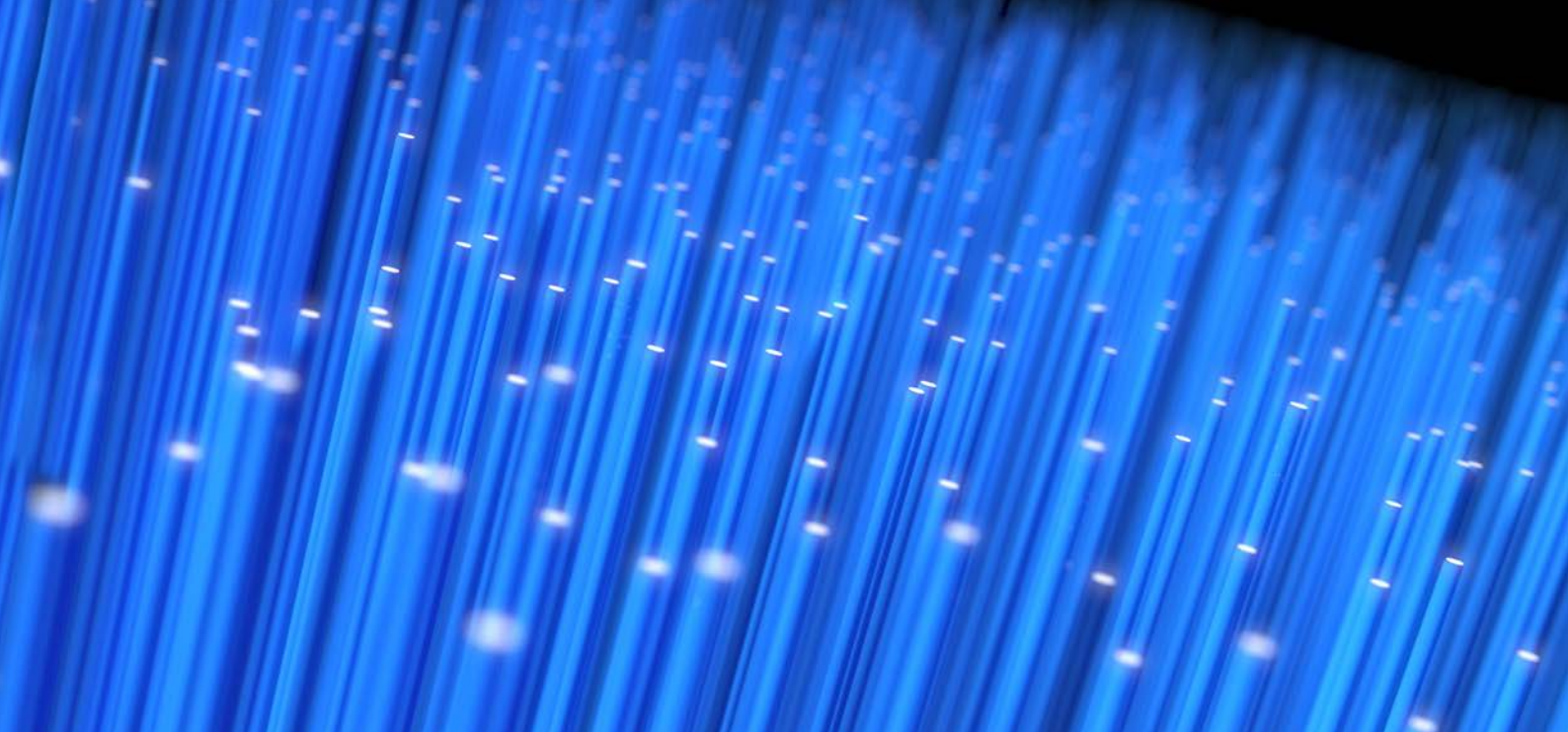
# The Executive Summary

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Sensors and Wi-Fi are changing how we interact with the world around us, bringing a new era of connectivity – dubbed the Internet of Things. With this enhanced connectivity comes the chance to tap into and use any data collected, opening up almost boundless opportunities for business, communities, personal and civic benefit. Central to facilitating much of that potential will be banks.

Our very relationship with banks will be transformed, as will the way they operate. Branches will disappear as we no longer require face-to-face service. Wearables and biometric devices, cars, homes, offices and even the built environment will initiate transactions directly with banks in real time, while banks' role as custodians of our money will grow to include management services to help with budgeting and even health.

The extent of change is limited only by our imagination. Already there are game-changing applications and services being trialled and implemented. It is time for financial services to be provided by the "Bank of Things".



# Introduction

## Dawn of the “Bank of Things”

Over the past 10 years, I’ve seen analysts forecasts of the number of devices connected to the internet grow from 2 billion to 50 billion. The reality is we simply don’t know – and the ever-spiralling statistic is a sign of just how big the potential for this new technology is.

It seems it will soon be possible to connect anything and everything.

We already have a mattress cover that monitors your health; socks that tell you how many times they’ve been worn and washed; 3D printed clothes that adjust to temperature; and milk bottle tops that tell you if the contents have gone off. Meanwhile, toothbrushes, light bulbs, door handles and even pens can all be connected and deliver new services as a result.

### New types of information

A new era of connectivity has begun and with it comes a whole different level of Big Data, as devices emit a constant flow of information. In addition, just as the number and variety of things connected to the internet continues to grow, so does the range of information coming from them. Sensors can provide data on location (GPS),

movement (accelerometer), temperature, pressure and light, for example. And it quickly becomes apparent that the possibilities for this continuous stream of information are limitless.

### Interconnected “things”

Nor does it stop there, because these connected “things” can also communicate with each other. Imagine a washing machine that warns you that you’ve left your phone in the pocket of the jeans you’ve just placed inside it to wash. Or curtains that open when the alarm on your phone wakes you up in the morning (possibly a little later than usual because it has checked your diary for the day ahead and detected that you haven’t slept well).

Again, the possibilities of what could result from devices that are able to talk to each other are endless.

Children are today learning the basics of wiring up sensors and finding ways to employ the resulting data using kits such as Wunderbar, SAM and Kano to build their own gadgets. These are the skill sets of the future – electronics (circuits), APIs/scripting and analytics.

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## The future of banking

The implications of this new connected world are only just starting to be felt. Every industry is in a state of transformation and none more so than banking.

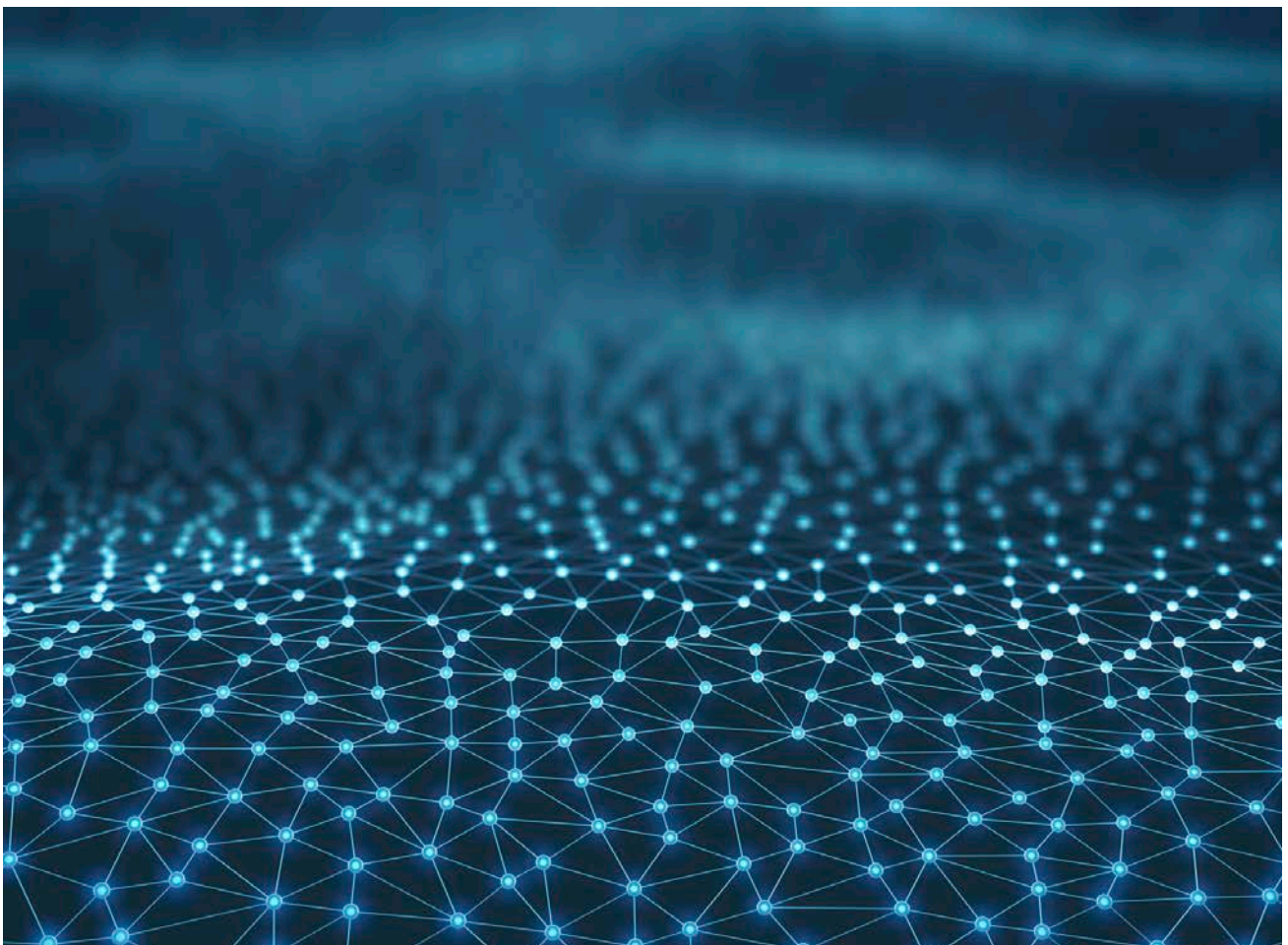
Banks are considering how Big Data could potentially transform what they offer to customers and their relationship with them. This is what I call the “Bank of Things” and in this new world it is likely that banks will want to become the trusted:

- Custodian of the customer’s data – helping to manage privacy and control sharing
- “Infomediary” – acting as an adviser between the customer and sellers
- Payments manager for the customer’s “things”.

## A glimpse of what’s to come

We are on the cusp of a new technological dawn that will clearly bring huge changes for banks and banking. In this white paper I will be exploring the topic from a banking perspective and looking at what it means in terms of Connected Cities, Connected Cars, Connected Homes and Connected People.

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# The “Bank of Things”: Connected Cities

City planners, governments and architects have been considering the possibilities of connected cities for years now; it is only people outside of these professions who are often surprised by how advanced the thinking is.

What’s made all this possible is ubiquitous Wi-Fi, which can be tailored to provide different reach, bandwidth and speed depending on the intended use. These new types of Wi-Fi make it possible to connect everything in a city – from street lights to parking meters, as well as cars and people.

## Keeping us moving

A large part of the work on connected cities is focused on transportation, which I will talk more about in the next chapter, but suffice to say that one of the main aims is to make traffic flow more freely as additional information becomes available. Whether that data comes from vehicles, traffic lights, CCTV cameras, street lights or elsewhere, all of it can be processed in real-time to improve movement on the roads.

Street lighting will undergo a huge change. Initial benefits will come from using more energy-efficient

LED and solar powered lighting, but there should also be progress to use lighting in a smarter way. This might include only turning lights on if people or traffic are detected to avoid unnecessary expense, for example. Street lighting could be used to help tackle crime – lights could be made brighter or a different colour to highlight danger, while alerting police that there is a problem. We can expect connected cities to be much cleaner as robots are employed to pick up litter. Smarter CCTV could come into play to automatically fine people who drop rubbish.

## The personal touch

Advertisers are experimenting with personalising the content and special offers on billboards depending on who is nearby and in vision. The technology already exists to alter video adverts to match merchandise to the preferences of the target audience.

We have barely scratched the surface of the possibilities that technology can bring to transform our cities. So what does all this mean for banking?

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First, we expect to see far fewer bank branches on the high street, and those that remain are likely to bear little resemblance to the traditional branches of the past. They will be open spaces, with fewer staff and more self-service machines.

They are likely to provide a very different customer experience, perhaps offering more “events based” financial advice. For example, if you are planning your wedding, a bank adviser could help you find a loan to pay for the big day and provide insurance in case anything goes wrong.

### Your friendly bank

In the world of connected “things”, banks are examining new ways of interacting with customers to give them advice, maybe presenting financial offers via their mobile phone as they walk past certain stores. They could use the same approach to provide guidance on:

- Spending : your bank could send you a warning to “skip Starbucks” as you’ve overspent on sundries this month (Ally Bank in the US is trialling this concept with an app called Splurge)
- Healthcare : if you’ve not exercised enough today, then should you really be buying a takeaway pizza?
- Saving : delay going into the city by an hour and avoid peak toll fees caused by current congestion.

In terms of payments, you may never again need to reach into your purse or wallet for cash or a credit card as you’ll be recognised (either through an implanted chip or biometrics such as facial recognition) and charged as you enter buildings (museums and cinemas, for example) or leave a shop with merchandise.

In the connected cities of the future, banks will have a sizeable role to play in the facilitation and control of payments. But there are also huge opportunities for them to act as trusted infomediaries – not only in providing real financial offers, but by supplying advice and rewards in other areas of life to attract and retain customers.

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# The “Bank of Things”: Connected Cars

The race is on to bring autonomous cars to our roads – and it won’t be long until laws are in place to accommodate them.

Dubai, for example, has set a target for 25 per cent of all trips on its roads to be made by driverless vehicles by 2030.

This will have a huge impact not only on legislation, but also on car insurance and jobs that revolve around driving. It is likely to bring important benefits for health, too, because it’s estimated that 96 per cent of car accidents are caused by human error.

Meanwhile, designers working in the automotive industry have moved their focus to car interiors as a space in which to relax or work.

## Smart cars

Connected cars are bringing new possibilities for owners. There are already some with sensors built in to the bodywork capable of detecting knocks or dents and reporting them automatically. Such a car may be able to book itself in for a service while you work. And manufacturers are designing car boots that can be used to accept parcels while you’re

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out. The courier notifies you of their arrival and you open the tailgate remotely via an app. So as cars become more interactive, what can our new “Bank of Things” provide?

There is a payments role in enabling cars to pay for tolls and fuel themselves. Banks can also look to provide accounts dedicated to a particular –vehicle – thus giving a full picture of the running costs, including servicing and insurance (personal finance management for cars).

The advent of self-driving cars will create the possibility of “car landlords” – people buying vehicles to earn money by driving others. This represents an opportunity for banks in terms of mortgage-style loans for “fleets” of cars as an investment.



## Better banking

There are already examples of innovative approaches to banking services.

Last year Santander teamed up with carzapp to involve dealerships in a car-sharing scheme. Customers use an app to pick up and drop off vehicles as required, one benefit being that they can use different models – a people carrier for a holiday or a convertible as a treat – rather than having to stick with the one they own.

The scheme was launched in Germany where Santander is one of the largest providers of car finance in the market, and is clearly very different from simply advancing a loan.

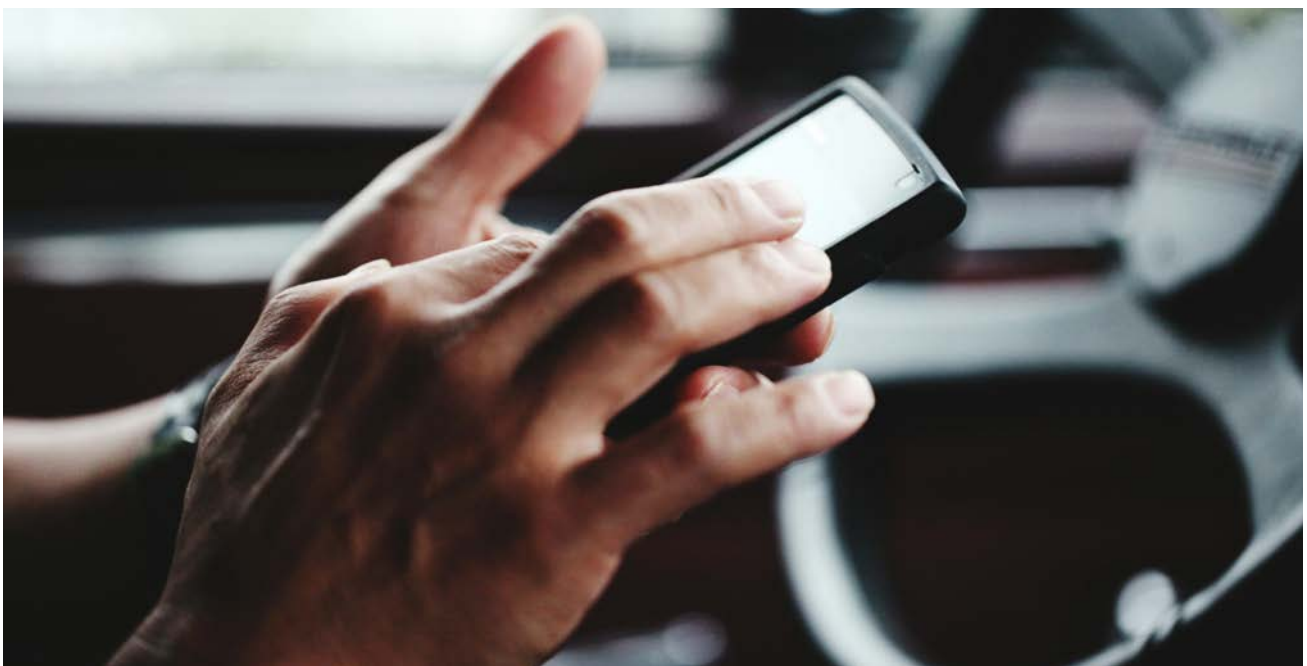
In Poland, Idea Bank has a fleet of vehicles that travel to business customers so they can deposit their takings or withdraw money with ease. You can request the car free of charge via an app and it will arrive at the chosen pick-up point. The bank claims the average deposit made through the mobile ATM is three times higher than at a bank branch. A fleet of self-driving cars could make this an even more viable service.

Meanwhile in Canada, BlueShore Financial has been thinking about how passengers in driverless

cars will fill their time. In response it has come up with new interfaces designed specifically for car windcreens, so that customers can review their wealth portfolios as they travel.

These are just some of the imaginative ideas that connected cars have stimulated in the finance industry, and in the era of the “Bank of Things”, there will be a lot more to come.

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## The “Bank of Things”: Connected Homes

For most people, one of the most exciting areas of digital technology is the connected home. Unlike connected cities, this allows individuals to be in control and introduce smart devices of their own.

Nearly every room could soon have a wide array of connected gadgets.

The sitting room will probably be all about TV and audio, but the home might also feature dedicated “vision” rooms where 3D projectors beam images on to every wall and floor to fully immerse the viewer or gamer.

For the bedroom, you can already buy a mattress cover that monitors and reports your sleep pattern and is able to regulate temperature to optimise your sleep experience.

Connected light bulbs now offer mood lighting and double as speakers or Wi-Fi boosters.

### The connected... toilet

In the bathroom, you can catch up on the news and personal messages in the mirror, while your connected toothbrush records your brushing habits

and sends alerts if it detects possible issues with dental hygiene. If you wish, your toilet will even make use of deposits to assess your health.

In the kitchen, your fridge will manage your shopping, possibly working with your bin so that items taken from cupboards can be recorded. Cooking may be a thing of the past as robotic arms assume the task, unless of course you’d rather just have a 3D printed burger. Today you can buy connected kettles, which respond to a command through an app so that the water is boiled by the time you reach the kitchen.

In the laundry room, the washing process may get smarter with clothes that select the right programme on their own. The machine could even alert you if you have mixed the wrong items together; never again will your whites come out pink. There are already socks that are connected and can tell you how often they have been worn and washed – hopefully the same number for each half of a pair.

Could there come a time when we don’t even need to wash our clothes? Will we instead simply recycle

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what we wear and have new items 3D printed? 3D printed garments can use smart materials that detect heat and adjust ventilation automatically – reducing the need for washing in the first place.

### Keeping track of spending

What does this mean from a banking perspective? Just like the connected car, the connected home might have its own account to provide detailed analysis of spending. Devices could be connected to it for shopping or ordering recipes by the robot chef.

Utilities could be connected for payments and budgeting. So it would be possible to set a budget for heating and an algorithm would reduce/increase temperature not only to suit the weather but also to ensure it's not exceeded. In the UK, utility companies reportedly hold £1.5bn in excess funds relating to overpaid pre-payments; this could be eliminated by connecting smart meters to people's bank accounts.

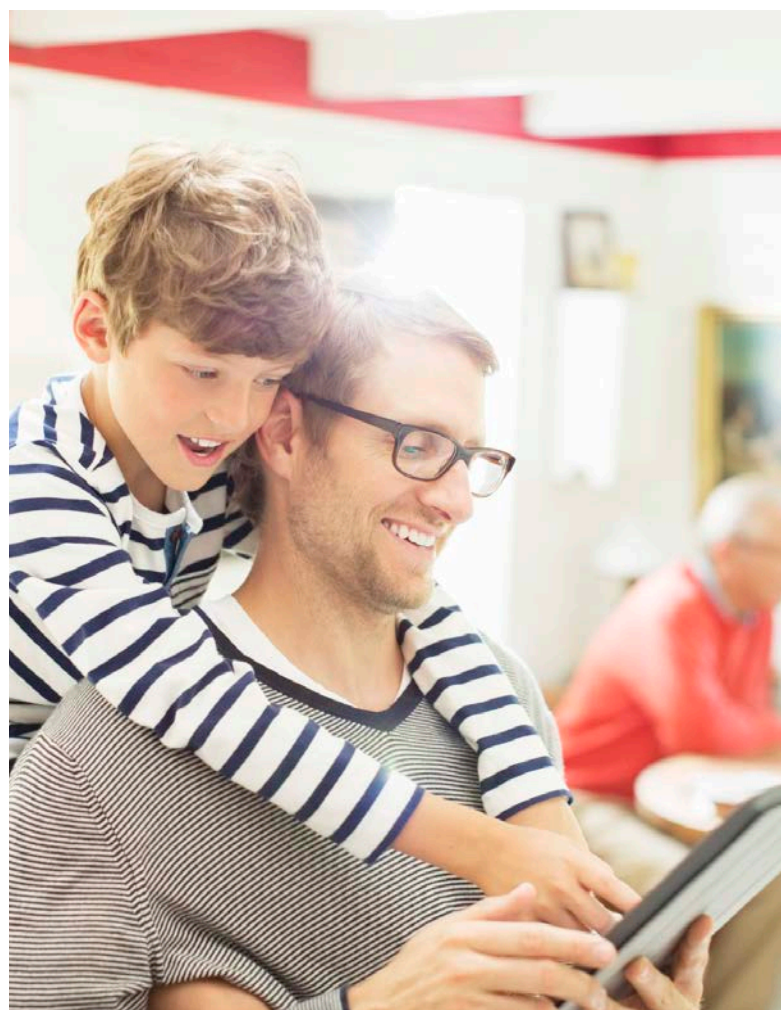
### Helping to manage money

Managing the home is a complex task. Banks could play a role as an infomediary by helping to switch between suppliers to get the best deals and provide a single statement for all bills. While personal finance managers can provide analysis on spending, banks have the opportunity to help customers manage their outgoings better.

Meanwhile, ASB Bank in New Zealand is looking ahead to try to make sure children understand finance in an increasingly cashless world. The bank's smart digital savings box, Clever Kash, comes in the shape of an elephant and has an interactive screen and a companion app. Parents can flick virtual coins from their bank account into the savings box via their phone – and the child can watch the balance being updated on the screen.

From connected piggy banks to smart meters, there are huge opportunities for innovation in the connected home and banks are looking to prototype new services for this exciting future.

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# The “Bank of Things”: Connected People

When your phone syncs with your smart watch it is using your Personal Area Network, which enables communication between devices and is private to you. In the future this network could include many other devices that form part of your jewellery, clothes or are even embedded in your skin.

## Into the future

In a key health development, Google has patented a contact lens that can report glucose levels – a boon for diabetes sufferers. Meanwhile Samsung has patents for contact lenses that project content directly on to your retina. Sony has launched Xperia Ear as a device that reads out messages, weather, news and more. And Nuheara is launching a device that offers hands-free connection to your digital devices while improving your hearing experience.

Emerge Interactive has gone a step further by creating a screen that can be embedded in the skin. The demo video shows how an app controls tattoos that can be animated or used to display running stats.

Motorola has launched a smart tattoo that can be used to unlock your phone, though the technology has much wider possibilities, in particular for payments.

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## A report from The World Economic Forum forecasts that smart chip implants could be commonplace by 2023.

### Beyond the touch screen

A report from The World Economic Forum forecasts that smart chip implants could be commonplace by 2023. These might range from simple chips for identity and payments to health devices such as cochlear implants or heart pacemakers. The report also highlights progress in research by Brown University into technology that connects directly with the brain to enable mind control of devices. This moves us into Zero UI, controlling devices beyond a touch screen, whether through voice control, gestures or even thought processes.

Google's project Ara is a modular phone that permits you to upgrade individual parts such as the camera or battery, putting an end to the need to replace the whole phone when you want an upgrade. Taking this concept further, perhaps the Personal Area Network could mean that eventually you only need one GPS, one camera, one battery and so on – each wirelessly communicating to other devices like your phone, car stereo and watch.

### The changing face of finance

Into this world of possibilities come banks. biometrics, devices and chips – wherever they are located on the human body – make payments possible without having to use cards.

Meanwhile, if banks have access to ever-richer data about people's lifestyles they will be able to play the role of infomediary and provide more relevant and targeted offers, advice and rewards. Banks will need to act round the clock to make the most of the information coming from these sources and respond to real-time events.

With increased information it's clear that products such as insurance will change dramatically to become more personalised to suit individual lifestyles. The key for banks is to look for opportunities to engage in creating compelling new customer experiences based on these devices and the data they provide, while always respecting privacy.

The Internet of Things is only limited by imagination – the time is ripe for banks to define how they might engage customers in their own 'Bank of Things'.

### A new world

As I highlighted at the start of this paper, the Internet of Things is only limited by imagination. A huge amount of innovation has already been brought to market – too much to cover in any white paper or even book.

Even five-year-olds (and maybe younger) are learning how to use the Internet of Things, and the time is ripe for banks to define how they might engage customers in their own "Bank of Things".

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## About Temenos

Temenos Group AG (SIX: TEMN), headquartered in Geneva, is a market leading software provider, partnering with banks and other financial institutions to transform their businesses and stay ahead of a changing marketplace. Over 2,000 firms across the globe, including 38 of the top 50 banks, rely on Temenos to process the daily transactions of more than 500 million banking customers.

Temenos customers are proven to be more profitable than their peers: in the period 2008-2014, they enjoyed on average a 31% higher return on assets, a 36% higher return on equity and an 8.6 percentage point lower cost/income ratio than banks running legacy applications.

To learn more contact us at [sales@temenos.com](mailto:sales@temenos.com) or visit us at [www.temenos.com](http://www.temenos.com)



