



The blockchain is essentially a huge multi-user digital ledger that, at the moment, can't be erased or altered and records every transaction permanently

use technology that already exists to bring together all their pension, savings, borrowing and cash account values from any provider on the same smartphone app. Slightly further out, he predicts machine-driven financial planning advice, which will view assets and liabilities, understand a customer's risk attitude, and recommend strategies in real time and prompt customer action.

"There are data privacy concerns, of course, but if you'd suggested ten years ago that private companies would issue people with a device that measures their health on a minute-by-minute basis, there would have been a big brother outcry," says Mr Masters. "Then along came the likes of Fitbit. It needs an under-the-radar approach like the Fitbit, but banks could become the mobile equivalent of the old AOL home pages."

Barclays bPay wristbands and its imitators are hoping to become the Fitbit of money, taking advantage of contactless to conduct small transactions without needing a wallet. Taking contactless far afield, Paul Makin, head of digital financial services and financial inclusion at Consult Hyperion, shows how mobile and contactless can work even in the difficult environment of a refugee camp.

Consult Hyperion is working with the Department for International Development on payments for refugees in Syria. Charity field workers carry toughened Android tablets that sync with credit card-sized payment cards on to which charities can send weekly payments – payments that used to be made in bundles of cash carried around war zones in vulnerable trucks. In a wi-fi area these tablets upload and download information so that, when taken into an unconnected camp, cards can be topped up and spending recorded. The charity can

CHALLENGER BANKS



Francisco Gonzales, chief executive of Spanish banking giant BBVA, may be predicting that 20,000 old-school banks will dwindle to several dozen digital banks in the next 20 years, but the evidence from the burgeoning challenger bank scene suggests otherwise.

Born out of the financial crisis of almost ten years ago, challenger banks range from the relatively traditional Virgin Money, which purchased Northern Rock's viable assets, to punchy startups such as Tandem, the UK's first mainly mobile bank. Although undermined by recent reports that five of the biggest of the roughly 40 challengers were being run by former Royal Bank of Scotland executives, business has boomed. Aldermore and Shawbrook Bank have lent more than £10 billion combined, and both have floated successfully.

Many are primarily lending vehicles. Shawbrook and Aldermore are specialist savings and lending banks, though some, such as Metro Bank and OakNorth Bank offer high street checking accounts. And it's not just UK-based banks

that Brits are choosing. Berlin-based Number26 is a Europe-wide mobile-only full service bank, with a huge reach among UK millennials.

"Normally you have to sign up to a bank account on paper – with ours you can do it on a mobile phone in around four minutes," explains co-founder Valentin Stalf. "Our customers log in to our app at least every two days so we can constantly react to what customers need."

OakNorth's chief executive Rishi Khosla isn't sure technology is crucial to good challenger banks and pitches human contact over the algorithm. "We always make sure a real person decides on any loan taking all factors into consideration," he says. OakNorth's lending is largely to smaller businesses, a sector that has struggled to get loans from established banks since the 2008 crash.

The drop in lending by UK banks and building societies has prompted the growth of crowdfunding and peer-to-peer lending, with almost \$80 billion raised worldwide, according to data from industry watchers Preqin. The sums are still relatively small in the UK; one survey by online marketplace Funding Options found that just 18 per cent of loans to UK small businesses were supplied by crowdfunding, peer-to-peer lending and rich individuals.

"Peer-to-peer lending is looking increasingly like a bubble – there are some 1,800 platforms around the world," warns Kamel Alzarka, chairman of the insurgent Falcon Group, which lends to mid-cap companies, a sector that has struggled with banking support. "At the same time banks are lending less – challengers will only grow."

prints with 64-bit codes imprinted may help. He's also keen on gesture recognition or heartbeat monitoring. "It needs to be fluid and unfakeable, which is tricky to guarantee," he says.

One solution, Mr Pearson suggests, is quantum money, using bleeding-edge quantum computers to issue currency that can't be copied, which would make it possible for any of us to create our own payment system, using anything from time to

treasury services in Europe, the Middle East and Africa. "The blockchain concept can be applied to any digital asset, such as security, bonds, loans and collateral, and could therefore be used in a number of different areas," he argues.

Brian Forde, MIT Media Lab director of digital currency, goes further, predicting a new capitalist revolution. "Cryptocurrencies and blockchain are the open protocol of payments, the SMTP [simple mail trans-