A blockchain-based decentralised university – video transcript

JOHN DOMINGUE: Hi. I've been watching the talks online, they've been a great set of talks. This talk relates to the previous talk and it's about technology as well.

I have a job which I really love. My job is to create a better future, especially in the educational space. And I'm going to talk about some ideas that we've had and others on the application of blockchains for higher education.

But before I talk about blockchain technology and say what it is, I want to talk about one of my other favourite technologies in the education space, and that's the blackboard. There it is. So slates have been used since ancient times in Sumerian and Babylonian for people to write but it was in 1801 that a headmaster and geography teacher at the school in Edinburgh put a big slate in front of the class, a blackboard.

And that transformed how teaching was done in that class. So for the first time the students could see what the teacher was thinking. He could draw on the blackboard or write on the blackboard and the students could see what the thoughts were in a visual form.

In a sense a blackboard was a sense of shared knowledge and truth for that classroom. Now a blockchain, I'm going to argue, can serve as a global source of truth and knowledge across the Internet.

This technology is best known as the underpinning of bitcoin, which you may have heard about, which is the cryptocurrency. It was created in 2008 as a bunch of computer scientists having a formal response to the global financial crisis. So maybe a bit arrogantly, they said maybe computer scientists can do better than bankers after looking for the global finances.

It's different to a standard currency in that it's not backed by any country or any nation. It's just a set of computers working together. It's now worth over $40 billion and there is no central control. There is no organization or central controller, just a set of computers that are networked.

Since 2008 lots of other cryptocurrencies have emerged. And next year Facebook are hoping to launch one of their own Libra. So there's a lot of excitement and actually some concerns about that. So at its core, this is just a ledger. It's a global ledger which everyone can see for a set of transactions.

And that's why banks are interested, because all the bank is at its very simplest is a ledger. So your bank balance depends on all of the transactions that you've had all of the payments and banks spend a lot of energy and reconciling their ledgers overnight. So this will save banks tens of billions of pounds, and that's why they like that technology.
There are various elements of a blockchain, which make it trust. This is the most technical part of the talk, there's not much technical. But this is the most technical part. So there are three things I'll talk about, really. One is for any computer file you can create a thumbprint which is unique to the file. So it's called a hash.

If anybody tampers with that file because of the thumbprint won't work anymore. And also it preserves privacy because you don't want to put your file on the blockchain because it's personal, you put the thumbprint on the file and then people can say things about that.

A blockchain is simply a set of blocks which are connected through this thumb printing mechanism. So anyone can tell if anything has been tampered with by bad people because the thumbprints won't work anymore. As well as putting data on the blockchain where you can put what are called smart contracts.
So these are small pieces of computer code which can represent in principle financial or legal contracts. Once it's on the blockchain, is there forever. Everything is digitally signed so who put it there. And if a smart contract is there, it will run forever with no bankers or no lawyers in the loop.

Now in contrast to the applications that you use on your smartphone or your tablet or laptop, it's what's called peer to peer. Which means you're not accessing some central database that you don't know who controls it, but everyone who's within the blockchain and anyone can join many blockchains. Everyone gets a complete copy of all of the data. So everybody can check what everybody is doing to make sure nothing bad is happening. OK, that's the end of the technical bit.

I often give explanations of this technology. And people often ask me OK, I understand the bits but where is it, where is the blockchain? So who here in the audience has a smartphone on them? Yeah, quite a lot of people.

We could run a blockchain as a company on our smartphones. So whoever would agree we could say, OK, let me put a blockchain and you put. And in the company would be exactly what's running on our phones.

We could, for example, set up a competitor to Facebook. So that our own social media platform and we would decide the rules, nobody else. We may say we don't allow any pictures of cats. We don't like cats. We allow advertising but only from ethical advertisers. We could have rules on how to change the rules, rules on how people can join and leave. But it will be up to us.

If you want to think about where is the blockchain running, it's running in your pocket. Now what does any of this to do with education? So blockchains are very good at recording things, because signs and things are there forever. So in education we use it for certificates.

Imagine if I had a conversation with one of you at lunch today and I say I have lots of qualifications and you say, well I don't believe you. All I have to do today, I'd have to go outside, get in my car, drive home, go up my loft, go around the boxes, pull our certificate, and show it to you. And say, look, here's my PhD certificate from the Open University. It proves I have a PhD from Open University from '87 and I was very popular as a baby. So there are lots of names that I have.

It improves verification. So companies will pay 50 to 80 pounds to verify each individual person they're hiring for each certificate. So that can be a lot of money. And it reduces fraud. There are lots of famous fraud cases that I could talk about.

There was a dean at MIT who had to resign after 30 years because she lied about her qualifications. There was a chief executive at Yahoo who had to do the same. There was a leader of a very big country who closed down the database of where he studied, because reporters were looking there. So we can reduce that.

There was an investigation from someone from the FBI that claims that half of the PhD certificates given out in the US are fake. So now another thing we can do is we can change what certificates are.

So here's a the certificate, we call it a badge. It's a physical certificate that we gave away at a summer school. So the students would carry these around and they would wear. I won't wear it because it'll interfere with the microphone.

And the students had to complete seven tasks it was in the AI course. And every time they completed a task, the tutor would wipe the badge and it would change color. So they would have a physical representation of what they've learned and it will be recorded forever on the blockchain.

Now, another thing that's important for us is identity. So I have all my names on there, but what's the digital identity that we're going to tie all the certificates to. Now there was a famous meme in '93 on the internet, nobody knows you're a dog. And it was about, well, what's your real identity on the Internet? how does your real identity tied to the internet identity?

Imagine that we want to support learning over life, over your lifetime. So you'll be learning at many places, at many universities, maybe you'll be learning online companies, maybe you'll be learning at work.

Well, I would predict that practically everyone in the audience has a digital identity. You have an email address. But probably that comes from your employer, or from your host university where you're studying, or from a large tech company. So somehow it's not really yours.

With blockchains we can create what are called self-sovereign identities. Basically equivalent to you writing on a piece of paper, my name is John Domingue and then people would sign that. So everything would be under your control. So as a previous speaker taking control of your data. This would be complete control of your online identity and control of all your digital credentials.

One of the things we can do more radically with this technology is create what I call decentralized autonomous universities. So using these smart contracts, people have

already created what are called decentralized autonomous organizations or dowels. And some of these have been running with hundreds and millions of in between.

You can take a university. At its simplest there are students who are studying with online resources, studying courses, there are various experts who make materials, experts who teach. And we can replace all those with smart contracts to organize this. So you can decentralized and you can automate various bits. And I'll explain what I mean more in the following slides.

One thing that we've been looking at is assessment. If you study, normally somebody will assess you. But we ask why does the assessment always have to be at the same place as the place that you are studying. So some people complain that if I'm assessing a student then maybe they'll hide from me what they don't know. But as a teacher I want to know what they don't know.

Here is something that we did in the corporate education space. So when people learn at work, often they leave work for a few days, learn something and come back. The US spent nearly $90 billion on this last year. But only 10% of a workplace training is ever applied in the workplace, studies have shown.

Here what we did is we have assessment happening in the workplace, I'll just start the movie. So in this movie, there are three workers and they each have a reputation bar. How good are their soft skills in communication and collaboration and problem solving.

And they get their own currency, their own currency for learning. And they can spend coins on each other if they think someone has displayed good organizational skills or good problem solving skills. And you see Kevin is giving some coins to James in this.

Then the assessment is happening in the workplace. And behind the scenes smart contracts automatically give out certificates when somebody's reputation buys over a certain level. So another thing that we're doing is we're creating a national and international blockchain for all accreditations that people acquire.

We're doing one for the UK and one project and we're collaborating with a lot of European partners to create one for the whole of Europe. So this will be a service for everyone,

where instead of having to drive in your car and drive home to your loft, you could just pull out your phone and say, look, here are my certificates. You could keep it private because it would only be the thumbprint and not the real certificates on the blockchain.

And also policymakers would know, how am I citizens in my region or my country internationally doing? Do they have the skills that we need? Do we have people who are qualified to be nurses? How do they match industrial demand?

Another thing we can do with this type of thing is support employability and employment. So we here what we've done is people are getting lots of certificates as they are learning in different places and we know the skills associated with those certificates.

Then we have an AI tool, which can read adverts of jobs which are online. So you read the jobs which are online and you match the skills in the jobs to the skills that the particular person is having. So this is a system where Michelle is looking for a job in the area, data science.

The system will find jobs for which she already has all the skills for and show them to her on a map, show them where they are. So that's the top part of the panel. In the bottom part of the panel, there are jobs for which she's nearly qualified for and there are some skills missing and in the system will find the courses which are online, which he can study to fill in the skills gap.

This is for us is the first step towards an AI automated career coach and course recommendation system. So again, it's beginning to automate and decentralize parts of universities. So our current challenge we're looking at is with this technology, we can really make higher education very, very agile. So we can teach anywhere.

And so we're looking at what I call Pop-up Education. So providing really high quality education to the most disadvantaged. And by a disadvantage, I mean training teachers for the over 260 million children globally who don't go to school, supplying education to the 70 million people who were displaced last year, supplying education to people in refugee camps.

I heard a shocking statistic a few weeks ago. That the average time that someone spends in a refugee camp is 17 years. So with this technology, we can provide a Pop-up University connecting people to high quality online resources, connecting people to high quality educators all through these smart contracts.

So I think that this technology, blockchain technology will be as transformative as blackboards or maybe even more so. Creating a global source of truth and a platform for high quality education that's really accessible to anyone, in any place, at any time. Thank you.

[APPLAUSE]