Bloodchain was co-created for the European Commission’s #Blockchain4EU research project. Main contributors were Cat Drew (Uscreates), Robbie Bates (Uscreates), Travin Keith (Agavon & Member Representative Hyperledger), Mika Lammi (Kouvola Innovation) and Marcella Atzori (University College of London)
According to the World Health Organisation (WHO), across European countries only 3.65% of eligible donors give blood. It tends to still take place sporadically, when someone has the motivation and time to go out of their way to visit a blood donation centre, which can be in hospitals or in mobile donation units in community centres. However, it is estimated that each European country needs 2.5% of its population to give blood regularly to keep up with demand and care for patients. Bloodchain, enabled by blockchain technology, would help manage supply and demand in two ways, creating a system that saves lives and money:

Firstly, it would allow people to securely register their blood types into a distributed blood bank which could manage supply and demand in real-time. Call-outs across the system could be made when particular blood types were in need. The use of a permissioned, multi-chain structure would maintain people’s privacy until after they had consented to a particular donation, and otherwise keep their blood type separate and unlinked from their personal ID. Applications of AI running on the top of data would be able to foresee the future demand of blood, for instance in hospitals, and prevent in time the exhaustion of blood stock.

Secondly, it would allow the deployment of an autonomous fleet of drones to be sent out to people’s homes to remotely collect the blood and return it to the hospital for checking and onward use. The blockchain would allow optimisation of drone workflows, making sure they are in the right place at the right time, and verification of their journeys to and from donors’ homes. This would reduce infrastructure costs and create savings in public expenditure, as well as reducing CO2 emissions.

Many people don’t like their blood being taken by a nurse reassuring you while the needle goes in, let alone giving blood via an autonomous drone. Design plays an important role here to help ‘humanise’ this technology, and there is a wider design challenge around how we can make the experience of giving blood more reassuring and convenient. Bloodchain has been designed to increase privacy and trust into the system through the use of blockchain technology, but we have also designed its service touchpoints to provide a reassuring and convenient experience for blood donors. This experience is delivers live feedback loops and a clear user experience through friendly graphic and product design.

We would also need to think carefully about the integrity of the system. Blockchain technology can enable privacy for donors to the bloodbank, and security of transport. However, people would want to know that this technology is full-proof. Digital systems carrying highly sensitive material cannot be allowed to fail as it would compromise their life-saving activity. The nodes which run the network and validate transactions need to guarantee business and service continuity, disaster recovery, financial stability and preservation of data.

And some people would worry about where this might lead to. There is a balance to be struck between making blood donation easy, attractive and rewarded (socially), and the potential monetisation/tokenisation of the service. Regulation would be needed not only to ensure standards for blood between different EU countries, but also how donors might be incentivised to provide blood.

As we think about how we extend into other areas, these issues become more acute. What does blockchain for organ donation look like, where it is more likely that organs will be transported not just by drones, but by a distributed network of multiple transport carriers. Do all of those have to be big suppliers and contracts? How can we take advantage of the transport that is taking place anyway and for other purposes, to ensure efficiency? And will this all be obsolete with the creation of synthetic blood and organs, or will we much better be able to match up demand with supply, with the better commissioning and manufacturing of this material on demand?