

Aladdin Blockchain Technologies

Progress on all fronts

Aladdin has issued a series of updates on its progress with the development and implementation of its technology suite. Perhaps most significantly, it has launched its prototype blockchain network and is now adding some quarter of a million electronic health records (EHR) to the platform. Separately, Aladdin has announced a prototype for the diagnosis of diabetic retinopathy, with early analysis indicating that accuracy is similar to, or better than, humans. Information on the commercial aspects of these developments is extremely limited and we await further updates with the H1 results in September.

Year end	Revenue (€m)	PBT* (€m)	EPS* (€)	DPS (€)	P/E (x)	Yield (%)
12/17	0	(0.02)	N/A	0	N/A	N/A

Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

Adding records to the platform

Spread across China and India, more than a quarter of a million EHRs have been added to the Aladdin data platform. With data volumes set to scale rapidly, the company has established data processing teams in both countries. The teams will oversee the aggregation of these vast data sets, in addition to contributing to ongoing R&D for the machine learning and artificial intelligence capabilities. From a standing start, the company appears to be well on track to meet its stated targets of c 1.5 million patient records across China and India by the end of the year.

Launch of blockchain network

Aladdin has announced the successful launch of Genesis, its first blockchain network. The company will now look to link Genesis to the EHRs so the blockchain can maintain a record of all modifications and views of the underlying data. It has also created an open source software tool, Maejor, for Hyperledger Fabric, which could improve the scalability of blockchain networks based on the Fabric architecture, including Genesis.

Diabetic retinopathy prototype

In a demonstration of its machine learning and artificial intelligence capabilities, the company has created a prototype to diagnose diabetic retinopathy. Early test results indicate a high level of accuracy (Aladdin: c 94%, humans 61–90%, recently FDA approved software: c 90%). If approved, such a tool could improve the speed at which patients can get accurate diagnoses, which should improve outcomes.

Delivery to targets

To date, Aladdin appears to be reaching the milestones set out in our [initiation note](#). However, although the market opportunity is undoubtedly large, the commercial visibility of these developments remains extremely limited and we hope to receive more details at the forthcoming H118 results. We maintain our expectation of an equity raise in H218 to fund the company through its current development phase.

Technology developments

Software & comp services

21 August 2018

Price €27.0

Market cap €309m

Net cash (€m) at 31 December 2017 6.4

Shares in issue 11.45m

Free float 55%

Code NMI

Primary exchange Düsseldorf

Secondary exchange N/A

Share price performance



52-week high/low €30.5 €0.5

Business description

Aladdin is an early-stage healthcare software company. The company intends to leverage novel technologies including blockchain, big data and AI to create a healthcare ecosystem to improve efficiency, security and patient outcomes. Aladdin's users are currently based in China, although we expect the business to grow internationally over the coming 12 months.

Next events

H118 results 28 September 2018

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Launch of Genesis and Maejor

Aladdin has launched Genesis, its proof-of-concept private blockchain network built on the Hyperledger Fabric architecture. The blockchain will ensure there is a complete log of access to an individual's medical records, which can only be viewed by approved individuals. Furthermore, each node within the blockchain will have access to a log of all the views of or modifications to the medical data, thereby improving security.

The company has also announced the release of Maejor, a suite of open source tools that enhance the scalability and customisability of the Fabric network. Specifically, it will enable more nodes to be added to the blockchain network without having to power down the network for reconfiguration of the process. It is hoped that making this proprietary tool open source will broaden Aladdin's reach within the industry, which could lead to an enhanced pipeline of collaboration opportunities, while also fostering an element of a peer review process for the technology. On this note, Aladdin will be sending a lead engineer to a Hyperledger Fabric workshop later this month.

Separately, Aladdin has announced that an initial 240,000 electronic medical records have been uploaded to the Aladdin platform in China. This compares with a target of one million by the end of CY18. Aladdin has set up a data processing team in China to facilitate the on-boarding of the records there, in addition to the ongoing development of the company's AI and machine learning capabilities. While we understand these records are yet to be covered by the blockchain (meaning that a log of changes to the data is not yet feasible), the announcement reaffirms the intention to apply Genesis to these data, and we expect this to happen gradually over H218.

Delivery to plan in India

As flagged previously, Aladdin has started the first commercial phase with its Indian partner, OurHealthMate. Aladdin has built a big data platform on which patient medical records can be stored and has announced that the first records have been uploaded onto the platform. As of the start of August 2018, the platform stored 25,000 anonymous records, with this number set to increase substantially over the coming year. Aladdin previously indicated it aimed for 500,000 records by end H218, with five million by 2021. As in China, Aladdin is creating a data processing team to structure the records. At this stage, commercial aspects of the agreement are unavailable.

Diabetic retinopathy diagnosis prototype

Diabetic retinopathy is caused by high blood sugar levels damaging the blood vessels of the retina. This reduces the eye's sensitivity to light and in severe cases can lead to blindness. To highlight the prevalence of the issue, the FDA reports it is the leading cause of vision impairment and blindness among working-age adults in the US. Typically, once diagnosed with diabetes, patients are encouraged to attend eye screenings on a regular basis to ensure early diagnosis and treatment of diabetic retinopathy. The number of scans taken is increasing much more quickly than doctors and opticians can analyse them, creating a significant backlog. This trend is set to continue as more people are diagnosed with diabetes.

Aladdin's machine learning and artificial intelligence algorithms have been applied to create a prototype for the diagnosis of diabetic retinopathy. The prototype analysed 37,000 retinal images, of which 80% were used to train the algorithms, with the remaining 20% used as a test set to trial the efficacy of the diagnosis. The results were highly accurate, with the algorithm able to diagnose the

extent of diabetic eye disease from a scan with 94.3% accuracy. This compares with recent FDA approved software (IDx-DR) which had 87% accuracy in identifying patients with mild diabetic retinopathy, and 90% in classifying those without the condition. A trained optician could expect accuracy levels ranging from 61–90% (Williams et al., 2004¹, Bhargava et al., 2012²).

The advantages of using a software package for diagnosis could be enhanced accuracy in addition to lower costs, as human screening requires costly training and periodic recertification. However, potentially the greatest advantage is the reduction in time taken to have a scan reviewed. This will speed up diagnosis timings and will free up time for medical professionals to devote to other patients or treatments. As early diagnosis is widely understood to be critical in terms of effective treatment, this would enhance a patient's prospects of keeping their eyesight unaffected by the disease.

Other details of the prototype (including the path to commerciality) are limited, but we note there are many other players in this space, most notably including the already FDA-approved IDx-DR software package and Google's DeepMind, which uses AI to spot common characteristics of eye diseases ranging from diabetic retinopathy to glaucoma and macular degeneration. Nevertheless, it is encouraging to see examples of working use cases for Aladdin's technologies this early in the company's lifecycle.

Financials

Further to the reverse takeover and fund-raise at the end of 2017, Aladdin had a cash balance of €6.4m at end of the financial year. The financial statements reported to date are of limited use as they represent the acquired shell's legacy operations, not those of Aladdin. The H118 results at the end of September will provide more information on the cost base, though we would expect costs to continue to rise thereafter as the business increases headcount. We maintain our view that the business will seek further equity funding in H218 to continue to develop the technology suite.

¹ Williams GA, Scott IU, Haller JA, et al. Single-field fundus photography for diabetic retinopathy screening: a report by the American Academy of Ophthalmology. *Ophthalmology* 2004; 111:1055-62.

² Bhargava M, Cheung CY, Sabanayagam C, Kawasaki R, Harper CA, Lamoureux EL, et al. Accuracy of diabetic retinopathy screening by trained non-physician graders using non-mydriatic fundus camera. *Singapore Med J* (2012) 53:715–9.

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