Research Report (Initial Coverage)

Blockchain Intelligence Group

"BIG offers software solutions that enable cryptocurrencies to be accepted. The company is a first mover and opens up the young, fast-growing market of blockchain technology"

Target Price: 1.03 CAD (0.69 €)

Rating: BUY

Blockchain Intelligence Group*5a,5b,7,11

Rating: BUY
Target price: 1.03 CAD
(0,69 €)

Current price: 0.16 CAD
17/08/2018 / CSE / 09:18 am
Currency: CAD

Key Data:

ISIN: CA08906Q1000
WKN: A2JSKG
Symbol: BIGG:CN
Number of shares³: 105.5m.
Marketcap³:16.88
³ in m / in m CAD
Free float: 73%

Primary listing: Canada CSE
Secondary listing: Frankfurt

Market segment: Open Market

Accounting Standard:
IFRS

FY End: 31/12/

Market Marker:
Bankhaus Scheich

Analysts:

Harald Hof
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* possible conflicts of interest
on page 33

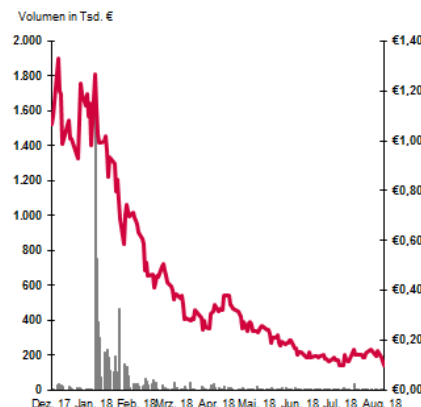## Company Profile

Sector: Software; IT-Solutions

Focus: Data generation and forensic analytics of block-chain transactions

Number of employees: 38
(plus 5 external Consultants (as of 30/06/2018)

Headquartered in Vancouver (British Columbia - Canada)

Management:
Shone Anstey, Excecutive Chairman & founder
Lance Morginn, CEO, founder

BIG Blockchain Intelligence Group Inc. offers software solutions that enable real-time checking of block-chain-based transactions using search and analysis functions. Its core competency includes software that is used to generate data from blockchain transactions. The data obtained in the search process is stored in a database, which in turn forms the company's core asset. The data are examined using analysis algorithms to detect, track and document transactions. The data obtained from the public blockchain are extended with the help of off-chain data from trading centres, illegal marketplaces in the dark web or gaming sites. BIG currently concentrates on cryptocurrency transactions and provides its clients, such as governments, law enforcement agencies, banks, financial service providers and e-commerce providers with the appropriate security technology. In addition to secure processing in accordance with compliance regulations, BIG's software also enables criminal prosecution (in particular money laundering and terrorist financing), as historical transaction associations can be identified. The products are sold globally.

P&L in CADm FY	31/12/17	31/12/18e	31/12/19e	31/12/20e	31/12/21e
Sales	0.10	0.30	5.53	11.27	16.90
EBITDA	-14.77	-8.49	-4.03	0.88	4.22
EBIT	-14.77	-8.57	-4.19	0.70	4.05
Net profit	-14.77	-8.40	-4.10	0.55	2.40

Key figures in CADm					
Earnings per share	-0.14	-0.08	-0.04	0.01	0.02
Dividend per share	0.00	0.00	0.00	0.00	0.00

Figures					
Marketcap/Sales	168.80	56.27	3.05	1.50	1.00
Marketcap /EBITDA	neg.	neg.	neg.	19.18	4.00
Marketcap /EBIT	neg.	neg.	neg.	24.11	4.17
PE	neg.	neg.	neg.	30.69	7.03

Financial calendar	**** Last research by GBC:**
05/09/18: ZKK	Date: publication/target price in CAD/rating
06/09/18: Hannover Blockchain Meetup	
11/12/18: MKK	** The research studies indicated above may be viewed at www.gbc-ag.de, or requested at GBC AG, Halderstr. 27, D86150 Augsburg

EXECUTIVE SUMMARY

- BIG addresses the growing need to regulate cryptocurrencies. This regulation is necessary to make it possible for cryptocurrencies to become part of everyday business life. In addition to tools for analysis and monitoring, BIG plays an active role in shaping the regulatory and political framework.

- BIG is a software provider for search, analysis and scoring solutions in the area of digital payment transactions. This applies both to pure transactions in the universe of cryptocurrencies and to the exchange of FIAT currencies (e.g. EUR or USD) into cryptocurrencies (e.g. Bitcoin) and vice versa. The company thus supports established market participants such as governments, banks and e-commerce traders in securely conducting transactions. BIG focuses on the need for secure transactions, which, in our opinion, will be absolutely necessary for there to be economic application in the future.

- In the spirit of "Fight the dirty Bitcoin", BIG enables the identification of criminal or questionable and dubious wallet addresses in this payment system. This allows commercial users to avoid the potential risk of unwanted complicity in money laundering, to comply with regulations, and to manage secure money transactions, whilst governments can associate addresses with entities to remove the pseudo-anonymity and initiate possible prosecution.

- BIG is a pure player in the rapidly growing field of blockchain technology, which has as disruptive a quality as the introduction of the Internet, for example. The company does not bear any economic or regulatory risk arising from its own issue or trading in and with cryptocurrencies.

- Even if Bitcoin is often equated with the blockchain, Bitcoin is only the first application of blockchain technology. Consequently, BIG's competencies and products represent a platform technology that can be used in various application areas for hedging purposes, to minimise risk and for risk management.

- BIG operates independently of prices and price developments in the global cryptocurrency markets. However, BIG benefits from volatile markets, as these tend to lead to more transactions, requiring a more frequent review process with BIG products.

- With its security technology, the company is a first mover and competes in a huge market with only a handful of significant competitors. Competitive qualifications are therefore of secondary importance, as all providers are likely to have disproportionately high growth rates.

- BIG is an ideal option to profit from the trend towards cryptocurrencies and, even more importantly, blockchain technology without the strong price fluctuations of the cryptocurrencies. More and more banks, stock exchanges and financial service providers are developing products such as derivatives and exchange-traded funds to invest in cryptocurrencies. The number of acceptance points and ATMs for digital currencies is also increasing daily. Commercial operators and private users have a regulatory interest in conducting secure transactions in order not to be associated with money laundering, for example. As a result, security and scoring software seem unavoidable. BIG has the experienced team, the necessary network and the financial strength to maintain its first mover advantage.

- **As part of the DCF valuation model, we have calculated a price target of 1.03 CAD (€ 0.69). Based on the current price level, we assign the BUY rating.**
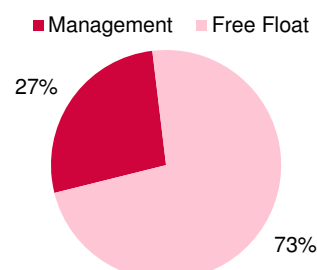
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COMPANY

Shareholder structure

|	
Management:	27.0%
Shone Anstey – Founder and management	9.1%
Lance Morginn – Founder and management	8.9%
Anthony Zelen – Founder and management	5.1%
Marty Anstey – Founder and management	1.9%
Kim Evans - Management	1.3%
Free Float	**73.0%**

Source: GBC, BIG

Corporate structure

BIG Blockchain Intelligence Group (BIG) was incorporated into an existing shell company (Acana Capital Corp.) in September 2017. In November 2017, Acana Capital Corp. was renamed BIG Blockchain Intelligence Group Inc. The primary listing is on the Canadian Stock Exchange (CSE) in Canada, a secondary listing exists in Frankfurt.

The operating units are located below the level of the listed company. These are Blockchain Technology Group Inc., which is responsible for development and data analysis as well as data evaluation.

Blockchain Technology Group in turn holds 100% of the shares of 2140 Solutions Software Inc., which contains the consulting business.

BIG - Corporate structure
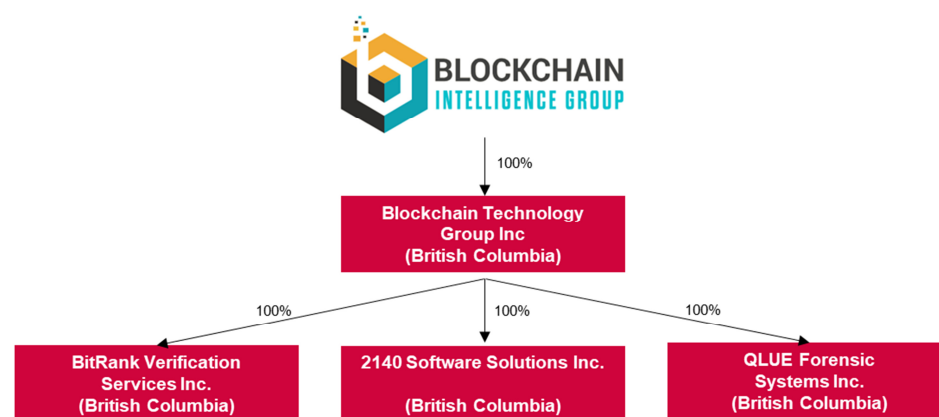
Source: GBC; BIG

BIG is headquartered in Vancouver, British Columbia, the tech hub of Canada. Since 27 February 2018, the company has also had a branch in Zug, Switzerland, which is regarded as the European centre for cryptocurrencies. In addition, a branch office was opened in Washington, D.C. in May. This location was selected because of its proximity to a large number of government agencies (e.g. Homeland Security Investigations (HSI), Federal Bureau of Investigation (FBI) and the US Treasury), and other clients who demonstrate a need for the technology.

BIG - Global footprint

Source: GBC; BIG

Management

Lance Morginn, CEO

Lance Morginn has been an executive at BIG since 2015 and has over 20 years of experience in the technology and software industry. In the past, Mr Morginn was actively involved in several start-ups as a serial entrepreneur and played a major role in their development as CEO and Director. This gives him a solid track record in private and listed companies.

Functions: Chief Executive Officer / Director / Co-founder

Shone Anstey, Executive Chairman, President, Director

Mr Anstey has been with BIG since 2013 and has been Chairman of the company since May 2017. He has over 20 years of experience in the IT industry. In addition to the development of complex technologies and software, this has also included the establishment of large data centres and the development of search engines. Mr Anstey is also a Certified Bitcoin Professional. Previously, he was Director of Technology for an industrial Bitcoin mining pool.

Functions: Executive Chairman / President and Co-Founder

Anthony Zelen, Director

Mr Zelen has been with BIG in this role since January 2015. He has over 20 years of experience in finance, investor relations and corporate development. He is the owner of the IR and PR corporate communications company Senergy Communications Inc. and spends the majority of his time running this company.

Functions: Investor Relations, Public Relations, Corporate Development and Co-Founder

Diana Kim Evans, CFO

Ms Evans has been with BIG in this role since 2015. She is also President and founder of Golden Reign, a publicly traded mining and exploration company. Ms Evans has extensive experience and over 17 years in management positions in a number of international companies.

Functions: Chief Financial Officer, CPA, CGA

In addition to management, BIG has a pool of external advisors who work closely with the company. This is common at start-ups in the Anglo-American region, particularly at software companies. As a rule, the advisors receive stock options as consideration rather than being paid a salary.

Company history

1999	Company formation and development of search engines
2013	Focus on cryptocurrencies and the development of suitable search algorithms
2014	Identification of the problem of big data analysis in the blockchain universe – start of development work on data analysis
2015	Assembly of team and expertise: Integration of search and blockchain technology
2016	Market launch of QLUE: Start of prosecution of criminal activities committed using Bitcoin
2017	Launch of BitRank
	The IPO followed in September and a successful capital increase in December (CAD 19.6 million)

Products

BIG offers various products to ensure real-time risk assessment and risk management of transactions with cryptocurrencies. The main focus here is on the avoidance of

- money laundering,
- financing of terrorist activities,
- corruption,
- trafficking in illegal goods (e.g. weapons, forged documents, drugs) and
- attacks using malware (e.g. Trojans and spyware).

BIG plays a key role among independently operating organisations.

Source: GBC; BIG

The company currently sells two core products, while two other solutions are already at an advanced stage of development. Further products are expected to be launched in 2019. In addition, the functions of existing solutions are constantly being enhanced to cover the large number of newly created and regularly issued cryptocurrencies. At the moment, functions are limited to the largest and best known cryptocurrencies Bitcoin and Ethereum.

Product portfolio at a glance

The main function of the QLUE product is to uncover illicit associations with cryptocurrency transactions, wallets and entities, by merging data to create a chain of evidence – collecting documents, checking account movements, and evaluating and analysing transactions. At the end of the process, a chain of evidence is created that links criminals to their activities. This applies to cyber theft, money laundering, terrorist financing and other analogue and digital crimes.

The QLUE software is distributed under a licence model.

High Risk

BitRank is a wallet scoring system. It provides a real-time valuation of the wallet and thus makes it possible to quantify and qualify the activities (deposits and withdrawals) of the wallet owner. Criminal organisations on the Internet, so-called mixers or tumblers, receive a bad rating, while neutral or specially protected and verified organisations (e.g. through an extensive legitimation process) receive a positive rating.
Negative ratings are generated, for example, by transactions with illegal and criminal websites or by websites with pornographic content.

BitRank is free for private individuals. Business users subscribe to receive access to the data via an API interface.

Services

The Service area comprises all other activities of BIG. This includes, in particular, the consulting and training service, which facilitates the handling of the solution for users of the software. The preparation of forensic analyses is also part of BIG's service.

BlockBits

BlockBits is another software application expected to be launched in summer 2018.3

QLUE – B2B

QLUE is a software solution that analyses the data of the Bitcoin or Ethereum blockchain and creates a chain of evidence in cyber format based on the search parameters. The data are collected and checked for connections to incriminating transactions or market participants. These connections are clearly represented graphically. In addition, the movements and transactions of the cryptocurrency are checked, evaluated and placed in context. This creates a connection between criminals and their actions. An essential point of the software is that it is able to reveal the historical associations of the potential entities involved, thus revealing the flow of funds for the purposes of criminal prosecution.

The main marketing strategy is primarily the responsibility of Robert Whitaker (former Special Agent at Homeland Security), where he was instrumental in monitoring the new cryptocurrency market. As Director of Forensics and Investigation at BIG, he is responsible for sales strategy and organises communication with the authorities.

Two-phase strategy to solve global money laundering via cryptocurrencies:

1) Cooperation with the authorities to identify money laundering in form and scope
2) Provide tools to identify money laundering entities to thwart money laundering

BIG thus provides a decisive building block for the growth of the cryptocurrency market. The question is how trading platforms such as Coinbase can quickly and promptly mitigate their risk associated with the enormous number of new customers and the cryptocurrency transactions involved. With tens of thousands of new customers daily, this task cannot be solved without a systematic, standardised and fast approach.

The advantages of QLUE:

Organisations, customers and users of the software are able to

- limit and deter criminal elements and activities
- check transactions for legality and legal compliance
- ensure general security (e.g. money laundering)
- increase confidence in digital currencies and
- reduce any risk that arises from cryptocurrencies.

These benefits are ensured by forensic analysis of data and transactions conducted by a dedicated department, the Forensic Services Division.

BitRank Verified – B2B and B2C

Source: GBC; BIG

BitRank Verified is an API-based cryptocurrency transaction risk-scoring service that provides for the analysis and classification of existing data from QLUE, including the option to provide a visual summary of the illicit activity identified. The service enables users to determine, before a possible transaction, whether the funds in a potential sender's wallet have been involved in any illicit activity. It can therefore be identified whether a wallet or the owner of the surrendering wallet has been involved in an exchange with negatively classified entities in the past. These include money launderers, arms dealers, drug dealers or websites with pornographic content.

Pages and transaction partners with neutral content are also evaluated neutrally. In contrast, other transaction addresses have positive attributes. For example, if a detailed and comprehensive KYC process (legitimation process) has been carried out.

Individual transactions can be accessed via the Internet using the verification addresses. Larger volumes of enquiries, as with government agencies or online merchants and financial service providers, are only possible via direct interfaces (APIs). BIG gives commercial providers access via software licences.

Product outlook

At present, it is not expected that the company will develop a large number of new products in the short term, as the focus is instead intended to be on the expansion of existing applications. In the current phase, only the original blockchain of the cryptocurrencies Bitcoin and Ethereum can be analysed.

It is expected that the Bitcoin-related blockchains will follow next in the upcoming update rounds. These would be BitcoinCash or Litecoin. Other established blockchain currencies such as Ripple and others should follow.

The 10 largest cryptocurrencies (measured by market cap)

	Name	Marketcap	Price
1	Bitcoin	€92.713.281.019	€5.387,32
2	Ethereum	€23.263.721.726	€229,59
3	XRP	€9.131.659.661	€0,231930
4	Bitcoin Cash	€7.426.923.636	€429,48
5	Stellar	€3.519.712.343	€0,187501
6	EOS	€3.467.539.675	€3,83
7	Litecoin	€2.656.538.401	€45,92
8	Tether	€2.129.301.872	€0,884577
9	Cardano	€2.085.984.190	€0,080456
10	Monero	€1.167.127.265	€71,75

Source: GBC, Coin Market Cap, as of 14/08/2018

Besides Bitcoin, there is now a huge number of alternative cryptocurrencies (altcoins), all of which were initialised after Bitcoin. The characteristics and designs are extremely variable and diverse. Technical developments are not infrequent. Often you can get greater data protection by using these altcoins; for example, the altcoin Monero uses unique addresses as a basis. There are also coins like Dash that do not use stealth addresses to avoid traceability. Dash uses public addresses, but these in turn are mixed up in a process of the digital protocol. So, a user never or rarely uses the same address. The traceability of transactions and trading activities is therefore only possible to a limited extent. Monero, Zcash and Dash in particular are considered attractive for criminal activities and have therefore moved into the focus of Europe's law enforcement authorities.

BIG's business model

BIG sells its products on the basis of commission and licensing models.

Initial commission revenues are generated through sales partnerships with specialised cyber security companies. Furthermore, the company is licensing QLUE directly to clients and sales partners generate revenues by reselling QLUE to their clients. By providing BitRank Verified Services, BIG receives a corresponding revenue share from the sales partners as soon as a verification process is initiated. Distribution agreements have already been concluded for both the US and Japanese markets. In Japan, Bitcoin has already been recognised as a legal tender.

The service is free of charge for end customers. Only the address of the cryptocurrency transaction to be checked is required.

Target markets and customers for BIG are

- Banks, stock exchanges and financial service providers
- Fintechs
- Retailers
- Regulators and authorities
- Legitimation service providers (KYC)
- Cash dispenser manufacturers
- End customers.

In addition, the company generates revenue through consulting and services.

Overview of customers and partners

Source: GBC; BIG

Explanations of terms

Blockchain
The blockchain is a secure and decentralised transaction protocol.

A blockchain is a globally-distributed database that connects the individual servers of the database via nodes. The most popular blockchain database is Bitcoin. It is considered secure and, in particular, forgery-proof, since all data can be accessed worldwide at any time. This enables each participant to carry out a verification process and check the authenticity of the data. The decentralised approach means that the entire system is not influenced, controlled or dominated from a central location.

Coin or token
After Bitcoin and other ICOs (initial coin offerings), the term "coin" was replaced by the more general term "token". In the context of the digital world and cryptocurrencies, the token has two meanings that merge into one term in the crypto world. Historically, a token was minted not by the government but by private merchants and companies in the United Kingdom and the USA.

In computer networks, a token is a tool for synchronising parallel processes. This means that whoever has the token has access to the resource (for example, a memory area or an interface). When the token is released, another participant can use the resource. This property is decisive for the use of the blockchain in all potential application areas, as it prevents collisions during access to data in a computer network. It is ensured that the holder of the token is the authorised person.

Number of official blockchain coins and tokens worldwide, each with a daily trading volume of more than USD 10,000
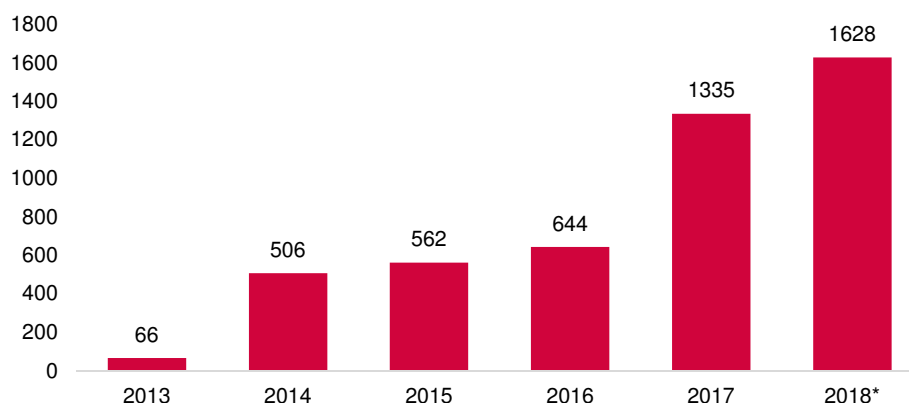
Source: GBC; Coin Market Cap; GB Bullhound (* as of 14.06.2018)

Cryptocurrencies
A cryptocurrency, also called crypto money, is a digital means of payment that is created or calculated using cryptography. The development process is called mining. Cryptocurrencies involve secure and decentralised transfer in a self-contained payment system. Up to now, these digital currencies have mainly been used by private initiators and acceptance is still controversial due to technical requirements and the qualification of the individual currencies.

However, countries such as Venezuela have also begun to issue their own cryptocurrencies and other countries such as Japan and Australia have already begun accepting individual currencies as means of payment.

The first publicly traded crypto money was Bitcoin, which has been traded since 2009. Since then, numerous other cryptocurrencies have been implemented. Following the example of Bitcoin, more than 1,600 additional cryptocurrencies are now in use, of which more than 1,000 achieve a daily trading turnover of more than USD 10,000 each at corresponding trading centres for cryptocurrencies.

FIAT currency

FIAT currencies are objects without intrinsic value, but which are accepted as means of payment and exchange. Any common currency such as the Euro or the US dollar is a FIAT currency. In these cases, an issuing government is necessary for a currency to be recognised as legal tender. This is probably the biggest difference to cryptocurrencies, which are not (yet) regulated and are not administered and controlled by central organisations.

Bitcoin BTC (initialised in 2009)

Bitcoin is a new digital currency (cryptocurrency). At the same time, Bitcoin is also the name of the worldwide, decentralised booking system. Furthermore, Bitcoin is the simplified term for a cryptographically legitimate allocation of work or computing power. Thus, a Bitcoin provides a certain amount of computing power throughout the entire network. The maximum number of Bitcoins is limited because the calculation process of the blockchain has a start and end point. Currently there are approx. 17 million Bitcoins, of which approx. 10,000 are traded per hour on average. (https://bitinfocharts.com/). The volume of the Bitcoin blockchain continues to grow due to its daily computing power and has reached a volume of well over 162,000 megabytes.

Size of the Bitcoin blockchain from 2010 to 2018 (per quarter; in megabytes)
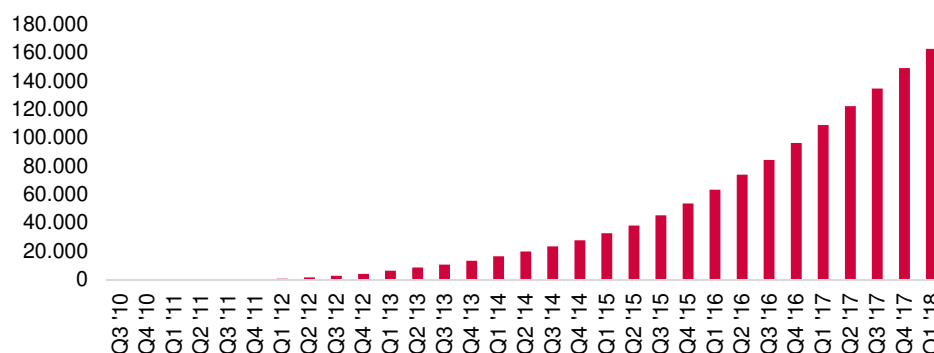
Source: GBC; Blockchain (March 2018)

Transactions within the system are self-organised, with, for example, no banking system being required. The Bitcoin itself is stored digitally in wallets. The wallets are thus used for the storage and execution of transactions.

How the blockchain works: Bitcoin blockchain

Source: Financial Times, GBC

LiteCoin

LiteCoin was developed as an alternative to Bitcoin in 2011 and differs slightly from Bitcoin in its technical features.

Bitcoin Cash (2017) and Bitcoin Gold (2017)

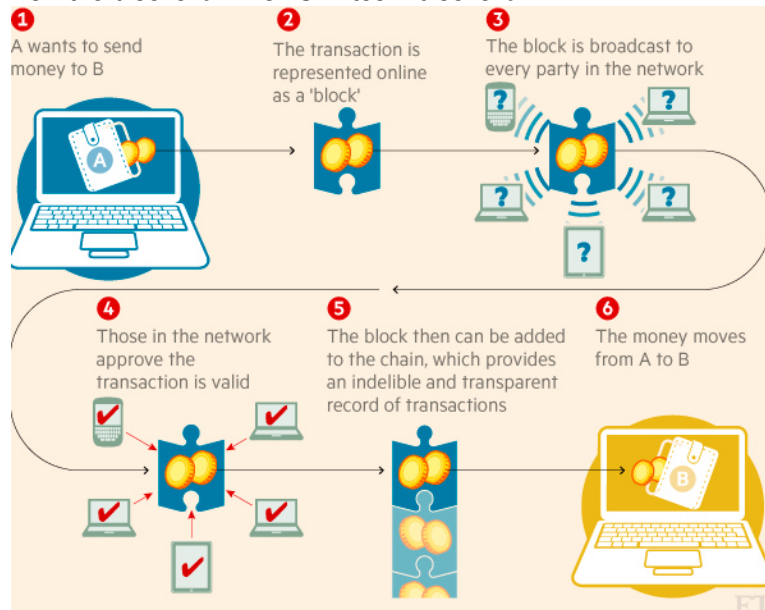BitcoinCash is a related cryptocurrency of the original Bitcoin. This involved a spin-off within the Bitcoin network, which took place on 1 August 2017. Until the spin-off, the blockchains were identical. Technical modifications to the script make Bitcoin Cash faster, as more transactions can be executed per time unit. The same applies to Bitcoin Gold, which was spun off in October 2017. With Bitcoin, a new Bitcoin block is only confirmed, i.e. created, every 10 minutes. With altcoins, the time unit has been adjusted to less than 10 minutes.

Ethereum or Ether (ETC)

Ethereum is a decentralised financial technology (a peer-to-peer network system) that offers the creation, administration and execution of programs and contracts (smart contracts) in its own blockchain. Ethereum uses the internal cryptocurrency Ether as a token/means of payment for transaction processing, which is handled by participating computers.

Ethereum is based on blockchain technology. Unlike Bitcoin, however, Ethereum is not just a cryptocurrency, but also a platform for so-called Dapps (distributed apps), which consist of smart contracts. There are a variety of applications for smart contracts (see below), including e-voting systems, virtual organisations, identity management and crowdfunding.

IOTA

In 2015, IOTA brought about a major change for decentralised technology with the integration of the directed-acycling-graph (DAG). In fact, it is not a blockchain itself, but an extended system that is intended to replace parts of the blockchain. The directed acycling graph describes a graphical, structured arrangement of nodes and connections between the points.

In this case, DAG is the replacement for the blockchain. Transactions based on DAG are confirmed by nodes. Each user of the network is a node, and the graph contains countless nodes. Nodes send and approve the transactions.

The most important difference between a DAG and a blockchain is that with the blockchain, all transactions are in the correct order. In the DAG system, however, it is impossible to determine the sequence of transactions, since there is no chain. In addition, IOTA is currently being traded as a solution for communicating from machine to machine in the Internet of Things. This clearly sets IOTA apart from other cryptocurrencies.

Wallet

A wallet is used to store bitcoins and other cryptocurrencies. Strictly speaking, from a technical point of view, no coins are actually kept; instead, you keep the digital keys which allow you to access a public address and authorise a transaction. This information about the digital keys is stored in a wallet.

Global number of wallets (in millions)
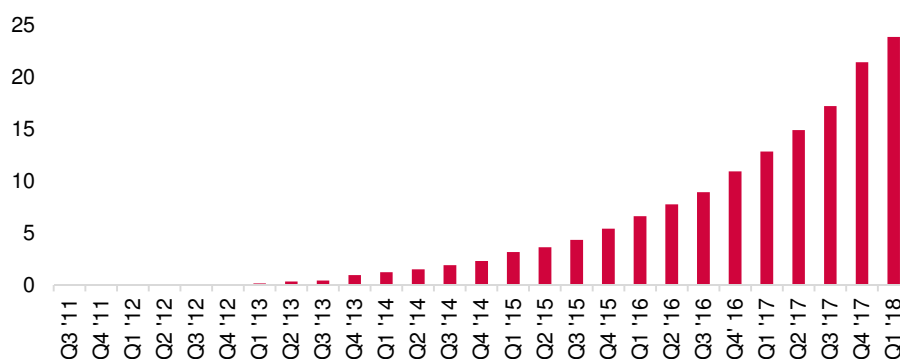
Source: GBC; statista/Blockchain (April 2018)

Wallets can be divided into two categories and further sub-categories: 1) Cold wallet (hardware, paper wallet) and 2) Hot wallet (desktop, mobile, online wallet).

Desktop wallets are very impractical when it comes to paying with cryptocurrencies in shops or at cash points. This is where mobile wallets come into play. Mobile wallets are installed as an app on a smartphone and store the private keys directly on the mobile device. This means that coins can be sent and received via mobile phone in a matter of seconds.

Cold wallet, offline wallet or hardware wallet

On a hardware wallet you can securely store one or more cryptocurrencies but you can also make payments. The wallet can usually be connected to a laptop or mobile phone via micro-USB. In order to guarantee security, various security measures (such as passwords and coding measures) must be applied to the display. This renders digital theft impossible.

Hot wallet or online wallet

A digital storage location for the digital key described above. The storage location can be a terminal or a cloud. However, the name "hot" indicates that the location is connected to the Internet and may therefore be exposed to viruses, trojans or hackers.

KYC process: Know Your Customer

The Know Your Customer Process (KYC) is the international term for a legitimation process such as the process applied in Germany when opening a customer relationship with a bank. The process is used to establish personal identification data based on identification documents and the determination of the persons involved.

KYT – Know Your Transaction

Describes the seamless traceability and control of transactions within the entire transaction process. This includes not only the actual transfer but also the participating persons, institutions and organisations.

Big Data and Big Data Analysis

Big Data describes the collection of a large number of data points that is stored in databases. The blockchain plays a special role here, since it is a decentralised database that grows by millions of data points daily. In this context, decentralised means that the data are not available on one or a few servers, but that each computer involved in the calculation of a blockchain is part of the network. The Internet connects these endpoints and nodes.

It is important to use fast and flexible software for the analysis, as the distances in the network are much greater than in conventional networks.

Smart contracts

Smart contracts were first integrated into the Ethereum system (the Bitcoin blockchain does not contain any smart contracts). Smart contracts can only be concluded with the prior consent of both parties. If a site does not want to confirm the transaction, it is not concluded. Smart contracts thus represent a further development of transactions.

51% attack

A 51% attack is when a (possibly malicious) person or group takes control of a blockchain by obtaining more than 50 per cent of the hashrate, so that the hacker(s) can take control of the network.

The number of attacks has increased recently, with the most prominent attacks having been on Verge, Bitcoin Gold and Electroneum. If a network is not protected by a strong hash performance like that of Bitcoin, Ethereum, LiteCoin and ZCash, it is difficult for developers to completely protect the blockchain against a 51% attack.

Hashrate

The unit of calculation in which the capacity of a blockchain network is represented/indicated. The computing power necessary to generate (mine) the next token/coin is also measured in hash.

MARKET AND MARKET ENVIRONMENT

Blockchain & Big Data Analytics – A trend with potentially perfect symbiosis

The blockchain is currently considered to have a multitude of possible applications whose influence in everyday life could have an even greater disruptive effect than the introduction of the Internet and its subsequent development.

The first pilot projects of these applications have already become reality, such as the transfer of funds via the Bitcoin blockchain. Moreover, the advance of technology is being accelerated globally by many other applications. A consortium of 47 Japanese banks has joined forces with a company called Ripple to facilitate money transfers between bank accounts via blockchain. The stated reason for the introduction was to enable real-time transfers at very low cost. One of the biggest factors making traditional real-time transfers expensive, has been the potential risk factors that arise by short time frames for verification processes. Higher expenses or additional expenses resulting from transaction errors are the main reasons for the limited use of real-time transactions to date. Blockchain technology largely avoids this risk. Big Data Analytics makes it possible to identify patterns of consumer spending and identify risky transactions much faster than with current technology. This has the potential to significantly reduce the costs of real-time transactions.

Further application options in the financial industry

60% of the financial companies surveyed already have plans to use the blockchain for international money transactions. A fifth of companies also intend to use the blockchain for legitimation processes (KYC) and money laundering prevention.

Planned application areas of blockchain technology

Application area	Value
Security issuance and transfer	11
Asset registries	12
Fraud deterrent	15
Decentralised notary	16
Creating transparency	19
Fiat currency payment and settlement	19
KYC and anti-money laundering	20
Securities clearing and settlement	23
International money transfers	60

Source: GBC; Temenos (2016)

Outside the banking industry, security was the main driving force behind the introduction of the blockchain. In healthcare, retail and public administration, companies have started using blockchains to analyse data, and prevent hacking and data leaks. A technology such as blockchain can, for example, ensure that checks are performed at every level of data access. Blockchain technology has the potential to develop into a kind of universal authentication technique.

Security through size - value of the Bitcoin network

It is estimated that all connected computers in the network have a value of up to EUR 4 billion and consist of up to 4 million individual computer units. Since at least 51% of the computing power would have to be controlled by one entity in order to manipulate the ledger from that point going forward, control by a single entity with large blockchains is almost impossible. Billions would have to be invested to build up the necessary computing capacity.

Possibility of using real-time analyses

Since the blockchain contains a database entry for each transaction, all participants, i.e. institutions and private users, can search for test samples in real time if required.

Up to now, it was either difficult or impossible to detect upstream fraud in the transaction process, i.e. in real time. Young companies like BIG, on the other hand, use real-time intelligence to detect anomalies and/or fraudulent intent at an early stage, enabling the earliest detection possible of transactions in breach of compliance requirements. For example, credit card providers check whether or not the transaction has been carried out in the cardholder's home country. If there is any doubt, the transaction could be terminated.

However, technologies are usually not used to identify questionable or fraudulent activity until after the transaction. Young companies like BIG, on the other hand, use real-time intelligence to detect anomalies and/or fraudulent intent at an early stage, i.e. before the transaction takes place.

Potential of blockchain technology

It is important for potential identification that cryptocurrencies are only a kind of use case, i.e. a test project of the inventors of the blockchain. The founders wanted to show what the technology could do. The resulting market can be understood as a track record of the technology. Against this background, a large number of tokens or coins have been issued, which usually have different characteristics and use different programming languages. They address a wide range of different applications.

Number of coins and tokens worldwide
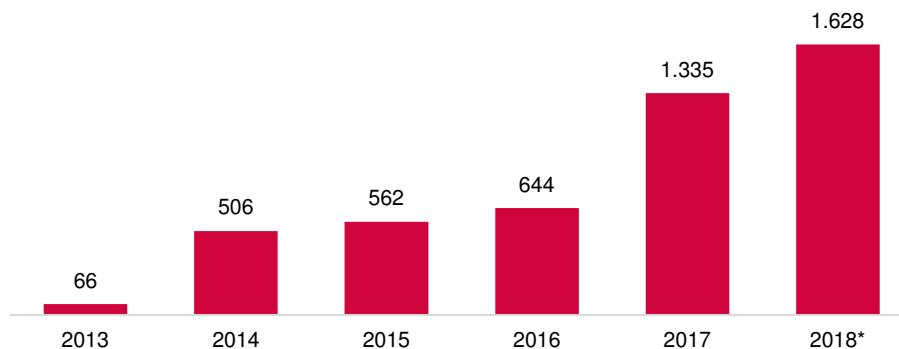
Source: GBC; Coin Market Cap; GB Bullhound (* as of 14/06/2018)

Although blockchain technology offers promising prospects for data science, many blockchain-based technology systems have not yet been tested or are not available on the scale required for industry. This is because it is an open-source trend, which means that many developers publish beta versions without having corrected the programming errors of the early development phase.

This means that young basic technology is available, whose application in practice is currently still in an early stage. However, the broad assessment is that as the technology matures, applications and economic significance will increase rapidly across all industries. At present, the financial industry is mostly affected by cryptocurrencies.

Further examples of applications of the technology

Source: GBC

Surveys already show that companies, especially retailers, are heavily involved with the technology and are already considering a wide range of applications. The surveys showed that in 2017 none of the respondents were completely unaware of the technology and every entrepreneur already had an idea for a potential application.

Potential use of blockchain technology in retail (figures in %)
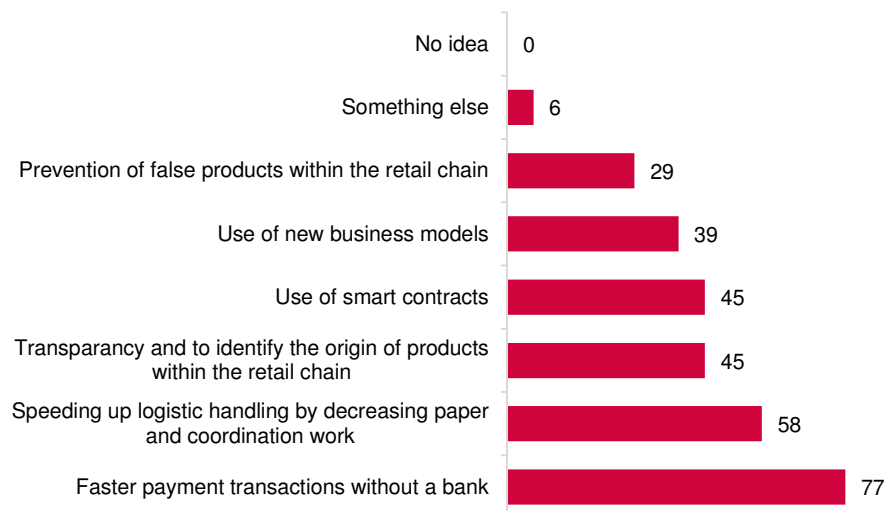
Source: GBC; ABN Amro Economic Bureau (Dec 2017)

Selected examples of blockchain applications

Energy: The change of course in energy policy under discussion in Germany is possible via blockchain-based microtransactions of data given its decentralised power generation, transmission and distribution. The data collected at the nodes is sent, validated and distributed to the grid using the blockchain to ensure payment to the energy producer or transmitter.

Insurance: Vehicles can communicate with insurance providers via intelligent devices and blockchain status updates. This enables insurers to assess transport use individually and determine insurance premiums on an individualised basis. This reduces overall insurance costs by eliminating the need for auditing and authentication of data. This also applies to the development of driverless vehicles.

Health care and public administration: The blockchain could make the much-discussed electronic patient file possible. The data stored in a blockchain are retrievable and secure, and can be retrieved and updated. This enables the democratisation of patient data and facilitates the transfer of data between providers. This also applies to public administration, so that identity documents, for example, are provided with personal and individual data.

Supply chain: This application can enable the distribution of goods in trade and industry. By using a distributed general ledger, all participants in a supply chain can see stock levels, tracking, deliveries and progress with other suppliers. The delivery process can be optimised, tracked and made cheaper.

Retail: Terminals can be used to track retail transactions through secure marketplaces. Product information, deliveries and bills of lading can be tracked via the blockchain and payments can then be made via cryptocurrencies such as Bitcoin.

Market and growth of the blockchain

After an extensive wave of initial coin offerings (ICO) or initial token offerings (ITO), the total number of cryptocurrencies and tokens has risen to 1,634 (as of 14/06/2018; coinmarketcap.com). Each of the tokens may use its own technology with different characteristics.

Outlook: Global size of blockchain technology 2016-2021 (in USD million)
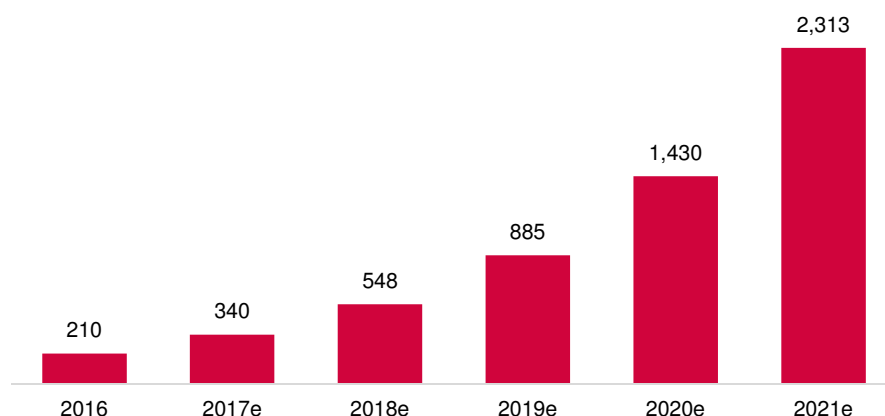
Source: GBC; MarketsandMarkets (October 2016)

It is important to understand that the blockchain is a technology and the Bitcoin is only a first application of this technology. The "money transfer" application was developed to operate in a decentralised system free of regulations and centralised influence. Anonymity was defined as one of the most important characteristics of the new monetary system. In the past, this led to growth, value enhancement and increased use of digital money transfer. Cryptocurrencies therefore address a massive market.

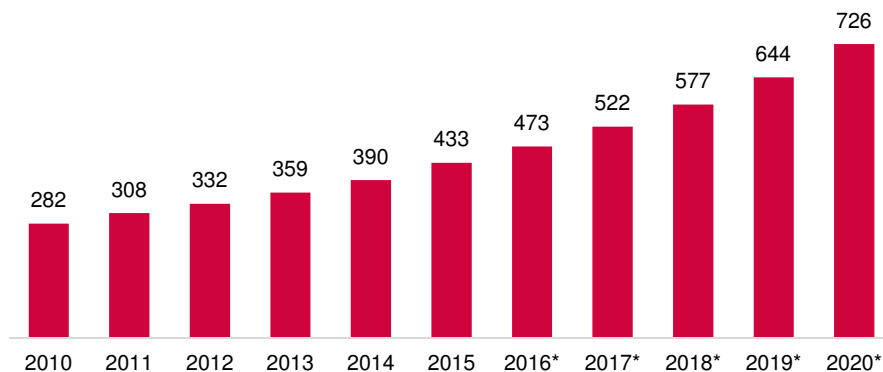**Number of cashless payment transactions worldwide from 2010 to 2020 (in billions)**

Source: Capgemini; BIS; statista (published 10/17); GBC

Originally Bitcoin represented transparency, since all transactions can be traced. However, anonymity (transactions are not necessarily linked to names and addresses) changed the way the application was used. For example, the original idea of unregulated money transfer became less part of the public discussion and more an object of speculation and investment, and illegal activities were made possible and easier with Bitcoin. In particular, at the end of 2017/beginning of 2018, the number of monthly transactions increased rapidly and fell sharply thereafter. This development is closely linked to the price of the Bitcoin, which reached its all-time high during this period and fell sharply thereafter.

Development of the number of transactions per month using Bitcoin (in millions)
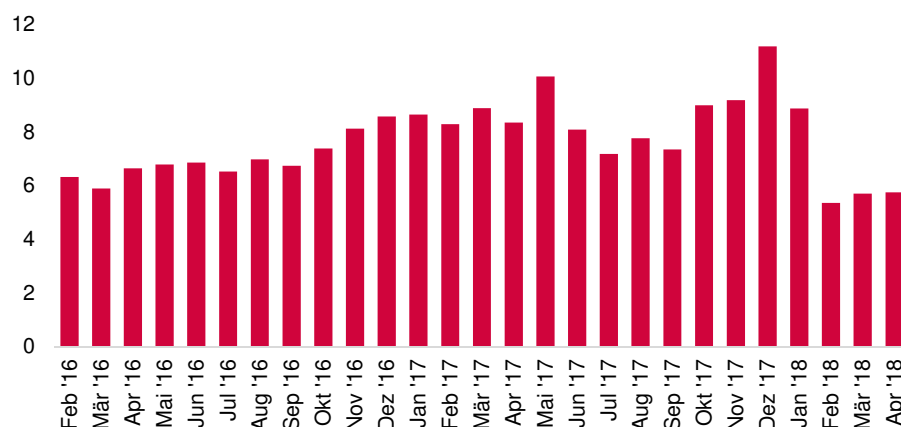
Source: Blockchain, GBC

At around 11.19 million transactions, December 2017 was the month with the highest trading volume for Bitcoin. Trading activity fell sharply to an average of 5.60 million transactions in the period from February to April 2018. The transaction volume is subject to a technical limit of 867,000 per day – there are therefore limits to trading activity. By the end of April 2018, a total of around 313.49 million transactions had been carried out worldwide using Bitcoin. The sharp rise in demand resulted in the Bitcoin blockchain

reaching its limits. As a consequence, the transaction confirmation has increased significantly at times, partly because the blockchain is becoming longer and longer.

Development of the average Bitcoin transaction confirmation (in min.)
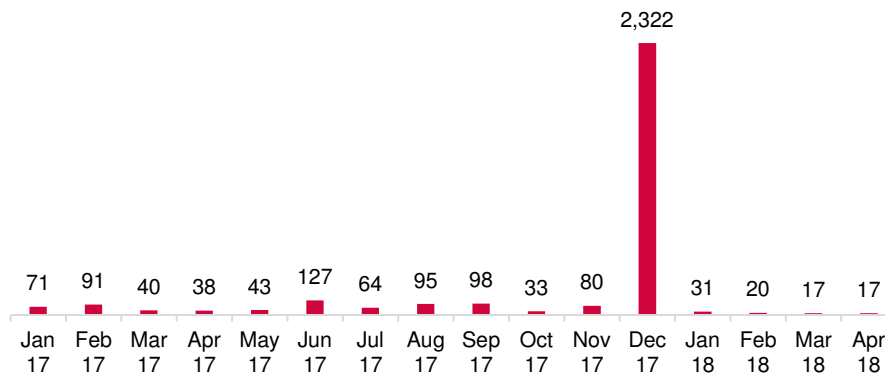
Source: GBC; Blockchain (2018)

Criminal activities using Bitcoin

Due to the anonymity of Bitcoin and the use of technological methods to obscure transactions (e.g. VPN client or the dark web browser Tor), cryptocurrencies have become a popular tool for criminal activities. Due to the novelty, complexity and lack of data, the information on criminal activities differs significantly. On average, it is estimated that 25% of all transactions are related to crime. Depending on the Bitcoin price, this corresponds to a daily volume of around USD 15 million (10,000 transactions at a rate of USD 6,000/Bitcoin).

Drivers for growth

In the context of a secure and state-regulated system (not the Bitcoin system itself, but the interfaces and acceptance points between cryptocurrencies and FIAT currencies need to be regulated), growth rates are expected to be significantly above average. When the point is reached where the use of cryptocurrencies has no legal consequences for private individuals and companies, a further enormous increase in transactions can be expected. Transactions are already growing at a disproportionately high rate.

Growth in Bitcoin transactions

This chart shows the global total of all Bitcoin transactions from the end of January 2016 to the end of April 2018. In January 2016, the total amounted to around 107 million transactions. In the 24 months following (until January 2018), the total increased by a factor of over 2.5 to 269 million transactions.
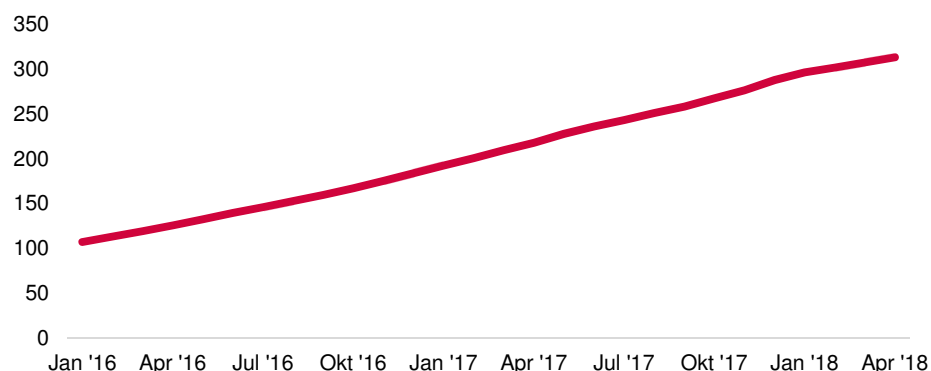
Source: Blockchain, GBC (2018)

Drivers: Bitcoin ATMs

Digital exchange offices are booming internationally, enabling the exchange of FIAT currencies into cryptocurrencies. Until now, this has been possible using credit cards and bank accounts. In addition, there are almost 2,400 Bitcoin ATMs worldwide (current estimates). And Reuters reports that around 15 new locations are added every day. The majority of Bitcoin ATMs are currently located in the USA and Canada. But the market is also growing in Europe, especially in the United Kingdom, Austria and Switzerland. In Eastern European countries such as Ukraine, additional machines are also put into operation every day.

Number of Bitcoin ATMs in selected countries (in thousands)
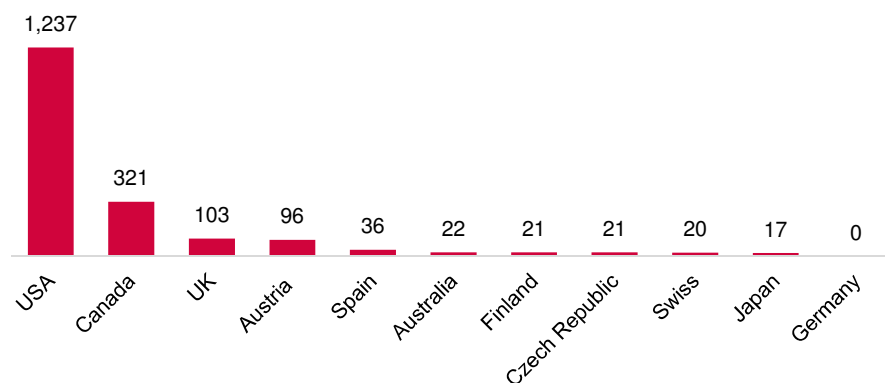
Source: Coin ATM Radar; GBC

According to information provided by the company itself, the Austrian provider Cointed operates 60 ATMs in Austria. Expansion into the German market is planned, but the regulatory obstacles imposed by the BaFin have so far prevented the operation of ATMs in Germany.

Bitcoin ATMs in Austria

Source: Cointed; GBC

Cryptocurrencies were classified by BaFin as "units of account" and thus as financial instruments, which means that numerous requirements for trading in cryptocurrencies must be met. The operation of exchange platforms therefore requires prior permission from the financial supervisory authority BaFin.

The world's largest ATM operator Diebold regards the cryptocurrencies as immature, which is why it does not intend to implement any technology for exchanging cryptocurrencies for the time being.

The number of ATMs is a very interesting figure for BIG. Here, in particular, cryptocurrencies can be exchanged into FIAT currencies and vice versa. The operators of the ATMs must ensure that, in doing so, the equipment is not used for money laundering. Therefore, these devices and/or the related transactions can be verified using BIG solutions. This significantly reduces the risk for operators.

Competition

Data are the key

In BIG's competitive environment, the quality and amount of the data are the keys to market leadership. Companies that can generate the largest database and, at the same time, have the fastest and highest quality search algorithms can make the most meaningful statements about the transaction chain and the participating players.

Competitors

Generally speaking, a number of companies are active in the market for forensic analysis and big data analysis of blockchain transactions. However, since the blockchain is an extremely young technology, whose widespread breakthrough with Bitcoin did not take place until 2014, the corresponding analysis providers are even newer, usually having been founded in 2015 and 2016. As with BIG itself, these are start-ups. In direct comparison, however, BIG's mature profile and its stock exchange listing mean that much more extensive information is available on it.

The providers listed (sorted by importance) below are all in direct competition with BIG. In addition, other start-ups such as Coinalytics from Palo Alto, California, USA, were previously active in this area and have discontinued operations for unknown reasons.

	QLUE competitor	BitRank competitor
DMG Blockchain Solutions (including subsidiary BlockSeer)	✓	✓
Chainalysis	✓	✓
Cipher Trace	✓	✓
ScoreChain	✓	✓
Elliptic	✓	✗
Crystal	✓	✗
Neutrino	✓	✗
Guardian Analytics	✓	✗
CoinFirm.com	✗	✓

Source: GBC

DMG Blockchain Solutions

DMG Blockchain Solutions has one of the strongest parallels to BIG in terms of structure. Based in Vancouver, British Columbia, Canada, the company is a publicly listed company with listings in Canada (Toronto) and Germany (Frankfurt). The company was founded in 2011.

DMG sells a product that competes with BitRank. In addition, the DMG subsidiary BlockSeer markets an alternative to QLUE. This makes BIG and DMG very similar. However, DMG has a less focused business model. In addition to the activities mentioned above, DMG offers a mining service and trading tools.

Chainalysis

Chainalysis can be seen as the main competitor. The company recently raised around USD 16 million in a financing round to finance growth and market penetration. Chainalysis is based in New York and has offices in Washington, D.C. and Copenhagen.
The company offers two products that are very similar to those offered by BIG. CHAINALYSIS REACTOR is distributed as investigation software, which involves the merging of wallets and transactions. This product is comparable to BIG's QLUE.

CHAINALYSIS KYT is compliance software that creates a risk profile of incoming and outgoing transactions. This is a service similar to BitRank.

CipherTrace
CipherTrace has a similar set-up to BIG and Chainalysis. Besides competing products to QLUE and BitRank, for example, the company offers additional services. It focuses on the development of individual blockchains and smart contracts, which are intended to enable users to work securely and in compliance. The company's headquarters are in Menlo Park, California, US, and it claims to serve a global customer base.

Elliptic
Active on the US market and in the UK. The company offers forensic data analysis to identify money laundering (AML) and criminal activities. The data analyses serve as evidence for criminal prosecution and are in demand from authorities. The company is based in the UK.

Neutrino
Based in Milan, Italy, the company specialises in data analysis for law enforcement and financial institutions, and was founded in 2016.

Guardian Analytics
Founded in 2005, it is the most experienced competitor. The company has been active for over a decade in the areas of fraud prevention, legitimacy verification, anti-money laundering and information security. With a strong existing customer base of brokers, investment advisors, banks, insurance companies and financial service providers, the expansion of the service to cryptocurrencies is being targeted.

COMPANY PERFORMANCE AND FORECAST

Strategy

BIG is an IT company addressing the extremely young market of blockchain technology. The primary focus here is on establishing cyber security in dealing with cryptocurrencies.

The company's strategy is to be the first mover in cyber security and forensic analysis of big data related to cryptocurrencies in order to be the leading provider of the necessary security technology for financial services providers, governments, government agencies, law enforcement and commerce. The commercialisation of BIG's search, analysis and scoring solutions is expected to begin in the second half of 2018. The products are already available and international distribution, particularly in the USA, Canada and Japan, has been initiated. The first partnerships have already been reported.

Since all cryptocurrencies are less than 10 years old and general public awareness is less than 4 years old, little empirical data is available. The same holds true for the underlying blockchain technology. The biggest current obstacle to the use of cryptocurrencies is the lack of a regulatory treatment and an official classification of cryptocurrencies in national and international legal systems. BIG's strategy is therefore to recruit former government employees in order to support the authorities in understanding the technology with their expertise and networks. This strategy should prove to be effective. The fact that BIG cooperates with experienced government employees is one of the company's most significant competitive advantages.

Forecast and model assumptions

A scenario based on the successful and widespread establishment of cryptocurrencies was used to formulate the forecasts and model assumptions. Since BIG's security solutions address the resulting needs of business organisations and the public sector, the company should develop in line with the huge market potential. These assumptions and this scenario represent a major opportunity and an equally high risk.

in m CAD	FY 2017	FY 2018e	FY 2019e	FY 2020e	FY 2021e
Sales	0.10	0.30	5.53	11.27	16.90
EBITDA	-14.77	-8.49	-4.03	0.88	4.22
EBITDA-margin	-14808.2%	-2830.2%	-72.8%	7.8%	25.0%
Profit	-14.77	-8.40	-4.10	0.55	2.40
EPS in CAD	-0.14	-0.07	-0.03	0.00	0.02

Source: GBC AG

Sales forecast

Blockchain technology has revolutionary potential to change the world. A parallel can be drawn with the Internet, which has a major impact on life today. The influence of the Internet was not underestimated, but the speed of its implementation was. This led to soaring prices on the Neuer Markt, which was followed by a crash. Only then was it possible to establish the technology and build up new business models. After the rapid rise in the value of cryptocurrencies at the end of 2017 and the subsequent consolidation, the current phase could serve as the foundation for establishing business models. As a security and service provider of IT solutions, BIG would be a first mover. This scenario gives rise to the following expectations.

In recent years, the company has developed solutions to market maturity, established an international network, established subsidiaries at strategically important locations and

built up an experienced workforce. In addition, various pilot projects have been implemented. Given this, we assume that BIG can use its current position to establish and expand its market position and show dynamic growth.

Sales development (in CAD million)
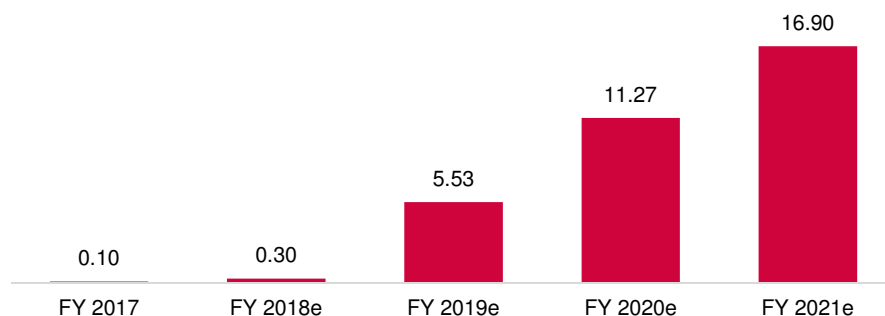
Source: GBC

Earnings forecasts

The earnings forecasts reflect the assumptions outlined here. As a software company, we expect there to be an intensive scaling of the business model. The search and scoring tools are ready for the market and no major investment should be required to develop the existing tools into earnings and value drivers.

Due to the lack of sales and the high development costs in recent years, the key figures provide very little useful information. This should change as of 2021E, when the company approaches the EBITDA margin target of 25%.

EBITDA development (in CAD million)
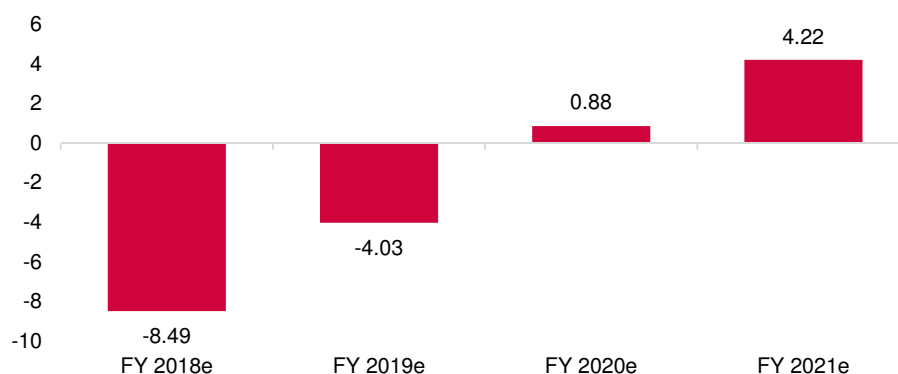
Source: GBC

BIG operates in a business environment with low capital investment. This requires constantly updated and accessible expertise. This applies to the initial and ongoing development of new products, in particular the expansion of the software to alternative blockchains and corresponding cryptocurrencies. In addition, the adaptation to changing conditions (e.g. modifications to the code of individual currencies), is likely to entail regular programming adjustments.

On the other hand, the licence business offers a steady, recurring and profitable revenue stream. The drivers of the results are assumed to be maintenance and services, which generally make significantly higher contributions to margins than the pure licence business.

Balance sheet and financial situation

A newcomer to the stock exchange
The company went public on the Canadian stock exchange in a reverse IPO in September 2017. A capital increase followed in December 2017. With the issue of approximately 26 million shares, around CAD 19.55 million was raised in a private placement. As at the balance sheet date of 31 December 2017, cash reserves amounted to approximately CAD 20.7 million. With approximately CAD 18.1 million (as at 31 March 2018), the company is sufficiently financed to achieve medium-term growth and the global market launch of the products.

The balance sheet shows no borrowed capital. BIG is 100% equity-financed.

Cash flow development
In line with forecast expectations, the company will not be able to show a positive operating cash flow in the next few years. The low sales combined with ramp-up costs are the result of further investments for market entry and customer acquisition. However, following the successful capital increase last December, BIG should have sufficient financial resources to reach break-even.

Financed up to break-even (in million CAD)
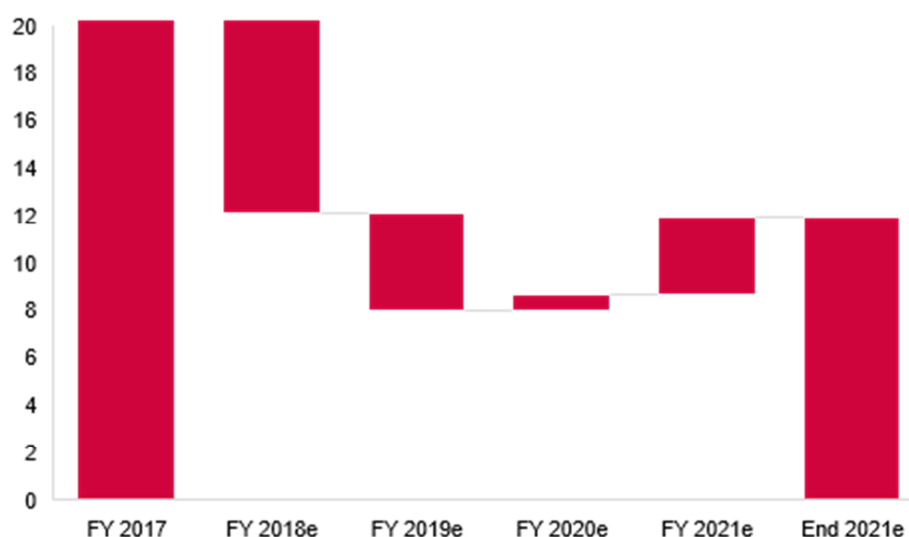
Source: GBC

It should take another 2 years before the break-even point is reached. Financing requirements in 2018e should be around CAD 8.6 million and CAD 4.2 million in 2019. A positive operating cash flow of approx. CAD 0.7 million is expected in 2020E.

Summary

BIG is an ideal option to profit from the trend towards cryptocurrencies and, even more importantly, blockchain technology without the strong price fluctuations of the cryptocurrencies. More and more banks, stock exchanges and financial service providers are developing products such as derivatives and exchange-traded funds to invest in cryptocurrencies. The number of acceptance points and ATMs for digital currencies is also increasing daily. Commercial operators and private users have a regulatory interest in conducting secure transactions in order not to be associated with money laundering, for example. As a result, security and scoring software seem unavoidable. BIG has the experienced team, the necessary network and the financial strength to maintain its first mover advantage.

SWOT analysis

Strengths	Weaknesses
• BIG is a first mover and a driving force for security, transparency and compliance requirements in dealing with cryptocurrencies. Without the secure tools for risk minimisation, the broad acceptance of cryptocurrencies is not feasible. • BIG supplies attractive products to protect against criminal activities and money laundering. If you want to use cryptocurrencies, you have to implement appropriate security software. BIG offers a comprehensive product portfolio. • BIG has an experienced team and outstanding expertise. In addition to its own human resources, the company has a pool of consultants at its disposal. • Through licensing agreements, the company benefits in the long term and through stable cash flows.	• So far, the products are only active and applicable on the Bitcoin and Ethereum blockchains. • BIG is a young company in a highly competitive market environment. More than 10 competitors are active with comparable products. None of the companies has a track record. • Theoretically, the number of possible Bitcoin transactions is limited to 867,000 per day. This also limits BIG's current business model. If the number of analysable technologies and cryptocurrencies does not increase, the assumptions made could be too positive.

Opportunities	Risks
• Blockchain technology improves transparency in data analysis. There are many ways it could be used, some of which are not yet fully realised. The area of application of BIG's analysis tools may be many times larger than expected. • Governments have not yet regulated the use of cryptocurrencies or made their entry into everyday life possible. Solving this uncertainty is the only way to unleash the true potential. • Even though competition for money transactions is fierce, major online shops and paying agents today rely on all procedures to reach every customer. Accordingly, potential market growth is huge.	• Cryptocurrencies under development are already working on integrating control mechanisms into the currency. Scoring tools could become less important. This would be negative for sales of the solutions. • Customers are public authorities, governments and large corporations. Their decision-making processes are usually long and budget-dependent. BIG could develop more slowly and less dynamically than expected. • Banks and financial service providers are working on fast transaction models and systems ("instant payment") that may limit the advantage of cryptocurrencies. • Apps already enable payments (from restaurant visits to rental payments) in real time. Applications like these call into question the need for cryptocurrencies.

VALUATION

Model assumptions

We rated BIG Blockchain Intelligence Group using a three-stage DCF model. Starting with the concrete estimations for 2018, 2019, and 2020 in phase 1, in the second phase, from 2021 to 2025, our forecast uses value drivers.

Here we expect a sales increase of 50.0 %. We have assumed an EBITDA margin target of 25.0%. We have taken into the account average Canadian tax rates of 26.5 %. Additionally, a residual value is determined in the third phase by using the perpetual annuity by the end of the forecast horizon. As the final value, we assume a growth rate of 2.0%.

Determination of capital costs

The weighted average cost of capital (WACC) of BIG Blockchain Intelligence Group is calculated using equity costs and debt costs. The market premium, the company-specific beta, as well as the risk-free interest rate have to be determined in order to determine the equity cost.

The risk-free interest rate is derived in accordance with the recommendations of the expert committee for company valuations and business administration (FAUB) of the IDW (Institut der Wirtschaftsprüfer in Deutschland e.V.) from the current interest rate yield curves for risk-free bonds. The zero bond interest rates according to the Svensson method published by the German Federal Bank form the underlying basis. To smooth out short-term market fluctuations, we use the average yields over the previous three months and round up the result to 0.25 basis points. **The value of the currently used risk-free interest rate is 1.25%.**

We set **the historical market premium of 5.50%** as a reasonable expectation of the market premium. This is supported by historical analyses of stock market returns. The market premium reflects the percentage by which the stock market is expected to be more profitable than low-risk government bonds.

According to GBC estimates, we have determined a beta of 1.71.

Based on these assumptions, the calculated equity costs amount to 10.68% (beta multiplied by the risk premium plus the risk-free interest rate). Since we assume a sustainable weighting of the equity costs of 100 %, the resulting weighted average costs of capital (WACC) amount to 10.68%.

Evaluation result

The discounting of future cash flows is based on the entity approach. In our calculation, the result for the corresponding weighted average costs of capital (WACC) is 10.68%. The resulting fair value per share at the end of the 2019 financial year corresponds to the target price of CAD 1.03 (€0.69). This target price is valid until 31/12/2019 or until a previous change or update of the valuation model.

DCF-Modell

BIG Blockchain Intelligence Group - Discounted cash flow (DCF) model scenario

Value driver of the DCF - model according to estimate phase:

consistency - Phase	
Sales growth	50.0%
EBITDA-Margin	25.0%
Depreciation to fixed assets	17.1%
Working Capital to sales	10.0%

final - Phase	
Eternal growth rate	2.0%
Eternal EBITA - margin	25.0%
Eternal effective tax rate	26.5%

Three phases - Model:

phase	estimate				consistency				final
in €m	FY 18e	FY 19e	FY 20e	FY 21e	FY 22e	FY 23e	FY 24e	FY 25e	Terminal Value
Sales	0.30	5.53	11.27	16.90	25.35	38.02	57.03	85.54	
Sales change	200.9%	1742%	103.8%	50.0%	50.0%	50.0%	50.0%	50.0%	2.0%
Sales to fixed assets	1.00	6.14	10.88	10.88	10.88	10.88	10.88	10.88	
EBITDA	-8.49	-4.03	0.88	4.22	6.34	9.50	14.26	21.39	
EBITDA-margin	-2830%	-72.8%	7.8%	25.0%	25.0%	25.0%	25.0%	25.0%	
EBITA	-8.57	-4.19	0.70	4.05	6.07	9.11	13.66	20.49	
EBITA-Margin	-2857%	-75.7%	6.3%	24.0%	24.0%	24.0%	24.0%	24.0%	24.0%
Taxes on EBITA	0.00	0.00	-0.19	-1.07	-1.61	-2.41	-3.62	-5.43	
Taxes to EBITA	0.0%	0.0%	26.5%	26.5%	26.5%	26.5%	26.5%	26.5%	26.5%
EBI (NOPLAT)	-8.57	-4.19	0.52	2.97	4.46	6.69	10.04	15.06	
Return on capital	1856%	-3053%	220.8%	449.7%	137.6%	137.6%	137.6%	137.6%	97.7%
Working Capital (WC)	-0.16	-0.67	-0.37	1.69	2.53	3.80	5.70	8.55	
WC to sales	-54.3%	-12.0%	-3.3%	10.0%	10.0%	10.0%	10.0%	10.0%	
Investment in WC	-0.37	0.50	-0.29	-2.06	-0.84	-1.27	-1.90	-2.85	
Operating fixed assets (OAV)	0.30	0.90	1.04	1.55	2.33	3.49	5.24	7.86	
Depreciation on OAV	-0.08	-0.16	-0.18	-0.18	-0.27	-0.40	-0.60	-0.90	
Depreciation to OAV	26.8%	17.9%	17.1%	17.1%	17.1%	17.1%	17.1%	17.1%	
Investment in OAV	-0.31	-0.76	-0.31	-0.69	-1.04	-1.56	-2.34	-3.52	
Capital employed	0.14	0.23	0.66	3.24	4.86	7.30	10.94	16.41	
EBITDA	-8.49	-4.03	0.88	4.22	6.34	9.50	14.26	21.39	
Taxes on EBITA	0.00	0.00	-0.19	-1.07	-1.61	-2.41	-3.62	-5.43	
Total investment	-0.68	-0.26	-0.60	-2.76	-1.89	-2.83	-4.25	-6.37	
Investment in OAV	-0.31	-0.76	-0.31	-0.69	-1.04	-1.56	-2.34	-3.52	
Investment in WC	-0.37	0.50	-0.29	-2.06	-0.84	-1.27	-1.90	-2.85	
Investment in Goodwill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Free cash flows	-9.17	-4.28	0.09	0.39	2.84	4.26	6.39	9.59	180.96

Value operating business (due date)	98.09	112.85
Net present value explicit free cash flows	9,14	14.40
Net present value of terminal value	88.95	98.45
Net debt	-16.62	-12.42
Value of equity	114.71	125.27
Minority interests	0.00	0.00
Value of share capital	114.71	125.27
Outstanding shares in m	121.55	121.55
Fair value per share in €	0.94	**1.03**

Cost of Capital:	
Riskfree rate	1.3%
Market risk premium	5.5%
Beta	1.71
Cost of Equity	10.7%
Target weight	100.0%
Cost of Debt	7.0%
Target weight	0.0%
Taxshield	28.7%
WACC	**10.7%**

Return on capital		WACC				
		10.1%	10.4%	10.7%	11.0%	11.3%
	97.2%	1.11	1.07	1.03	0.99	0.95
	97.4%	1.12	1.07	1.03	0.99	0.95
	97.7%	1.12	1.07	**1.03**	0.99	0.95
	97.9%	1.12	1.08	1.03	0.99	0.96
	98.2%	1.12	1.08	1.03	1.00	0.96

ANNEX

I.
Research under MiFID II
1. There is a contract between the research company GBC AG and the issuer regarding the independent preparation and publication of this research report on the issuer. GBC AG is remunerated for this by the issuer.
2. The research report is simultaneously made available to all interested investment services companies.

II.
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