EU Blockchain
Observatory and Forum

EU Blockchain Ecosystem Developments

A Thematic Report Prepared By
The European Union Blockchain Observatory & Forum

An initiative of the European Commission

About this report

This is the first thematic report prepared by the new team leading the EU Blockchain Observatory and Forum, aiming to present the latest updates and developments within the EU blockchain ecosystem.

This is the first of a series of reports that will be published addressing selected topics in accordance with the European Commission priorities. The aim is to reflect on the latest trends and developments and discuss the future of blockchain in Europe and globally.

Credits

This report has been produced by the EU Blockchain Observatory and Forum team.

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Note

While we have done our best to incorporate the comments and suggestions of our contributors where appropriate and feasible, all mistakes and omissions are the sole responsibility of the authors of this paper.

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Executive Summary

Europe is on the cusp of making major steps forward in harmonizing the legal, regulatory and policy frameworks of the European Union member states on crypto assets. On September 24, 2020, the European Commission published a proposal for a "*Regulation of the European Parliament and of the Council on Markets in Crypto-Assets*", commonly referred to as the *MiCA proposal*. This proposal is part of the Digital Finance package, which is a holistic package of measures to further enable and support the potential of digital finance in terms of innovation and competition while mitigating the risks. In addition to the MiCA proposal, the Digital Finance package also includes a proposal for a pilot regime on distributed ledger technology (DLT) market infrastructures, a proposal for digital operational resilience and a proposal to clarify or amend certain related EU financial services rules. Europe's strategy prioritizes ensuring that the EU financial services regulatory framework is innovation-friendly and does not pose obstacles to the application of new technologies. The MiCA proposal, together with the proposal on a DLT pilot regime, represents the first concrete action within this area.

Given the rising interest in crypto-assets and their underlying technology (blockchain or Distributed Ledger Technology, DLT), the European Blockchain Observatory and Forum has undertaken a study on capturing the current state of technological, market and regulatory developments in each of the 27 EU member states, plus the United Kingdom and Switzerland. The study is topical as different countries present different states of development in blockchain and crypto-assets on several dimensions:

- Regulation and policy: several countries have recently legislated or issued guidance, thus leading to market fragmentation.
- Business activity: as a result of different regulatory treatment, entrepreneurial and investment activity is unevenly concentrated among countries, thus leading to emerging clusters.

To support Europe's efforts to develop a harmonized framework across the EU member states, it is therefore important to study the current level of regulatory and market maturity in each of them. This report aims to do that, by providing short country-level 'factsheets' summarizing the state of affairs in each country.

COUNTRY-LEVEL SUMMARY

Austria has adopted a mostly *laissez faire* approach to regulating blockchain, limiting itself to monitoring developments in the decentralized finance space and issuing warnings to investors when needed. There is no specific legislation for crypto-assets, while parts of more generic regulations (such as the Austrian Alternative Financing Act, the Austrian Banking Act, the Austrian Electronic Money Act and the Austrian Capital Markets Act) may apply. State-sponsored innovation and research activities, such as the Austrian Blockchain Center, pave the way for spearheading innovation though a PPP (public-private partnership model). A relatively large number of blockchain companies are present in the country, which have collectively raised tens of millions in funding.

Belgium can boast a vibrant crypto-assets community, with a distinct focus on Fintech startups. Due to its proximity to European Union decision-making headquarters, the country is an attractive location for international companies (for example, Fujitsu has set up its international Blockchain Innovation Centre in Brussels) and hosts a relatively large number of EU-funded blockchain research and innovation activities. While there is no crypto-assets specific legislation, the country's Financial Services and Markets Authority has published guidance and warnings aiming at investor protection.

Bulgaria is catching up on the European blockchain scene, with an emerging base of blockchain enthusiasts, as well as venture capital investors and start-up incubation programs. Moreover, it has been an epicentre of

activity in the 2017-18 Initial Coin Offerings (ICOs) boom. Despite that, there is no crypto-assets specific legislation in the country, save warnings issued by the National Bank of Bulgaria.

Croatia has a small, but growing, ecosystem of blockchain startups and communities. The country's financial supervisor has recently (May 2020) approved a bitcoin investment fund, even in the absence of any specific country-level legislation specific to crypto assets.

Cyprus is one of Europe's blockchain hotspots, with a national strategy to support and promote blockchain in the country adopted by the government in 2019 and an ongoing effort to develop legislation specific to crypto-assets. Moreover, the country boasts the first ever academic course and full degree on the subject, offered by the University of Nicosia since 2014. Funds raised per capita place the country among the EU's top member states in attracting investment capital for blockchain startups.

The **Czech Republic** boasts a vibrant crypto-asset community, including some notable European blockchain startups and one of the largest concentrations of public venues accepting digital currencies as forms of payment. It also has a relatively strict regulatory framework, with laws aiming at limiting the anonymity of crypto-asset transactions.

Denmark is one of the few countries globally where the government has engaged in comprehensive research on the potential economic impact of blockchain on industry and the labour market. Although there is no legislation specific to crypto-assets, the country shows a rising ecosystem of startups and universities working on blockchain-related applications and research.

Estonia has adopted blockchain as one of the technological pillars of its state-backed digital backbone. It has also been one of the first countries in Europe to work on crypto-assets regulation, providing a 'digital assets license' to exchanges and custodial crypto-asset wallet providers. As a result, the country has attracted a very large number of companies that have raised enough capital to place the country in the top spot, as far as the EU member states are concerned, in terms of blockchain funding per capita.

Finland, although not having a comprehensive crypto asset regulatory framework in place, has passed the Finnish Act on Virtual Currency Providers in 2019, providing a clear landscape for the registration and supervision of these companies. The government has shown interest in blockchain, with a number of pilot initiatives in e-government and the private sector has produced one of the world's first digital currency exchanges, operating since 2012.

France is at the forefront of crypto asset recognition in Europe, having passed a legal framework for Initial Coin Offerings as early as 2016, followed by further legislative initiatives in 2017 and 2018. There is a relatively large number of blockchain companies in the country, with one of the world's most successful hardware wallet providers (Ledger) headquartered in Paris.

Germany has a very active blockchain ecosystem of companies and enthusiasts, especially in the city of Berlin. The country's government has adopted a national blockchain strategy in 2019, highlighting financial services and digital identity as areas of national importance. There is an abundance of entrepreneurial activity with hundreds of companies active nationwide, while universities offer specialized degrees and professional training programs, as well as engaging in research and technology development activities.

Greece is a signatory to the European Blockchain Partnership, yet there are no specific references to crypto assets in the country's regulations. There are a few blockchain startups and a growing user community, as well as grassroot initiatives, such as the Hellenic Blockchain Hub, that are trying to raise awareness and promote blockchain in the country.

Hungary has shown state interest in crypto assets and blockchain, with the country's Ministry for Innovation and Technology setting up an inter-ministerial working group on blockchain to foster dialogue about the technology and its potential applications. The country's National Bank and tax authorities have published warning and statements related to crypto assets, but the country does not have a crypto asset specific legal framework in place to date. Similarly, the business and startup scene in the country is still relatively small, but showing early signs of success in capital raising.

Ireland has a relatively mature blockchain company ecosystem, with both local companies and subsidiaries of international ones (such as Consensys). The country has opted for a flexible and permissive regulatory approach to date, without passing regulation specific to crypto assets, but applying existing financial services legislation on a case by case basis instead. Blockchain in companies in Ireland have collectively raised tens of millions in funding.

Italy has a number of state-sponsored pilot initiatives aiming at testing blockchain applications in government, as well as a large number of private pilots, mostly by financial institutions. The country is one of the first in the world to recognize the legal validity and enforceability of smart contracts in 2019.

Latvia has a blockchain-friendly business and regulatory climate, characterized by an active community of enthusiasts and a willingness to experiment (for example, airBaltic, the country's national owned air carrier, became the first airline to accept digital assets for payments). There is a sizeable community of blockchain developers in the country, while authorities have published guidance on the legal treatment of digital assets and investor protection.

Lithuania became an epicentre of ICO (Initial Coin Offering) activity in Europe during 2017-18, combining a blockchain-friendly regulatory approach with an abundance of local engineering talent. The Blockchain Center Vilnius acts as incubator of local startups, while the Bank of Lithuania has also launched a sandbox (called LB Chain) to support crypto asset innovation in the country. The amount of funding raised by Lithuanian startups places the country in the top tier of European Union member states, ranked by this criterion.

Luxembourg is one of Europe's financial centers and, as such, has been at the forefront of developments in the financial applications of blockchain. The country has passed a bill on 'de-materialized securities' as early as 2013 and has attracted a number of crypto asset related startups and significant funding in the industry.

Malta has been called 'the blockchain island' as it has been one of the first countries in the world to have a comprehensive regulatory regime for crypto assets, since 2018, as part of the country's national strategy to promote blockchain innovation and adoption (later revised to promote digital transformation in general). As a result, the country attracted a large number of prominent crypto asset related companies and is one of Europe's most successful countries in attracting investment capital in the field. More recently, the country has enacted a stricter regulatory approach for crypto asset related licenses and company supervision.

The **Netherlands** boast very strong blockchain communities, being among Europe's top performers when measured by the amount of funding secured by crypto asset and blockchain startups. The country has not passed a crypto asset specific regulatory framework but has adopted a regulatory sandbox approach that empowers regulators to use a principles-based rather than a rules-based approach when dealing with emerging technologies. A large number of companies accept digital assets as form of payment, while the various meet-ups of digital assets enthusiasts in the country number thousands of members.

Poland has adopted a strict approach against crypto assets, taxing profits from their trading as income and warning investors about the dangers from investing in them (the Polish Financial Supervision Authority (KNF) has published guidance for crypto assets and ICOs). Conversely, the underlying technology of blockchain is viewed more favorably, with a number of pilot projects financed by the state and industry alike.

Portugal does not have a crypto asset specific framework in place, limiting itself to issuing guidance for investor protection by the relevant authorities. There is a growing base of enthusiasts organized in communities and a small, but dynamic, startup scene, which has been successful in raising growth capital from the market.

Romania has passed a law in 2019 specifying that income from digital assets trading is taxable on profits but has otherwise refrained from regulating the crypto assets space. The country's startup scene is at early stages of development, with a number of incubation and acceleration programs available to startups interested in scaling up.

Slovakia boasts Europe's first ATM, installed in Bratislava in 2013. There is no crypto asset specific regulatory framework in place in the country, while the startup scene is at early stages of development.

Slovenia has a very active ecosystem around crypto assets, combining government support and active business development. The country was the first EU member state to launch a national test blockchain infrastructure (SI-Chain) in 2019. There is no specific legislation for crypto assets in the country. Conversely, there is a very active startup scene, with a number of very successful companies originated in the country: one example is the digital currency exchange Bitstamp, now headquartered in Luxembourg.

Spain is among the leaders in the blockchain education space in Europe, with no less than eight universities already offering degrees on the subject. The country is also home to a number of blockchain companies but has not yet passed any crypto asset specific regulations, although drafts bills have been proposed since 2018. One notable initiative is Alastria, which was formed in 2017 by a consortium of Spanish banking, energy and telecom companies, and has grown to more than 500 industry members today.

Sweden has a developed and diverse blockchain ecosystem with notable initiatives. Riksbank, the country's central bank, was among the world's earliest examples of research on a Central Bank Digital Currency (CBDC), called the *e-krona*. Other notable pilot projects of public interest include a blockchain-based land registry and a number of applications in the financial services industry. The Swedish government assigned a special committee to investigate needs for legislative changes in eliminating barriers to digital development in the public sector in 2017, however the investigation did not result in any legislative amendments related to crypto assets or blockchain.

Switzerland is one of the most advanced nations when it comes to blockchain and crypto-assets, not only in Europe, but also globally. It has been called the 'crypto nation' and is home to the world-famous 'crypto valley' of the Zug canton. The country is home to a very large number of blockchain companies, among them some of the most well-known industry names, such as the Ethereum Foundation, Polkadot, Cardano and Libra. Companies and organizations operating nationwide have collectively raised more funds than in any other country. Moreover, there is a very active venture capital and startup support ecosystem, including two regulated digital currency banking entities. The country moved early to clarifying the legal situation of crypto-assets, with the earliest report by the federal government published in 2018, analyzing the applicability of existing legal framework on blockchain. Since then, specific guidance and initiatives have been announced, most notably by the Swiss Financial Market Supervisory Authority (FINMA), but also by regional authorities in some of the country's cantons. Several universities have launched blockchain-focused academic degrees or specialized courses.

The **United Kingdom** has shown great interest in blockchain early on, with the first report commission by the government published in 2016. The country remains an epicentre of business activity in the space today, with many startups and significant capital raising success. The Financial Conduct Authority's (FCA) digital sandbox has helped innovation development in the country, even in the absence of a crypto assets' specific regulatory framework.

STATE OF THE UNION

Following the Tallinn Declaration on eGovernment (2017), the **European Blockchain Partnership (EBP)** was created by 21 EU Member States and Norway in 2018, marking the first EU-wide initiative specifically devoted to blockchain. Since then, eight more countries have joined the Partnership, bringing the total number of signatories to 30[1].

Among others, the EBP has worked to develop a trusted, secure and resilient **European Blockchain Services Infrastructure (EBSI)**, a network of distributed blockchain nodes across Europe, leveraging a number of applications focused on specific use cases, such as notarization, education credentials, European self-sovereign identity, trusted data sharing among customs and tax authorities in the EU. Today, the EBSI features 27 active nodes in twenty member states.

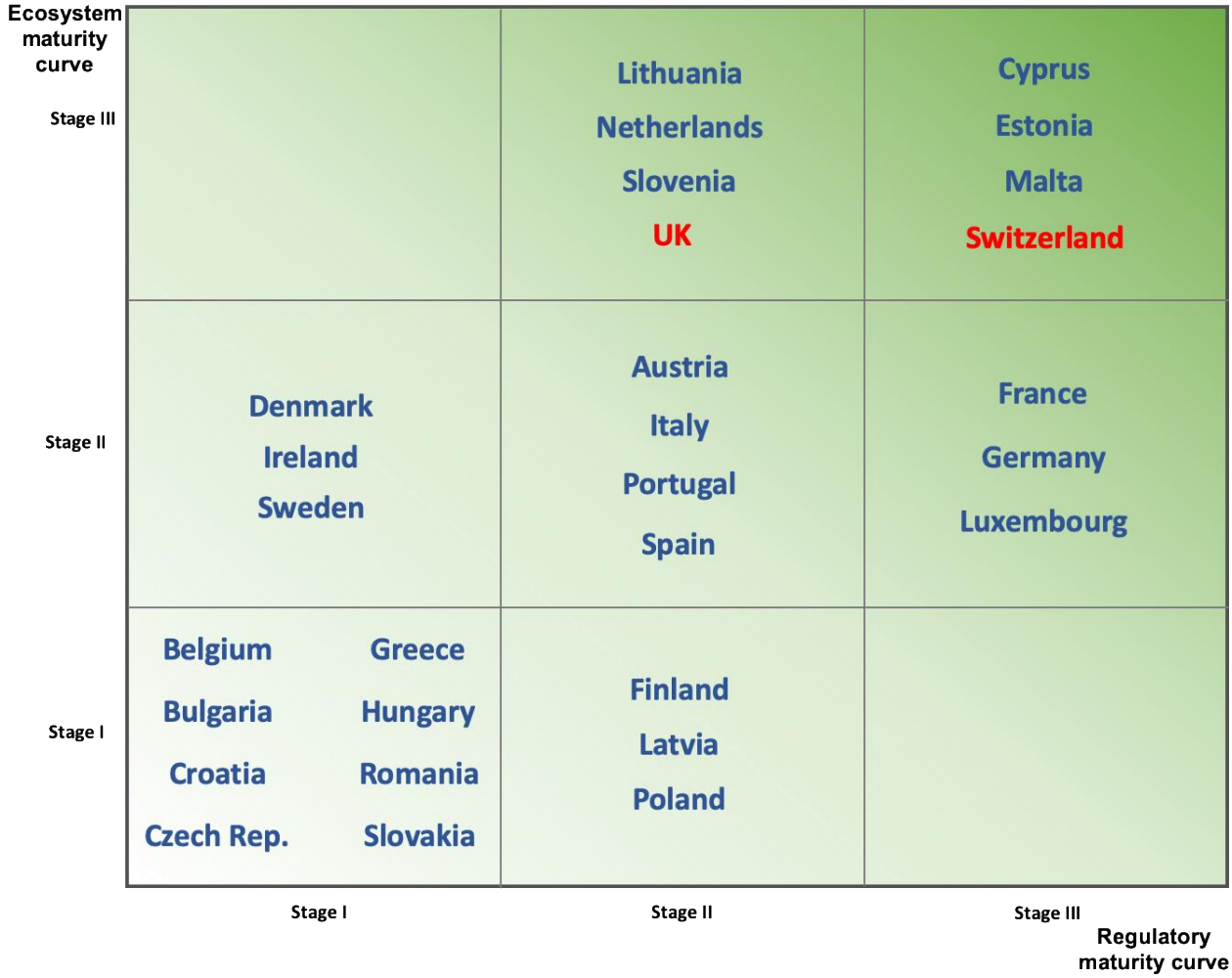
On a path toward harmonizing their regulatory and policy frameworks, EU member states are currently at different maturity levels in terms of regulatory and ecosystem development. We can broadly group each country in one of three stages of maturity in each dimension of each maturity curve (regulatory and business):

- **Regulatory maturity curve**: this dimension measures the degree of top-down support provided by national or regional government:
  - **Stage I regulatory maturity**, where no specific crypto asset legislation exists, save perhaps warnings issued by local authorities in the context of investor protection.
  - **Stage II regulatory maturity**, where the state has shown signs of significant involvement with the field, through a combination of adoption of wider regulatory schemes (for example, related to KYC/AML, but also explicitly touching upon crypto assets, such as regulation of alternative forms of financing, ICOs, STOs) or through other specific measures, which might include, government-sponsored studies (for example, taxonomies of virtual assets as far as applicable existing regulation is concerned) or government-sponsored pilot applications of blockchain in the public sector. An established framework for the taxation of digital currencies and digital assets is another characteristic of countries that fall under Stage II.
  - **Stage III regulatory maturity**, where either specific legislation for blockchain or crypto assets have been voted or published, and/or the government has announced a national strategy/vision, specific to blockchain (or for new technologies, explicitly addressing blockchain). Regulatory sandboxes, innovation hubs and other initiatives that allow blockchain, fintech and other firms to pilot novel implementations, as well as the involvement of the banking sector, are also characteristics of countries in Stage III.
- **Ecosystem maturity curve**: this dimension measures the degree of bottom-up development of the local ecosystem in each country, as evidenced through three main indicators: presence of a local business/startup ecosystem; number of blockchain-related formal education and academic research initiatives; number of user-driven communities around blockchain or virtual assets. Again, we have grouped countries into three broad categories:
  - **Stage I ecosystem maturity**, where there is evidence of sizeable and dynamic initiatives in none or one of the three indicators (business, academia, communities).
  - **Stage II ecosystem maturity**, where there is evidence of sizeable and dynamic initiatives in at least two of the three indicators.

[1] The EBP declaration was initially signed by Austria, Belgium, Bulgaria, Czech Republic, Estonia, Finland, France, Germany, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, UK. Norway was also a signatory. Since then, the following countries have joined: Greece (23 May 2018), Romania (29 May 2018), Denmark (1 June 2018), Cyprus (4 June 2018), Italy (27 September 2018), Liechtenstein (1 February 2019), Hungary (18 February 2019), Croatia (16 October 2019).

- **Stage III ecosystem maturity**, where there is evidence of sizeable and dynamic initiatives in all three indicators.

According to the above classification, we can position the 29 countries we have studied into a 3x3 matrix, as shown in the following figure. It must be noted that, naturally, the borders between categories are by definition porous and countries may not always objectively belong strictly to one of the matrix categories. It must also be stressed that this is a fast-evolving space, so that all countries are expected to gradually move from the bottom-left to the top-right part of the matrix. Notwithstanding these, the matrix is a helpful instrument in assessing the current status of the European blockchain ecosystem at the end of 2020.



At the one extreme of this categorization, we find countries in the early stages of development in both the local ecosystem and the initiatives of the state in providing regulatory clarity for the treatment of crypto assets. These countries should not be considered as falling behind in the blockchain and crypto assets development path: it may simply be the case that there is not significant commercial activity yet in their local markets to necessitate specific regulatory action by authorities. These countries include (in alphabetical order) Belgium, Bulgaria, Croatia, the Czech Republic, Greece, Hungary, Romania, and Slovakia. These countries will be mostly expected to follow and adopt EU-level policy making developments in the field of crypto assets.

At a mid-level tier, we find countries that show signs of development in their local business and market ecosystem and/or some sophistication in regulatory approaches to crypto assets. These countries include

Austria, Denmark, Finland, France, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, and the UK outside of the EU. Although with significant differences in individual development paths among them, this group of countries is expected to inform the development of EU-wide policy by contributing their unique experiences, success stories and lessons learnt from their involvement with the field.

Finally, at the other extreme of our grouping, we find the group of countries that exhibit the most sophistication in both their market development and regulatory maturity. These countries include Cyprus, Estonia, and Malta (in the EU), as well as Switzerland. Again, these countries have their individual differences, of course. Yet, they all provide rich cases of experience that can inform how Europe will pave its harmonized path toward assuming a globally leading role in crypto assets innovation and development, while mitigating risks associated with new technologies.

Country Profiles

Key Findings

€ 47 million

total funds raised

Energy, Mobility, & FinTech

the most active sectors

50+

blockchain solution providers

AUSTRIA

THE AUSTRIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Austria is one of the most prosperous countries in the world, ranking 15th globally and 10th in Europe in gross domestic product (GDP) per capita. It has a highly industrialised economy and education levels, coupled with a generally receptive regulatory approach towards digital currencies and blockchain, thus rendering Austria a welcoming place for those transformative technologies.

As a result, approximately **50 global reaching companies and startups**, counting the national champions Bitpanda, Coinfinity, and Blockpit, as well as more than **35 research initiatives**, are currently established in the country. Companies are active in a wide range of verticals, while research mainly concentrates in the energy, mobility and financial technology (FinTech) sectors.

The Austrian state has adopted a generally proactive approach towards digital currencies and blockchain, with the capital city of Vienna spearheading the country's efforts through 'Smart City Vienna', an initiative to foster social and technical innovations, while improving quality of life for citizens and conserving resources. State-sponsored initiatives can also be identified in the areas of public administration, contact tracing to combat the spread of COVID-19, heat waste management, and even a rewards citizen programme in the form of a "culture token" developed in partnership with the Vienna University of Economics and Business.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: Austrian policy makers and financial regulators are generally receptive towards transformative technologies, especially those that apply to the FinTech sector. Correspondingly, regulators have adopted an overall non-restrictive approach towards digital currencies and blockchain to avoid hindering innovation. Indicatively, during the 2019 ANON Blockchain Summit discussion panel, the Austrian Federal Minister for Digital and Economic Affairs, Margarete Schramböck, remarked that "*Europe has a strong tendency to overregulate. [...] And then we are surprised that there are no European companies in the top 10 worldwide. […] We do not need regulation for blockchain.*"

In November 2019, the Austrian Blockchain Centre (ABC) was established, in an attempt to explore blockchain applications in the fields of finance, energy, logistics, public administration and the internet of things (IoT). ABC, currently involving more than 21 institutions and 54 companies in its public-private partnership (PPP) model, aspires to become the world's largest blockchain research centre. Blockchain is also a key facilitator of the 'Smart City Vienna' and 'Open Government Data' initiatives. The capital city of Austria aims to utilise blockchain technology to reinforce transparency, openness, trust and citizen participation in its operations, and has conducted numerous successful pilot releases to date.

Digital currency legislation that applies to blockchain: The Austrian Financial Markets Authority (FMA) has warned the general public and investors of the risks associated with digital currencies, with many unlicensed business entities active in the space included in the Authority's warning list. FMA closely monitors the developments in the field of decentralised financing, including initial coin offerings (ICOs), initial exchange offerings (IEOs) and security token offerings (STOs). Digital currencies are generally treated as commodities in Austria. However, depending on their specifics, various business activities involving blockchain and digital currencies may provoke licencing requirements under the Austrian Alternative Financing Act (AlfFG), the Austrian Banking Act (BWG), the Austrian Electronic Money Act (E-Geldgesetz) and the Austrian Capital Markets Act (KMG).

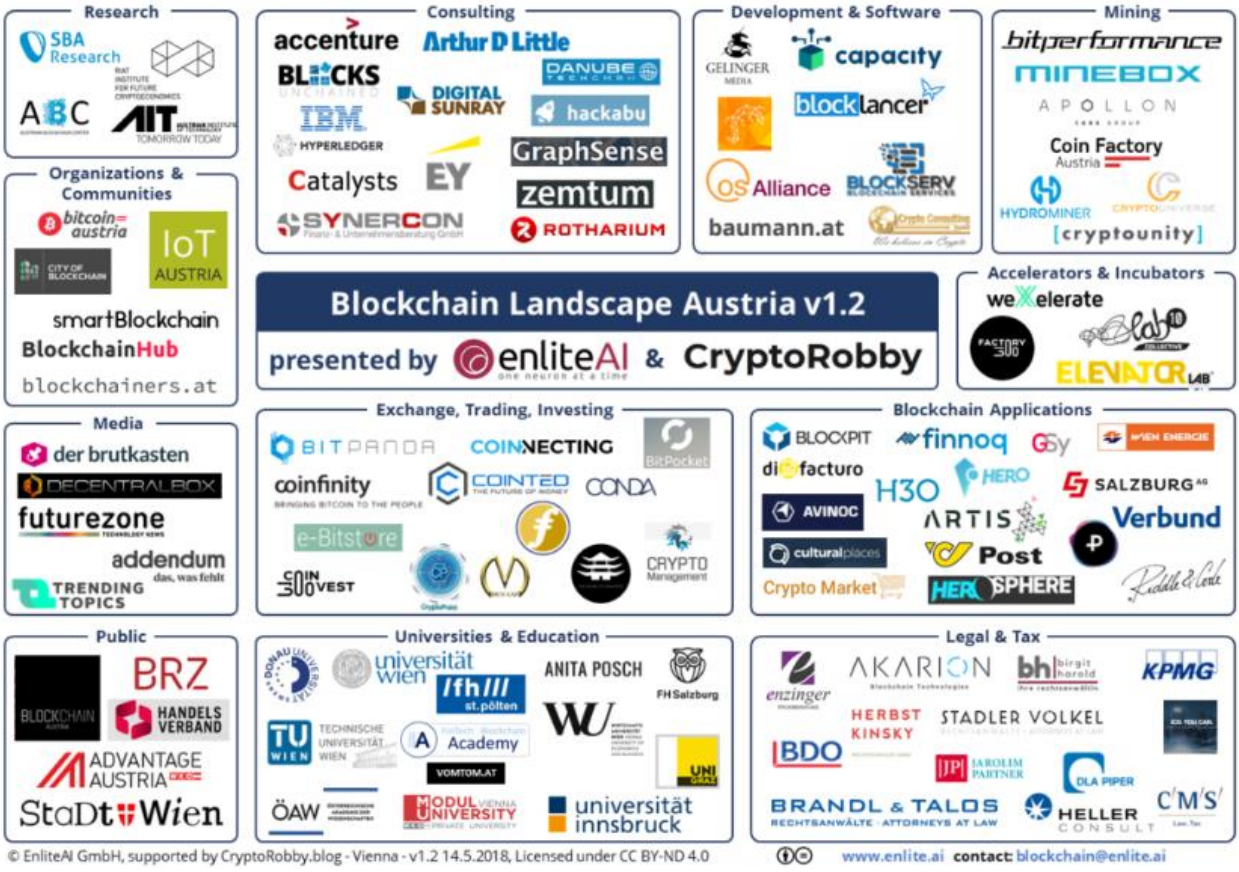
Digital currency exchange is VAT exempt, as is the case in most European countries. Their use as payment for goods or services is treated no differently than fiat currencies. Capital gains from their sale are subject to a progressive income tax that amounts to up to 55% for individuals and 25% for corporations. In case digital currencies are used to generate interest income, they are characterised as investment assets and different taxation policies may apply. Anti-money-laundering (AML) and know-your-client (KYC) regulation applies for payment service providers that utilise digital currencies. Digital currency mining remains largely unregulated in Austria and no specific restrictions apply.

Academic Courses & Professional Qualifications: The Vienna University of Economics and Business (Wirtschaftsuniversität Wien, or WU), a research partner in ABC, provides a professional certification course on blockchain, titled 'Certificate in Blockchain Transforming Business'. The same university has also launched the Institute of Cryptoeconomics, dedicated to the research of transformative technologies.

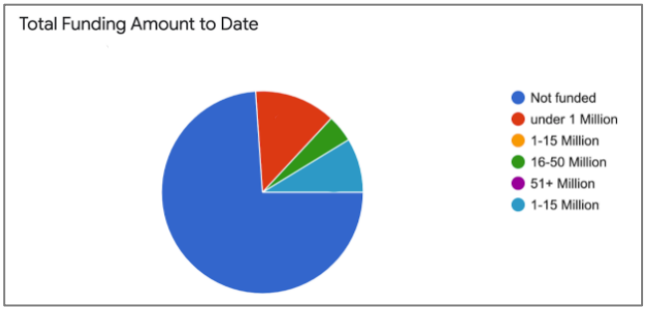
Blockchain across key industries: While Austria-based startups are active in a wide range of business verticals, the state has concentrated its efforts to exploit blockchain technology in specific sectors. Various initiatives have been exploring blockchain technology to facilitate the country's digitisation plan, with the capital of Vienna leading the charge. Blockchain technology is expected to be implemented in data management and e-governance sectors, with the energy sector following next.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Relative to its size and population, Austria counts a high number (50) of startups that are active in the blockchain space. However, apart from a few global reaching national champions, most initiatives are in very early stage. This is evident by the relatively small number of employees per company (1-10 on average), as well as the wide range of verticals in which companies are active. Specific geographical or sector clusters could not be identified, although the capital of Vienna concentrates the highest number of company headquarters, being home to 8 out of 10 largest companies.



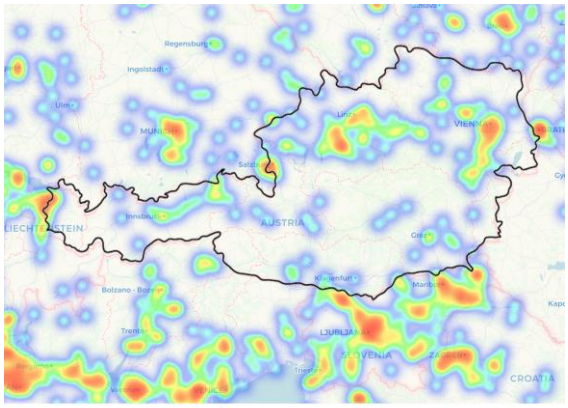
As of September 2020, Austria-based blockchain companies have raised a total of approximately EUR 46 million, and opportunities in the space were identified as early as 2012. Notable startups and companies in the country include **Bitpanda**, **Blockpit** a digital assets investment platform responsible for more than EUR 510 million traded in 2017; **Coinfinity**, a digital currency broker; and **Conda**, a crowdinvesting platform for Austrian startups.



BLOCKCHAIN COMMUNITY

Austria has an emerging blockchain community. Two blockchain conferences take place in the country, the ANON blockchain week and the blockchain-REAL, while blockchain is heavily featured in events in the FinTech space, such as Fintech Week Vienna. The Community Ethereum Development Conference (EDCON) was scheduled to take place in Vienna in February 2020, but was moved online due to COVID-19 safety concerns.

Established in 2011, Bitcoin Austria is a non-profit organisation that aims to facilitate digital currency adoption in the country, especially for bitcoin. The community counts more than 2,000 members and regularly hosts workshops and meet-ups. Other initiatives, such as 'Blockchainers' and 'Block & Wine', counting 1,000 and 500 members respectively, are also important parts of the community, while smaller groups, such as 'Smart Blockchain' and 'City of Blockchain' could be identified, too. Enthusiasts from other verticals, such as FinTech and IoT, also show a strong interest in blockchain.



Source: coinmap.org

Overall, the Austrian blockchain and digital currency communities consist of 110,000 observers, or 1.2% of the total population. Observers are individuals loosely interested in the concepts of blockchain and digital currency. Enthusiasts, or active members of official and unofficial groups of practice, amount to 10,000 individuals.

(Source for observers: Facebook audience, ages: 16-65+, location: Austria, keywords: blockchain, digital assets, digital currency, bitcoin | Source for enthusiasts)

NOTABLE BLOCKCHAIN COMPANIES

Bitpanda: Founded in 2017, it is a digital asset investment and trading platform that allows users to purchase and trade bitcoin, Ethereum, Gold and other digital assets through a variety of payment service providers. It also actively develops the Bitpanda Ecosystem Token (BEST).

Blockpit GmbH: Established in 2017, Blockpit is a digital currency portfolio manager and tax calculation software. It allows users to calculate gains and losses, set price alerts, and integrates with popular digital currency exchanges.

Conda: Founded in 2012, it is a crowdinvesting platform for Austrian startups, counting more than 30,000 registered users and upwards of 128 funded projects.

Coinfinity: A coin digital currency broker that primarily deals with bitcoin. It offers a wide range of options to purchase the popular digital currency, including ATMs, online services and vouchers. It also offers consultation and educational services.

Morpher: A digital exchange platform with a mission to make global financial markets available to everyone. It utilises the Ethereum ERC20 token standard to allow its users to trade stocks, forex and digital currencies.

Blocklancer: Active in the gig-economy space, it offers a marketplace for freelance services, allowing users to work for and pay in digital currencies. It has also issued its own token, LNC, which users can stake for rewards.

S1seven: Utilises blockchain technology to digitise steel raw materials and products, replacing mandatory quality certificates with traceable and tamper-proof digital records.

Riddle&Code: Established in 2015, it develops hardware to facilitate physical-digital blockchain interoperability through the use of IoT.

Salamantex: Develops an all-in-one digital currency payments solution. The company recently enabled 2,500 merchants to accept digital currencies as payment.

CryptoWiener: Provides non-fungible token versions of iconic individuals from Vienna.

INSIGHTS FROM EXPERTS

Alferd Taudes, Professor at Vienna University of Economics and Business (WU)

Head of the Research Institute for Cryptoeconomics

Head of the Department of Information Systems and Operations

Head of Computing Services

Scientific Lead at ABC Research

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in Austria?

In many regards it is good. What I think we have to do in the future is to work more on the regulatory aspects. As you are probably aware, Germany is preparing laws for fully digital securities and they also have a blockchain strategy on a federal level. At the same time, Switzerland recently announced plans to regulate distributed ledger technologies (DLT). While Austria has taken certain steps towards a unified strategy for the treatment of blockchain technology and digital securities and assets, this is something that we (Austria) need to work more on, as those matters are critical for many initiatives in the financial sector, that require legal certainty to operate. This is an area where I would try to do my best in the near future, and where other competitive countries have taken definitive steps. Austria had a clever approach about two years ago, because we simply introduced token classifications for digital currencies and not a new set of laws. We already have too many laws.

Overall, the blockchain ecosystem in Austria is strong were our traditional economy is strong.

Are there specific regulatory or national policy initiatives in place in Austria?

First, there is our token classification system that is mentioned in the European Union Blockchain Observatory and Forum (EUBOF) report. Besides that, on the regulatory front, Austria recently introduced a sandbox which I think is a step in the right direction. However, in that regard, Austria is already a late mover. Other leading countries in the blockchain space, such as the United Kingdom, have had similar sandboxes in place for years.

Are there any notable blockchain-related education and training offerings by universities or other providers?

In WU, we are in the process of hiring a Professor from the field of blockchain and DLT, hopefully by the end of this year. They will be responsible for introducing new specialisations in the area of blockchain in our undergraduate courses. At the same time, we are introducing a new 2-year master's programme in 'Digital Economy', for which blockchain will play an important role. This, of course, is in addition to our executive academy on blockchain.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Austria?

When it comes to citizens, according to a report by the Austrian National Bank, approximately 2% of all Austrians hold crypto assets, which may sound little, but I would guess that only 2% of Austrians own shares too. If you look at the demographics, they may be the same people too. Maybe those low numbers are an indicator that Austria is a cash-first society and that our currency is stable. On the business side of things, the Austrian Chamber of Commerce is actively cooperating with us [WU and ABC Research]. We have a joint project and we are also organising the blockchain awards together.

Business-wise, while there are firms that are doing good in the blockchain space, one of the problems for further adoption of blockchain is that most Austrian companies are small- and medium-sized businesses (SMBs) and predominately subsidiaries of German firms. This means that they usually have no innovation centre or budget to spend exploring blockchain applications.

What does the future hold for the UK blockchain ecosystem?

Blockchain is here to stay. For the Austrian blockchain award, we had more than 30 blockchain companies submit their projects, and we only allowed for projects that are in the prototype phase and have already attained customers. So, there is definitely adoption. Of course, it will take time to discover the most appropriate use cases [for blockchain]. This is the dialog that is currently unfolding between users and developers.

In the short term, we will have a hard time due to COVID-19, as many companies are affected financially with many ceasing operations. So, they have no funds to expend on research. On the other hand, I do see a scenario were the Coronavirus crisis accelerates blockchain adoption in the long run, as we will have to invent new solutions for those new problems. Last week we [ABC Research and WU] hosted the 'Unblocked Conference' that focused on the areas of blockchain and sustainability. As we move forward, we will need solutions that are more environmentally friendly, due to the higher environmental standards we set. We are setting high standards for data protection too. We will also need more equality. Blockchain can be the answer to all the above.

The government [Austrian Government] has already started providing funds for those special kinds of innovation, more information will be announced in the future. In a sense, I think we are on the right track, but I'm afraid that for the next months we will have to do some firefighting and our priority should be to keep companies alive [referring to the COVID-19 crisis].

Key Findings

65

European R&D blockchain projects

FinTech

Most active sector

3,200

Blockchain professionals

BELGIUM

The Belgian blockchain ecosystem at a glance

Belgium has one of the largest GDP per capita, strong scientific work, and FinTech sector. This combination has fostered the creation of an active blockchain ecosystem nationwide. Being one of the most important financial centres of the world, the Belgian blockchain startup ecosystem is primarily centred around applications for the banking and the financial sector.

The majority of blockchain startups focus on Business to Business (B2B) and Business to Consumer (B2C) projects that, apart from the financial and banking sectors, cover diverse domains, such as legal, logistics, supply chain, corporate governance, among others. Several blockchain companies also offer consultancy services for big corporations, which helps to highlight why existing companies investigate the applicability of blockchain technologies in their business.

Belgium is also characterised by regional disparities when it comes to blockchain companies. The region of Flanders has approximately 60% of all blockchain-related startups, followed by Brussels with 30%, while Wallonia is home to the remaining 10% of blockchain companies.

Belgian companies are also heavily involved in research and innovation activities around blockchain technology, mainly in Horizon 2020 projects funded by the European Commission. To date, a total of 65 projects have been funded. This number is relatively high when compared to other European countries of larger size and population.

Regulation and policymaking: Belgium, together with 20 other Member States from the European Union, is a committed participant of the European Blockchain Services Infrastructure (EBSI). As a first step towards this, Belgium has commissioned its first node on 12 February 2020, as a result of a collaboration between Belnet, the country's public services provider of high-speed internet, and Smals, which develops applications and services for the ICT sector.

TOWARDS MAINSTREAM ADOPTION

Within the 'Blockchain on the Move' project, the City of Antwerp envisages the first attempt to provide citizens, through blockchain technology, with a 'Self-Sovereign Identity (SSI)' that they can use in their interactions with governments, other (public) organisations or companies. The project focuses on the use of new technologies (including blockchain), providing citizens with more freedom of choice and room for regulation in their contracts with the government, and granting citizens ownership of their data.

Digital currency legislation that applies to blockchain: According to a recent report on the regulation of cryptoassets from Burges Salmon, there are currently no specific laws or regulations in Belgium. In 2017, the country's Financial Services and Markets Authority published a communication on Initial Coin Offerings (ICOs) that provides an overview of the legislation and regulations that may apply to ICOs as well as cryptoassets. At the same time, the Belgian National Bank and the Financial Services and Markets Authority have issued public warnings, informing consumers and potential investors of the risk associated with digital currencies as early as 2014. The later Authority, actively maintains a red-list of fraudulent digital currency sites.

According to the financial regulator of Belgium, the characteristics of cryptoassets may be similar to:

- investment instruments, given that they may provide rights to revenues or returns;
- a means of storage, calculation, and exchange, given their convertibility into other cryptoassets, tokens or fiat money; and/or
- a utility token, if they provide access to certain products or services.

It should be mentioned, however, that the Anti-Money Laundering (AML) regulations and Know Your Customer (KYC) policies are still applicable to crypto exchanges operating in Belgium.

Belgium has digital assets taxes, at 33% on any digital assets income.

Blockchain in academia: Professional training courses on blockchain technology are available in Belgium, mainly through independent training and certification providers. Academia has also adapted their curricula to include specific blockchain- related topics, to meet the public's increased interest in blockchain and digital assets. It is important to note that the topics are not offered as dedicated organised programmes that lead to a degree associated with blockchain or other decentralised technologies.

Blockchain across key industries: Analysing the startup ecosystem in Belgium, it is evident that the majority of active startup companies focus on application and services around the banking and the financial sector. This can be attributed to the fact that Brussels is the financial capital of Europe and the seventh most important financial centre worldwide. Additionally, the legislative and regulatory frameworks do not pose any specific restrictions or hurdles that would prevent the development of the FinTech and ecosystem in Belgium.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

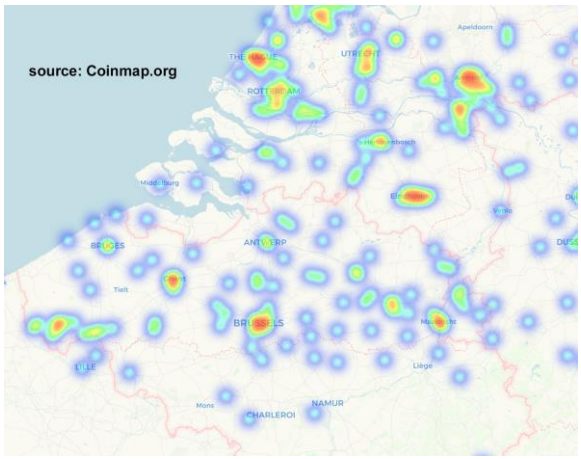
Belgium is home to a fast-growing startup scene, thanks to its strong service economy, and the fact that the majority of people are proficient in English. Adding to this, the number of newly incorporated companies in the country is constantly on the rise, and numerous Belgian cities host startup weekends, hackathons, meetups, and open coffees. This startup ecosystem is supported by many diverse acceleration programmes and incubators across the country.

Moreover, being one of the financial centres of the European Union, along with its diverse innovative startup scene, Belgium is an attractive location for international companies that are looking for a place to set up their excellence centres. In March 2018, Fujitsu inaugurated its international Blockchain Innovation Centre in Brussels, which focuses on the promotion of research and development in the field of blockchain technologies beyond financial services, addressing the needs of sectors such as logistics and supply chain, real estate, decentralised digital identities, and smart contracts.

The number of blockchain startups in Belgium according to Crunchbase is 27.

BLOCKCHAIN COMMUNITY

Brussels, as well as other Belgium cities, host an active and diverse ecosystem of blockchain-related startups that are developing applications and services for various sectors. This ecosystem is supported and further promoted by various associations incorporated in Belgium with, in some cases, pan European or global influence and presence.



Founded in 2019, the International Association of Blockchain Trusted Applications (INATBA) is driven by DG Connect of the European Commission. INATBA serves as a joint platform for various industrial players, startups, as well as regulatory and policymaking and standardisation bodies that support and promote blockchain and Distributed Ledger Technology (DLT), by encouraging public and private sector collaboration.

Blockchain for Europe represents international blockchain industry players at the EU-level, with a primary focus on proactively contributing to the regulatory debate by supporting European decision-makers in their goal to make blockchain technology a success. HIVE Blockchain Society is a non-profit blockchain association that aims to create a multidisciplinary community of blockchain enthusiasts and experts, to promote the understanding of DLTs and its potential for decentralisation, its different applications, and challenges, as well as to inform the Belgian and international community about its developments.

In addition to organised blockchain associations and hubs, the Belgian blockchain community consists of 45,000 observers based on the extended outreach data from Facebook Audiences, which corresponds to approximately 0.4% of the population. Out of those, 10,105 members are engaged with communities of practice related to blockchain technology and are involved in 28 frequent meetup groups.

NOTABLE BLOCKCHAIN COMPANIES

AGEify: A simple, accurate, and privacy-preserving age verification solution. It is based on advanced IT security methods and techniques used in Identity & Access Management and Privacy-Preserving solutions and a blockchain backbone that guarantees non-repudiation of the already minimal information stored. It may be used for controlling access to online age-restricted content, such as adult web sites, rated-videos, gambling and games platforms, alcohol, tobacco, etc.

IntellectEU: An international technology company focused on digital finance and emerging technologies. IntellectEU became a founding member of the Linux Foundation's Hyperledger in 2016. Today, the company works with all leading blockchain providers (R3 Corda, DAML, Hyperledger, VMWare, IBM) in the banking, insurance, capital markets, and telco space.

Keyrock: It is digital assets market makers building scalable, self-adaptive algorithmic technologies to support efficient digital asset markets. Through a combination of in-house algorithmic trading tools, high-frequency trading infrastructure, and industry expertise, Keyrock provides unparalleled liquidity services to tokens, exchanges, and brokerages within the digital assets ecosystem.

NGRAVE: A blockchain security provider offering a user-friendly end-to-end solution for the self-sovereign management of individuals' and businesses' digital assets and digital assets. The NGRAVE product suite consists of hardware wallet NGRAVE ZERO, backup solution NGRAVE GRAPHENE, and mobile application NGRAVE LIQUID. Developed with world leaders in nanoelectronics, hardware security, and applied cryptography, NGRAVE ZERO's advanced features make it the most secure and easy to use a crypto hardware wallet in the world. NGRAVE will support over 20 coins in its first shipped devices including Bitcoin, Ethereum (and ERC20 tokens), Ripple, Bitcoin Cash, Litecoin, EOS, and many others.

SettleMint: Founded in 2016, it has one goal: To make blockchain applications accessible for organisations and companies. With their platform, they reduce the complexity of the blockchain technology, making it easy, fast, and seamless for an organisation to turn a business concept into a working blockchain application in a fraction of time.

Sofitto: Merged blockchain technology into traditional banking products and low-powered IoT devices. Sofitto's solution utilises blockchain technology to enable, for example, instant and tamper-proof money transfers (fiat and digital assets). At the same time, it integrates seamlessly with all aspects of legacy systems, including ATMs and POS terminals, which means that physical infrastructure costs are negligible.

T-Mining: Offers a Decentralised Technologies Framework, to build decentralised applications fast and cost-efficiently - leveraging reusable functionality - and to set up and run decentralised platforms more easily. This Framework is tailored for Supply Chain use-cases, including Maritime, Port, Logistics, Insurance, and Transport.

Yuso: Integrates renewable and sustainable energy sources into the existing markets. By focusing on decentralised energy production, companies can manage their energy consumption and injection flexibly. Yuso is your intermediary to the new energy market.

INSIGHTS FROM EXPERTS

Matthew Van Niekerk – Cofounder and CTO, SettleMint

The blockchain ecosystem in Belgium benefits from both financial and academic support however, there is a lack of government engagement with the private sector to drive the ecosystem ahead at speed. With the recent formation of a federal government, which is signaling support for an acceleration in the digital transformation of the country, I am optimistic that this void will be filled in the coming 6-18 months enabling the ecosystem of investors, academics and private sector to solidify and accelerate in the years ahead.

Mr. Dirk Pauwels (Program Manager) & Mr. Marco Canton
(Senior European Affairs Executive) – Fujitsu Blockchain Innovation Centre

Last years, various Blockchain use-cases have been investigated in different domains, ranging from governmental services over food trading to supply chain management. While many Blockchain-projects have been limited to a proof-of-concept, real successful implementations remain rare. Although the technology is mature, non-technical aspects such as business-IT-alignment, legal constraints and user-adoption are equally important for successful Blockchain implementations. Therefore, a multidisciplinary co-creation-based approach starting from societal and business needs and taking into account standards and interoperability is essential to realize the promise of Blockchain as an enabler to change drastically the way we work and cooperate in a decentralized European society.

Koen Vingerhoets – Senior Manager Digitalization & Blockchain, Deloitte Belgium

There are only a few Belgian start-ups and scale-ups in blockchain or crypto assets, but they are actively engaged in projects all over the world. Based in a transit country, our key industries understand the importance of being connected in consortia in finance, pharma and energy. The proximity of EU policy makers creates unique opportunities.

Key Findings

30 ICOs
from companies based in Bulgaria

Individuals organised in Digital Currency Communities

Observers: 180,000
Enthusiasts: 2,500
Devotees: 1,100

BULGARIA

THE BULGARIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Bulgaria's blockchain scene is relatively active to the population of the country, as businesses and individuals are taking part of the ecosystem. Individuals keen in learning more on blockchain have the opportunity to educate themselves by enrolling in a master's degree programme in Sofia. The number of the enthusiasts in blockchain is estimated to be over 2,500 people that take part in meetups.

In Bulgaria, the business scene is accommodating around 25 companies that are active in applying blockchain. The majority of the companies have been recently established and are operating in financial and software development sector.

TOWARDS MAINSTREAM ADOPTION

The National Bank of Bulgaria proceeded in joining, based on its announcement from February 2018, the position of European Supervisory Authorities (ESA) on digital assets. The announcement warns consumers on the risks in purchasing digital currencies after noticing the extreme price volatility in the crypto market.

The risk has been identified earlier than the aforementioned announcement as Bulgaria's tax authorities began taking actions already from 2014. Particularly, the authorities issued statements which regulates the income from the sale of digital assets as income from the sale of financial assets and it is an income to be stated in the annual income tax return.

A Bulgarian court had to settle disputes over the lawfulness of refusing the registration application in the Commercial Register for a crypto trading company in 2015. The court concluded that activities associated with digital assets are not subject to licensing requirements.

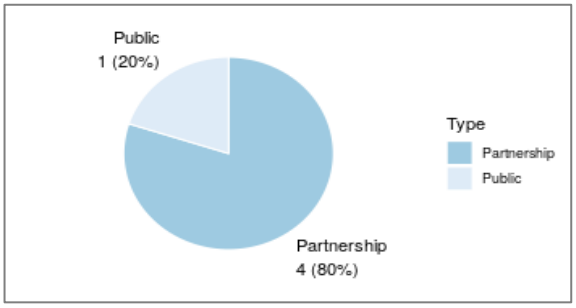
Education: In Bulgaria, there are not many dedicated programmes on the blockchain from educational institutions. A Master Degree in Business and Digital Transformation/Blockchain Innovations was launched by the private educational establishment, University of Finance, Business and Entrepreneurship (VUZF), based in Sofia.

The situation does not drastically change in the professional qualification. A center that offers blockchain training is the New Horizon Computer Training Centers based in Sofia.

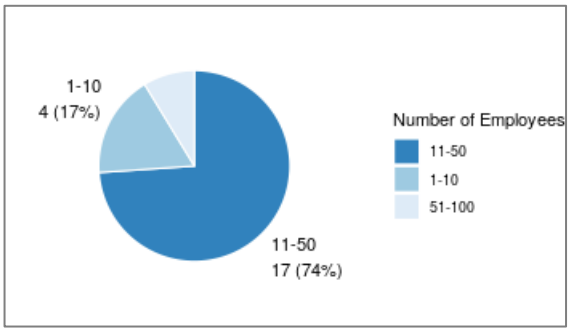
Industries: The economy continued to grow robustly resulting in documenting GDP of 51.7 million euros in 2019. Bulgaria possesses a mostly service-oriented economy as the service sector contributes around 60% to GDP. The service sector is driven by tourism and IT services. Finally, the industrial sector contribution to GDP is decreasing and the exports are mainly in mineral products, metals and machines.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Accelerators programs are available for startups to join and experience a faster growth rate. æternity Ventures have organised an accelerator program in 2019, named Starfleet Accelerator Program, that was seeking to accommodate ventures in blockchain technology. Individuals with concepts and ideas could be aided from Start It Smart which is an entrepreneurship organization that spreads and develops the entrepreneurship way of thinking

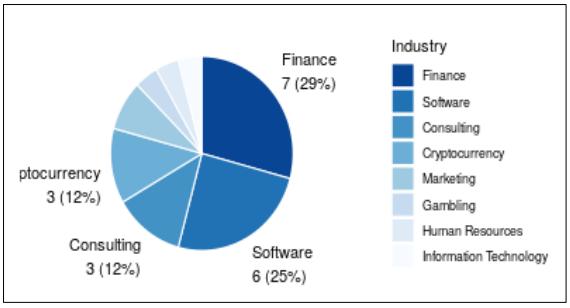


Along with accelerators, startups have the opportunity to be funded by venture capitals to kick-start their activities. Such a venture capital is Eleven Ventures, which supports early stages entrepreneurs. Another option for finding venture capitals in Bulgaria is LANCHHub Ventures, which seeks investment in blockchain projects

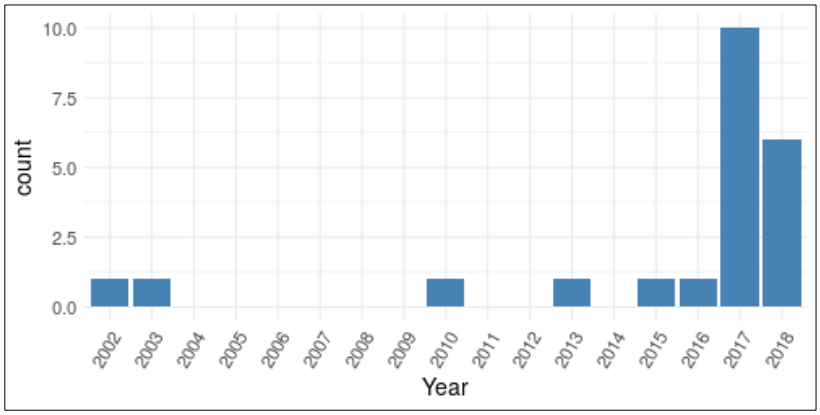


The average size of a company that is active in blockchain is small, as only a small percentage of the employees, over 50 professionals. The range of employees for the companies is between 11 to 50 professionals.

The sectors, that the companies in blockchain are mostly involved in, are the financial and the software development. Companies are eager to deploy solutions in the FinTech sector as the blockchain could provide security in the transactions of data between different stakeholders.



Finally, there are a few companies that are established from back in 2002. The cases in the early years of 2000 are software developing companies that aim to be involved in the edge of technology and have adopted blockchain technology. A boom in the establishment of new companies is apparent for the years 2017 and 2018 as depicted in the following chart.



BLOCKCHAIN COMMUNITY

Bulgaria's blockchain community could be characterised to be in the initial stages where it fosters a small but growing number of participants. There are organised and unofficial enthusiast groups which foster around 2,500 people. These groups of people are organizing meetups and talks which can be found in the largest cities of the country. Sofia, Plovdiv and Burgas are hosting meetups on blockchain, smart contracts and digital assets.

In addition to the groups, organizations have been establishing with the aim of developing the blockchain ecosystem in the country. Such an organization is the Balkan Blockchain Association, which is based in Sofia. The association is a not-for-profit organization with the its goal being to support blockchain projects and initiatives in the region. Another similar organization is the Bulgarian Fintech Association which aims to provide a common ground and bring the traditional financial institutions with cutting-edge technologies.

The blockchain community is empowered organised venues such as summits and meetings where the community participants gather together to be introduced to the most recent developments in the field. For instance, Digital Expo is an event to showcase products in cutting edge technologies and it will take place in Plovdiv for 2020. In 2018, Innowave Summit, a blockchain conference, took place in Varna with success.

NOTABLE BLOCKCHAIN COMPANIES

AE Ventures: is an investment company established in 2017 with their mission being to support projects that would drive blockchain technology and SaaS to be scalable and usable. The focus of the company is to fund early-stage projects along with driving collaborations in the blockchain ecosystem.

BitFuture: is a digital assets trading platform allowing users to take part in trading digital assets. The platform was established in 2018.

BitHope Foundation: is a non-governmental organization in public benefit that exclusively uses digital assets to generate funds for the campaigns hosted in its website. The website hosts different small-size campaigns.

CoinPoint: is a marketing agency established in 2013 which aims to assist teams which implement the blockchain technology to develop an identity and scale up.

Colibra: is a startup established in 2018 which developed an application to receive compensation for flight delays. Colibra 's principle behind the application is 'solidarity', since the user is agreeing share any possible compensations with the community for a guarantee monetary amount. The compensation is available in digital assets to address the community 's demands.

Crypto APIs: is a company founded in 2018 which provides infrastructure which aids teams to develop their blockchain and crypto products. Blockchain as a Service (BaaS) is allowing the team to connect to various blockchain protocols with one API letting customers to focus on developing their solutions.

Evedo: is a startup founded in 2018 believing in the absolute decentralization of the world and offers a decentralised marketplace and ecosystem for performers, event organisers, venues, attendees and sponsors.

This is achieved by having a B2B marketplace for contractors and sponsors and a B2C platform. The platforms would solve problems such as finding the right partners and eliminating middlemen in ticket sales.

FoodChain: is a web and mobile blockchain platform which bridges food businesses and customers to benefit both side by reducing food waste. The customers could find items near their expiration dates and benefit from the reduced prices, while the companies could boost their sales.

LockTrip: is a blockchain online marketplace for hotels and rental properties established in 2017. The application is developed based on decentralised open source bookings technology, since it is built over Ethereum VM. Property can be rent around the globe and the owners can collect the payments and manage booking without any middlemen.

Mimirium: is a software company which develops ecosystem primarily focusing on the privacy aspect for data collection, processing and analysis. The company has developed four products with blockchain protocols as their base. The products offer solutions in employee surveys, a network, a health platform and statistics for smart cities.

Navigato: is a company founded in 2015 and is a blockchain-based charging infrastructure management solution. A solution which Navigato developed is a decentralised map service to achieve high accuracy and faster navigation.

NovaMining: founded in 2017 and is a decentralised peer-to-peer hashing power marketplace and digital assets exchange based on Bitcoin Auxiliary Layer. The digital assets exchange would be based on the use of HTLC (Hashed Timelock Contracts) and would allow the exchanges across blockchain via Atomic Swaps.

Open Source University: was established in 2015 and aims to offer education and professional development opportunities on the Ethereum blockchain. Principles of open source are applied to bring change into the educational model. The company applies blockchain in verifying credentials in order to bridge the gap between businesses and educational institutions.

TraDEXsocial: aims to provide a crypto ecosystem which would guide people through their crypto experience. In the ecosystem, any user, even the ones without any prior knowledge, would have the opportunity to mine on any smart device and copy other traders. The user anonymity is achieved via a decentralised chain.

INSIGHTS FROM EXPERTS

Philip Matov, Venture Architect at ConsenSys (interview)

"When I came back to Bulgaria from Japan, I was positively surprised by the vibrant crypto culture existing in Bulgaria. I was also very happy to learn that quite many substantial and very important blockchain projects were started by Bulgarian entrepreneurs. Projects such as Aeternity which at one point was one of the top 30 projects. It helped grow the blockchain ecosystem in Bulgaria, including delivering capital, facilitate crypto meetups, and building protocol infrastructure." On the other hand, Philip Matov states *"The business environment is very traditional and conservative. Some Companies are taking risks, especially IT companies looking to develop products to outsource other markets. Traditional businesses like finance and insurance are typically branches of large international corporations which makes their innovation budgets quite limited."*

Nick Todorov, LimeChain & and Emilian Enev, CEO of ReCheck (article)

"Even though nobody is making too much noise around that, Bulgaria, at this very moment, is one of the driving forces behind the global blockchain industry. The evidence are names like Nikola Stojanow of Aeternity or Petar Tsankov of Chain Security, who recently found an exploit in an Ethereum update right before it was published – a significant event for the global community."

"I would say that few Bulgarian companies have validated business model and stable market presence with growing number of clients. Still majority of the players do many iterations in order to validate their business cases and value proposition. The Bulgarian developers are competitive in the international markets and are involved in some prominent projects, Chain Security is one of the names that comes to my mind."

Nikola Stojanow, CEO of AE Ventures (interview)

"As I was born in Bulgaria and saw the growing potential and talent in the IT sector here, so it was a logical decision for me to build the new entity in Sofia."

Key Findings

10 ICOs
from companies based in Croatia

Individuals organised in Digital Currency Communities

Observers: 83,000
Enthusiasts: 1,500
Devotees: 521

CROATIA

THE CROATIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Croatia has an emerging blockchain ecosystem where groups of enthusiasts and startups are engaged in projects and activities on the technology. A moderate number of 1,500 enthusiasts is taking part in groups, that are based in the biggest cities, relevant to blockchain's subjects. While, the business scene seems to be young as the reported startups have been established since 2017, the blockchain implementations are distributed in various business sectors in the startup ecosystem.

The interest in the blockchain is growing in Croatia as there are more cases of companies from different sectors are adopting the technology. Such an example is the logistics company, HUBBIG, that has adopted blockchain to provide more transparency in the supply chain along with lower costs.

In Croatia, the biggest provider of postal services in the country launched crypto exchange service at 55 branches in 2019. An exciting project that is reported to be based in Zagreb is a project on digital adverting that was developed by Brave Software and produces the digital assets Basic Attention Token (BAT).

Despite the absence of any special regulations on digital assets, Croatia's financial supervisor, Hanfa, approved a bitcoin investment fund in May 2020. Hanfa's board of directors supported Griffon Asset Management's plan to establish and manage the Passive Digital Asset fund. In the frame of the same decision, Hanfa also approved Croatian state-owned bank HPB to serve as the depository.

TOWARDS MAINSTREAM ADOPTION

In December 2017, Croatia's Financial Stability Council noted that the digital assets were associated with considerable risk, price volatility and these products do not resemble the traditional currency. The individuals who invest in such assets bare sole responsibility for their losses, since digital currencies are not electronic money in terms of the provisions of the Electronic Money Act, nor are they payment services in terms of the provisions of the Payment System Act.

Similarly, the National Bank of Croatia issued a warning which was accompanied by EBA and European Central Bank (ECB) opinions on the digital assets in September 2017.

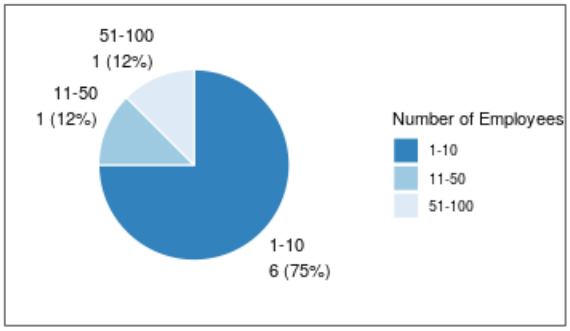
Blockchain in academia: There doesn't seem to be a university program solely dedicated to blockchain. The University of Zagreb offers a postgraduate course, named Distributed Ledgers and Digital assets, for enthusiasts in learning. Contrary to that, there are research programmes with blockchain application such as the Interoperable and Decentralised IoT Environment by the Faculty of Electrical Engineering and Computing in Zagreb.

In the absence of dedicated projects, people interested in learning blockchain technology can participate in short and intensive training programs. Such a programme is taking place in Sibenik and it concentrates on real-world crypto and privacy.

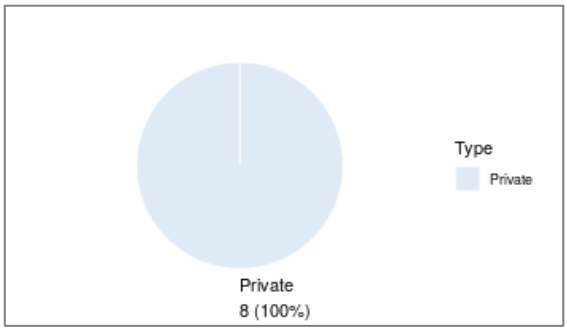
The services sector is reported to have the highest participation in Croatia's GDP and the services' share is reported to be growing over the past decade. Apart from the businesses in retail, tourism takes a major part of the services sector. The country's exports, which are coming from the industrial sector, are documented to be in shipbuilding, food processing and chemical industry.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

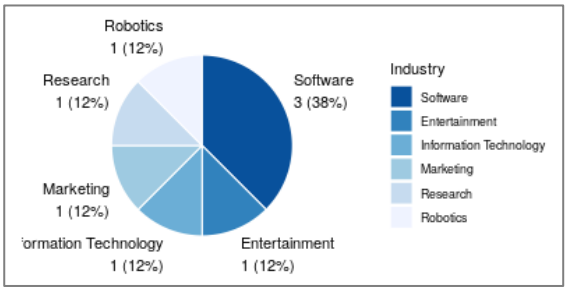
The blockchain technology is starting to merge into the Croatian business scene and has the potential to be applied in various sectors. The example of the supply chain company, HUBBIG, is recent, where the adoption of the technology has made a case for more security in logistics. All in all, new ideas and projects could be funded and get valuable knowledge from acceleration programs and venture capitalists (VCs).



A pre-accelerator program, that welcomes startups, is ZICER's Startup Factory. The program has been decorated with awards for the excellence of the program and has fostered ideas in technology, such as a healthcare chatbot, and other sectors. Another option for entrepreneurs could be the Croatian Office for Creativity and Innovation (HUKI) that promotes entrepreneurship, social innovation, networking and mutual assistance.



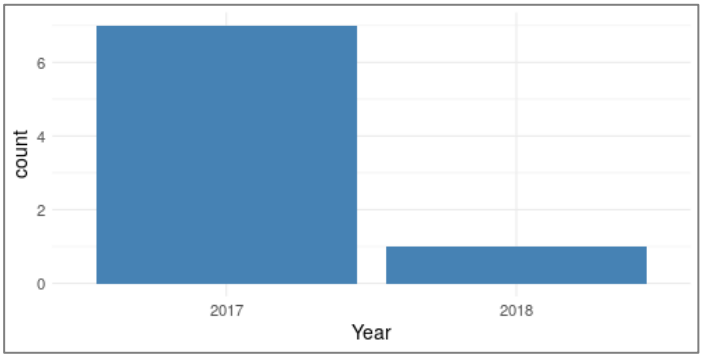
Startups could meet private investment funds to grow their activity. VCs active in Croatia, are: Quaestus, Feels Capital Partners and Fil Rouge Capital. Along with the VCs, an angel investors' network is active in Croatia known as CRANE (Croatian Business Anglel Network) which offers know-how and investment in the range of €25,000 to €250,000.



Most of the companies in Croatia in the collected dataset are reported to be small and medium as expected. Only a handful of companies, report occupying over 10 employees without exceeding the number of 100 employees. The startups in Croatia are privately held and with profit organisations making up the majority.

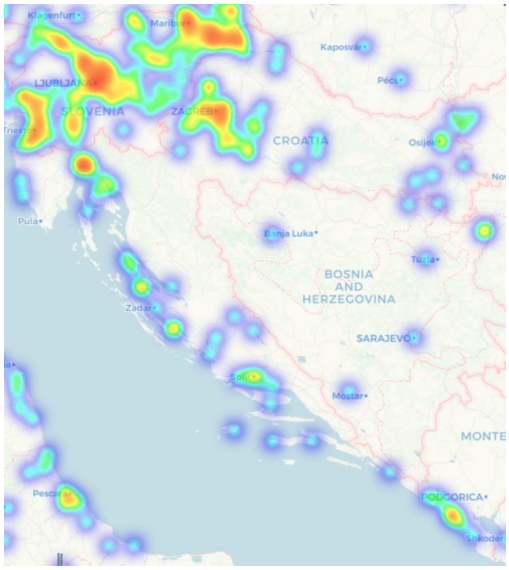
There is a variety in the business sector which is selected by the startups to be launched. Projects, that apply blockchain, are in sectors like advertising and entertainment. On the other hand, startups have also developed platforms in sectors such as tourism (i.e. travel).

Startups have only recently started venturing in the blockchain field, as documented by the collected dataset: the oldest startup has been active since 2017. Skewness in the data is apparent as most of the startups have been established in 2017. Most blockchain-related companies in Croatia appeared since 2017, while the number of new companies has declined since 2018



BLOCKCHAIN COMMUNITY

The Croatian community is beginning to formulate a blockchain ecosystem. Enthusiasts are creating groups to share knowledge and ideas on the innovate technology and the total number of enthusiasts is estimated to be 1,500. Zagreb has taken a predominant place in meetup's organizations, since it is the city to host meetups focused on blockchain, digital assets and smart contracts. Other big cities, such as Rijeka and Split, are organizing meetups on new technologies where references to blockchain are made.



The blockchain community in Croatia is gradually maturing. Initially, a non-governmental association was established in 2018 with the goal to create and foster a community of people in technology; to inform and educate; and support the development of regulatory frameworks and projects on blockchain. The association is titled Association of Blockchain and Digital assets, UBIK (Udruge za Blockchain I Kriptovalute).

Conferences are attracting the media attention, since they are used as an opportunity to familiarise with technology adoption and formulate business relations. Interest in FinTech seems to be popular, since Adria hosted a Fintech conference in 2019 while Shift Money is taking place in Zagreb in 2020. The interest in blockchain is not confined only in fintech; an international conference on blockchain business and development was hosted in the city of Split.

NOTABLE BLOCKCHAIN COMPANIES

Async Labs: An agile software development team, which actively provides services in software development, product marketing and blockchain. The team was founded in 2016 and has been involved in a variety of projects in blockchain, with two of them of immense importance. The first one is Odee, which is a decentralised exchange for trading tokens based on Ethereum. The latter project is Rewardzzz and utilises the blockchain to transfer vendor-specific loyalty points among the platform's participants.

Basic Attention Token: A project for a new token for the digital advertising industry, which has started in 2017. The project's basic idea was based on the notion of fraudulent incidents in the marketing sector. The crypto coin utilises the Ethereum blockchain and is used as a currency in the Brave Platform

Blockroad: Established in 2018 as a blockchain startup consultancy company. The company is aiming to build Decentralised Finance (DeFi) products, provide consultancy and research services.

DenCity: Established in 2017 as an AI and blockchain-powered platform, which gives the opportunity to build a new world and engage to the immersive VR experience. The blockchain is implemented in a layer as proof of ownership to avoid any disputes on the creator's rights.

Dynamic Division: Founded in 2018 in order to share its innovation in the field of robotics and blockchain technology. The innovative idea is the implementation of autonomous cleaners, which would charge based on the square of the area. The blockchain technology is integrated to support the compensation of robotics work.

Electrocoin: A startup, which started its activities in blockchain in 2014. The company is active in brokerage, payment processing and consulting and education about blockchain. The main venture is a digital assets brokerage service platform, named bitcoin mjenjacnica, which allows the trade between digital assets and serves both Croatian and EU companies.

Equinox Vision: A platform established in 2018 for social-network0style publishing of augmented reality interactive digital content on the blockchain. The idea sprang from the revolutionizing mobile game, Pokemon Go, and aims to cut costs down.

Forebit: started in 2015 and ventured into the digital assets trading market. The project's scope is to create a bridge between blockchain products pricing and regular exchanges which do not offer these assets. The project will offer indexes and will use the Ethereum blockchain-based decentralised applications like Augur.

Katalyo: A no-code digital transformation platform for the decentralised world to build hybrid apps established in 2017. The company enable organizations to utilise blockchain' data immutability, so that the systems' data can be tracked and managed on the blockchain.

NodeFactory: A company founded in 2018 that operates in blockchain development. The company has projects such as a tool for Ethereum 2.0 validators and a decentralised AI-powered investment and financing platform. The company is a member of UBIK and takes part in BUIDL meetups as an organiser.

Shard Labs: A startup founded in 2019 that introduces itself as an independent blockchain development agency. The agency specialises in blockchain use cases, custom blockchain development services and token development.

VeeMee: A platform that enables the traceability of food products and has the potential to reduce food wastes. The platform was founded in 2017 and bridges the agricultural and trading sector. The platform uses a QR code to achieve the food traceability.

INSIGHTS FROM EXPERTS

Mirko Stanić, representative for Croatia at the European Blockchain Partnership in the technical and policy groups and in the ESSIF and digital diplomas use case groups.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Croatia?

General knowledge about blockchain in both the citizens and the businesses is very low. I cannot quantify it due to lack of concrete data from both Croatia and other countries but I base my assessment in the number of blockchain start-ups. The largest group of blockchain enthusiasts from the business sector is organised in the UBIK association (Udruga za blockchain I kriptovalute). Government involvement with blockchain related activities is also very low and focused almost exclusively on the FinTech sector.

Are there specific regulatory or national policy initiatives in place in Croatia?

Croatian Financial Services Supervisor Agency (HANFA) has been given oversight powers over blockchain related companies such as exchanges or other businesses involved in crypto based FinTech. In May this year, HANFA authorised the creation of a digital assets investment fund with the Croatian state-owned bank "Hrvatska Poštanska Banka" (HPB) serving as the depository.

Are there notable blockchain-related education & training offerings by universities or other providers?
University of Zagreb, Faculty of Electrical Engineering and Computing has started a graduate course titled Distributed Ledgers and Digital assets as part of their Computer Science, Software Engineering and Information Processing study programs. Also, all of Croatia's technical and economic higher education institutions have organised at least one guest lecture on blockchain in the past two years.

How would you evaluate the overall level of size & maturity of the blockchain and digital assets markets in Croatia?

The blockchain and digital asset market in Croatia is very small and limited exclusively to private initiative. So far, there has been little to no interest in blockchain on government level. The only two exceptions being the interest of the Agency for Science and Higher Education, Croatia's higher education and science institution accreditation body, in digital diplomas on which it works through the EBP and the Ministry of Economy and Sustainable Development which has announced the formation of an office related to FinTech applications of blockchain.

What does the future hold for the Croatia's Blockchain ecosystem?

It is difficult to predict the future but by observing current trends one can surmise that the proliferation of small companies, which act as contractors to larger EU entities will continue. On the political side, any major legislation will almost certainly be reactionary to the EU regulations.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Croatia?

There are some notable companies in Croatia, which perform blockchain related activities or have blockchain related products:

- The biggest blockchain related company in Croatia is HashNET which developed its own blockchain implementation, Tolar, and its own consensus algorithm based around Prof of Authority. HashNET also operates in Slovenia and the TOLAR network has been submitted by the Slovenian representatives in the EBP for evaluation to become one of EBSI certified ledger technologies.

- Odee is a decentralised exchange platform built on Ethereum which allows for trading of tokens based on Ethereum. Odee is registered in Estonia which is a common thing among Croatian tech startups due to the unfavourable investor climate in Croatia.
- NodeFactory is a company, which specialises in blockchain development, services and consulting. The company was founded in 2018 and is a member of the Croatian organization for blockchain, UBIK.
- Shardlabs is a small startup founded in 2019, which focuses on blockchain related services relating to custom development.
- VeeMee stands out from other blockchain companies in Croatia by virtue of being a supply chain management solution and thus one of the rare examples of blockchain in Croatia which is not related to FinTech. The startup is funded through the EU SME instruments. Its main product is an agricultural supply chain tracking solution.
- Base58 is another company, which offers blockchain as a service. The company was founded in 2010. And is headquartered in Osijek in eastern Croatia. They provide consulting services in blockchain space.

Key Findings

€ 142 million

total funds raised

2.5 %

of the population are interested in blockchain and digital currencies

20+

blockchain solution providers

CYPRUS

THE CYPRIOT BLOCKCHAIN ECOSYSTEM AT A GLANCE

The island state of Cyprus has emerged as one of Europe's blockchain hotspots, further confirming the trend of small European nation states, such as Malta and Estonia, embracing transformative technologies early.

In terms of public sector initiatives, the positive outlook towards blockchain and distributed ledger technologies (DLT) is reaffirmed by state-backed initiatives, such as the Innovation Hub, a unified national strategy to regulate and exploit blockchain for the public and private sector. The existence of strong private initiatives in the space, as well as the country's low tax plans, have further propelled blockchain growth in the country. As a result, Cyprus, a signatory to the European Blockchain Partnership (EBP), counts more than 20 startups and companies active in the blockchain and digital currency space, while the country's largest private educational institution, the University of Nicosia has spearheaded blockchain education and research on a global level since 2014.

As was the case in neighbouring Greece, the debt crisis following the events of 2008 was a major facilitator for the rising interest in digital currencies as self-custodian stores of value. Digital currencies and blockchain first surged in popularity as discussions over the 2013 Cypriot bank deposit haircut unfolded. In fact, the events in Cyprus are largely assumed to have caused one of the biggest rises in bitcoin price at the time.

Cyprus today is primarily concerned with the transformative effects of blockchain technology in its public and private sector, and continues to work towards a common national framework to utilise blockchain at a national level.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: While no specific references to digital currencies and blockchain technologies exist in the country's legal or regulatory framework, the state's increasing interest in blockchain and relevant technologies is evident in the barrage of warnings and advice to potential investors and firms, issued by the Central Bank of Cyprus (CBC) and the Cyprus Securities and Exchange Commission (CySEC) from 2014 to date. The CBC and CySEC have warned the public of the risks that digital currencies pose, including volatility, their potential use for money laundering and terrorist financing, and the possibility of unrecoverable loss of funds, among others.

In pursuit of remaining in sync with international developments in the space, CySEC launched an Innovation Hub in 2018. The Hub aims to serve as a two-way communication channel between regulators and companies in an attempt to foster innovation and an informed regulatory landscape on the topic of transformative technologies. The Hub has since partnered with the University of London to research blockchain applications in automating compliance and regulation. The Chair of the Innovation Hub, Demetra Kalogerou, noted: *"[…] Financial technology (FinTech) firms will have access to specialised regulatory expertise, industry and academic roundtables - and will also have a voice to improve CySEC's understanding of the risks and benefits of new innovative investment products and platforms, using DLT (e.g., blockchain), enabling a more informed regulatory landscape.*"

In 2019, the Finance Minister of Cyprus, Harris Georgiades, announced a draft bill to regulate blockchain technology, as part of the country's national strategy to exploit blockchain technologies across its public and private sector. Georgiades noted: "*[Blockchain technology] is a form of simplification and modernisation of cutting down red tape, but in a swift and completely transparent and secure manner. [It will allow for] transactions to be executed speedily, with transparency, security and immediacy, [and its use] will bring about savings both in the public and the private sector.*"

Initial coin offerings (ICOs) and digital currency mining remain largely unregulated in the island, while tax-reporting requirements apply to digital assets. Digital currencies are regulated under existing laws for the prevention of money laundering and terrorist financing.

Legislation of blockchain: There are currently no specific references to digital currencies or other digital assets in Cypriot legislation. However, a bill is currently under development within the Cyprus Parliament (House of Representatives).

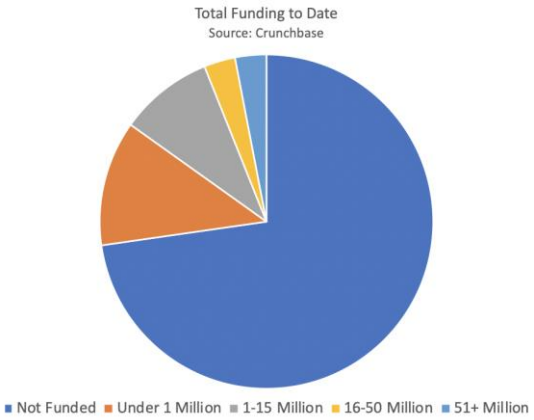
Blockchain in academia: Since 2014, the University of Nicosia (UNIC) has emerged as a major facilitator of blockchain and digital currency education, not only in Cyprus, but also globally. By leveraging the country's favourable outlook towards transformative technologies, the university has achieved global impact through online courses, a full academic degree (MSc in Blockchain and Digital Currency), and professional certificates. UNIC's Massive Online Open Course ('Introduction to Digital Currencies') has been attended by close to 40,000 students from 100+ countries since 2014. The university has also established the Institute for the Future, a research centre focused on transformative technologies, and actively supports one global blockchain conference, Decentralized. Other executive and professional certificates are also offered, while some consulting firms have integrated blockchain courses in their curriculums.

Blockchain across key industries: The Cypriot economy is primarily driven by services that support its ever-growing tourism. Private education, especially at higher levels enjoys great growth, mainly benefiting from the lack of private higher-education institutions in neighbouring Greece. Cyprus is the world's 11th maritime power and a major exporter of agricultural products and pharmaceuticals. In June 2020, VeChain announced that the Mediterranean Hospital of Cyprus will be employing their blockchain-based solution to store COVID-19 results. The country's national strategy on blockchain technologies suggests 11 primary areas in which blockchain applications will yield significant benefits: land registry, customs and taxation, National Betting

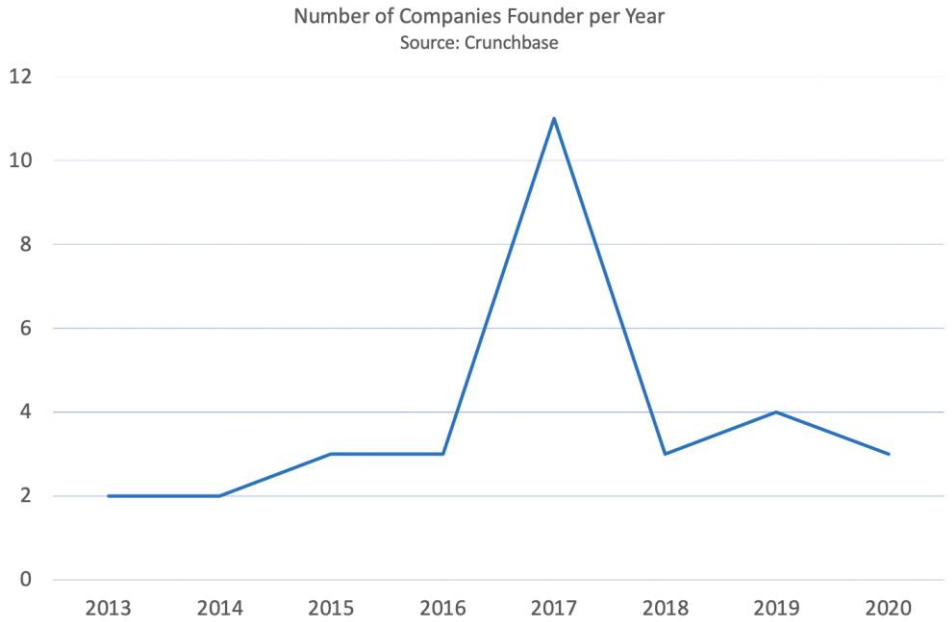
Authority, educational certification/digital certification, know your client (KYC), energy, e-invoicing, anti-money laundering, medical records, supply chain, and company registry. In a direct quote from Kyriacos Kokkinos, the Deputy Minister of Cyprus for Research, Innovation and Digital Policy, "the most promising domains for which the Republic of Cyprus stands to attain the greatest benefits if it incorporates blockchain technology, will be identified with the completion of the request for interest (RFI) procedure that was announced in December 2019."

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Cyprus is home to a number of small- and medium-sized blockchain and digital currency companies and startups. The country counts more than 20 for-profit organisations registered across its territory that have raised a total of EUR 142 million.



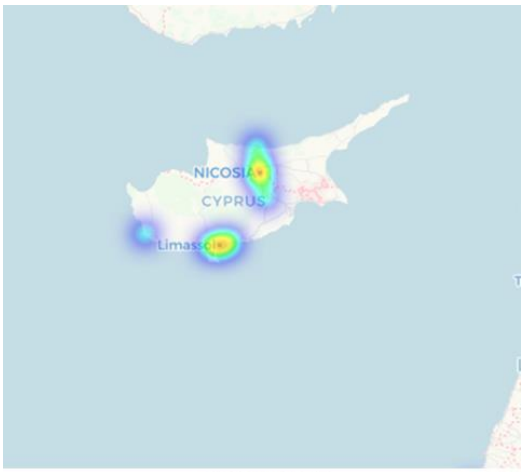
Cyprus-based companies and startups are active in a wide range of verticals. Payment and banking services are by far the most popular category, with compliance and legal, digital currency exchanges, and entertainment/gaming following. Due to the country's favourable tax treatment, many startups from Greece, Central Europe, and even the United States of America choose to establish their business and operations in Cyprus.



BLOCKCHAIN COMMUNITY

One of the most prominent and far-reaching community initiatives from Cyprus is the Decentralised Chapters community. Decentralised Chapters are independent communities of practice and enthusiast groups organised under the sponsorship of the Decentralized conference. To date, there are 34 in total, seven of which are based in EU member countries, while the rest hail from the United Kingdom, the United States of America, Latin America, United Arab Emirates, and even Venezuela. The Decentralised Chapters community counts 260 members in total, with 49 being Cypriot natives. The Chapters are responsible for independently organised events and workshops, spanning a wide range of interest areas that relate to blockchain and digital currency

technologies, from applications in the public sector and law, to transformative effects of decentralised finance (DeFi) and central bank digital currencies (CBDCs).



source: coinmap.org

Besides the Decentralised Chapters, the Cypriot community amounts to roughly 37,000 observers, or 2.3 % of the total population, and approximately 300 enthusiasts. Observers are individuals loosely interested in the concepts of blockchain and digital currency, while enthusiasts are members of official or unofficial communities of practice and enthusiast groups, who actively participate in discussions, events, or workshops, whether physical or digital.

(Source for observers: Facebook audience, ages: 16-65+, location: Cyprus, keywords: blockchain, digital assets, digital currency, bitcoin | Source for enthusiasts)

NOTABLE BLOCKCHAIN COMPANIES

0xGames: A company active in entertainment and gaming. The team develops open economy games powered by blockchain technology.

AlleoChain: A software development company that focuses on the development of blockchain enterprise applications.

AlleoTech: A software development company that offers auditing and consulting information technology (IT) services. It also develops blockchain enterprise applications.

Block.co: Offers verifiable digital certificates and relevant credentialing services leveraging blockchain technologies.

Decentralized Vision | PumaPay: Develops and supports smart-contract-based protocols that facilitate consumer to merchant payments.

Tradeline: Active in the commodity trading, logistics and shipping industry, it utilises blockchain technology to achieve secure, efficient, transparent and reliable post-trade communication.

Cyprus Blockchain Association: Concentrates industry leaders in the field of transformative technologies in an attempt to promote innovation in the field of blockchain technologies.

INSIGHTS FROM EXPERTS

Kyriacos Kokkinos, Deputy Minister to the President, Deputy Ministry to the President of Cyprus for Research, Innovation & Digital Policy

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in Cyprus?

Cyprus has embraced transformative technologies and the level of involvement and maturity of the ecosystem in Cyprus is at an initial stage and fragmented. Maturity in the space of blockchains and digital assets is characterised by various factors ranging from regulation, technology adoption and community/user awareness. We believe that Cyprus has the potential to obtain a leading position in EU in terms of digital transformation, and become a "technology-friendly" island, not only for blockchain technology and digital assets, but also for other technological advancements as well (such as artificial intelligence and cybersecurity). As Government we target at unifying the various ad-hoc efforts from regional teams, technology startups and academic institutions, under the same umbrella.

To this end, the Council of Ministers has approved Cyprus' National Strategy on Blockchain and Distributed Ledger Technologies in June 2019. The National Strategy sets out Cyprus' vision for DLT and blockchain, which is part of the wider vision of Cyprus for digital transformation. The Strategy provides a framework and a high-level road map for examining the applications of DLT, across different sectors, in the context of process optimisation and cost efficiency, and addresses the risks arising from the emergence of new products utilizing DLT.

We believe that with the implementation of the National Strategy, Cyprus will transform the economy and adopt to new business models, and therefore increase the level of maturity towards disruptive technologies (such as DLTs and artificial intelligence). In addition, the upcoming DLT and Digital assets bill, which is currently drafted, will contribute towards improving the maturity levels of this technology for Cyprus, and thus, creating an 'enabling environment' for technology and FinTech companies to flourish.

Lastly, community awareness and mass adoption of a new technology is driven by education which will further contribute to improving the maturity levels of this technology in Cyprus.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Cyprus?

Cyprus is home to a collection of small- and medium-sized blockchain and digital currency companies and startups at their early days. Some startups have been introducing experimental services which are still at the embryonic stage. They are active in a wide range of verticals, such as payment and banking services, compliance and legal, digital currency exchanges, KYC, and entertainment/gaming. Additionally, we have recently seen national innovations in the medical records domain with the adoption of Blockchain Enabled Medical Data Management Platforms (Mediterranean Hospital of Cyprus). Consulting firms have been making their moves at providing consulting and other services leveraging on their internal networks.

Are there specific regulatory or national policy initiatives in place in Cyprus?

As per the National Strategy, the preparation of a new legislation on DLT and blockchain is in process. We already have the first draft available and the legal sub-committee's work is still in progress. Our aim is to propose an umbrella law that covers future innovations and includes amendments to other specific related laws, such as the Property law and the Evidence law.

Furthermore, the Government is closely monitoring and participating in the discussions for the European Commission's legislative initiative for DLT and cryptoassets in particular, so as to quickly adopt it and ensure that our national legislation will be in line with the European one.

Within the frames of the implementation of Cyprus' National Strategy on DLT and blockchain, we have announced in December 2019 an RFI to consolidate the interest from the market and identify the most

promising domains for which the Republic of Cyprus stands to attain the greatest benefits if it incorporates blockchain technology. We have received around 60 proposals and we are currently in the final steps of the completion of the evaluation procedure.
The Republic of Cyprus also participates in the EBP and the European Blockchain Services Infrastructure (EBSI) with the aim of materialising an EU-wide cross-border distributed ledger infrastructure. EBSI envisions the development of reusable software, specifications and services to be used by public and governmental organisations, and other EU institutions.

Are there any notable blockchain-related education and training offerings by universities or other providers?

Cyprus is a facilitator of blockchain and DLT education in the area, by offering education and trainings programmes in this field. A specialised MSc degree in digital currency, blockchain and DLT is offered by the University of Nicosia. Executive professional and academic certificates are also offered, and other academic institutions (such as the Cyprus Institute of Management – CIIM) and consulting firms have integrated blockchain courses into their curriculums. Research centres have been established, some of which with the cooperation of the University College London Centre for Blockchain Technologies, which is a worldwide pioneer in the field. Cyprus is also active in the organisation of blockchain events and conferences, such as the Cyprus Blockchain Summit that was organised last month. Additionally, we are seeing attempts from other training firms to emerge, which shows that there is an increased demand on education/awareness by the local community.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Cyprus?

A number of FinTech startups experiment with the technology in financial products as proof of concepts. The FinTech or foreign exchange (Forex) companies already in place in Cyprus have also been exploring the potentials of the technology. We believe that with the adoption of the DLT and digital assets bill, many more companies will shift their focus towards such markets. Overall, it is still early days for assessing the current status of the digital assets in Cyprus.

Cyprus considers blockchain and distributed ledgers as a technology with great promise and the approval of the national strategy on blockchain and DLT illustrates this fact. With the finalisation of the new legislation, we expect that the ecosystem will get to the next evolution stage and attract investments and talent. The aim is to allow companies to attract capital through blockchain investments, exchange of technologies and also release a blockchain backbone run by the Government that will allow companies to build applications on our blockchain-based public services.
Furthermore, with the implementation of the various use-cases that the Government is exploring under the national DLT/blockchain strategy the space will get more mature with more stakeholders involved.

At the EU level, the involvement of Cyprus as an active member, contributing towards the EBP will enable us to gain know-how and expertise to further support the main goal of the Deputy Ministry for a complete digital transformation.

In general, and with the upcoming legislative reform, the groundwork is already happening, and Cyprus is now prepared to take the next concrete steps ahead to the digital era.

Irini Piki, Head of Strategy, Coordinator and Communication, Directorate at Ministry of Finance

How would you evaluate the overall level of size & maturity of the blockchain and digital assets markets in Cyprus?

Blockchain first drew our attention as policy makers a few years ago. It is an area that has definitely shown dynamic in our country especially in the financial services sector. Cyprus overall has a strong but traditional financial services sector, however, FinTech has been getting a lot of attention lately.

As I said, we started really thinking about DLT [Distributed Ledger Technologies] some years ago. A committee was formed at the policy making level to discuss how we should proceed.
In 2019 we [the Ministry of Finance] hosted a round table to discuss what should be included in our national strategy on blockchain. We had more than 100 participants with whom we spent a day prioritizing element in the legal framework, discussing what blockchain use cases can emerge in the country, and other similar issues.

I would say that the Cypriot blockchain market is still small and not quite mature yet, but there seems to be a lot of potential for growth, especially due to recent pan European initiatives such as the framework introduced by the European Commission.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Cyprus?

The first initiative of blockchain business activity that comes to mind from at least from a national policy perspective, Is the innovation hub of CYSEC [Cyprus Securities and Exchange Commission], which was established about a year ago. I know that there has been a lot of interest by private initiatives, however, I cannot point to a national champion with certainty, especially one that is native to the country. Cyprus counts many companies that operate nationwide and make use of blockchain technology, but those companies are for the most part multinational businesses with an international focus, none of which emerged from the local ecosystem. Another initiative that I would point to is the Cyprus Blockchain Association

Are there specific regulatory or national policy initiatives in place in Cyprus?

Our national strategy on DLT has already been approved by the council of Ministers since 2019. It is interesting to say that for the preparation of the national strategy we had ministerial departments involved with both the CYSEC and the Central Bank of Cyprus, the Parliament, as well as important stakeholders from the private sector including the Cyprus bar association and the Cyprus Chartered Accountants Association. Given that it was in the truest essence, a national strategy. In more detail, the national strategy has set 3 priority axes:

The first was the preparation of a legislative framework for those technologies, the second had to do with special applications and use cases in both the public and private sector, such as land and registry, KYC [know your customer], and tax, and the third axis dealt with the dissemination of knowledge on the technologies.

We, as the Ministry of Finance have the role of the coordinators of an umbrella legislation for DLT. The idea behind this umbrella legislation, is to create a framework that will regulate the industry. This framework should be technologically neutral enough so as to promote innovation, but also robust so as to protect the consumers. It will also include definitions and clarifications for those technologies, including smart contracts, and property status. After the framework is introduced, it will be up to the various authorities to prepare “Sector-Specific regulations”.

Of course, in addition to all this, the European Commission came out last week with specific proposals for regulations known as MiCA. We are now working to make sure that our national legislation is informed, and in full harmonisation with what the Commission is proposing at a European level.

Are there any notable blockchain-related education & training offerings by universities or other providers?

The first one that comes to mind is the UNIC [University of Nicosia]. We are very proud that one of our largest private universities has been innovating in a number of spectrums, blockchain included. Having one university being a pioneer in the blockchain sector has helped other universities to follow-on. Innovation is definitely high on the agenda of the government and we are very prone to any initiatives that promote it. One indicative example is the DECENTRALIZED event, organised by the University of Nicosia. This is something that has been embraced by the government and the public. There were ideas on how to cooperate this year in the organisation of the event which unfortunately as I understand is going to be online. Besides UNIC, we also starting to see other academic initiatives in Cyprus. We have a number of great experts in the field and we are

trying our best to cooperate with them as much as possible through the initiatives of the Deputy Ministry, such as the proof of concepts.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Cyprus?

Blockchain for many people blockchain is just a buzz word. There is a big confusion of what it really is and its very much associated with bitcoin with many, viewing them as one and the same.

We hosted a digital literacy event back in May [2019]. Lack of financial and especially digital literacy is one of the problems that Cyprus faces. Going back to what we were saying before, in our national strategy the third priority axis has to do with dissemination of information through events, platforms and other various activities. COVID-19 definitely had an impact on our planned activities but we are now starting to pick back up. I'm convinced that soon, hopefully within 2021 we are going to see more awareness from the public and businesspeople alike.

What does the future hold for the Cypriot blockchain ecosystem?

Having the appropriate legislation in place is going to provide a sense of certainty for businesses in the field. We are aware that in certain scenarios regulation can prove a hurdle for the private sector, by strangling innovative initiatives, however it is important to have regulatory certainty. We are trying to strike the perfect balance between allowing for innovation to grow, while protecting consumers. This will help the ecosystem grow.

If you were to ask me if having a regulatory sandbox in Cyprus could have made a difference in this respect [innovation], I would say that that would probably be the case. We are in an area where we attract a lot of interest from numerous fintech companies from neighboring countries that could use a regulatory sandbox in Europe and its legislations. I believe that this could be a key enabler for the acceleration of the ecosystem. We are still not there yet. We started with the CYSEC innovation hub, but I predict that a sandbox could be the next step.

Key Figures:

38+
Blockchain startups

€1.45M
Fundraising revenue

42
Initial Coin Offerings

150
Venues that accept digital assets payments in Prague alone

4,200
Individuals organised in blockchain communities

CZECH REPUBLIC

THE CZECH BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Czech Republic is a signatory of the European Blockchain Partnership (EBP), and in 2019 the Czech Republic held a 1-year presidency of the EBP.

Dozens of blockchain companies operate in the Czech Republic. It is an incubator for blockchain innovations and fintech startups.

In 2018, Prague gained publicity following high ratings in crypto-friendliness from reports by FortuneJack and Cointelegraph. The capital and largest city in the Czech Republic has around 154 venues, including bars, restaurants, hotels, cinemas and attractions that now accept bitcoin as a method of payment. In addition, special ATMs in the city dispense real cash from digital money accounts.

The Czech Republic took steps to regulate digital assets, as did many EU countries. In January 2017, a law adopted in the country limited the anonymity of transactions. Currently, digital assets exchanges and other exchange services are required to verify their customers. This is done as a means to fight money laundering and financing of prohibited activities.

The Czech Republic is also an important hub for conferences and meetups involving leading blockchain specialists from the country and technology enthusiasts abroad. For example, the Blockchain & Bitcoin Conference was held in Prague for a couple of years.

Approximately 4,200 people make up the core of the blockchain community in the country, according to official Meetup.com groups. Communities of practice constitute the primary facilitator of education and discussion in the field.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: The Government of the Czech Republic does not prevent the introduction of digital assets in business circulation as a means of payment. Despite the fact that in many countries digital assets are considered a threat to the traditional financial systems and restrictive laws are enacted, the government implements only EU AML policy that is favourable to business interests and does not create obstacles to the digital assets community. On 1 January 2017, a new law defined the concept of "digital currency" and imposed obligations on Czech banks, Digital Asset Service Providers and other financial service providers. This was done to establish the identity of their customers when exchanging digital currencies in the Czech Republic for amounts exceeding 1,000 euros. Nevertheless, the legal status of bitcoin, as well as other digital currencies in the Czech Republic today, is not defined at all by the legislation. The income tax on the sale of goods and services for digital money is governed by the same rules as when paying with conventional money in the Czech Republic.

Raising funds through initial coin offerings (ICOs), as well as the issue and sale of digital tokens, are also not regulated by Czech national legislation. However, both EU and Czech legislation on combating money laundering and the financing of terrorism is applied to such operations.

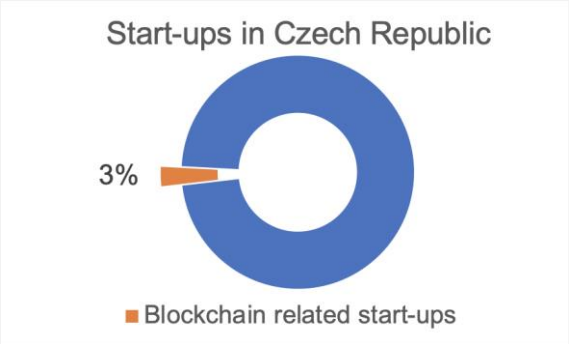
The Czech Republic has been extensively involved in preparing for the implementation of Model law on electronic transferable records with the United Nations' Committee. This positions the nation well in terms of expediating the usage of blockchain technologies at government level, as the law entails blockchain usage and offers a strong basis for expanding the initiative to other areas of governance.

Blockchain across key industries: Due to the government's favourable attitude towards the community, the Czech Republic attracts enthusiasts to the field of cryptography and IT. The country's capital is the location for the crypto anarchy centre 'Paralelni Polis' – founded by the Ztohoven artist group. The hub is focused on crypto technology development. It has a co-working space for IT experts and a 3D printing studio. Paralelni Polis is a hub for multiple hackathons and international crypto events. In addition to digital assets exchanges, dozens of blockchain companies operate in the Czech Republic. It is an incubator for blockchain innovations, such as Adelphoi.io, fintech startups SDK.finance, Cashila and finGOOD, as well as the bitcoin banking service wBTCb. In addition, Expobank CZ claims to be the first bank in Europe to offer account holders the opportunity to perform crypto-related transactions alongside traditional banking activities.

Blockchain in academia: Blockchain's academic landscape in the Czech Republic is sparse. The University of Economics in Prague offers a course called "Blockchain and business innovations for digital economy". However, there are lots of non-academic courses. For example, the European Summer School offers the on-campus course "Blockchain Fundamentals" that examines important concepts and the history of blockchain, potential applications and their impact on the business world. Interested parties can also receive qualifications in blockchain through online professional courses and certifications.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

The Czech Republic is an important player in the digital assets sectors, considering that it is one of the pioneers in this type of activity. Prague has a very well-developed infrastructure for digital assets users.



Businesspersons interested in starting the company registration procedure for a digital assets business should know that the Finance Ministry requires such companies to determine the identity of its users, an aspect that had not been requested prior to the law prepared to bind EU AML policy.

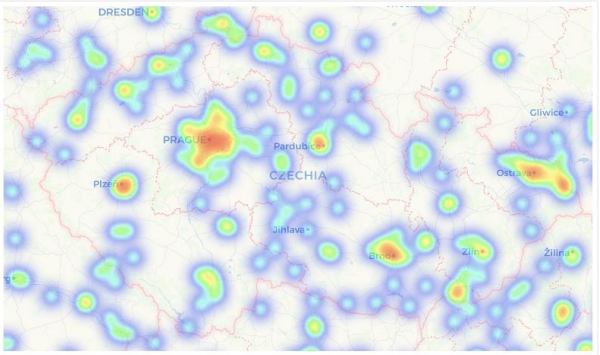
Furthermore, in 2019, the Czech authorities announced that digital assets companies will need to comply with a set of additional regulations. For example, digital assets companies are required to register with the Trade Licensing Authority.

According to tracxn.com, the Czech Republic has 1,424 startups, while 38 of them are related to Blockchain.

Startups operate in several different industries, such as digital assets exchanges and wallets, mining pools, blockchain funding and communication platforms.

BLOCKCHAIN COMMUNITY

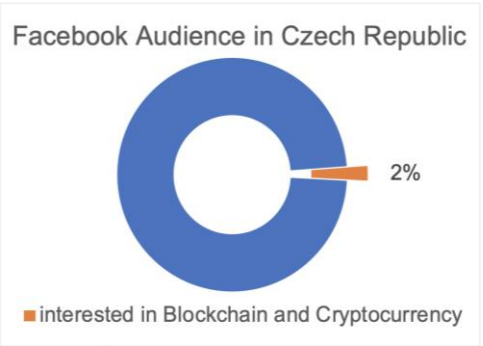
The Czech Republic has a noteworthy blockchain community. Official and unofficial enthusiast groups amount to more than 4,200 active members concerned with a variety of blockchain and digital assets aspects.



All the cryptocurrency merchants in Czech Republic
coinmap.org

A major European and international hub for bitcoin and other digital assets, Prague counts 154 venues (bars, restaurants, hotels, cinemas and other attractions) where digital assets are accepted as a method of payment. Furthermore, over 1,000 e-stores in the Czech Republic accept bitcoins, including the largest online retailer Alza.cz.

Prague's cryptoculture has been booming in recent years. In 2014, the first bitcoin ATM appeared in the streets of the Czech capital, while local users also launched their own home-grown digital assets, the Czech Crown Coin (CZC) (doesn't exist anymore), meant to offer a local alternative to bitcoin and other digital currencies. More famously, Prague is home to the Bitcoin Coffee, allegedly the first of its kind in the world where digital assets (e.g. bitcoin, Litecoin, Monero) are the only accepted form of payment. The Bitcoin Coffee is part of the Paralelni Polis building, an experimental alternative centre launched by the art group Ztohoven in the Holešovice district, which also hosts a co-working space and the Institute of Cryptology. In short, Prague is the epicentre for enthusiastic members of the global digital assets community.



According to ekonom.cz, at the beginning of 2017, there were some tens of thousands of bitcoin owners in the Czech Republic.

Today, this number is surely many times bigger. Facebook Audience shows that 2% (about 100,000 people) of Czech Facebook users (5 million) are interested in blockchain and digital assets. This figure is considered substantial.

NOTABLE BLOCKCHAIN COMPANIES

Slushpool: Bitcoin mining pool operating since December 2010. Unique reward system provides stable and transparent rewards for loyal miners. The entire infrastructure runs on highly secure servers and users' wallet address can be secured with two-factor-authentication (2FA).

TREZOR: Hardware device designed as a bitcoin wallet. Because all transactions are signed in by the device itself, the keys never leave the device and thus cannot be stolen by a virus, malicious code or an attacker.

SatoshiLabs: Provides a digital assets hardware wallet called Trezor to receive, store and send digital assets. It also provides two more projects called Password Manager and Blockbook for the hardware wallet.

BrikkApp: Decentralised crowdfunding real estate marketplace built on top of the hyperledger fabric blockchain.

Kira Core: Software development company building a full stack DeFi ecosystem and truly distributed applications.

Saifu: App-based digital assets wallet. Supports multiple fiat and digital assets, including bitcoin, Ethereum and Euro. Services offered include digital assets exchange, SWIFT wire transfers, money transfer, load currencies onto VISA and MasterCard accounts, and digital assets payments.

Simple Coin: Digital asset exchange platform. Offers to buy and sell digital assets with Euro and Czech koruna. It also provides a crypto-to-crypto exchange service. It supports bitcoin, Ether, Litecoin, bitcoin cash and Ripple.

True Gym: Decentralised platform for the fitness industry. Users are rewarded with True Gym Coin for sharing workout data with the network.

INSIGHTS FROM EXPERTS

Miroslav Lukeš - Senior Vice President at Mastercard

Alex Ivančo - Ministry of Finance of the Czech Republic

Maria Staszkiewicz - Guarantor for the area of blockchain and finance, Chairperson of the Czech FinTech Association

Miroslav Lukeš

Senior Vice President at Mastercard

"Decentralised technologies bring us closer to a frictionless and paperless economy. The Czech Republic, with its strong cryptographic community, can become one of the leaders in blockchain applications."

Alex Ivančo

Ministry of Finance of the Czech Republic

"At the UN, we have contributed to the creation of modern model rules for international trade law. The Czech Republic also needs blockchain-friendly legislation to remain part of the global trade networks."

Maria Staszkiewicz

Guarantor for the area of blockchain and finance Chairperson of the Czech FinTech Association

"The innovations in a highly regulated financial sector, such as blockchain technology, is often hindered by obsolete legislation, which represents the barriers to the rapid development of new services, restricts the competition and slows down the entry of more user-friendly and cheaper solutions. The legal regulation of financial services must be as flexible and technologically neutral as possible."

Key Findings

€32.3 million
Total funds raised

Maritime, Trade, Transportation

The most active sectors

24

Blockchain solution providers and startups

DENMARK

THE DANISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

Denmark has been progressive by establishing strong foundations towards the mainstream adoption of blockchain technology. Such initiatives are not only limited to attracting new startups, but also focus on the use of the technology in governmental operations, too. As described by the Ministry of Foreign Affairs of Denmark, "a buzzing ecosystem of startups is bringing blockchain to practical application in e.g. finance, where fintech is delivering savings and improved transactional experience. Danish universities complement the early-stage application, by bringing world-class research in the domain of the blockchain technology."

The country is constantly achieving high ratings in the Digital Economy and Society Index (DESI Index) and is amongst the global leaders in digitalisation. The DESI index is a composite metric that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness.

Denmark is one of the few countries for which there is comprehensive research done on the economic impact of blockchain on the Danish industry and labour market. The report is a joint achievement of the European Blockchain Centre at the IT University of Copenhagen, Fraunhofer Institute for Industrial Engineering, Confederation of Danish Industry, Statistics Denmark and the Danish Industry Foundation. It focuses on the application of blockchain technologies in different industry sectors in Denmark.

The survey conducted by Statistics Denmark had a 44% response rate from a total of over 3,000 interviewed corporations and organisations. The outputs of the survey showcase a dynamic potential for the adoption of blockchain activities within the Danish industry and market. The most prominent blockchain related sectors include fintech, the professional services industry, IT, and the maritime shipping and transportation industries. According to the report, and despite the fact that there are only very few blockchain initiatives in the Danish banking and insurance industry, the fintech and blockchain startup scene in Denmark is nevertheless quite active. Furthermore, the report noted that around 15% of large companies and 12% of medium-sized companies use blockchain technology. The greater Copenhagen region appears to be hosting quite a large number of startups and established companies involved in blockchain activities. The Danish blockchain ecosystem is currently grouped into four general business groups: fintech, the professional service industry and IT, and the maritime shipping and transportation industry.

TOWARDS MAINSTREAM ADOPTION

Regulation and policy making: In October 2018 during the International Anti-Corruption Conference (IACC), the Danish government, through the Ministry of Development Cooperation, published a report that highlighted the importance of blockchain technology in combating government corruption.

The government trusts that the digitalisation of public services and procurement through blockchain technology can facilitate transparency in the administration of financial transactions and land ownership, while averting corrupt practices in governmental institutions.

According to Ulla Tørnæs, the Minister for Development Cooperation:

"With digital technologies, we now have new tools to fight corruption. With this report, we wish to start a discussion about potentials and dilemmas. On the one hand, there are enormous possibilities and on the other hand, we should not forget the risk that comes along with them."

The Danish state-owned energy company Energinet has examined how to use Iota Tangle to develop IoT-based products and services. The two entities have worked together on a data marketplace initiative since late 2017.

In line with the digitisation efforts of the maritime industry, the DMA created a project in 2017 that uses blockchain to register ships by owners. Until now the owners must fill in and handle all related forms manually.

Legislation of blockchain: Denmark has no laws specifically addressing digital assets, and no regulatory proposals on digital assets are pending in the Danish Parliament. However, government agencies have issued a few statements on digital assets.

Overall, Denmark is considered friendly to digital assets and blockchain, with the Danish Central Bank reportedly contemplating a blockchain backed E-Krone. As reported by CoinTelegraph, one of the key concerns arises when failing to anonymise a currency, introducing concerns if the central bank should monitor and track the transactions of its people.

Digital currency legislation that applies to blockchain: According to the industry's media references, the Denmark Tax Authority has been authorised by the country's Tax Council to obtain information from three domestic crypto exchanges. On another note, Denmark-based digital assets users have received letters from the Danish Tax Agency requesting traders to submit a full list of their digital assets' transactions for the fiscal years 2016-2018 with respect to the First in First Out principles.

Blockchain in academia: Universities in Denmark have identified a need for education at all levels, especially at the executive level, as evident by their academic offerings.

University of Copenhagen: The University of Copenhagen offers an Introduction to Blockchain Technology with a subsequent focus on the hands-on implementation of a blockchain prototype. Students engage in a "blockchain summer of code", four weeks of software development where they have a solid introduction to state-of-the-art blockchain technology, followed by the implementation of a prototype in a team to solve a real-world problem using blockchain technology. Examples of potential projects are contract management languages, identity (Know-Your-Customer, data mining), reporting, and applications such as backup, bill of lading and resource tracking. Each team can choose a blockchain platform (e.g. Ethereum network, R3 Corda) that is suitable for the particular use case.

Blockchain Summer School: Organised by the European Blockchain Centre, the summer school is a collaboration between the IT University of Copenhagen, the University of Copenhagen and the Copenhagen Business School. The summer school premiered in 2016 as the first of its kind in the entire world. Since then, blockchain technology has become significantly more mature, providing new challenges for the participants to work on, says Roman Beck, professor at ITU and head of the European Blockchain Centre.

ITU research - tools to investigate crypto crime: A new research project at the ITU aims to develop new methods that will allow authorities to investigate suspicious transactions, while at the same time guaranteeing anonymity for law-abiding users. Bernardo Machado David, Associate Professor in the Department of Computer Science at the IT University of Copenhagen, has received DKK 2.9 million from Independent Research Fund Denmark for a research project that may pave the way for a wider implementation of digital assets.

The project enables authorities to investigate suspicious crypto transactions while solving another fundamental problem: securing the anonymity of law-abiding users.

Aarhus University - Concordium Blockchain Research Centre: The Swiss non-profit behind the Concordium Blockchain Network announced the establishment of the Concordium Blockchain Research Centre, in partnership with Aarhus University's Department of Computer Science. The Centre's mission is to provide the foundational research to support the development of energy-efficient, scalable blockchains that are provably secure. The Concordium Blockchain Research Centre's goal is to build on decades' worth of research to create new blockchain technologies. The Centre will focus on areas such as consensus protocol efficiency, sharing and state-flattening, as well as new cryptographic techniques supporting privacy-preserving identification, KYC and AML, better zero-knowledge techniques and formal verification of smart contracts.

Blockchain Academy Network: A new research project at the Department of Engineering has received a total of EUR 0.9 million in funding from the Danish Industry Foundation to help Danish companies. Called the Blockchain Academy Network, the project aims to bring together Denmark's brightest minds in blockchain technology to teach and advance the Danish business community, organisations and the political system so that they can better understand the technology's opportunities and challenges.

Blockchain across key industries: An empirical analysis based on a comprehensive survey amongst Danish companies was performed in January and February 2019. The goal was to gain insight into the current assimilation state of blockchain technologies in Denmark, as well as of drivers and hurdles to future developments.

The selection of the specific sample and the implementation of the survey was carried out by Denmarks Statistik, the Danish national statistics office. From the national industry register, 28 sectors were selected for the survey and clustered into six groups, namely trade, information and communication, transportation, knowledge-based services, manufacturing, and financial and insurance. These six sector groups comprise the most important private industries in Denmark. The data sample with a response rate of over 44% of the 3,000+ companies surveyed allows for a very robust empirical analysis of the innovation dynamics and blockchain activities within the Danish industry.

Some of the key insights as outlined here, are the following:

The financial services industry had the most knowledge about blockchain, with around 77% reporting to have experience with it. However, a similarly high percentage was found for the information and communication technology sector in Denmark. At the same time, the logistics and shipping industry has taken a great interest in implementing use cases to showcase how the shipping industry could benefit from blockchain by registering and issuing certificates on blockchain.

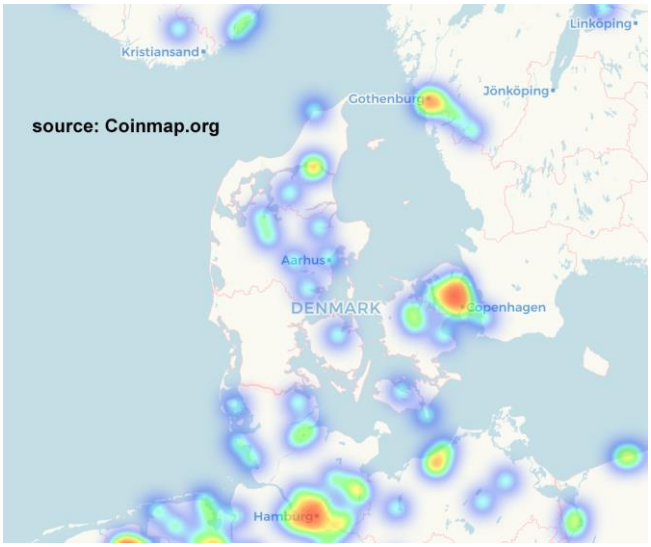
There are two major blockchain initiatives in the supply chain industry: Tradelens with the bill of lading on blockchain and improving the turnaround and management of containers to reduce costs by Blockshipping. Considering Denmark's advanced maritime industry and long history, it is fair to assume that more initiatives in this domain will increase.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

An overview of the Danish blockchain cluster illustrated that most identified blockchain-related entities can be classified into three main sectors: fintech; professional service industry and IT; and the maritime shipping and transportation industry.

According to the Crunchbase database, 22 blockchains startups operate in Denmark. This list is not exhaustive, since major endeavours and blockchain startups such as Chainalysis, Blockshipping and MakerDAO were established in Denmark, but are registered in countries outside the Danish territory.

BLOCKCHAIN COMMUNITY



The Danish blockchain ecosystem is prominent, featuring high-growth opportunities due to the active engagement opportunities of the scene and the large number of organisations advocating to support the blockchain technology.

The community consists of 84,000 observers, according to Facebook's audience metrics system. Out of those, 2,604 are actively engaged in communities of practice, engaging in 14 frequent meetup groups.

(Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Denmark, Keywords: Blockchain, Digital assets, Digital Currency, Bitcoin | Source for Enthusiasts

NOTABLE BLOCKCHAIN COMPANIES

Sepior: Enables trust in online financial transactions and enterprise data protection applications, such as digital assets custodial wallets, public or private blockchains and cloud-based SaaS offerings, using threshold-based multiparty computation (MPC).

NewBanking: Company founded in 2015 to provide a user identity platform that allows end users to verify their identity easily and securely across businesses, while having control and ownership of their data and identity online. Platform also solves the regulatory challenges that financial institutions face, especially in regards to the 4th European Anti-Money Laundering (AML) directive and the General Data Protection Regulation (GDPR), among other relevant regulatory legislation.

Clearhaus Holdings: As the parent company of the Clearhaus Group, Clearhaus A/S performs its operational activities. Payment institution regulated by the Danish Financial Supervisory Authority, as well as a Visa and Mastercard Principal Member that offers payment solutions to e-commerce across Europe. The company has managed to reduce friction in online payments by offering a fast sign-up online, using modern technology in the form of developed APIs and assisting merchants through a dedicated support team.

Aryze: Issues fully redeemable stable coins backed by and pegged to traditional assets. By creating the bridge between conventional fiat money and digital digital assets, it aims to be the primary payment infrastructure enabling individuals, businesses and IoT devices to make instant payments globally in a modular ecosystem with no transaction fees. MAMA is the name of its multi-asset wallet application that will allow users to send, receive and store currencies with near-zero transaction fees.

Nets: Provider of payments, credit and debit cards, and information services. Helps financial institutions, businesses and merchants make tomorrow a little easier for customers while providing unrivalled security and stability. Turns a complex reality into easy, intuitive and customer-oriented solutions, and guarantees it remains a reliable hub of the payments industry by building on unmatched connectivity. Founded in 2003 and based in Ballerup.

InPAY: Delivers real-time cross-border transactions in 60+ countries. This enables customers across the banking, travel, B2B and financial services sector to improve efficiency, reduce costs and create new revenue streams.

Digishares: Provides a software solution that is used through the issuance process. It is a white-label software solution for the issuance and management of securities (e.g. shares, bonds, etc.) on blockchain, and is one of the first functional and compliant STO platforms in Europe.

AMAZIX: Operates as a turnkey crypto-consultancy firm with a large and rapidly growing client base.

INSIGHTS FROM EXPERTS

Hasan Surtiwala – Venture Consultant ONE/10

The Nordic Blockchain Association is the pioneer in creating more awareness of the technology. However, universities such as IT University of Copenhagen have also contributed a lot to the blockchain community through their European Blockchain Centre. In my opinion, there has yet to be developed a cluster purely for the development of blockchain technology in Denmark. Copenhagen Fintech Lab is most likely the one housing the most blockchain-related ventures, but nevertheless operating within the realm of fintech. Many universities and governmental initiatives can make their centres a hub of blockchain adaption and innovation. MakerDAO and Aryze are still in my opinion the most notable movers and shakers in the Danish blockchain ecosystem and becoming an integral part of the growing DeFi ecosystem. Coming from the investment community, unfortunately blockchain technology in Denmark is still something that most people cannot explain; however, luckily, some do understand. Hindering the flow of capital to the technology impedes the development and mass adoption. Capital can create significant change, and it is important that more awareness is created. In my opinion, this can happen if more use cases outside the realm of tokenisation and crypto assets are presented, and corporations adopt the technology more and more in their organisations. The private investment community especially, needs to understand that investment in this space goes beyond gaining multiple X on the decentralised exchanges.

Ian Choo – Ekofolio Founder & CEO

Denmark is a pool of talent for blockchain professionals. Due to the fact that it is an educational hub, Denmark is fueled by the pool of professionals who have the necessary skills to work in the blockchain industry. There are many notable applications for non-financial application, mainly in auditing, shipping and the supply chain in general. Denmark, as a highly digital country, is the key reason that the young generation is very aware of digital assets. However, neither blockchain nor digital assets are widely covered by Danish mainstream media.

Key Findings

€ 257 million

total funds raised

1,500

Digital currency licenses issued by 2019

2 % of GDP & 1,400 years

Working time, saved annually by digital services secured by blockchain and X-Road

ESTONIA

THE ESTONIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Having been characterised as "The most advanced digital society in the world" by Wired and "The world's most digital country" by Forbes, Estonia is considered by many, Europe's blockchain Mecca.

Estonia utilises a highly scalable, privacy-focused keyless signature infrastructure (KSI) Blockchain, developed in the country, which is also used by NATO and the United States Department of Defence. Today, healthcare, property, business, and succession registries, along with the state gazette and the country's digital court system, are largely powered by this KSI Blockchain. e-Estonia's backbone is a state-backed solution known as 'X-Road', also implemented by Finland, Azerbaijan, Namibia and the Faroe Islands. X-Road facilitates data transfers between public and private databases and, while officially not a blockchain, shares many of the same principles, including a decentralised architecture, immutability, high security, standardisation and availability.

Estonia was one of the first countries to regulate digital currencies and provide a 'Digital assets License' for exchanges and custodian digital currency wallet providers. Transparent legislation and a generally positive outlook towards digital currencies, blockchain and initial coin offerings (ICOs), coupled with the country's e-Residency programme that allows for registering a company remotely, as well as low corporate tax and comparatively inexpensive licensing requirements, were responsible for almost 1,500 digital assets licenses issued by 2019, with hundreds of other companies active in the blockchain space without the need for one. More than 80 % of the licenses issued worldwide concerned Estonia-based businesses. Considering the country's population and total area, Estonia is a "digital" home to one of the largest blockchain ecosystems in Europe.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: In her article for Quartz, Kersti Kaljulaid, President of Estonia, highlights that "*Estonia is running its country like a startup*", and mentions, "*Estonians expect that if the private sector is constantly innovating, the government should be, too*". Blockchain technology is behind many of the country's initiatives in the public sector and regional governance.

Verified digital identities in the form of digital signatures, X-Road and the e-Residency programme, largely paved the way for blockchain use in the country. Estonians and e-Residents can use their electronic identifications (eIDs) as an all-in-one solution to interact in a cryptographically verifiable way with authorities online, with only marriage, divorce and real-estate transactions requiring physical presence. X-Road, a technology that draws from blockchain, enables secure internet-based data exchange between information systems, whether private or public.

The blockchain-enabled e-Residency programme, has proven a significant facilitator of blockchain business activity in the country. It allows anyone to start and manage an EU-based company completely online. The fees are minimal and the application process takes minutes, while the application review, a few weeks. Estonia's e-Residency site is also home to a marketplace of services in the areas of virtual offices, finance, tax, legal and payment/banking. The combination of the country's digital ambitions, the ease with which one can start a business remotely, coupled with clear digital currency legislation, constitute a compelling case for aspiring entrepreneurs, digital nomads and business people active in the blockchain space. Estonia's offering is so compelling that in fact, the e-Residency programme is growing faster than the country's population. What is more, in 2020, the country launched a blockchain-backed notary service for its e-Residents, to notarise marriages, birth certificates and more on-chain transactions. To date, Estonia counts more than 66,000 e-Residents and upwards of 10,000 e-Resident companies. Indicative of its blockchain ambitions, Estonia also had plans for its own digital currency, known as 'Estcoin', before they were scaled back following backlash from banking authorities, including from the President of the European Central Bank, Mario Draghi.

The country's digitised public services secured by blockchain and X-Road are estimated by Estonia's government officials to save 2 % of the gross domestic product (GDP) and 1,400 working years annually.

Digital currency legislation that applies to blockchain: Estonia was the first European country to provide clear regulation and guidelines for digital currencies. Estonian law recognises digital currencies as "*value represented in digital form that is digitally transferable, preservable, or tradable, and that natural persons or legal persons accept as a payment instrument*". However, digital currencies are not considered legal tender and do not otherwise possess the legal status of money. The country was the first European state to adopt the 5th Anti-Money Laundering European Directive to subject digital currency exchanges and custodian wallet providers to anti-money laundering and counter terrorism financing regulation.

In terms of digital currency taxation, as is the case in most countries, their use is VAT exempt. Digital currencies are treated as property when it comes to personal income tax purposes and thus, their exchange is subject to a capital gains tax of 20 %.

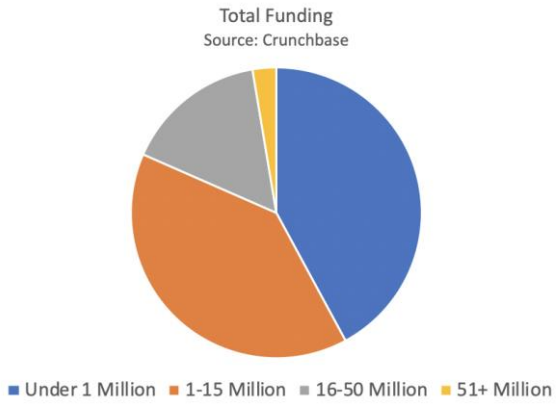
To facilitate the 2017/2018 growth of ICOs, The Estonian Financial Supervision and Resolution Authority (EFSA) published guidelines categorising cryptoassets into security, payment, charity and utility tokens, and invited ICO issuers to submit their plans for feedback, so they can be informed of any specific regulations that apply to them. Regulation also applies to advertising ICOs.

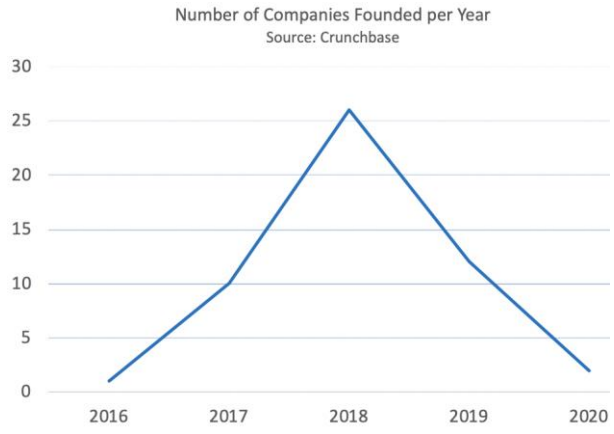
Blockchain in academia: Despite the prominent blockchain ecosystem in the country, no relevant academic courses or professional qualifications could be identified.

Blockchain across key industries: Estonian companies have identified a staggering number of verticals to be disrupted by transformative technologies, including blockchain. The Estonian Investment Agency (EIA) openly invites investors and entrepreneurs to utilise the country's established digital infrastructure in order to invest or start a business in the country focusing in any of those areas. The Agency's website explicitly lists blockchain as a facilitator under the categories FinTech, Cyber-Security, Industrial Digitalisation/Industry 4.0, Blockchain and Blockchain-as-a-Service, and e-Health.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

The country's e-Residency programme, coupled with a marketplace of service providers to facilitate establishing a company online, is largely responsible for attracting thousands of blockchain entrepreneurs from all over the world. The programme appeals to the borderless and online-first ethos that most blockchain businesses subscribe too. Up until 2019 approximately 1,500 digital assets licenses were issued by the Estonian Financial Intelligence Unit (EFIU), with hundreds of other companies active in the blockchain industry without requiring one. Due to the – until recently – comparatively trivial nature of setting up a company and obtaining a digital assets license, it is impossible to pin down the exact number of active businesses and startups in the space, as many of them were registered, issued a license, and never operated in the first place. The task of quantifying active blockchain businesses is complicated further by recent government efforts to prevent financial crime, following a EUR 190 billion money-laundering scandal, which resulted in 1/3 of the issued digital assets licenses to be revoked. As highlighted by the Head of the Estonian Financial Intelligence Unit (EFIU), Madis Reimand, "*more than a half of the remaining crypto companies may lose their licenses as they have no operations in Estonia and their managers are outside the country*". While recent developments in the country have certainly set back explosive growth, Estonia remains one of the primary options for aspiring blockchain entrepreneurs.



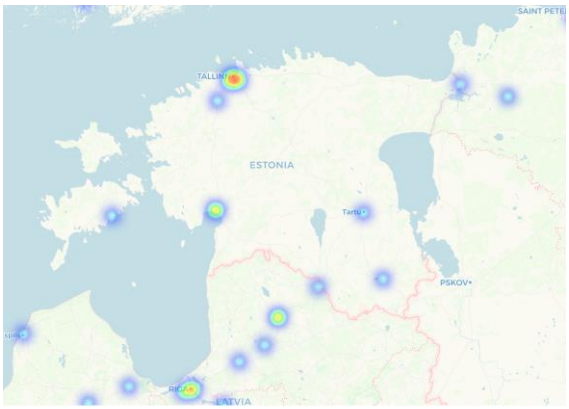


The top 30 Estonian blockchain businesses have raised collectively north of EUR 215 million through a combination of traditional financing and ICOs. Hikaru Kusaka, Founder of Blockhive, a company that originates from Japan, but is established in Estonia through the e-Residency programme, stated the following in a recent interview: "*We have a clear reason why we are here in Estonia. No other country but Estonia has done more to use blockchain in their e-government system which dramatically changes citizens' daily lives*".

A concentration of business activities around financial services, namely digital currency exchanges and banking, could be identified, with more than 60 % of the top 15 companies active in one of the two areas. Estonia's favourable treatment of ICOs and lack of taxation for undistributed profits put them in the top 10 countries in the world for the most ICOs launched in 2018.

BLOCKCHAIN COMMUNITY

Estonia's remote and digital-first approach was catalytic in shaping the local blockchain community, or lack thereof. While the general public is interested in transformative technologies, and the number of registered companies is high nationwide, no prominent official or unofficial enthusiast groups and communities of practice could be identified, as Estonia constitutes primarily a "virtual" home for most of the businesses. Some community initiatives exist in the form of local discussion groups, but they do not qualify as a quantifiable sample.



Source: coinmap.org

Observers in Estonia add up to approximately 18,000 individuals, or roughly 1.3% of the total population. Enthusiasts amount to 1,100. Observers are individuals loosely interested in the topics of blockchain and digital currencies, while enthusiasts are active participants in official or unofficial groups of practice.

(Source for observers: Facebook audience, ages: 16-65+, location: Estonia, keywords: blockchain, digital assets, digital currency, bitcoin | Source for enthusiasts)

NOTABLE BLOCKCHAIN COMPANIES

Crypterium: Founded in 2017, it aims to become an all-in-one solution for digital currency users. Its suite of products, which include UnionPay and Visa cards, a digital currency wallet and banking application, allows users to buy, exchange, transfer and spend digital currencies easily.

Solve.Care: Provides a blockchain-backed global platform for healthcare services administration and payments. The company serves a wide range of verticals, including insurance companies, government agencies and clinical organisations.

PlasmaPay: Established in 2017, it provides a blockchain- and digital currency-backed banking account for entrepreneurs and digital nomads.

CoinLoan: Established in 2017, it provides a peer-to-peer (P2P) lending platform for digital asset-backed loans. Users can take out loans without losing their exposure to their digital assets.

KickEcosystem: Aims to provide a next-generation digital currency and digital assets exchange. It offers a suite of products, including their own token, auction platform, wallet and payment acquirer.

CoinMetro: A digital currency exchange and investment platform which allows its users to buy and sell digital currencies, margin trade and copy trade.

Envoychain: Established in 2018, it utilises blockchain technology to bring efficiencies to the global supply chain, trade and finance.

Onlife: A software-as-a-service (SaaS) startup that provides a blockchain-backed mobile application for influencers and travellers, with social media elements.

AdHive: Offers a blockchain-powered platform to connect advertisers and influencers for video advertisement purposes.

INSIGHTS FROM EXPERTS

Florian Marcus, Digital Transformation Advisor at e-Estonia Briefing Centre

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in Estonia?

I can mostly talk about the government side. As pointed out in the present report, the Estonian government uses a KSI Blockchain that serves as an independent trust anchor. So, for example, we can see when access has been granted and if something has been changed, so we can refer back in case there was a cyber-attack or something of similar nature. In terms of business environment in Estonia, I would say that there are a few companies that deal with blockchain and are aware of the capabilities. In some other countries, everyone is jumping on the blockchain train, and if we are being honest, blockchain is a fantastic solution for some use cases, but for others it's just the latest trend. I think that Estonians have not made the same mistake, that is, of putting everything on blockchain just for the sake of it. Estonia doesn't do blockchain for the sake of blockchain.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Estonia?

The report already mentions most of them, but there is another that I want to highlight, and that is the company that is responsible for the KSI Blockchain. The company is called **Guardtime** and they provide the KSI Blockchain on a national basis, but also serve international agents including the European space agency. I would say that this is a big player that has established themselves in the blockchain space. The rest of the companies are more in the digital assets and security tokens space.

Are there specific regulatory or national policy initiatives in place in Estonia? Any comments on the recent "exodus" of digital currency firms from the country.

As far as I understand it, the later was connected with the notion that those companies were not actually operating in the country, which made it legally questionable whether they should be able to acquire a digital assets license in Estonia. My understanding is that it was a matter of where the majority of the value was created. For example, just like with paying taxes, one company might be registered in Germany, but if it creates 90 % of its value in the UK, they might have to do taxes differently. This might be part of the complication, but this is not my area of expertise.

In terms of other regulations, I think the present report offers a comprehensive analysis of everything. There is no national policy or legislation that pertains exclusively to blockchain technology in Estonia. We also don't have a national blockchain strategy, meaning to implement blockchain everywhere. It is the effort of individual ministries and government authorities that consider the use of blockchain on a case-by-case basis, rather than an umbrella approach of "blockchain everything".

Supplementary question: Is a national strategy the way moving forward?

It can be. If it is thoughtfully created, then it absolutely can. Because, what we have seen with digitisation overall is that if you are a country that has to catch up with those topics, a top-down approach often yields faster and better results than a bottom-up approach. So, in many cases, yes, a strategy can help, but it has to be very well informed, and that is usually the catch.

Are there any notable blockchain-related education and training offerings by universities or other providers?

As far as I'm aware, the only things that specifically deal with blockchain in Estonia in terms of education are some workshops for information technology (IT) professionals. In addition to that, in the Tallinn University of Technology, or Taltech, there is a blockchain and technology group. This group is mostly comprised of research professionals and PhD students that are focusing on blockchain. In Tartu University, that is more of a humanities and social science university, they offer a master's in information and communications technology (ICT) law, whereas Taltech has a master's in e-government solutions. So, in both cases there is definitely a digitisation programme where blockchain plays a part, but there are no full-blown academic programmes or professional training like there are, for example, at the University of Nicosia, in Cyprus.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Estonia?

I think with businesses the awareness is very high, in terms of what it can or can't do [referring to Blockchain]. I can't judge whether all businesses that should use blockchain use it. With the citizens though, I think the awareness could be higher. There is also a lot of misunderstanding internationally on what blockchain does. Some journalists are coming to Estonia saying "Oh, this country is working on the blockchain" – which is not right.

To recap, I think that the awareness for citizens needs to be higher. We should explain to them how we can use blockchain within existing systems. At the same time, if we are being honest, most people don't understand how voting systems work, and if we start throwing IT specifics at them, it might be too much. It is a complicated topic, but I'm sure that we can do a better job of explaining blockchain to people both in Estonia and abroad.

What does the future hold for the Estonian blockchain ecosystem?

The honest answer is that I don't know. Again, we don't have a national strategy for it. However, we do have plenty of e-government ideas because 99 % of our government services are online. We are thinking more about user experience and how, for example, we can work on services for proactive social funds. One idea can work like this: "Hey, you just had your kid, here's your child benefit payments, just redirect us to which bank account you would like to receive the payments". We also want to tie in the voice assistants available on our phones so one can, for example, say "My wife is about to go in labour". Then, the AI would call an ambulance and forward relevant medical data to the hospital. But to what extend this is connected to the blockchain, we don't know yet.

About the business environment, it is also hard to tell where they are going with this. This is also down to how the EU is going to regulate, or not, the market as it is now. Estonia very briefly thought about introducing a digital asset, the Estcoin, but plans were quickly shut down. What the future holds is very hard to say. It is primarily an EU thing that has to be figured out.

Key Findings

150+

Blockchain startups

€4.6 million

Total funds raised

FINLAND

THE FINNISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

The blockchain ecosystem in Finland consists of public sector projects, research organisations and companies exploring the new technology's potential. Some of the projects and developments are well-known and internationally competitive (i.e. LocalBitcoins).

Currently, digital assets or crypto assets are not specifically addressed in Finnish legislation, but the Finnish government and policymakers are starting to respond to this emerging technology. The Finnish Financial Supervisory Authority (Fin-FSA) approved the Act on Digital Currency Providers in 2019. In accordance with the Act, Fin-FSA will serve as the registration and supervisory authority for digital currency providers. Digital assets are generally taxed as capital assets. In accordance with EU law, trade in digital assets is not subject to value-added tax.

Finland is a highly digitised country. Key areas where digitalisation has been adopted are in healthcare, social services, integration services, elections and citizen participation services. Blockchain as an alternative e-governance solution has also been tested. For instance, blockchain as a digital identity solution for undocumented refugees was experimented back in 2015.

In general, the blockchain ecosystem in Finland is relatively small yet robust, with several influential startups and law firms offering blockchain legal services. Finland has the potential to become the blockchain capital of Scandinavia.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: The public sector in Finland has been trying to experiment with the emerging technology. Despite the fact that projects never went beyond the experimental stage in order to show the blockchain potential, there is proven interest and awareness on behalf of the public sector towards the new technologies. For instance, in 2018 the Central Union of Agricultural Producers and Forest Owners (MTK) announced its readiness to become Finland's first organisation to launch a blockchain based e-government solution. The Finnish Immigration Service proposed a pilot project offering refugees a prepaid card linked with their digital identity on blockchain to ultimately speed up their process of becoming established in Finland. The Finnish government has announced yet another collaborative effort with decentralised interoperability protocol Essentia to build blockchain-based solutions for smart logistics.

Digital currency legislation that applies to blockchain: As a relatively defined regulatory framework is already in place, there are several legal firms that analyse blockchain technologies. Nordic Law, one of Finland's most prominent law firms, already offers advisory services and assistance in the mapping of legal risks regarding blockchain-based business practices.

Blockchain in academia: There are no universities in Finland offering a degree in blockchain-related fields. However, Finnish universities play a significant role in exploring the technology by researching various relevant use cases (Aalto University – SOFIE project).

Blockchain across key industries: As some practices in blockchain use already exist in the shipping industry, Finland is also set to transform logistics through blockchain technology. With the support of the Finnish government, local blockchain companies are working on the SmartLog project. With the use of smart containers and blockchain, a route, schedule and cargo conveyance will be independently determined by the container. The project received EUR 2.4 million in funding from the EU.

There are a limited number of technological startups that utilise blockchain as their underlying technological infrastructure, most of which are in the acceleration or early stage. However, Nokia, one of the most successful Finnish companies in history, seems to be interested in the technology and is developing a blockchain platform to store and protect personal medical data.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Finland is one of the European countries that is receptive to blockchain projects. The country is conducting studies and experiments with distributing ledger technologies. Pilot blockchain projects are being launched by partnering with local innovators in the space. This creates incentives for entrepreneurs to innovate and prove their expertise in practice.

Finland also offers government funding to entrepreneurs. Business Finland, the most important public funding agency for research and innovation, has injected significant funds into the industry. SOMA, a decentralised platform that facilitates trade and social interaction powered by blockchain technology, is one of the most recent startups funded by the agency. The company has raised more than a million euros in funding in total.

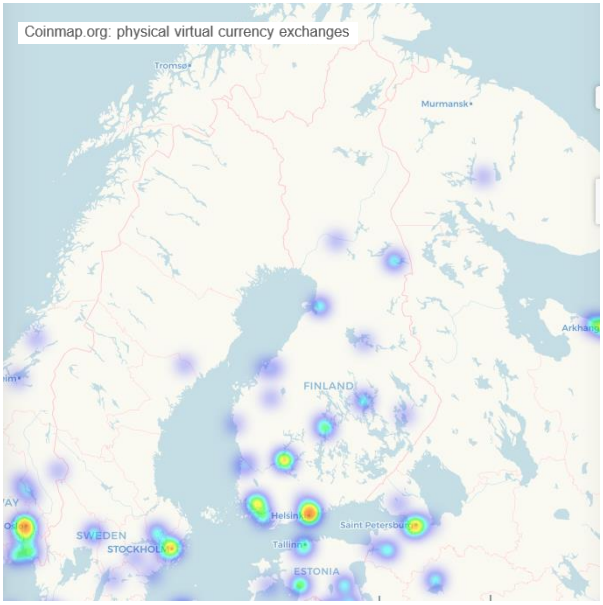
Business opportunities in the space were identified as early as 2014, with the majority of companies founded between 2017 and 2018. Revenue numbers are generally hard to come by, both due to their small volume and the variety of income generation mechanisms employed by those companies and startups. The issue with identifying exact figures are amplified due to the use of digital currencies as a means of payment.

Academic & international experience as facilitators of entrepreneurship. As previously mentioned, the Finnish government has shown interest in the technology and launched several initiatives at the early stage. In addition to e-government projects, the country's central bank and the Ministry of Finance held a blockchain seminar back in 2017 involving experts from Nets, Microsoft, Fortum, VTT Technical and other technology companies. To further facilitate entrepreneurship, the Finnish government often partners with local startups to explore new blockchain projects.

Finland also has a strong academic sector with capable researchers exploring the potential use cases for the new technology. Aalto University of Finland is working on the SOFIE project, an open business platform aiming to use several different blockchain systems to store same transactions in several registers simultaneously. Their focus is on renewable energy, food chain monitoring and mixed reality games.

BLOCKCHAIN COMMUNITY

Finland has an active community of blockchain developers and enthusiasts who often meet at conferences in Helsinki that bring together blockchain devotees and business representatives. Community members are concerned with a variety of blockchain and digital assets aspects. E-government, decentralised services and exchange platforms are some of the most popular topics amongst community members.



The Finnish blockchain community operates internationally, but many local communities have also evolved around the technology. Enthusiasts often organise meetings, discussions and events with good local internet representation. Bittiaraha.fi, one of the most popular forums, is a place where community members share their ideas, exchange digital assets and ask for technical assistance.

The Finnish blockchain ecosystem is geographically diverse, with Helsinki being the largest hub in the country. There are around 60 companies that accept digital assets as a payment method, 22 of which are based in Helsinki. The capital also has a Bitcoin Embassy, a non-commercial organisation aimed at promoting digital assets amongst citizens. Another big hub is the city of Tampere – the former research and engineering centre of Nokia. The city offers a large pool of highly qualified engineers and software developers. With its Smart City initiative, Tampere also provides incentives for tech startups.

NOTABLE BLOCKCHAIN COMPANIES

SOMA (SOcial MArketplace): Decentralised P2P trading and exchange of physical goods. Founded in 2016, the platform is built on Ethereum and uses a native Social Community Token (SCT) to incentivise users to contribute to the network by serving as an escrow agent. Their Heimdall Protocol stops forgeries and counterfeiting by validating ownership and provenance history on blockchain. (soma.co)

LocalBitcoins: Founded as early as 2012, it is an exchange where people from different countries can swap their local currency for bitcoins. Users post exchange rates and payment methods for buying or selling bitcoins. The counterparty replies to these posts and agrees to meet the person to buy bitcoins with cash, or trade directly with online banking. (localbitcoins.com)

Espeo blockchain: Full-service partner for transforming the blockchain concept into a complete decentralised product. Offers approachable and concise blockchain training. Also helped to launch an STO: advise, analyse and supply the technology. (espeo.eu)

Haja Networks: Startup founded in 2018 develops distributed and decentralised database solutions based on blockchain solutions. Aims to develop a decentralised database protocol that enables users to control and manage data, and integrates into existing databases to provide interoperability between structured data sources. (haja.io)

2Miners: Offers digital assets pool mining services. Connects users to multiple mining pools for digital assets mining. Also provides a coin listing platform allowing users to add coins on Ethash or Equihash algorithm to the mining pool. (2miners.com)

P2PChange: Automatic exchange of bitcoin to PerfectMoney. Users can exchange BTC to supported digital assets after the network's zero confirmation. Certified exchange partner for Perfect Money. (p2pchange.is)

Empirica Finland Oy: Blockchain technology startup that specialises in fintech, digital assets and ICO advisory services. Also specialises in software development, advanced analytics, Internet of things (IoT) solutions and machine vision. (empirica.fi)

Fortum: Finish power company that offers a blockchain-based solution allowing consumers to control their homes via the internet. Offering blockchain-based energy services since 2016. (fortum.com)

SmartLog: EU-funded proof-of-concept platform. Creating smart containers in the shipping industry based on blockchain technology that will determine the route, schedule and cargo transportation procedures on their own. Blockchain technology is used to store transactions concerning shipments. (smartlog.kinno.f

INSIGHTS FROM EXPERTS

Mr. Sebastian Sonntag, CEO of LocalBitcoins

Finland is a well-functioning society, which holds trust and confidence at high levels. At the same time, the controls in the financial sector are of particularly high quality and the position of the clients is well protected.

Mr. Mika Lammi, Head of IoT Business Development for Kouvola Innovation

It was easy to get people's attention as there was a big interest in the technology, but what made it hard was to get all involved parties to understand exactly what I was proposing to accomplish, in the middle of all that hype and distortion.

Mr. Hannes Helenius, Chairman of the Board at FA Solutions

Current legislations are in some part there and some parts coming up. In my opinion, there should not be country-specific legislation for digital assets or blockchain technology. Instead, this should be as globally harmonised as it can be. As far as I see it, the most difficult part is to harmonise tax rules with digital assets. However, as the EU recently announced, it shall apply the anti-money laundering rules to the cryptos, too. This is an indication that digital assets are becoming more accepted and a more regulated asset class.

Key Findings

170+

Blockchain startups

€180+ million

Total funds raised

FRANCE

THE FRENCH BLOCKCHAIN ECOSYSTEM AT A GLANCE

In 2016, France became the first country to recognise blockchain technology by establishing a favourable legal framework for initial coin offerings (ICOs), allowing issuers to register cash vouchers directly into the blockchain. In 2017, the French Financial Market Authority (AMF) launched a unique digital-asset fundraising support and research programme (UNICORN) to support and analyse ICOs. France also adopted a specific ordinance to become the first country to authorise the registration and transfer of unlisted securities using blockchain technology.

The French blockchain startup ecosystem is sizeable. Historically, there have been significant hurdles to starting a business in France. However, with increased government incentives to transform the country into a tech hub, the situation is starting to change. Lawmakers have been introducing a comprehensive regulatory framework specifically for blockchain. A new type of visa (Tech-Visa) is offered to tech entrepreneurs enabling them to get work visas for their entire families in only three weeks, The PACTE Bill, passed in April 2019, eliminates many obstacles to the creation of new companies.

The French government has introduced initiatives to provide investment opportunities for blockchain startups. The government-owned Deposits and Consignments Fund invests directly in companies and startup infrastructure projects. The fund has invested EUR 300 million in blockchain and Artificial Intelligence (AI) in the European Commission's Investment Program for the Future (Programme d'investissements d'avenir.)

The French blockchain ecosystem is burgeoning, becoming a critical player within the EU. It is unsurprising that the strong computer literacy amongst French citizens, combined with a dedicated effort by the government to support startups, has led to the mainstreaming of both digital assets and blockchains.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: French President Emmanuel Macron has openly stated his ambitions to make France a startup nation. Increased support for innovation and entrepreneurship had a positive effect across industries, including emerging technologies such as blockchain. In 2016 while serving as Minister of Economy and Finance, Macron expressed his positive attitude towards digital assets and blockchain in general. In 2018, the French Minister of the Economy (Bruno Le Maire) declared a desire for Paris to become the capital of ICOs. Later that year, the French Strategy and Prospective General Commission (France Stratégie) published a report proposing reforms and enabling the development of blockchain and digital assets in France. Following the 'Blockchain, Open Education & Digital Citizenship' conference, the state operator of the 'Passeport Orientation, Formation & Compétences' initiative (La Caisse des Dépôts) has chosen the BCdiploma platform with its open badges to transfer their education ID information onto the new blockchain-based system. The University of Lille has been offered to be a VIP tester of the new solution. In terms of taxation, France's highest administrative court (Conseil d'état) reduced the tax burden on profits coming from digital assets and set a flat rate tax of 30%.

Digital currency legislation that applies to blockchain: As a relatively defined regulatory framework is already in place, there are many legal firms that analyse blockchain technologies. An increasing number of blockchain and smart contract references in legal and other relevant forums can be observed, too. Some of the large auditing and consulting firms, for example the Big Four (Deloitte, Ernst & Young, KPMG, PwC) have already created internal divisions to better understand and use blockchain technologies.

Blockchain in academia: The French engineering school ESILV became one of the first academic institutions in the world to show interest in blockchain technology by certifying student diplomas in bitcoin. Even as far back as 2015, students were able to choose courses in bitcoin and digital assets. Since late 2018, Montpellier Business School has been offering an MSc in Finance with a specialisation in innovative finance (fintech, blockchains and digital assets). The University of Lille, in collaboration with BCdiploma and ARK, has launched a blockchain application for certificating diplomas, academic and language competence certificates thanks to Open Badges known as ARKeducation. As the European Blockchain Services Infrastructure (EBSI) takes shape, hashes produced by ARKeducation ill easily be transferred to the EBSI platform.

Blockchain across key industries: Boosting entrepreneurship was one of the main pillars of Macron's presidential campaign in 2017. As previously mentioned, the French government has shown an interest in the technology and launched several initiatives since then to appeal to entrepreneurs. At parliamentary level, a forum dedicated to blockchain technology was organised in March 2016 at the National Assembly. Participants included French blockchain startups, large companies, universities, researchers, public authorities, international speakers and experts in the field.

A new type of visa is offered to entrepreneurs willing to move to France and kick-start their operations from there. The government owns several funds that inject funding into tech startups (DCF, ECIPF). However, the main investors in French blockchain firms have been private investment funds. Despite the above-mentioned initiatives by the French government aiming to foster entrepreneurship and kick-start blockchain startups, French authorities have not yet felt confident enough to set up real experiments and to deploy some aspects of the blockchain technology in the public sector.

There are only a few technological startups that utilise blockchain as their underlying technological infrastructure, most of which are in the acceleration or early stage. At the same time, anticipating the possible market disruption from new tech startups, some large French companies have started experimenting with the technology to avoid being left behind. For instance, BNP Paribas has launched several proofs-of-concept (PoCs) such as an inter-company immediate payment service and a crowdfunding project. Other banks, such as Société Générale, RCI Bank & Services and Natixis, have joined the R3 banking blockchain consortium.

Companies from other sectors such as SNCF (transport), Carrefour (retail) and Total (energy) are slowly building awareness around blockchain technology and starting to explore it.

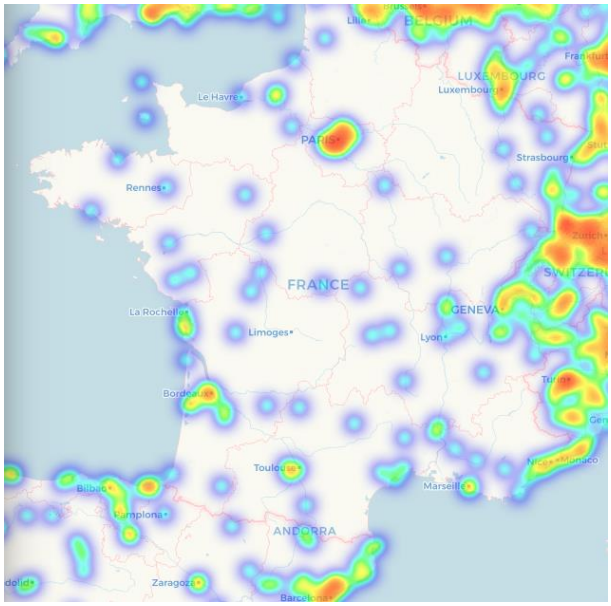
BLOCKCHAIN STARTUP AND BUSINESS SCENE

There are various influential blockchain companies in France that are recognised globally. Business activities range from platforms, infrastructure, hardware, enterprise applications and research, to consumer-facing rewards programmes. One of the most influential representatives of the French blockchain industry is Ledger. Their hardware wallets are one of the most popular solutions on the market. Another one is iExec – leaders in decentralised cloud computing.

Business opportunities in the space were identified as early as 2014, with most companies founded between 2017 and 2018. Revenue numbers are generally hard to come by, both due to their small volume and the variety of income generation mechanisms employed by those companies and startups. The issues with identifying exact figures are amplified due to the use of digital currencies as a medium of payment.

BLOCKCHAIN COMMUNITY

France does not lack software developers, engineers, or talent in tech. Actual numbers for blockchain enthusiasts are hard to come by, but there are thousands of interested professionals that attend the Paris Blockchain Summit and other blockchain gatherings. Community members are concerned with a variety of blockchain and digital assets aspects, from purely technological and social to speculative.



There have been many prominent steps to strengthen the blockchain community in France, including the creation of the French Digital Asset Association (FD2A), the announcement of the Financial Markets Authority's regulatory framework and the creation of a G7 digital assets task force. The French blockchain community attracts foreign investors, and or entrepreneurs now that a special visa for entrepreneurs has been introduced.

Map of the French blockchain ecosystem

Coinmap.org: physical virtual currency exchanges

The blockchain ecosystem in France is geographically heterogeneous. Paris is distinguished by its dynamism, with around half of the country's startups concentrated here. Another important region is Marseille, with numerous startups emerging.

NOTABLE BLOCKCHAIN STARTUPS

Ledger: Offers digital assets hardware wallets and supports multiple digital assets, including bitcoin, Ripple, Ethereum, Bitcoin Cash and EOS. Ledger Vault is a multi-authorisation digital assets wallet management solution. Founded in 2014, has more than 20 investors with the total of €72mln in funding. (Ledger.com)

Coinhouse: Founded in 2014, offers crypto asset management and transaction services, including staking, saving and custody. The first digital asset service provider (DASP) recognised and registered by the French Financial Market Authority (AMF). (coinhouse.com)

iExec: Blockchain-Based decentralised cloud computing powering applications in the fields of artificial intelligence, fintech or 3D rendering. Founded in 2016, it aims to provide blockchain-based distributed applications with a scalable, secure and easy access to the computing resources required for their execution.

Pikcio: Decentralised data exchange platform that lets users and companies exchange data, including an automated digital onboarding solution that collects, verifies and certifies customers' personal information, and enables companies to comply with KYC norms. Founded in 2015, the company managed to raise €18.7mln in investment. (Pikcio.com)

ACINQ: Founded in 2014, startup builds products for and offers services to the bitcoin ecosystem. Working on bitcoin scalability, it is building an open standard for Lightning, a scalable instant payment network for the bitcoin blockchain. (acinq.co)

TEZOS: Decentralised blockchain project that allows companies to deploy their blockchain infrastructure (smart contracts + nodes) without worrying about having to redeploy everything on a new chain in case of a hard fork. (tezos.com)

Tilkal: Offers decentralised traceability solution for supply chain management. The solution collects supply chain data via APIs and encrypts and notarises the collected data. It builds digital IDs of products and assets specific to each stakeholder. The solution provides a statistical and analytical view of product flow. Founded in 2017 and raised €3.4mln in funding (tilkal.com)

Kaiko: Market data provider in the blockchain-based digital assets space providing institutional investors and market participants with enterprise-grade data infrastructure. Claims to provide the most extensive digital asset datasets in the industry for the market data needs of professional investors, academic researchers, regulators, security issuers, third-party platforms and exchanges. (kaiko.com)

Stratumn: Leading provider of network solutions that secures processes between enterprises and their stakeholders through blockchain technology and advanced cryptography. Helps companies secure and streamline regulatory and compliance procedures. (stratum.com)

BCDiploma: Issuance of diplomas, certificates and badges on the blockchain. Relatively new Ethereum project founded in 2017 enables educational institutions to issue digital diplomas using DLT. Issues a turnkey DApp for schools to issue certificates. Graduates can then authenticate their diplomas using an URL. (bcdiploma.com)

Woleet: Founded in 2015, multi-usage platform leverages blockchain technology for securing the ownership/authentication of intellectual property, documents and certificates. Provides a Blockchain-as-as-Service platform to enable the secure authentication and maintenance of rights. Platform works with several public and private blockchains. (Woleet.io)

INSIGHTS FROM EXPERTS

Amandine Doat and Etienne Laborde, Ledger

France is a great place to launch a career in crypto, thanks to the quality of its STEM graduates and the increasing number of job opportunities for them. This will be a growing industry for many years to come and a great time for talent to start their career in the space.

Pierre Noizat, CEO, Blockchain.io

Most startups find it hard to open a bank account, as many banks do not yet know how to identify scammers and properly run KYC in such an innovative ecosystem.

Additionally, the applicable tax rate and accounting standards need to be clarified. Ledger is dedicated to creating jobs and opportunities, and our footprint in France will continue to grow.

Jonathan Chester, Founder of Bitwage

France seems to be quite forward-looking when it comes to digital assets. The French Tech Ticket grant available for entrepreneurs connects international startups within the French ecosystem with money, mentorship, office space and access to a local accelerator. The government looks very favourably towards blockchain and technological innovation in general

Key Findings

€10 million

Average size of ICO

**FinTech,
IoT,
Energy**

Most active blockchain sectors

180

Blockchain solution providers and startups

GERMANY

THE GERMAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Germany has a broad ecosystem of active companies in the blockchain space, with Berlin being the blockchain capital of the country. The impact of blockchain technologies in on Germany's technology and economic life has been identified by the German government. It is their view that the vibrant blockchain ecosystem should be preserved and fostered, to continue its growth, and render Germany as an attractive opportunity for investments in this sector.

To support this goal, in 2019, the German government adopted a national blockchain strategy, showing their commitment to support the use of the technology. This strategy provides, among other things, guidelines for the funding of blockchain-related projects and considers various areas of application including financial services and digital identity.

It is expected that the vast German ecosystem of startups will benefit from this strategy as it aims to ensure stability, stimulate and support innovation, disseminate blockchain knowledge, and contribute towards the country's goal of becoming a world leader in this field. Striving towards this strategic goal, several state-backed projects have already been planned, such as a blockchain-based energy database for tracking power usage, a system for verifying educational qualifications, and a smart contract registry with the Deutsche Energie-Agentur. Perhaps the most important initiative in the country is a state-wide digital identity system, with a focus on keeping personal data safe and ensuring data integrity.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: The German government has recognised the importance and potential impact of blockchain technology in the context of digital transformation. Digital currencies were classified as early as 2011. In September 2019, the German government published its blockchain strategy. It placed an emphasis on the importance of blockchain-based solutions and their application for both the public and private sectors and set a target by end of 2021 to leverage the opportunities provided by blockchain technology.

A year later, in September 2020, the Deutsche Energie-Agentur announced the launch of the Future Energy Lab. It involves, among other things, the pilot projects related to the application of blockchain technology in the energy sector, such as the Blockchain Machine Identity Ledger (BMIL) and the Smart Contract Registry (SCR). The BMIL, is a digital and decentralised directory for device identities. In addition to intelligent metering, it enables the integration of millions of decentralised generation systems into the energy system. The SCR will be developed with expert participants from all application levels. The purpose of the project is to create a registry using blockchain technology to record and organise contractual issues in the energy industry, e.g. areas of law, types of contracts, parts of contracts, etc.

Legislation of blockchain: Currently in Germany, the is no specific legislation or regulatory framework for the use of blockchain technologies. However, depending on the use of blockchain, there are several sector-specific regulations that may apply for example with loans or payments via blockchain and digital currencies, decentralised purchasing platforms based on smart contracts, electronic securities and crypto tokens. It is also important to note that part of the blockchain strategy for Germany, announced in September 2019, will include the design of the required legal framework around blockchain and digital currencies.

Digital currency legislation that applies to blockchain: Digital currencies are not considered legal tender in the country, and are generally treated as investment assets, or so called “substitute currencies - Ersatzwährungen”, in part due to consumer-protection concerns. On several occasions, financial authorities in Germany have issued statements warning the public and investors of the risks associated with digital currencies and ICOs. The Federal Financial Supervisory Authority (BaFin) also discerns between digital assets that share characteristics with securities or utility tokens.

Blockchain in academia: Following the wide adoption of blockchain technologies in Germany, a large number of organisations offer professional training on blockchain technologies. One of the most notable academic training is offered by the Frankfurt School Blockchain Centre, a think tank and research centre that investigates implications of blockchain technology, digital assets, and distributed ledger technology (DLT) for companies and their business models. In addition to the development of prototypes, it serves as a platform for managers, startups, technology, and industry experts to share knowledge and best practices. The EIT Digital Professional School also offers a professional training course on blockchains, developed in collaboration with Fraunhofer FIT. The European Blockchain Association also offers courses that help to deepen participants’ knowledge on blockchain and DLT technology.

Blockchain across key industries: Blockchain startups in Germany span over a spectrum of diverse use cases and sectors. More than 25 % of startups focus on the finance and crypto domain, followed by sectors such as entertainment, digital identity, and the Internet of Things (IoT). As previously touched upon, the energy sector is also of high interest within the German blockchain ecosystem. In September 2020, Elia Group, through its subsidiary 50Hertz , one of the four transmission system operators for electricity in Germany, announced a multi-year strategic partnership with Energy Web that will focus on testing and validating the technological promises of enterprise-grade, blockchain-based solutions that support the energy markets Elia Group serves. The scope of collaboration will include understanding the potential of decentralised identifiers for a more-decentralised electricity system, tracking of green energy and services, as well as the provision of technical expertise and support for Elia Group’s new DLT Lab.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

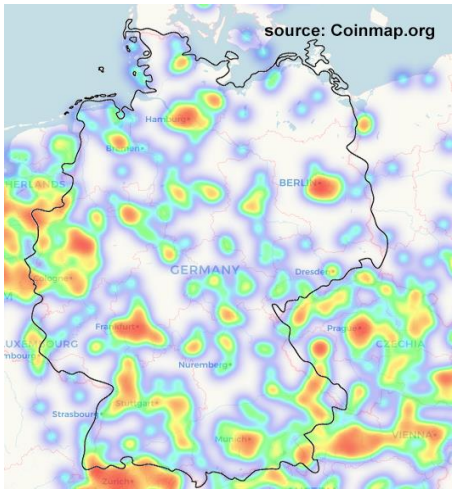
Following the rapid price rise of bitcoin in 2017, a large number of startup companies were incorporated in Germany, with the majority being located in Berlin – the blockchain hub of Germany. While the majority of startup companies were founded after 2017, a significant number of early adopters can be traced back to as early as 2013. It should be highlighted that companies founded in 2016 conducted the highest percentage of ICOs. For the majority, ICOs were the preferred way of funding compared to traditional funding mechanisms, such as private or corporate funding, and grants, while the average size of ICO was about EUR 10,000,000.

Source: www.chain.de/statistik; 10/2019

Startups are spread almost equally in a plethora of business verticals including applications, infrastructure, and the provision of services, while a smaller portion of the companies' focus on middleware.

When it comes to the size of startup companies, more than half of them consist of 10 or less people, while 30 % of companies have 10 to 19 people. In the current phase, blockchain-related companies are almost equally split between revenue-making, product-ready, post-seed, and pre-seed. The majority of revenue-making companies that disclosed their revenues declared revenues of up to EUR 500,000, while the startups that generated the highest revenue were those providing business-to-business solutions.

BLOCKCHAIN COMMUNITY



The blockchain community in Germany consists of both professionals and enthusiasts, as well as of associations targeting the promotion of blockchain-based solutions in a more organised and systematic manner.

Established in 2017, the Blockchain Bundesverband is a non-profit association with more than 60 members. Members include leading startups in the blockchain sector based in Germany. According to its mission, Blockchain Bundesverband believes that blockchain and similar decentralised technologies based on cryptography are fundamental to digital infrastructure innovation. The association's initiatives focus on education for decision-makers in politics and industry-leading corporations, as well as the wider public. It maintains blockchain adoption is necessary to keep Germany competitive in an increasingly digital world and that the technology can only flourish if it is recognised by politics, society, and institutions as well as used by the latter two.

Based in Munich, the European Blockchain Association provides an independent neutral platform for blockchain-related communities and organisations to discuss, develop, and elaborate on shared work.

The German blockchain community consists of 150,000 observers based on the extended outreach data from Facebook Audiences, which corresponds to approximately 0.2 % of the population. Out of those, 131,165 members are engaged with communities of practice related to blockchain technology and are involved in 362 frequent meetup groups. There are more of 180 blockchain startups incorporated or operating an office in Germany, with their majority located in Berlin.

NOTABLE BLOCKCHAIN COMPANIES

BigchainDB: It is like a database with blockchain characteristics. It has high throughput, low latency, powerful query functionality, decentralised control, immutable data storage, and built-in asset support.

Bitwala: Offers the world's first banking experience combining fully protected German bank accounts with access to digital currencies, digital assets, and blockchain-based finance. Through secure technology, Bitwala helps customers reap the benefits of new financial technology by being the bridge between the old and new financial systems.

Energy Web Foundation: Known as Energy Web (EW), it is a non-profit organisation focused on accelerating blockchain technology across the energy sector. EW focuses on building core infrastructure and shared technology, speeding the adoption of commercial solutions, and fostering a community of practice. In 2019, EW launched the Energy Web Chain, the world's first open-source, enterprise blockchain platform tailored to the energy sector. EW's technology roadmap has since grown to include the Energy Web Decentralised Operating System (EW-DOS), a "blockchain-plus" suite of decentralised solutions.

IOTA Foundation: Develops an open-source protocol that supports data and value transfer between devices and humans. IOTA also has an open-source distributed ledger and digital currency designed for the IoT. It uses a directed acyclic graph to store transactions on its ledger, motivated by potentially higher scalability over blockchain-based distributed ledgers.

Konfidio: A blockchain venture studio that combines 20 years of top-tier consulting experience with a talented team of technologists and venture developers. Konfidio has provided many end-to-end solutions for a wide range of enterprise customers. Konfidio is also investing in the new frontier of digital innovation whilst promoting sustainability, equality, and confidence.

Neufund: A fintech startup that bridges investors and entrepreneurs in a novel way. The company creates blockchain-based solutions and services, which include a fundraising and investing platform, Employee Stock Option Plan Manager, Light wallet, post-investment instruments, and others.

PONTON: A software company that focuses on energy trading, grid management, blockchain applications, and consulting, mainly via its Enerchain platform. Enerchain is the first blockchain-based distributed trading infrastructure that enables Over the Counter energy trading in power and gas products such as standardised spot and forward contracts. Many other energy product types that can be defined by the market participants themselves.

ubirch: A developer of a blockchain-backed technology designed to capture information from the IoT sensor. UBIRCH has rethought IoT security and is pursuing a revolutionary approach based on robust established cryptography and blockchain technology. The UBIRCH solution is easy to integrate into IoT platforms and other system environments require no additional hardware and consist of only two components: The ubirch Nano Client and the ubirch Trust Service.

INSIGHTS FROM EXPERTS

Irene Adamski, Member, Blockchain Expert Policy Advisory Board, OECD

Germany has a decentralised blockchain ecosystem of hubs: The largest and most prolific one is Berlin, with smaller, more focused ones in Frankfurt, Munich, Hamburg and Mittweida. Berlin has been lauded as The Global DLT Hotspot, where technical talent, fundamental code and architecture development, as well as use case applications are concerned. For aspects of digital currencies, investment and business models, Germany is still a global hub, but secondary to those in East Asia. Aside from the concentration of business, knowledge, technology and talent, the German blockchain ecosystem also enjoys stable, collaborative and direct ties to the national and international political sphere.

Raimund Gross, Head of Digitisation and Innovation, Camelot ITLab GmbH

The German startup eco-system is characterised by a few apparent dynamics. We see a stronger collaboration with traditional industries, government, regulators, and enterprises happening; the startup model being actively adopted by big corporations to gain speed and flexibility driving digitalisation and innovation; more orientation along full industry value chains (B2B, B2B2C) compared to B2C focus previously; and UN SDGs becoming a strong driver for scenario selection and curation. Access to funding and monetary resources has improved however still is behind opportunities in other world regions. Overall: A healthy heterogeneity in cases and ecosystem participants help the startup ecosystem mature and diversify.

Key findings

15+

Blockchain solution providers

5 000+

Individuals organised in blockchain and digital currency communities

GREECE

THE GREEK BLOCKCHAIN ECOSYSTEM AT A GLANCE

Greece, located in south-eastern Europe and a signatory to the European Blockchain Partnership, is home to an emerging blockchain ecosystem, populated by companies and startups as well as official and unofficial communities of practice. More than 15 companies offer services in those fields exclusively, with many more expanding their offerings to accommodate the growing need for blockchain applications in the country, in Europe and the rest of the world. Greek companies are active across a wide range of business activities in the blockchain space; however, geographical clusters or a specific industry focus were not identified.

Local authorities have adopted an overall passive approach as there are no specific references to blockchain or digital currencies in Greek legislation.

Approximately 5,000 people make up the core of the blockchain community in the country. Communities of practice constitute the primary facilitator of education and discussion in the field, due to the lack of relevant state-backed or industry initiatives.

Relevant bibliography and extended media coverage suggest that the Greek debt crisis has been a critical factor in the limited adoption of digital currencies as a self-custodian store of value, out of fear of a bank run, especially after 2013 (the year that a haircut was imposed to depositors in Cypriot banks). Bitcoin emerged as an alternative, with publications reporting an increase in the number of Greek citizens seeking to invest in digital assets. The capital controls imposed in 2015 proved to be a major hurdle in accessing digital currencies; a factor that prevented further adoption. Greece today does not constitute a major player in the European blockchain scene.

TOWARDS MAINSTREAM ADOPTION

Regulation & policymaking: Blockchain and distributed ledger technologies (DLT), along with their derivative digital currencies and other digital assets as well as alternative forms of financing, such as initial coin offerings (ICOs), remain largely unregulated in Greece. What is more, no state-sponsored initiatives from blockchain-powered public infrastructure could be identified. However, both the Hellenic Capital Market Commission and the Bank of Greece have committed efforts to understand and eventually provide a regulatory framework for these assets. On two occasions, in 2014 and in 2018, the Bank of Greece issued announcements warning the general public of the potential risks associated with digital currencies. In a recent interview, Yannis Stournaras, governor of the Bank of Greece, recognised the potential of blockchain technology for cost savings through disintermediation. Greek Member of the European Parliament Eva Kaili is an active supporter of the development and use of blockchain technology in the digitalisation of the European economy. Over the past years, Ms Kaili has become one of the most prominent figures in the blockchain space and is regarded as a key policymaker in the field.

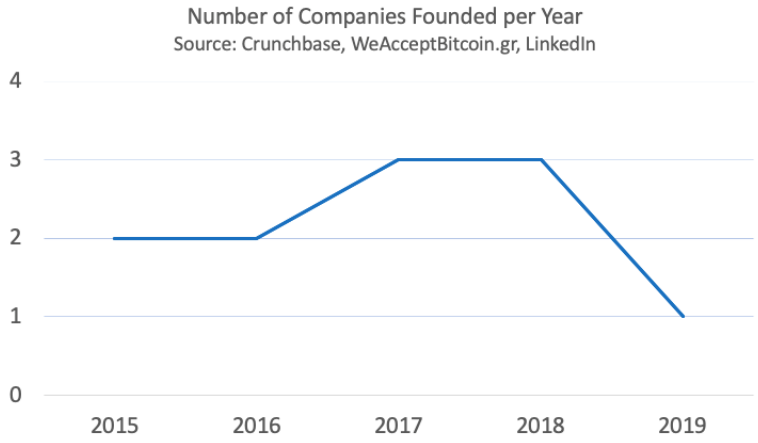
Digital currency legislation that applies to blockchain: There are currently no specific references to digital currencies or other digital assets in Greek legislation.

Blockchain in academia: Regarding academic qualifications, courses or degrees, there is currently a one-month "Certified Blockchain Professional" qualification offered by the Hellenic American College. No Greek university has implemented a blockchain or digital-currency-related programme to date.

Blockchain across key industries: No key industries could be identified in Greece.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Founders of Greek blockchain companies are typically entrepreneurs or researchers with strong academic backgrounds and international experience. Due to the relatively small size of the domestic market for blockchain, companies at large develop solutions that correspond to the needs of international customers and markets. Generally, Greece is home to small companies with employee numbers ranging between 1 and 20. Business opportunities in the space were identified as early as 2015, with the majority of companies founded

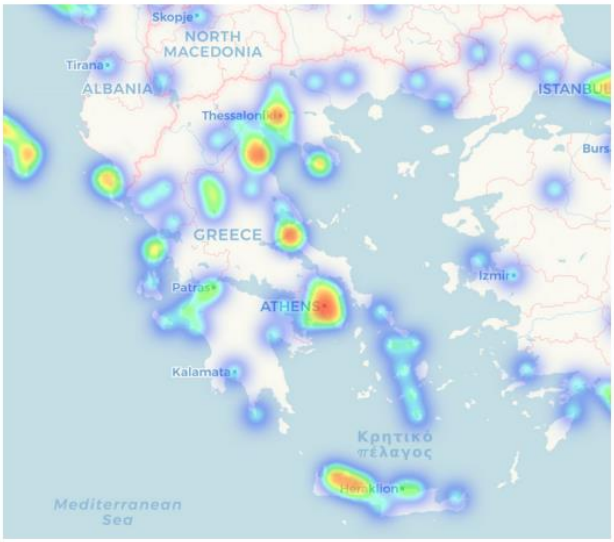


between 2017 and 2018. The majority of organisations are headquartered in the capital city of Athens.

The business activities of Greek blockchain startups vary greatly, from enterprise applications and research to consumer-facing rewards programmes, with a focus on digital currency wallets and portfolios as well as legal compliance services. As a result, no specific business verticals could be identified.

BLOCKCHAIN COMMUNITY

Relative to its size and business scene, Greece fosters a small but vivid blockchain community. Official and unofficial mid-size enthusiast groups, some of them active since 2011, amount to more than 5 000 active members and are concerned with a variety of blockchain and digital assets aspects, from purely technological and social to speculative.



source: coinmap.org

Two major groups or categories of community members can be identified, based on their level of involvement in the space: The Observers, or the general audience, who represent a total audience of approximately 140,000 people or 1 % of the total population of the country; and the individuals actively participating in events, or Enthusiasts, who amount to a little over 5,400 people.

While community members are geographically dispersed, the capital city of Athens, along with Thessaloniki, the second-largest city by population, have the highest concentration of communities of practice and are the epicentre of most major community meetups.

(Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Greece, Keywords: Block Chain, Digital assets, Digital Currency, Bitcoin | Source for Enthusiasts)

NOTABLE BLOCKCHAIN COMPANIES

BlockPegnio: Established in 2019, BlockPegnio utilises blockchain technology to offer verifiable digital ownership and immutability of actions for video games.

Bitfortip: Founded in 2015, Bitfortip is a consumer-facing digital currency rewards programme that compensates individuals for providing productive answers to community questions.

Stampd: Stampd is active in the field of blockchain credentialing, offering document verification and timestamping for a variety of industries, including legal, research, media, and even art and design. The company was established in 2015.

Bcash Greece Inc: Bcash Greece Inc is a manufacturer and operator of digital currency ATMs in Greece as well as a franchisor of the Bcash brand. The company also provides services for processing payments in digital currency. Bcash was established in 2017.

Synaphea: Founded in 2016, Synaphea is focussed on providing blockchain-backed solutions for enterprise applications, by offering custom blockchain and smart services.

ComeTogether Network: The company provides an infrastructure for event ticketing, fraud elimination and secondary market revenue management. An EOSIO blockchain ticketing engine controls the entire life cycle of a ticket.

Parity Platform: A crowdfunding platform that connects citizens with green energy projects that seek funding for their development. Investors can support green energy investments and receive rewards for their performance.

SignedBlock: SignedBlock offers a range of specialised blockchain services including consulting, algorithmic digital currency trading, education, ICO design and auditing as well as custody of digital currency assets. It was founded in 2018.

Tradeline: The company aims to transform the global commodities trading industry by offering a robust and flexible workflow automation platform.

Mytracknet: Mytracknet is a consumer-facing rewards programme that awards digital currencies to its users for participating and contributing to their global “Lost & Found” network. It was founded in 2017.

TrojanDAO: Founded in 2014, it is a project to create a community-governed organisation-as-artwork, initiated from Athens. It involves artists and technologists as well as activists and groups from various backgrounds, united in their vision of an art world that advances plurality, sustainability, community and self-sovereignty. Blockchain technology and a novel model of governance are utilised to reduce coordination costs associated with resource allocation, and decision-making processes to sustain art practices and reduce bureaucracy, mediators, directors and employees, with a focus on transparency and borderless cooperation.

INSIGHTS FROM EXPERTS

Giorgos Karamanolis, Co-Founder & CTO/CIO at Crowdpolicy, Chairman of Hellenic Blockchain Hub

The interest in blockchain technology is great and could be compared to other emerging technologies such as AI, machine learning and analytics. This interest could be measured by the active participation across different forums, events and discussions. Still, despite that active interest, most solutions are mainly limited to the market exploration or proof of concept stage, without any large-scale adoption references. The following key reasons keep the number of blockchain startups low:

1) The lack of funding resources.

2) The bureaucratic procurement process of the Greek state, which discourages young companies from participating in delivering innovative solutions for large-scale projects.

Dimitris Provatas, Blockchain Project Advisor and Co-Founder at CORE Admin Group

At the present time, Greek communities are the primary pillars of education in Greece. Community members and Enthusiasts exchange knowledge and expertise, and this kind of networking cannot be found elsewhere in the country, whether online or offline. What is more, Greece lacks an established institution offering guidance in the fields relating to digital currency and blockchain technologies. As such, educational, informational and networking duties, especially for newer members in the space, fall on the shoulders of communities like Cryptoschool.

Key Findings

6 ICOs
From companies based in Hungary

€ 4 million
Total funds raised

Individuals organised in Digital Currency Communities

Observers: 82,000
Enthusiasts: 5,000
Devotees: 770

HUNGARY

THE HUNGARIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Hungary's blockchain ecosystem is emerging as it attracts more and more participants and initiatives about the technology. In February 2019, Hungary joined the European Blockchain Partnership and would participate in the activities of the partnership to deploy cross-border platform on blockchain. The Blockchain Hungary Association presents an overview on the blockchain ecosystem in the country, where entities such as startups, research and more are included. For example, TE-Food presents an interesting proposition in the food sector by providing the ability to trace products from farm to table.

The logistics sector is not the only sector that blockchain has found a way to disrupt these sectors. On the contrary, the widest adoption of the technology is documented in the financial sector. In 2019, Hungary adopted legislation on the non-real time customer due diligence. The aforementioned legislation could help projects in the financial sector.

The community in Hungary seems to be interested in participating in blockchain. Around 5,000 people are participating in unofficial groups that organise meetups in the biggest cities of the country. The blockchain community is supported by the establishment of non-profit organisations with their goal being the popularisation of blockchain. The Blockchain Hungary Association is an example of such an organisation.

The Ministry for Innovation and Technology has set up an interministerial working group on blockchain in order to foster the professional dialogue about the technology itself as well as its potential applications and the state of the Hungarian ecosystem. The members of the working group are the Ministry of Interior, Ministry of Finance, Ministry for Innovation and Technology, National Tax and Customs Authority and National Bank of Hungary.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: Hungary was one of the first to issue warnings on the digital assets investments. In December 2016, the National Bank of Hungary warned about the high risk on digital assets, since these assets operate in an unregulated system with no proper rules. Similarly, the Bank had issued statements to alert and inform consumers in 2014 and 2015.

Apart from the warnings, the National Tax Authority has published an opinion which states that mining activity is subject to tax, and that tax may also be payable on profits earned from digital assets.

In 2017, Hungary's Authority for Data Protection and Freedom of Information (NAIH) published a guidance on blockchain data protection. In the guidance, NAIH provided a description on blockchain, including a definition of personal data, the legal basis of data processing and the identification of data controller and data processor in blockchain.

In December 2019, Hungary proceeded in the removal of restrictions on the non-real time customer due diligence (KYC) conducted by credit and financial institutions. This development may prove to allow broader access to fintech companies.

Blockchain in academia: Universities in Hungary are adapting their modules to facilitate the transition to blockchain. Edutus University is a private higher education institution located in Tatabánya, which launched a specialised training program on Blockchain with the support of Digital Welfare Program (DWP) in 2019. Additionally, Budapest University of Technology and Economics is hosting a course on the blockchain technology. The course covers the theory of blockchain, bitcoin, Ethereum and smart contracts. Finally, the International Law Enforcement Academy (ILEA) is hosting an investigating digital assets course in collaboration with United States Secret Service (USSS). The course duration is two weeks and is aimed at educating the participants on the blockchain with hands-on cases.

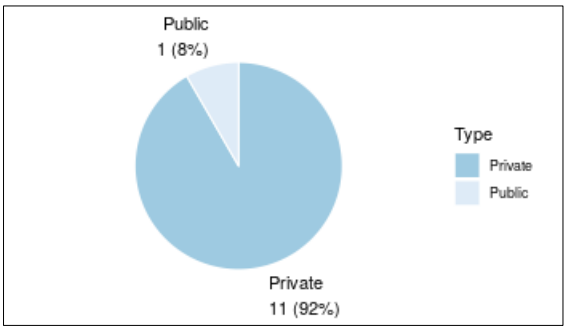
In parallel with education institutions, there are organisations which develop training programs to educate individuals on blockchain. Such an organisation is NetAcademia, which offers online courses in software development and ethical hacking. The platform is offering a course on the Ethereum blockchain. Moreover, IQSOFT is a training center which organises IT training in various technologies. People interested in learning about blockchain are offered a program named "Economic Blockchain Training" where notions on the blockchain and practical examples are presented. Finally, ITCB is an institute which offers banking training programs; the blockchain program offered is titled "Economic Blockchain Training" differentiates from the rest of the training programs appealing to audience from the financial sector since the educational material covers ICOs and tokenisation.

Workshops are held to educate individuals in Hungary who are willing to learn about blockchain. For example, such a workshop was held in 2019 by ELTE, EiT Digital and Solidity Services on blockchain and smart contracts. The workshop was offered free of charge and gave the opportunity to participants to learn to code.

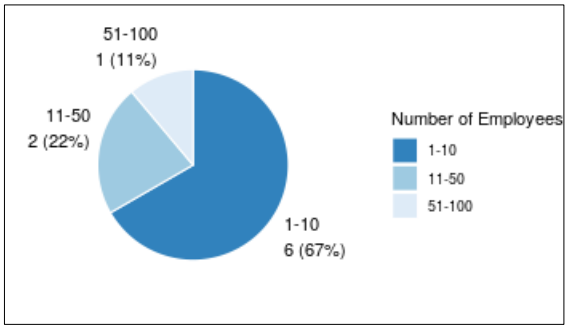
Blockchain across key industries: Hungary's GDP is reported to have grown over the past decade and the domestic spending on R&D is increasing and gradually holds a higher percentage of the GDP. The automotive, electronics and pharmaceutical industries are in the spotlight having the majority of the exports and employing over 200,000 people. The Observatory of Economic Complexity is reporting that cars and packaged medicaments have 9.08% and 3.09% participation in the exported goods.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

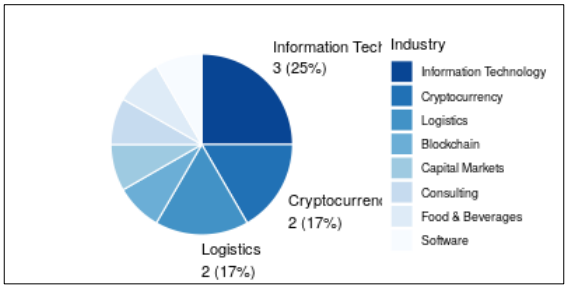
The Hungarian ecosystem has accelerators and incubators mainly for start-ups where the newly created companies in blockchain could find support for their ventures. Innomine, which is a firm of innovation advisors with presence in Silicon Valley and Europe, offer support via the programs for SMEs such as the ALTFINator and CloudiFacturing. Another accelerator program is the Digital Success Programme of Hungary which was launched by the Hungarian government in 2015. Finally, Start it @K&H has its office in the heart of Budapest and provides infrastructure, mentoring, consulting and training.



In Hungary, there are options for entrepreneurs to be funded by venture capitalists (VCs). Start-ups in blockchain could address to VCs that are involved in the technology sector. An example of such VC is the FastVentures that is based in Budapest and invests in information technology, communications and life science sectors. Other options in VCs are Hiventures Investment Fund, OXO Angels, PortfoLion Ventures and Solus Capital.

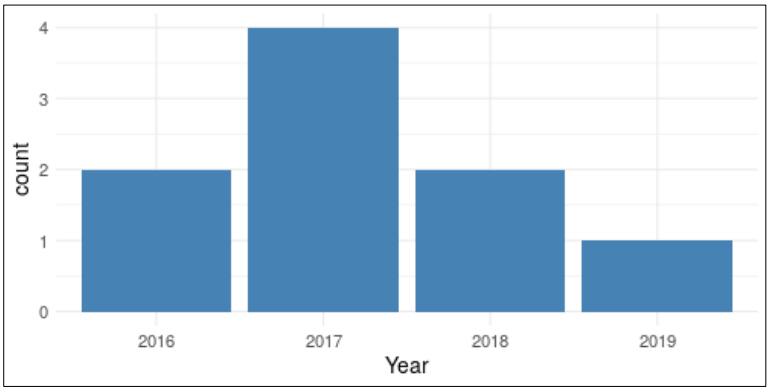


Blockchain start-ups are characterised as small and medium sized in Hungary. A differentiating factor in the size of employees is the existence of businesses in the range of 11 up to 50 people as the reported percentage for that category is 27% in our dataset. The prevalent type of start-ups is privately held and only a small portion is reported as public companies or non-profit organisations.



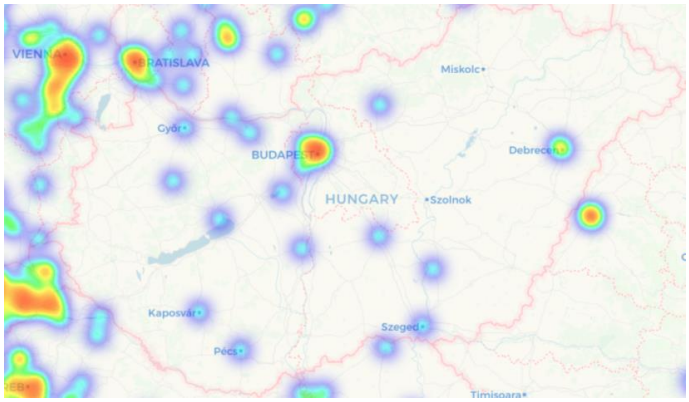
The start-ups in Hungary are mainly focused in developing IT solutions and products based on blockchain technology. It makes sense that most of the start-ups are in the Information Technology and Services sector since they develop a product and offer solution around that technology.

Blockchain technology and its adoption by companies could lead in shifting of the endeavours of a company. This could be the case in Hungary since companies, that are established in the early 90s, are present in our dataset. The most exciting year for the blockchain is 2017, where the majority of the Hungarian start-ups begun their operations.



BLOCKCHAIN COMMUNITY

The enthusiasts in Hungary are engaged in groups which are focusing on blockchain and digital assets' technologies. There are around 10 groups which are populated with around 5,000 members. The majority of meetups are held in Budapest and only meetups on new technologies could be found in other cities.



Furthermore, the community is reported to be supported by associations and organisations, which aim to popularise the blockchain technology in real-world applications. One such organisation is the Blockchain Hungary Association which was established in 2018. The Blockchain Hungary Association mission is to build the Hungarian blockchain community and promote regulation.

Conferences are taking place in Hungary supporting knowledge sharing in the community. BlockchainBudapest is a conference held in Budapest which gathers in the same place people such as decision makers, investors, networkers and start-uppers on blockchain and digital assets. Another conference is the FintechShow which focuses on cases in the financial sector where the blockchain has found application.

NOTABLE BLOCKCHAIN COMPANIES

Augmint: A project, founded in 2017, which develops a decentralised stablecoin. The tokens are issued when a new collateral backed loan is issued and destroyed on repayment. Ethereum was selected as the core blockchain for the ecosystem, since it was the most mature Turing blockchain in the time of conception.

Dylyver Technologies Limited: A company started in 2016 aiming to disrupt the transportation market by harnessing the advantages of blockchain technology. The platform 's idea is the development of smart contracts for ride sharing and package delivery in a decentralised environment via the use of blockchain. Blockchain is deployed as a mean to solve problems as the demand for secure payments and the insurance of the parcels.

Everprove: A company founded in 2018 and a DLT-powered data and document certification platform. The Everprove Ledger harnesses the blockchain technology to secure the data integrity with the decentralised network of nodes. A mobile application is planned to be launched in order to allow the registration of contracts to Everprove Ledger from anywhere.

Etheal: A Hungarian startup which has developed a blockchain-based healthcare platform. The goal is to make healthcare more affordable and eliminate suffering, lack of transparency and inefficiencies. A native token, based on ERC20 proper utility token, is HEAL.

Fundastik: Established in 2018 as a decentralised investment marketplace. The platform is based on HyperLedger blockchain by IBM and aims to provide online, self-service, visual investment marketplace for individual investors.

INLOCK: Founded in 2018 as a blockchain and smart contract-based lending platform which uses crypto-assets as collateral. The lending platform executes a peer-to-peer lending model, which bridges lenders and borrowers without any connections to big-banks or credit companies. The team backing the platform consists of technology and Fintech oriented people.

Insurwiz: An insurtech startup that delivers solutions through data-driven and blockchain technology. Insurwiz developments facilitates smart contracts to speed up processes in order to help companies providing a nuanced and valuable experience to their customers, mainly in insurance sector. Insurwiz introduced its first product; MoWI is an automated weather-insurance service.

Multiversum: A project, founded in 2017, which defines itself as fourth generation blockchain. The project aims to offer faster and more scalable solutions, In the published whitepaper, there are references in the development of a relational blockchain, improvements in the speed and quantity of data of the transactions, the development of Proof of Identity (POI) to achieve security and rollback system.

TE-Food International: A food technology company, founded in 2016. The company is a whole-chain traceability solution able to cover all the aspects of the logistics chain and food safety activities. Solutions in food traceability can be used for cost efficiency, a quicker product recall, compliance to regulations or defense against counterfeiting. The company recently has partnered with GE Aviation's Digital Group to improve the efficiency of the aviation industry supply chain.

WarrantIQ: An early-stage startup initiation that aims to make a warranty reform by inventing the Warranty-as-a-Service solution. The blockchain technology assures the security of the documents in the chain and provides an authentication method.

INSIGHTS FROM EXPERTS

Daniel Szego, independent distributed ledger consultant and architect.

How would you evaluate the overall level of size & maturity of the blockchain and digital assets markets in Hungary?

The market seems to not be as developed as leading markets, but there are couple of companies that notable for their innovative ideas and solutions. Crypto exchange or ATMs are quite popular applications of the blockchain for a while. Despite the existence of such exchanges, Hungary is really far from adopting crypto assets or even blockchain applications in general. The situation in the banking adoption of blockchain is lackluster, especially considering the use cases from Switzerland and Germany.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Hungary?

The most popular use cases are coming from the financial sector. DeFi use cases are the companies: Solidity Services and InLock. There are companies that are focused on digital currencies such Shinrai that offers digital currency services, Coincash that is a crypto exchange and Wasabi that is a private wallet.

Companies in different business sectors are TE Food that developed a solution in food supply chain, Blockben that enables software development on the platform and Interticket that deploys blockchain in ticketing marketplace.

Conference are offering the opportunity to the businesses to connect and such an event is the Blockchain Budapest.

Some of the examples have mixed geographical operations as they are present in Hungary and European countries that are more crypto-friendly.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Hungary?

The public awareness is perhaps good thank to the strong technical community and the hype around the digital assets in 2018. The technical community has solid theoretical education in maths and cryptography as universities are focused on those subjects. Moreover, there are early adopters of blockchain who have impact on the community.

Despite the solid community, the adoption by the businesses seems to still be far from mainstream. The hype has fade away as blockchain moves to a more mainstream adoption and hurdles are coming to the surface. Companies need to develop products that use blockchain in a meaningful way to find success and not use the term blockchain as a buzz word to attract interest.

Are there notable blockchain-related education & training offerings by universities or other providers?

The Edutus University tries to give a general blockchain education that could apply to various professionals with technical and no technical background.

Eötvös Lóránt University (ELTE) has an extended work on cryptography and blockchain where the research is published in academical papers.

The adoption is taking place in the academical institutes with the introduction of specialised courses on blockchain. Such an example exists in the Technical University of Budapest.

What does the future hold for the Hungary's blockchain ecosystem?

I think the Hungarian blockchain ecosystem is strong in sense of technical competence and community. The problem is that the lack of positive or clear regulation will not make it possible to be strong on the business side as well. It might change in the future with the EU regulation.

Bedrettin Gürcan, attorney and founding partner of Gurcan Partners.

How would you evaluate the overall level of size & maturity of the blockchain and digital assets markets in Hungary?

In short, a summarisation on the size and maturity of the ecosystem would be that we are in the first baby steps of the Hungarian ecosystem, especially when considering pioneer countries, like Germany and Switzerland, which act as examples to follow.
The aforementioned initial steps should not cause confusion as Hungary accommodates a scene with numerous experts in blockchain. There are experts both in technical and business side that are active in the ecosystem.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Hungary?

The companies that I distinguish are INLOCK, TE-Food and Wasabi Wallet. In a bit more detail, INLOCK is a crypto based lending platform and is pretty successful. TE-Food is operating in the food supply chain and uses blockchain as validation for the food supply chain. Finally, the Wasabi wallet is developed by zksnacks and is a Tor based privacy wallet.
An innovative paytech solution is Ex Machina, which builds on card payment with a hybrid instant payment acceptance. We are taking part in this solution and also developing to deploy in the future a lighting network BTC acceptance solution called Exipay.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Hungary?

The citizens do not demonstrate any remarkable awareness to blockchain in general. On the other hand, digital assets are well-known to the public as there are exchanges available to the public. There might be the case for public where the digital assets are identified with the blockchain as the public might not be accustomed to blockchain applications.
The situation is different in the business sector. Companies are doing research on blockchain. Some leaders are INLOCK and the Wasabi wallet that are FinTech companies. Apart from the leaders in the payment sector that are offering sophisticated and matured solutions, there are numerous solutions in their initial stages that are focused in the development of their product. An example of such a company is one of my own where develops a private arbitration system based on blockchain. Other projects that I am aware of are the ones that was admitted in Start it@K&H incubator and they are PreDeem, LivePod and helloCoin!.
Hungary hosts two big events around blockchain that are Blockchain Budapest and Fintech Show. Hungary has the potential to be a hub for events due to its geographical position.

Are there specific regulatory or national policy initiatives in place in Hungary?

There is no specific regulation in Hungary on digital assets and banks does not consider digital assets as regular currency. A warning was issued by the Central Bank in 2014 on the digital assets investments. Moreover, NAV, the National Tax and Customs Administration, has not yet published any information from which citizens can receive clear instructions on the form of taxation.
Some days before this interview, a Hungarian chairman spoke on the possible future adoption of Forint currency as a CBDC by Hungarian National Bank.

Are there notable blockchain-related education & training offerings by universities or other providers?

I am aware about educational programs on the blockchain that are offered by Cornvinus University and CEU InnovationsLab. People who are interested in learning about blockchain could gain from participating in the aforementioned programs as there are not prerequisites on the background.

What does the future hold for the Hungary's Blockchain ecosystem?

Blockchain demonstrates promises that could enhance the trustiness and transparency in business models. In Hungary, there were some nefarious events in the banking sector and blockchain could be used to tackle such events and restore trust.
In my view, Hungary has the potential to attract FinTech companies with blockchain applications. There are the cases of TransferWise and INLOCK that are based in Hungary. A couple of reasons could lead entrepreneurs in choosing to operate in the country. Hungary offers a low corporate tax rate in comparison to the rest of the European countries. Moreover, the country's geographical position, which is located in the Central Europe and borders seven other countries, could be another reason to attract entrepreneurs.
There is a disadvantage to note in comparison to some other smaller countries like Malta. Such countries seem to be specialised in attracting people in a particular sector and have acted faster to provide a legal framework.

Key Findings

19 ICOs
From companies based in Ireland

45 mil €
Total funds raised

Individuals organised in Digital Currency Communities
Observers: 76,000
Enthusiasts: 15,000
Devotees: 2,500

IRELAND

THE IRISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

Research indicates that Ireland fosters a relatively mature blockchain ecosystem. Irish blockchain communities count more than 15,000 members. The community has the support of non-profit organisations such as Blockchain Ireland and Technology Ireland ICT Skillnet. Furthermore, a Master's programme has been established for those wishing to educate themselves on blockchain technology.

The business scene in Ireland appears active given that 50 startups are associated with blockchain. The activity should not come as a surprise as international companies decided to set up offices in Ireland, like the US-based blockchain company ConsenSys. The predominant size of local companies is small – up to 10 employees – and the financial sector is the most common. Some key projects include AID:Tech, W3BCLOUD and Gecko Governance.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: Ireland has not adopted regulations specifically tailored to digital assets. In March 2018, the Central Bank of Ireland stated that initial coin offerings (ICOs) are regulated by the existing financial services legislation on a case-by-case basis. Every case is examined based on the tokens matching to financial instrument issuance.

The Central Bank of Ireland cautioned consumers about digital assets in December 2013 following EBAs' warning. Furthermore, the Bank warned of the risks followed from ICOs back in December 2017.

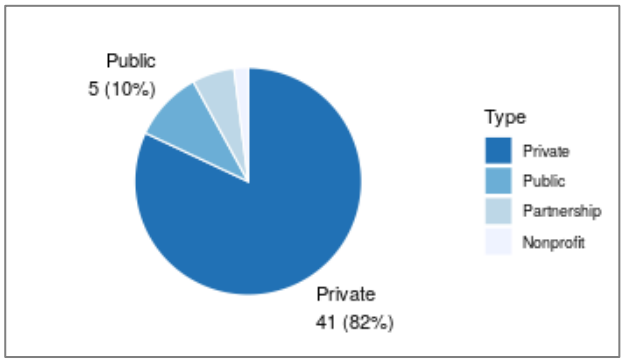
Any profit from a digital assets transaction is subjected to capital gains tax according to the law. In 2020, Ireland is set to adopt the anti-money laundering directive (AMLD5) that is going to affect digital currency exchanges.

Blockchain in academia: In 2019, the country's first Master's Degree titled "Blockchain Distributed Ledger Technologies" was announced. The programme was developed by Technology Ireland ICT Skillnet in collaboration with Dublin City University.

Various training programmes are held in Ireland. New Horizons Computer Learning Centers offer a training programme in Ethereum blockchain held in Dublin. Moreover, ICT Skillnet offers a certificate in "Emerging Digital Technologies" where participants gain an understanding and subsequently set themselves in position to leverage the advantages of the technology.

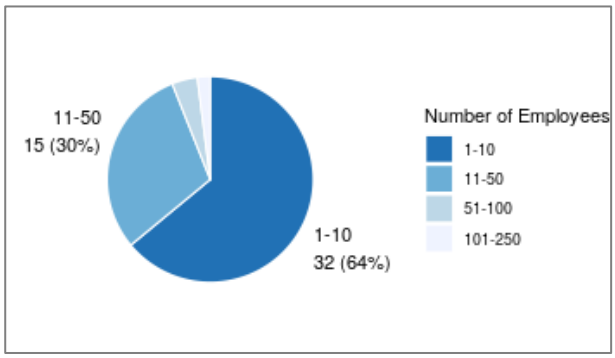
BLOCKCHAIN STARTUP AND BUSINESS SCENE

In Ireland, it is reported that international companies are attracted to the country in order to expand their presence in Europe. Such instances are Coinbase, Wachsman and ConsenSys. The attraction of international companies can be regarded as an endorsement that could expand the ecosystem.

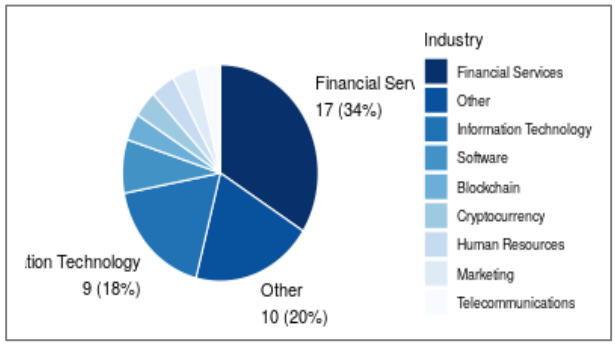


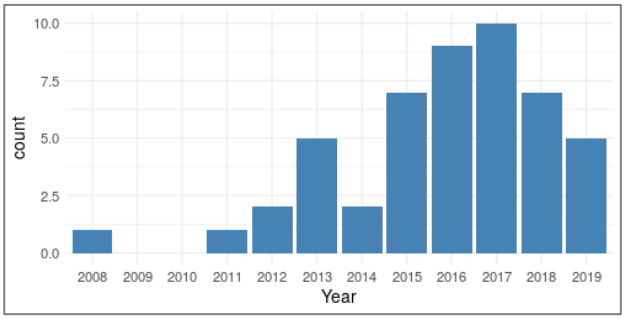
The existence of venture capitalists (VCs) that are ready to support innovative projects in new technologies is apparent in Ireland. In our research, two cases stood out as the most prominent. The first case is Draper Esprit that funds projects in new technologies in Europe and has backed the popular digital assets wallet Ledger. The second case is COSIMO Ventures where it quickly becomes clear from their introductory statement that blockchain is a technology that VCs are interested in investing in.

Early-stage projects could ask for aid from incubators and accelerators programmes that are aimed for technology startups. No documentation exists for incubators or accelerators that are dedicated on to blockchain. Therefore, an alternative is to seek entities that foster technological projects. The most well-known Irish incubators are the National Design Research Centre (NDRC), SouthEast BIC and ARC Labs Waterford. Accordingly, Propeller Venture Accelerator and Sprint are two accelerators that are undertake accepting technological projects are Propeller Venture Accelerator and Sprint.



Blockchain startups in Ireland are mostly small and medium sized, with the most common type of businesses being small enterprises of 1-10 people (64%), followed by medium sized enterprises of 11-50 people (31%). Another 4% of companies employ more than 51 people.

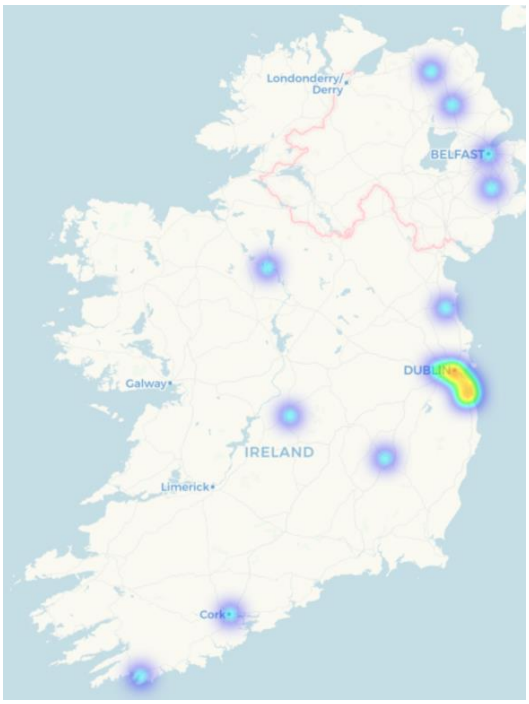




Blockchain activities in Ireland started as early as 2008. Since 2011, there has been a steady increase in the number of blockchain startups. This growth reached a peak in 2017.

BLOCKCHAIN COMMUNITY

Ireland's blockchain community appears to possess a vivid interest in this technology, since the number of enthusiasts seems to be evident relative to the country's population. The enthusiasts are organised in 32 groups that accommodate around 15,000 people eager to participate in meetups. These meetings are organised in Dublin and Cork.



In 2019, the non-profit Blockchain Ireland was launched to grow the country's blockchain ecosystem. Members are representatives of state agencies, corporations, academia and industry who work together to share insights and expertise and to promote the growth of blockchain technology. Additionally, Technology Ireland ICT Skillnet was established in 2005 and offers courses and training in blockchain technology.

Innovation hubs take part in the knowledge sharing and problem-solving process. The Innovation Hub and Health Innovation Hub Ireland (HIHI) operate in the technology sector. The Innovation Hub enables fintech companies to communicate with the Central Bank outside of the traditional and more formal engagement processes. Similarly, HIHI works across the health sector with Irish businesses to creatively solve problems and improve patient care by harnessing the innovations in the development of healthcare products, services and technologies.

According to various media channels, Ireland hosts one of the most popular summits focused on blockchain technology. The Blockchain Summit Ireland is planned to take place on November 2020 in Dublin and it is expected to bring together decision makers and business owners.

NOTABLE BLOCKCHAIN COMPANIES

AID:Tech: Founded in 2016, provides digital identity and seamless access to life services for decentralised finance. The first company that successfully delivered international aid to Syrian refugees in Lebanon by using blockchain. Offers a decentralised digital ID based on W3C standards and AI solutions along with blockchain. All these activities with contemporary technologies have resulted in several awards.

Arc-net: Platform that protects a brand's reputation through transparency. Blockchain technology is used to provide data security and immutability. Platform is characterised by its interoperability since it could be used as an API for application development. Developed solutions for the traceability of products in distilleries and breweries, along with the food sector.

Blockchain Reactor: Offering blockchain consultancy and end-to-end development services since 2018. Global team set up whose presence can be found in Belgrade. The company hosts accelerator workshops to power entrepreneurs.

Blocknubie: Established in 2018, offers decentralised startup ecosystem and market economy aimed at overcoming the challenges of starting a successful blockchain business. Platform alleviates the burden of new ventures and consequently facilitates the onboarding of entrepreneurs in blockchain. A number of Dapps are available on the platform for that purpose. In March 2018, the company raised 5 million dollars in an ICO.

Gecko Governance: Described as a regulatory tech (RegTech) solution for managing compliance in the Financial Services and was founded in 2015. It is possible to manage compliance, Operation Due Diligence, Fund Launches and Investor On-Boarding. The platform aims to ensure that ICOs and token sales are regulatory compliant from start to finish.

Piprate: Founded in 2017, insurtech startup builds “digital twins” of insurance risks to solve the insurance industry’s fundamental data sharing problems. Offers a SaaS solution since blockchain-based data wallets and APIs are provided to secure data transfer and have complete traceability.

TradeIX: Open platform for global trade finance founded in 2016. Provides the most connected and secure platform infrastructure by adopting distributed ledger technology. The core platform and application developer of the Marco Polo Network. Secured partnership with Pole Star in 2020. Company’s innovation is the key and is reflected from the numerous awards.

we.trade: Joint venture where 16 Europeans banks and IBM collaborate to renovate financial services by providing the first enterprise-grade, blockchain-enabled trade finance platform. Founded in 2017, the number of participating banks continues to grow. Platform is built on Hyperledger Fabric, an IBM solution helping to accelerate production time. Platform is able to enhance business cashflow by providing bank guarantees and to address challenges, such as cyber fraud and late invoice payments.

Xena Exchange: Comprehensive environment for individual traders and financial institutions established in 2017. Platform facilitates the trading of well-known digital assets and simplifies things for traders by providing AI studies and signals.

INSIGHTS FROM EXPERTS

Simon Cocking has been Chief Editor at Irish Tech News, CryptoCommonwealth, CryptoCoinNews and InvestInIT.

How would you evaluate the overall level of size & maturity of the blockchain and digital assets markets in Ireland?

The market size could not be characterized as huge, while it could be a consequence of the maturity as Ireland's ecosystem has not matured yet.

Are there any notable companies or clusters that could be considered national champions?

Well-established and recognized companies are evaluating use cases and potential scenarios. Deloitte's Blockchain Lab in Dublin and Consensys and IDA 's presence in Ireland are some of more prominent examples.

What are the main technologies or innovations that have been developed in Ireland?

Most of the innovative projects are in early stages.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Ireland?

The public 's awareness feels to be low and the business' adoption rate is low too. The strategy that the public and businesses could be characterized as wait and see approach.

Are there notable blockchain-related education & training offerings by universities or other providers?

There are different education providers in Ireland for blockchain. The most notable ones are DCU and Skillsnet among others.

What does the future hold for the Ireland's Blockchain ecosystem?

It is hard to give an exact estimation on the future situation. Ireland has slightly been watching on the sidelines, while other countries have done things more, faster and sooner. But there are some VC companies like COSIMO Ventures, that is based in Ireland and US, which are active in blockchain and provide support in the ecosystem's growth.

Key Findings

€25.6 million
Total funds raised

Finance, supply chain, agriculture

The most active sectors

67

Blockchain solution providers and startups

ITALY

THE ITALIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

The diffusion of blockchain-based technology solutions is advancing rapidly, and Italy has the potential to be an important player in this nascent market, according to a 2020 report by the Organization for Economic Cooperation and Development (OECD) titled Blockchain for Small-Medium Sized Enterprise (SME) and Entrepreneurs in Italy. The OECD research team concludes that the country features a plurality of use cases for which blockchain technology is being accelerated, namely supply chain management, copyright protection, HR, procurement and payments reconciliation. Using data points from the Ministry of Economic Development and the research center Osservatorio Blockchain & Distributed Ledger of the Politecnico di Milano, the report identified a total of 67 companies developing blockchain products (excluding crypto-exchanges and digital wallet providers).

According to researchers from the Centre for Entrepreneurship, SMEs, Regions, and Cities (CFE), it is still too early to identify with certainty in which direction a possible Italian blockchain cluster could evolve. An indicative report from Politecnico di Milano (PoliMi) states that Italian companies invested an estimated 30 million EUR in blockchain projects in 2019, up by 100% compared to 2018. The same research ranks Italy in the top 10 countries in the world when taking into consideration the total number of blockchain projects for 2019. Despite the overall small size of venture capital investments (as a proportion of GDP/ according to the OECD), there are a few emerging VC funds that have decided to focus specifically on blockchain companies. According to the same OECD report, “most Italian companies lack a detailed understanding of DLTs and blockchain applications.” Conducted in 2019, the survey indicates that 14% of large companies have a deep understanding of the technology, while another 23% know about it on a more superficial level. The percentages decrease when considering SMEs, as 4% and 16% have a deep and superficial understanding, respectively. This is reflected in low levels of application, with only 2% of large companies and 1% of SMEs having ongoing experimentation and projects in the area (Osservatorio Blockchain and Distributed Ledger POLIMI, 2020).

The Italian government has showcased an innovative policy action at the international level. The Italian Parliament approved in the Decreto Semplificazioni (DDL n. 989, 2019) a definition of DLTs and the legal validity of smart contracts. The legislator has introduced in Italy an innovative legal principle that recognises smart contracts as legal contracts in the Italian legal system.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: There are no large-scale public sector initiatives in Italy that attempt to establish a blockchain ecosystem for blockchain approaches or blockchain clusters.

Since 2015, the Ministry of Economy and Finance has launched two pilot projects to test the technology within the public administration systems. The first was Secure Information Sharing in federated heterogeneous private clouds (SUNFISH). The Italian prototype used smart contracts on a blockchain infrastructure to ensure integrity and secrecy in the exchange of information between the MEF and state police, concerning in particular the residence and status of Italian public security agents.

Again by the MEF, the second implementation initiative of DLT technology is called PoSeID-on, a platform for personal data management and data protection. The initiative aims to create an ecosystem platform using permissioned blockchain and smart contracts for management and protection of personal data in compliance with the GDPR framework. The platform will be accessible in different phases. The first phase will onboard up to two million Italian public servants registered on NoiPA (legal-economic management service of the payroll within the Italian public administration) that will have the possibility to use an improved dashboard for the management of their data.

Both projects have been financed by the European Commission, and more specifically by Horizon 2020.

In 2019, the MiSE instituted a high-level expert group to discuss a national blockchain strategy. The draft document has been finalised by the experts and will provide the basis for the Italian national strategy on blockchain.

Legislation of blockchain

Regulators such as the Bank of Italy, CONSOB, and the tax authority (Agenzia Delle Entrate) have issued various official documents to clarify issues related to cryptographic assets. The scope of these clarifications has been solely limited to digital assets rather than the use of blockchain in real-world applications.

A Ministerial Resolution of 2016 issued by the Agenzia Delle Entrate (revenue agency) addressed certain aspects of the tax treatment of bitcoin and other cyber currencies. It implemented a European Court of Justice (ECJ) decision which held that no Value-added Tax (VAT) can be imposed on the exchanges of crypto to fiat, and vice versa. However, “for purposes of the corporate income tax (Imposta sul Reddito sulle Società, IRES) and the Italian regional production tax (Imposta Regionale sulle Attività Produttive, IRAP), profits and losses on such transactions constitute corporate income or losses subject to taxation.” In short, all profits from crypto are taxable, except for crypto transactions.

Legislative Decree No. 90 of 2017 subjected digital currency providers to the regulations established for traditional money exchange operators. To that effect, Legislative Decree No. 90 directed he Ministry of the Economy and Finance to issue a ministerial decree setting forth the modalities and timelines for the legal performance of such activities throughout the country.

On 7 February 2019, the Italian Parliament approved a law that provides a legal definition of both DLTs and smart contracts and recognises their full legal validity and enforceability. As a result, Italy was one of the first countries to introduce legislation rendering smart contracts legally equivalent, for certain purposes (such as consensus formation and evidentiary value), to traditional contracts.

Blockchain in academia

Politecnico di Milano - Osservatorio Blockchain & Distributed Ledger: Established in 2018, the mission is to generate and share knowledge on blockchain and distributed ledger-related topics and contribute to the development of the Italian market. This will create debate and meeting and comparison opportunities for the main players active in this field. As a result of the collaboration between the Management, Economics and Industrial Engineering Department and the Department of Electronics, Information and Bioengineering, the Observatory analyses these topics from both a business and technical perspective.

University of Florence: Started a professional course on blockchain and blockchain technologies. The intent is to go beyond bitcoin to understand the technology underlying the first digital assets. Students will have the chance to update their competences, following the innovations that blockchain will bring for the economy and society. This is the goal of a course in Economy and Law of Digital Assets that has been initiated by the Department of the Signs of Economy and Business of the University of Florence. The course started on 12 October 2020.

Lewis Business School: Launched an advanced university course named Blockchain Business Revolution. It is aimed at executive directors, managers, entrepreneurs and public administration officials. In addition, there are a number of other courses from different private and public universities in Italy, such as Master's courses in blockchain technology, blockchain innovation and blockchain technology management. These include the Link Campus University, the University of Roma Tre, University of the System of the Italian Chambers of Commerce, and several universities in the northern Italian cities of Verona and Padua.

SDA Bocconi/ School of Management: The Blockchain Education Network Italia was founded at the end of 2014 and became a non-profit in 2016. It promotes the study and use of blockchain technology through conferences, courses and project development. Oriented to the university environment, it collects membership from students, teachers and researchers, and collaborates with companies and public administrations. Scientific dissemination and education on the technology underlying bitcoin and other digital assets constitute BEN's mission.

Blockchain experimentation by large firms: A key characteristic of the Italian economy is the large number of SMEs and the advancement of export-oriented industrial sectors. Key players in Italy include technology providers such as IBM Italy and Microsoft Italy. In fact, solution providers are in most cases small startups. These players have gathered in several associations: Italia for Blockchain is one of them, with over 350 members.

Ten Italian enterprises are already using blockchain successfully. Ania works with IBM and has developed the sandbox project. ANIA is the Italian National Association of Insurance Companies and sandbox is a protected virtual space where a dispute resolution procedure is experimented based on blockchain technologies. In short, parties have interest in taking part in the project, since this guarantees faster resolution of disputes.

Mediolanum Bank uses Ethereum blockchain to certify the originality of non-financial declaration (a document that collects for example information on environmental and social policies), publishing the hash off the document on the bank's institutional website. Mediolanum is also exploring other possible applications for document authentication.

Carrefour Italy was the first Italian enterprise to use blockchain for the traceability of products on their shelves. Information is also available through a smartphone app. The project was initiated implemented with chicken in 2018 and was extended to citrus fruits in 2019.

The municipality of Bari collaborates with SIA and has started a project based on blockchain technology to digitalise the process of managing guarantee policies in public procurement. This project allowed to dematerialise the issue of guarantees on the part of banks, financial intermediaries and insurance companies that are certified in an unambiguous and irrevocable way.

CREA is a body supervised by the Ministry of Agricultural, Food and Forestry Policies tasked with undertaking research in the agribusiness field. It has adopted blockchain solutions by Microsoft to develop an application for the traceability of wood from the tree to the consumer. The entire supply chain has been stimulated, starting from planted trees until the final product, including wood cutting and processing.

IT Taxi is the largest network of taxi drivers in Italy (nearly 15,000 members). In collaboration with the Italian startup Chainside, it has activated a system that allows taxi fare to be paid in bitcoins. As soon as a new-generation point of sales called Matt is installed in vehicles, IHT Taxi will become one of the major commercial crypto value networks.

The Italian postal service provider has already invested in Conio, an Italian wallet for the purchase and exchange of bitcoin. Furthermore, it has started the development of other projects in cooperation with IBM and Hyperledger.

UniCredit is participating in the platform 'we.trade', along with other eight Italian European banks, to allow the use of crypto values within traditional banking activities. In March 2019, the ASA Group (producer of metal packaging) purchased a batch of tin plates using bitcoin from its supplier steel force, supported by the KBC Bank in Belgium.

Due to the characteristics of the Italian economy, the supply chain management industry is a highly relevant case study for the adoption of blockchain technologies.

The consortium of red Sicilian oranges has used blockchain to implement a tool to fight food fraud and enable consumers to recognise the originality of citrus fruits simply by scanning the IGP mark attached to each orange crate or net with a smartphone. It is possible to check the field where the fruits have been produced, the collection date, and the modes of conservation and distribution.

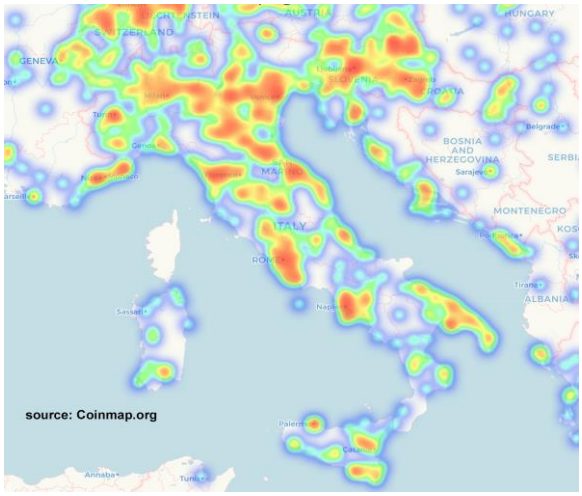
Barilla collaborates with IBM to develop a pilot project that exploits blockchain technologies to guarantee the origin and quality of products and raw materials from the field to the table. The first application was developed for Italian fresh basil.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

There is a dynamic community of startups based in Italy that have deployed innovative blockchain-based projects. According to data collected by the Osservatorio Blockchain and Distributed Ledger Technology of the Politecnico di Milano and the innovative SMEs and startups registered on the database created by the MiSE in cooperation with Infocamere and Camere di Commercio d'Italia (the Italian Chambers of Commerce Association), 67 SMEs and startups active in the blockchain space were identified. Italy accounts for 0.8% of the total global number of bitcoin ATMs. Coinatmradar counts 17 Bitcoin ATMs spread throughout Italy.

According to Crunchbase, the data tool for our cross-country benchmark, there are 28 blockchain-focused companies.

BLOCKCHAIN COMMUNITY



The Italian blockchain ecosystem is prominent, featuring a large number of professionals actively engaged in the blockchain technological community.

The community consists of 1.4 million observers, according to Facebook's audience metrics system. Of those, 170,000 individuals are actively engaged with communities of practice, engaging in 58 frequent meetup groups.

No notable grassroots organisations operate in the country.

(Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Italy, Keywords: Block Chain, Digital assets, Digital Currency, Bitcoin | Source for Enthusiasts)

NOTABLE BLOCKCHAIN COMPANIES

Cynny: Developing MorphCast, a premium adaptive video format that delivers face recognition in a smartphone without the need for an app or plugin and is underpinned by deep neural network technology that enables real-time, content-engagement triggers, whilst fully maintaining the viewer's data privacy. It was built upon a powerful technological insight that the processing capabilities of mobile devices would increase rapidly, enabling to create new types of personalised video-based experiences within the device's browser.

Young Platform: Brand new digital assets exchange that allows to buy and sell digital assets (e.g. bitcoin, Ethereum) with FIAT money (Euros and British Pounds) safely, quickly and easily.

Volvero: App that provides access to a E 170 Billion market, enabling vehicle owners to earn by sharing them.

Criptalia: Uses blockchain technology to connect businesses that have projects to be funded with people and organisations that are looking for high-yield investments. Offers an online platform where companies publish their innovative ideas and industrial improvement projects. Investors, the general public and institutions can fund these projects by lending money in exchange for a higher interest rate.

Ecosteer: IoT and blockchain software company that enables the secure deployment of IoT projects. IoT edge security and project scalability are ensured by the key product, the EcoFeeder, a patented push-only Edge Gateway software that converts any kind and number of devices into shareable data streams, immediately accessible to all enterprise applications. IoT Data Privacy is guaranteed by the blockchain-enabled Data Ownership Platform, where the same data streams can be tokenised and securely shared with selected stakeholders outside the enterprise perimeter.

Poleecy: Sells policies using the digital channel, covering well-known risks for a short time with no paperwork and recorded with blockchain, tailored to the customer location, habits, needs and paid by e-money.

Magrovia Solutions: Software house providing consulting, development and support services for blockchain solutions. Bridges the gap between ambition and action, in a manner that delivers unique competitive advantage, all without disrupting the existing processes and networks.

INSIGHTS FROM EXPERTS

Luca Alessandro Remotti, Senior Innovation Advisor, Data Power Consulting

Even though most large enterprises and technology consulting companies feel the need to be part of the game, there seems to be a wide interest on the part of developers, startups and big tech, but little action on concrete projects. In fact, it is observed that the global market essentially focuses on the implementation of new platforms which require months or years to reach operational maturity. With respect to platform focus, project development is much less advanced. Italian businesses are still far from a full awareness of the potential of blockchain and distributed Ledger. The low number of operational projects in Italy is not only related to lack of trust in technologies, but most of all to the limited knowledge, competences and available resources for the management of highly complex projects. The main barriers to adoption of blockchain technologies are the difficulties in identifying operational and market benefits, developing or finding competencies, and allocating resources. Overall, there seems to be a wide interest in blockchain technologies as enablers for secure business processes in different sectors. Most applications belong to the financial sector where different projects are developed and experimented with. It must be said that blockchain technologies are still in their infancy, with numerous tests and technology suppliers positioning themselves as solution providers. In general, at this point in time the potential is perceived, but blockchain is very much in its early stages and still has to see a wider scale take up.

The issue of COVID-19 has certainly affected companies' strategic plans and possibly slowed down initiatives.

Massimo Buonomo, blockchain expert, United Nations Alliance of Civilizations

Massimo Buonomo suggests that the Italian blockchain scene is limited with only a few companies involved, but without notable use cases. The country is mainly a follower of international trends, while the interest of companies to accelerate blockchain technology is quite limited. When it comes to regulation, the country is mainly expected to adopt the European regulatory framework. One of the issues for the slow adoption of blockchain technology by enterprises could be the digitalisation gap in Italy. Buonomo suggests that citizens are not currently aware of the opportunities since they are not actively involved in any project that they use in their daily lives.

Key Findings

30,000

Employed in IT

Lack of regulation

Specific to crypto assets

Strong developer community

For blockchain applications

LATVIA

THE LATVIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Baltic states are at the forefront of blockchain technologies. Although Estonia and Lithuania outperform the rest of the world in adopting new technologies, Latvia does not fall far behind its neighbours and invests significant resources to develop blockchain technologies. The regulation for blockchain and digital assets is not fully developed in Latvia as there are no clear rules in place, but lawmakers have a liberal approach towards the industry and do not currently require special licences and permits to operate.

The business climate in the country is relatively favourable, especially for startups. Latvia incentivises the local blockchain startup scene by having a flexible tax system, tax benefits for early companies in need of funding, and by issuing special visas for founders to become residents in the country. StartUpLatvia is a government-supported initiative that further fosters the ecosystem.

Latvia encourages e-government in all domains of government and has also explored the use of blockchain systems in the public sector and government-provided services. airBaltic, the nationally owed carrier became the first airline to accept digital assets. Latvia has pioneered a blockchain-based project moving the national Enterprise Register (UR) (similar to a corporate registration system) to the blockchain.

Latvia has a highly qualified and skilled pool of thousands of IT professionals and software developers. The country has been a popular destination for outsourcing IT-related projects. Blockchain-based development has not been any different, with the Latvian blockchain scene dominated by startups offering development services.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: The public sector in Latvia is open towards the emerging technology and has already attempted to experiment with it. In 2019, the Economic Ministry of Latvia introduced two blockchain-based pilot projects to boost the efficiency of services offered by the state. To strengthen the supervisory capacity of the State Revenue Service (VID) and thus reduce the shadow economy, the implementation of a blockchain-based cash register was introduced. The second pilot project will ease the process of acquiring limited liability company status by using blockchain systems in Enterprise Registry.

Digital currency legislation that applies to blockchain: As relatively defined regulatory framework is already in place, there are several legal firms analysing blockchain technologies. Financial and Capital Market Commission (FKTK), public agency, consults entrepreneurs to have legal compliance in the country.

Blockchain in academia: Latvia universities do not offer a degree in blockchain-related technologies. However, there are a number of independently organised courses and seminars. Additionally, the University of Latvia Business often offers accelerator programmes to blockchain startups and assists them with research in the sphere.

Considering the strong regional ties between the Baltic countries, it is important to note that as a whole they have made a significant mark on the global blockchain front. Experience sharing is common, and the enthusiast communities are closely tied, and there is even government support for experience sharing. Notably, Estonia and Lithuania have both advanced significantly in the blockchain sphere. To support blockchain initiatives and share the experience, Latvia has signed a memorandum of understanding with Estonia and Lithuania. The finance ministries of the three Baltic states announced their cooperation to promote distributed ledger technologies aimed at fostering innovation in their countries.

The Baltic Honeybadger conference is a major blockchain event in Latvia and worldwide dedicated to blockchain and the technologies built around it. The conference has attracted the most talented, driven and passionate members of the industry from around the world and established itself as one of the leading conferences globally. The conference has been attended by people like Andreas Antonopoulos, Elizabeth Stark, Adam Back, Peter Todd, Tuur Demeester, Tone Vays, Giacomo Zucco and Eric Lombrozo, among others.

Blockchain across key industries: There are a limited number of technological startups that utilise blockchain as their underlying technological infrastructure. However, the public sector has been surprisingly curious about the technology and experimented with it by launching several interesting initiatives as mentioned above. Moreover, there are a significant number of companies (early-stage, big business, publicly owned) that accept digital assets as a payment method. airBaltic started selling tickets for digital assets in 2014, ss.lv sells cars, while the city.lv real estate website sells housing for digital assets.

Latvia has a strong community of developers. About 30,000 of its 1.9 million people work in IT. Foreign companies have been outsourcing their IT projects to Latvia for the past few years ever since the Baltic countries became a popular destination for software development outsourcing. Foreign companies have been outsourcing their IT projects in Latvia for the past few years. Many European countries choose to hire developers from Latvia. As a result, software development outsourcing plays a crucial role in the country's exports. Latvia has around 6,500 ICT companies and over 400 startups, many of which have already started specialising in blockchain-based development and offering full outsourcing services. AXIOMA Group, Blockvis, Netcore and Soft-FX are some of most widely known blockchain development companies who have served Binance, Bitfinex, Bitstamp, Kraken and many more big names in the industry. If this trend continues, Latvia could become a powerful force in Europe if this trend continues, eventually dominating the blockchain-based development scene.

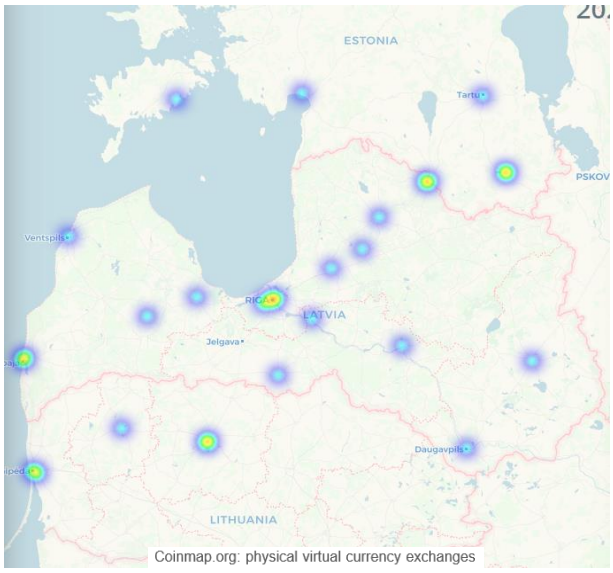
BLOCKCHAIN STARTUP AND BUSINESS SCENE

Latvia ranks 3rd in the Organisation for Economic Co-operation and Development (OECD) for the attractiveness of its tax system, with the lowest financial requirements for startup founders. Startups can also receive additional tax benefits (EUR 200,000) if they manage to raise no more than EUR 30,000 from venture funds and accelerators. Latvia's parliament has introduced a special flat tax regime for startups. Another government initiative is a startup visa that provides temporary residence permits for up to five founders, encouraging the creation of blockchain startups as international talents are often needed in this domain. A special license for crypto-related activities is required, but if there is uncertainty, the Financial and Capital Market Commission (FKTK) consults new investors and businesspersons on legal compliance in the blockchain industry.

Business opportunities in the space were identified as early as 2014, with the majority of companies founded between 2017 and 2018. Revenue numbers are generally hard to come by, both due to their small volume and the variety of income generation mechanisms employed by those companies and startups. The issues with identifying exact figures are amplified due to the use of digital currencies as a medium of payment.

BLOCKCHAIN COMMUNITY

Latvia has a population of 1.9 million, and the IT sector generates 30,000 jobs. IT services rank 3rd in the overall export of Latvian services. It is no surprise that the country has an active community of blockchain developers. Community members are concerned with a variety of blockchain and digital assets aspects. E-government, decentralised services and exchange platforms are some of the most popular topics amongst community members.



Coinmap.org: physical virtual currency exchanges

The Latvian blockchain community operates internationally, but many local communities have also evolved around the technology. Due to a forgiving tax system, easy-to-obtain visas and the cheap cost of living in Riga, the country also attracts numerous startups and blockchain enthusiasts from across Europe. In 2017, Riga hosted the Baltic HoneyBadger conference, the largest blockchain industry event in the region. It hosted speakers from the most successful blockchain initiatives, was well received and grew in popularity within the industry. In 2019, more than 700 blockchain enthusiasts attended.

The Latvian Blockchain ecosystem is geographically diverse, with Riga serving as the dominant hub. There are several blockchain associations that bring together local and foreign talents in Latvia. For instance, the Latvian Blockchain Association supports entrepreneurs with broad array of information, trainings and staff expertise.

There is a significant level of e-governance practices set in place in Latvia. The country managed to transform a post-soviet state into a technologically advanced nation. As a result, this new technology has a good reputation amongst a vast majority of the population, with an understanding of the opportunities it brings.

The blockchain community in numbers: With just 4 regular **MEETUP** groups and 591 **MEETUP** attendees, the enthusiast community is rather small. A Facebook marketing campaign indicates the audience for blockchain-related terms is 30,000.

NOTABLE BLOCKCHAIN COMPANIES

AXIOMA Group: Active player in the development of blockchain solutions, creating complex web projects, startup launches and promotion.

Blockvis: Blockchain development and consulting group helps clients to enhance and facilitate existing business processes by leveraging blockchain technology or its parts.

Velvet: Blockchain-powered solution for online identification, payments and controlling of the process in any online deal.

FINTELUM: Comprehensive ICO/STO token launch, smart contract, AML/KYC, compliance, crypto currency escrow/custodian platform with transfer agency, secondary token OTC desk functions and ongoing corporate action services.

Netcore: Digital agency based in Latvia providing a wide variety of development services for clients and other B2B partners. Blockchain development team provides a wide variety of solutions, such as smart contract integration, securely distributed ledgers and decentralised application development.

Bitfury: Founded in 2011, world's leading emerging technologies company has been at the forefront of the blockchain scene for almost a decade. Registered in the USA and technically cannot be considered a Latvian startup achievement. Founder and Latvian native Valerijs Vavilovs is an active member of the Latvian blockchain community, sharing his knowledge at different community events.

Soft-FX: Company specialises in software development for financial companies. Creates high-tech software solutions for largest digital assets brokers and digital assets exchange that includes Binance, Bitfinex, Bitstamp, Poloniex, Kraken and Currenex, among others.

HodlHodl: Global P2P digital assets exchange that allows users to trade directly with each other. Does not withhold user funds, locking them in multisig escrow instead. This minimises the possibility of crypto asset theft and reduces trading time.

INSIGHTS FROM EXPERTS

Ģirts Ozolins, CEO and founder of Eventech

Creating a business is easy and fast. It is difficult to develop it by attracting funding, looking for partners, new applications, new market niches and customers. In turn, when founding the startup, the company's basic financing for its development was attracted by the company's co-owners and a loan from the Baltic International Bank.

Deniels Pavluts, Latvia's former Minister of Economics

It would be great to see if our capital city Riga could learn from Stockholm in regards with the investments they make and the level of coordination present in the startup ecosystem. It would be lovely if we could help each other to become as single minded, communicative and IT-orientated as the Estonians. There are many good things that we would like to copy. But most importantly, we must communicate those things that make the Latvian startup ecosystem unique and attractive.

Key Findings

31

Blockchain startups

€ 422 million

Total funds raised

LITHUANIA

THE LITHUANIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Lithuania became an epicentre of European blockchain adoption during the crypto boom of 2017-2018. Within this timeframe, the country was ranked in the top 3 according to the amount of funding raised by its blockchain startups through initial coin offerings (ICOs) – a remarkable feat for such a small country.

Lithuania combines some of the most blockchain-friendly regulatory regimes in the EU with high availability of tech talent, low taxes and low cost of living. These advantages continue to support the blockchain startup ecosystem in the country even after the end of the ICO boom.

Lithuanian blockchain startups are leaders in several important fields including FinTech, educational technology and medical technology. Interest in blockchain is high in public sector, too. The Lithuanian central bank was the first one globally to create LBChain – a sandbox environment or digital currency experimentation.

Blockchain continues to be supported by Lithuanian politicians on the highest-level ranging from members of the parliament to the finance minister to senior central bank officials. One of the members of parliament founded a leading NGO which acts as an incubator for blockchain startups and offers qualifying blockchain startups coworking space and mentorship support. Lithuanian entrepreneurs can also take advantage of multiple country-level and EU-level government grants and incentives.

Overall, the country has a strong and vibrant community of enthusiasts which is well positioned to power the next wave of blockchain adoption.

TOWARDS MAINSTREAM ADOPTION

Regulation and policy making: Lithuania is one of the most pro-blockchain countries in Europe. One of the country's leading politicians, a former member of the parliament and serial entrepreneur, Antanas Guoga, is a founder of Blockchain Centre Vilnius – a leading NGO supporting blockchain startups. Several other leading politicians, including the finance minister, have voiced their support for blockchain.

The Lithuanian approach to building a blockchain ecosystem has been characterised by open dialogue between politicians, startups and NGOs. The biggest among NGOs is Blockchain Centre Vilnius which operates like an incubator for blockchain companies. It provides a co-working space for blockchain startups, connects them with international investors, assists them with business development activities in the EU and Asia and carries out due diligence of blockchain projects, among other things. Another key player in the blockchain space has been the Bank of Lithuania, which has launched a digital currency sandbox called LB Chain, which is envisioned to become a prototype for central bank-issued blockchain-backed coins. The Bank of Lithuania has gained international acclaim for creating a FinTech-friendly regulatory and supervisory environment while enforcing international money-laundering and "know your customer" regulations.

Digital currency legislation that applies to blockchain: Lithuania is renowned for its balanced approach to blockchain regulation which combines a commitment to create a safe environment for blockchain experimentation with strict enforcement of international banking regulations. Lithuania became one of the first countries to regulate ICOs in June of 2018 when the complete set of regulations for ICOs and digital assets was published by the country's finance ministry. This package of measures not only eliminated the regulatory uncertainty that had been impeding blockchain development in the country, but it also created more favourable conditions for blockchain development than in other EU countries.

In April 2019, Lithuania adopted some of the strictest KYC and registration requirements for digital asset service providers in Lithuania. According to the rules, service providers need to be registered with the country's Centre for Registers. They are required to perform KYC and anti-money laundering checks and to inform the Financial Crime Investigation Service (FCIS) about larger transfers. While this has been seen by some as a negative step that might stymie adoption of digital assets and blockchain, it improved public perception of blockchain and crypto, thus paving the way for further adoption.

Blockchain in academia: The 'Blockchain Technology Group' at Vilnius University, Lithuania is focused on blockchain research and development (R&D). The group connects academic researchers and PhD students with specialisation in blockchain technology, data mining, high-performance computing, operational research, networking, and distributed systems. In addition to R&D, the group offers 'Blockchain Technologies' courses for undergraduate and doctoral students.

In addition to the blockchain technology group, there are multiple online courses available through global and local providers.

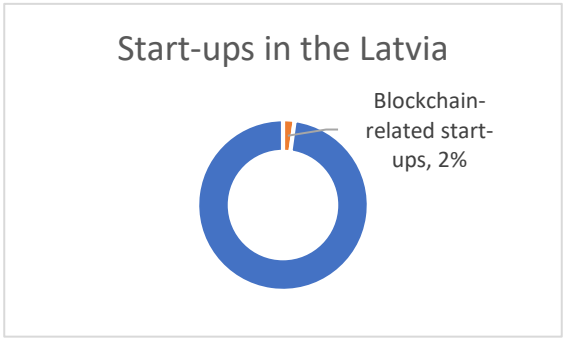
Attracting world-class researchers to Lithuania is not only a national, but also an EU-wide priority. The amount of funds budgeted for attracting foreign researchers is EUR 15 million, and it is financed from the European Regional Development Fund. The activity is managed by the country's Research Council and the ministry of education and science.

The European Regional Development Fund also finances the measure 'Implementing World-class R&D Projects (SMART)' with the total budget of EUR 41 million. The measure aims to support research projects intended to develop results compliant with R&D relevant for the country's economic sectors and that could subsequently be commercialised. Measure implementation is managed by the country's Research Council and the ministry of education and science.

Blockchain across key industries: Lithuania made several headlines in 2017-2018 when a country with a population less than that of Berlin became known as a home of several startups that together raised EUR 42 million and the country with the highest number of initial coin offerings (ICOs) per capita. For instance, the initial coin offering of the FinTech startup Bankex is one of 10 largest ICOs globally.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

As a European blockchain startup hub, Lithuania has attracted multiple blockchain startups, especially in the FinTech area. The majority of the startups were established prior or during crypto-boom of 2017-2018 and were funded through ICOs. Due to the well-developed legal framework, Lithuanian startups continued to raise money through ICOs in 2018 even after the stream of ICOs thinned elsewhere. However, eventually ICO funding dried up which led to a slowdown in startup activity.

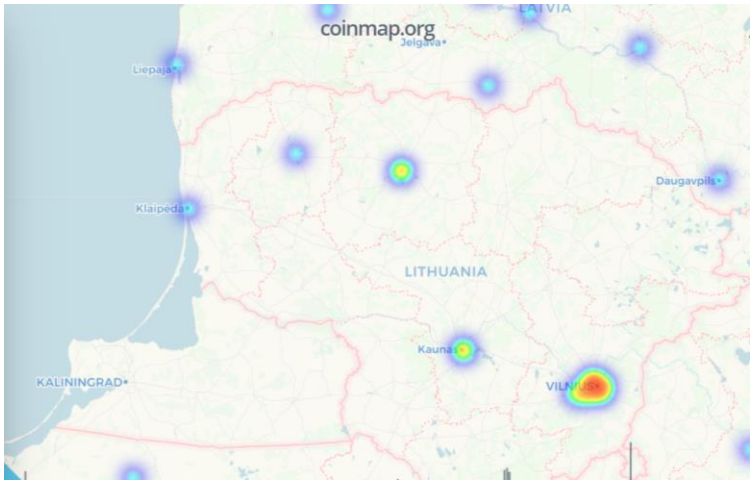


Currently, according to Startup Lithuania, there are 1,090 startups operating in Lithuania (this number also includes startups headquartered outside the country). According to data compiled by crunchbase.com out of 1,090, 969 start-ups have been founded in Lithuania, 17 of which are related with blockchain.

The key sectors where Lithuanian blockchain startups are present include FinTech (Bankera), education (BitDegree), music (Musical blockchain) and several others. It appears that the majority of startups are still at a pre-revenue or early revenue stage. The exact figures are not known as companies are exempt from publicly reporting their financial figures due to their small size.

BLOCKCHAIN COMMUNITY

The biggest centres of software development in general and in blockchain software development are Vilnius and Kaunas, and, to a lesser extent, Klaipeda. All of the cities are major economic and administrative centres of Lithuania.



Vilnius is the capital of Lithuania and its biggest city. International companies that selected the country's capital as a location of their major R&D offices include Wix (a site development tools platform, with almost 200 professionals employed in Vilnius), Uber's critical site reliability centre, Adform (advertising platform, offices in both Vilnius and Kaunas, employing 371 full-time equivalents), Unity (gaming engine, with 120 developers), Revel (a payment technology startup, employing 180 full-time equivalents) and several others.

Vilnius is the site of several regular blockchain events. The majority of events are organised by Blockchain Centre Vilnius. The topics discussed at the events include blockchain use cases, startup management, financial and legal issues surrounding startups, as well as synergetic technologies such as artificial intelligence (AI).

In addition to the events, Blockchain Centre Vilnius offers mentorship to premium residents of the centre. To be eligible for mentorship, a startup must focus on "creating proper solutions to real-world problems using blockchain technology".

International companies are less well represented in Kaunas. The most notable international IT company with offices in the city include Adform and Bentley systems, a developer of engineering software. Nevertheless, the city is a magnet for local startups – almost half of all blockchain startups. Mentors have broad and varied experience ranging from investment banking to legal to software development to sales and marketing.

The most significant blockchain community event in Kaunas is Kaunas Blockchain meetup, which is performed every few months. Also, due to the geographical proximity to Vilnius (a 90-minute journey by train or car), blockchain developers from Kaunas can easily attend events organised there as well.

The blockchain community in numbers: Lithuania's blockchain community is small, by European standards, but remains on par with the region. There are eight regular Meetup groups and 2,642 Meetup attendees, making this community relatively active. What's more, a Facebook marketing campaign indicates the audience for blockchain related terms is 49,000.

NOTABLE BLOCKCHAIN COMPANIES

Musical Blockchain offers an AI composer solution underpinned by blockchain-based nodes collaboration solution. Users upload their data and the Musical Blockchain's solution converts it into a melodic sequence. The company's technology can use, for example, images or text (what it describes as "inspiration") for a tune. The company foresees a much wider application area for its solutions. Its website mentions such additional use cases as city development, art, education and medicine.

DappRadar is a market intelligence vendor for decentralised applications (DApps). The company aspires to remove the noise and hype from the DApp selection process and instead focuses on measurable indicators such as the number of active users, token volume and transaction activity. In September 2019, the company raised EUR 2.1 million in seed funding from investors that include Naspers ventures.

Bankera is focussed on creating a banking experience that seamlessly integrates crypto and traditional banking. Founded in 2013, it was initially known as the developer of SpectroCoin – a digital assets brokerage service. SpectroCoin enabled Banker to develop the transaction processing infrastructure that can rival that of traditional banks.

Currently, the company looks to address inefficiencies inherent in traditional banking, such as high effort and cost required to make cross-border transactions. The company attempts to differentiate itself by focusing on ease of use, initiative user interface, instant transaction processing as well as by being crypto-friendly. Bankera does not only provide crypto wallet services to its customers, it also operates a fully licenced digital assets exchange. Bankera has raised a total of EUR 100 million in funding over two rounds. Its latest funding came in November 2017 from an ICO round.

Gatepool are positioning themselves as investment managers in the decentralised economy. Founded in 2017, the core of Gatepool is a technology-enabled investment platform that enables institutional investors, family offices and high-net-worth individuals to analyse and invest into decentralised assets. The information about funding is not publicly available.

BitDegree describes itself as a "Blockchain-based and gamified online education platform". The key advantage of BitDegree's offering is that information about completed courses is stored immutably on blockchain. Unlike traditional online course providers, BitDegree developed a blockchain based micro-scholarship programme that keeps customers engaged and motivated throughout the process. Founded in 2017, the company is based in Kaunas.

Coingate was founded in 2014 in Vilnius, CoinGate, and represents the first wave of blockchain startups. The company provides acquiring and trading/investment solutions in the digital assets space. CoinGate exceeded 1 000 users in 2016 and exceeded 10 000 users in 2017. The same year the company became the first one to launch phone digital assets payments. The company employs around 20 specialists across its sales and marketing, development, operations and customer support teams. The information about funding is not publicly available.

Lympo is a developer of digital wellness and engagement programmes. Founded in 2017, it also provides incentivised brand management services (rewarded marketing programmes). Operating from Vilnius, Lympo has raised a total of EUR 8,5 million from an Initial Coin Offering (ICO) on 3 January 2018.

INSIGHTS FROM EXPERTS

Despite the hype about blockchain and its potential applications, driving the transformation to the internet of value, there are limited insights about what companies can do to reap all the benefits. Representatives of the largest blockchain startups in Lithuania describe the great opportunities as well as several challenges ahead for the Lithuanian blockchain scene.

Antanas Guoga

Member of Parliament, founder of Blockchain centre Vilnus, Lithuania

“It’s more about the creation of smart contracts and in those smart contracts, we can put assets, such as real estate. In the future, poor people all over the world can own assets like rich people can now. It’s an easy way of purchasing assets virtually.”

Vytautas Karalevičius

CEO of the highest valued Lithuanian blockchain startup Bankera

“As in the current regulatory environment, these businesses have two sides requiring completely different mindsets. On the one hand, these businesses are completely technology-driven, and everything is binary and concrete. On the other hand, compliance is a legal field which is rarely binary — black of white — and requires good interpretation skills.”

Key Findings

€13 million

Total funds raised
Funds raised by blockchain projects by VCs or other sources of funding, such as crowdfunding, ICOs, and STOs.

Securities, FinTech, Insurance

Most active sectors

49

Blockchain solution providers and startups

LUXEMBOURG

THE LUXEMBOURG BLOCKCHAIN ECOSYSTEM AT A GLANCE

Luxembourg is one of Eurozone's financial centres and the second largest investment fund capital in the world. Luxembourg is considered Europe's centre of excellence in wealth management, corporate, commercial, and depositary banking, featuring 125 international banks from 27 countries, EUR 395 billion private banking (assets under management, AUM), and a solvency ratio of 25.9%.

According to the Commission de Surveillance du Secteur Financier (CSSF), the financial regulation Authority of Luxembourg, (June 2018), Luxembourg is a global hub for international fund distribution. More precisely, the country boasts the #1 ranking in Europe, and only second in the world, with EUR 4.8 trillion AUM in investment funds (as of January 2020). Similarly, the country has a strong insurance industry with 55 non-life insurance companies, 195 independent or captive reinsurance companies, and 41 life insurance companies.

Luxembourg is the European leader in international securities listings with 36,000 listed and tradable securities on the Luxembourg Stock Exchange in over 64 currencies, counting 2,100 issuers from 100 countries, and a EUR 7 billion held in custody by major post-trade services providers, including Clearstream, a leading international central securities depository (ICDC). The country is a major European FinTech and startup hub, with eBay, PayPal, Amazon Pay, Rakuten, Alipay, MangoPay and AirBnb among the leading startups incorporated in the country.

All those factors constitute favourable conditions for the growth of the country's blockchain scene. The Luxembourg House of Financial Technology (LHoFT), a public-private sector initiative that drives technology innovation for Luxembourg's financial services industry, features a dedicated task force for the promotion of the blockchain technology in the industry. The task force aims to connect the major actors of the Blockchain/ Digital Assets industry to fix issues, tackle challenges, and foster collaboration between the stakeholders in these four main directions: education, banking relationship, legal & process, and mentoring. One of the bank's board members is the ministry of finance, which receives updated feedback directly from the market.

The Luxembourg financial regulator Financial Sector Supervisory Commission (CSSF), was the first authority in the financial sector in favour of the regulation of platforms for the exchange of digital currencies when exercising an activity of the financial sector, since 2014. The CSSF considered that activities, such as the issuing of means of payments in the form of digital or other currencies, the provision of payment services using digital or other currencies, and the creation of a market (platform) to trade digital or other currencies, should be defined as being financial activities and that any person wishing to establish in Luxembourg to carry out such an activity has to receive a ministerial authorisation.

The country is home for numerous high growth blockchain startups. There are also at least three operating non-governmental organisations, which consist of hybrid organisational formats (engaging the public sector with the private market) committed to widespread adoption about the blockchain technology, and to further educate the professionals about prospects and applications across numerous domains.

TOWARDS MAINSTREAM ADOPTION

Regulation and policy making: As a global financial centre, Luxembourg has positioned itself as a financial technology startup hub, embracing early blockchain technology. It's been widely considered among the most innovative EU countries, with a liberal and progressive mindset, embracing new technologies with an innovative mindset. Luxembourg has been the first EU country that has licensed digital currency exchange platforms as financial institutions. Since April 2016, Bitstamp Europe S.A. has been authorised exchanges of Bitcoins, euro and US dollars. This authorisation is the result of the opinion issued by the Financial Sector Supervisory Commission, which has been the first regulator to advise that digital currencies could be regulated by financial activities.

In December 2019, five leading actors active in the blockchain space joined forces to support Luxembourg's economy. Coined Blockchain Lab, this initiative includes:

- Infrachain, a Europe-wide organisation supported by the Luxembourg government to enable governance for operational blockchain use;
- Luxembourg Blockchain and DLT Association LëtzBlock, a non-profit organisation supporting the blockchain industry in Luxembourg;
- Luxembourg House of Financial Technology (LHoFT), a dedicated startup centre to foster innovation in Financial Technology;
- Luxembourg Institute of Science and Technology (LIST);
- University of Luxembourg (SnT).

This cross-sectoral consortium supported by the ministry for digitalisation intends to develop a European Blockchain Lab for research, education, and industrial blockchain projects where industry could test commercial Proof of Concepts by the end of 2020.

Legislation of blockchain: Luxembourg's Chamber of Deputies passed a bill to offer greater certainty for investors and to make the transfer of securities more efficient by reducing the number of intermediaries. Known as "Bill 7363", it provides a legal framework to financial market participants by making transactions using blockchain and distributed ledger technologies on par with the traditional ones.

In April 2013, Luxembourg amended the securities law of 1 August 2001 and made it possible to legally issue "dematerialised securities". Bill 7363 now essentially adds Article 18a to update the umbrella of dematerialised securities. The commentary makes an explicit reference to blockchain, which is however only one of the possible technologies that could qualify as a distributed electronic register (i.e. DLT) and therefore even more so as an electronic registration device.

The commentary further specifies that, in the world of securities accounts, a "token" stored in a blockchain should be considered as an "electronic asset" representing the security, as in the case of paper security or a traditional dematerialised security. Hence, the token would be the *instrumentum* representing the security.

According to PWC CEO's Agenda, while the Bill 7363 remains technologically neutral, blockchain mostly aptly serves as a technology that could serve as a distributed electronic register. The commentary makes specific mention of the blockchain technology.

- The bill refers only to the holding and circulation of securities, not their issuance. This makes it clear that the bill is not governing Security Token Offerings.
- A token stored in a blockchain serves as a means of representing securities. The possession of a token serves as proof of holding the associated security.

Blockchain in academia: While there is no available academic coursework dedicated to blockchain technologies, the University of Luxembourg has acted proactively – showcasing partnerships with the private sector. A plethora of organisations are actively organizing events and trainings, to educate mainly professionals and students about the blockchain technology.

Additionally, the American technology company Ripple has announced it will partner with the academic community to help lead the development of blockchain research. The University of Luxembourg is building a new blockchain research programme inside their departments of computer science and engineering with the help of the University Blockchain Research Initiative (UBRI).

Previously, the Luxembourg-based VNX Exchange and the University of Luxembourg aimed to improve the security of digital assets, as reported by the business news outlet Luxembourg Times on 23 November 2018. The researchers at the University's Interdisciplinary Centre for Security, Reliability, and Trust (SnT) will reportedly design new IT frameworks to improve exchange security, as well as custody of crypto assets.

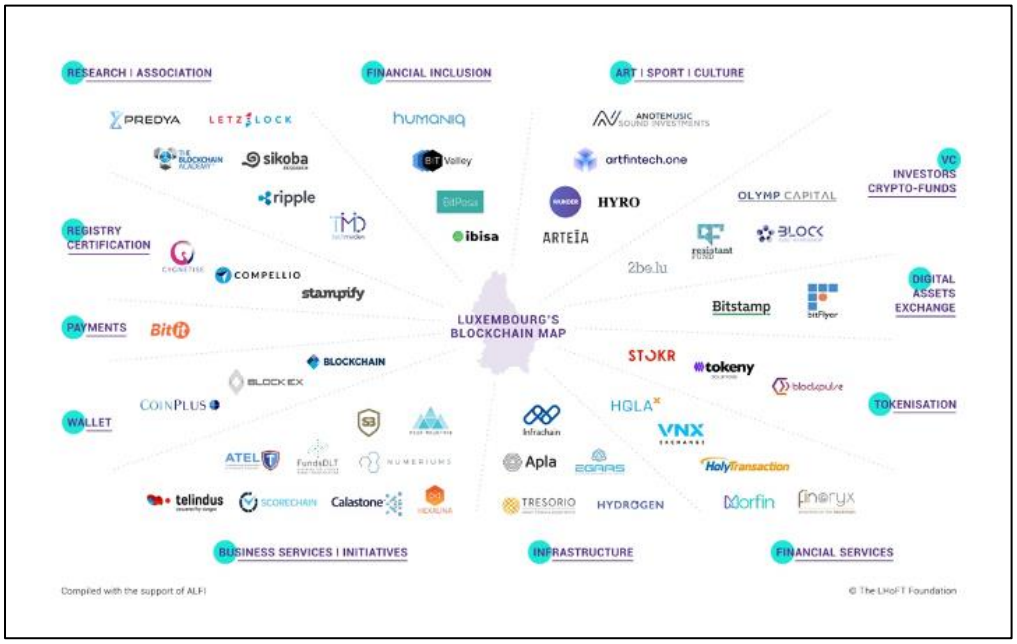
Blockchain across key industries: According to a recent round-table discussion (22 July 2020) with blockchain experts (Antony Martini, Engagement Manager at LHoFT, Laurent Marochini, Head of Innovation at Société Générale Securities Services in Luxembourg. Tom Kettels, Project Lead at Infrachain and Member of the Blockchain Expert Policy Advisory Board at the OECD, and Tobias Seidl, a FinTech and Investment Structuring expert) blockchain could affect the following industries: Payments, Big Data, Insurtech, Regtech and Lending.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

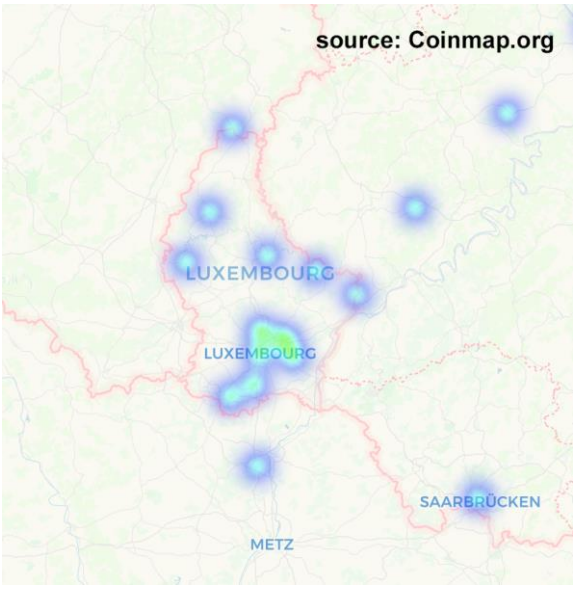
According to LHoFT, there are 49 companies in the Luxembourgish blockchain ecosystem.

The equivalent report which is used as a benchmark for our report suggests 18 companies, which have raised collectively a little more than EUR 13 million.

The difference between the Crunchbase report and the following map is due to the Holding Company registration.



BLOCKCHAIN COMMUNITY



The Luxembourgish blockchain ecosystem is prominent, featuring high-growth opportunities due to the active engagement opportunities and the large number of organisations advocating to support the blockchain technology.

The community consists of 18,000 observers, or general audience loosely interested in blockchain and digital currencies. Out of these, 5,092 are engaged with communities of practice, and are active in 13 frequent meetup groups.

Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Luxembourg, Keywords: Blockchain, Digital assets, Digital Currency, Bitcoin | Source for Enthusiasts

NOTABLE BLOCKCHAIN STARTUPS

Blockchain.com: Over 50+ million customers have signed up to use the Blockchain.com platform. It's the fastest and easiest way to buy your first bitcoin, trade crypto, send, receive, secure and borrow digital currencies. The Blockchain.com explorer is one of the most trafficked websites in the world to find out what's happening in the crypto markets and the Blockchain.com exchange supports a lightning fast trading experience.

INFRACHAIN: A Luxembourgish non-profit organisation supported by the Luxembourg government and created by the emerging blockchain-industry. INFRACHAIN is a blockchain community, a non-profit organisation, committed to creating an on-top governance framework allowing blockchain applications to become operational in the current regulatory environment.

LHoFT: As a public-private partnership, the organisation is supported by the government of Luxembourg, as well as Luxembourg For Finance, which assists with the promotion of FinTech around the world, and the Chamber of Commerce of Luxembourg. LHoft has a taskforce dedicated to the blockchain with seven members. One of its key tasks is to issue recommendations to the Board.

TokenySolutions enables mid-cap companies, investment banks, funds, asset managers and distributors to dematerialise assets on the blockchain, allowing them to reach a global audience, enforce compliance obligations, enable automation and increase operational efficiency. The Luxembourg-based FinTech company is the market-leader in delivering an institutional grade, modular end-to-end platform, allowing for the issuance, transfer and servicing management of tradable digital assets and security tokens, such as tokenised loans, structured notes, equity and funds.

A-Note Music: ANote Music is the European primary and secondary market for music royalties. Through this investment platform, anybody can now invest in music and purchase rights from content creators.

Stokr: By providing a turn-key solution to founders for their investment processes, STOKR provides support for multi-blockchain issuance of the security tokens. Its founders can manage the issuance, subscription, maintenance, and administration of security tokens (programmable digital shares), as per the EU capital market laws.

3C Payment: Their technology makes it convenient and secure for consumers to pay in person and online with Point-to-Point-Encryption (P2PE) Solutions and specialised EMV tokenised transaction flows which simplify the payment experience. Their secure 3C Integra hosted platform unifies multiple payment channels allowing merchants to confidently trade cross border in over 30 countries worldwide with multiple acquirers through a standardised infrastructure integrated to onsite and ERP systems.

INSIGHTS FROM EXPERTS

Tom Kettels
Project lead at Infrachain

Tom Kettels aspires to grow opportunities within the local Luxembourgish blockchain hub, partially due to the dynamics and initiatives driven directly by the central government. He suggests that the ecosystem is mature and advanced, and startups have the support from different organisations. He believes 'Education and Skills' is a very important pillar which goes beyond simply technical skills but includes managerial skills to understand the potential of blockchain – specifically what is the disruptive potential of blockchain for specific ecosystems. He believes the finance sector has already understood this very well, but this is not necessarily the case in other parts of the economy.

Laurent Marochini
Head of Innovation at Société Générale Luxembourg
Laurent Marochini was interviewed as Head of the Innovation Lab #LePlateauLux and Blockchain Leader for the group, and comments are personal, without representing Société Générale Luxembourg.

Marochini explained that local startups and use cases have overcome the "hype phase" and that most initiatives focus on real-world applications.
The Luxembourgish legislators support innovative and new blockchain-powered projects. They have been the first to introduce legislation about Bitcoin transactions and have provided licencing to digital assets exchanges.

When it comes to use cases and business direction, the key focus will be around finance, and potentially Security Token Offerings.

Similarly, Marochini referred to the intense interest around digital assets from the local population, based on his personal insights and conversations with various ecosystem actors. While it is relatively easy to open the door in Luxembourg to entrepreneurs and blockchain product managers, there is a need to think big.

In terms of unique selling propositions, he said it is important to think on a European and global scale.

Key findings

€51 million

Total funds raised

26,000 people

(5.5% of the population)
interested in blockchain and digital currencies

360° regulation

For blockchain and digital currencies

MALTA

THE MALTESE BLOCKCHAIN ECOSYSTEM AT A GLANCE

Malta, the self-proclaimed "Blockchain Island," is located in the southern European archipelago in the Mediterranean Sea. Counting a population of approximately 500,000 and covering an area of 316 km^2, the island state is one of the smallest countries in Europe and the 10th smallest in the world. Despite that, Malta ranks in the top 30 countries globally in terms of GDP per capita and is one of the fastest growing economies in Europe. This is in part due to its highly industrialised and innovation-driven economy, which has led the country to adopt a proactive and receptive approach towards blockchain and digital currencies. Malta's positive outlook on those technologies further confirms the trend of smaller European nation-states, Austria, Cyprus and Estonia included, adopting blockchain as a facilitator of economic growth and entrepreneurship.

In 2018, the Maltese parliament passed three bills establishing a comprehensive regulatory framework for blockchain and digital currencies, as part of the country's national strategy to pave the way for blockchain adoption. Malta became one of the first countries in the world to offer relative regulatory clarity in those areas. As a result, many prominent businesses from the blockchain and digital currency space, including Binance, OKEx and BitPay, along with hundreds of smaller startups flocked to Malta to benefit from this positive regulatory climate, while other notable initiatives, such as TRON, expressed their interest in contributing to the country's blockchain vision. This "migration" was welcomed by the prime minister and other high-profile state officials. Within a short timeframe, Malta became a hotspot for blockchain conferences and business–state dialogue, and even adopted blockchain technology to issue and store its university degrees and register local businesses. The largest university in the country, the University of Malta, started offering a master's programme in blockchain and distributed ledger technology (DLT) in 2019.

Following initial enthusiasm, Malta's change of leadership in early 2020, coupled with the failure of most prominent businesses active in the blockchain space to comply with legislation and receive the necessary licence, meant that the Maltese vision for a blockchain island is being revisited. The newly elected government repositioned the country's blockchain ambitions under an umbrella approach that included other niche sectors. In an interview with *Cointelegraph*, Kearon Bruno, chairman of the country's Digital Economy Think Tank, mentioned: "*We're moving away from [being a] blockchain island and more towards a digital island because we believe more in this holistic vision that includes all aspects and technological components*."

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: Malta's blockchain strategy is characterised by a regulation-first approach. While addressing the United Nations in 2018, former Prime Minister of Malta Joseph Muscat presented the country as "Blockchain Island." In the same year, following a highly collaborative procedure involving regulators and businesspeople, the country launched the highly anticipated Digital Innovation Framework, a comprehensive regulatory scheme concerning the areas of blockchain and DLT, initial coin offerings (ICOs) and digital currencies. The goal of the framework was to foster innovation in the aforementioned areas while preserving the country's financial integrity and stability and protecting potential investors.

Regulation was deemed necessary to realise the country's ambition for blockchain to account for 10% of its total GDP by 2027. The key actors responsible for the trio of laws collectively referred to as the Innovation Framework were: **the Malta Digital Innovation Authority** (MDIA), **the Malta Financial Services Authority** (MFSA) and **the Malta Gaming Authority** (MGA). More specifically, the laws approved by the Maltese parliament were **the Virtual Financial Assets Act** (VFAA), with an objective to regulate the field of ICOs, digital assets, digital currencies and related services, **the Innovative Technological Arrangements and Services Act**, which aimed to set the framework for the registration of technology service providers in the blockchain space and the certification of smart contracts, and the **Malta Digital Innovation Authority Act**, which established the MDIA, with a role to certify blockchain deployments and smart contracts.

As in most European countries, digital currencies are not considered legal tender in Malta. However, unlike most other nation-states, the country's Digital Innovation Framework recognises four distinct categories of digital assets, subject to a different set of rules. These mutually exclusive categories are: **electronic money**, **financial instruments**, **virtual** (utility) **tokens** and **virtual financial assets** (VFAs). The MFSA has introduced the Financial Instrument Test in order to classify blockchain and DLT-based assets in one of the aforementioned categories and thus determine whether they would be subject to regulation under the VFAA. Digital assets falling under the virtual token category are exempt from regulations. Digital currency and digital assets taxation adhere to the aforementioned guidelines, with such assets taxed according to their classification. Licensing requirements for activities involving blockchain and digital currencies are also determined according to provisions of the VFAA. Four different types of licences exist, and companies interested in acquiring one need to apply to the MFSA. Activities in the digital currency and blockchain space are subject to anti-money laundering (AML) and counter-terrorism financing (CTF) rules.

In 2019, Malta became the first country in Europe to issue its educational certificates in blockchain. Junior Minister of Financial Services, Digital Economy and Innovation Silvio Schembri announced that the country will utilise blockchain to register new businesses. In the same year, "Vision 2021" was launched as an initiative to strengthen the MFSA and prepare for the next generation of financial services, including blockchain-backed ones.

Blockchain in academia: In 2019, the University of Malta launched its Master of Science in Blockchain and DLT Technologies. The three-semester programme offers specialisations in ICT, law and regulation, or business and finance. Students of the programme have reportedly developed and launched a blockchain-voting platform.

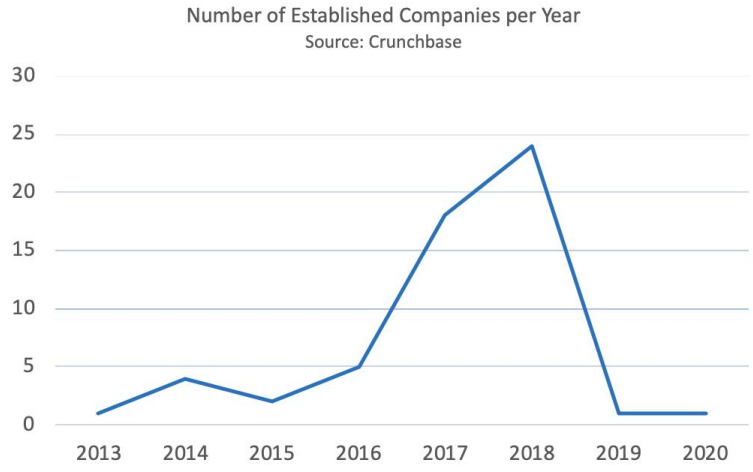
Blockchain across key industries: Maltese regulation and guidelines were some of the first in the world to provide a framework for ICOs at a time where excitement around alternative forms of financing was high. Various local startups took advantage of this newly found market for ICO services by beginning operations in the field, in an example of a state-identified business opportunity/sector that was exploited by private initiatives. Similarly, the country's intent to provide a welcoming regulatory slate for financial service providers active in the blockchain and digital currency space attracted global players in this field. While the ICO frenzy has largely faded, Malta remains home to initiatives across the financial, payments and banking services industries.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

The state's actions and its adoption of what was seemingly a blockchain-friendly regulatory framework constituted a catalytic development for the local blockchain and digital currency startup and business scene. From late 2017 to mid-2019, Malta became the recipient of a migration wave from large companies active in the blockchain space, due to them facing increasing regulatory scrutiny in Japan and other areas of the world. This wave included well-known names such as Binance, OKEx, ZBX, BitPay and other companies with which government officials maintained strong ties. Smaller startups followed suit in what would become – in many regards – a case of success for the country.

In April of 2020, the MFSA announced a "Warning to the Public," stating that "*[a large number of companies] failed to submit either a letter of intent to initiate the application process for a Virtual Financial Assets services licence or a cessation of activities notification,*" before warning the public of the risks of conducting business with unregulated firms. With only 26 of the initial 83 companies applying for licence and none granted to date, all signs point to the fact that many entities found the VFSA's requirements too demanding. Many companies ceased operations, while others have maintained presence in the country.

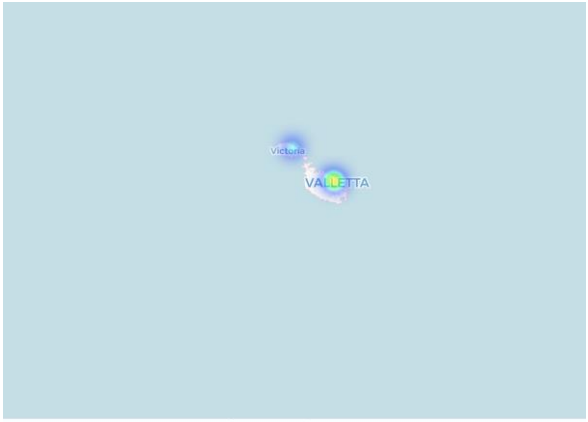
Malta's top 10 companies collectively raised north of €51 million through a variety of mediums. Most businesses participated in seed funding rounds, with others conducting ICOs and seeking later-stage venture funds. High concentration and business activity is observed in the financial services industry, which slowed down overall after the – stricter than expected – regulation.



BLOCKCHAIN COMMUNITY

Despite its small size and low population, Malta is home to a vibrant blockchain and digital currency community. Beginning in 2018, the country became a hotspot for some of Europe's biggest blockchain conferences, which featured prominent figures from the space. The two flagship conferences that focus on blockchain technology are the AI and Blockchain Summit and the DELTA Summit. The latter was attended by more than 4,000 individuals from all over the world in 2018, a number that is close to 1% of the total population of Malta.

Leaving aside the global community of enthusiasts that the country has amassed, impressive numbers can be identified when examining the local population too. The number of Observers in the country adds up to 26,000 people, meaning that a remarkable 5.5% of the total population is at least loosely interested in the topic of blockchain or digital currencies. Enthusiasts, meaning individuals organised in groups and communities of practice, amount to approximately 1,700 people. The number of blockchain experts in the country is approximately 730 individuals.



Source: coinmap.org

(Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Malta, Keywords: Blockchain, Digital assets, Digital Currency, Bitcoin | Source for Enthusiasts)

NOTABLE BLOCKCHAIN COMPANIES

Binance / Binance Labs:* Established in 2017, Binance is a global-reaching digital currency exchange. The company is active in a variety of areas in the blockchain space, including decentralised exchanges, non-custodian wallets, education, charity, broker services and incubators for blockchain projects, on top of maintaining its own digital currency BNB and proprietary blockchain. Note: following recent advancements and an announcement from the MFSA, Binance seems to only operate back-office activities in Malta.

The Founders Bank Project: The Founders Bank project, founded in 2018 and currently under a licensing process to obtain an EU banking licence from the MFSA, is a corporate challenger bank servicing the tech industry, including blockchain and other emerging technologies.

Pacific: Pacific offers a blockchain-powered payments system for social media and e-commerce that utilises smart QR codes.

Changelly: Changelly is a popular platform that allows for the purchase and exchange of more than 150 digital currencies and digital assets.

Komodo Platform: Komodo Platform is a popular, open, composable smart-chain platform built on a multi-chain architecture.

BitPay: Established in 2014, BitPay is a digital currency and digital assets exchange.

Tokenomica: Tokenomica allows its users to create, buy, sell and trade digital assets. Its suite of products includes a marketplace, a security token exchange and an issuance mechanism for digital securities.

Stobox: Founded in 2018, Stobox offers a platform for small and medium-sized enterprises to issue digital securities in order to raise funds, in a process known as security token offering.

STASIS: STASIS provides a platform for the tokenisation (digitisation) of financial assets for investors, bridging real and digital-world assets. STASIS maintains EURS, a stablecoin pegged to the euro.

INSIGHTS FROM EXPERTS

Joshua Ellul, Chairman of the MDIA, director of the Centre for DLTs, University of Malta

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in Malta? Any comments on certain firms not being able to acquire a VFA license?

I would say the [blockchain] industry in Malta is still in its infancy. Even though Malta did announce relevant laws and did attract particular attention, like other countries, we are still finding our feet, both in the local scene as well as the European and the international scene. I can't go into the specifics of who is here and who is not here, but I will say that there is a fair number of large players and a decent number of startups. Again, the industry is still in its infancy.

When it comes to the laws that were passed, there are the virtual financial assets or VFA laws, and those are taken care of by the Malta Financial Services Authority. These laws look into regulating the crypto operating aspect. To date, I'm not aware of any companies that have gotten licensed under the VFA framework. That being said, I have been told by various individuals, whom I can't name, that there are various companies currently undergoing the licensing procedure.

Then we have the Malta Digital Innovation Authority, and there are two main acts associated with that. One act set up the authority as a structure, and then the Innovative Technology Arrangements and Services act (ITAS) talks about how we can instil high levels of assurances into certain types of technologies that we are using.

For example, when are talking about crypto, because it is based on blockchain or DLT, and potentially smart contracts, we have code that is distributed across different computers, and if we want to update a bug, this could potentially be very hard. When it comes to immutable smart contracts operating on top of those distributed networks, we can't update the code, and if we can't update the code, this means that we need to find assurances for users before they use this code that can't be updated. The idea behind it [the ITAS act] is to have independent audits of the various types of blockchain, DLT and smart contracts, to raise the level of technology assurance.

Again, I would say that Malta is still in its infancy in regard to the overall ecosystem. The education aspect is really here with the master's programme and a high number of students attending. The regulatory framework is there; we are just waiting for licences to be approved. And next, we need to start seeing the various players come together to create this ecosystem.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Malta?

I can't name specific companies as a regulator, but there are a number of hubs where different companies are working in the same place, at least they were before COVID. A lot of the interest in Malta that I'm aware of is ICO- and VFA-related. There are a number of other players working on interesting applications for blockchain including rental contract market, the gaming industry and the sports market, as in how to tokenise various aspects of sports. Apart from that, we have other entities looking into the tokenisation of games. I would say we have one part that is looking into the finance and ICO-related stuff, and the other part is looking into blockchain applications. Interestingly, I'm also aware of companies that are doing staking operations in Malta; there are some big players that do this. It's quite an interesting turn since when blockchain was developing, we always said that we would never see mining firms in Malta, it is too hot and electricity is too expensive, but at least we have staking now.

Additional question: Does Malta moving from a "blockchain island" to a "digital island" mean that the role of blockchain in the country is diminished under this new umbrella approach?

Personally, I think that it was overhyped in the beginning; it is not necessarily about blockchain, it is more than that. Now that this hype is over, all of those players are gone, and I think that this is a good thing. The fact that we did not have too many startups start and fail, as they customarily do, is also a good thing for our economy. I foresee that blockchain is still going to play an important role in Malta, especially due to the national policy on governance. The economic strategy was released lately, which consists of five pillars. One of the pillars was good governance, and blockchain is the best thing for that.

To recap, I think that blockchain will still play an important role, perhaps not in an "in your face way." Success for me is when you don't think about the technology when you are using the technology. And that is the future that I would like to see in Malta.

Are there specific regulatory or national policy initiatives in place in Malta?

The main thing that I would reiterate is the importance of technology assurance. In regard to policy, what Malta is looking to do now is not just about blockchain, and I think the whole blockchain thing was very timely during the 2017–2018 hype, but it's more about creating a centre for digital innovation across the board. The idea is to start using the right technology for the right task; there is no need to use blockchain in everything. In terms of policy, we will start seeing more implementations that are looking to help increase good governance.

Are there any notable blockchain-related education and training offerings by universities or other providers?

The only programme that I'm aware of at a master's level is offered by the centre of DLT, of which I am the director. It is a master's programme that allows for specialisation in computer science, DLT, law and regulation or business and finance, but it starts with an introduction to all fields. This is our flagship programme. Then, at the university [University of Malta], we have a number of units that we deliver as part of the undergraduate programmes. I believe that there is another institution in Malta, MCAST, which offers a subject on fintech, potentially blockchain as well. I would say that those are the main players that provide traditional education programmes. There are some other professional educational programmes in Malta, but I've only heard of one that provides blockchain education and training; of course, there could be another.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Malta?

I would say there is a large number of people in Malta who are aware of what blockchain and crypto is. That awareness came from the interest of a number of players who wanted to enter into the VFA from the blockchain and crypto space. That being said, there are a lot of people who are less aware of what those technologies are but are familiar with the terminology as they've seen it in the news. A lot of people will tell you that they've heard of blockchain, and they would probably confuse blockchain with bitcoin and crypto as it is all in one bucket for them, and a lot of people believe blockchain is probably something that we shouldn't be using because it was mentioned a lot in the past, and now it is not mentioned at all. I would say we need to go on a campaign to clearly differentiate between blockchain and crypto and highlight the benefits of blockchain in isolation. Then, we need to create a campaign in regard to what CBDCs [central bank digital currencies] are going to be because I think this is where we are going to see those things being used and adopted by the masses. I believe that CBDCs will bring mass adoption of the technology through a centralised form of digital assets. But at least it will onboard users into the space, and once users are into the space, they can perhaps move freely due to being more familiar with the systems, and choose to use a different crypto. For blockchain, the killer application would be the application that supports transparency and trust and users are not even aware of [while using it]. Much like we are using cloud-based applications and nobody knows or cares that

they are using them. I see blockchain as the infrastructure for decentralised trust. That will ultimately be the killer application.

In terms of the awareness by businesses, given the amount of conferences and the buzz around blockchain, a lot of them [businesses] were getting interested, but now I believe that many feel like this was something of the past. That will change with time as we start to see more applications being deployed for the general public and as more educational campaigns are held.

What does the future hold for the Maltese blockchain ecosystem?

Unfortunately, I think that this question has a very boring answer. I think that we are going to see a number of applications being deployed to instil good governance. If we look at Malta, it is currently suffering some reputational risks, and I think that blockchain can be one of those pillars to help support a good governance structure. At the same time, we will start seeing Malta lobbying for its technology assurance framework with the rest of the EU as it is not only important for Malta but for the EU as a whole [referring to the assurance framework]. Malta will continue to be a strong voice when it comes to blockchain-based assurances.

Additional question: Is there anything else that you would like to comment on?

The only thing that I would add is that the vision of Malta needs to be less changeable. In general, we need a wider vision that is looking at digital innovation as a whole rather than as a specific technology. Specific technologies come and go, but an innovation vision that creates an ecosystem and a mentality of entrepreneurship and innovation is something that will prevail. This is something that we lack in Malta. The Maltese often tend to be risk-averse; we need to create an ecosystem that allows for entrepreneurs to experiment.

Key Findings

150+

Blockchain startups

€337+ million

Total funds raised

20,000

Members in the largest blockchain meetup community in the country

NETHERLANDS

THE DUTCH BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Netherlands has traditionally been very strong in the tech industry. Such global names as Philips, NXP Semiconductors, ASML, Adyen and Booking Holding (US-domiciled but main operating division in Amsterdam) are headquartered or have their roots in the Netherlands.

With an English-speaking environment and immigration-friendly policies, the Netherlands is also a startup hub in Europe, featuring one of the highest startup densities in the region. The Netherlands' position is further enhanced by the balanced approach adopted by lawmakers, who showed their willingness to try new technologies as long as they do not create unmitigated risks for the public.

The country's blockchain startups work in a wide variety of areas, including payments, fintech, healthcare, education and supply chain. A large share of blockchain startups operate on the intersection between blockchain and other cutting-edge technologies, such as Internet of things and AI.

The country has a number of blockchain communities and meetup groups that deal with both organisational/business and technology/software development facets of blockchain. The largest such community counts almost 7,000 enthusiasts as part of its membership. Almost 10 other communities exceed 1,000 members.

Overall, the country is poised to maintain its innovative lead in blockchain due to favourable government policies, a vibrant startup scene and high public interest in blockchain.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: In general, the Dutch government supports the adoption of blockchain technology. Types of support include financing research and participating in public-private partnerships. In addition, the government has shown a willingness to reconsider the existing legal frameworks if they are not sufficiently flexible or do not mitigate the risks of technology to the extent required.

The priority use cases for the Dutch government include: (i) ship registers (ii) grant administration automation (iii) smart contract adoption (iv) hazardous waste tracking (v) and data protection.

There is no coordinated blockchain strategy at the national level, so different government departments independently explore the areas of blockchain technology that fall under their purview. That includes, for example, an analysis of ICOs undertaken by the Dutch National bank that paved the way for the introduction of a regulatory regime similar to that applicable to traditional financial services providers.

Legislation for digital currencies which might affect blockchain: Dutch regulators (DNB and AFM) recognise that the implementation of certain blockchain-based products might be stymied by current regulatory framework limitations. Therefore, they have developed several tools to overcome these limitations. The first is InnovationHub, a one-stop shop for regulatory information for startups. The second tool is a regulatory sandbox that empowers regulators to use a principles-based rather than a rules-based approach when dealing with emerging technologies. This means that some technicalities might be put aside, and compliance is determined based on the intent of laws and regulations rather than their letter. The final tool is partial authorisations, which means that licenses are available on an à la carte basis, i.e. a fintech startup does not need to meet all the banking license criteria if it only wants to conduct money transfers.

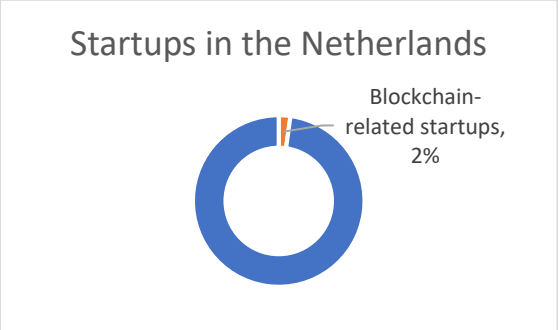
Blockchain in academia: Notable examples of dedicated blockchain educational programmes include the Blockchain Summer School offered by the University of Utrecht School of Law and blockchain masterclasses from the University of Amsterdam. There appear to be quite a few open positions for blockchain lecturers at all the leading Dutch universities, indicating that they are looking to create dedicated blockchain courses or/and integrate blockchain studies into their existing curriculums. In addition to the previously listed options, there are multiple online courses available through global and local providers.

Blockchain across key industries: The Netherlands is a home to a flourishing startup ecosystem. The Dutch government provides several forms of assistance to startups, including a special visa regime for startups (Netherlands startup visa) and tax rebates for recently qualified immigrants, a reduced effective tax rate for technology-intensive businesses, reliable infrastructure and great physical and virtual connections with other countries. Overall, the Netherlands boasts over 7,000 startups according to startup tracker tracxn.com, over 150 of which are involved in blockchain-related research.

In addition to a vibrant startup ecosystem, positive attitude towards advancing regulation by the government and general public support for blockchain technology, the Netherlands has replicated this enthusiasm through a number of notable industry uses. During the COVID-19 pandemic, Tymlez launched a project to support the government's transparency in medical supply chains through blockchain technology. Dutch agriculture is also renowned for its efficiency. For example, there are projects in this area such as Blockchain for Agri-food that is financed by the Dutch Ministry of Agriculture, Nature and Food Quality to improve agri-food supply chains.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

The Dutch startup ecosystem is well established and mostly relies on traditional venture capital funding rather than on initial coin offerings. That explains why the funding amounts raised by Dutch startups might look small in comparison to other countries that took advantage of inflated valuations during the ICO boom. On the other hand, reliance on traditional venture funding provided a more sustainable flow of funds into blockchain innovations.



Currently, according to tracxn.com, the Netherlands has 7,057 startups, 155 of which are related to blockchain.

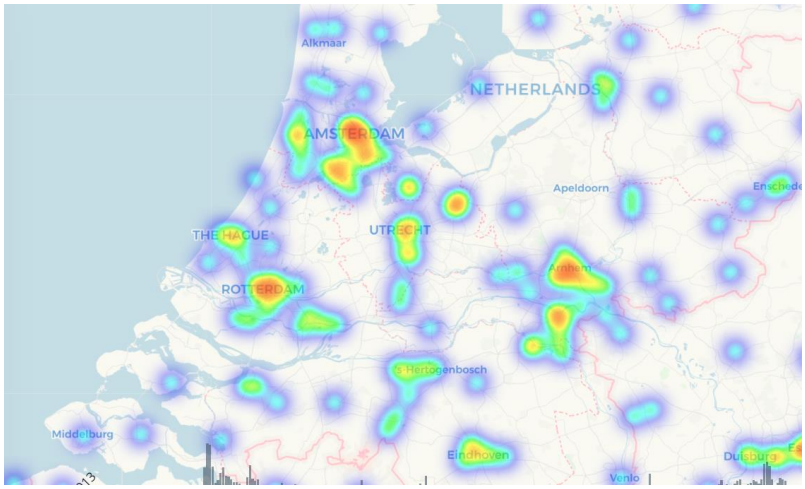
The key sectors where Dutch blockchain startups are present include fintech (e.g. Finturi, a blockchain-powered trade finance platform), location services (e.g.UNL), decentralised marketplaces (SingularityNET) and entertainment (iCasting). Multiple companies work on the intersection of blockchain and other next-generation technologies such as AI.

It appears that the majority of startups are still at a pre-revenue or early revenue stage. The exact figures are not known as companies are exempt from publicly reporting their financial figures due to their small size.

Academic & international experience as facilitators of entrepreneurship: The Netherlands is a magnet for qualified emigrants in Europe. The country does not only offer a simplified visa process for startups and qualified migrants, but also tax rebates for the first five years of an immigrant's residency in the country. In addition to the tax breaks, the Netherlands benefits from a mostly English-speaking environment. Combined with the cultural appeal and stability, these advantages place the Netherlands in a league of their own in attracting top foreign talent.

BLOCKCHAIN COMMUNITY

As a country, the Netherlands is extremely well-connected and decentralised. Most parts of the country can be reached from Amsterdam in under two hours. This helps explain the fact that the startup ecosystem in the Netherlands is quite spread out and that multiple startups were established outside major cities.



This spread of activity is also evident in the number of venues (bars, restaurants, hotels, cinemas and other attractions) that accept digital assets. With 183 venues, Arnhem has the highest concentration, followed by Amsterdam with 67. A significant concentration is also observed in the Rotterdam-The Hague area with over 35. The Eindhoven area, home to many high-tech companies, ranks 4th with 11.

Amsterdam is a major centre for conventions and conferences. 2020's Blockchain Expo is planned to be held in Amsterdam in November. Blockchain Expo is Europe's largest Blockchain Conference and Exhibition primarily targeting enterprise technology. The blockchain event will be held simultaneously with the IoT Tech Expo, AI & Big Data Expo and Cyber Security & Cloud Expo to help participants explore the synergistic effect of these technologies.

There are several meetup groups in Amsterdam, including those that are business and societal impact focused such as Blockchain Talks, Blockchain Netherlands, Food Integrity Blockchained, Permissionless Society Blockchains, Bitcoin Wednesday Amsterdam, as well as more tech focused such as Ethereum Dev NL and Hyperledger Netherlands. The largest of these meetup groups counts almost 7,000 people as part of its membership. Most of the communities organise recurring meetings, such as the monthly international BCT event that is hosted in Beurs van Berlage (a former stock exchange) in Amsterdam.

The blockchain community in numbers: With 109 regular Meetup groups and 40,282 Meetup attendees, the community is quite active. A Facebook marketing campaign shows the audience for blockchain-related terms is 180,000.

NOTABLE BLOCKCHAIN STARTUPS

Bitfury: Global emerging technologies company founded in 2011 designs and produces mobile bitcoin mining datacentres powered by custom semiconductor chips (ASICs) and proprietary liquid cooling appliances. Software division develops and markets crypto-compliance tools and enterprise blockchain software. AI division develops solutions for Edge data processing. Raised EUR 145 million in investor funding. In the latest round, the company was valued at around $1bn.

Finturi: Blockchain-powered trade finance platform acts as an intermediary between businesses who can use it to obtain financing backed by receivables and financiers. The loan to value amount is currently set at 80% and the company's fee is 0.5% of the value of each transaction. Founded in 2018 in The Hague and raised EUR 1.7 million in financing.

UNL: Mapping and navigation services provider founded in 2018 in Amsterdam. Data about the Earth surface and indoor spaces is stored on a blockchain. Data is accessible through an API based on a virtual location IP address. Believes that the technology can transform such industries as logistics, advertising (location-based

ads), city management and pubic administration. Raised EUR 1.7 million in financing from investors, including SOSV, HERE and The Mobile Only Accelerator.

SingularityNET: Aims to create a marketplace that connects AI algorithm developers and AI data providers and algorithm users. Developers can protect their intellectual property by wrapping it into a smart contract. Seeks to develop an ecosystem that fosters cooperation and will allow small companies to reap benefits of AI technologies. Founded in 2017 in Amsterdam and raised EUR 1.7M in financing from investors, including 42Fund, Suicide Ventures and Chrono Fund.

Attrace: Creating a smart contract-based affiliate marketing tracking system. The system will introduce transparency and auditability to the currently opaque process of advertising measurement. Founded in 2017 in Amsterdam and raised EUR 850k in financing.

Aurus: Creators of a gold-backed digital assets underpinned by Etherium blockchain. The digital assets can be used both as a medium of exchange and as a store of value. The company was financed through an ICO. Investors in the company's coin will receive 50% of transaction fees generated by AurusGOLD.

ICasting.com: Blockchain-based platform that matches actors, models, extras, singers and dancers with the companies representing the world of entertainment. The talent matching process is based on both models' looks and their skills. Users include TV production companies, media groups, brands, media agencies and small business owners. Founded in 2014 in Zwolle and raised EUR 850k in financing.

ReCheck: Developer of blockchain middleware. Stores and secures documents using blockchain, and can be used to audit authenticity of documents and transfer ownership of the data. Founded in 2016 in Geleen and raised EUR 850k in financing from investors, including AE ventures.

INSIGHTS FROM EXPERTS

Rudolf van Ee

Co-founder of Blockchain Talent Lab (BTL) and board member of the Blockchain Netherlands Foundation (BCNL Foundation)

"The internet gave us free access to information. It also promised to become a place where everything would be fairer. The reality is that tech giants have emerged (Google, Facebook, etc.) who have hung opaque revenue models from the new gold: data. Social awareness is growing that data is valuable and we are currently using our data to pay for "free" services.

The volume of data also continues to grow exponentially. The triangle IoT (Internet of things), AI (Artificial Intelligence) and blockchain will therefore become increasingly important. IoT generates data, AI interprets data and blockchain / DLT offers a reliable, safe and fair infrastructure."

Christiaan van Steenbergen

Founder of PayAccept

"The majority of the world, both individual and business, relies on legacy banking and payment systems for their financial activity. But these legacy systems can be impacted by the decisions of political leaders and central banks. Nowadays, if you want to open a business that is active in the digital assets market, banks refuse to do business with you. In some countries, you do not even get access to a bank account. Without it, you cannot be active in the global financial system. Gladly, blockchain and decentralised finance are making it possible to offer these businesses and (the unbanked) people around the world access to an excellent alternative platform.

Read More https://techbullion.com/interview-with-christiaan-van-steenbergen-founder-of-payaccept/"

Key Findings

32 ICOs
From companies in Poland

€20 million
Total funds raised

Individuals organised in Digital Currency Communities
Observers: 280,000
Enthusiasts: 20,000
Devotees: 3,500

POLAND

THE POLISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Polish blockchain ecosystem shows significant interest from individuals, companies and academia, while the government seems to have a relatively less favourable approach to crypto assets. In 2020, Polish media presented two cases of document verification processes using blockchain technology, affirming the growing interest in the technology. The first case involved Polish insurer LINK4 which adopted the blockchain platform, Trudatum, by Coinfirm for document verification. The second case was the Proof of Concept between Billon Group and Tauron for the use blockchain technology to store and deliver contracts to the latter's clients. As an energy utility company, Tauron's aim is to streamline the process of managing, sharing, and signing energy contracts.

FinTech, which encompasses many different sectors of the financial industry, appears determined in adopting the blockchain technology to address the shortcomings of contemporary business models. The Central Securities Depository of Poland (KDPW), in collaboration with IBM, has developed an e-voting system for Annual General Meetings (AGMs). Shareholders may choose between in person participation or the engagement of representatives. A voting system implemented in IBM's Hyperledger could provide solutions to the constraints of physical presence, providing a high degree of confidentiality and trust. For example, Spain's Santander was one of the banks that used a pilot system at its AGM back in 2018.

In Poland, more than 45 companies are active in blockchain technology. They are active mainly in the sectors of information technology, followed by the financial sector. These companies in Poland are considered small, employing between 11 and 50 people.

Furthermore, the community has over 20 000 blockchain enthusiasts in groups that are present in various cities in Poland. Community growth is supported by organisations dedicated to this goal. In addition to the local organisations, there is the Swiss-Polish Blockchain Association that facilitates cross-border initiatives.

TOWARDS MAINSTREAM ADOPTION

In July 2017, the Polish National Bank and the Financial Supervision Commission issued a joint announcement to express concerns about digital assets investments. The announcement issued a warning against investing in these currencies due to the price volatility along with the high-risk of fraud. Overall, Polish regulators appeared to have adopted a harsh attitude towards cryptos.

Regulation and policymaking: In January 2018, Poland's Prime Minister Mateusz Morawiecki stated the country's intention to either ban digital assets or ensure the reliability by regulating its circulation. The Finance Ministry followed up with the publication of a guidance about tax effects of digital assets trading. The income from the transactions is subject to income tax (with two brackets). Also, the acquisition of digital currencies is subject to a levy on the transaction's value in cases in which property rights are transferred with the transaction. To clear the speculations around the legal doubts, the Polish Financial Supervision Authority (KNF) has stated in June 2018 that there were no regulations prohibiting the conduct of an activity as an exchange or an exchange office for digital assets.

Also in January 2018, Poland passed anti-money laundering and counter-terrorist financing measures regarding digital assets. The Polish government extended the measures to cover crypto-to-crypto, as well as fiat-to-crypto and crypto-to-fiat, exchanges. In this way, trading of cryptos and Initial Coin Offerings (ICOs) can be considered as crypto-to-crypto. In accordance to the law, these platforms are required to carry out due diligence process for investing.

Poland is taking steps towards the adoption of blockchain, as the country is poised to become an innovation centre that fosters projects in this technology. As such, the Ministry of Digital Affairs has established the Council for Digital Affairs that has a working group on Distributed Ledger Technology and Blockchain. The working group has published four whitepapers about various blockchain technology adoptions in the economy. The titles of these four whitepapers are: *Token as Bond, Electronic promissory notes and bills of exchange using blockchain technology, Electronic seal and GDPR and Blockchain*.

What is more, Poland has adopted a new type of corporation, a simple joint-stock company, which is a response to calls from the market. Some of the general characteristics of the simple joint-stock is the online registration within 24 hours and the absence of required stated capital. There is also no nominal value assigned to the shares. The most intriguing aspect of this type is the fact that the shares can be registered in a digital register of shareholders, leaving the floor for the potential use of blockchain and share tokenisation in the registration. However, opponents are voicing their concerns about this law. Their concerns are mainly related to the non-existence of stated capital that might not protect the interests of contractors since it could be low. Overall, simple joint-stock could help in the digitalisation of the procedure of starting a business.

Blockchain in academia: The Warsaw School of Information Technology offers a Master's Degree in Blockchain Technology in Business. The programme's duration is four semesters and it is designed to prepare students to acquire other certificates (ITIL® Foundation, Change Management® Foundation) to further their development.

In Warsaw, SGH Warsaw School of Economics offers postgraduate studies in Finance Technology in a Global Monetary Policy. The course is designed to provide an introductory understanding of decentralised digital currencies.

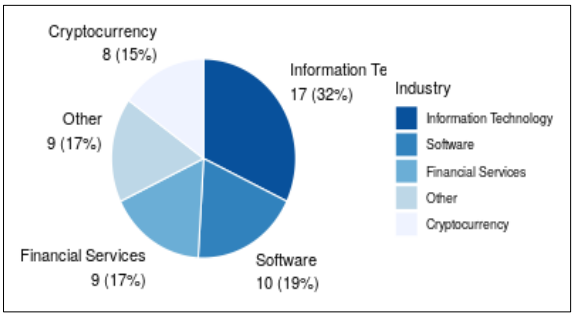
The Blockchain Technology Centre at Lazarski University is a scientific centre dedicated to blockchain. It is an interdisciplinary unit with the purpose of conducting research and providing education. Conferences are scheduled to promote blockchain in the community.

There are also training programmes relevant to blockchain and are offered by universities. In Poznan, for instance, the University of Economics and Business holds a training session, named Blockchain Fundamentals for Accounting and Finance Professionals Certificate. This training programme aims to build a foundation toward creating strategic business partners and providing participants with real-world literacy on blockchain and crypto assets.

Blockchain across key industries: Poland's economy is prospering. The country's GDP has reported steady growth over the past 10 years. Various industries have contributed to the economic growth. One major industry is the energy sector where brown coal and hard coal are produced, and renewable energy sources are harnessed to boost energy supply. Another industry that is a big growth engine is manufacturing, particularly shipbuilding, petrochemicals and electrical machinery. Despite the aforementioned products, the automotive

industry is undoubtedly Poland's key product. Vehicle parts were the highest export good in 2018 accounting for over EUR 14 billion.

BLOCKCHAIN STARTUP AND BUSINESS SCENE



The Polish community has an increasing number of organisations that are dedicated to promoting the adoption of blockchain technology. One of the first was a project, launched in 2018 by a group of young enthusiasts from economic universities. The aim of this group, which is called

Blockchain4Everyone, was to raise public awareness about new technologies and the forthcoming changes caused by these technologies in the labour market. In addition to that project, there is the Polish Bitcoin Association which has been active since 2013. The aim of this association is to actively increase public awareness of modern digital currency.

Most recently, a non-profit institution based in Warsaw joined the blockchain community. This institution, Blockchain Alliance and Acceleration Hub, cooperates with different participants within the blockchain ecosystem and aims to build a system for education, acceleration and investment in blockchain.

There are reports of cross-border actions in Poland that would enhance the connection with other countries. For instance, a joint venture established since 2018 allows Poland and Switzerland-based blockchain ecosystem participants to share knowledge and form bonds. The venture is the non-profit organisation named Swiss-Polish Blockchain Association.

Overall, members of the community have the opportunity to participate in conferences and summits. They are also able to learn about innovative projects on blockchain technology. In 2019, Warsaw hosted the Blockchain NeXt, which is a series of conferences demonstrating ways of replacing intermediaries with a decentralised network. Despite the lockdowns and travel restrictions imposed to curb the spread of the COVID-19 pandemic in 2020, members of the community managed to attend events held two different cities. The first event the Infoshare tech conference, which was streamed online from Gdańsk. The second was the FinTech & InsurTech Digital Congress in September 2020 that was held in Warsaw, combining physical and online activities.

NOTABLE BLOCKCHAIN COMPANIES

AT.Systems: An automated digital assets trading platform founded in 2017. Users are in place to take part in digital assets exchanges with the use of the software. The software communicates with the APIs of Binance and Poloniex.

Algory: A startup that offers tools for crypto traders. The flagship product of this startup is an advanced digital assets scanner, Cryptoscanner. It also offers a crypto news aggregator to keep traders informed about the crypto activity.

Billon SP.: Part of Billon Group that operates in both England and Poland. The group implements distributed ledger technology to tokenise national currencies, documents on-chain and identity management into a single system.

BlockHunters: A company founded in 2018 and consists of blockchain and smart contract auditing specialists. Founded on the premise that blockchain is a promising technology, it recognises that there could be

vulnerabilities as potential scam and security breaches. To tackle vulnerabilities, the company performs audits, checks for bugs and conducts logic analysis.

easyMINE: A complete, self-contained software platform for digital assets mining. The platform eases the mining process by its design which facilitates the process of setting up and managing a mine.

GamerHash: A blockchain-supported application that facilitates the computer power sharing and rewards the user with cryptos. Founded in 2017, the users of the application have the opportunity to monetise their machines, similarly with vehicles in Uber's case, to take advantage of their computer power while being idle or engaged in demanding activities.

Golem Factory: A decentralised, P2P network using Ethereum and smart contracts as transaction systems. Founded in 2017, the Golem Network connects computers in a peer-to-peer network. This function can be considered as IaaS as well as PaaS. The ecosystem created within the network is supported by the Golem Network Token (GNT). The network is promising to developers since they can rent more computing power, and to users who can monetise their machines.

MillionCoin: A decentralised payment currency platform founded in 2018. It has created the MillionCoin token based on Ethereum blockchain. The ecosystem allows users to sell goods and services in digital assets, to use automated processes with the dedicated software, and to exchange digital assets.

Ramp: A startup, established in 2017. Its mission is to empower communities to participate in open networks. The company aims to bridge the gap between blockchain and the existing banking system. Currently, Ramp offers a way to allow users acquire cryptos directly from a customer's decentralised application (DApp). This results in a real confidence boost in using DApps.

INSIGHTS FROM EXPERTS

Kamil Rafał Gancarz, president and founder of the Blockchain Development Foundation (interview)

"It needs to educate and help mitigate perception of risk by education and building strong relationships with investors. Polish blockchain environment is way smaller and I don't particularly feel a lot more pessimism, compared to the whole startup space. In Poland we don't have many investors specialized in blockchain angel, VC investing, therefore only general risk related with the Polish and World economy increased. I think that it was always hard to fundraise in Poland for a blockchain business, therefore we are trained to work hard, and we know it's never easy".

Katarzyna Ciupa, blockchain researcher & speaker (interview)

"Legal and policy landscape surrounding digital assets and blockchain technology in Poland is very complex and I believe there are still many things that have to be undertaken in order to enable blockchain adoption and create the environment where blockchain start-ups could build and deliver their value proposition".

Key Findings

7 ICOs

From companies based in Portugal

€40 million

Total funds raised

Individuals organised in Digital Currency Communities

Observers: 140,000
Enthusiasts: 11,000
Devotees:1,800

PORTUGAL

THE PORTUGUESE BLOCKCHAIN ECOSYSTEM AT A GLANCE

Portugal is picking interest for the absence of taxation on the digital assets mining and gains, providing a friendly investment environment for digital currencies. In September 2020, the Banco of Portugal announced that it would supervise the entities that manage virtual assets including digital assets.

Blockchain has found its way in the adoption in various business sectors. A report on the Portuguese FinTech for 2019 documents that 5% of the FinTech startups are deploying solutions based on the blockchain technology. The business scene accommodates over 15 companies that are involved with blockchain and the majority is in the financial sector. Some of the interesting projects are coming from Bitcliq, TAIKAI and Utrust.

Companies are drawn by the potential in the use of blockchain as it could complement the creation of marketplaces as the new technology could enhance the trust between the marketplaces' participants and even allow for greater profit margins as market intermediates could become obsolete. Aptoide is such a case, as it was established in 2011 as an Android store. In 2018, the company introduced the use of a digital assets, named AppCoins. The AppCoins is using ERC-20 protocol in an attempt to harness the benefits of smart contracts.

The community in Portugal is quite active and numbers around 11,000 people. The biggest cities are the ones that hold meetups that foster the community. Alongside with these unofficial groups, associations like the Portuguese Blockchain Alliance are organisations to help the growing blockchain community with their actions.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: In Portugal, digital assets activities such as issuing and trading, are neither regulated nor supervised by the Federal Reserve Bank of Portugal or any other authority. The absence of regulations should not discourage participation in the ecosystem, since digital currency activities are not prohibited as noted by the Federal Reserve Bank. Digital assets do not qualify as fiat currency nor are they treated as electronic money due to that legal tender. In other words, digital coins are treated as an alternative payment method.

In November 2017, the Portuguese Securities Market Commission (CMVM) aligned with European authorities and cautioned investors about the risk of digital assets. Nevertheless, the Portuguese Tax Authority published two rulings concerning the tax regime. One of the rulings, issued in 2016, exempts natural persons from tax with respect to gains derived from the valuation of digital assets or the sale of digital assets. The latest ruling, published in 2018, concerned the exemption of VAT tax on digital assets' exchanges.

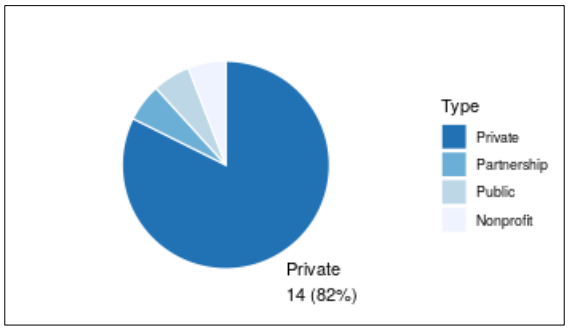
Blockchain in academia: People interested in blockchain can attend the programme "Blockchain and Smart Contracts" developed from the collaboration between Católica Lisbon School of Business & Economics and Técnico+. The Católica Lisbon School of Business & Economics is a business school, while Técnico+ is an advanced professional training school of Instituto Superior Técnico, an engineering school. Both institutes are located in Lisbon and collaborate to carry out the 21-hour training programme that is separated in two sessions. Similarly, NOVA Information Management School organises an executive programme in "Digital Innovation for Business" to introduce the participants to a broader set of technologies.

Interest in blockchain is high in Portugal, where enthusiasts could emerge in technology with summer camps. Bee2WasteCrypto invited the community to take part in its summer camp by registering until July 2020. The programme duration is 12 weeks. The Bee2WasteCrypto project is led by Compta in partnership with NOVA Information Management School, Instituto Superior Técnico. It aims to create an innovative platform using blockchain and digital assets technology for MSW management.

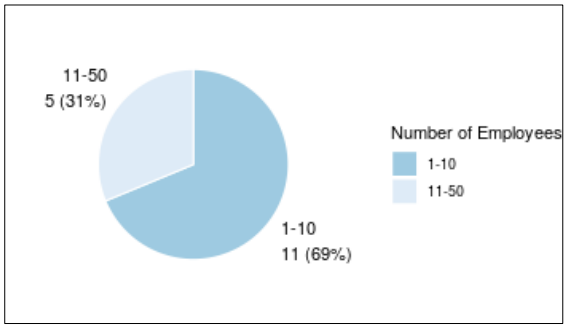
Blockchain across key industries: The Portuguese economy was affected by the economic crisis, but it bounced back as reflected by the increase of the GDP since 2015. The service sector contributes around 60% to the GDP. Portugal attracts many visitors every year making tourism a focal point of the service sector. The industry sector is not to be ignored as it contributes around 25% to the GDP. The main industry sectors in the country include automobile, computer software and pharmaceutical products

BLOCKCHAIN STARTUP AND BUSINESS SCENE

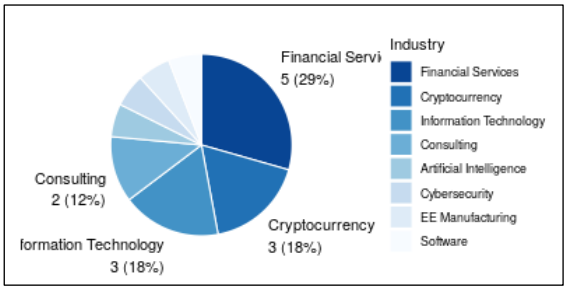
There are various accelerator programmes for startups in Portugal, but there is a particular case to aid blockchain projects. Booster is an accelerator born from the collaboration between WPP group and Startup Lisboa to provide mentoring, organise networking events and support proof of concept. The accelerator accepts startups operating in new technologies, including blockchain projects. In addition to the accelerators, startup hubs are also active, such as Startup Portugal, Made of Lisboa and Startup Lisboa.



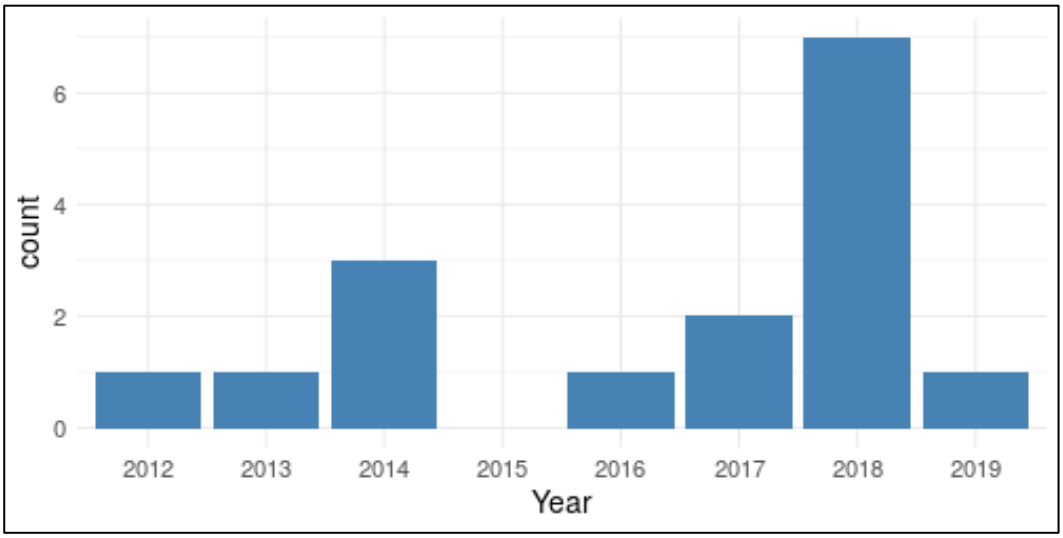
Similarly, venture capitalists (VCs) specialise in new technology projects. One such example is Indico Capital Partners who has particularly focused on blockchain projects. This particular VC backed the blockchain startup Bitcliq during a funding round in 2019.



The blockchain startup landscape in Portugal is dominated by small and medium enterprises of up to 50 people. Most of them (61%) consist of small enterprises of 1-10 people, while the rest (39%) consist of medium-sized companies of 11-50 people.

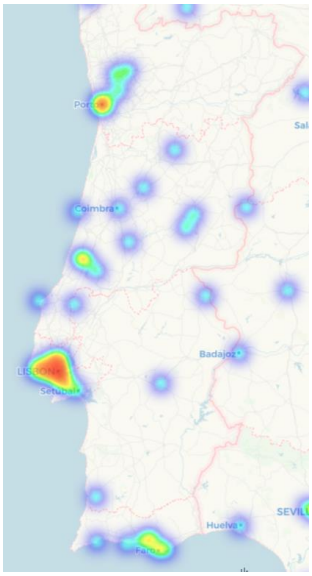


Blockchain-related startups in Portugal started appearing on the scene around 2012. Their growth was slow in the following years. The exception is 2018 when a large number of companies were founded that adopted blockchain in their operations.



BLOCKCHAIN COMMUNITY

The blockchain community in Portugal draws the attention of numerous individuals from the public. In total, 25 groups accommodate around 11,000 people interested in blockchain, digital assets and smart contracts. The groups are mainly active in bigger city centres such as Porto and Braga. Naturally, Lisbon being the capital holds the majority of the meetups.



Associations established in Portugal foster the growth of the blockchain community. According to various media channels, the most active association is the Portuguese Blockchain Alliance (ALL2BC).

The association was launched in 2018 to raise awareness in blockchain in Portugal by promoting collaborations and providing support in scaling up projects. Another association is the Portuguese Blockchain and Digital assets Association (APBC), which is a collaboration of people interested in the promotion of new technologies in society. Finally, another relevant community that fosters blockchain is the Portugal Fintech established in 2016.

Conferences and expos are held that offer an excellent opportunity for the participants to network. The Portuguese Blockchain Alliance has been conducting a yearly conference since 2018. These daily conferences are organised in Lisbon every November. Moreover, a summit focused on web technology takes place annually in Lisbon and accommodates fintech companies.

NOTABLE BLOCKCHAIN COMPANIES

Aptoide: Marketplace in the Android platform founded in 2011 that allows developers, OEMs, telcos and integrators to create and manage their Android store. The company has developed AppCoins, a digital assets based on ERC-20 standard to solve drawbacks in the mobile industry. In September 2020, it was announced that 0.1% of the previous day's in-app purchases would be burnt.

Atidium: Payment and budget management decentralised application founded in 2017. A crypto token is available from the platform with the symbol (ATD). Apart from digital assets, the main features are the availability of an AI virtual budget advisor and a shared digital wallet. In June 2020, Atidium became a completely open-source Decentralised application.

BetProtocol: Founded in 2018, aims to be a no-coding platform enabling developers and entrepreneurs to create gaming platforms based on blockchain technology. BetProtocol is a white label system with a set of tools given to developers to program their own betting system. In November 2019, the startup was able to raise 3 million dollars in its first private token sale round.

Bitcliq: Company established in 2013 with expertise in delivering products in various technologies. Developed a platform named Lota Digital that will be used as an e-marketplace for seafood trading. The platform can act as a quality control service and control agreements with the use of blockchain.

EYESO: Founded in 2018, aims to build a transparent marketplace for artists to sell their work and for brands to communicate their story. Blockchain technology is used as the basis for artists to upload their work. It is possible to track transactions with brands.

Indico Capital Partners: Founded in 2017, independent firm aims to support scalable projects based on blockchain technology. In April 2020, announced plans to launch a new accelerator to boost the Portuguese ecosystem in partnership with Google.

TAIKAI: Platform founded in 2018 with the vision to create the right environment for companies to post their challenges and for participants to showcase their skills. Uses the EOS.IO protocol to run smart contracts and native digital assets. Blockchain offers the opportunity to trace transactions and to take snapshots during the hackathon. In other words, the platform aims to curate hackathons in a fair way for all participants.

Universe Coin: Startup founded in 2019 that aims to make digital assets payments easy with innovations to the payment system. Platform aims to immediately the digital assets to fiat currency and designed to safeguard users from currency volatility. The ecosystem includes the payment gateway, the business side management platform, the physical terminal and mobile apps. The startup announced its partnership with a Portuguese real estate developer.

Utrust: Operating since 2017, it offers a digital assets payment solution designed to modernise the finance and payments industry. The company's platform helps merchants easily accept digital currencies for goods and lets buyers pay with them.

WalliD: Protocol established in 2018 developed for use in digital ID transactions. The company envisions the easy and safe use of any identification documents in the digital space. The platform allows users to encrypt and store identity documents in an Ethereum wallet.

INSIGHTS FROM EXPERTS

Miguel Correia, Associate Professor with Habilitation (Agregação) at Instituto Superior Técnico (IST) of Universidade de Lisboa (ULisboa) and a Senior Researcher at INESC-ID, in Lisbon.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Portugal?

The adoption of blockchain is its initial stages, where there are people interested in learning about blockchain and there are some use cases in the market. The ecosystem is going to grow in the next years. The is a large interest all over the country, with companies appearing, meetings, seminars, etc.

Are there notable blockchain-related education & training offerings by universities or other providers?

People are showing interest in learning blockchain. In Lisbon, the economic and engineering universities are adopting blockchain in courses for undergraduate and postgraduate students. Additionally, the programme from Tecnico+ and Católica-Lisbon is oriented towards professionals without any restriction on the industry sector.

Research on blockchain is really vivid as extensive research is being done by Portuguese academics. The Practical Byzantine Fault Tolerance (PBFT), a widely used protocol in permissioned blockchains, was developed by Miguel Castro (a Portuguese) and Barbara Liskov in late 90s. Today, a library named BFT-Smart was adopted by several permissioned blockchains and developed at the University of Lisbon by Prof. Alysson Bessani and his team. For instance, the library can be used in Hyperledger Fabric. The use of the library can save time as the protocols are extremely complicated. Another relevant example of blockchain research is a framework named SmartBugs that allows checking the correctness and security of smart contracts. The framework became public in 2020, developed by Prof. João Ferreira, colleagues and team.

What does the future hold for Portugal's blockchain ecosystem?

Companies, public organisations and universities are planting seeds as prototypes are developed and research ideas are further elaborated. All these actions will consolidate in the creation of full-fledged marketplace products in the future. Example projects that are known and mature are Aptoide AppCoins, Utrust and WalliD. The ecosystem will keep growing in the next years as more ideas and companies come onto the scene.

How would you evaluate the overall level of size & maturity of the blockchain and digital assets markets in Portugal?

There was a lot of excitement in blockchain when the idea was introduced to the public. But as time goes by, the interest and excitement have toned down as a consequence of three factors.

The first one is that projects in blockchain are not immediately successful and their success is not dependent on blockchain use.

Furthermore, complaints about blockchain emerge as more people attempt to adopt the technology. A complaint that is regularly stumbled upon the news would be the energy efficiency of blockchain. It is justifiable to express such concerns when the focus is on bitcoin mining, but it would not hold true to generalise on the technology.

The rise in the number of complaints should not come as a surprise as the expectations were initially inflated. A report by Gartner describes the situation perfectly as people are coming to the realisation that blockchain

would not magically solve problems and unsolved issues would come to the surface during the implementation phases.

The final factor for the diminishing excitement in blockchain has to relate to the growing focus on Artificial Intelligence. AI has a broader adoption and it exists for a longer time than blockchain.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Portugal?

There are several companies, e.g. well-known cases of Aptoide, Utrust and WalliD. Another intriguing solution has to do with the digitalisation of the local fish marketplace, named Lota Digital, from Bitcliq.

There are a couple of competitions for companies and teams to participate and showcase their skills in Portugal. GovTech was a public competition held in 2018 that called for innovative products. The competition might not be dedicated to blockchain applications, but the voting system applied blockchain as the citizens were given a virtual wallet to use for voting the projects. The Portuguese Blockchain Alliance is also running challenges that could attract students and startups to formulate a solution.

Key Findings

28 ICOs

From companies based in Romania

€20 million

Total funds raised

Individuals organised in Digital Currency Communities
Observers: 280,000
Enthusiasts: 6,500
Devotees: 1,500

ROMANIA

THE ROMANIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

The blockchain ecosystem in Romania seems to be in the initial stages. Nevertheless, there is growing participation in the ecosystem. Legislation in Romania has a tax exemption for overall transactions up to a threshold. Furthermore, Romania's legislative authorities will adopt the European Union's 5AMLD regulation in 2020.

The Romanian business scene accommodates around 21 companies that deploy solutions based on blockchain technology. The companies are mainly involved in information technology and the software sector. Moreover, companies are mainly small in size as the majority have fewer than 10 employees.

The community in Romania has unofficial groups in various cities and accommodates around 6,500 enthusiasts in blockchain subjects. The growth of the communities is assisted by organisations like Associatia Blockchain Laboratory that aim to foster the community. Finally, summits are held in Romania that give the opportunity to ecosystem stakeholders to gather in one place.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: In Romania, digital assets were confronted with scepticism by the authorities. Initially, the National Bank issued a warning in March 2015 about the risks associated with digital assets stating that they are not a form of electronic currency according to Law No. 127/2011. Furthermore, the Bank discouraged local credit institutions from any involvement in digital assets due to the potential reputation risk with their announcement in February 2018.

In October 2017, the National Fiscal Administration Agency (ANAF) declared that it was not possible to provide a tax regulation framework due to the lack of a legislative framework on digital assets. The situation changed with Law No 30/2019 in January 2019. According to the law, income from digital assets trading was taxable on profits. An interesting aspect of the law was the tax exemption on transaction profits under EUR 41 which annually accumulate to under EUR 123.

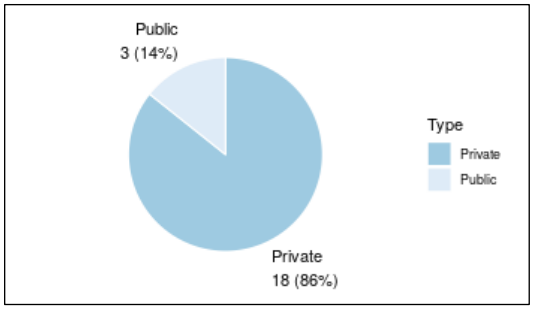
Blockchain in academia: In Romania, independent actions take place for blockchain education. Such actions are the organisation of workshops to educate the community. An example was the workshop organised by Modex conducted at the facilities of the Polytechnic University in Bucharest in December 2019. Additionally, workshops held by the Western University of Timisoara were announced to the public.

Furthermore, an intriguing initiative in the education field was initiated by four Romanians who created the company Code of Talent. It is a microlearning platform developed to provide lectures on various subjects and blockchain is one of the subjects.

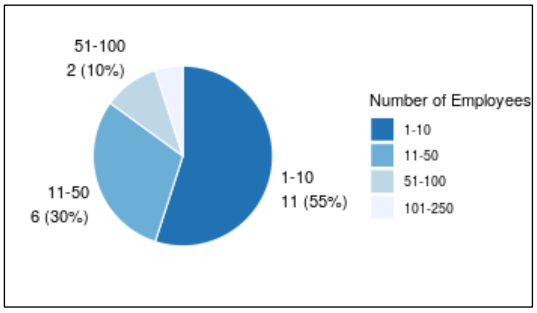
The educational institutions are offering educational programmes on contemporary technologies in software engineering. Despite the plethora of the available master's programmes, there is no programme solely dedicated to blockchain application.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

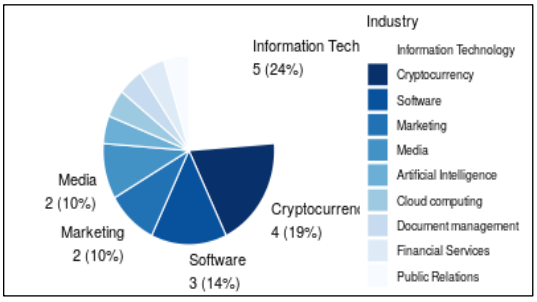
Accelerator programmes are meant to aid startups to grow in the initial stages faster than incubators. There are various accelerator programmes in Romania's technology sector, but research has focused on two cases for blockchain technology. An accelerator is Techcelerator that is based in Bucharest along with offices in Cluj and provides a 10-week acceleration programme for innovative startups. For instance, Techcelerator's portfolio includes the startup Oncochain that uses blockchain technology. The other accelerator for technology startups in their early stages is organised by Early Game Ventures.



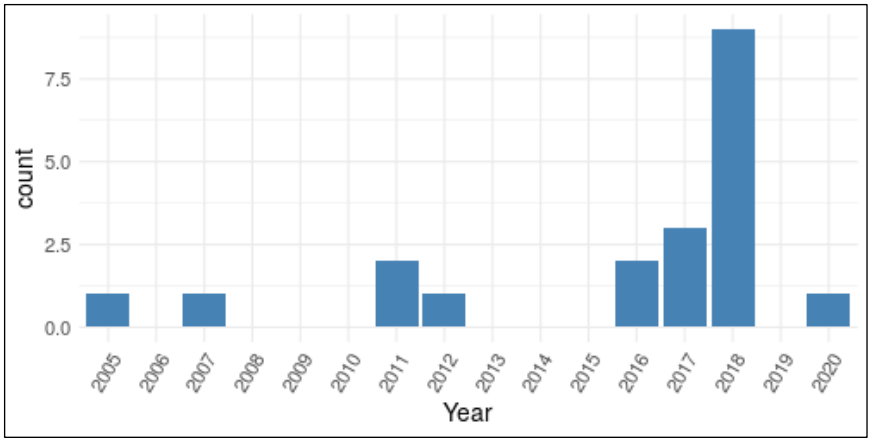
Other than accelerator programmes in Romania, activities originate from venture capitalists that provide funds to companies. Fundshing and Gecad Ventures have publicly showed interest in funding blockchain technology projects. Fundshing acts as an ICO consultant as it offers ICO management, OTC trading and blockchain integration services. Gecad Ventures is a venture capital firm that seeks to be an early investor in tech companies.



In Romania, 85% of blockchain-related startups are small and medium enterprises. The most common size is small companies of 1-10 people, representing 55% of all startups, followed by medium companies of 11-50 people (30%). Larger companies of 51-100 people or more represent the remaining 15%.

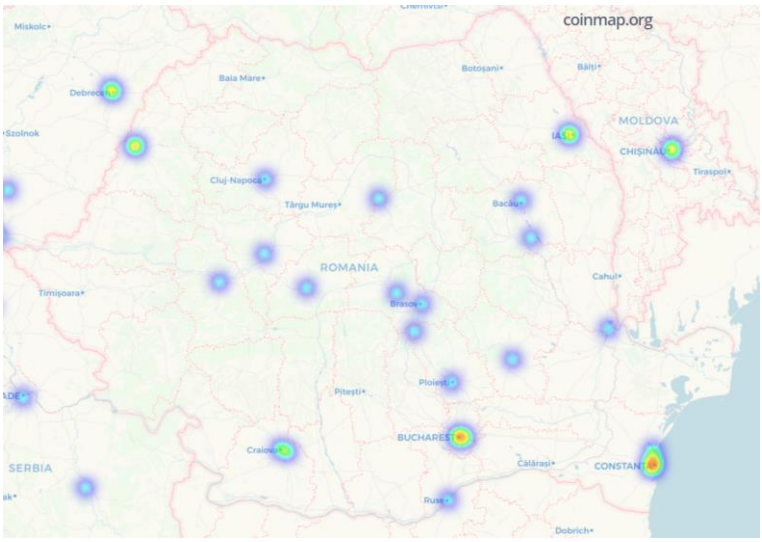


Romanian startup companies dealing with blockchain technologies began appearing in 2005, with a few new companies being founded during the next years. Since 2016, interest in blockchain technologies by startup companies seems to have grown, leading to a gradual increase in the number of relevant startups founded yearly. A peak was reached in 2018.



BLOCKCHAIN COMMUNITY

There is vivid interest shown in the Romanian blockchain community that is organised in around 28 groups. The groups foster knowledge in subjects such as the Ethereum blockchain and bitcoin, along with general subjects on the technologies for about 6,500 enthusiasts. The groups mainly organise meetups in Bucharest, Cluj, Timisoara and Sibiu.



Associations and initiatives are forming in order to facilitate the needs resulting from the community's growth.

In 2020, an initiative between the ICI Bucharest and ECEB came to fruition to facilitate research and educate and train executive professionals in blockchain. In addition to the initiative, an organisation called Associatia Blockchain Laboratory has been established to promote blockchain integration and adoption.

The community has the opportunity to grow its network during summits and conferences that take place in Romania. In November 2020, various stakeholders involved in blockchain had the opportunity to attend the Romania Blockchain Summit in Bucharest where prominent figures from the blockchain ecosystem spoke. The city of Cluj accommodated two conferences in 2019: MindChain and Transylvanian Crypto Conference (TC Conf). MindChain was a 2-day event that explored the interaction between blockchain and Artificial Intelligence. TC Conf was a 3-day event with talks, panel discussions and debates about bitcoin.

NOTABLE BLOCKCHAIN COMPANIES

Ccoin Network: financial ecosystem based on blockchain with the goal of reducing all fees resulting from personal fiat transfers to zero. Based on zero fees, there is the possibility to discount invoices. The ecosystem was founded in 2016 and was developed in Solidity. The ecosystem is based on the Ethereum blockchain and has its own token CCOIN. Ccoin Wallet was introduced in 2020 to allow the users to share, exchange and earn CCOINs.

Cegeka Romania: The company has been operating in the information technology and services sector since 2004. The company offers its competences in contemporary technologies, like blockchain, for software development.

CertSIGN: company founded in 2006 is a qualified trust provider and software house involved in the information security area. Adopted blockchain technology and developed certME, a service to guarantee the identity in the blockchain. The application assists in changing physical ID cards with a digitalised way of identification. The application implements the decentralisation of user identity using a distributed application that runs the public Ethereum blockchain and users are in control of their data.

Elrond: startup incorporated in Malta in 2017 but builds its activities out of Romania. Regarded as the second-best funded startup in Romania. Aims to completely reconstruct the public blockchain infrastructure by relying on two cornerstones. Firstly, an Adaptive State Sharding approach is proposed where the chain is partitioned

into multiple shards to handle in parallel. The second cornerstone ensures long-term security and distributed fairness by eliminating the energy-intensive use of Proof of Stake algorithms.

Moonlet: digital assets wallet founded in 2017 that allows users to easily store their different crypto assets. The wallet is blockchain agnostic, cross-platform integrated and secure.

Persona: founded in 2017, provides a blockchain-based data security platform. The company is described as a solution in identity management aligned with contemporary data protection regulations. The blockchain is leveraged for the idntity services along with the protection of individuals' personal details. The developed platform provides a community for users to choose validators for data access control. The validators are able to provide validation only after ensuring proper authentication based on a video call.

Restart Energy: energy supplier and blockchain-based energy exchange founded in 2015. Developed a platform named Restart Energy Democracy to allow direct energy exchanges between producers and consumers. Platform's ecosystem operates on the Ethereum blockchain and has its native digital assets token named MWAT. The fundamental idea for platform development was that decentralised trading would decrease costs and democratise energy access. Smart contracts are utilised for handling the transactions without third-party intervention.

SWAZM: is a startup which was established in 2018. The company aims to simplify the scalability of projects and offer detailed monitoring, easy deployment and effective load management. To achieve this, the underlying architecture is based on blockchain technology and is designed to allow horizontal and decentralised development. In 2019, the company had successfully raised EUR 500 000 in investment.

INSIGHTS FROM EXPERTS

Sînică Alboaie has over 20 years of experience as an entrepreneur, a software developer, a technical manager, and a researcher in areas as distributed systems, software integration, privacy, and blockchain technologies.

How would you evaluate the overall level of size & maturity of the blockchain and digital assets markets in Romania?

The blockchain industry is focused mostly limited on digital assets and crypto trading. Some research projects and blockchain enterprise-oriented startups appeared.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Romania?

I am close to the PrivateSky project at the Alexandru Ioan Cuza University of Iaşi that promotes a new method of using blockchain for enterprise solutions (OpenDSU). There are other projects and startups that are more impressive from a marketing point of view, but not as innovations.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Romania?

Citizens and businesses have limited to almost zero adoption of blockchain.

Are there specific regulatory or national policy initiatives in place in Romania?

I am not aware of any regulation that stands out. Romanian startups are typically looking to compete in external markets.

Are there notable blockchain-related education & training offerings by universities or other providers?

Yes, universities are starting to teach blockchain courses. For example, the computer science faculty at Alexandru Ioan Cuza University of Iaşi.

What does the future hold for the Romania's blockchain ecosystem?

Hard to say. It depends on what happens at the international levels. Most Romanian companies and research groups follow the international markets.

Key Findings

€ 13.7 million
Total funds raised

First Bitcoin ATM
In Europe

Most active sectors
Cybersecurity
Digital assets Exchanges
Software Development

SLOVAKIA

THE SLOVAKIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Despite the relatively limited blockchain scene in Slovakia, the Slovakian blockchain hub is constantly offering opportunities for the local tech professionals to engage further with the blockchain technology and community.

The country is an important landmark in the history of digital currencies. On 8 December 2013, Europe's first Bitcoin ATM was installed in Bratislava, Slovakia. Similarly, an independent store of the popular fast-food chain Subway has been accepting payments with digital currencies in its Bratislava store since 2013.

On another note, the Venture Capital firm and crowdfunding platform Crowdberry, which is an official partner of the Slovakian government sovereign fund Slovak Investment Holding, has invested in blockchain startups.

TOWARDS MAINSTREAM ADOPTION

There is no available data suggesting that blockchain has significant adoption in the Slovakian public sector or regional governance.

Legislation of blockchain: On 23 March 2018, the ministry of finance published guidance explaining that revenues stemming from digital assets need to be taxed. It said that any type of exchange, such as an exchange of a digital currency for an asset or a service rendered or for another digital currency, must be considered to be a taxable transfer. The guidance underlines that digital currencies must be treated as "short-term financial assets other than money" and priced at market value at the time of transaction. The guidance also notes that digital currencies directly obtained from mining should be kept off the balance sheet until they are sold or traded. Earlier, the finance minister had noted that trade in digital assets, which is unregulated and anonymous, involves risks of terrorism and organised crime

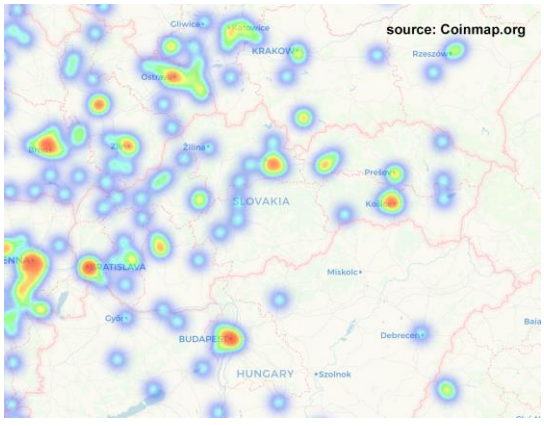
Blockchain in academia: Beginning from the academic year 2020-2021, full-fledged University-grade course for Computer Science classes focused on in-depth understanding of bitcoin, Ethereum, Digital assets and blockchain technology lectured at Faculty of Informatics and Information Technologies at Slovak University of Technology will be offered by blockchain advisors David Stancel and Kristian Kostal. The course syllabus is publicly available.

Additionally, Blockchain Slovakia, an educational non-profit organisation aims to create a platform that brings together all the stakeholders in the country's crypto space. such as the regulators, developers, businesses as well as the general public. The organisation is focused on raising awareness about digital assets and blockchain technology via various educational activities. The organisation is regularly hosting meetups, seminars and workshops.

Blockchain across key industries: The Slovakian cybersecurity firm ESET has been active in the identification of malware along numerous blockchain and Digital Currency projects. ESET began as a pioneer of antivirus protection, creating award-winning threat detection software. Given the expertise, and the size of the company in the Slovak tech ecosystem, cybersecurity could be identified as one of the industries that are relevant to the blockchain opportunities.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

The number of blockchain startups in Slovakia is rather low, with only one startup in the revenue generating phase. There are eight blockchain startups and digital assets-themed companies.



Bratislava is home to the second centre for crypto-anarchy – the Paralelni Polis, which has been initially established in the Czech Republic. Paralelni Polis is self-described as a "freedom think-tank" that aims to serve as a breeding ground for such ideas. A phrase that translates to "parallel city," at its surface, Paralelni Polis is like many Digital Currency centres worldwide. The Paralelni Polis focuses on education, meetups, a co-working space, and walking newcomers through the process of converting their fiat into Digital Currency in order to buy a coffee, for example. As Coindesk reports, Paralelni Polis stands for its open refusal to cooperate with governments and its role in nurturing projects that actively antagonise the state. It is also on a mission to provide individuals with the tools to disassociate themselves from it.

BLOCKCHAIN COMMUNITY

The community consists of 130,000 observers, according to the extended outreach data, as those exported by Facebook audiences. Out of these, 935 members are engaged with communities of practice, involved in five frequent meetup groups.

The number of blockchain startups in Slovakia is rather limited, with only one startup being in the revenue generating phase.

Sizeable communities of technology enthusiasts can be found around educational NGOs such as Paralelni Polis and Blockchain Slovakia. They are committed to educating the public.

Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Slovakia, Keywords: Blockchain, Digital assets, Digital Currency, Bitcoin | Source for Enthusiasts

NOTABLE BLOCKCHAIN COMPANIES

3IPK: 3IPK is a B2B blockchain Software as a Service (SaaS) platform providing digital solutions automating certification, supply chain, maintenance and programme management processes for aerospace, automotive, defence and other sectors.

Eterbase: First regulation-compliant European Digital Currency exchange, offering fast, secure trading on a clean, powerful, user interface.

AltFins: A cloud-based platform allowing investors and traders to track and analyse digital assets across various platforms.

DMG MEDIA: DMG focuses on designing, developing, and commercializing innovative blockchain-based solutions for the media and entertainment industry. Its mission is to facilitate content distribution in a faster, more cost-efficient way while ensuring content creators get their fair share of revenue for their work and content consumers pay a fair price.

Fumbi Network: Smart and Safe investing in a dynamic portfolio of top digital assets for the general public.

INSIGHTS FROM EXPERTS

David Stancel

COO at Blockchain Slovakia

To verify the findings of desktop research, David Stancel, COO at Blockchain Slovakia, was interviewed. He also serves as adjunct Lecturer in Digital assets in the University of Economics (Bratislava), and advisor in numerous Digital Currency ventures.

David Stancel notes the Slovakian community around digital assets and blockchain is quite mature and has roots in early hackerspaces and tech communities that established even before digital assets became a thing. Therefore, the community of early adopters is rather sizeable and has been active for many years. This is reflected also in a couple of companies that were founded in this field in the country.

The tax and regulatory regimes have not been keeping up though. Many of the crypto businesses suffer from de-risking and are flatly denied banking services regardless of their product or adherence to Know Your Customer (KYC) and Anti-Money Laundering (AML) rules. The growth of this sector has been dwarfed. So have tax rates related to Digital Currency trades. Given that most of the surrounding countries offer more favourable conditions in this regard, some companies decide to operate from elsewhere. This pattern is more material especially in relation to the Czech Republic with which we have historically a very close connection.

According to Mr. Stancel, there are two major educational organisations – Paralelni Polis and Blockchain Slovakia – that organise meetups on the wide variety of topics related to digital assets and blockchain.

In addition to this, there are a few successful Slovak companies in this field. The list includes Digital Currency broker Fumbi and Bitcoin ATM providers such as Bitcoinmat.sk or Cryptodiggers that also provide a payment gateway.

There are also a number of companies developing different blockchain products. David Stancel listed the following: Decent, Bethereum, and CryptoTittiez. He also noted that most of them did not get much traction.

There are also several companies that focus on software development services focused on Digital Currency and blockchain space and these include Vacuum Labs, Creanet, DLT Soft, or Block Unison.

A working group focused on digital currencies was formed in 2018 by the Centre for Financial Innovation under Slovakia's ministry of finance. The Slovak National Bank launched an Innovation Hub in 2019 which deals also with crypto companies. However, none of the initiatives have produced tangible results that would positively impact the companies active in this space. The only Digital Currency-specific laws that Slovakia has are related to taxation Digital Currency trading.

As one of the founding members and COO of Blockchain Slovakia, an NGO which offers seminars and workshops for companies as well as public institutions, David Stancel has backed a full-fledged semester-long course on digital currencies and blockchain, in cooperation with industry leaders such as Ernst & Young. The course is currently being offered by two universities, the Slovak University of Technology and the University of Economics in Bratislava. The course is open-sourced and continuously updated on Github, so that other institutions can use it too.

In general, Slovakia boasts with one of the densest networks of Bitcoin ATMs in the world, and there is a number of merchants, both small and big, accepting payments in digital assets. Given the educational efforts of the companies and NGOs in the field, the general public awareness is relatively high.

Key Findings

5% of global investments

in blockchain projects

FinTech, Supply Chain

Most active sectors

25

Blockchain solution providers and startups

SLOVENIA

THE SLOVENIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Republic of Slovenia, while small in size, is renowned worldwide for their blockchain companies. The country promotes its economy as “Green, Creative, Smart”, and one that leans towards a higher adoption of blockchain technology. Slovenia ranks second in the world for the number of searches of the term Initial Coin Offering (ICO), surpassed only by Singapore. The country is also home to the second-largest bitcoin scene within Europe based on Google search queries.

To highlight the importance of blockchain-related technologies in the Slovenian economy, in October 2017, Slovenia’s Prime Minister at the time, Miro Cerar, declared that the government "*want[s] to position Slovenia as the most recognised blockchain destination in the European Union.*"

In December 2019, an important milestone was reached in the country. Slovenia launched the national test blockchain infrastructure SI-Chain, enabling the testing of existing and new blockchain applications for the public and private sector. This also provided the country with the opportunity to actively participate in the development of use cases implemented on the European Blockchain Services Infrastructure. This led to Slovenia becoming the first EU Member State to establish a blockchain test infrastructure.

Slovenia was further recognised by the United Nations Group of Friends on Digital Technologies as a role model. This stems from the cooperation between public and private sectors in the country to develop blockchain solutions. Finally, the European Commission recognised Slovenia as a reliable partner to be hosting the first pilot project – the regional investment fund for AI and Blockchain startups in Europe.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking In November 2019, the launch of the SI-Chain that was established by the technology provider company Hashnet in cooperation with Telemach, the telecommunication solutions provider, helped Slovenia's public sector make significant progress towards blockchain adoption. Moreover, Blockchain Think Tank Slovenia, established in 2017, serves as an open forum that enables individuals, organisations, commercial and state bodies to work together, share, and exchange information. The Think Tank is one of the key enablers promoting the blockchain environment in Slovenia, by fostering the dissemination of information among relevant stakeholders, from the government, research and innovation bodies, companies, and non-governmental organisations, as coordinated by the Ministry of public administration.

Recently, Danfoss Trata Slovenia and Blockchain Think Tank Slovenia agreed to collaborate on a joint project, focusing on identifying blockchain companies and projects in the wider region that are developing technological solutions within the energy industry.

Legislation of blockchain: The Financial Administration of the Republic of Slovenia clarifies that the profit received by individuals from trading digital currencies (as a result of fluctuations in the digital currency market) is not subject to any income taxation. This clarification is based on the fact that according to the Slovenian Income Tax Act, capital gains are generally not taxable if they are derived from movable property or disposal of derivative financial instruments. Taking into account that digital currencies are not defined as financial instruments or shares, they do not fall within the scope of capital gains tax applicable to natural persons.

Blockchain in academia: Following the wide adoption of blockchain technologies in the country, academia is also starting to adapt to this new trend. The Blockchain Lab of the University of Maribor is the most notable academic initiative in Slovenia related to blockchain technology. The blockchain lab consists of a multidisciplinary team of researchers, developers, and consultants who develop and evaluate solutions and services, based on blockchain technology. The focus of the lab is on promoting and accelerating the use of blockchain technology in the development of innovative IT solutions and services that support new business models. In addition to this initiative, other universities have already added or are in the process of adding courses related to blockchain technology to their curricula. Moreover, several associations such as the Slovenian Blockchain Association, the Bitcoin Association Slovenia, the Blockchain Alliance Europe, and the Noordung Blockchain Hub are offering professional training related to blockchain and digital currencies.

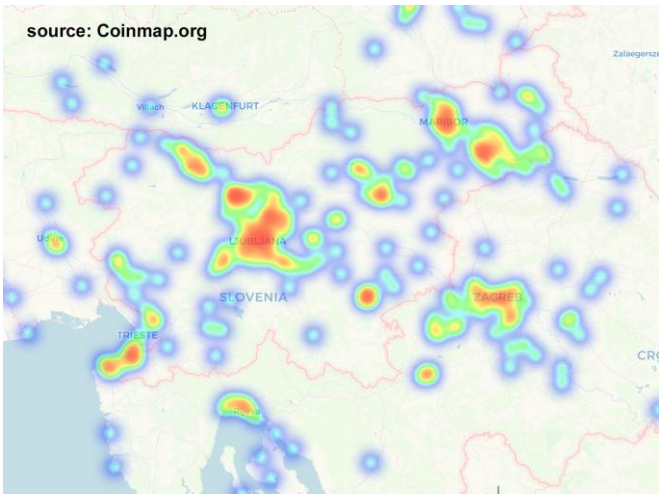
Blockchain across key industries: While blockchains startups operating in Slovenia cover a wide spectrum of sectors and businesses, it is those that focus on the financial and digital currency that make up the majority. Of these, Bitstamp is the most notable digital currency startup. It was originally incorporated in Slovenia, but later moved its registration to the United Kingdom and then to Luxembourg due to the lack of adequate financial and legal services in Slovenia. Supply chain-related startups are also starting to emerge in the country, making this a promising sector for the years to come.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Relative to its size and population, Slovenia hosts a large and vibrant blockchain ecosystem. This comes as no surprise, as some of the most significant EU blockchain companies emerged from the country's capital. The fast-paced growth of the blockchain startup and business scene is attributed to the fact that since 2017, Slovenian projects received over 5% of global investments in blockchain projects. Half of the startup companies, not eligible for institutional funding due to their growth levels, were mainly funded by ICOs, which gave rise to the blockchain-related entrepreneurial ecosystem and expanded the existing business environment in Slovenia in new directions. As a result of this boom in blockchain startups, Slovenia currently has a large number of IT professionals that offer their services not only in companies within the country, but also to companies worldwide that outsource parts of their software development process.

To promote the development of an innovative and diverse startup ecosystem, as well as to foster the productivity and competitiveness of the Slovenian economy, in 2018, the Ministry of Economic Development and Technology issued a call for demonstration and pilot projects funded by EU funds amounting to € 73 million and were allocated to projects planning the use of blockchain technology (65% funding) and artificial intelligence (74% funding) and other converging technologies (Internet of Things, big data, machine learning, predictive analytics, augmented reality, virtual reality, mixed reality, 3D, etc.). It is expected that the results and the lessons learned from these projects will allow the Slovenian government to create the necessary regulatory framework for the various sectors disrupted by blockchain technology. This regulatory framework will introduce, among other things, the "smart contract" definition into Slovenian corporate law and define the required regulatory sandboxes for different fields of industry and the public sector.

BLOCKCHAIN COMMUNITY



The blockchain community in Slovenia consists of both professionals and enthusiasts, as well as of associations targeting the promotion of blockchain-based solutions in a more organised and systematic manner.

Established in 2017, the Slovenian Blockchain Association aims to connect developers, students, crypto enthusiasts, and organisations, who wish to take part in the transition into the decentralised future, to foster knowledge sharing, testing, and development of impactful blockchain solutions. The Bitcoin Association Slovenia, is another example primarily focusing on the digital currency-related application of blockchain technology, while the Blockchain Alliance Europe, was established with the purpose of mutual assistance in the field of business development, networking, cooperation, and a joint approach to defending the interests of the members of the alliance. It also seeks to raise awareness of the importance of blockchain technology among the professional and lay public, and therefore, organises various events and training courses. It also cooperates with government authorities in the field of the relevant legislation. Blockchain Think Tank Slovenia operates under the auspices of the Slovenian Digital Coalition and its purpose is the distribution of knowledge, as well as the exchange and transfer of information among all the relevant stakeholders (from the government, research and innovation bodies, companies, and non-governmental organisations, as coordinated by the Ministry of Public Administration. Moreover, the Noordung Blockchain Hub, aimed to create a network of businesses and individuals from different branches, where they can participate in the development and optimisation of their work and business, the development of project ideas and projects, and to access knowledge and information.

Apart from the organised blockchain associations and hubs, the Slovenian blockchain community consists of 22, 000 observers based on the extended outreach data from Facebook Audiences, which corresponds to approximately 1.1 % of the population. Out of those, 723 members are engaged with communities of practice related to blockchain technology and are involved in 6 frequent meetup groups.

The number of blockchain startups in Slovenia according to Crunchbase is 25, with the majority being incorporated in Ljubljana in 2017.

NOTABLE BLOCKCHAIN COMPANIES

CargoX: Aims to disrupt the global logistics industry by introducing Smart B/L documents based on blockchain technology, replacing old-style paper Bill of Lading documents. It claims to reduce the time taken for transfer of ownership from the traditional 5-10 days involving the physical transfer of the certificate to 20 sec by building a smart contract for the transfer of ownership.

Eligma: Uses blockchain and AI technology to provide an e-commerce platform. It provides product recommendation and matching algorithm, value prediction algorithm, decentralised loyalty, blockchain database, crypto-payment gateway, etc.

Hiveterminal: A blockchain-based invoice financing platform. Users register their company details and upload their invoices. The platform utilises its real-time invoice rating algorithm and provides information about the financial health of the invoice. Once the invoice is purchased from the invoice seller, the invoiced buyer receives the full invoice amount directly from the invoice seller's debtor on the invoice due date.

Iconomi: A digital currency investment platform. It supports bitcoin, Ethereum, Ripple, etc. It offers multiple digital currency indices for investments including Incrypt Fundamentals, StrongCoindex, Hive Index, Solidum Prime, etc. It also offers a mobile app to buy and sell digital currencies and digital portfolios.

Iryo Network: A decentralised database to store medical health records. It claims to streamline the format of recording data and combine all the fragmented data from multiple sources related to a particular patient into a single file, thereby eliminating fragmentation. The code is open source and available on GitHub.

NiceHash: A digital currency cloud mining, hash rental service, and multipool. It offers two separate marketplaces: Europe and the United States with stratum servers and also provides stratum proxies located in Asia (Tokyo and Hong Kong). It charges a processing fee from each party of hash rate trade (buyers and sellers) and the fee is currently set at 3%. It offers two types of contracts, auction-based and fixed price.

OriginTrail: Enables data sharing along any supply chain. The decentralised, blockchain-supported platform helps companies exchange relevant data seamlessly and in a secure way to build accountability, protect their brands, and increase efficiencies.

SunContract: An energy-trading platform that utilises blockchain technology to create a new business model for buying and selling electricity.

Tolar HashNET: A scalable, fast, secure, and fair decentralised- beyond blockchain project, leveraging Distributed Ledger Technology and consensus algorithm which keeps all positive characteristics of blockchain technology while increasing throughput to more than 200,000 transactions per second.

Viberate: A database and analytics company for electronic music artists and professionals. The platform is meant for artists, labels, and venues to browse profiles of other professionals' profiles. The company tracks the performance of artists and venues through online channels and generate analytics based on the same.

INSIGHTS FROM EXPERTS

Anja Blaj, President Blockchain Think Tank Slovenia

Slovenia has a lot of early crypto adopters and if you sit down for a drink at the riverbanks in the middle of Ljubljana, you'll hear people talking about bitcoins and blockchain based projects even when there is no all-time-high on the market. The know-how has been shared and internationally applied on numerous ends. I believe clear tax and accountancy standards established early on can drive the adoption of blockchain infrastructure even further.

Nejc Novak, Blockchain Legal Specialist, Founder Novac Router

Slovenia is home to a number of excellent and experienced blockchain developers, who have tapped into the space. They now work with some of the best-known names in the industry and many of them have the majority of their operations in Slovenia, namely Bitstamp, OriginTrail, Iconomi, Eligma and others. As a country, Slovenia has been supportive of the blockchain industry, but favours an EU-wide regulatory approach instead of country-per-country regulation. The Slovenian tax authority has provided clear and favourable crypto taxation guidelines, but for more regulations, Slovenia seems to be waiting for EU-wide action.

Tadej Slapnik, Director, Tolar HashNET

Slovenia is a country of successful blockchain companies, always on the global frontiers of blockchain development and implementatio

Key findings

€23 million

Total funds raised

8 universities

Offering programs related to blockchain

150+

Companies active in the blockchain space

SPAIN

THE SPANISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

Spain is the second largest country of the European Union and the fourth largest within the continent. Blockchain technology is generally viewed as an opportunity by country officials and local entrepreneurs alike.

The year 2018 was catalytic for blockchain's development in Spain as the technology gained traction among regulators and prominent entities in the business field alike. Draft bills and suggested legislation regarding blockchain enjoyed wide acceptance across the country's political parties too. At the same time, Spanish authorities issued warnings against initial coin offerings (ICOs) and digital currencies on several occasions. Nonetheless, blockchain initiatives by the private sector started gaining significant traction, with companies in the banking, energy and shipping sectors exploring blockchain applications.

Today, blockchain and digital currencies remain largely unregulated, while Spain is home to more than 150 companies and startups in the blockchain and digital currency space. These companies are active in a variety of verticals, with only financial services presenting a high amount of concentration. The Spanish blockchain and digital currency community is relatively small when considering the country's population and total area, with around 180 enthusiast groups and communities of practice interested in the areas of blockchain and digital currencies. Despite that, no less than eight universities offer higher-level blockchain education.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: The year 2018 was characterised by the increased interest of Spanish policymakers in areas relating to blockchain and digital currencies. In May of 2018, a draft bill to regulate blockchain and digital currencies received wide cross-party support in the Spanish Congress. The initiative promoted blockchain as a cost-efficient system to facilitate payments and monetary transfers and argued for the introduction of blockchain technologies to the Spanish market in a controlled manner. A month later, deputies from the leading party proposed the use of blockchain in public administration, while tax breaks for blockchain companies were also being considered. At the same time, a Spanish bank reportedly became the first in the world to utilise blockchain technology in their financial products. On September 17th, the Spanish Congress unanimously approved a new legislation to facilitate the digital transformation of the financial system. The new bill introduces a regulatory sandbox for novel fintech projects, including blockchain and digital currencies.

Digital currencies are not considered legal tender and their exchange is VAT exempt. They are largely governed under legislation that relates to commodities, namely the general rules of the Civil Code and the Code of Commerce. On several occasions, Spanish financial authorities have criticised and distanced themselves from digital currencies and ICOs. This is especially true in areas that fall under the country's securities legislation. In February 2018, in a joint statement, the Spanish National Securities Commission and the Bank of Spain noted that digital currencies are not issued, registered, authorised or verified by Spanish regulators, in an attempt to alert investors to the inherent risks of loss or fraud associated with them. In a similar announcement, on March 27, 2019, the Spanish Securities Market Commission stated that the agency has never approved or authorised projects active in the ICO sector to that date. Warnings have also been issued by the police, while country officials reportedly worked together with other European countries on regulating Facebook's digital currency, Libra.

Capital gains from the exchange of digital currencies are subject to a variable tax rate ranging from 19 % to 23 %. ICOs and other alternative forms of financing that utilise blockchain may be subject to securities regulation. Digital currency mining remains unregulated.

Blockchain in academia: Spanish universities, vocational institutions and training centres are committed to providing higher-level blockchain education, with numerous standalone courses offered across a wide range of interest areas. In total, eight universities that are offering master's programmes focussing on blockchain could be identified. Through their academic programmes, these institutions cover a wide range of areas – even niches – in the blockchain space, including, but not limited to: smart contracts, decentralised autonomous organisations, game theoretical elements, regulation and tax, cryptography, development and monetary policy. Most programmes are offered in-person, while others adopt a hybrid model or are conducted exclusively online. Courses are taught in Spanish and English. More specifically, the courses offered are:

University of Alcala: – "Master's in Blockchain, Smart Contracts and CryptoEconomy": Established in 2019, the "Master's in Blockchain, Smart Contracts and CryptoEconomy" is offered in Spanish and provides options for in-person and distance learning. It focusses on the areas of game theory and blockchain application development, with a primary focus on Ethereum.

Innovation and Entrepreneurship Business School – "Master's in Blockchain and Fintech": Since 2018, the Innovation and Entrepreneurship Business School has been providing an online master's degree in blockchain and fintech. The curriculum covers the areas of blockchain, regulation, digital currencies and smart contracts.

University of Barcelona – "Global Master's in Blockchain Technologies": Since March of 2019, the University of Barcelona has been offering the online Master's in Blockchain Technologies, in collaboration with the Zigurat Innovation & Technology Business School. The curriculum covers the areas of blockchain architecture, cryptography, digital currencies and regulation.

Miguel de Cervantes European University – "Master's in Applied Blockchain, Programming Taxation and Cryptoeconomics": Since March of 2019, the Miguel de Cervantes European University has been offering a master's degree in applied blockchain, focussing on the areas of programming, taxation and digital currency economics.

EU Business School / Universidad Católica de Murcia / University of Roehampton – "MBA in Blockchain Management / MSc in International Management": The programme on blockchain management by the EU Business School offers a dual qualification depending on the students' professional experience: an MBA by the University of Roehampton and a master's degree in international management accredited by the Universidad Catolica de Murcia.

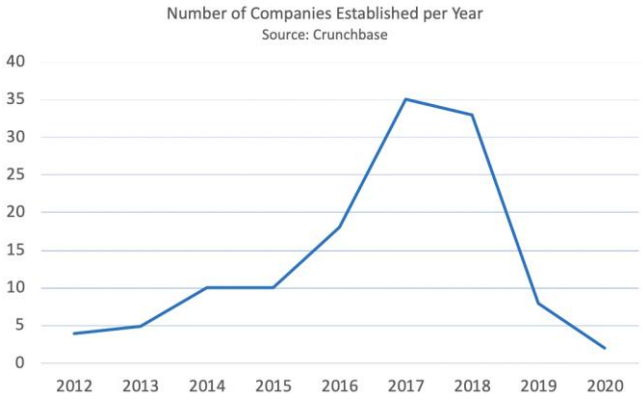
University of the Basque Country – **"**Master's in Blockchain Technology and Cryptoeconomy**"**: Since October of 2020, the University of the Basque Country has been offering an in-person master's degree in applied blockchain, focussing on the areas of cryptography, game theory, regulation and tax, quantum computing and blockchain programming.

University of Girona – **"**Master's in Distributed Ledger Technology and Artificial Intelligence**"**: The master's programme on DLT and AI offered by the University of Girona focusses on high-level programming, security and cryptography, the business and legal aspects of blockchain and relevant technologies as well as the development of applications that can interact with blockchain protocols and smart contracts.

Universidad Europea de Madrid – **"**Expert in Blockchain and Bitcoin": With a duration of six months, the postgraduate programme in Blockchain and Bitcoin offered by the Universidad Europea de Madrid teaches the fundamentals of digital currencies and blockchain with a focus on legal and economic aspects associated with the above technologies. The same university also offers an in-person three-month bootcamp on blockchain technologies.

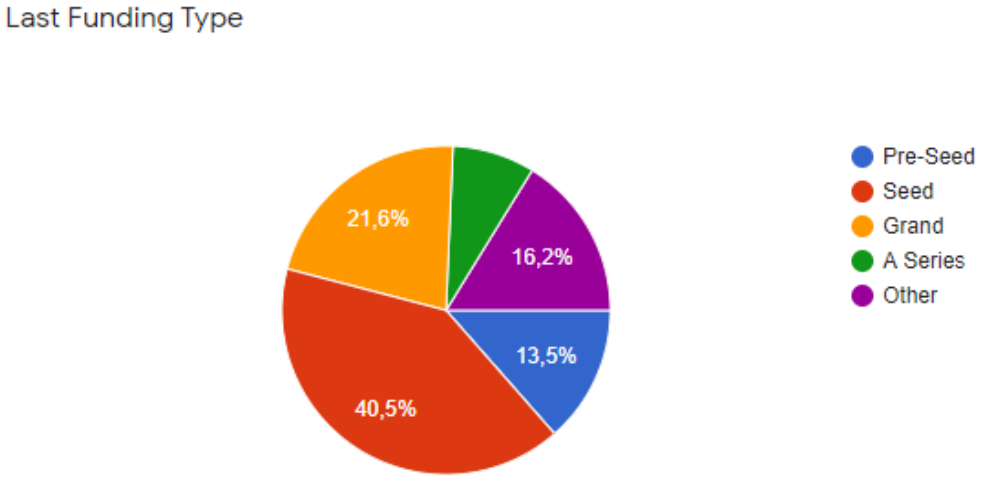
Blockchain across key industries: Spanish banks were some of the first entities in the country to explore blockchain-powered applications. BBVA issued a €750 million loan entirely on-chain, which reportedly *"cut the negotiation time for the loan from days to hours."* Banco Santander announced plans to utilise xCurrent, a blockchain-based technology offered by Ripple, for cross-border payments and remittances. CaixaBank continues to explore blockchain technology, even partnering with leading companies from the space. Firms from one of Spain's largest sectors, the energy sector, are also exploring blockchain technology. Indicative examples are initiatives from ACCIONA and Iberdrola. Endesa is also using blockchain in collaboration with the Malaga City Council to protect financially vulnerable customers. The food giant Campofrío also uses blockchain technology to guarantee transparency in some of its food products.

BLOCKCHAIN STARTUP AND BUSINESS SCENE



The Spanish blockchain startup and business ecosystem is active with initiatives from prominent players in traditional fields such as banking, energy, shipping, telecommunications, and even sports. In 2017, 70 of the largest Spanish companies from the areas of banking, energy and telecommunications came together to form Alastria, a non-profit consortium aiming to accelerate digital transformation through blockchain technology. Today, Alastria counts more than 560 members from the private and public sectors and has developed a novel digital identity model coined Alastria ID. In 2018, BBVA became the first global bank to issue loans utilising blockchain technologies. In early 2020, CaixaBank implemented the we.trade blockchain platform allowing smart contract-enabled trade and payments. Lastly, FC Barcelona, one of the world's most popular football clubs, teamed up with blockchain provider Chiliz to issue their own digital asset token.

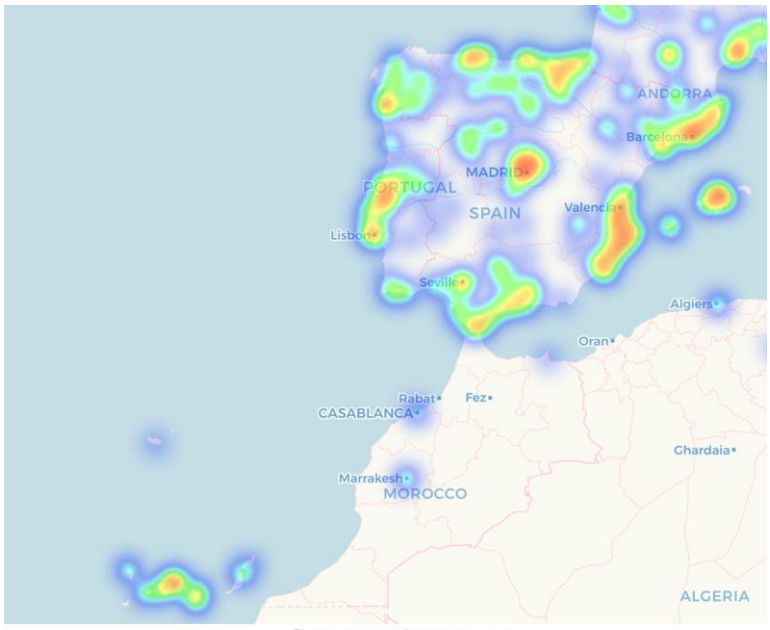
Apart from initiatives by established players that do not primarily operate in the blockchain space, Spain is home to more than 150 small and medium-sized companies and startups in the blockchain and digital currency space, which employ on average 10–15 individuals. Companies in the country have collectively raised north of €21 million in funds. This was done primarily through venture funds as no ICOs, STOs [security token offerings] or alternative forms of financing could be identified. Blockchain companies are active in a wide range of areas, from financial services and IT to gaming and energy. Apart from financial services, no statistically significant concentration in any other vertical could be identified.



BLOCKCHAIN COMMUNITY

Compared to the country's population and total area, the Spanish blockchain and digital currency community is relatively small. A total of 180 enthusiast groups and communities of practice could be identified. Communities are active nationwide, the highest concentration found in Madrid and Barcelona. Some prominent blockchain conferences have taken place in Spain, namely the European Blockchain Convention and the Convergence Global Blockchain Congress.

Approximately 290 000 Observers (individuals interested in the topics of blockchain and digital currencies) could be identified nationwide. Enthusiasts (people that are part of groups and communities with a purpose to promote blockchain) along with Devotees (who actively participate in discussion and events) roughly amount to 80 000 people. A significant overlap between different Enthusiast groups and communities of practice exists, signalling that the Spanish community is overall interested in various aspects of blockchain technology.



Source: coinmap.org

(Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Austria, Keywords: Blockchain, Digital Currency, Bitcoin | Source for Enthusiasts).

NOTABLE BLOCKCHAIN COMPANIES

EthicHub: Established in 2017, EthicHub provides a blockchain-based P2P platform that connects small farming communities with lenders and product buyers.

Validated ID: Validated ID, founded in 2012, leverages blockchain technology to provide a decentralised self-sovereign digital ID in an attempt to facilitate on-boarding and KYC procedures.

Atani: Founded in 2018, Atani offers an all-in-one digital currency trading platform, wallet and tax reporting software.

Witnet: Witnet is an open-source project that aims to offer a decentralised oracle network that connects smart contracts with the real world in a trustless way.

Ethereum Madrid: Established in early 2016, Ethereum Madrid is a for-profit think tank and educational initiative that provides education and hosts hackathons and events on all things blockchain. The initiative has partnered with prominent projects from the Ethereum space such as Aragon and Gnosis.

iCommunity Labs: iCommunity Labs or iBS offers blockchain-as-a-service (BaaS) & software-as-a-service (SaaS) platforms. The company aims to bridge the existing gap between business organisations and blockchain technology.

Place to Plug: Founded in 2015, Place to Plug is an EV charging platform powered by AI and blockchain that connects EV drivers and charging stations.

Blockchain Company: Founded in 2017, Blockchain Company is a media platform helping people discover blockchain news.

Review.Network: Review.Network is a blockchain-powered consumer-generated review and primary market research platform. The company aims to build the world's fastest, most trusted and intelligent market feedback platform by rewarding users for their feedback.

Tutellus: Tutellus is a P2P blockchain-powered edtech platform that pays students for learning.

INSIGHTS FROM EXPERTS

Monste Guardia Guell, General Manager, Alastria Blockchain Ecosystem

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in Spain?

In terms of maturity, we have reached a good level. We started seeing some entrepreneurial activity [in Spain] as early as 2009, 2010 or 2011, with some banks studying digital assets and blockchain as early as 2012. In 2016, Vitalik Buterin was invited to the Mobile World Conference and I had the opportunity to interview him, and we started becoming more open-minded towards decentralisation and getting a better understanding of the various blockchain, deployments and digital assets. In 2017, there was the biggest joint effort between entities from the banking, energy, legal and other sectors such as insurance and real estate to create Alastria. That was three years ago. Since then, we have been working on a legal framework not just for public blockchains but also for concepts of permissioned blockchains and private blockchains. We are also working on Hyperledger and Quorum and permissioned deployments of Ethereum blockchain, at the same time looking into standardising the legal framework. Our next step will be to publish a proposal for the first standard for digital identity in Spain. I believe we are at a good maturity level, in part because we are embracing the legal aspects. On this front, we are working very hard with the Spanish government and regional government as well as entrepreneurs to align our efforts with European regulation, promote use cases for it [the digital identity framework] and lastly deploy it as a working product for the public administration and in the enterprise as well.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Spain?

For sure, banking, financial service providers, fintech firms and big banks in Spain are all involved with blockchain. We have been seeing some initiatives from insurance lately as well. Real estate is also critical in Spain, and they [firms in the sector] are embracing the use of blockchain; we have already started seeing some use cases emerge. Other initiatives come from energy companies that operate in agreement with public administration and regional governments and are already deploying use cases. For example, one of the most important has to do with families that are living in poverty. The local council and the elected government have information on the financial status of families and are cooperating through blockchain to guarantee that – for example – their electricity is not terminated due to unpaid bills; so, this is a case of blockchain for social good. Last but not least, we are seeing blockchain in the tourism and health industry. Hotels, restaurants and other local organisations and city councils are exploring blockchain for COVID-19 contact tracing.

Blockchain, in general, is being applied in sectors that were traditionally strong in Spain, as well as sectors that were already open to innovations. Such sectors are for example the Fintech, Insurtech, and Regtech sectors.

What does the future hold for the Spanish blockchain ecosystem?

My opinion is that blockchain use will increase in the future. The future would be to link the European blockchain services infrastructure with deployments from the private and enterprise sectors and identify common use cases. For Spain, in particular, I predict a lot of common ground between public and private initiatives. I also see the development of digital identity for individuals, objects and organisations as the way to move forward.

Additional question: Is there anything else that you would like to comment on?

For us in Alastria what is important is Europe as a whole. This is not just about the efforts of one country but the collective efforts of all countries. We need to work together in this trifecta of public–private partnerships

and academic institutions to promote blockchain innovation on a pan-European level**Manuel Machado, Head of Mobility & Payment Solutions, Worldline Global**

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in Spain?

I would say it is getting more and more mature. We have been going through an innovation trigger phase, where there were a lot of proof of concepts, pilots and tests, many of which were nothing more than marketing buzz, meaning that they were not looking into producing a specific solution but had a priority to make "noise" in the market. However, things have been evolving, the marketing buzz has almost disappeared, and we are starting to see some more streamlined approaches.

We are also seeing some major initiatives emerge and a lot more collaboration between various actors in the country, such as NGOs, businesses and universities, together with regulators to understand what should be changed in the legal framework to make blockchain a viable medium for businesses to deploy solutions. Changes could include reviews of civil and merchant laws. Compared to last year, there have been some serious developments on how existing laws can be adopted to facilitate blockchain projects to flourish.

Another thing is that, since blockchain is now taken more seriously, many initiatives are working in "stealth mode" so as not to reveal what they are working on to competitors. One of the key accelerations of this change has been Alastria's consortium, which has channelled discussions with regulators and efforts on the standardisation of processes. Alastria also offers its own blockchain infrastructure where pilots and services can be deployed.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Spain?

The main cluster in the country is Alastria. It has 550 organisations ranging from big corporations to universities and SMEs, and as such it represents the whole spectrum of the blockchain ecosystem. Generally, we have an "open doors" policy, and there are some government bodies that exchange knowledge with Alastria on blockchain matters, without being members of Alastria, of course. So, Alastria is the biggest and most impactful player in Spain. Besides Alastria, there is a plethora of other companies doing interesting things such as consortiums, comprising big corporations that are coming together to test various blockchain use cases; some of them more advanced, others not so much. The whole range of activities in the blockchain space is explored in Spain.

Are there specific regulatory or national policy initiatives in place in Spain?

There were some laws promoted in 2018. Following that, there have been some practical adjustments between the government and the various ministries in certain areas. My reading on the matter is that they [regulators] have been looking at some specific areas such as STOs for real estate or the interpretation and categorisation of certain digital assets. They [regulators] have been working on further understanding how to better fit those blockchain activities in the existing regulatory framework and where certain adjustments are needed.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Spain?

I think that we are still far from the general public understanding blockchain, and even in the business field, many people don't understand.

I would, however, say that there has been a huge shift compared to two or three years ago. One of the positive things about such innovations [referring to blockchain and digital currency] is that they receive positive

exposure and positive comments from the press. Even non-technology-based journals are talking about blockchain and digital assets. At the very beginning, in 2017, they were only talking about digital assets and how one can become rich by investing in them, which, of course, was not the case. This speculation disappeared as the hype died down.

We are now working on disseminating what actually matters in blockchain as well as digital assets, and not only for their speculative aspects but innovations from areas such as stablecoins and CBDCs [central bank digital currencies], and even utility tokens that can be used in closed ecosystems.

What does the future hold for the Spanish blockchain ecosystem?

What I believe for Spain I believe for the rest of Europe too. I don´t think that this technology will be massively understood; far from it. In terms of perception, it will be like an SQL server. If you were to ask some non-expert which database we should deploy, they wouldn't know how to respond, a specialist would have to respond for them.

I think that blockchain is going to integrate with existing technologies. Blockchain provides a cost-efficient and capable way of digitalising existing digital ecosystems transparently and securely. We have individual projects digitising identity on the blockchain and exploring other similar applications. The value will come when this is done at an ecosystem level, with many entities participating, and when Big Data machine learning can be applied to this information in order to adapt to the market needs in real time. This is one of the big blockchain-enabled changes that will come, but nobody will know that blockchain will be "under the hood."

I don't know how far we are from this future, but the sooner we reach it, the better.

Key Findings

20+

Blockchain startups

8,000+

Individuals organised in digital currency communities

€47.33 million

Raised by blockchain ICOs in Sweden

e-krona project

Europe's first CBDC

SWEDEN

THE SWEDISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Swedish blockchain ecosystem is well developed and diverse in terms of practical applications, community interest and government support. Sweden has a strong talent pool in the industry. It also has a notably high level of scientific and technological education which means that public attitudes towards blockchain and other emerging technologies are positive.

The Swedish Central Bank (Riksbank) is one of the public supporters of blockchain technology, in particular their e-Krona initiative. Cash use continues to decline in Sweden. The Riksbank has proposed that if the marginalisation of cash continues, a digital krona – e-krona – could ensure that the general public still has access to a state-guaranteed means of payment. The nation's central bank has noted that being slow to act in the face of current developments will completely leave the payment market to private agents, and ultimately leave the general public entirely dependent on private payment solutions that may make it more difficult for the SCB to promote a safe and efficient payment system. According to the dGen report, Sweden has already made significant progress in a central bank digital currency development and might become a cash-free country by 2025.

Other government bodies are equally supportive of the technology. For example, the Swedish land ownership authority Lantmäteriet began testing blockchain technology in 2016 in cooperation with the telecommunication company Telia, consulting firm Kairos Future and the blockchain company Chromaway. As a result, a pilot project was presented to develop future real estate transactions by using smart contracts that aimed to significantly reduce the time it takes to sign contracts, register a deal and ultimately sell a property. The project consists of three steps. The first was an experiment to demonstrate the technology's potential. On 30 March, 2017, the second stage ended with the release of a report that showed how the preparation of smart contracts automates the processes of cadastral operations. The third phase enabled the actual transfer of land rights. On June 2018, developers completed the first successful transaction on the platform.

The private sector also carries out notable blockchain projects. The SEB, one of Sweden's major banks, has initiated a project together with Nasdaq, the stock exchange operator, called Nordic Fund Ledger. It aims to improve mutual fund trading by applying blockchain in order to protect customers' data and build their systems exactly according to their own needs.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: In 2017, the Swedish government assigned a special committee to investigate the need for legislative changes in eliminating barriers to digital development in the public sector. However, the investigation did not result in any legislative amendments to facilitate the use of blockchain technology. At the same time, the Minister of Finance publicly declared to the Parliament that the Swedish government is positive towards technical innovations and that blockchain technology creates opportunities in a variety of sectors where the technology could be used to improve record-keeping. For this reason, the attitude should be regarded as positive.

Digital currency legislation that applies to blockchain: The adoption of blockchain and other distributed ledger technologies in Sweden has not yet fully taken off. Several initiatives and collaborations have been initiated with the purpose of utilising and commercialising the technology, but the market is still in its very early stages. Blockchain is a novel technology that in many ways does not fit in with the current legal framework, and the absence of new legislation specifically addressing it creates a legal vacuum. This means one must often use the existing legal framework and force blockchain to fit within that framework, which of course is not ideal. Therefore, the principal supervisory authorities likely to make inroads in the blockchain space are the Swedish Financial Supervisory Authority (the SFSA) and the Swedish Data Protection Agency. Consulting firms are also involved in blockchain development. For instance, the global consulting firm Accenture has been contracted by the Riskbank to work on e-krona.

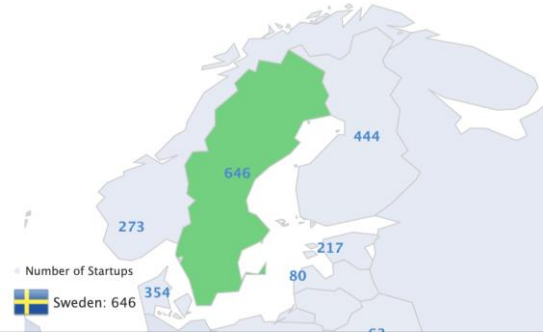
Blockchain in academia: There is quite a limited number of entities who supply special courses via blockchain technologies. The Swedish Center for Digital Innovation (SCDI) offers Blockchain LAB (BLAB), an initiative for creating a creative environment that allows researchers and students involved in SCDI to work with blockchain solutions in their studies and research. At the same time, the KTH Royal Institute of Technology in Stockholm provides a special course on blockchain fundamentals. This course provides a comprehensive survey of topics relevant to blockchain technology and the ecosystem surrounding it, starting from the basics of cryptography to the related economics and game theory premises.

Blockchain across key industries: There are a limited number of technological startups that utilise blockchain as their underlying technological infrastructure. However, the fintech sector intends to move forward with modern market development and evolve blockchain technologies. The government, larger financial institutions and private equity firms asked the Swedish Financial Supervisory Authority (SFSA) to consider the need for a regulatory sandbox in Sweden. The SFSA decided against creating a regulatory sandbox, arguing that innovations in the financial sector are already strong in Sweden and that a regulatory sandbox could adversely affect competition in the market. For the same reason, the SFSA decided not to consider any regulatory changes.

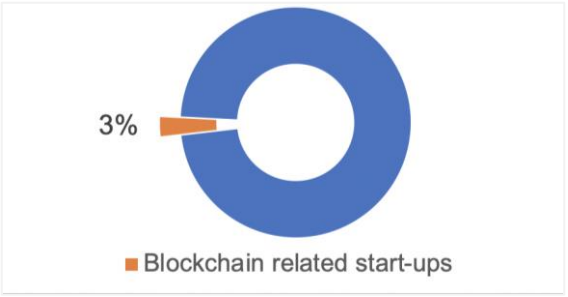
There are not many large-scale industrial blockchain applications. However, there is one project that is particularly notable. Axfoundation, together with Martin & Servera, SKL Kommentus, Sustainable Procurement (a collaboration between Sweden's provinces) and Kairos Future, collaborated to map blockchain's potential within the nation's food industry.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Sweden has a variety of small and medium-sized startups, companies and non-profit organisations active in the blockchain space. Most organisations have an international focus. The average number of employees is between 15-20.



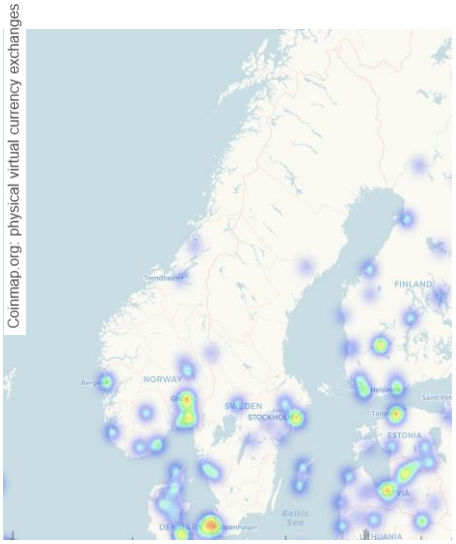
According to data, as for now there are 19 blockchain startups out of a total of 646 across all industries, or almost 3% of the total number of startups in Sweden.



Business opportunities in the space were identified as early as 2012, with most companies founded between 2014 and 2016. Revenue numbers are hard to come by, both due to their small volume and the variety of income generation mechanisms employed by those companies and startups. The issues with identifying exact figures are amplified due to the use of digital currencies as a medium of payment.

One of the most notable non-financial applications of blockchain technology in Sweden is a collaboration between the Swedish Mapping, Cadastral and Land Registration Authority (Sw. Lantmäteriet) and several private sector companies that used blockchain technology to successfully carry out a real estate transaction. There are also attempts to create electronic negotiable promissory notes using blockchain solutions. These carry specific legal issues under Swedish law that technology could potentially resolve. There are also established businesses in Sweden that deal with digital currency mining and businesses that offer trading venues for digital currencies and tokens.

BLOCKCHAIN COMMUNITY



Relative to its size, Sweden fosters a small blockchain community that is mostly located in Stockholm. Official and unofficial medium-sized enthusiast groups, some of which have been active as early as 2013, amount to more than 8,000 active members. They are concerned with a variety of blockchain and digital assets aspects, from purely technological and social to speculative.

The Swedish Competition Authority recently issued a report that analysed blockchain technology from a competition perspective. The report investigated whether blockchain technology could have potential anti-competitive effects, but also whether it could facilitate the Competition Authority's supervisory work.

The main outcomes suggest that, while risks exist, blockchains are used for anti-competitive practices, today such risks are mostly of a theoretical nature. However, the report pointed out that whatever risks there are could be reduced by giving competition authorities insight into private blockchains that are developed within consortia of companies, either voluntarily or through legislative measures.

The Swedish blockchain community in numbers: With 21 regular Meetup groups and 2,608 Meetup attendees, the community is quite active. A Facebook marketing campaign indicates the audience for blockchain-related terms is 88,000.

NOTABLE BLOCKCHAIN COMPANIES

3Box: Secure and decentralised user data storage system. It is the easiest way for developers to build engaging, fully-featured applications without needing to run a backend for handling user data. The product is fully open-source and licensed under MIT.

AIAR: Developing an Ethereum-based education platform that leverages AI and blockchain technology. Claims to provide personalised learning content such as videos and reading material by using AI. Allows users to earn, trade and donate EdTokens.

Bitrefill: Provides digital gift cards and mobile airtime refills to 170 countries using cutting-edge bitcoin technologies. The platform offers an evolving shopping platform with innovative digital assets payment options, including the latest Lightning Network technology.

Blocksettle: Offers a blockchain-based trade settlement solution. The company is developing a system that allows for transactions to be validated and transferred without using a traditional bank as a verifier. Features include on-chain asset issuance, on-chain atomic swaps, cross-chain atomic swaps and real-time bilateral settlement.

Chromaway: Founded in 2014 and an early pioneer of what is now blockchain 2.0 technology. With great blockchain experts, it provides a platform for smart contracts, and issuing and transferring assets through a blockchain. It has been working with the Swedish Land Registry and other institutions and financial companies to provide smart contract solutions for real estate. Among many other successes, ChromaWay presented Postchain, a consortium database.

Chromia: Relational blockchain designed to make it much easier to make complex and scalable DApps.

Cinizen: Swedish startup founded with the goal to revolutionise the existing film distribution model.

Goobit: Fintech company in the Swedish bitcoin and blocktech industry. Main business is exchange and management of digital currencies. Its first product enables the exchange of bitcoin from Swedish crowns under the main brand BTCX – Bitcoin Exchange. Other products and services include: BTCX Payments allowing shopping with bitcoin over the counter, in regular stores and online; BTCX Donation enabling organisations to receive donations in bitcoin; BTCX Wallet allowing users to manage their bitcoin funds; BTCX News is their Swedish language blog and news outlet.

Norbloc: Premier blockchain platform and applications provider in Europe. It focuses on regulatory solutions for financial services and sectors with sensitive personal data. Financial services platform embeds the KYC/AML process on a blockchain framework, allowing removal of duplication of efforts between financial institutions and other obliged entities.

Qwids: Rewards and loyalty platform enabling users to share photos and videos online for companies and organisations. Users are rewarded points for sharing vital information regarding brands. Provides a web app wallet and a mobile app. The app is available for Android and iOS.

Safello: Founded in July 2013, set out to bring greater compliance and security to the bitcoin industry. Its user-friendly approach has since attracted thousands of customers throughout Europe with an easy way to get into bitcoin. Today, supports direct payments in 32 countries and payment methods like Swish, bankgiro, SEPA and international wire. With tens of millions of Swedish Krona, euros and British pound sterling in and out of bitcoin processed, Safello is leading the crypto currency revolution in Europe.

Starflow: Blockchain-based fan engagement platform for brands and influencers. The platform enables influencers to connect with their fans and monetise their content. The platform also allows influencers to partner with brands for launching marketing campaigns. The company is offering StarCoin, an ICO for its crypto tokens. The app is available for iOS devices.

StrawPay: Micropayment system based on blockchain. They operate an open payment network built on the features of bitcoin protocol, Stroem, that can handle micropayments, down to a few cents. They claim that the payment process from the consumer to a merchant takes less than a second. Stroem also builds on top of the payment protocol spec BIP 0070 which is used primarily between the consumer's wallet and the merchant. Characteristics include low cost, privacy, fraud resistance, and proof of purchase etc.

Trijo: Digital assets exchange platform allowing users to buy and sell bitcoin, Ethereum, Litecoin and Monero. Offers news, analysis and explanatory texts on digital assets exchange.

INSIGHTS FROM EXPERTS

David Suomalainen, advisor to the Swedish Ministry of Infrastructure

Blockchain is hard for a government, especially open blockchain because government usually is just in control of certain processes. That's the job of government. I personally think that if technology is available to help you work better or more efficiently, we should try it. The following are potential use cases for blockchain implementation at EU level:

- to audit bills
- for diplomas
- for self-sovereign identity
- for data sharing

Maria Marenco, Blockchain and Digital Health consultant

Through the use of blockchain technology, we could increase privacy, security and trust of the evolving digital environment, empowering citizens and mental health professionals in proactively monitor treatments, regardless of the geographical location of the patients or the healthcare provider. Blockchain not only helps with the uniformity and accessibility of data between primary and secondary health providers and social services, but also helps to incentivise healthier behaviour through tokens and digital assets.

Key findings

€3.5 bn / €22 bn

Total funds raised / Total valuation

800

Dedicated blockchain solution providers

8 unicorns

(Projects valued at above $1bn)

Ethereum  *

** The formal development of Ethereum begun in Switzerland. The Ethereum Foundation, a non-profit organisation dedicated to supporting the development of Ethereum and related technologies, is also based in Switzerland.*

Open, public, permission-less blockchains are not owned or controlled by any singular organisation and are jurisdiction agnostic. They operate in a decentralised manner in terms of geography and are governed by protocol rules and incentivised actors that reach distributed consensus in networks secured by the principles of game theory and cryptography.

SWITZERLAND

THE SWISS BLOCKCHAIN ECOSYSTEM AT A GLANCE

Switzerland, coined the "Crypto Nation" and home to the "Crypto Valley" of Zug, can – in many regards – be considered Europe's most mature blockchain ecosystem and a global hotspot for some of the world's most far-reaching initiatives in the space. The Swiss economy is one of the most advanced and prosperous in the world, with wealth management and banking constituting primary pillars of economic prosperity in the country. Progressive blockchain and digital currency legislation coupled with early successful private initiatives in the space, an established infrastructure of educational and research institutions, expertise in areas relating to financial services and well-capitalised international investors have positioned the country to emerge as a blockchain epicentre.

As of Q2 of 2019, Switzerland is reportedly home to approximately 800 companies active in the blockchain and digital currency space, valued at EUR 21 billion in total. Among those companies, the country counts eight "unicorns," or projects valued at above EUR 860 billion. These included the Ethereum Foundation, DFINITY, Polkadot, Bitmain, Tezos, Cardano, Cosmos and Libra. Apart from initiatives in the blockchain protocol and infrastructure sectors, companies in the financial services cluster are driving innovation too.

The flourishing blockchain ecosystem can mainly be attributed to an overall positive regulatory outlook towards blockchain and digital currencies, a strong epicentre of blockchain activity, in the form of the Crypto Valley, the emergence of large-scale, global-reaching initiatives from the country, such as Ethereum, and low overall corporate taxation. On various occasions, blockchain has been utilised by regional authorities for digital ID deployments, voting, and even payments through digital currencies.

TOWARDS MAINSTREAM ADOPTION

Regulation & policymaking: Swiss regulators and policymakers are generally receptive towards blockchain and digital currencies. The transformative potential of those technologies is generally recognised in the country, with both the Swiss Financial Market Supervisory Authority (FINMA) and the federal government highlighting their importance on various occasions. The government's positive outlook was further reaffirmed by a recent set of law reforms, in favour of blockchain technology.

Legislation of blockchain: In December of 2018, the Swiss federal government issued an extensive report analysing the applicability of the current general legal framework on blockchain. The report deemed existing legislation sufficient. In March of 2019, the Federal Council published draft legislation in an attempt to improve the existing framework conditions relating to blockchain and distributed ledger technologies (DLT). In particular, adjustments in the areas of electronic registration of rights, debt collection and bankruptcy were proposed. At the same time, a new market authorisation category for "DLT trading facilities" was created with the purpose of offering services in the areas of trading, clearing, settlement and custody through a DLT medium to regulated financial entities and private customers. Lastly, licensing requirements for securities trading were also addressed.

Switzerland is in many regards well-positioned to constitute a global leader in the emerging blockchain sector, in part due to its favourable legislation and relevant efforts by the various state authorities or cantons. On a regional level, blockchain has been used in the fields of digital self-sovereign identity and identity management as well as voting, with digital currencies accepted for paying taxes and various public services. The city of Zug, arguably the epicentre of the so-called "Crypto Valley," spearheaded the above efforts. Following a successful pilot, the city launched its blockchain-powered digital identity programme in November of 2017. In early summer 2018, the Ethereum-based "Zug ID" was successfully used for a non-binding referendum. Additionally, in what is the first case of government agencies accepting digital currencies as a form of payment, the municipalities of Zug, Chiasso and Zermatt accept some tax payments in digital currencies. Bitcoin, the most popular digital currency, can be bought 24/7 from all ticket machines of the Swiss Federal Railways.

Digital currency legislation that applies to blockchain: Despite the above, digital currencies are not deemed legal tender in Switzerland, as is the case in most other countries. In 2014, the Swiss federal government published a report addressing their economic significance, clarifying their legal treatment and highlighting risks associated with their use and exchange. In the same report, digital currencies were characterised in the following way: "*A digital currency is a digital representation of a value which can be traded on the internet. (…) Digital currencies exist only as a digital code and therefore do not have a physical counterpart, for example in the form of coins or notes. Given their tradability, digital currencies should be classified as an asset.*" This same definition has been used by the FINMA and in the country's Anti-Money Laundering (AML) Ordinance. In 2018, the FINMA published guidelines on how market legislation would apply to the various types of digital currencies and alternative forms of financing such as ICOs. The FINMA categorised digital currencies based on their function and purpose as 1) payment tokens, which have no further functions other than as a payment/investment medium, 2) utility tokens, which provide utility on an underlying platform, and 3) asset tokens, which closely resemble financial instruments that represent equity in an underlying company, earnings, entitlement to dividends and interest payments. This last category is analogous to equity bonds or derivatives.

The AML and securities legislations were found to be most applicable to alternative forms of funding such as initial coin offerings (ICOs). The latter were categorised in accordance with the framework presented above, as payment ICOs, utility ICOs and asset ICOs, which are also subject to securities legislation.

Tax rates and rules vary between the individual cantons. Digital currencies are generally treated as foreign currencies for the purposes of wealth taxation. Their exchange value is determined by the Federal Tax

administration at the end of the year, with assets that do not receive an official evaluation taxable at the cost of acquisition. Capital gains on digital currencies are exempt from income tax for individuals. Purchases with digital currencies are VAT exempt.

Blockchain in academia: Currently, blockchain education in Switzerland primarily comprises singular courses often concerning blockchain in addition to other transformative technologies, offered by both companies and universities. While many such initiatives exist, some indicative programmes offered by prominent organisations are listed below:

University of Applied Sciences and Arts of Southern Switzerland (SUPSI) – **"**MAS in Blockchain, Digital assets and Decentralised Technologies": The Master of Advanced Studies in Blockchain, Digital assets and Decentralised Technologies builds upon four modules, namely Introduction to Blockchain, Smart Contracts Development and Use Cases, Crowdfunding and Regulation and Decentralised Technologies, to give a complete overview of blockchain technologies. The programme was jointly developed by SUPSI and the Swiss blockchain company Eidoo and supported by the European Chamber of Digital Commerce.

Swiss Federal Institute of Technology in Lausanne (EPFL): – "Financial Applications of Blockchains and Distributed Ledgers": The course offered by EPFL covers the basics of cryptography and its applications to digital currencies and discusses potential positive and negative implications of utilising decentralised ledgers in finance. Concepts relating to the bitcoin, Ethereum, Ripple and EOS protocols are explored too.

IMD Business School for Management and Leadership: – "Digital Finance IMD": The biannual digital finance programme aims to help executives from the financial sector identify and monetise opportunities from the fields of blockchain, fintech and cybersecurity, among others.

HWZ University of Applied Sciences in Business Administration Zurich – **"**Certificate of Advanced Studies (CAS) Blockchain Economy": The 18-day blockchain economy course, offered exclusively in German, aims to link blockchain technology with commercial opportunities for modern organisations.

Lucerne University of Applied Sciences and Arts – **"**CAS Blockchain Disruption Through Distributed Databases": The blockchain course offered by the University of Lucerne covers the fundamentals of blockchain technology, digital currencies and the new digital business models that have emerged.

Bern University of Applied Sciences – **"**Distributed Ledger Technology and Applications": The course offered by Bern University aims to offer an overview of distributed ledger technologies and provide detailed insight into their use for industry, healthcare and public administration applications.

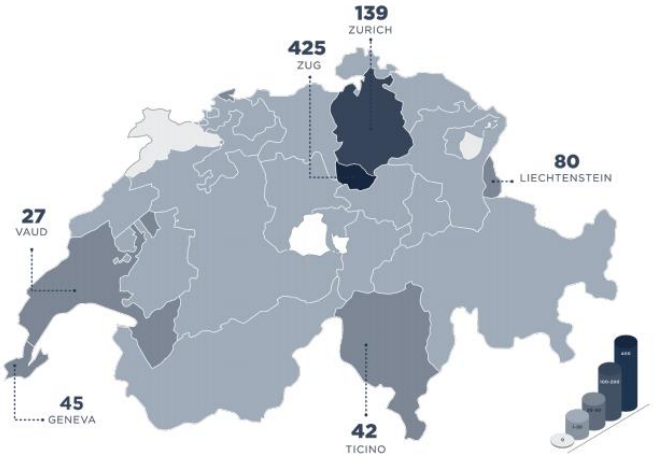
Swiss Federal Institute of Technology in Zurich – **"**Blockchain and the Internet of Things": The BIOTS programme offered by ETH Zurich is an annual course that explores the potential of blockchain and IoT technologies, with a focus on sustainable development.

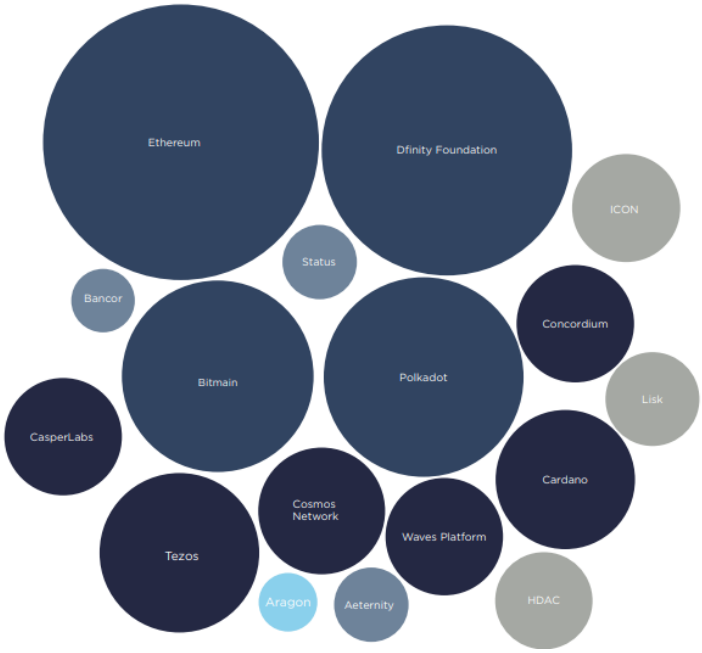
Blockchain across key industries: Public and private actors in Switzerland have identified a plethora of industries to be disrupted by blockchain technologies. In terms of regional governance, blockchain has been utilised by regional authorities for identity management, voting and payments through digital currencies. Companies in the country are active in the areas of financial and banking services, blockchain protocol and infrastructure, and even art, education, energy and utility, insurtech, media and entertainment, transport and supply chain.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Data primarily derived from CV VC's Q2, 2019 Report

The Swiss blockchain and digital currency startup and business scene is in many regards the most mature and one of the largest in Europe and the world. In total, north of 800 blockchain businesses that employ 4 400 individuals are active nationwide. Organisations in the country have received upwards of USD 3.5 billion in funding through a combination of venture funds and alternative forms of financing such as ICOs. Regarding the latter, since 2016, Switzerland has hosted 6 of the 15 largest overall ICOs. In 2017, ICOs active in the country raised EUR 1,237 million, a number second only to the United States of America.

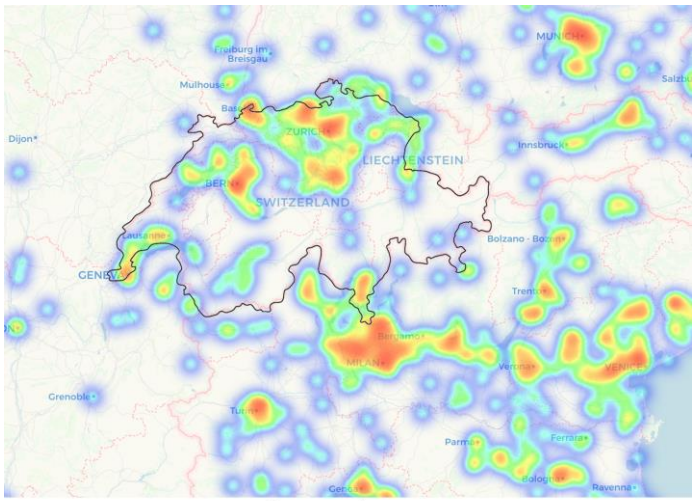




The so-called "Crypto Valley", an area spanning the canton of Zug to Liechtenstein, is presenting the highest concentration of blockchain businesses. CV VC's biannual report highlights eight particular crypto hotspots in Crypto Valley: Zug, Zurich, Geneva, Ticino, Liechtenstein, Vaud, Lucerne, and Bern. As of September 2020, the area counts at least eight "unicorns": Ethereum, DFINITY, Polkadot, Bitmain, Cardano, Tezos. Cosmos and Libra. Companies are active in a wide range of verticals with many notable players in the blockchain platform space largely shaping the global blockchain ecosystem. In total, CV VC's report identifies three main verticals of blockchain activity in the country: 1) blockchain technology, which includes data and analytics, hardware and infrastructure, digital currency mining, and platform and protocol, 2) blockchain financial industry, which includes broker, trade and exchange services, lending and funding, payment and stablecoins (digital currencies pegged to a fiat counterpart or collection of fiat counterparts), and digital currency wallet services, 3) blockchain and other industries, including art, education, energy and utility, insurtech, media and entertainment, and transport and supply chain.

In the second half of 2019, the FINMA officially licensed two institutions, the SEBA Bank AG and Sygnum Bank AG, to operate as regulated digital currency banking entities. In this way, a new category of blockchain entities was established, as many other businesses, such as Bitcoin Suisse, are expected to apply for licensing too.

BLOCKCHAIN COMMUNITY



Source: coinmap.org

The Swiss blockchain and digital currency business scene and community converge in many regards, with the area known as "Crypto Valley" constituting the epicentre of most activity. Co-working spaces such as Trust Square and initiatives such as the Crypto Valley Association have emerged as blockchain hubs for blockchain enthusiasts and businesspersons alike. Conferences on blockchain technology and related topics are hosted regularly too. However, it is uncertain whether this ecosystem will survive, as reports suggest that more than two thirds of Crypto Valley's firms are likely to go bankrupt due to the COVID-19 pandemic.

Switzerland in total counts 86,000 Observers, or individuals loosely interested in the areas of blockchain and digital currencies. This number is approximately 0.7 % of the total population. There is a total of 160 blockchain groups and communities of practice in the country that aggregately amount to 60,000 Enthusiasts, or people that actively participate in the various events and initiatives. (Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Switzerland, Keywords: Blockchain, Digital assets, Digital Currency, Bitcoin | Source for Enthusiasts)

NOTABLE BLOCKCHAIN COMPANIES

Ethereum Foundation: The Ethereum foundation is a non-profit organisation that coordinates efforts to support the development of Ethereum, an open-source blockchain protocol used for programmable money and decentralised applications as well as other related technologies. This is done through funding critical research, providing grants and organising the community and events.

DFINITY Foundation: The DFINITY Foundation is a non-profit organisation that oversees research centres in Palo Alto, San Francisco and Zurich. Through its work and the DFINITY platform, it aims to build an "Internet Computer" to reduce enterprise IT system costs.

Polkadot: Polkadot aims to provide a completely decentralised web and identity management system by offering interoperability solutions for private and public blockchain and DLT deployments.

Bitmain Technologies: Established in 2013, Bitmain originally sold digital currency mining hardware. Today, through its subsidiaries, namely Antminer, AntPool and HashNet, the company is active in various areas of the digital currency space.

Libra: Libra is a digital currency based on a permissioned blockchain and proposed by the American social media company Facebook. The project is expected to launch in 2020. Libra aims to become a global payments system and financial infrastructure.

Tezos: The Tezos foundation aims to further the advancement of decentralised applications and technologies as well as the Tezos protocol.

Cardano: The Cardano Foundation oversees and supervises the advancement of Cardano, an open-source decentralised public blockchain and digital currency project that seeks to deliver advanced protocol-level features.

Cosmos / Interchain Foundation: The Interchain Foundation is a non-profit organisation that aims to further the development of decentralised applications and networks, with a particular focus on Cosmos. Cosmos is a decentralised network of independent parallel blockchains.

SEBA: SEBA is a FINMA-licensed digital currency bank that provides financial applications that bridge traditional and digital assets.

Sygnum: Sygnum is a FINMA-licensed digital currency bank that offers a portfolio of regulated digital currency banking services.

INSIGHTS FROM EXPERTS

Maria Magenes, community and marketing manager for Europe & Africa, MakerDAO

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in Switzerland?

In general, I would say that Switzerland can be called a "Crypto Nation." In many regards, this [Switzerland] was the first real place where a lot of companies started to build on blockchain technology. I think that we have somewhere in the neighbourhood of 900 blockchain companies employing 5 000 people, and that is in a small country – this is very significant. Of course, there are areas where blockchain activity is more present, Zug and Zurich for example, but also in southern Switzerland too. There are several well-managed companies that are growing fast. AAVEE, another important player, was born in Switzerland too.

To recap, Switzerland presents a very mature ecosystem, not only in terms of cryptocurrency activity but also in blockchain in general.

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in Switzerland?

The first one that comes to mind is of course the Ethereum Foundation, which is incorporated in Zug, but it is important to mention that this is a very decentralised organisation. While the Foundation is in Zug, Ethereum is everywhere in the world. Ethereum has allowed an ecosystem of decentralised finance to be born through its smart contract functionality, including MakerDAO. In my opinion, Ethereum are the pioneers of the blockchain space.

I would also like to mention some other players. In Switzerland, we saw the birth of the very first digital asset bank, Sygnum. Then we have Aragon, which is the base layer for many decentralised autonomous organisations, and as such, they are facilitators of more decentralised solutions. There is also Nexo, a lending platform that, while not decentralised, is worth mentioning. Last but not least, I would also like to mention Bitcoin Suisse.

There are a lot of different blockchain applications being developed in various areas such as logistics, finance, art and non-fungible tokens. Then, there is also real estate asset management. Generally, blockchain is used in a plethora of fields.

Are there specific regulatory or national policy initiatives in place in Switzerland?

What I think has happened during the last year is that everyday people, users and various institutions alike have realised that crypto is not a fraud. Banks have also started seeing the potential in this technology and realised that they should go with it, and not against it. This allowed many crypto and blockchain companies to open accounts with them.

Since then, a lot of regulations are being introduced with a goal to legally support this. One such example is the Blockchain Act. In general, they [regulators] are introducing a lot of regulations and laws to legitimise blockchain companies in the eyes of the end users and banks.

Are there any notable blockchain-related education and training offerings by universities or other providers?

Usually, there are a lot of meetups where people can learn by themselves. However, universities such as the Universities of Zurich and Basel have several courses that include blockchain as part of the curriculum. They are also introducing three PhDs for blockchain and digital assets. The first one is in Zurich, and the rest are in Basel. This will be their first year. Generally, we are noticing a surge in the interest of academic institutions in blockchain technology. In many universities in Europe, there is a blockchain department, and even if they don't have a full-blown programme, they are involved in the space.

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in Switzerland?

Switzerland in my personal experience is one of the most advanced [countries] in this sense. People are totally aware of digital assets, and they don't associate them with bitcoin and financial fraud or pure speculation, as is the case in some other places. People still use digital assets for trading and speculator reasons, but they have also realised that there is more to it than that. This is one of the reasons why banks and universities have started paying more attention. On the same note, businesspeople are starting to understand the potential of blockchain, decentralised finance and digital assets. There are more than 900 blockchain and crypto companies in a country with a population of 8.5 million; how could they not be aware?

What does the future hold for the Swiss blockchain ecosystem?

I always associate the future of blockchain and crypto with regulation. In the end, if regulators are against it [blockchain and digital currencies], then we cannot do much. I think that Swiss people and regulators collectively are too smart to miss this opportunity and let the potential of blockchain get away from their country. If they started going against companies in the space, then the companies would just move elsewhere. In my opinion, this will not happen. The regulators are talking with banks as well as blockchain and crypto companies. Everything will be made with joint forces and a joint vision to encourage and sustain the existing blockchain ecosystem so they can collectively realise the huge potential of this technology.

Key findings

€1.97 billion

Total funds raised

700

Dedicated blockchain solution providers

2.7 million

Individuals who own or have owned digital currencies

UK

THE UK BLOCKCHAIN ECOSYSTEM AT A GLANCE

Located off the north-western coast of Europe, with a population of 66.6 million, the United Kingdom is the second largest European economy and the sixth largest in the world by nominal GDP, with its growth primarily driven by financial services. The UK arguably constitutes one of the most important financial centres of the world.

Country officials showed great interest in blockchain and distributed ledger technologies (DLT) early on. The UK established itself as one of the first movers in the space, as indicated by a 2016 report by the UK Government Chief Scientific Adviser that explored the potential of blockchain and DLT. Since then, local authorities have dedicated efforts in understanding business behaviour and consumer sentiment in the field. Overall, the UK's policymakers have adopted a neutral approach towards blockchain and DLT, with the regulatory framework for the treatment of digital currencies and digital assets still being actively developed and refined.

While in recent years more agile European countries may have taken the blockchain lead in terms of utilising the technology in public infrastructure, the UK remains a strong epicentre of blockchain business activity. The country is home to more than 700 companies and start0-ups active in the space, primarily concentrated in the financial services business vertical. Those have collectively raised north of EUR 2 billion in funding through a combination of venture funds and initial coin offerings (ICOs). The capital city of London has emerged as a definitive hub and is home to the vast majority of blockchain companies.

TOWARDS MAINSTREAM ADOPTION

Regulation & policymaking: The UK was one of the first countries to officially recognise the potential of blockchain and DLT in a 2016 report by the Government Office of Science. The significance of digital currencies was highlighted in a 2015 report by Her Majesty's Treasury (HM Treasury), which identified potential benefits, risks and barriers towards their adoption and suggested regulatory actions in relation to this new form of digital asset. In 2017, the government launched its Digital Strategy with an ambition to facilitate the development of digital businesses, including companies active in the blockchain and DLT space. The Financial Conduct Authority (FCA) digital sandbox is also accepting initiatives from the blockchain space.

The UK's financial regulators have on several occasions issued warnings in relation to digital assets, while the broader legal framework is still largely under development. The Bank of England has officially highlighted the potential of a digital currency issued by a central bank, also known as central bank digital currency or CBDC. According to Andrew Bailey, the head of the Bank of England: "*We [the Bank of England] are looking at the question of, should we create a Bank of England digital currency? We'll go on looking at it as it does have huge implications on the nature of payments and society. I think that in a few years' time we will be heading toward some sort of digital currency.*"

Legislation of blockchain: In May of 2018, the Chancellor of the Exchequer launched the Cryptoassets Taskforce, bringing together the HM Treasury, the FCA and the Bank of England, in an attempt to foster innovation in the blockchain and DLT space while protecting consumers and preserving the UK's reputation as a safe and transparent place for financial services through regulation. Yet, despite this seeming mobility, no direct references to blockchain and DLT could be identified in UK legislation. The same is true for utilising the technology in the public sector or regional governance. This regulatory neutral approach is further reaffirmed in a 2018 report by the Cryptoassets Taskforce, which highlights: "*The Taskforce considers that the technology is still in its early days, and there are some significant challenges to wider adoption […] The Taskforce does not consider there to be regulatory barriers to the adoption of DLT. The PRA and FCA will continue to take a technologically neutral approach to regulation as well as providing a platform for innovation*." The report goes on to highlight the potential of blockchain and DLT in areas such as efficiency, resilience, transparency, automation and tokenisation.

Digital currency legislation that applies to blockchain: The Cryptoassets Taskforce defines digital currencies as "*cryptographically secured digital representations of value or contractual rights that use some type of DLT and can be transferred, stored or traded electronically*." The authority has created a framework for the characterisation of digital assets based on their use and intrinsic value or lack thereof, categorising them as 1) exchange tokens, meaning digital currencies that are primarily used as a medium of exchange and usually hold no intrinsic value, 2) utility tokens, or digital currencies that can be redeemed for services or products in the underlying blockchain or DLT deployment, 3) security tokens, meaning digital currencies that represent ownership of an underlying asset, share in future profits and others, and lastly 4) e-money tokens, which refer to digital assets that meet the e-money definition of the Electronic Money Regulations. From the above, the latter two, e-money and security tokens, are considered regulated tokens, or digital currencies for which a regulatory framework exists, while exchange tokens and utility tokens remain unregulated. Any digital currency or digital asset that doesn't fit the description of security tokens or e-money is considered unregulated.

Digital currency taxation is largely determined by a 2019 policy paper issued by the UK tax authority HM Revenue and Customs (HMRC). Dealings in digital currencies are likely subject to capital gain tax and income tax. Digital assets received for payment or income are subject to taxation too. Lastly, funds received through activities such as mining and airdrops are also subject to income tax.

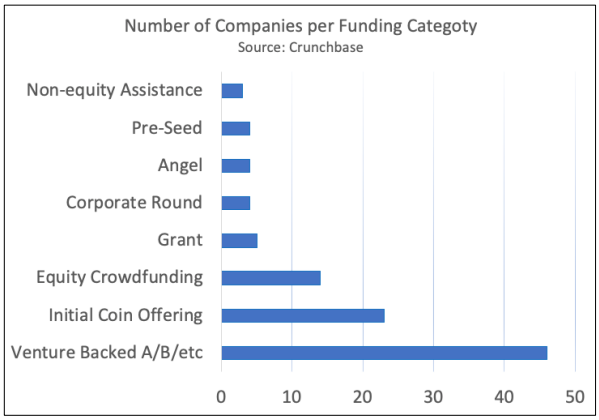
Blockchain in academia: Educational institutions in the UK are embracing blockchain as part of their curriculum. Most notably, the Master of Science programmes in the field of fintech from the University of

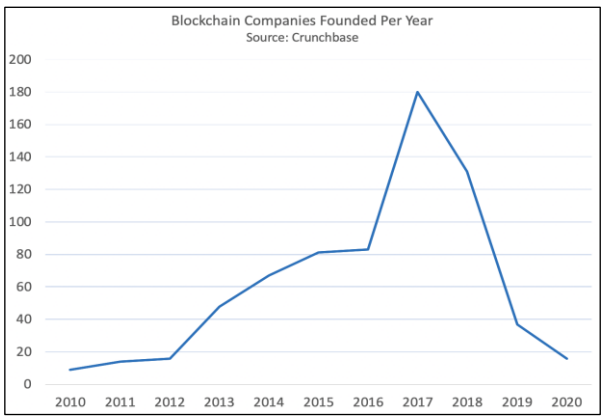
Strathclyde, the University of Sussex, Manchester Metropolitan University, the University of Stirling, SOAS University of London and Coventry University are all covering blockchain technologies to a certain degree. Standalone courses exist too, such as the "Blockchain in Business" master class by the London School of Economics and Political Science, a course in Blockchain Software Engineering by the University of Oxford as well as a "Blockchain and Digital assets" course by City, University of London, among others. Lastly, a plethora of professional qualification courses by small and medium-sized players could be identified, too.

Blockchain across key industries: Taking advantage of the country's global leading position in the areas of financial services and banking, blockchain companies have leveraged existing expertise and infrastructure in their novel offerings. The vast majority of blockchain startups and initiatives fall, one way or another, under the financial services or fintech sector, with no meaningful concentrated activity in other business verticals.

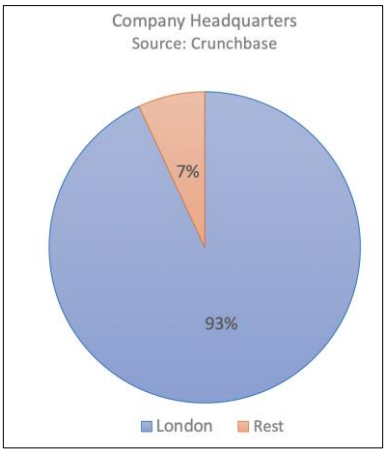
BLOCKCHAIN STARTUP AND BUSINESS SCENE

Following initial enthusiasm for ICOs, the number of blockchain companies in the UK rose exponentially from 2015 to 2017, before declining sharply to 2012 levels. Despite that, the majority of companies in the space have raised funds through traditional forms of financing. Specifically, 23 ICOs could be identified, while venture funds were raised by more than 100 companies.





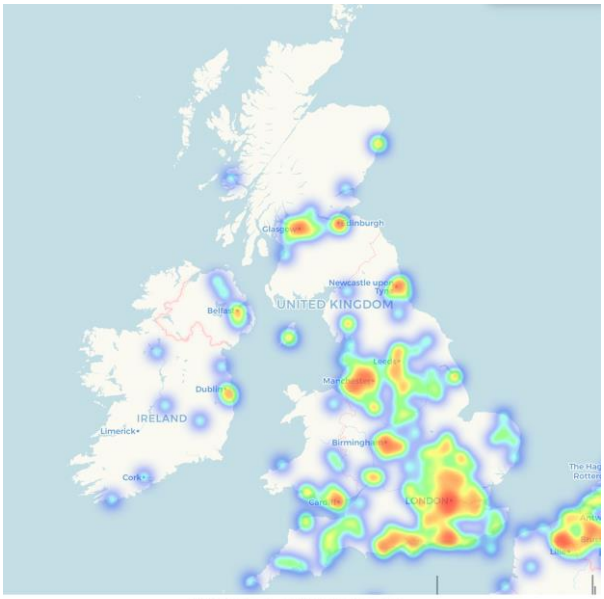
Today, the blockchain startup and business scene in the country is active, with initiatives that are shaping the next generation of blockchain applications in terms of both functionality and end-user intuitiveness. Indicative of the above is the case of national champions such as the user-friendly digital currency wallet Argent or the popular protocol for decentralised "money markets," lending and borrowing AAVE.



Following the UK's global leadership in banking and financial services, the majority of blockchain startups are active in this field, too. Specifically, 9 out of 10 of the top-10 companies in the country are active in the financial services sector. Reports from the All-Party Parliamentary Group on Blockchain (APPG Blockchain) and the digital technologies agency Digital Catapult further reaffirm the above. In Digital Catapult's report, the lack of regulatory clarity and a deficit of legal experts in the field were highlighted as key sources of concern for blockchain companies. Additionally, 54% of companies active in the space faced significant difficulty in opening a traditional bank account for their business activities. The capital city of London has emerged as the UK's most definitive blockchain hub and geographical cluster, with more than 90% of all blockchain companies in the country headquartered there.

BLOCKCHAIN COMMUNITY

In an updated 2020 consumer research report, which was conducted exclusively online and counted 3 085 participants, the FCA presents key figures of digital currency and digital asset usage in the country. Its data can prove useful in determining the overall size and characteristics of the domestic digital currency and blockchain community. The report estimated that 1.9 million adults, or 3.86% of the total population of the UK, own digital currencies at present. This number climbs to 2.6 million individuals when taking into account past owners. Additionally, 27% of the participants stated that they have used digital assets for the purchase of goods or services.



Source: coinmap.org

Besides those highlights, there is significant value that can be extracted by further delving into the full report. Digital currency owners are predominately male (79%), who acquired digital currencies "as a gamble" (4%) or as part of their wider investment portfolio (25%), and are generally aware of the risks associated with the volatility of digital assets and the lack of regulatory protections. Additionally, participants were largely deemed adequately educated on the technological underpinnings behind digital currencies (blockchain). In general, an uptrend in the public's interest could be identified when considering reports from the previous years. Data on the exact number of people who are at least loosely interested in blockchain and digital currencies are hard to come by. Some reports suggest that the majority of the UK's population are at least aware of digital currencies but are reluctant to use them.

In terms of official and unofficial enthusiast groups and communities of practice, a total of 227 such initiatives were identified that counted north of 110, 000 members. While such groups can be found nationwide, the capital city of London constitutes the largest community hub and home to a plethora of blockchain events such as conferences and workshops.

NOTABLE BLOCKCHAIN COMPANIES

Celsius Network: Established in 2017, Celsius Network is a mobile-first, blockchain-based lending platform. Through the platform, users can purchase digital currency with dollars.

AAVE: AAVE is an open-source, non-custodial protocol built on Ethereum that allows for the creation of money markets as well as digital currency lending and borrowing. AAVE was founded in 2017.

Nexo: Founded in 2017, Nexo offers digital asset custodian banking services, such as borrowing and lending.

Everledger: Everledger utilises blockchain technology as an immutable ledger of supply chain history that verifies the origin, characteristics and ownership of diamonds and other valuable assets.

Elliptic: Elliptic offers a suite of services that aim to help compliance teams automate the detection and investigation of risky digital currency transactions. Elliptic was founded in 2013.

Wirex: Wirex is a digital currency payments solution provider. Through its platform and Visa card, it allows individuals and businesses to buy, store, exchange and spend digital assets.

Argent: Argent is a user-friendly digital currency wallet with a focus on decentralised finance. It introduces a novel social recovery mechanism feature.

Arweave: Arweave develops a novel blockchain-powered data storage protocol that enables users to permanently store documents, applications and other data on a serverless web.

Bitstamp: Established in 2011, Bitstamp owns and operates an exchange that allows companies and individuals to buy and sell a variety of digital assets.

William Knottenblet

Professor of Applied Quantitative Analysis, Department of Computing. Director of the Centre for Digital assets Research and Engineering. Imperial College London

How would you evaluate the overall level of size and maturity of the blockchain and digital assets markets in the UK?

My view is that, in line with global markets, digital asset markets in the UK are at an early stage of maturity with a relatively low level of institutional ownership of digital assets and few regulated derivatives markets; notably, UK-based Crypto Facilities recently obtained a multilateral trading facility (MTF) licence from the Financial Conduct Authority, as can be viewed here. Exchanged traded products providing access to digital assets for retail investors are growing in popularity, e.g. CoinShares has exchange traded products tracking bitcoin and Ethereum with c. EUR 851,235,000 under management, as can been seen here. The recent emergence of institutional-grade custodians (e.g. Komainu) and the trend towards the tokenisation of real-world assets is expected to dramatically increase the size of digital asset markets in the UK in coming years (bearing in mind that the UK has EUR 7.7-8.8 trillion conventional assets under management, many of which are suitable for tokenisation).

Are there any notable companies or clusters that could be considered national champions? What are the main technologies or innovations that have been developed in the UK?

Blockchain.com is a world-renowned provider of blockchain wallet and blockchain-related data services, hosting more than 50 million wallets. CoinShares are pioneering regulated investments in digital assets and have more than EUR 851,235,000 under management in stock-market-listed digital assets trackers alone; further, together with Imperial College London they have developed novel investable indices which aim to address the volatility of cryptoassets. Crypto Facilities, now acquired by Kraken, have also designed a number of cryptoasset indices for international financial giant CME Group. Companies like Chainalysis and Elliptic are enjoying growing reputations in the blockchain forensics space. Outlier Ventures stands out as a web 3.0 accelerator focussed on novel token-based economies. Provenance.org have well-established blockchain-based supply chain tracking technology. Amongst emerging startups, Interlay stands out as developing some promising technology for blockchain interoperability, soon to be integrated into the Polkadot project. Monolith have developed technology which allows users to deploy Ethereum funds in a Visa credit card format. Aave are transforming the world of decentralised finance via flash loans. Aventus have developed some promising technology for managing digital assets across value chains, whether they be event tickets, loyalty points, vouchers, financial assets or in-game collectibles.

Are there specific regulatory or national policy initiatives in place in the UK?

The Cryptoassets Task Force report lays out the UK government's approach to "support innovation while maintaining safe and transparent financial markets." Amongst specific initiatives, the regulatory sandbox initiative seems to have been a great success with the programme, now into its 6th cohort. The UK puts great emphasis on compliance with AML/CTF [anti-money laundering / counter-terrorism financing] legislation, as can be seen here.

Are there any notable blockchain-related education and training offerings by universities or other providers?

Many universities in the UK offer blockchain-related modules as part of their UG or PG curricula in computer science; indicative examples are the University of Edinburgh, Imperial College London, the

University of Oxford, and Kings College London. Many institutions have sizeable PhD student populations undertaking research in blockchain or digital assets (e.g. UCL, Imperial, Edinburgh, Newcastle, Surrey etc.)

How would you evaluate the level of awareness or adoption of digital assets or blockchain solutions by the citizens and businesses in the UK?

I believe the digital asset space is rapidly maturing with increasing institutional interest emerging. With notable exceptions, adoption of blockchain-based solutions by businesses is still tentative and mostly in the prototype phase (at least so far as I can tell).

What does the future hold for the UK blockchain ecosystem?

Having survived a tough crypto winter, I see a bright future for the UK blockchain ecosystem, in terms of its ability to continue to develop fundamental technologies through its academic and industrial research bases, in terms of increasing institutional recognition of cryptoassets as legitimate components of investment portfolios, increasing tokenisation of traditional asset classes, and in terms of the deployment of blockchains in specific industry verticals.

Conclusions

The European blockchain ecosystem is growing fast, fuelled both by bottom-up developments in industry, academia and user communities, as well as top-down initiatives spearheaded by member state governments and the European Commission.

EU-WIDE INITIATIVES

The current policy-related situation in the European Union (EU) can be traced back to the Tallinn Declaration on eGovernment, signed in 2017 by the EU member states and EFTA countries. The Tallinn declaration outlined the importance of efficient and secure digital public services in order to achieve the full potential of the Digital Single Market across the EU.

Following that, in 2018, 21 EU member states and Norway signed a declaration creating the **European Blockchain Partnership (EBP)** with the ambition to provide digital public services matching the required level of digital security and maturity of today's society. Mariya Gabriel, Commissioner for Digital Economy and Society, welcomed the signature of the declaration by stating that "*in the future, all public services will use blockchain technology. Blockchain is a great opportunity for Europe and member states to rethink their information systems, to promote user trust and the protection of personal data, to help create new business opportunities and to establish new areas of leadership, benefiting citizens, public services and companies. The Partnership launched today enables member states to work together with the European Commission to turn the enormous potential of blockchain technology into better services for citizens*". Since then, eight more countries have joined the Partnership, bringing the total number of signatories to 30.

Since 2018, EBP has worked with the aim to develop a trusted, secure and resilient **European Blockchain Services Infrastructure (EBSI)** meeting the highest standards in terms of privacy, cybersecurity, interoperability and energy efficiency, as well as full compliance with EU law. The EBSI will be materialised as a network of distributed blockchain nodes across Europe, leveraging a number of applications focused on specific use cases. Four use cases were selected in 2019 (notarization, education credentials, European self-sovereign identity, trusted data sharing among customs and tax authorities in the EU). The EBSI platform is a peer-to-peer network of interconnected nodes, some of which are operated by the European Commission, and others by member states at the national level. All the nodes will be able to create and broadcast transactions that will update the ledger. All the nodes will be synchronized, sharing the same state of the ledgers and off-chain distributed storages. Today, the EBSI features 27 active nodes in 20 member states.

Finally, in December 2019, the European Commission also started an open market consultation in preparation of the **European Blockchain Pre-Commercial Procurement** that is looking for novel, improved blockchain solutions for the future evolution of the European Blockchain Service Infrastructure. The results of this consultation were published in June 2020, while the call for tenders for the pre-commercial procurement is expected to be published in October 2020.

STATE OF THE UNION: A COUNTRY-LEVEL ANALYSIS OF 29 COUNTRIES

Naturally, not all EU member states are at the same level on the overall blockchain maturity curve. However, as the preceding individual country 'factsheets' have shown, there is a growing momentum in all countries that helps Europe as a whole mature toward becoming a world leader in the field. It should be noted that no European country has adopted any hostile regulation against blockchain and virtual currencies.

We have analysed the current situation in each EU member state (as well as the UK and Switzerland) in two dimensions:

- **Regulatory maturity curve**: this dimension measures the degree of top-down support provided by national or regional government. We have grouped countries into three broad categories, that incorporate relevant elements from the recently published Global Standards Mapping Initiative regulatory report. Those categories are:
    - **Stage I regulatory maturity**, where no significant specific blockchain or virtual assets related legislation exists, save perhaps warnings issued by local authorities in the context of investor protection or other minor state initiatives.
    - **Stage II regulatory maturity**, where the state has shown signs of significant involvement with the field, either through adoption of wider regulatory schemes (for example, related to KYC/AML, but also explicitly touching upon virtual assets, such as regulation of alternative forms of financing, ICOs, STOs) or through other specific measures, which might include, government-sponsored studies (for example, taxonomies of virtual assets as far as applicable existing regulation is concerned) or government-sponsored pilot applications of blockchain in the public sector. An established framework for the taxation of virtual currencies and digital assets is another characteristic of countries that fall under Stage II.
    - **Stage III regulatory maturity**, where either specific legislation for blockchain or virtual assets have been voted or published, and/or the government has announced a sovereign national strategy/vision, specific to blockchain (or for new technologies, explicitly addressing blockchain). Regulatory sandboxes, innovation hubs and other initiatives that allow Blockchain, FinTech and other firms to pilot novel implementations, as well as the involvement of the banking sector, are also characteristics of countries in Stage III.
- **Ecosystem maturity curve**: this dimension measures the degree of bottom-up development of the local ecosystem in each country, as evidenced through three main indicators – presence of a local business/startup ecosystem; number of blockchain-related formal education and academic research initiatives; number of user-driven communities around blockchain or virtual assets. Again, we have grouped countries into three broad categories:
    - **Stage I ecosystem maturity**, where there is evidence of sizeable and dynamic initiatives in none or one of the three indicators (business, academia, communities).
    - **Stage II ecosystem maturity**, where there is evidence of sizeable and dynamic initiatives in at least two of the three indicators.
    - **Stage III ecosystem maturity**, where there is evidence of sizeable and dynamic initiatives in all three indicators.

According to the above classification, we can position the 29 countries we have studied into a 3x3 matrix, as shown in the following figure. It must be noted that, naturally, the borders between categories are by definition porous and countries may not always objectively belong strictly to one of the matrix categories. It must also be stressed that this is a fast-evolving space, so that all countries are expected to gradually move from the bottom-left to the top-right part of the matrix. Notwithstanding this, the matrix is a helpful instrument in assessing the current status of the European blockchain ecosystem at the end of 2020.

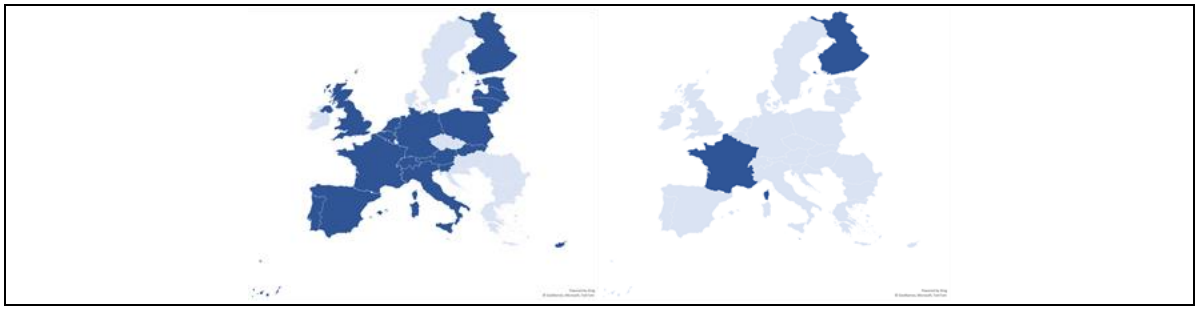
Ecosystem maturity curve	Stage I	Stage II	Stage III
Stage III		Lithuania Netherlands Slovenia UK	Cyprus Estonia Malta Switzerland
Stage II	Denmark Ireland Sweden	Austria Italy Portugal Spain	France Germany Luxembourg
Stage I	Belgium Bulgaria Croatia Czech Rep. Greece Hungary Romania Slovakia	Finland Latvia Poland	

Regulatory maturity curve

REGULATORY MATURITY CURVE

Current situation

Most European countries do not yet have a specific and holistic regulatory or legislative framework for virtual assets. Having said that, there is a growing number of countries that have already voted or are developing such legislative frameworks and/or have announced guidance regarding the legal treatment of virtual assets. An overview of the countries with existing legal frameworks and provided guidance for virtual currencies in Europe is illustrated in the figures below.



Countries with provided guidance (left) and existing legal frameworks (right) for virtual currencies (source). *As of 2020 Cyprus has a legal framework and national strategy.

Where no specific regulatory framework exists, member states have adopted taxonomies or characterizations of virtual assets to identify the most applicable existing regulatory treatment in each case. For example:

- In Malta, the country's Digital Innovation Framework recognizes four mutually exclusive categories of digital assets, namely electronic money, financial instruments, virtual utility tokens, and virtual financial assets. The Financial Instrument Test can be deployed to determine whether a specific case would be subject to regulation under the country's Virtual Financial Assets Act.
- A similar approach is followed in Switzerland, where a digital token can be categorized as a payment, an asset, or a utility, thus allowing the digital token to be regulated under existing laws.
- In the United Kingdom, the Cryptoassets Taskforce, which consists of HM Treasury, the Financial Conduct Authority (FCA) and the Bank of England, has created a framework for the characterization of digital assets based on their use and intrinsic value or lack thereof. The four categories identified are exchange tokens, utility tokens, security tokens, and e-money tokens, with e-money tokens and security tokens being regulated under existing frameworks.

It should be mentioned that even though no specific legal framework exists for virtual assets in most of the European countries, the laws pertaining to anti-money laundering and countering terrorist financing provisions are applied to virtual currencies. As far as taxation in European countries is concerned, in most jurisdictions no specific tax laws on the taxation of virtual currencies exists and their tax treatment is based on general principles and guidance issued by the national tax authorities.

The following table summarizes the most important communications, guidance, regulations, and laws that are applicable to virtual assets and blockchain in the various countries.

Country	Regulatory considerations	Type
Austria	Austrian Financial Market Authority (FMA) • FMA Focus on Initial Coin Offerings (ICOs) • FMA Focus on Bitcoin & Co • Certain initiatives also regulated under the Austrian Alternative Financing Act (alfFG), Austrian Banking Act (BWG), Austrian Electronic Money Act and the Austrian Capital Markets Act (KMG)	Guidance
Belgium	Financial Services and Markets Authority • Initial Coin Offerings (ICOs) • Characteristics of virtual currencies and digital assets	Communication
Bulgaria	No regulation/guidance	N/A
Croatia	No regulation/guidance	N/A
Cyprus	National Strategy, and umbrella legislation for DLT and blockchain, co-developed with the business and academic sector • Consultation Paper on the Amendment of the Law 188(I)/2007 for the Prevention of Money Laundering and Terrorist Financing • Innovation hub that includes DLT and blockchain technologies	National strategy
Czech Republic	KYC/AML	Guidance
Denmark	No regulation/guidance	N/A
Estonia	Estonian Financial Supervision Authority • Information for entities engaging with virtual currencies and ICOs • The legal framework of initial coin offering in Estonia	Legal framework

	• Special "Digital assets License" for companies active in the virtual currency/digital assets space	
Finland	Financial Supervisory Authority (FIN-FSA) • Finnish Act on Virtual Currency Providers (572/2019)	Regulation
France	République Française • Ordonnance n° 2017-1674 du 8 décembre 2017 relative à l'utilisation d'un dispositif d'enregistrement électronique partagé pour la représentation et la transmission de titres financiers • Décret n° 2018-1226 du 24 décembre 2018 relatif à l'utilisation d'un dispositif d'enregistrement électronique partagé pour la représentation et la transmission de titres financiers et pour l'émission et la cession de minibons Autorité des Marches Financiers (AMF) • Building a European Digital Strategy in Financial Services • Towards a new regime for crypto-assets in France	Legal framework
Germany	Blockchain National Strategy on a Federal level Federal Financial Supervisory Authority (BaFin) • Blockchain Technology – Thoughts on Regulation • Tokenisation • Crypto tokens remain a risk for consumers	National strategy
Greece	No regulation/guidance	N/A
Hungary	No regulation/guidance	N/A
Ireland	No regulation/guidance	N/A
Italy	Commissione nazionale per le società e la borsa (CONSOB) • Initial offers and exchanges of crypto-assets	Guidance
Latvia	Financial and Capital Market Commission (FCMC) • FCMC opinion on the legal framework for Bitcoin and similar instruments • FCMC alerts investors about a new financial investment service – Initial Coin Offering (ICO) and associated risks	Guidance
Lithuania	Bank of Lithuania • Position of the Bank of Lithuania on Virtual Assets and Initial Coin Offering • Guidelines on Security Token Offering	Guidance
Luxembourg	Bill on Blockchain-held or "dematerialized" Securities	Regulation
Malta	• Malta Digital Innovation Authority Act 2018 • Virtual Financial Assets Act 2018 • The Innovative Technology Arrangements and Services Act 2018	Regulation
Netherlands	Netherlands Authority for the Financial Markets (AFM) • Cryptos: recommendations for a regulatory framework • Initial Coin Offerings (ICO's): serious risks Innovation Hub, Regulatory Sandbox, *a-la carte* licenses	Guidance
Poland	Polish Financial Supervision Authority (KNF) • Statement by Narodowy Bank Polski (NBP) and the Polish Financial Supervision Authority (KNF) on "virtual currencies" • The KNF's statement on selling so-called coins or tokens (Initial Token Offerings – ITOs or Initial Coin Offerings – ICOs) • Report on the activities of the Special Task Force for Financial Innovation in Poland	Guidance
Portugal	Bank of Portugal • Virtual currencies Comissão do Mercado de Valores Mobiliários (CMVM) • Questions and Answers for Entities on Cryptoassets	Guidance

Romania	No regulation/guidance	N/A
Slovakia	Slovak National Bank (NBS) • Crypto-Assets and Initial Coin Offerings (ICOs)	Guidance
Slovenia	Financial Stability Board (FSB) • Crypto-asset markets: Potential channels for future financial stability implications • Crypto-assets: Work underway, regulatory approaches and potential gaps	Guidance
Spain	Spanish Markets Securities Commission (CNMV) • Criteria in relation to ICOs • CNMV considerations on digital assets and ICOs addressed to market professionals • Joint press statement by CNMV and Banco de España on "digital assets" and "initial coin offerings" (ICOs)	Guidance
Sweden	No regulation/guidance	N/A
Switzerland	Swiss Financial Market Supervisory Authority (FINMA) • Virtual Currencies • FINMA Guidance 04/2017: Regulatory treatment of initial coin offerings • Guidelines for enquiries regarding the regulatory framework for initial coin offerings (ICOs) • Federal Council initiates consultation on improving framework conditions for blockchain/DLT	Guidance
United Kingdom	Financial Conduct Authority (FCA) • Guidance on Cryptoassets • Digital sandbox that includes blockchain initiatives	Guidance

Source: Cryptoassets Report; EUBOF individual country reports

Future considerations

On September 24, 2020 the European Commission announced legislative proposals on crypto-assets to draw on the possibilities offered by crypto-assets, while mitigating risks for investors and financial stability that involves a proposal for regulation on markets in crypto assets, which creates a pan-European regulatory regime for crypto assets and related services, as well as a pilot regime for market infrastructures based on distributed-ledger technologies, offering a safe space for testing innovative technologies around DLT-based financial market infrastructures in the European Union.

One of the main objectives of the proposed legislative framework is to provide a sound legal framework for all crypto assets not currently covered by the existing financial services legislation, thereby providing the necessary legal certainty required within the European Union for the development of the crypto-asset markets. Moreover, the proposed framework is expected to promote and foster innovation related to crypto assets, as well as the wider use of DLT, in a proportionate and safe manner. An additional objective is to instil appropriate levels of consumer and investor protection and market integrity, as well as to ensure financial stability.

One of the important aspects of the proposed framework on crypto assets is that the European Commission differentiates between those crypto assets already governed by EU legislation, and other crypto assets, thereby providing a safe environment for innovation by preserving financial stability and protecting potential investors. For crypto assets already subject to existing legislation no changes are proposed. However, the European Commission proposes a pilot regime for market infrastructures to test trading and settlement processes using crypto assets, thus enabling market participants and regulators to gain experience with the use of DLT exchanges.

In the case of crypto assets that were previously unregulated, including stablecoins, the European Commission proposes a bespoke regime that sets strict requirements for issuers and service providers of crypto assets in Europe, which include capital requirements, custody of assets, a mandatory complaint holder procedure available to investors, and rights of the investor against the issuer. It should be mentioned that stringent capital requirements, as well as liquidity management and interoperability requirements, will apply for issuers of significant asset-backed crypto assets.

ECOSYSTEM MATURITY CURVE

Industry funding

The table below summarizes our findings regarding the number of blockchain startups in each EU member state (plus the UK and Switzerland), as well as the total amount of reported funds raised by these companies. The list provides a first categorization of countries in terms of the intensity and dynamism of entrepreneurial activity in each country and, hence, the ecosystem maturity in it.

Country	Blockchain startups	Total Funds Raised (€)	Population	Funds Per Capita (€)	Funds Per Startup (€)
Austria	40	47,000,000	8,859,000	5.31	1,175,000.00
Belgium	23	9,500,000	11,460,000	0.83	413,043.48
Bulgaria	24	620,000	7,000,000	0.09	25,833.33
Croatia	7	50,000	4,058,000	0.01	7,142.86
Cyprus	27	142,000,000	875,900	162.12	5,259,259.26
Czech Republic	38	1,450,000	10,690,000	0.14	38,157.89
Denmark	24	32,300,000	5,806,000	5.56	1,345,833.33
Estonia	143	257,000,000	1,329,000	193.38	1,797,202.80
Finland	17	4,600,000	5,518,000	0.83	270,588.24
France	170	181,500,000	66,990,000	2.71	1,067,647.06
Germany	180	227,500,000	83,000,000	2.74	1,263,888.89
Greece	9	147,000	10,720,000	0.01	16,333.33
Hungary	14	4,000,000	9,773,000	0.41	285,714.29
Ireland	50	45,000,000	4,904,000	9.18	900,000.00
Italy	67	25,600,000	60,360,000	0.42	382,089.55
Latvia	8	2,000,000	1,920,000	1.04	250,000.00
Lithuania	31	422,000,000	2,794,000	151.04	13,612,903.23
Luxembourg	49	13,000,000	613,894.00	21.18	265,306.12
Malta	60	51,000,000	514,564.00	99.11	850,000.00
Netherlands	150	337,000,000	17,280,000	19.50	2,246,666.67
Poland	54	20,000,000	37,970,000	0.53	370,370.37
Portugal	16	40,000,000	10,280,000	3.89	2,500,000.00
Romania	20	20,000,000	19,410,000	1.03	1,000,000.00
Slovakia	8	13,700,000	5,458,000	2.51	1,712,500.00

Slovenia	25	67,700,000	2,081,000	32.53	2,708,000.00
Spain	150	23,000,000	46,940,000	0.49	153,333.33
Sweden	20	47,330,000	10,230,000	4.63	2,366,500.00
Switzerland	800	3,500,000,000	8,570,000	408.40	4,375,000.00
United Kingdom	700	1,970,000,000	66,650,000	29.56	2,814,285.71

**All data on funding figures sourced from Crunchbase pro from the period of August 2020 to September 2020. Keywords used: Blockchain, Virtual Currency, Virtual Currencies, Digital assets, Digital assets, Bitcoin, Ethereum. Figures converted at varying dollar to euro exchange rates (+/- 2.5%) and rounded to the closest integer.*

Data on Switzerland sourced from CV VC's Top 50 Report H2/2019.

It is worth noting that the majority of initiatives, especially those that emerged during the period or extreme value appreciation for some virtual currencies (2017-2018) concentrate in the financial services sector, and more specifically payment and trading services, as well as custodian and non-custodian fund storage solutions. However, following the increased involvement of governments, the introduction of relevant regulation, the sponsoring of research, and in certain cases regulatory sandboxes and innovation hubs, an increasing number of initiatives that explore the whole range of blockchain applications outside the financial services sector can be observed. Besides open source permissionless protocols that enjoy a wide and global developer base, in their absolute majority, companies in the space are small-to-medium-sized businesses or enterprises (SMBs, SMEs) with an international focus.

In every case, the amount of funds raised has proven to be an indicative and highly comparative metric in determining the overall size and maturity of the blockchain and business scene across countries. Novel forms of financing such as initial coin offerings (ICOs), security token offerings (STOs) and initial exchange offerings (IEOs), have constituted a major facilitator of blockchain activity for countries that either offered some amount of regulatory clarity, reduced hurdles, or outright embraced them allowing with favorable legislation. Indicative of the above is that most countries in the top 10 of funds raised were epicentres of ICO activity.

More specifically, from stage III, Switzerland has constituted a global epicentre of blockchain activity and is home to some of the world's largest blockchain initiatives in terms of total valuation, including Ethereum, Polkadot, Tezos, Cardano, Cosmos and Libra. Switzerland and the UK emerged as global hubs of ICO activity during a three-year-period from 2017 to 2019. Malta, Estonia and Lithuania, with their favorable legislation, and low taxes, attracted a large number of players in the years 2017 and 2018. Malta and Estonia also offered licensing provision for virtual currency companies, with the latter allowing for the setup of a company remotely, through its e-residency program. Lastly, the combination of a small country with concrete legislation and some large initiatives propelled Cyprus and Luxembourg to the top. Blockchain companies have leveraged synergies from adjacent sectors (Fintech, Banking) in Germany, France, and the Netherlands, while popular virtual currency exchange, Bitstamp, is largely responsible for Slovenia's high place. Austria, Italy, Portugal, Spain, Denmark and Ireland are all home to emerging blockchain ecosystems, with Austria and Spain leading the way, and as such are placed in stage II. Lastly, countries in stage III present limited blockchain activity, with Croatia and Greece tied for the last place.

Education initiatives

European universities have offered academic programs focused on blockchain and virtual currencies since 2013 (the University of Nicosia's MSc in Digital Currency being the first such

program *in the world* and the largest to date), while the number of programs available has increased significantly after 2017. Today, blockchain education in Europe is alive as never before, with many prominent universities progressively incorporating relevant material in their undergraduate curricula, a large number of dedicated postgraduate programs, an increased interest by PhD candidates, as well as numerous professional and executive qualification courses. We have identified more than 15 postgraduate programs (at the Master's level) that focus on blockchain and virtual currencies, offered by universities in eleven European countries, with Spain leading the pack with no less than eight such programmes.

Academic and professional educational offerings cover a wide range of interest areas, primarily concentrating on business and entrepreneurship, economics and finance, programming and IT, as well as regulation and law. Blockchain and virtual currencies are explored holistically in most curricula, which study both public and private deployments, as well as state and regional initiatives. Programs can be segmented in three distinct categories and their combinations:

- Programs that focus on the technology of blockchain and distributed ledgers.
- Programs that focus on virtual currencies and digital assets.
- Programs that incorporate blockchain and/or virtual currencies under a wider umbrella that includes FinTech, RegTech, the digital economy, and other so-called exponential technologies, such as artificial intelligence, machine learning, and the internet of things.

This holistic focus has lately been adopted by many universities, for example the Wirtschaftsuniversität Wien (WU) through its MSc in the Digital Economy. Many UK universities, including the universities of Strathclyde, Sussex, Manchester, Stirling, SOAS, Coventry, Oxford, LSE, and City follow a similar approach. If this trend is to prevail, one can expect increased incorporation of blockchain and virtual currency educational material in relevant existing curricula, and less new standalone programs, at least on a postgraduate level.

Most academic initiatives in the space have embraced distance learning or are adopting a hybrid approach, offering courses through various platforms such as Moodle, Canvas, other proprietary solutions, as well as on-campus. At the same time, the overwhelming majority of programs are taught in English, with only a few exceptions. From the above, we can denote that programs in the field have an international focus. As

concrete correlation between the characteristics or state of the domestic blockchain market, such as its size, maturity, funds raised, or the number of blockchain companies, and a country's academic offerings. As an indicative example, while Switzerland boasts a mature ecosystem with numerous companies operating in the space, and Estonia has a favourable outlook and the extensive implementation of blockchain in its public governance, their academic offerings are limited, when compared to those in Cyprus, Spain or the Czech Republic, which have comparatively smaller market size and public sector initiatives.

In 2013, the University of Nicosia (UNIC) spearheaded blockchain education on a global level by introducing the first full-fledged postgraduate degree in blockchain and virtual currencies, the online MSc in Digital Currency, in addition to an introductory Massive Online Open Course (MOOC) on virtual currencies. Today, the MOOC has been attended by more than 40,000 students from more than 100 countries and the University of Nicosia's offerings have expanded to also include eight professional training and academic certification courses, in addition to the MSc degree. UNIC has also established the Institute for the Future (IFF), a research centre focusing on exponential technologies, including blockchain and DLT.

There is a total of eight universities in Spain offering postgraduate programs on blockchain and virtual currencies. Through their academic programs, these institutions cover a wide range of in the blockchain space, including, but not limited to: smart contracts, decentralized autonomous organizations, game-theoretical elements, regulation, tax, cryptography, and monetary policy. Most programs are offered on campus, while others adopt a hybrid model or are conducted exclusively online. Courses are taught in Spanish and English. In addition to the above, the Spanish blockchain consortium Alastria is offering a global alumni program for blockchain graduates and counts over 30 university members.

Covering an area of 316 km2 and counting a population of 500,000, Malta is the smallest country in Europe that offers a dedicated blockchain program. The 3-semester MSc in Blockchain and DLT technologies offered by the University of Malta is one of the programs that focuses on the technical aspects of blockchain, while offering specializations in ICT, law

and regulation, or business and finance. The University of Malta has also established the Centre for Distributed Ledger Technologies, dedicated to studying the impact of blockchain.

The Wirtschaftsuniversität Wien (WU), with its Master's in Digital Economy, is an indicative example of academic institutions incorporating blockchain and virtual currency education under a wider umbrella. WU has also introduced the Institute for Cryptoeconomics, a research centre focusing on virtual currencies, and is part of the Austrian Blockchain Research Center.

Leading Universities in the UK are also adopting the same approach. MSc programs in the field of FinTech from the University of Strathclyde, University of Sussex, Manchester Metropolitan University, University of Stirling, SOAS, University of London, and Coventry University are all covering blockchain technologies to a certain degree. At the same time, standalone courses on blockchain are offered by London School of Economics and Business, University of Oxford, and City University of London. There is also a sizable PhD student population undertaking research in blockchain and virtual currencies in the country.

In Poland, Warsaw University of Information Technology is offering a Master's degree titled Blockchain Technology in Business, while blockchain and virtual currencies are present in the Master's in Finance Technology and Global Monetary Policy by the SGH Warsaw School of Economics.

The Utrecht University, School of Law in the Netherlands, and the IT University of Copenhagen in Denmark, both offer blockchain summer schools.