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 eighth of a series of reports that will be published addressing selected topics in accordance with the European Commission priorities. The aim of this report is to present the latest updates and developments within the EU blockchain ecosystem.

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

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The EU Observatory & Forum would like to expressly acknowledge the following reviewers and/or interviewees for their contributions to this report as members of the EU Blockchain Observatory and Forum Expert Panel, or as external contributors: Vice President of the European Parliament, MEP Eva Kaili, Deputy Ministry of Research, Innovation and Digital Policy of the Republic of Cyprus, Kyriacos Kokkinos, Prof. Alfred Taudes, Koen Vingerhoets, Dr Hristian Daskalov, Professor Joyce O' Connor, Dominic Briggs, Dr Clara Billek, Dr Joshua Ellul, Ivan Pito, Filip Pawczynski, Prof. Carmen Holotescu, Daniel Szegö, David Stancel, Nena Dokuzov, Tadej Slapnik, Urko Larranaga Piedra, Tim Weingaertner and Robert Herian.

Special thanks to Scope for the editorial review and language proofing.

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.

Comments and inquiries may be addressed to the following email: …

Disclaimer

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Executive Summary

Europe is making major steps forward in harmonising the legal, regulatory and policy frameworks of the EU Member States on crypto assets. On 24 September 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. The European Parliament voted a draft of the proposed MiCA framework on 14 March 2022 that has now moved into the next phase of discussions between European Parliament, European Council and European Commission. The proposal remains a major challenge for the EU as the debate on how crypto should be regulated is strong and ongoing.

In addition to the MiCA proposal, the Digital Finance package also includes a proposal for a pilot regime on 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 prioritises 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.

Finally, as showcased in the "European Financial Stability and Integration Review" of 2022, the European Commission is well aware of the potential of decentralised finance (DeFi) and its associated innovations for streamlining the financial sector and offering efficient, robust and transparent services.

Given the rising interest in cryptocurrencies assets and their underlying technology (blockchain or DLT), in 2020 the European Blockchain Observatory and Forum (EUBOF) has undertaken a study on capturing the current state of technological, market and regulatory developments in each of the 27 EU Member States, plus Switzerland and the United Kingdom (UK).

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 amongst countries, thus leading to emerging clusters.

The study was first published in 2020. To improve its quality and to make sure that everything in the study is up to date, the EUBOF team has updated each country's factsheet. This updated version of the report features important developments in the European blockchain ecosystem over the last 2 years. In addition, it presents two new countries: Norway and Liechtenstein.

To support Europe's efforts to develop a harmonised 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" summarising 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 DeFi 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 public-private partnership model. As of December 2021, Austria-based blockchain companies have raised approximately EUR 50 million and the number of blockchain courses offered in the country has slightly increased.

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 and several well-established companies and VC funds serve the continuous growth of the cryptocurrency ecosystem in the country. The number of blockchain startups in Belgium, has significantly increased. Belgium was the first country in the EU to spin up a second EBSI node. As of May 2022, the Financial Services and Markets Authority (FSMA), requires the region's crypto exchanges and custodial wallet services to register.

Bulgaria is improving its position in the European blockchain scene, with an emerging base of blockchain enthusiasts, as well as venture capital investors and start-up incubation programmes. Moreover, the country is part of the European Blockchain Service Infrastructure (EBSI) with five technology companies developing the node. The Ministry of Finance introduced the Anti-Money Laundering regulation in 2020 according to which cryptocurrencies have to be declared and audited by the National Revenue Agency as a financial asset. Bulgaria has also seen an increase in the number of blockchain-related educational courses.

Croatia has a small, but growing, ecosystem of blockchain start-ups and communities. There are a handful of cases for adopting cryptocurrencies as a payment method in Croatia. In May 2020, the country's financial supervisor approved a bitcoin investment fund, even in the absence of any specific country-level legislation specific to crypto assets. In a span of 2 years, Croatian universities have incorporated blockchain courses in their curriculums while there are also organised research initiatives related to blockchain.

Cyprus remains one of Europe's blockchain hotspots, and after announcing the draft bill to regulate blockchain technology in 2019, the government published the bill for public consultation in September 2021. Cyprus is also amongst the few Early Adopters of the EBSI, working on developing a fully operational national EBSI Infrastructure. Guidelines for the tax treatment of cryptocurrencies are also being prepared by the Tax Department. The country does not only boast the first-ever academic course and full degree on the subject, offered by the University of Nicosia (UNIC) since 2014, but additional blockchain courses are being prepared by UNIC and other research institutions.

The **Czech Republic** boasts a vibrant crypto asset community, including some notable European blockchain start-ups and one of the largest concentrations of public venues (doubled since 2020) 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. In September 2020, the Ministry of Foreign Affairs of Denmark released a report analysing the use of blockchain in the fight against corruption. Danske Bank, the largest bank in Denmark, laid out its official position on cryptocurrencies in June 2021, not taking any practical stance against cryptocurrency. Although there is no legislation specific to crypto assets, the country shows a rising ecosystem of start-ups and universities working on blockchain-related applications and research.

Estonia initially adopted a receptive approach towards blockchain and cryptocurrencies by being the first country to adapt relevant legislation. Regulatory certainty, coupled with the country's digital first approach, and e-residency programme allowing for the registering of companies remotely, resulted in a large number of blockchain businesses in the country. While the country remains a proponent of public sector blockchain initiatives on a national and European level, recent tightening of its positive policy and outlook on blockchain and cryptocurrencies has slowed down the expansion of the private sector.

Finland, although not having a comprehensive crypto asset regulatory framework in place, 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. Compared to 2020, the number of blockchain start-ups in the country has significantly decreased.

France is at the forefront of crypto asset recognition in Europe, having passed a legal framework for initial coin offerings (ICOs) 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. As of 2020, Germany included a new financial instrument in its banking laws, the crypto asset. In line with the governmental 2019 blockchain strategy, the German parliament issued a law on introducing electronic securities, including a blockchain register, in the summer of 2021. There is an abundance of entrepreneurial activity with an increasing number 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 (EBP), and has announced a draft bill on emerging information and communication technologies in 2022.Firms give careful consideration as to whether their activities constitute regulated activities, according to guidance from the European Securities and Markets Authority (ESMA). The overall size and maturity of the blockchain and cryptocurrency business ecosystem remains small despite the efforts of some initiatives to raise awareness and promote blockchain in the country. However, the number of blockchain courses offered by different institutions has increased.

Hungary has joined the EBP since 2019 and is developing an EBSI node. The Hungarian Central Bank announced plans to launch its native Central Bank Digital Currency. An update on the regulatory part is the revision of the tax rate on cryptocurrency profits. Essentially, Hungary revised the tax rate on cryptocurrency profits and decided on a more friendly regulation on cryptocurrency taxation. The public's interest in blockchain is vivid as the community engaging with blockchain subjects grows.

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. In 2021, the Central Bank of Ireland updated the consumer warning on virtual currencies. The public and private initiatives to promote blockchain adoption are increasing as are blockchain education initiatives. Blockchain 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, while football fan tokens are on the rise and are significantly contributing to blockchain adoption in the country. The country was one of the first in the world to recognise the legal validity and enforceability of smart contracts in 2019. According to a ruling by the Revenue Agency, issued in July 2021, the tax authorities reiterate the equivalence of cryptocurrencies to foreign currencies.

Latvia has a blockchain-friendly business and regulatory climate, characterised 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. Blockchain academic qualifications in Latvia are not established as Latvian universities do not offer a degree in blockchain-related technologies.

Liechtenstein has managed to establish a growing blockchain community, despite being Europe's fourth smallest country. The blockchain ecosystem in the country is supported by a constellation of organisations, such as the Office for Financial Market Innovation and Digitalisation, the Financial Market Authority and the Entrepreneur Service. Since early 2020, Lichtenstein has put in force the Blockchain Act in an effort to provide a comprehensive regulatory framework for the token economy. In addition, the University of Liechtenstein acts as a major player for the country's blockchain ecosystem offering two certificate blockchain programmes and participating in several projects and programmes.

Lithuania became an epicentre of ICO activity in Europe during 2017-2018, combining a blockchain-friendly regulatory approach with an abundance of local engineering talent. The country does not rest on its laurels and continues to develop its blockchain ecosystem. Lithuania is one of the top 30 of Europe's biggest start-up hubs. The financial technology (FinTech) and ICT sectors have the highest growth and count with well-established start-ups. The Bank of Lithuania opened a pre-sale for the world's first digital collector coins – dubbed "LBCOINs". The amount of funding raised by Lithuanian start-ups, which has increased from millions to a billion in 2 years, places the country in the top tier of EU Member States, ranked by this criterion.

Luxembourg is one of Europe's financial centres and, as such, has been at the forefront of developments in the financial applications of blockchain. The country passed a bill on "dematerialised securities" as early as 2013 and has attracted a number of crypto asset-related start-ups and significant funding in the industry. The country is the European leader in international securities listings. In late 2021, Luxembourg issued a guidance paving the way for alternative investment funds to invest in virtual assets.

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. The country has made significant progress in the past 2 years as it became the first country to install a blockchain-based IP Register and transfer 60 000 records using the blockchain network. In addition, the Malta Gaming Authority has recently announced a digital asset focused sandbox, while the Malta Digital Innovation Authority launched a Technology Assurance Sandbox. Malta has 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. Following the University of Malta that launched its Master of Science in Blockchain and DLT in 2019, the Leadership and Management Institute has launched several additional blockchain courses.

The Netherlands boasts very strong blockchain communities, being amongst Europe's top performers when measured by the amount of funding secured by crypto asset and blockchain start-ups. 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. The number of blockchain start-ups launched and the millions raised by blockchain ICOs have increased compared to 2020. The number of companies that accept digital assets as a form of payment is large and keeps increasing, while the various meetups of digital assets enthusiasts in the country number thousands of members.

Norway has joined the EBP and has not implemented any laws or legal frameworks related to blockchain technology. Although Norwegian regulators have not yet taken a definitive stance on blockchain technology, the Financial Supervisory Authority of Norway has emphasised the risks associated with trading cryptocurrencies and the need for a strong regulatory framework. After completing the third phase of a study on central bank digital currencies (CBDCs), Norges Bank announced in May 2021 that it will begin testing technical solutions for a CBDC over the next 2 years. Norway is the first European nation to embrace public Ethereum, as the government announced a cap tables platform for unlisted companies built on public Ethereum.

Poland has adopted a strict approach against crypto assets, taxing profits from their trading as income and warning investors about the dangers of investing in them (the Polish Financial Supervision Authority (KNF) has published guidance for crypto assets and ICOs). The Office of the KNF published a warning in July 2021 on the Binance platform, which had traction in popularity. The cases of blockchain adoption in private and public sectors are increasing. The most notable case is the virtual sandbox and Innovation Hub by the UKNF. The KNF launched a virtual sandbox in 2021. The virtual sandbox was intended to simulate a number of banking operations and test solutions with the interaction with Open API for innovative payment services.

Portugal is to establish a node to join the EBSI. The country has friendly legislation towards cryptocurrencies holders, as the Portuguese Tax & Customs Authority announced that it is tax-free to exchange cryptocurrencies. There is legislation to support innovation via the blockchain application. There is a growing base of enthusiasts organised in communities and a small, but dynamic, start-up scene, which has been successful in raising growth capital from the market.

Romania passed a law in 2019 specifying that income from digital assets trading is taxable on profits and has established regulations around cryptocurrencies to protect investors. Elrond, a Romania-based blockchain start-up, achieved unicorn status in early 2021. The country implemented blockchain to safeguard the integrity for parliamentary elections in November 2020. The interest in blockchain is vivid as the community in Romania grows each year.

Slovakia boasts Europe's first ATM, installed in Bratislava in 2013. The country is home to a Bitcoin mining facility which converts human and animal waste into Bitcoin hash rate, securing the network while mining Bitcoin. 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. In August 2021, the Slovenian Finance Authority announced a proposal to tax cryptocurrency participants with 10% of their assets income while the Slovenian Finance ministry sought a public opinion regarding crypto tax laws. Slovenia has also became the first country in the world to issue NFT tokens which will serve to promote the Slovenian economy and tourist destinations.

Sweden has a developed and diverse blockchain ecosystem with notable initiatives. Riksbank, the country's central bank, was amongst the world's earliest examples of research on a 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 number of blockchain startups launched and the millions raised by blockchain ICOs have slightly decreased compared to 2020. 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 remains 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, amongst them some of the most well-known industry names, such as the Ethereum Foundation, Polkadot, Cardano, Solana, Cosmos and Tezos. Companies and organisations operating nationwide have collectively raised more funds than in any other country while the total valuation of top 50 companies is extremely high – higher than any other country. Switzerland is home to the first two blockchain banks SEBA and Sygnum, with a banking license from the Swiss Financial Market Supervisory Authority. The country moved early to clarify the legal situation of crypto assets, with the earliest report by the federal government published in 2018, analysing the applicability of the existing legal framework on blockchain. In 2020, the Swiss Parliament passed the DLT blanket act, which selectively adapts 10 existing federal laws. In August 2021, one of the key changes came into force, a license for DLT trading facilities. Several universities have launched blockchain-focused academic degrees or specialised courses. The number of blockchain-focused academic degrees offered in the country has also increased.

The **United Kingdom** maintains its great interest in blockchain, with the first report commissioned 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. More than 300 companies have raised north of EUR 3.8 billion, while the energy and creative industries are two emerging sectors in terms of blockchain application. Even in the absence of a crypto assets specific regulatory framework, there are many initiatives underway in the UK, driven by the various hubs within the innovation blockchain ecosystem.

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]).

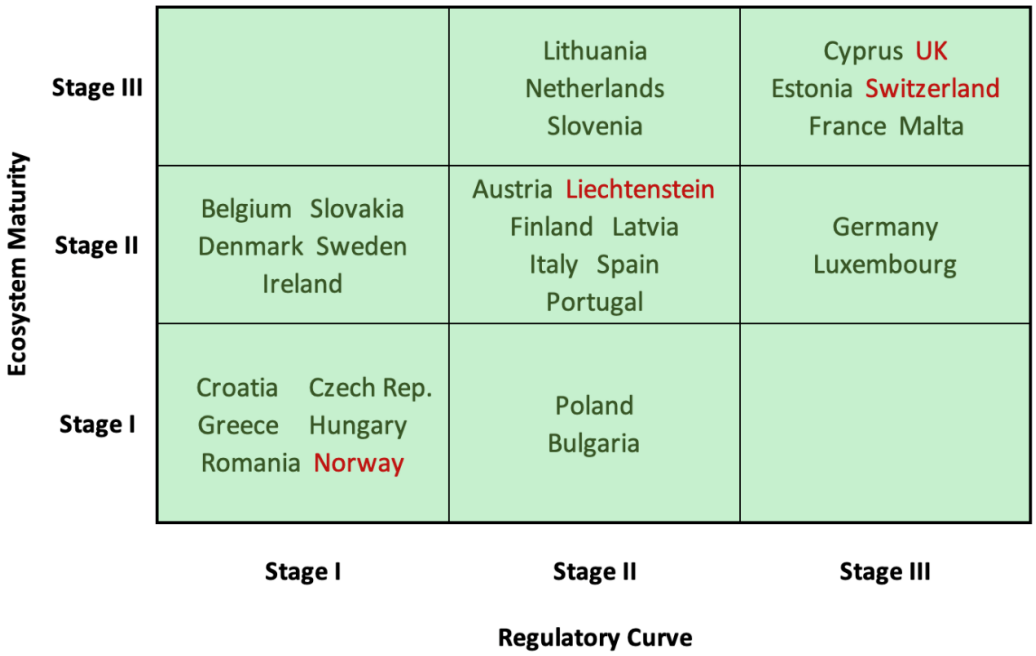
Amongst other efforts, the EBP has worked to develop a trusted, secure and resilient **European Blockchain Services Infrastructure (EBSI)**, a network of distributed blockchain nodes across Europe, leveraging a number of applications focused on specific use cases, such as notarisation, education credentials, European self-sovereign identity, and trusted data sharing amongst customs and tax authorities in the EU. Today, the EBSI features 27 active nodes in 20 Member States.

On a path toward harmonising 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 know your client/anti-money laundering, but also explicitly touching upon crypto assets, such as regulation of alternative forms of financing, ICOs and security token offerings) 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 has 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.
  - **Stage III ecosystem maturity**, where there is evidence of sizeable and dynamic initiatives in all 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 and the United Kingdom. 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) and Croatia (16 October 2019).

According to the above classification, we can position the 31 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 in the middle of 2022.

At the one extreme of this categorisation, 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 are (in alphabetical order): Croatia, Czech Republic, Greece, Hungary and Romania. These countries will be mostly expected to follow and adopt EU-level policymaking 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 are: Austria, Bulgaria, Finland, Germany, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovenia and Spain. Although with significant differences in individual development paths amongst 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 are: Cyprus, Estonia and Malta (in the EU), as well as Switzerland and the United Kingdom. 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 harmonised path towards assuming a globally leading role in crypto assets innovation and development, while mitigating risks associated with new technologies.

Country Profiles

Key Figures

TOTAL FUNDS RAISED

€50 million

THE MOST ACTIVE SECTORS

Energy, Mobility, FinTech

BLOCKCHAIN SOLUTION PROVIDERS

50

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 policymakers and financial regulators are generally receptive towards transformative technologies, especially those that apply to the FinTech sector. For example, the Financial Market Authority (FMA) has established a registry for Virtual Asset Service Providers in Q4 2020. 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 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 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 licensing 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).

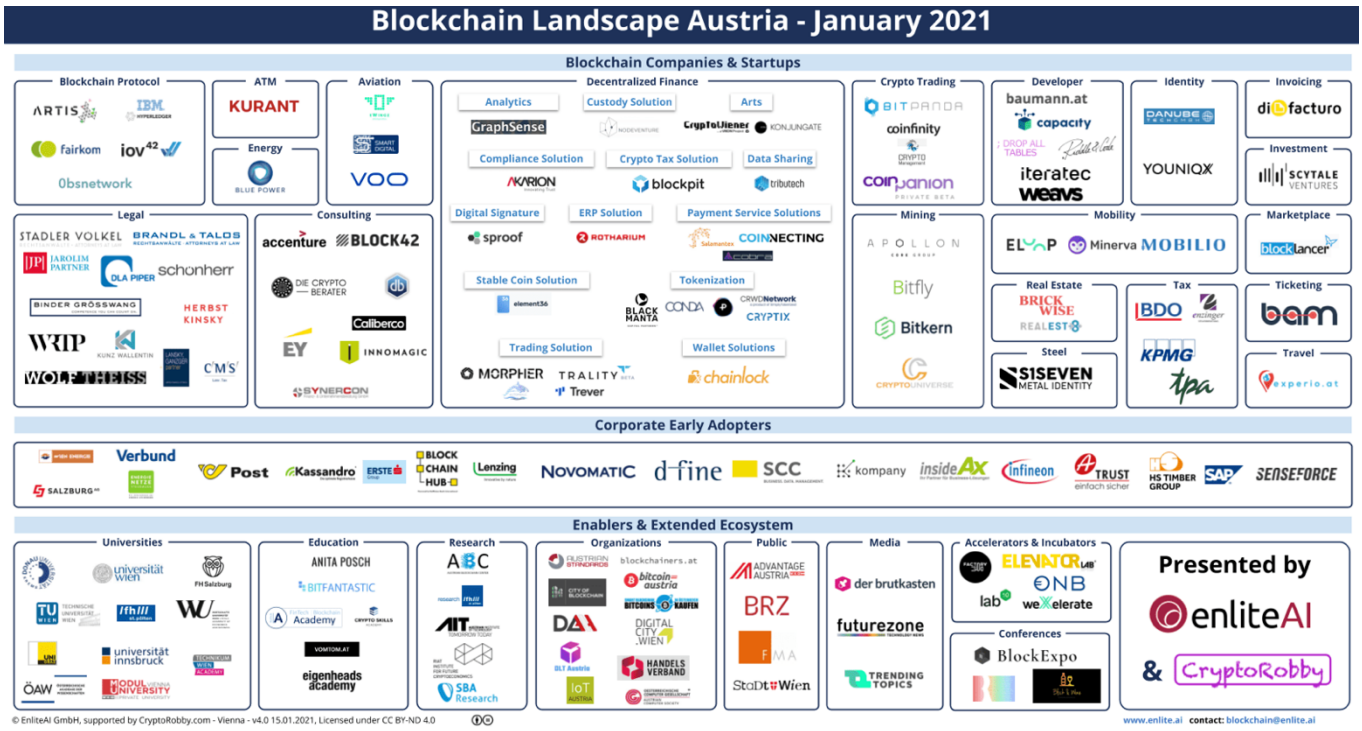
Digital currency exchange is VAT exempt, as is the case in most European countries. Their use as payment for goods or services is treated no differently than fiat currencies. Capital gains from their sale are subject to a progressive income tax that amounts to up to 55 % for individuals and 25 % for corporations. For the near future, however, a harmonisation in the capital gains taxation of token-based assets with traditional assets is proposed. 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 and offering two undergraduate courses on blockchain topics: "Introduction to Blockchain" and "Blockchain and Token Economy". Moreover, the university offers a master's degree programme in "Digital Economy", which includes some blockchain courses.

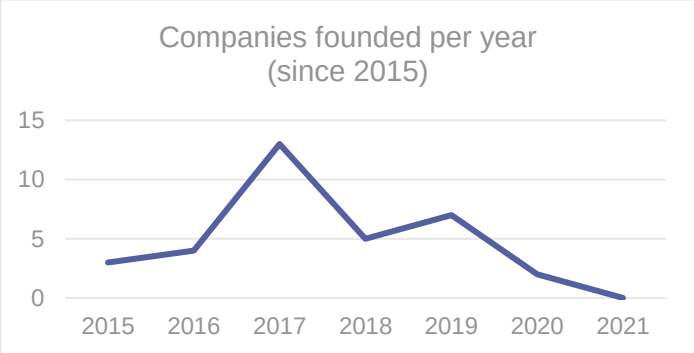
Blockchain across key industries: While Austria-based startups are active in a wide range of business verticals, the state has concentrated its efforts to exploit blockchain technology in specific sectors. Various initiatives have been exploring blockchain technology to facilitate the country's digitisation 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 a 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 the 10 largest companies.

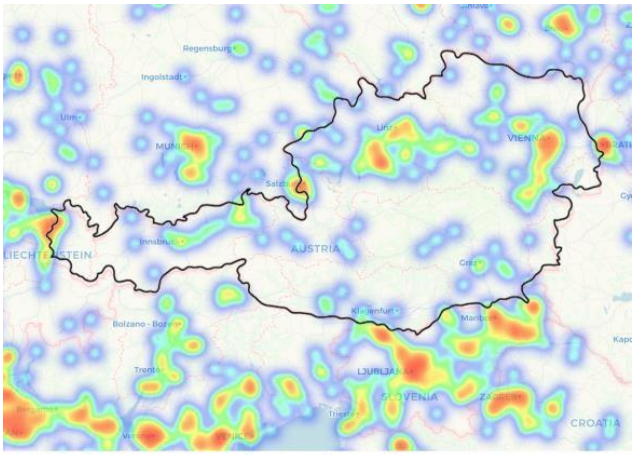


As of December 2021, Austria-based blockchain companies have approximately EUR 50 million, with business opportunities in the space were identified as early as 2012. In total, 7 companies have secured funding with an average number of 2.5 investors per funded company. Notable startups and companies in 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 crowd-investing platform for Austrian startups.



BLOCKCHAIN COMMUNITY

The COVID-19 pandemic had an evident impact on Austria's blockchain community. Annual events and get-togethers were postponed, others turned virtual, while others were cancelled. Concurrently, measuring the growth of the Austrian blockchain community over the past years in a meaningful manner is hard. Yet, 11 000 individuals make up Austria's blockchain community.



Source: coinmap.org

Overall, the Austrian blockchain and digital currency audience consist of 231 000 to 272 000 individuals, or approximately 2.8 % of the total population.

(Source for audience: Facebook audience, ages: 16-65+, location: Austria, keywords: Block chain (database), cryptocurrency, Bitcoin, Ethereum | Source for enthusiasts*)*

INSIGHTS FROM EXPERTS

Alfred Taudes, Professor, Department of Information Systems and Operations Institute for Production Management, Vienna University of Economics and Business

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Austria? Has the recent growth of the cryptocurrency markets facilitated familiarity?

The awareness of the blockchain technology and cryptocurrencies has risen in Austria especially in the past few months. This was mainly driven by mainstream media coverage of the recent growth in cryptocurrencies markets in general, specific phenomena, such as non-fungible tokens (NFTs) as well as highly visible VC [venture capital] investments in selected Austrian blockchain startups. In Austria, the blockchain technology and especially cryptocurrencies are still associated with tax evasion and money laundering. Due to the lack of legal regulatory measures and reliable control measures, the people's trust in this technology is relatively low. However, despite this low trust, the Global Digital Report 2020 shows that nine per cent of the persons living in Austria in 2020 owned cryptocurrencies in any kind, which is two percentage points above the worldwide average.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Austria?

The overall size of blockchain and cryptocurrency business ecosystem in Austria is due to the above-mentioned facts and circumstances relatively small and mostly startups are currently engaged in this sector. However, these Austrian startups encompass numerous aspects and business areas that deal with cryptocurrencies and the blockchain technology in general, for instance such as crypto tax reporting, crypto broker exchanges and even token-emitting startups. The startup part of the ecosystem can be characterised by a high level of growth combined with a high level of attrition. Overall, once regulatory measures and reliable control measures will be implemented, in our view, the size and maturity of the blockchain and cryptocurrency business ecosystem in Austria will face a huge chance of growth since institutional investors and other companies then SMEs could be likely to make use of this technology. With regards to larger corporate players, an increase of experimentation in innovation departments can be seen. However, these remain at early stages of product lifecycles. The focus is on understanding the technology, product discovery and limited proofs-of-concepts. However, once such regulatory measures and reliable control measures will be implemented, in our view, the size and maturity of the blockchain and cryptocurrency business ecosystem in Austria will face a huge chance of growth due to the fact that institutional investors and other companies then SMEs could be likely to make use of this technology.

What measures has Austria taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

The EU's 5th Anti Money Laundering Directive (Directive [EU] 2018/843), which had to be implemented by all Member States and therefore also in Austria by 31 January 2020, introduced a uniform definition for cryptocurrencies (so-called "virtual currencies") and, on the other hand, certain due diligence obligations, which must be carried out by domestic service providers in relation to cryptocurrencies. These obligations include, for instance, the regular verification of the identity of the customer, the beneficial owner and the origin of the funds. Thus, for the first time, a regulatory framework was created both at the EU level and in Austria, which has increased legal certainty and subsequently also the willingness of investors to invest in cryptocurrencies.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

Due to the payment character of the “virtual currencies” defined in the 5th Anti Money Laundering Directive on the one hand and the increasingly diverse design possibilities of tokens as well as their growing popularity on the other hand, which can be structured similar to shares, participation rights or vouchers, new regulatory and supervisory measures will be necessary to achieve legal certainty and consequently the increased willingness of investors to invest in such assets. On the part of the EU, there are already moves in two different directions: with the DAC 8 directive proposal, the EU is planning a further step towards equalisation with capital assets, as crypto assets are also to be covered by the automatic exchange of information between the Member States. With the Markets in Crypto Assets (MiCA) directive proposal, crypto assets not qualifying as financial instruments are to be subject to the same regulatory provisions (i.e. in particular with regard to market manipulation). Furthermore, the directive proposal aims at providing legal certainty for crypto assets not covered by existing EU financial services legislation in general.

What does the future hold for the Austrian blockchain and cryptocurrency ecosystem?

In our view, the future for the Austrian blockchain and cryptocurrency ecosystem must be divided into the cryptocurrency and blockchain sector. On the one hand, the cryptocurrency sector might diminish in the upcoming years since the payment character of such assets is becoming increasingly less important. However, because of the paradigm shift undertaken in the course of the eco-social tax reform 2022, cryptocurrencies (but not tokens) have been integrated into the taxation system of capital assets and will be treated as such retroactively as of 28 February 2021. This could have an impact on the popularity of cryptocurrencies. On the other hand, assets that allow for utility and governance functions are becoming increasingly popular. This leads to the second, i.e. blockchain sector, which provides for numerous ways of usage, such as the tokenisation of assets, making it possible for precious goods (e.g. real estate and shares) to be divided into parts which then allows people to acquire those parts and participate in the gains derived by those assets, or simply to own (a part of) an asset they always wanted to possess. Furthermore, the blockchain technology due to its inherent characteristics allows for the unadulterated and aggregated storage of data that can be used to enhance especially processes involving big data, e.g. for customs and other purposes.

Key Findings

THE MOST ACTIVE SECTORS

FinTech

BLOCKCHAIN PROFESSIONALS

992

BLOCKCHAIN SOLUTION PROVIDERS AND STARTUPS

47

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 financial sector. More recently, the growing understanding of tokenisation's benefits fostered several startups' growth in that scene. The lack of specific legislation didn't hamper the issuance of utility and even security token offerings. Last but not least, several well-established companies and VC funds serve the continuous growth of the cryptocurrency ecosystem.

Most blockchain startups focus on Business to Business (B2B) and Business Consumer (B2C) projects that, apart from the financial and banking sectors, cover diverse domains, such as legal, logistics, supply chain, and 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, more than 65 projects have been funded. This number is relatively high 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 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. Belgium was also the first country to spin up a second node. In collaboration with KU Leuven and BOSA (a government agency, Belnet and Smals founded BelBlock, an EU CEF project. Their website and other activities aim to raise awareness for EBSI in the Belgian context.

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. This project, alas died a silent death when the Flemish Government stopped supporting it.

Ubisoft in partnership with Belgium Pro Soccer league has launched a free to play crypto soccer game.The company has partnered with the Jupiler Pro League, the professional soccer league of Belgium.

Seety, a digital parking startup based in Belgium, has introduced crypto payment support for parking tickets. The startup has rolled out a crypto payment feature in Antwerp and Brussels. According to the press release issued by the company, customers will not incur any additional fees if they use crypto.The Seety app reportedly has over 355,000 users in Belgium and the Netherlands.

Brewers and farmers from Belgian Barrels Alliance (BBA) have partnered with Zeromint to offer nonfungible tokens (NFTs) aimed at preserving the UNESCO recognized Belgian beer culture and heritage. The Belgian Barrels Alliance, aims to launch NFTs initiatives to promote tree plantations and learn specialized artisan skills and traditions in addition to building engagement and reward opportunities for beer fans and enthusiasts.

Virtual 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 (FSMA) published a communication on Initial Coin Offerings (ICOs) that provides an overview of the legislation and regulations that may apply to ICOs and 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 virtual currencies as early as 2014. The latter Authority actively maintains a red-list of fraudulent virtual currency sites. Nevertheless, the FSMA approved during 2021 a real estate token project and an (art) security token project. Utility token offerings are considered a regular option to raise capital.

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 cryptocurrency taxes, at 33% on any cryptocurrency income depending on how the tax subject is investing. If it's merely an increase of value over time, there is no taxation, but the tax subject has to proof the HOLD'ing. This is considered an investment as a *bonus pater familias*. Contrary to other countries, there is no

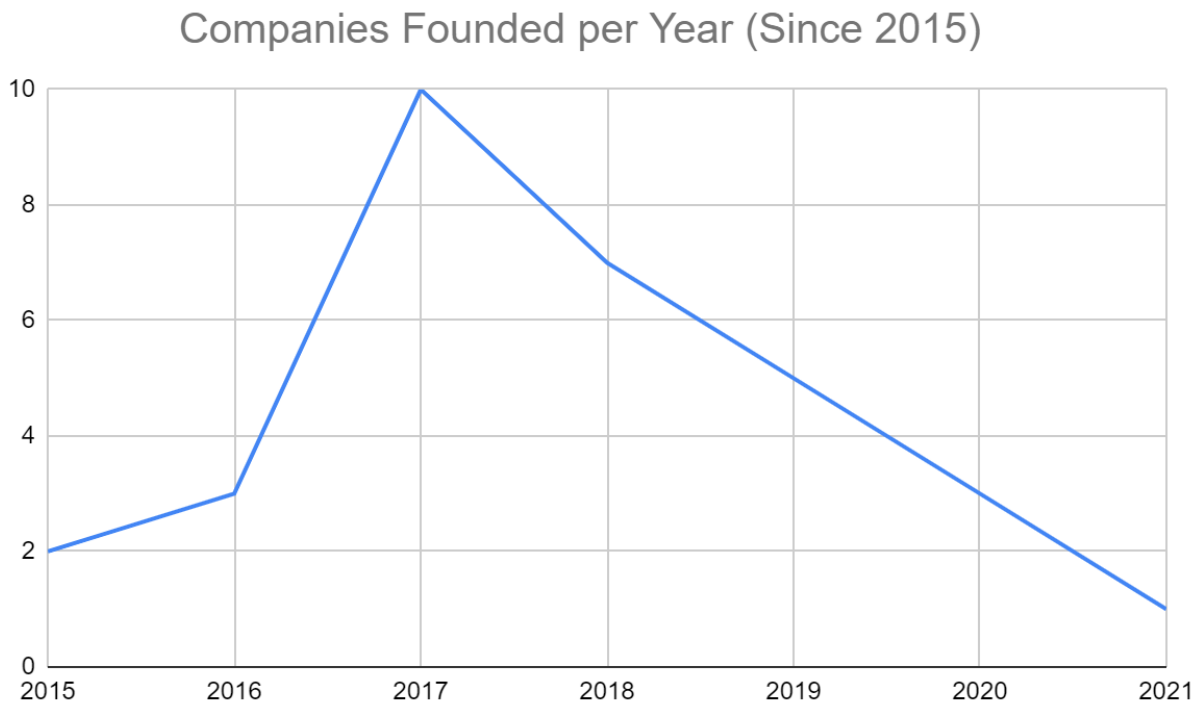
specification on the required holding time. The intention has to be proven. If the profit results from speculation and market trading, the tax is 33% (taxed as other income). However, if the tax subject acts as a professional trader (i.e. buy hardware, subscribe to paid info sources,...), then the income from the trading will be taxed as regular income. Belgium has one of the highest taxes on income, as of 39.660 €, you pay up to 50% on taxes.

Blockchain Regulation for Crypto Exchanges and Custodial Wallets: The Financial Services and Markets Authority (FSMA), requires the region's crypto exchanges and custodial wallet services to register as of 1 May, 2022. Crypto businesses in Belgium that have been already operating before this official announcement are required by law to notify the FSMA of the “exercise of their activity” within the next two months, before July 1 2022. In addition to disclosing operations, existing businesses have been given four months, i.e., before Sept. 1, to register as a regulated business with the financial regulator. Crypto service providers must fulfill seven conditions that include being constituted in the form of a company with a minimum capital of 50,000 euros.

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 cryptocurrencies. 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 most active startup companies focus on applications 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. The presence of financial knowledge also fosters the growth of companies focusing on cryptocurrencies and decentralised finance.

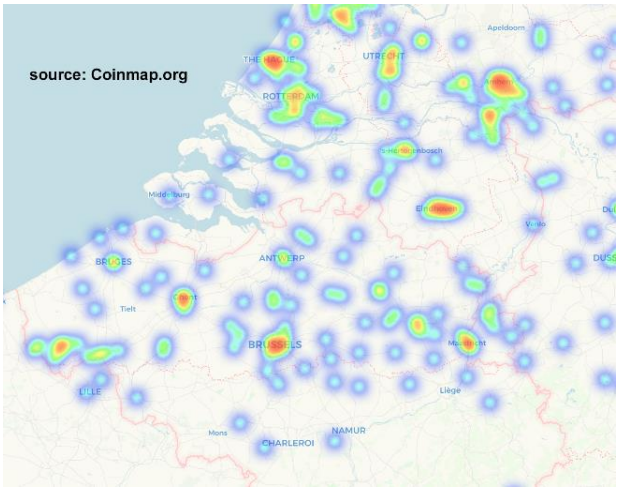
BLOCKCHAIN STARTUP AND BUSINESS SCENE



Belgium is home to a fast-growing startup scene, thanks to its strong service economy, and the fact that most 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 the financial centre of the European Union, along with its diverse, innovative startup scene, Belgium is an attractive location for international companies 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 47. According to data retrieved by Linkedin, the number of blockchain professionals is 992.



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.

The Blockchain proponents in Belgium are at the moment still organised across several axes. Supported by the Wallonian (French / German speaking part of Belgium) government, WalChain aims to unite blockchain

startups to position their digital solutions as drivers for the development of new digital ecosystems, and the further economical development of the region.
The enterprise blockchain focused BelTug Blockchain taskforce, established in 2018, unites the largest stakeholders in Flanders (Dutch speaking part of Belgium). They aim to unite enterprises to create a common voice towards the government.

The newly founded Belgian Blockchain & Cryptoassets Federation, at the moment with a strong cryptoassets/cryptocurrencies focus, aims to unite all Belgian blockchain and cryptoassets proponents.

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. Based on LinkedIn data, 3,200 professionals are directly or indirectly associated with the blockchain technology.

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.

Keyrock: It is cryptocurrency 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 cryptocurrency ecosystem.

Delta: Delta is a Bitcoin & cryptocurrency portfolio tracker app. Delta allows users to keep track of all cryptocoins, including Bitcoin, Ethereum, Litecoin and over 2000 altcoins. The company has been acquired by eToro.

Credix: Credix is a decentralised credit marketplace powered by Solana blockchain technology. Credix protocol enables global access to efficient undercollateralized lending for loan originators (e.g. FinTech companies) in emerging markets and fixed-income investment opportunities for investors. Credix bridges traditional finance and DeFi with the regulatory compliant framework institutions need.

Playtreks: The PlayGrounds is the NFT marketplace for artists and digital content creators. PlayGrounds NFT marketplace, one of the first digital marketplaces where artists and digital content creators can mint their content into non-fungible tokens (NFTs) and expose their crypto collectibles. Creators and fans alike can buy, sell, and discover exclusive digital items.

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.

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.

Venly (formerly Arkane) : Venly provides a wallet and NFT products that seamlessly integrate with your blockchain project.

INSIGHTS FROM EXPERTS

Interview with Koen Vingerhoets, FUJITSU

EUBOF: How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Belgium? Has the recent growth of the cryptocurrency markets facilitated familiarity?

KV: The public awareness about and familiarity with blockchain, cryptocurrencies and NFT's are steadily growing. Initiatives are easily picked up by the mainstream media, although frequently contextualized by powerful critical voices. It could be summarized as "mainstream-with-a-frown". Some examples that made it to many households through the news: a well-known artist like Jeroom sells his drawings as NFT's, a house was put on the market together with its digital twin in the metaverse (https://www.zimmo.be/nl/metaverse-huis/), a work of art was tokenized (https://www.rubey.be), newspapers write about novelties like real estate tokenization (https://www.tijd.be/ondernemen/vastgoed/dankzij-blockchain-ben-je-kotbaas-vanaf-50-euro/10332538.html), KBC had her own employees test the KBC Kate-coin (a bank backed stablecoin) on a festival (https://www.demorgen.be/nieuws/kbc-test-eigen-cryptomunt-op-werchter-boutique-daarna-beschikbaar-voor-alle-klanten~b7435a6d/). Crypto even made it to the late night news (https://www.vrt.be/vrtnws/nl/2022/05/25/bijna-10-van-de-belgische-gezinnen-belegt-in-cryptomunten/), but a smirk is never far away. Owning crypto as part of an investment portfolio is no longer an oddity and tips are frequently shared by (so-called) crypto-experts. However, the loudest voices in the public debate (National Bank, economists) warn about the risks of cryptocurrencies and NFT's, and, but to a lesser extent, the risks of blockchain technologies.

EUBOF: How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Belgium?

KV: The business ecosystem is in my opinion steadily growing in diversity and size, but still remains largely under the radar. Companies like Keyrock are essential to the crypto market, but still fairly unknown. Venly (formerly Arkane) raised millions to expand their NFT marketplace and services. NGrave receives rewards for having the most secure crypto storage device. With Tioga Capital, there is an investment fund focused on blockchain technology. Service providers like SettleMint, IntellectEU and Fujitsu bring projects from idea to production all over the world. Recent events like Web32 in Antwerp and the Brussels Blockchain Week showcased a myriad of startups and established companies moving to blockchain based solutions. The Walloon region created WalChain to properly support blockchain technology based start- and scale-ups. Three elements impact the lack of visibility: (i) customers are often located abroad, (ii) Belgian people are modest and aim to have a solution in production prior to communicate about it, (iii) the different actors in the blockchain & crypto market are not fully aware of each other. To counter the latter, #Blockchain4Belgium, an initiative supported by FPS BOSA (https://bosa.belgium.be/en), aims to unite all professional actors and stakeholders in the Belgian blockchain and crypto ecosystem.

EUBOF: Only respond if specific measures have been taken - What measures has Belgium taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

KV: As far as I know, there is no legislation promoting blockchain and crypto adoption. The FSMA and NBB have been very open to discuss blockchain projects. The kick-off of #Blockchain4Belgium (https://blockchain4belgium.be/), supported by the SPF BOSA, is as far as I know the most visible action.

EUBOF: What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

KV: On national and EU level, a coordinated approach to properly regulate cryptocurrencies would contribute to legal certainty, which is imho elementary for entrepreneurs. No more “crypto friendly” zones, clear guidance on what is a utility/security token, publication of past decisions to show the way, regulatory sandbox to provide proper understanding to all parties involved,… could be manifestations of such a coordinated approach. I do believe the EU is taking steps in the right direction.

EUBOF: what does the future hold for the Belgium blockchain and cryptocurrency ecosystem?

KV: In the future, I expect more regulation and legislation to protect consumers. It’s a two-edged sword: an almost religious belief in a decentralized approach, requires support and decisions from the most centralized instances to make progress. It will foster public adoption, but contain and channel the almost unlimited innovation of today into customer focused, secured solutions.
For enterprise blockchain, I expect a further steady growth into tech-stack oblivion, supporting ever more mindblowing use cases (in other words: it will reach the platform of productivity in the Gartner hype cycle).

USEFUL RESOURCES

International Association for Trusted Blockchain Applications – Website of INATBA

Blockchain for Europe – Website of Blockchain for Europe

HIVE Blockchain Society – Website of HIVE Blockchain Society

Cryptoassets: A UK and European perspective on the regulation of cryptoassets – Burges Salmon

Blockchain on the Move – City of Antwerp, Innovation and Technology Division.

Key Figures

TOTAL FUNDS RAISED

€6.39 million

BLOCKCHAIN SOLUTION PROVIDERS

51

Bulgaria

THE BULGARIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Bulgaria locates in the Balkans and has been part of the European Union since 2017. According to the European Commission report, the economy experienced strong economic growth in the past few years. General figures on the country are available through various organisations such as the World Trade Organisation and World Bank.

The country hosts a vibrant ecosystem around the blockchain. Moreover, the ecosystem has grown from the previous report, as indicated by the number of startups. Bulgaria participates in European initiatives on the blockchain, such as hosting nodes for the EBSI, as discussed in the adoption.

There are regulations mainly focused on the financial aspect and cryptocurrencies. The regulations are relevant to taxation and investors' protection. Moreover, academia fosters the ecosystem around blockchain by establishing courses and certifications. Private entities are active in providing educational material.

The startup ecosystem in Bulgaria is composed of small and medium entities, with the focal sector being financial services.

TOWARDS MAINSTREAM ADOPTION

Blockchain adoption: There is interest in blockchain adoption in Bulgaria as various cases showcase the interest. Rumours from international media reported that the country explores crypto payment options, as Bulgaria uses its national currency and may have little benefits in a digital euro without a swift in currencies. Moreover, the country is part of the EBSI and the coordinator for setting up a node in the network is Industria Technology OOD as defined by the EC announcement. The action includes entities from the national ecosystem active in blockchain that will have to cooperate to deliver the node and other functionalities.

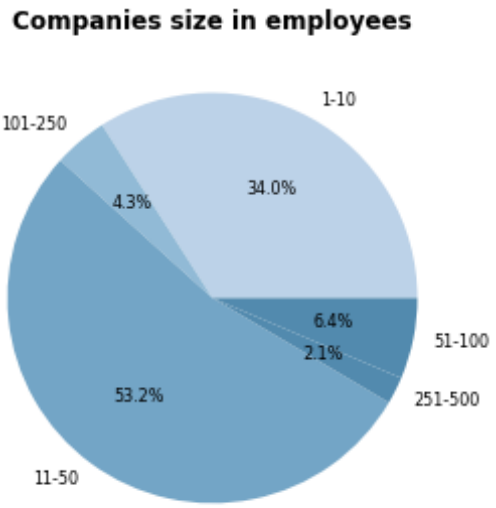
Legislation of blockchain: The regulation mainly focuses on cryptocurrencies, and the subjects are relevant to the uses of cryptocurrencies. In detail, cryptocurrencies have to be declared and audited by the National Revenue Agency as a financial asset. Gains from cryptocurrencies trading and mining are considered taxable events, so citizens will have to report that source of income to the tax authorities. Finally, a public registry for entities, including both natural persons and companies, with cryptocurrency-related activities have to be registered in a public register. The regulation for AML was introduced in 2020 issued by the Ministry of Finance with Ordinance No. N-9.

Blockchain in academia: There was a scarcity of information relevant to educational initiatives on blockchain in Bulgaria. Blockchain impacts numerous business sectors and it is included as a subject in FinTech related masters. In detail, the Faculty of Economics and Business Administration (FEBA) collaborates with Bulgarian Fintech Association (BFA) for a FinTech master, including blockchain. The initiative has been covered by the media and university. The university accommodates individual courses such as Blockchain changing Digital Strategies and others. The Technical University in Varna is another institute with individual blockchain courses like Blockchain Technologies as part of artificial intelligence (AI) systems.

Moreover, there are initiatives from the private sector for educating the public on blockchain. The last report on the national ecosystems included a couple of training programmes that are still active. Another initiative in education comes from the private company, LimeChain, with the introduction of LimeAcademy. For example, there is educational material for Blockchain Developers with eight modules to guide them.

Blockchain across key industries: The blockchain activity is across a diverse range of industries and sectors in Bulgaria. The prevalent industry for blockchain use is in finance, as the majority of entities are concentrated. The finance sector has a higher degree of maturity, and the Bulgarian Fintech Association is active in the national ecosystem. Another use for blockchain is to support applications and software, and this is the second most prevalent use of the technology. The services make use of blockchain attributes to deliver functionalities with their services.

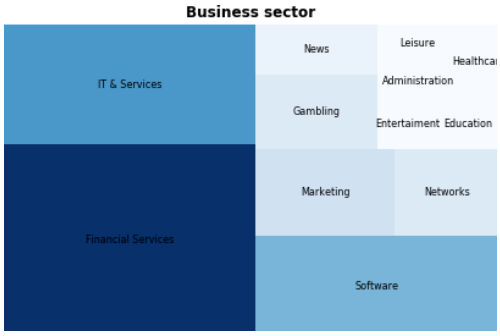
BLOCKCHAIN STARTUP AND BUSINESS SCENE



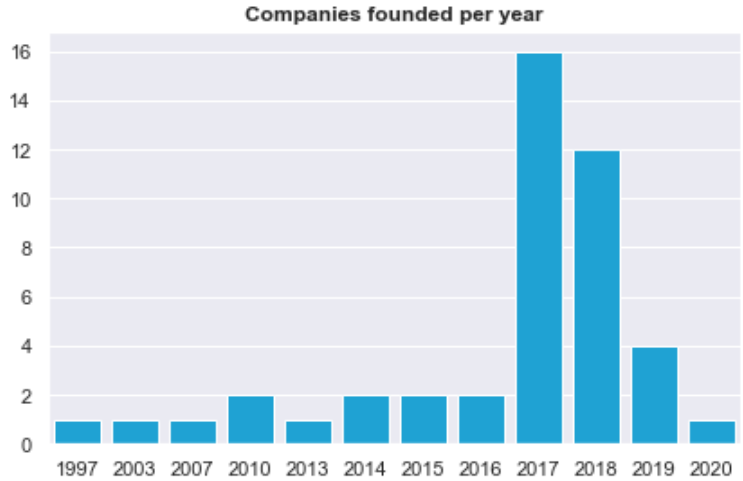
A robust startup scene closely relates to aspiring innovators and entrepreneurs' investment and funding opportunities. The last version of the report included venture capitals, such as æternity Ventures, Eleven Ventures and LANCHHub Ventures, active in the Bulgarian ecosystem. Apart from venture capitals, accelerator programmes are beneficial for preparing startups for their next stage, and the Starfleet Accelerator Program was part of the report's last version. This report will aim to extend and dive deeper into the startup opportunities in Bulgaria.

As the venture capital is interested in blockchain technology, startups in the early stages can explore the option of the New Vision 3 Fund. The portfolio fosters some entities with blockchain applications like Phyre, Klear and others. Similarly, LAUNCHHub Ventures is active in supporting the blockchain ecosystem. For example, as one of the latest news – Ambire succeeded in raising close to EUR 2.5 million. Other venture capital options with blockchain projects in their portfolio include Vitosha Venture Partners and NEVEQ Management.

Apart from venture capitals, there are accelerators programmes to support the innovation in the Bulgarian blockchain ecosystem. Accelerators can provide a wide range of benefits to participants: from idea validation up to preparation for funding rounds. The Bulgarian Innovation Hub hosts accelerator programmes for startups, with last year's cohort covered in a news article. Innovation Capital provides another option for attending accelerators with different options to select depending on the startup's needs.

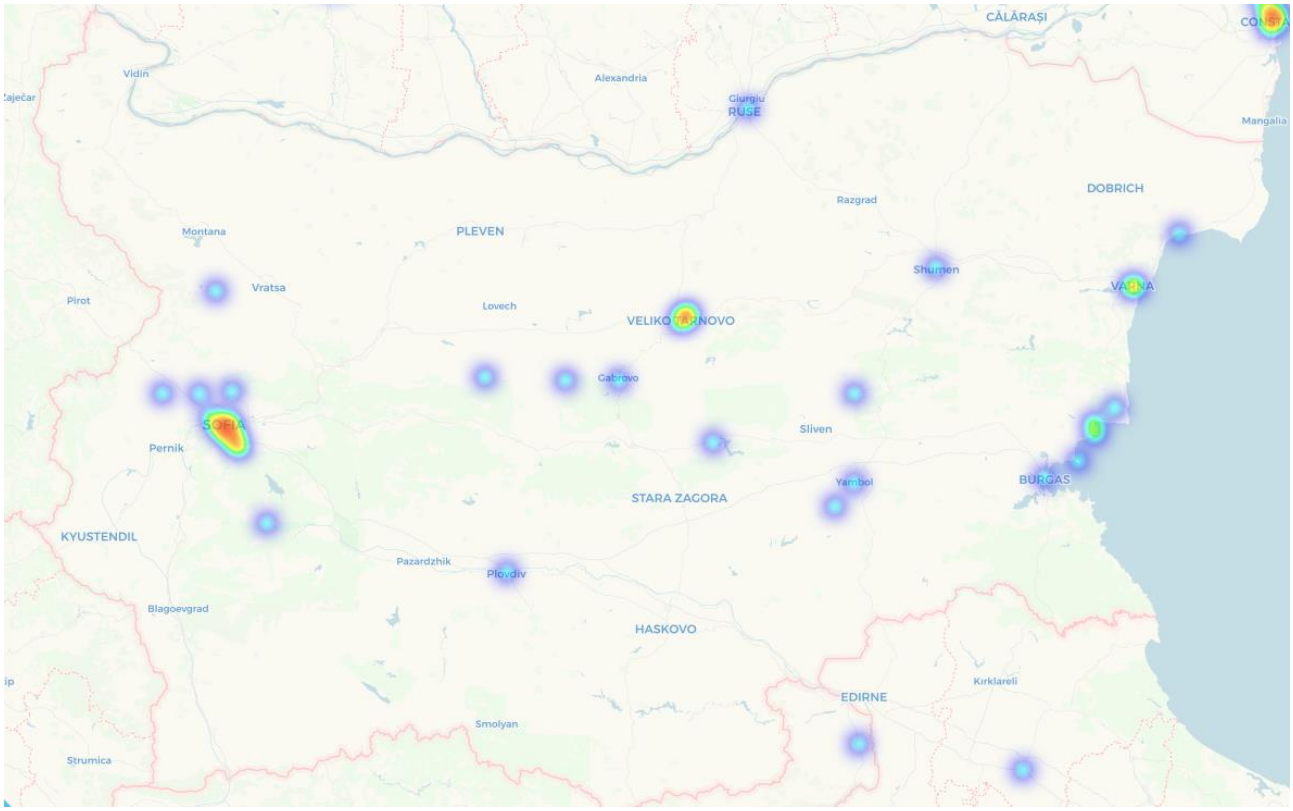


The blockchain startup ecosystem is vibrant with small and medium companies. The vast majority of the entities were established between 2017 and 2019, as Bitcoin hit the news and popularised blockchain technology. There are entities that swift their operations and adopt blockchain, as indicated from entities established prior in years, before the 2010s. Finally, the startups cover a wide range of business sectors, with the most prevalent being the financial sector.



BLOCKCHAIN COMMUNITY

There are organisations and incentives in Bulgaria to support and boost the participation of the public in blockchain. The past version of the report included the Balkan Blockchain Association and Bulgarian Fintech Association. The first association participates in INATBA as a member as announced in 2019. Bulgarian Fintech Association is active with publishing reports on Bulgarian FinTech ecosystem with the 2021 report being available online. Blockchain is a subject for FinTech, as the technology can disrupt the financial sector and the traditional business model.



Conferences are another choice for people active in the blockchain to participate. Conferences are events that permit participants to learn the state-of-the-art on the subject and expand their network. For example, Bulgarian Digital Week has accommodated the International Conference on Crypto Finance & Blockchain Technologies in June 2021. For upcoming events, the enthusiasts for blockchain have the opportunity to join the FinTech Summit in March 2022, where the subject will be on the way for blockchain disruption in the FinTech and benefits to harness. Finally, the academic community sets up events for promoting research. An example is the Science Events Ltd with events on multiple subjects and publication such as last year's Blockchain in Marketing by Justyna A. Minkiewicz.

Apart from associations, private companies aim to support the community with organising events. Such events share the passion and experience of experts active in the field. For instance, the private entity hack.bg has organised meetups for blockchain developers. Similarly, another entity, DEV.BG, has a user group on blockchain where events take place for learning and socialising between people with similar interests. While the majority of events are concentrated in the capital, other cities accommodate events and meetups for the community. An event in Blagoevgrad covered in a news article had as a topic FinTech and Blockchain in the past year and was organised by Startup@Blagoevgrad.

BLOCKCHAIN COMMUNITY

Ambire: is a company established in 2017 relevant to digital advertising. The solution aims to boost transparency for advertisements while respecting users' privacy. Advertisers are recognised via cryptographic identities as personal data are in off-chain storage. A dedicated wallet to handle tokens and permissions is part of the suggested solution.

Coinpanda: is an application launched in 2018 for tracking cryptocurrency portfolios and the resulting taxes. The idea emerged from the frustration of tracking transactions and calculating the taxes. Digital wallets can be used for that purpose by using their public keys for querying the blockchain transactions via APIs.

Credefi: introduced its idea to connect crypto lenders with SME borrowers in 2020. The roadmap of the project presents the adoption of Polygon and the future migration to Solana. The project includes three distinct phases. The platform makes use of Ethereum blockchain and the matured language Solidity for deploying smart contracts.

Deriveum: a startup founded in 2019 which was funded by Block.IS. The start-up's idea is to utilise crypto commodities as credit-default swap (CDS) collateral and manage risk-sharing. The idea involves locking value in a smart contract to cover the case of inability to pay. The startup seems to implement Corda blockchain for its application.

Qaisec: is a company that states to offer custom solutions in the banking sector. One of the solutions is the introduction of the quantum encrypted blockchain (QEB). The application of QEB offers a greater level of security to safeguard blockchain from vulnerabilities stemming from the proliferation of quantum computing.

Ricoto: is a company established in 2018 with an expertise on content writing for blockchain projects. The proliferation of ICOs necessitates the presentation of coherent plan around the suggested solution of a project.

TokenGet: is a platform to launch ICOs in a secure and manageable way established in 2017. It permits the companies to focus their efforts on marketing and promotion of the ICO, since the platform delivers functionality across the different actions involve in an ICO. The company is part of the Balkan Blockchain Association.

Tresaro: is a blockchain marketplace that focuses on three sectors: e-commerce, crowdfunding, and charity. The decentralised marketplace is a trustless environment for peer-to-peer trading without the arbitration of a centralised authority. The marketplace utilises a SWARM network deployed on Ethereum.

INSIGHTS FROM EXPERTS

Hristian Daskalov, Doctor in Industrial Management, Technical University of Sofia

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Bulgaria?

When my colleagues and I launched the "Open Source University" project in 2015, it was among the few, if not the only blockchain-development initiative in the country beyond the world of finance. The Center for Shared Science and Business, which we set up at the Technical University of Sofia to academically govern the project, was the only such laboratory. Today there is a plethora of blockchain R&D projects in the country from all the industry sectors – software development and consulting, accounting and legal, exchanges and brokerages, infrastructure providers, mining services, NFTs, and educational programs. We have Web3-focused venture funds active on the ground, a couple of crypto associations, and a very active "Sofia Crypto Meetup" community. Major international entities in the blockchain sector have invested in the country by employing outsourced teams and establishing development offices in Sofia. I would say that Bulgaria, as of today, has a fully-fledged blockchain/crypto ecosystem, which is among top 6 in Eastern Europe. The only thing the country needs is its Web3 unicorn to make the headlines globally and attract more awareness and talent, similar to countries such as Estonia.

What measures has Bulgaria taken over the past year in terms of public sector initiatives to promote blockchain and cryptocurrency adoption?

Bulgaria has recognized blockchain as the new infrastructure and enabler for more transparent, efficient, and accountable public administration. It is among the founding countries behind the European Blockchain Service Infrastructure (EBSI), which explores how decentralized technologies can empower the creation of human-centric solutions that foster civic participation and digital sovereignty. Over the past year, a country-level consortium was formed, which is now in charge of implementing the Bulgarian part of EBSI with pilots in the field of document validity checks and elf-sovereign identity.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

I believe that the new eIDAS 2.0 regulatory framework and the European Digital Identity Wallet are significant initiatives under the umbrella of the European Commission, which have the potential to advance the adoption of blockchain by the public. Blockchain's adoption as a means for transparency and accountability in the private sector is also important, but policy-makers on national and international levels should avoid too much intervention in the area if they are to be seen as enablers. Cryptocurrencies and DeFi, in general, are a whole other story and the more they correlate with the traditional financial world assets, the closer regulations they should expect. Hence, it is important to go towards smarter, digital-savvy regulations for all – such that provide trust and predictability and encourage innovation on the side of all key stakeholders.

What does the future hold for the Bulgaria blockchain and cryptocurrency ecosystem?

The Bulgarian startup ecosystem is a regional leader in innovation, ranked number 36 globally by StartupBlink. According to recent research, Bulgaria is an ideal place to locate for energy & environment, software and data, as well as marketing & sales startups. All of this speaks well about the development of the blockchain and cryptocurrency ecosystem in the country. While there is a global recession ahead of us, Bulgaria was actually on a net profit as a result of the previous one in 2018 due to the relocation of many IT businesses in the country, known as a preferred nearshore destination among international corporations. I believe we can expect similar developments this time around, but with Web3 companies making a move towards Bulgaria.

Key Figures

TOTAL FUNDS RAISED

€104 922.4

Croatia

THE CROATIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Croatia is a country located in central and south-east Europe and part of the EU since 2013. Croatia's economy has been affected negatively by the pandemic, but the economy is to recover and grow as forecasted by the European Commission. The recovery after the pandemic is an indicator of the reforms in the economy in the prior years. The Startup Europe Network accommodates an overview of the startup ecosystem in the country. A notable point from the startup ecosystem is the range of sectors they operate within.

There is interest in Croatia to adopt blockchain as there are public activities like Croatian Post's cryptoexchange introduction and crypto stamp. Moreover, the Croatian Energy Strategy mentions blockchain as an example of a technology to act as a mechanism to foster smaller market segments in the energy sector. Blockchain adoption is continuous in the public sector as Croatia has joined the Blockchain Partnership since 2019.

The legislation around blockchain and cryptocurrencies incorporates the European actions around the subjects. Activities related to cryptocurrencies like trading and mining are considered taxable events in Croatia. Moreover, entities supporting cryptocurrency activities should be registered to the Croatian Financial Services Supervisory Agency to adhere to the regulations.

The private sector seems to grow with a variety of blockchain applications introduced. Private companies try to facilitate transactions with cryptocurrencies as their popularity grows. Moreover, Croatia attracts tourists who wish to use their cryptocurrencies in their exchanges with the local community. There are a handful of cases for adopting cryptocurrencies as a payment method in Croatia.

The blockchain community seems to grow and has the support of academia and associations. There are training and courses for the community to learn about blockchain. The research on blockchain matters is facilitated as there is an established laboratory dedicated to the technology. The community can attend large scale events and network during these events.

TOWARDS MAINSTREAM ADOPTION

Blockchain adoption: Cryptocurrencies are not equivalent to traditional money, but their popularity is undeniable, with more citizens owning a crypto token. After launching a crypto stamp, the Croatian Post has introduced a service to exchange your cryptocurrencies with the introduction of Crypto Centers. This action was covered by articles, as the service is available in over 50 spots. It should be noted that a handful of the popular cryptos are selected to be available through the service.

As previously mentioned, cryptocurrencies are not equivalent to money. In contrast, people are eager to hold digital tokens, and companies are adjusting to this trend. For example, Tesla shook the world in 2021 by announcing crypto payments availability. In a similar fashion, Konzum, a Croatian supermarket chain, is in place to accept payments in cryptocurrencies as covered in CoinTelegraph. It should be noted that the company does not receive or hold in their ledger cryptocurrencies but fiat money. The exchange of cryptocurrencies to tokens is the responsibility of the Croatian brokerage, Electrocoin. Similarly, there is another service that is structured to accept cryptocurrencies. This service is the petrol payments per CoinTelegraph, as it is a service to assist tourists in their experience in the country.

Blockchain adoption should not be limited to cryptocurrency payments, as blockchain structures facilitate different functionalities. For example, NFTs were one of the trends in 2021 for blockchain. These trends reshape business models and interactions between stakeholders in an ecosystem. An example from Croatia is the music event Circus Maximus, which envisions establishing a DAO and mint NFTs for ticketing. The Distributed Autonomous Organisation (DAO) can democratise the participation in events, as the organisations could be run on logic with the application of code.

Legislation of blockchain: There are no major updates in the regulations from the previous report. Cryptocurrencies and related activities are regulated as part of the Personal Income Tax Act that handles the general tax policy. It should be noted that mining is an activity producing tax events as described in a blog post.Entities that are active in providing exchange services for digital currencies are obliged to apply measure and procedure for AML. The Croatian Financial Services Supervisory Agency (HANFA) is the supervisor for the implementation of the regulation. HANFA provides a list with the registered entities on their site, as a means for the public to avoid fraudulent entities.

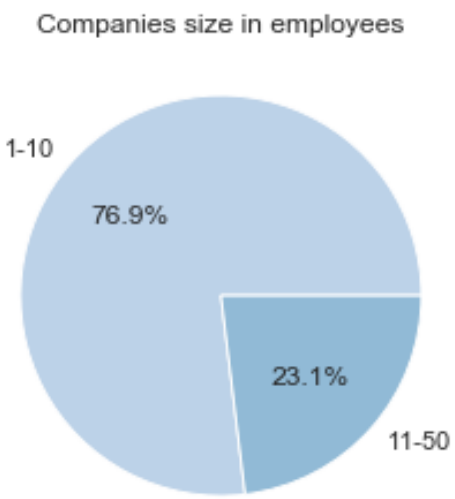
Blockchain in academia: Universities have incorporated courses in their curriculums for blockchain and its applications. An example is the University of Pula, with a course titled Blockchain applications. The course is part of a master's degree programme and includes suggested literature on the blockchain. Another course is the postgraduate one at the University of Zagreb, titled Distributed Ledgers and Digital Assets.

An upcoming summer school in June 2022 will be held in Šibenik with the subject of crypto in real-world applications and privacy. The summer school is organised collectively by Radboud University, ETH Zurich Information Security and Privacy Center, and the University of Zagreb.

The academia scene in Croatia takes actions into organised research initiatives to research and innovate on the blockchain. For that reason, the Laboratory for Applications of Blockchain Technology aims to test innovative methods and applications with the implementation of blockchain and DLT technology led by Prof. Kristijan Lenac. Additionally, research projects set the groundwork for blockchain applications and innovations. There is IoT4us funded by the Croatian Science Foundation with ongoing work and publications

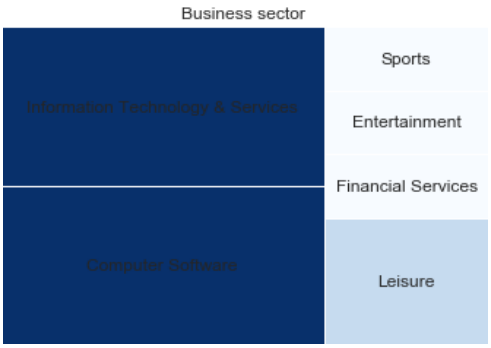
Blockchain across key industries: The adoption of cryptocurrencies as a payment method seems to be popular in Croatia. The incentive for this adoption is to facilitate a method for tourists to use their cryptocurrencies during their stay in the country. The gathered data about the startup ecosystem in Croatia indicate that the majority of services are adopting blockchain as a part of the software application. Blockchain is general technology with use in different sections and developers make use of it to incorporate as a component for their service.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

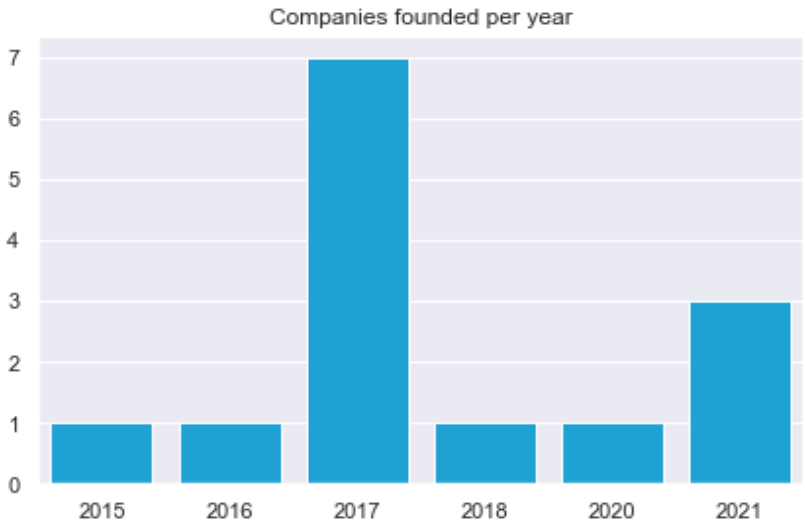


Croatia's ecosystem has significantly grown the past few years as recorded by Startup Europe Networks. There are initiatives that exceeded the borders and have been funded by different sources. An example is Revuto that introduced a digital token, REVU, to facilitate its financial service.

Startups can select from venture capital to incubators to assist their growth depending on their strategy. Fil Rouge Capital is a venture capital established in Zagreb with different options for entities to choose from depending on their situation. There are incubation, acceleration, and growth programmes for entities to participate in. Additionally, there is ZICER, Zagreb Innovation Centre, a place with a list of options as incubation and acceleration programmes are available. Another option is the tech company incubator SPOCK, which helps students, researchers, and scientists shape their ideas into startups.



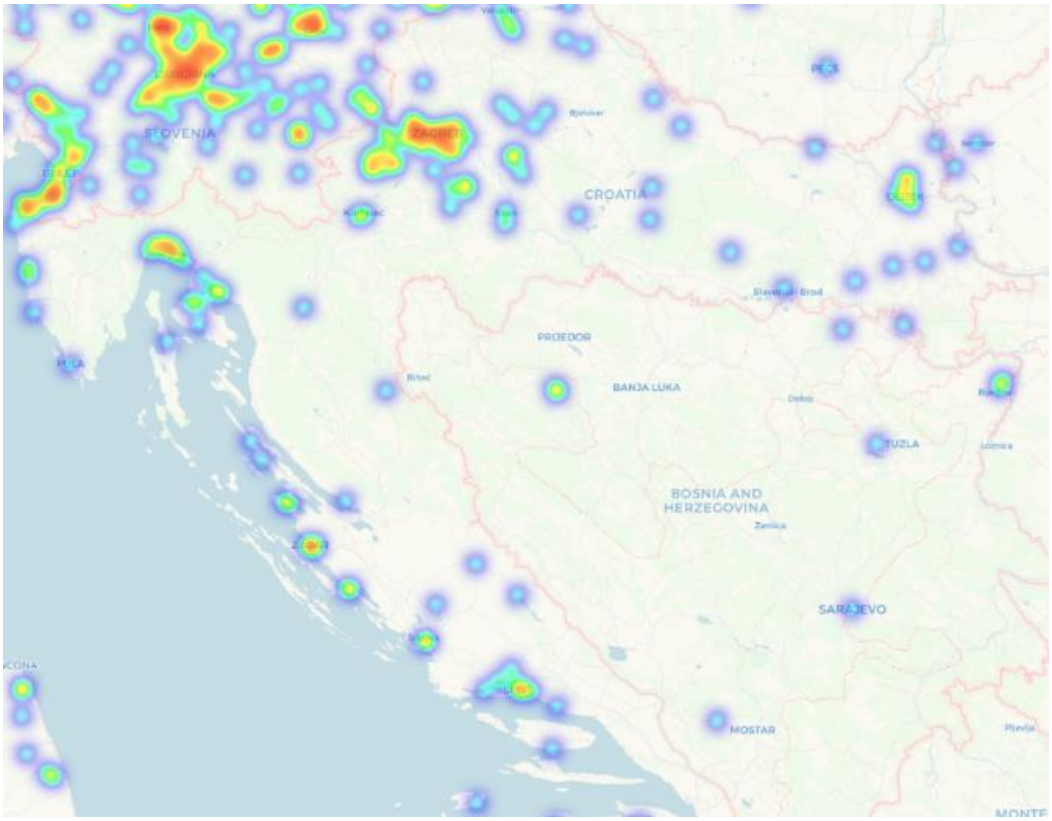
Most entities in our startup data set for Croatia were established in 2017. Lately, there have been new additions in the startup ecosystem with the inclusion of newly formed entities. Blockchain is used predominantly in software applications and IT services, but other sectors like leisure and sports have adopted blockchain. The size of the entities is small and medium, as it is normal for technologies companies that develop software.



BLOCKCHAIN COMMUNITY

The community can participate in associations for blockchain that promote the technology and its applications. One example is the Croatian Association for Blockchain and Cryptocurrencies, UBIK, with a range of activities. The activities include workshop organisation, updates on the blockchain and even an NFT collection.

Large-scale events have been hindered by the pandemic, but conferences and events gradually return. There are two events scheduled for May 2022 that will be available for the community to interact with each other. BlockSplit will be organised for the third time with workshops, a 2-day conference and a hackathon. The event will occur in Split with numerous subjects in the respective workshops and talks. Another event is BlockDown Croatia held in Sibenik, with the focal point being NFTs and Web3.



There are smaller-scale events held in Croatia that are interesting to the community from time to time. For example, a virtual panel accommodated by the University of Dubrovnik discussed the contemporary issues in money, digital euro, and more subjects in a panel. The panel consisted of blockchain practitioners in business and universities professors as moderators. More details and a video recording are available in the university's blog post. There are events organised by universities accommodating blockchain and its subjects. For example, the University of Rijeka and the Croatian Academy of Sciences and Arts held a conference on the COVID-19 messages where Prof. Kristijan Lenac presented blockchain solutions for the post-pandemic period.

An indicative but non-exhaustive list of blockchain companies in Croatia

Ampnet: is a platform for fundraising and tokenisation established in 2018. The platform aims to speed up the global fundraising procedures, as it provides KYC methods and reporting for automating procedures. The tokenisation can be applied in a wide range of businesses.

Beyondi: is a development company that is active in different technologies established in 2014. Their expertise in blockchain lies on Hyperledger and its frameworks that allow the creation of decentralised systems.

Break Stuff App: this is a one-stop shop for sports cards collectors established in 2021. The shop merges AI with blockchain to mitigate issues that collectors have to deal with. The shop is currently under development, as there is an available waiting list for access to the prototype.

Spiritus: introduced itself in 2021 as a platform based on blockchain for creating digital memorials. The platform is currently in its initial stages, as a fundraising is live. The platform goal is to ameliorate oblivion, where past relatives are forgotten with the passage of time. Users of the platform can upload images and stories of their beloved people.

TheGepek: is a platform introduced as a carpooling for packages delivery based on blockchain. The platform established in 2021 and was featured in an article. The platform is intended to support package delivery in a paradigm of sharing economy.

Unifty.io: is a multi-chain infrastructure platform that enables creators to decentralised no-code solutions. It provides services around the NFT space. And through the platform, creators can buy, sell, swap and create NFTs and NFT farms. It is founded in 2020 and is based in Zadar, Croatia.

INSIGHTS FROM EXPERTS

Ivan Piton, Member of the organizing committee of UBIK- Union for Blockchain and Cryptocurrencies Croatia

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Croatia? Has the recent growth of the cryptocurrency markets facilitated familiarity?

The public awareness and adoption of blockchain and cryptocurrencies have been increasing in the past years; however, relative to the more developed countries with a more proactive approach when it comes to blockchain technology, Croatia is behind the curve. The recent growth of the crypto market has facilitated familiarity with blockchain technology in general, and there is a growing number of companies that utilize blockchain in some way, shape or form. There is still plenty of room for growth and adoption of this technology, but the regulations are not set up in such a way that they favour growth, and the regulators are too reactive instead of proactive. This creates a significant barrier to entry for all beginners and slows down growth.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Croatia?

The overall size and maturity of Croatia's blockchain and cryptocurrency business ecosystem exceed the expectations. The companies that engage in blockchain development, as well as the companies that conduct their business on-chain, are mature, experienced and forward-thinking. These companies' networks have a worldwide market reach and meet the expectations of the growing worldwide market. Unfortunately, their growth is stunted within Croatia due to inadequate regulation.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

A step toward making blockchain and cryptocurrencies more appealing for entrepreneurship can guide Croatia in setting up a proper framework for regulating these companies and delivering a tax framework that is not vague and does not hinder the growth of these businesses. A clear and coherent framework can pave the path for a significant inflow of foreign investments, which we are currently missing out on simply due to poorly set up infrastructure.

What does the future hold for the Croatia blockchain and cryptocurrency ecosystem?

Regardless of the difficulties, the future is very bright, and the companies that are currently engaging in business based on blockchain are paving the way for all other companies that will come in the future. Current obstacles will be surmounted because the market is simply demanding change, and it is becoming too large to ignore. Many regulators are slowly becoming digital as well as blockchain-friendly, and it is only a matter of time and proper education before a well-established framework for blockchain-based businesses is set up.

Key Figures

TOTAL FUNDS RAISED

€150 million

POPULATION INTERESTED IN BLOCKCHAIN AND CRYPTOCURRENCIES

2.5 %

BLOCKCHAIN SOLUTION PROVIDERS

48

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 (DLTs) 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 attractive framework and set of policies on foreign direct investment (FDI) for technology companies, 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 collection 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, amongst 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 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." The CySEC regulatory sandbox project was included in Cyprus' Resilience and Recovery Plan with an aim to "enable FinTech, startups, and other innovative companies to expand their offering in new products or services, by regulators establishing a 'testing ground' that would allow them to conduct live experiments in a controlled environment under their supervision." The initiative is expected to launch by mid-2023.

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 noting that: "[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." The bill was recently published for public consultation.

Cyprus is also amongst the few Early Adopters of the EBSI, working on developing a fully operational national EBSI Infrastructure under the Deputy Ministry of Research, Innovation and Digital Policy. This project has gained funding by CEF and is being implemented in collaboration with academia (University of Nicosia) and enterprises (TALOS, Goldman Solutions). As part of the Project, a Diploma Blockchain Use Case will be developed in collaboration with the Cyprus Scientific and Technical Chamber.

Legislation of blockchain: Besides the CySEC AML directives for crypto assets service providers, 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) and is expected to be approved in 2022. Guidelines for the tax treatment of cryptocurrencies are also being prepared by the Tax Department.

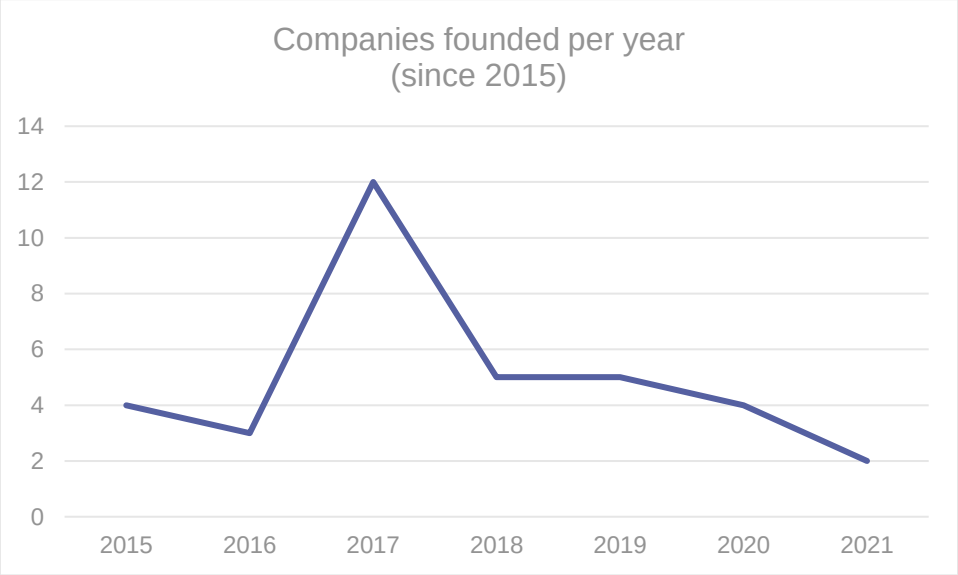
Blockchain in academia: Since 2014, the University of Nicosia (UNIC) has emerged as a major facilitator of blockchain and digital currency education, not only in Cyprus, but also globally. By leveraging the country's favourable outlook towards transformative technologies, the university has achieved 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. In 2021, UNIC introduced the first MOOC on decentralised finance (DeFi) in the world as well as the UNIC Open Metaverse Initiative.

Other executive and professional certificates are also offered, while some consulting firms have integrated blockchain courses in their curriculums. Following the same path, Frederick University's Mobile Device Laboratory is working on an online learning platform for the use of Blockchain Technologies in SMEs. An online, self-study course, named "Introduction to Blockchain & Cryptocurrency", is also provided by the SCP (School of Certified Professionals) Academy.

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, KYC, energy, e-invoicing, AML, medical records, supply chain and company registry. The most promising domains for which Cyprus stands to attain the greatest benefits were identified with a request for interest (RFI) conducted in early 2020. Based on the outcome, a Blockchain Call for Proposals is expected to be announced by the Research & Innovation Foundation.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

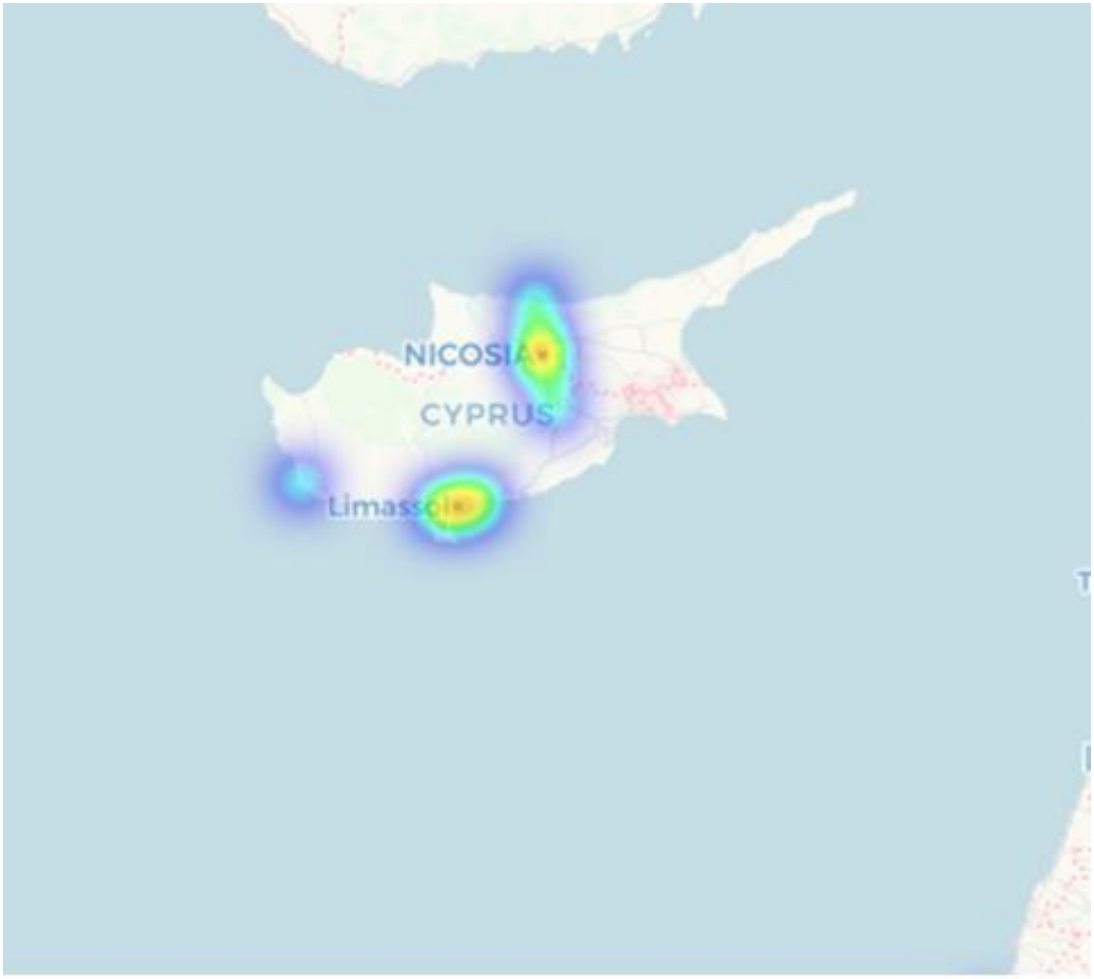
Cyprus is home to several small and medium-sized blockchain and digital currency companies and startups. The country counts 48 companies, 12 of which have raised approximately EUR 150 million. Cyprus-based companies and startups are active in a wide range of verticals. Payment and banking services are 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 (US) choose to establish their business and operations on the island.



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 more than 35 such chapters, 7 of which are based in EU Member States, while the rest hail from the United Kingdom (UK), the US, Latin America, United Arab Emirates and even Venezuela. The Chapters are responsible for independently organised events and workshops, spanning a wide range of interest areas that relate to blockchain and cryptocurrencies.

Besides the Decentralised Chapters, 102 500 individuals interested in blockchain and cryptocurrencies could be identified. This amounts to 11.5 % of the total population.



source: coinmap.org

(Source for audience: Facebook audience, ages: 16-65+, location: Austria, keywords: Block chain (database), cryptocurrency, bitcoin, Ethereum)

INSIGHTS FROM EXPERTS

Kyriacos Kokkinos, Deputy Minister to the President for Research, Innovation and Digital Policy, Republic of Cyprus

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Cyprus? Has the recent growth of the cryptocurrency markets facilitated familiarity?

Firstly, I would like to stress that the Cyprus Strategy refers to crypto assets in general and not cryptocurrencies as such. We are still at an experimental space, with an ongoing growth in terms of awareness and adoption. Cyprus is home to a number of small and medium-sized blockchain and digital currency companies and startups. 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.

A number of companies have already utilised the blockchain technology whilst some startups and even public sector organisations, experiment with the technology as Proof of Concepts. We believe that with the adoption of the Cyprus DLT Bill, as well as the adoption of the European Regulations, namely Markets in CryptoAssets and Pilot Regime for market infrastructures based on DLT, many more companies will shift their focus towards DLT and crypto assets markets.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Cyprus?

Cyprus has embraced transformative technologies and the level of involvement and maturity of the ecosystem in Cyprus is at an evolving, but still fragmented stage. Maturity in the space of blockchains and crypto 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. As government, we aim to facilitate the various ad hoc efforts from regional teams, technology startups, and academic institutions, under the same umbrella.

To this end, the Council of Ministers approved Cyprus’ National Strategy on Blockchain and Distributed Ledger Technologies in June 2019. 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 engagement with disruptive and emerging technologies. In addition, the upcoming DLT Bill, will contribute towards improving the maturity levels of this technology for Cyprus and thus creating an “enabling environment” for companies to flourish.

The National Strategy focuses on three priorities:

- Priority 1 – Preparing an enabling legislative framework,
- Priority 2 – Enhancing the application of the technology by the government and the private sector, and
- Priority 3 – Promoting DLT in the financial sector

What measures has Cyprus taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

The National Strategy on Blockchain and Distributed Ledger Technologies sets out Cyprus’ vision for DLT, and 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.

On the basis of the National Strategy, the preparation of a new legislation framework on DLT and Blockchain has been prepared and has already been published for public consultation. Additionally, the Tax Department is also preparing a Circular on Cryptoassets tax treatment.

CySEC has also published AML directives for crypto assets service providers, while CySEC's envisaged regulatory sandbox has been included as a project in the Cyprus Resilience and Recovery Plan. The sandbox is expected to be launched by mid-2023 and aims in enabling FinTech, startups and other innovative companies to expand their offering in new products or services, by regulators establishing a "testing ground" that would allow them to conduct live experiments in a controlled environment under their supervision. It shall consist of facilitating the development of a suitable and attractive regulatory regime on FinTech and innovative technologies and strike a balance between the seamless deployment of innovative products or services and ensuring investors' protection.

The Republic of Cyprus also participates in the European Blockchain Partnership (EBP) and the EBSI (European Blockchain Services Infrastructure) with the aim of materialising an EU-wide cross-border distributed ledger infrastructure. Cyprus is amongst the few Early Adopters of the EBSI, working on developing a fully operational national EBSI Infrastructure under the Deputy Ministry of Research, Innovation and Digital Policy. The project is implemented in collaboration with academia (UNIC), enterprises (TALOS, Goldman Solutions) and the Scientific Technical Chamber of Cyprus (ETEK).

What does the future hold for the Cypriot blockchain and cryptocurrency ecosystem?

With the upcoming legislative proposal, Cyprus is prepared to take the next concrete steps ahead towards the digital era.

We believe that with the release of the DLT Bill, which aims to provide legal certainty for smart contracts and crypto assets as property, the ecosystem in Cyprus will progress to the next evolution stage. 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.

Cyprus as a small economy wants to innovate and be the role model and test bed for others worldwide, as our strategy is not only intended for the local market. Cyprus has still a long way to go but through the implementation of a holistic DLT national strategy, we are trying to promote, create the right framework, attract foreign direct investment and establish our country as a key player in the international arena.

Key Figures

BLOCKCHAIN STARTUPS
40+

FUNDRAISING REVENUE
€1.45 million

INITIAL COIN OFFERINGS
42

VENUES THAT ACCEPT CRYPTOCURRENCY PAYMENTS IN PRAGUE ALONE
300+

INDIVIDUALS ORGANISED IN BLOCKCHAIN COMMUNITIES
4 200+

Czech Republic

THE CZECH BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Czech Republic can be the ideal market to enter the blockchain and cryptocurrency industry, considering that this country is one of the pioneers in this type of activity. It is a signatory of the 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 300 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 virtual money accounts ([2]).

The Czech Republic took steps to regulate cryptocurrencies, as did many EU countries. In January 2017, a law adopted in the country limited the anonymity of transactions ([3]). Currently, cryptocurrency 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.

([2]) Source: https://coinatmradar.com/city/129/bitcoin-atm-prague/

([3]) Source: https://prague.bc.events/en/news/kriptovalyuta-v-chehii-zakoni-i-nalogooblogenie-95367

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: The Government of the Czech Republic does not prevent the introduction of cryptocurrencies in business circulation as a means of payment. Despite the fact that in many countries cryptocurrencies 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 cryptocurrency community. On 1 January 2017, a new law defined the concept of "virtual currency" and imposed obligations on Czech banks, Virtual Asset Service Providers and other financial service providers. This was done to establish the identity of their customers when exchanging virtual currencies in the Czech Republic for amounts exceeding EUR 1 000. Nevertheless, the legal status of Bitcoin, as well as other virtual 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 virtual money is governed by the same rules as when paying with conventional money in the Czech Republic.

Raising funds through 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 ([4]). 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 cryptocurrency 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 Sservice 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.

([4]) The Model law on electronic transferable records (MLETR) sets out the basic rules for recognition of electronic securities, such as the bill of lading.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

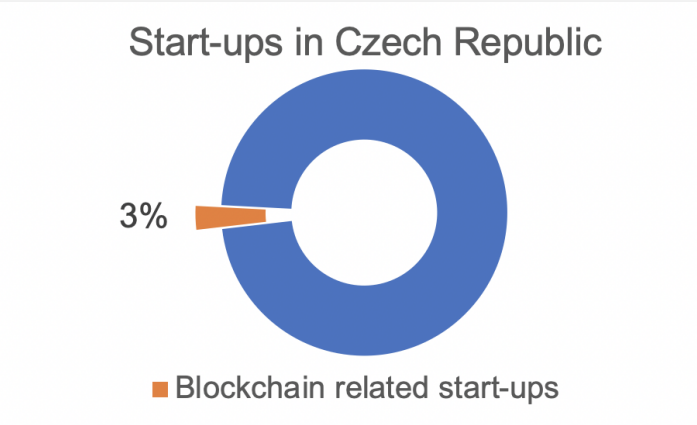
The Czech Republic is an important player in the cryptocurrency sectors, considering that it is one of the pioneers in this type of activity. Prague has a very well-developed infrastructure for cryptocurrency users.

Businesspersons interested in starting the company registration procedure for a cryptocurrency 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 cryptocurrency companies will need to comply with a set of additional regulations. For example, cryptocurrency 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.

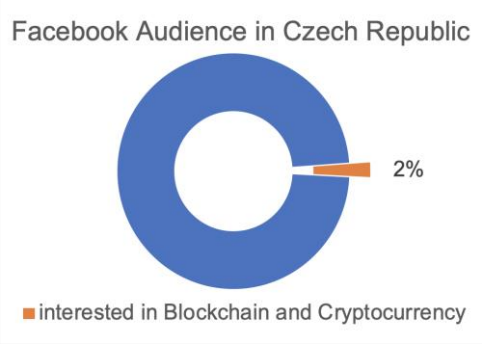
Startups operate in several different industries, such as cryptocurrency exchanges and wallets, mining pools, blockchain funding and communication platforms.



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 cryptocurrency aspects.

A major European and international hub for Bitcoin and other cryptocurrencies, Prague counts 232 venues (bars, restaurants, hotels, cinemas and other attractions) where cryptocurrencies are accepted as a method of payment. Furthermore, over 1 000 e-stores[5] 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 cryptocurrency, 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 cryptocurrencies (e.g. Bitcoin, Litecoin, Monero) are the only accepted ([6]) 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 cryptocurrency 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 170 000 people) of Czech Facebook users (5.9 million) are interested in blockchain and cryptocurrency. This figure is considered substantial. The Czech blockchain community is slightly below the median, with 1 500 LinkedIn professionals registered as working with or in the industry

NOTABLE BLOCKCHAIN COMPANIES

A major European and international hub for Bitcoin and other cryptocurrencies, Prague counts 232 venues (bars, restaurants, hotels, cinemas and other attractions) where cryptocurrencies are accepted as a method of payment. Furthermore, over 1 000 e-stores[1] in the Czech Republic accept Bitcoins, including the largest online retailer Alza.cz.

Slushpool: Bitcoin mining pool operating since December 2010. A 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.

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.

([5]) Source: https://kafkadesk.org/2018/10/06/czech-republic-prague-crowned-most-crypto-friendly-city-in-the-world/

([6]) Source: https://www.bitcoincoffee.cz

SatoshiLabs: Provides a cryptocurrency hardware wallet called Trezor to receive, store and send cryptocurrencies. 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 cryptocurrency wallet. Supports multiple fiat and cryptocurrencies, including Bitcoin, Ethereum and euro. Services offered include cryptocurrency exchange, SWIFT wire transfers, money transfer, load currencies onto VISA and MasterCard accounts, and cryptocurrency payments.

Simple Coin: Digital asset exchange platform. Offers to buy and sell cryptocurrency 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

Blockchain is one of the most prominent yet confusing technologies. Most people know about it through the recent popularity of the cryptocurrency market. However, since its emergence, the technology is used in different spheres. An example is the adoption of blockchain technology for the government's database registration across several sectors, such as security, law, health and the judiciary. In turn, it should potentially reduce the level of corruption and bureaucracy. Indeed, the Czech Republic is one of the most advanced countries in Europe in the cryptocurrency field.

Therefore, blockchain solutions are emerging in the financial sector in the form of simple platforms that replace complex business transactions and automate administrative activities with self-enforcing contracts. This reduces the error rate and the risk of fraud, as all retailers, including banks and insurance companies, have access to the same, secure, real-time database.

Reducing administrative burdens and increasing the credibility of electronic documents is one of the basic features of blockchain. It can also be applied to other areas, including the public sector.

Miroslav Lukeš, Senior Vice President at Mastercard

"With a blockchain we have avoided a number of manual steps that are relatively slow for human workers to make, and they can make mistakes."

Read more: "https://archiv.hn.cz/c1-66331660-blockchain-setri-firmam-papirovani-rakouska-skupina-erste-pomoci-neho-napriklad-zprostredkovala-vydani-dluhopisu"

Alex Ivančo, Ministry of Finance of the Czech Republic

"Blockchains can radically change, how payments are tracked, securities and derivatives trades are processed, global agricultural supply chain become more transparent and health records are stored."

Read more:
"https://www.researchgate.net/publication/335083459_The_Czech_Republic's_push_for_innovative_agenda_in_the_UNIDROIT_and_the_UNCITRAL"

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

"An important driver is also the EU regulator, though it is a double-edged sword. It is responsible for financial services is pushing for a more competitive, modern regulatory framework, be it opening of banking infrastructure to third party providers or recently by proposing a regime for crypto-assets."

Read more: "https://thepaypers.com/interviews/interview-with-maria-staszkiewicz-edfa-president-on-the-european-fintech-ecosystem-in-2021--1249801"

USEFUL RESOURCES

Coinmap.org – Website containing information on physical virtual currency exchanges (ATMs)

Tracxn.com – Information about innovative companies in different industries and countries

Cointobuy.io – Cryptocurrency analysis tool

Kafkadesk – Local news from central Europe

Meetup – Events in any field

Sb-sb.cz – Fintech lawyers

Ekonom.cz – Independent weekly

Digital Czech Republic – Institute for politics and society

INDIVIDUALS INTERVIEWED

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

Key Figures

TOTAL FUNDS RAISED

€32.3 million

THE MOST ACTIVE SECTORS

Maritime, Trade, Transportation

BLOCKCHAIN SOLUTION PROVIDERS AND STARTUPS

24

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 policymaking: 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 cryptocurrencies, and no regulatory proposals on cryptocurrencies are pending in the Danish Parliament. However, government agencies have issued a few statements on cryptocurrencies.

Overall, Denmark is considered friendly to cryptocurrencies 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 cryptocurrency users have received letters from the Danish Tax Agency requesting traders to submit a full list of their cryptocurrency 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", 4 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 cryptocurrencies.

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.

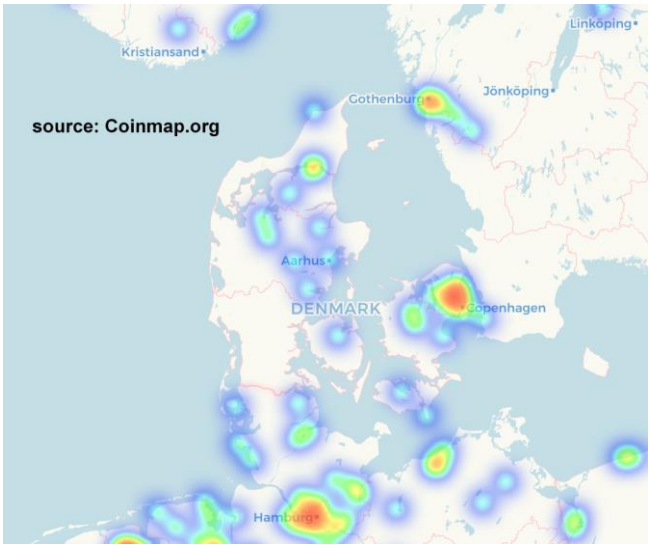
There are two major blockchain initiatives in the supply chain industry: Tradelens with the bill of lading on blockchain and improving the turnaround and management of containers to reduce costs by Blockshipping. Considering Denmark's advanced maritime industry and long history, it is fair to assume 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. According to LinkedIn data, 1 500 professionals are directly or indirectly associated with blockchain technology.

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

NOTABLE BLOCKCHAIN COMPANIES

Sepior: Enables trust in online financial transactions and enterprise data protection applications, such as cryptocurrency 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), amongst 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 cryptocurrencies, 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.

Key Figures

TOTAL FUNDS RAISED

€285 million

THE MOST ACTIVE SECTORS

Finance, Commerce, IT

BLOCKCHAIN SOLUTION PROVIDERS

200+

Estonia

THE ESTONIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Between in 2017 and 2018 Estonia facilitated the advancement of the European blockchain ecosystem by being the first country to embrace clear legislation for blockchain and digital assets. Moreover, the country's existing digital infrastructure, receptive culture to new technologies, e-Residency programme allowing for business registering remotely, and low corporate tax served as a bedrock for the establishment and developed of a blockchain ecosystem in the country. Specifically, almost 2 000 digital assets licenses were granted to Virtual Asset Service Providers by 2019.

The country has since backtracked on its receptive attitude towards blockchain and cryptocurrency initiatives from the private sector. New legislation expanding the definition of Virtual Asset Service Providers, coupled with AML requirements, revocation of over 1 000 licenses from crypto companies, and regulators calling for the revocation of all licenses have discouraged private blockchain and cryptocurrency activity in the country.

Yet, Estonia remains a proponent of public sector initiatives. The country utilises a highly scalable, privacy-focused keyless signature infrastructure (KSI) Blockchain, developed in the country, which is also used by NATO and the US 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. Additionally, besides examining the launch of its own CBDC in the past, the Bank of Estonia finds "Unlimited" potential in the Digital Euro.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: 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 (e-IDs) 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. 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 businesspeople active in the blockchain space.

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. Additionally, the Estonian Money Laundering and Terrorist Financing Prevention Act defines cryptocurrencies and introduces safeguards to prevent illicit activity.

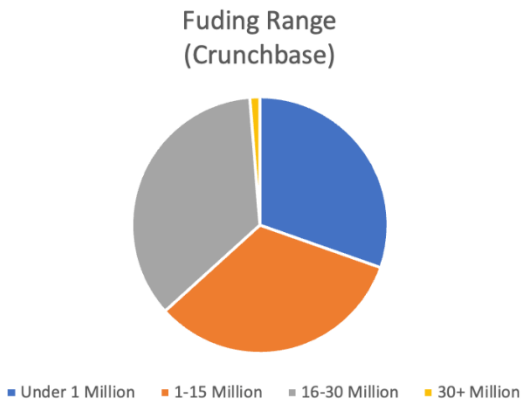
In terms of digital currency taxation, as is the case in most countries, their use is VAT exempt. Tax liability arises only when cryptocurrency is converted to fiat, exchanged for another cryptocurrency, or used to pay for goods and services. Digital currencies are treated as property when it comes to personal income tax purposes and thus, their exchange is subject to a capital gains tax of 20 %.

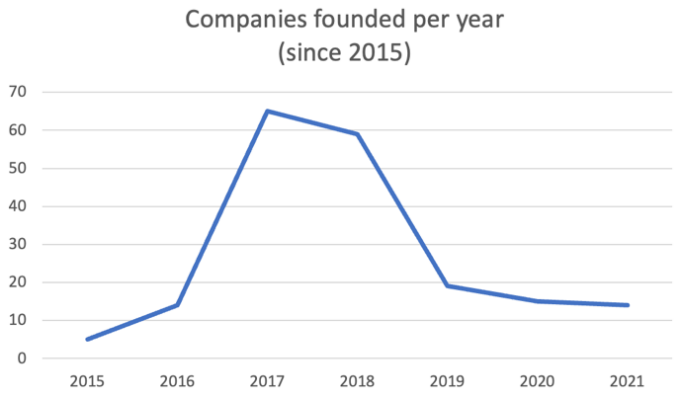
Blockchain in academia: Despite the prominent blockchain ecosystem in the country, only a few relevant academic courses or professional qualifications could be identified. More specifically, the University of Tartu (UT) recently conducted a Research Seminar in Cryptography and Cybersecurity. Also, it has launched the "BLISS – Blockchain Skills for ICT Professionals" project and the "BlockNet – Blockchain Network Online Education for Interdisciplinary European Competence Transfer" project, both focused on the subject of Blockchain Technology Applications. Moreover, the Tallinn University of Technology (TALTECH) offers a MSc in Cybersecurity, which includes the subject of cryptography.

Blockchain across key industries: The Estonian Investment Agency (EIA) invites investors and entrepreneurs to utilise the country's established digital infrastructure in order to invest or start a business in the country focusing on 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.

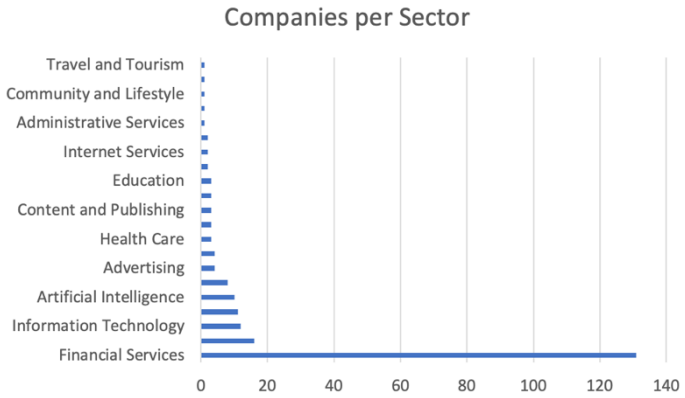
BLOCKCHAIN STARTUP AND BUSINESS SCENE

As noted, 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. 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 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 license revocations.





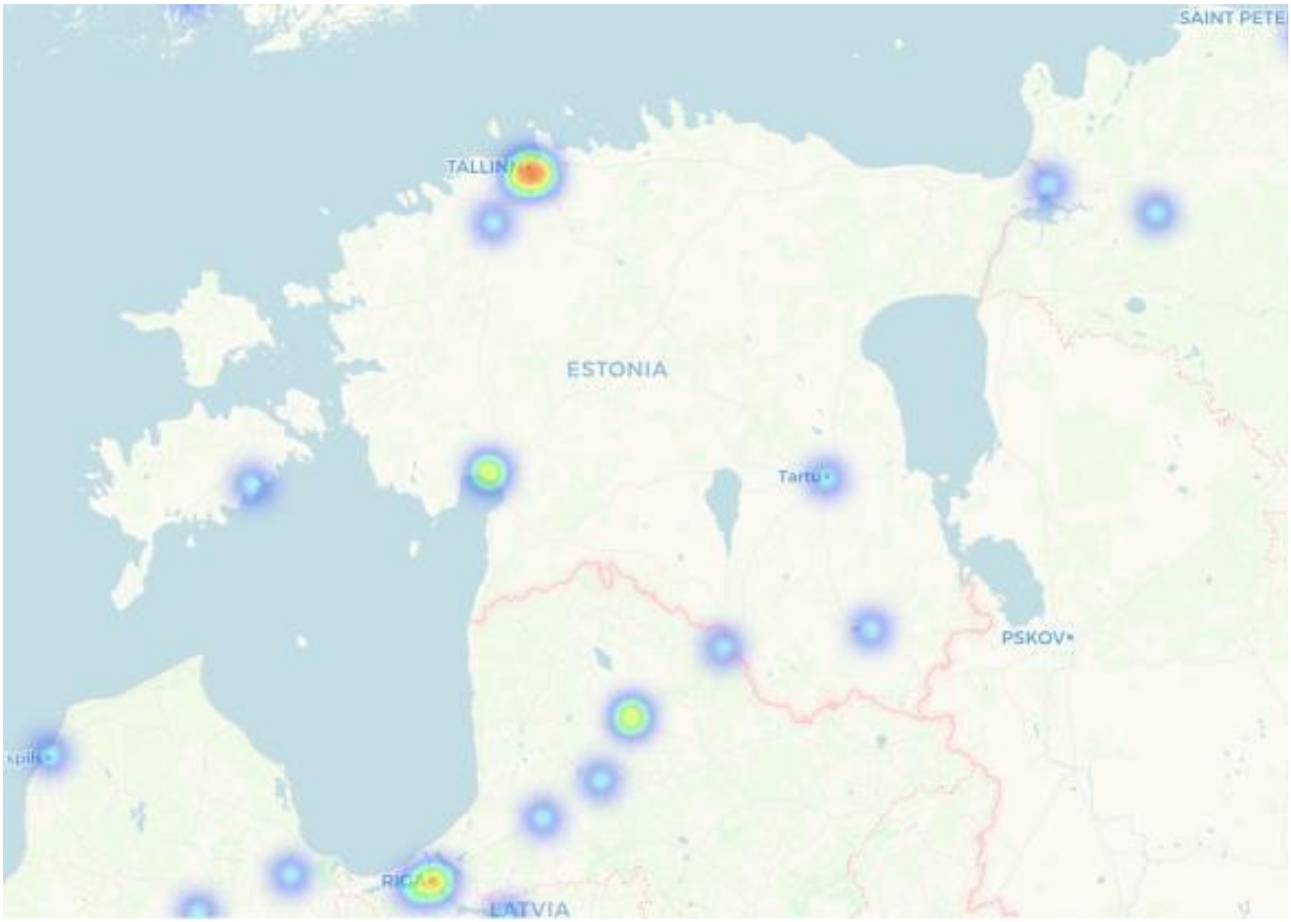
The sharp increase of blockchain companies established between 2017 and 2018 followed an equally sharp decline, a result of the aforementioned adjustment in policy. Estonia-based blockchain businesses have collectively raised a total of EUR 285 million through a combination of traditional financing and ICOs. Most companies (37 %) have received north of EUR 16 million in total funding. They are closely followed by companies that have received EUR 1-15 million (33 %) and under EUR 1 million (30 %).



Activities are concentrated in the financial services sector, that accounts for 60 % of blockchain businesses. A total of 17 % of businesses are active in commerce and shopping (7 %), IT (5 %), and apps (5 %). Other sectors include AI, advertising and gaming.

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, 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

Key Figures

BLOCKCHAIN STARTUPS

18

FUNDRAISING REVENUE

€4.6 million

NOTABLE INSIGHTS

- **STRONG LOCAL AND INTERNATIONAL BLOCKCHAIN COMMUNITY**
- **HIGH POTENTIAL FOR BLOCKCHAIN INTEGRATION IN VARIOUS SECTORS**

Finland

THE FINNISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

Finland is largely considered to be a model country for technology and development. Its advanced information networks are recognised globally. On top of the technological developments, the country is acclaimed internationally for its high level of scientific and technological education. As a result, the population has generally had a positive attitude towards innovations. Blockchain is no exception.

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, cryptocurrencies 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 Virtual Currency Providers in 2019. In accordance with the Act, Fin-FSA will serve as the registration and supervisory authority for virtual currency providers. Cryptocurrencies are generally taxed as capital assets. In accordance with EU law, trade in cryptocurrencies 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: In contrast to many other European countries, 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. 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.

Virtual 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. According to Swiss financial experts, Finland was listed amongst the top 10 blockchain-friendly countries. 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 euro in funding in total.

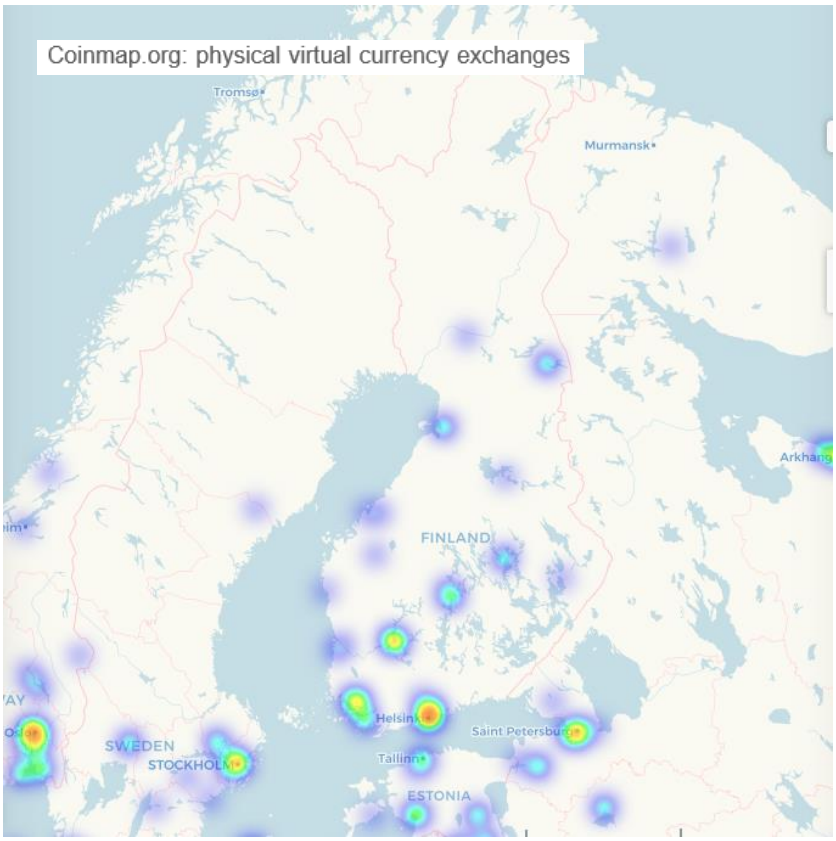
Business opportunities in the space were identified as early as 2014, with the majority of companies founded between 2017 and 2018. Revenue numbers are generally hard to come by, both due to their small volume and the variety of income generation mechanisms employed by those companies and startups. The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

Academic and 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 cryptocurrency 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 cryptocurrencies and ask for technical assistance.

The Finnish blockchain ecosystem is geographically diverse, with Helsinki being the largest hub in the country. There are more than 60 companies that accept cryptocurrencies (including 16 ATMs) as a payment method, 36 of which are based in Helsinki. The capital also has a Bitcoin Embassy, a non-commercial organisation aimed at promoting cryptocurrency 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 cryptocurrency pool mining services. Connects users to multiple mining pools for cryptocurrency 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 cryptocurrencies after the network's zero confirmation. Certified exchange partner for Perfect Money. (p2pchange.is)

Empirica Finland Oy: Blockchain technology startup that specialises in FinTech, cryptocurrency 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.fi)

INSIGHTS FROM EXPERTS

While the hype of blockchain and its potential applications are driving the transformation to the internet of value, there is limited insight into what companies are doing to reap its benefits. Representatives of the largest blockchain startups in Finland describe the great opportunities for Finland in the blockchain scene. The generally positive attitude towards new technologies has made it relatively easy for Finnish startups, although blockchain has yet to attract more public or private interest.

Mr Hannes Helenius, Chairman of the Board at FA Solutions, thinks Finland has a fairly advanced position in blockchain domain. As Finland is considered a tech-oriented country, blockchain is one of the hot topics, but mainly for business. Authorities have been trying to utilise the technology, as well as define legal perspectives.

Mr Toni Mattila, Senior Director at Investment Consulting "Invest in Finland", thinks the country has immense potential in developing blockchain applications: "The cumulated know-how from the ongoing blockchain research, combined with Finland's strong ICT expertise and availability of highly qualified engineers, can offer interesting opportunities for international companies."

Mr Keir Finlow-Bates, CEO of Chainfrog Oy, Finland's first blockchain startup, believes that the country has potential but still lags behind compared to other European countries. Despite being the technology and startup hotspot, Finnish startups seem to be more focused on gaming and IoT. However, if blockchain initiatives turn out to be fruitful, it is expected to spread quickly.

Mr Sebastian Sonntag, CEO of LocalBitcoins, expressed his views on Finland as a country open to blockchain technologies:

"Only registered virtual currency providers can market virtual currencies and related services in Finland. The controls in the financial sector are of particularly high quality, and the position of the clients is well protected."

Read more: "https://cointelegraph.com/news/finnish-regulators-tighten-the-screw-on-virtual-currency-marketing"

Mr Mika Lammi, Head of IoT Business Development for Kouvola Innovation, highlighted the key challenges when looking for financial support for the SmartLog project:

"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."

Read more: "https://www.ibm.com/blogs/internet-of-things/logistics-blockchain/"

Mr Hannes Helenius, Chairman of the Board at FA Solutions, on blockchain regulations and the legal framework in Finland:

"Current legislations are in some part there and some parts coming up. In my opinion, there should not be country-specific legislation for cryptocurrencies 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 cryptocurrencies. However, as the EU recently announced, it shall apply the anti-money laundering rules to the cryptos, too. This is an indication that cryptocurrencies are becoming more accepted and a more regulated asset class."

Read more: "https://fasolutions.com/blog/cryptocurrencies-and-blockchain-should-be-as-globally-harmonized-as-they-can-be-interview-with-hannes-helenius/"

USEFUL RESOURCES

Blockchain Partners – Articles, interviews, and guides on bitcoin and the blockchain space

EU Startups – Startup-related content, including blockchain

Cryptocurrency Tax Information – Interactive map of cryptocurrency taxation per country

Coinmap.org – Website includes information on Coinmap.org: physical virtual currency exchanges (ATMs)

OTHER SOURCES

Bittiaraha.fi: Blockchain forum in Finland

Crunchbase.com: Blockchain startups and fundraising revenue

SOMA: soma.co

LocalBitcoins: localbitcoins.com

Espeo blockchain: espeo.eu

Haja Networks: haja.io

2Miners: 2miners.com

P2PChange: P2PChange.is

Empirica Finland Qy: empirica.fi

Fortum: fortum.com

SmartLog: smartlog.kinno.fi

INDIVIDUALS INTERVIEWED

Hannes Helenius – Chairman of the Board at FA Solutions

Sebastian Sonntag – CEO of LocalBitcoins

Toni Mattila – Senior Director at Investment Consulting Invest in Finland

Keir Finlow-Bate – CEO of Chainfrog Oy

Mika Lammi – Head of IoT Business Development for Kouvola Innovation

Key Figures

BLOCKCHAIN STARTUPS

160+

FUNDRAISING REVENUE

€180+ million

NOTABLE INSIGHTS

- Favourable legal framework and guidelines
- Lack of adoption by public sector
- Numerous government incentives

France

THE FRENCH BLOCKCHAIN ECOSYSTEM AT A GLANCE

France has been at the forefront of blockchain technology adoption in the European Union. In 2016, France became the first country to recognise blockchain technology by establishing a favourable legal framework for 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 average sized, less dynamic, compared to countries like the US and China, but significant on the European stage. 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 AI in the European Commission's Investment Programme 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 cryptocurrencies 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 cryptocurrencies 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 cryptocurrencies 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 cryptocurrencies and set a flat rate tax of 30 %.

Virtual 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 cryptocurrencies. Since late 2018, Montpellier Business School has been offering an MSc in Finance with a specialisation in innovative finance (FinTech, blockchains and cryptocurrencies). 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 EBSI takes shape, hashes produced by ARKeducation will easily be transferred to the EBSI platform.

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 also offered to entrepreneurs willing to move to France and kick-start their operations from there. The government also 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.

Blockchain across key industries: There is a limited number of 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.

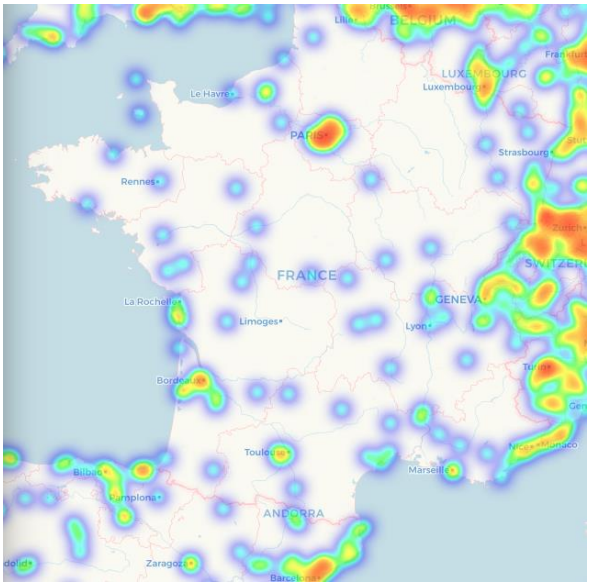
BLOCKCHAIN STARTUP AND BUSINESS SCENE

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 virtual 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 cryptocurrency aspects, from purely technological and social to speculative.



Map of the French blockchain ecosystem

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 cryptocurrency task force. The French blockchain community attracts foreign investors, and or entrepreneurs now that a special visa for entrepreneurs has been introduced.

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. There are around 200 companies that accept cryptocurrencies as a payment method.

NOTABLE BLOCKCHAIN STARTUPS

Ledger: Offers cryptocurrency hardware wallets and supports multiple cryptocurrencies, including bitcoin, Ripple, Ethereum, Bitcoin Cash and EOS. Ledger Vault is a multi-authorisation cryptocurrency wallet management solution. Founded in 2014, has more than 20 investors with the total of EUR 72 million 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 AI, 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 EUR 18.7 million 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 EUR 3.4 million 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 data sets 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

The hype of blockchain and its potential applications is driving the transformation to the internet of value. Yet there is limited insight into what companies are doing to reap its benefits.

Representatives from the largest blockchain startups in France describe the great opportunities and several challenges that lie ahead for the French blockchain scene. Development of the industry in France will largely depend on sufficient funding for successful new projects, as well as the continuous regulatory progress expected from the French government.

Pierre Noizat, a seasoned entrepreneur in the blockchain space and CEO of Blockchain.io, mentioned that French regulators are actively speaking crypto-entrepreneurs in France in order to get a better understanding of the market, its problems and attempt to regulate it accordingly. However, he wishes more incentives were put in place, such as lowering taxation, recognising the liberating nature of a payment in euros via a Bitcoin transaction, helping crypto entrepreneurs have easier access to banking services, and so on.

Pierre Noizat also believes in France's tremendous potential in becoming a blockchain hub in the near future. He states that France does not lack first-rate blockchain professionals in the space, but it's equally important for the government to do everything in its capacity to not let talents leave the country and to encourage the industry to grow.

Amandine Doat and Etienne Laborde from Ledger corporate development have openly stated in the interview that French regulators have done a good job of working with the industry by proposing a blockchain definition. They further added that today, regulators continue to be creative in adapting existing rules to the new ecosystem.

Amandine Doat and Etienne Laborde from Ledger on the blockchain ecosystem in France:

"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."

Read more: "https://blokt.com/news/exclusive-interview-french-crypto-experts-believe-france-could-become-europes-next-blockchain-hub"

Pierre Noizat highlighted the following key obstacles that blockchain entrepreneurs are facing:

"I think that the influence of banks on the evolution of crypto companies in France is strong. These banks sometimes influence political power, which itself is there to create rules for future technologies such as cryptocurrency, and unfortunately a vicious circle of influence can set in."

Read more "https://www.sia-partners.com/fr/actualites-et-publications/de-nos-experts/entretien-avec-pierre-noizat-bitcoin-et-cryptomonnaies"

Jonathan Chester Founder of Bitwage on the importance of funding for France's blockchain industry:

Obviously, the EU is one of the largest economic areas in the world with ties to developing countries in Africa, Eastern Europe, Asia and Latin America. We are specifically interested in France because of the connection between France & Francophone Africa. We have decided to make our European headquarters out of Paris to achieve these goals because of the French Tech Ticket.

Read More "https://medium.com/frenchtech/from-new-york-to-paris-bitwage-founder-shares-what-its-like-to-set-up-your-startup-in-france-f87c029cea01"

USEFUL RESOURCES

Blockchain Partners – Articles, interviews and guides on bitcoin and the blockchain space

EU Startups – Startup-related content, including blockchain

Cryptocurrency Tax Information – Interactive map of cryptocurrency taxation per country

Blockchain France – Blockchain hub in France

Global Legal Insight – Blockchain and crypto currency regulation in France

Coinmap.org – Website containing information on Coinmap.org: physical virtual currency exchanges (ATMs)

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lehub.bpifrance.fr: Blockchain hub in France

gouvernement.fr: French government news

Ledger: Ledger.com

Coinhouse: Coinhouse.com

iExec: iExec.ec

Pikcio: Pikcio.com

ACINQ: acinq.co

Tilkal: Tilkal.com

Kaiko: Kaiko.com

Stratumn: Stratumn.com

BCDiploma: BCDiploma.com

Woleet: woolet.com

INDIVIDUALS INTERVIEWED

Pierre Noizat – CEO of Blockchain.io
Jonathan Chester – Founder of Bitwage
Amandine Doat and Etienne Laborde – representatives from Ledger

WITH SPECIAL THANKS TO:

Pierre Marro: European Commission Directorate-General for Communications Networks, Content and Technology, Digital Innovation and Blockchain Unit

Key Figures

AVERAGE SIZE OF ICO

€10 million

MOST ACTIVE BLOCKCHAIN SECTORS

**FinTech,
IoT,
Energy**

BLOCKCHAIN SOLUTION PROVIDERS AND STARTUPS

343

BLOCKCHAIN PROFESSIONALS

4600

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- and likely the blockchain capital of Europe. The German government has identified the impact of blockchain technologies on Germany's technology and economic life. It is their view that the vibrant blockchain ecosystem should be preserved and fostered to continue its growth and render Germany an attractive opportunity for investments in this sector.

To support this goal, in 2019, the German government adopted a national blockchain strategy, showing its commitment to supporting the use of the technology. This strategy provides, among other things, guidelines for funding blockchain-related projects and considers various application areas, 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 toward 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, which focuses on keeping personal data safe and ensuring data integrity.

The German car manufacturer Mercedes has partnered with artists to issue an exclusive Mercedes-Benz NFT collection based on its G-Class vehicle line.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: The German government has recognised blockchain technology's importance and potential impact on digital transformation. Virtual currencies were classified as financial instruments (in the form of so-called units of account) early as 2013. In September 2019, the German government published its blockchain strategy. It emphasises the importance of blockchain-based solutions and their application for both the public and private sectors. It sets a target by the end of 2021 to leverage the opportunities provided by blockchain technology. As of 2020, Germany included a new financial instrument in its banking laws, the crypto asset. Germany further introduced a new financial service, crypto custody, which requires a license by the German supervisory body BaFin.

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 project's purpose 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.

In line with the governmental 2019 blockchain strategy, the German parliament issued a law on introducing electronic securities, including a blockchain register, in the summer of 2021. Following the 2021 election, the new coalition highlights in its current coalition agreement crypto assets as digital key technology and new financial innovation announces that the use of blockchain for land register shall be investigated and that the European supervisory body should not only take care of the traditional financial services industry but also monitor crypto assets.

Virtual currency legislation that applies to blockchain: Virtual currencies are not considered legal tender in the country and are generally treated as investment assets or so-called “substitute currencies - Ersatzwährungen”, partly 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 virtual currencies and ICOs. The Federal Financial Supervisory Authority (BaFin) also discerns between digital assets that share characteristics with securities or utility tokens.

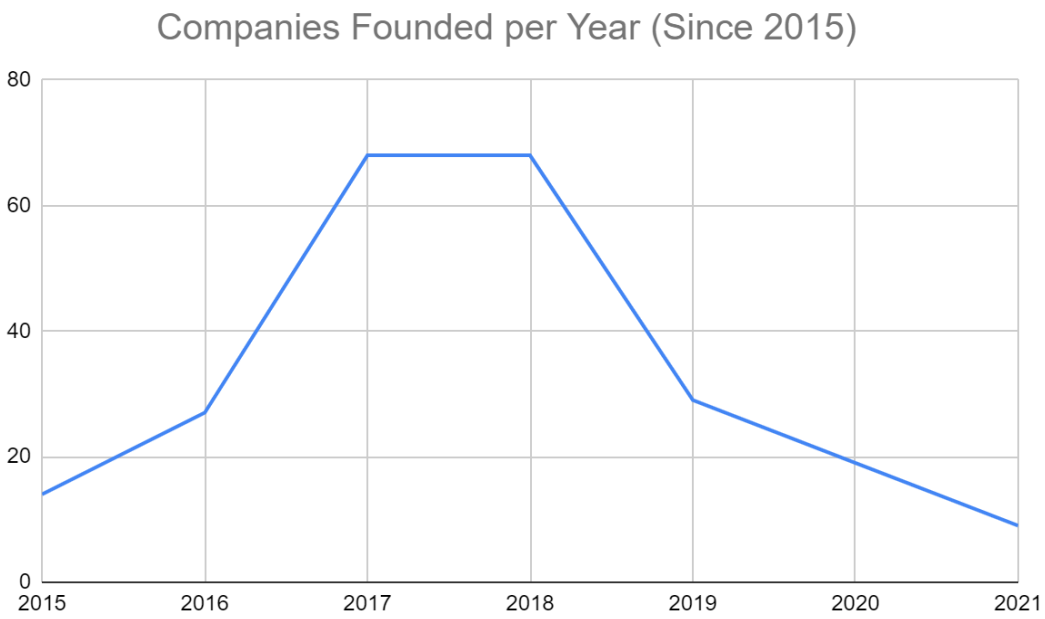
In May 2022, Germany’s Finance Ministry has released new cryptocurrency tax guidelines with no tax payable on gains from BTC and ETH sold 12 months after acquisition.

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 the implications of blockchain technology, digital assets, and distributed ledger technology (DLT) for companies and their business models. In addition to developing 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 a spectrum of diverse use cases and sectors. More than 25 % of startups focus on the finance and crypto domain, followed by entertainment, digital identity, and the Internet of Things (IoT) sectors. As previously mentioned, the energy sector is also highly interested 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 green energy and services, and providing 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. The average size of ICO was about EUR 10,000,000.

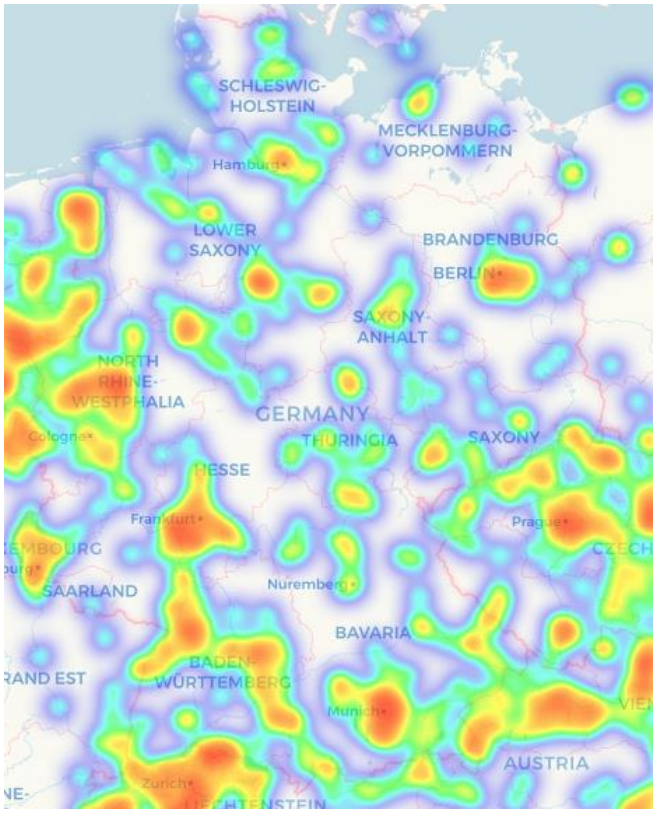
Startups are spread almost equally in many business verticals, including applications, infrastructure, and the provision of services, while a smaller portion of the companies focus on middleware.

In the current phase, blockchain-related companies are almost equally split between revenue-making, product-ready, post-seed, and pre-seed. Most 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. According to data from Crunchbase, 343 blockchain startups and enterprises are operating in Germany.

BLOCKCHAIN COMMUNITY

The blockchain community in Germany consists of both professionals and enthusiasts, as well as 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 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, industry-leading corporations, and 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 and 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, 4600 are practising blockchain professionals, according to estimated data retrieved from Linkedin.There are more than 343 blockchain startups incorporated or operating an office in Germany, with their majority located in Berlin.

NOTABLE BLOCKCHAIN COMPANIES

BitsCrunch: A Blockchain Analytics company which is headquarted in Munich, Germany - uses AI & ML to secure the NFT Ecosystem.

peaq: peaq is a Berlin based deep-tech company developing decentralized infrastructure for the Economy of Things.

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.

Nuri: Offers the world's first banking experience combining fully protected German bank accounts with access to virtual currencies, digital assets, and blockchain-based finance. Through secure technology, Nuri 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 virtual 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.

Finoa: Finoa is a regulated custodian for digital assets offering custody and staking services to institutional investors and corporations.

Chainflip: Chainflip is a decentralised, trustless protocol that enables cross-chain swaps between different blockchains.

Aragon: Aragon is a project that aims to disintermediate the creation and maintenance of organizational structures by using blockchain technology.

Unstoppable Finance: Unstoppable Finance is building a next-gen crypto wallet to bring DeFi to retail investors globally.

INSIGHTS FROM EXPERTS

Quote from 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.

Quote from 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.

USEFUL RESOURCES

Blockchain Bundesverband – Website of the German Blockchain Association

European Blockchain Association – Website of the European Blockchain Association

Frankfurt School Blockchain Center – Website of the Frankfurt School Blockchain Center

EIT Digital Professional School – Website of the EIT Digital Professional School

The Legal 500 & The In-House Lawyer – Legal and regulatory aspect of blockchain and crypto in Germany

BlockState – German blockchain index

Key Figures

BLOCKCHAIN SOLUTION PROVIDERS

10+

POPULATION INTERESTED IN BLOCKCHAIN AND CRYPTOCURRENCIES

3,6 %

INDIVIDUALS ORGANISED IN BLOCKCHAIN AND DIGITAL CURRENCY COMMUNITIES

6 000+

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 apart from the transposition of the 5th AMLD which introduces AML compliance requirements to all VASPs providing services in Greece, under the supervision of the Hellenic Capital Market Commission.

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 constitutes an emerging player in the European blockchain scene.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: Blockchain and DLTs, along with their derivative cryptocurrencies as well as alternative forms of blockchain financing, remain largely unregulated in Greece. Yet, with respect of the latter and according to guidance from the European Securities and Markets Authority (ESMA), firms give careful consideration as to whether their activities constitute regulated activities. If their activities constitute a regulated activity, firms must comply with the relevant legislation and any failure to comply with the applicable rules would constitute a breach. Namely, where the coins or tokens qualify as financial instruments it is likely that the firms involved in ICOs (or similar) conduct regulated investment activities, such as placing, dealing in, or advising on financial instruments or managing and marketing collective investment schemes. Moreover, they may be involved in offering transferable securities to the public. In such case, they need to contact the national competent authorities.

Both the Hellenic Capital Market Commission (HCMC) and the Bank of Greece (BoG) have committed efforts to understand and eventually provide a regulatory framework for these assets. Both competent authorities have implemented their own Innovation Hub, while BoG implemented mid-2021 a Regulatory Sandbox in collaboration with EBRD, funded by the European Union. On two occasions, in 2014 and in 2018, the BoG issued announcements warning the public of the potential risks associated with digital currencies. On the same note, on three occasions, in 2017, 2018 and 2021, the Hellenic Capital Market Commission communicated to the general public the warnings of ESMA on ICOs, ESMA/EBA/EIOPA on virtual currencies and ESMA on non-regulated crypto assets, highlighting the potential risks associated with them. 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.

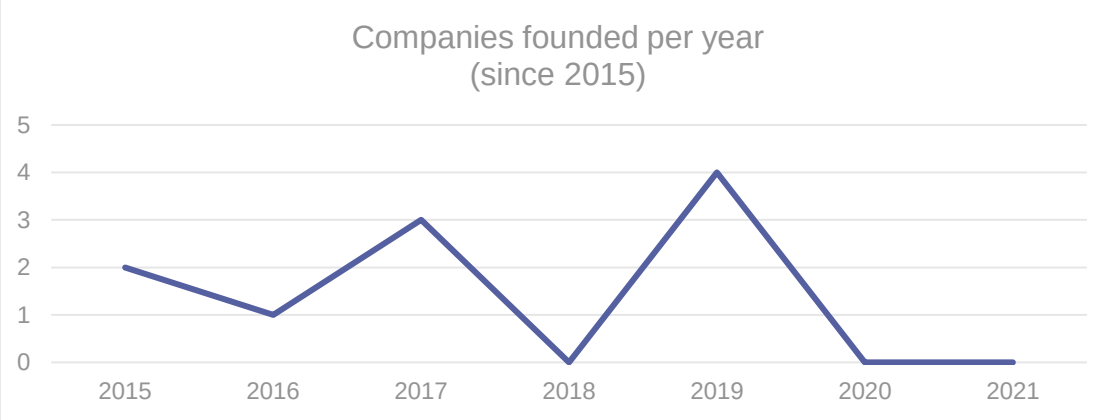
Digital currency legislation that applies to blockchain: Greece implements the 5th AML Directive; in July 2022, Greece announced a draft bill on 'emerging information and communication technologies, strengthening digital governance and other provisions', introducing requirements for the deployment of artificial intelligence (AI), Internet of Things (IoT), blockchain and other distributed ledger technology (DLT).

Blockchain in academia: Regarding academic qualifications, courses or degrees, Greek universities are an emerging power in the educational scene of the blockchain. More specifically, the National and Kapodistrian University of Athens is currently offering two e-learning courses: "Blockchain and Energy" and "Blockchain Developer". Correspondingly, the Aristotle University of Thessaloniki offers a Master's in Science in "Technologies of Interactive Systems", which includes a course about "Blockchain Technology and Applications". The Aegean University offers a blockchain course, as well, named "Blockchain Technology", while the University of Thessaly currently includes in its curriculum a course named "Blockchain Technologies and Decentralized Applications". Likewise, the Panteion University provides the "Blockchain Economics: Introduction to Cryptocurrencies" course and the Athens University of Economics and Business provides the "Cryptocurrencies: Economic and Financial aspects" course. The University of West Attica provides a course, named "Blockchain Technologies", and the Hellenic American College offers a 1-month "Certified Blockchain Professional" qualification. Lastly, the Institute of Digital Finance was launched in 2022 offering a program in crypto-economics.

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 many companies founded

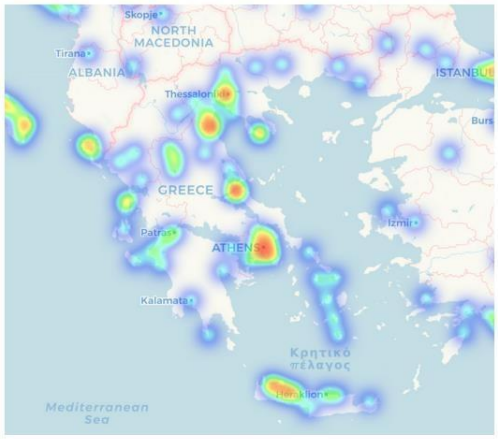
between 2017 and 2018. Most firms are headquartered in the capital city of Athens and have not received any form of funding.



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 6 750 active members and are concerned with a variety of blockchain and digital assets aspects, from purely technological and social to speculative.



source: coinmap.org

Approximately 391 500 individuals interested in blockchain and cryptocurrencies could be identified, a number that amounts to 3.6 % of the total population.

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 general audience: Facebook audience, ages: 16-65+, location: Greece, keywords: Blockchain (database), cryptocurrency, bitcoin, Ethereum | Source for Community Members)

INSIGHTS FROM EXPERTS

Eva Kaili, Vice President of the European Parliament.

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency Greece? Has the recent growth of the cryptocurrency markets facilitated familiarity?

Concerning the adoption of blockchain in Greece, based on the Registered Startup Database (https://elevategreece.gov.gr/startup-database/) of the "Elevate Greece" platform which is the official platform and leading resource for in-depth information on the Greek startup ecosystem, we can identify 29 startups working on blockchain, AI, Data analytics/Big Data, Cloud computing, etc., 19 of which are based in Attica, and 24 of which have not received funding. Said that, I would say that the Greek blockchain ecosystem seems to be, still, in its infancy. Turning to the cryptocurrency adoption in Greece, there is no official source of information. Based on media reporting on the Greek crypto ecosystem (https://greekreporter.com/2021/10/06/cryptocurrency-greece/) it is estimated that a double-digit percentage of the population are into cryptocurrency trading in various platforms, while only a few into mining due to the rising electricity cost.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Greece?

I would say rather small in size and in a nascent stage for both the blockchain and the cryptocurrency business ecosystem. Additionally, we have no cryptocurrency businesses (crypto exchange or any other kind of VASP/CASP) licensed in Greece, as no national legal framework has been implemented.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

At European level, I would say that the Commission's recent legislative initiatives are key to creating a safe and attractive environment that will allow all who wish to participate in the blockchain and crypto ecosystem, to do so under legal certainty. Ecosystems are usually being created by few pioneers; however, they need the mass adoption to scale and flourish. And the mass adoption can be realised only if the rules of the game are fair and transparent. This is where we stand now: we are creating a balanced and transparent "rule-book" to the service of all interested parties.

What does the future hold for the Greek blockchain and cryptocurrency ecosystem?

In the absence of a national legal framework, I would say that the Greek blockchain and cryptocurrency ecosystems will benefit at large from the DLT Pilot Regime Regulation (DLT PRR) and the Regulation for Markets in Crypto Assets (MiCA) respectively. The former, being the first Pan-European Regulatory Sandbox will test the deployment of DLT in financial services infrastructures that will provide services on the recording, trading, settlement and custody of tokenised financial instruments, while the latter will provide the necessary legal certainty to the participants of the crypto-ecosystem (CASPs, investors, issuers, etc.)

Key Figures

FUNDS RAISED BY BLOCKCHAIN PROVIDERS

€5 594 029.76

DEDICATED BLOCKCHAIN SOLUTION PROVIDERS

16

Hungary

THE HUNGARIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Hungary locates in Central Europe and fosters robust economic growth, as the European Commission report indicates. The Hungarian economy's general economic indicators and economic forecast for the Hungarian economy indicate the economy's recovery from the pandemic. The work by Endrődi-Kovács and Stukovszky gives an overview of the adoption of industry 4.0 of the Hungarian SMEs as a process to focus and foster for the future.

There are cases from the public sector indicating the adoption of blockchain. For example, the inclusion of a cryptoexchange service in the Hungarian post offices. The country has joined the European Blockchain Partnership since 2019 with the ongoing development of EBSI node. Furthermore, the taxation on cryptocurrency gains has been relaxed compared to the previous report.

The Hungarian Central Bank researches the subjects around blockchain and cryptocurrencies, as indicated by works such as Eurasia Forum's report and work on European digital finance packages. News reported plans for the development of its native Central Bank Digital Currency in 2021. On the other hand, news in 2022 reported the advocacy for crypto trading and mining ban.

The public's interest in the blockchain is vivid as the community engaging with blockchain subjects grows. There are events and workshops to strengthen the relations of the blockchain community. Intriguing news was the introduction of a statue of Bitcoin founder, Satoshi Nakamoto, in Budapest.

Finally, the startup scene moves forward as the number of companies increases. Entrepreneurs have several options to support their ventures in the blockchain ecosystem.

TOWARDS MAINSTREAM ADOPTION

Blockchain adoption: Cryptocurrencies are not equivalent to traditional money, but their popularity is undeniable, with more citizens owning a crypto token. After launching a crypto stamp, the Hungarian Post has introduced a service to exchange your cryptocurrencies with the introduction of Crypto Centers. This action was covered by articles, as the service is available in over 50 spots. It should be noted that a handful of the popular cryptos are selected to be available through the service.

As previously mentioned, cryptocurrencies are not equivalent to money. In contrast, people are eager to hold digital tokens, and companies are adjusting to this trend. For example, Tesla shook the world in 2021 by announcing crypto payments availability. In a similar fashion, Konzum, a Hungarian supermarket chain, is in place to accept payments in cryptocurrencies as covered in CoinTelegraph. It should be noted that the company does not receive or hold in their ledger cryptocurrencies but fiat money. The exchange of cryptocurrencies to tokens is the responsibility of the Hungarian brokerage, Electrocoin. Similarly, there is another service that is structured to accept cryptocurrencies. This service is the petrol payments per CoinTelegraph, as it is a service to assist tourists in their experience in the country.

Blockchain adoption should not be limited to cryptocurrency payments, as blockchain structures facilitate different functionalities. For example, non-fungible tokens were one of the trends in 2021 for blockchain. These trends reshape business models and interactions between stakeholders in an ecosystem. An example

from Hungary is the music event, Circus Maximus, which envisions establishing a DAO and mint NFTs for ticketing. The Distributed Autonomous Organisation (DAO) can democratise the participation in events, as the organisations could be run on logic with the application of code.

Legislation of blockchain: An update on the regulatory part is the revision of the tax rate on cryptocurrency profits. Essentially, Hungary decided on a more friendly regulation on cryptocurrency taxation. The tax rate was previously set to be 30,5 % for mining and trading cryptocurrencies, while the updated tax rate is decreased to 15 %. The updated tax rate will be applicable from 2022. The tax relaxation was part of the regulations and strategies to recover from the pandemic. It should be noted that the regulation accommodates an amnesty for the untaxed profits from cryptocurrencies for the past five years.

As there are updates on the European level on regulations, preparations are made on national levels to accommodate regulations like MiCA and Pilot Regime. On this fashion, the Central Bank of Hungary accommodates an article by Dr Csongrádi Erika for Europe's digital finance package and the future challenges. Other regulations mentioned in the article are the European digital strategy, the draft Digital Operational Resilience for The Financial Sector (DORA).

Blockchain in academia: Blockchain is a subject included in courses in academic courses. As the impact of blockchain grows, students have the opportunity to study the fundamentals of the technology. For example, the Budapest University of technology and Economics has a "Blockchain technologies and applications" course.

People interested in learning about blockchain have the opportunity to participate in mentorship programmes. In 2021, the Budapest University of Technology and Economics (BME) held a summer internship programme for Hyperledger. Projects are available on Hyperledger Foundation for participants to sharpen their skills.

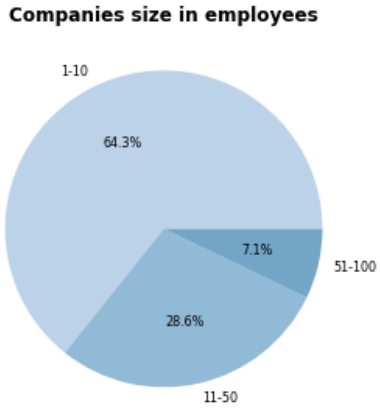
There are multiple education sources available around blockchain and its subjects for professionals. EIT Digital, an organisation for entrepreneurial education, holds a course for decision-makers in Budapest. As blockchain transcends the narrow definition of cryptocurrencies, more sectors are impacted by the technology. The course is relevant to CTO managers, product owners, and business solution architects. Another action by EIT Digital is the organisation of the digital master on FinTech, where Budapest's Eotvos Lorand University participates in the master.

Similarly, the Budapest School for Central Bank Studies organises courses around subjects of interest for Central Banks. In 2021, a digital currencies course was held with subjects on private and public money, monetary policy, and more. The interest in blockchain is expected to remain vivid, as CBDC and testing on the blockchain from Central Banks.

Blockchain across key industries: The technical literacy of the Hungarian community seems to drive the adoption towards adopting blockchain as a service. In detail, the majority of the companies are either deliver a service or offer computer software, and this indicates the adoption of blockchain as a component in the architecture of the solutions.

The financial sector has a keen interest in technologies, as FinTech is a subject of focus. Specifically, the Central Bank of Hungary has published reports on FinTech and Digitalisation for the past 2 years. Blockchain, DLT and cryptocurrencies are referred to in the reports. The interest takeaways for these subjects are the growing interest and application of blockchain in FinTech.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

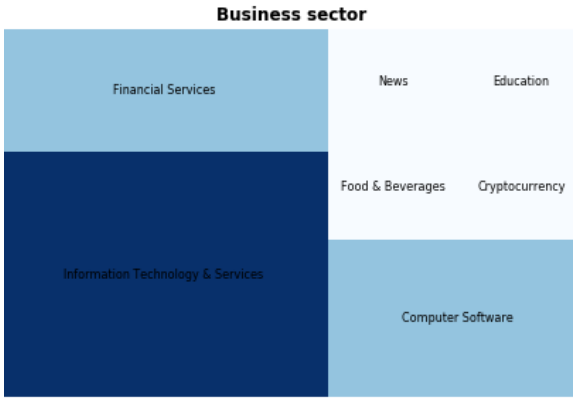


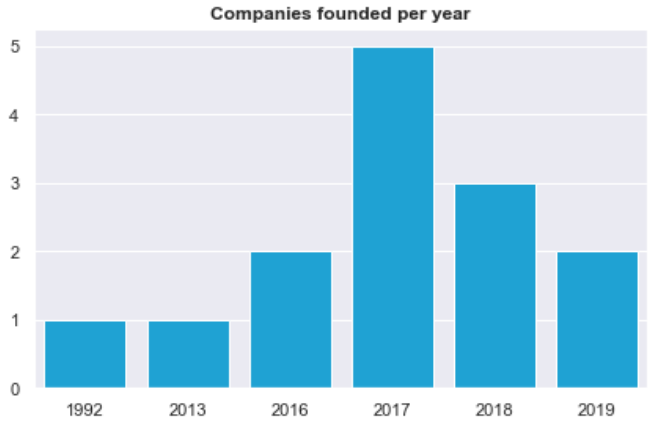
The startup ecosystem in Hungary is robust and has success stories in technologies. For example, SEON aims to fight fraudulent events and is to be used in Sorare, established a collaboration with Sorare, the sports blockchain platform, for that reason. There is anticipation for the startups' success to translate to the blockchain ecosystem. News like INLOCK's introduction to Crypto Valley Association and TE Food's upgrade in the TONE token economics are success stories in the blockchain ecosystem.

As blockchain has a wide range of applications in business sectors. The Hungarian Chamber of Agriculture has established an incubator to promote the adoption of technologies in the agricultural sector. NAK TechLab's goal is to aid the enterprise maturity with a 3-month programme. Another choice for entrepreneurs is the MKB Fintechlab, which works on digital products in the financial sector. BnL Start Partners works with startups offering accelerator and incubator services, but the entity has a general focus on technologies.

There are venture capitals active in funding and supporting the growth of entities in Hungary. The overview of venture capital investment has not significantly changed from the previous report. In detail, FastVentures, Hiventures Investment Fund, OXO Angels, and PortfoLion Ventures are active entities for startups in the technological sector.

The blockchain startup ecosystem accommodates entities mainly established in 2017 and 2018. Blockchain is used as a component in services, as the technology is general and can be used in different ways. Finally, the startups are small and medium companies per the number of people employed in them. Technology entities can compose of small and agile teams delivering applications bringing great impact.

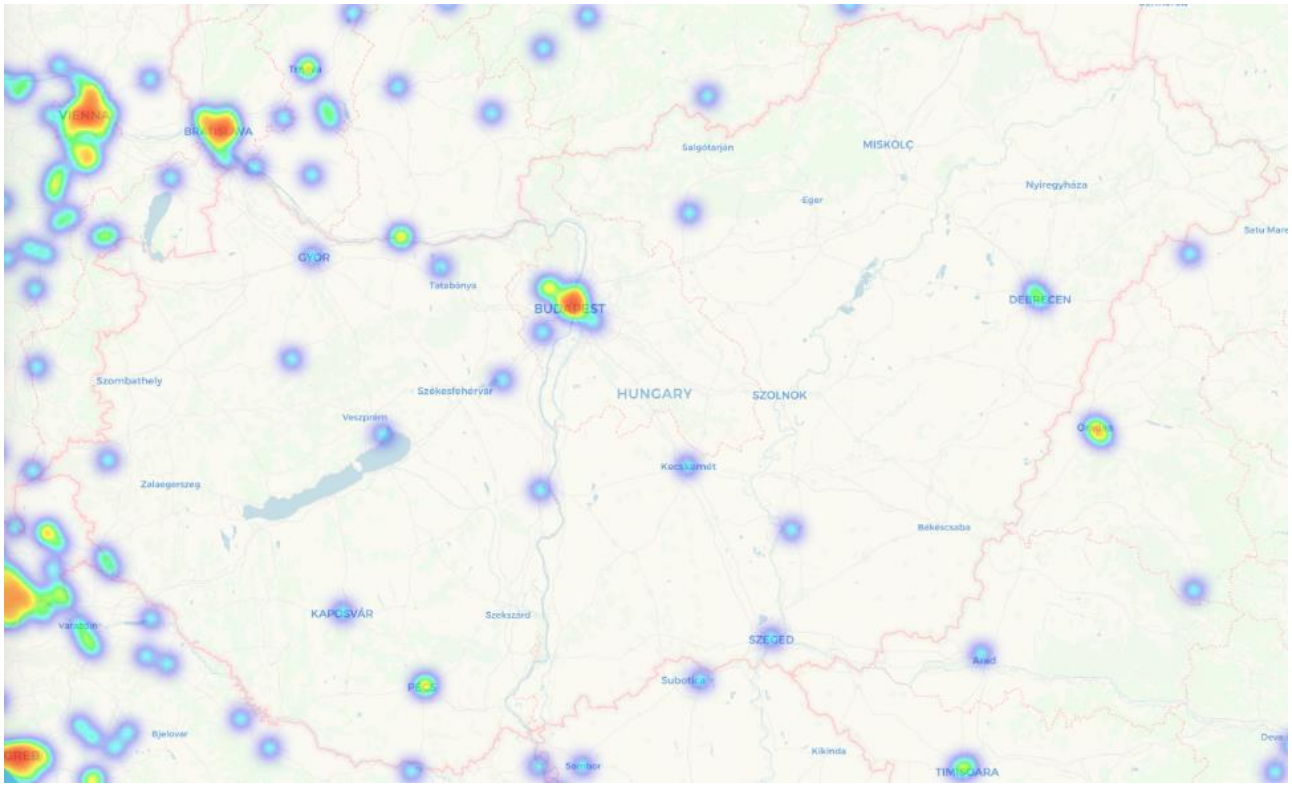




BLOCKCHAIN COMMUNITY

The community around blockchain in Hungary is vivid, and there is enthusiasm around the technology subjects. A testament to the enthusiasm in the community is the introduction of a statue to Satoshi Nakamoto in Budapest. There are events and associations to assemble the community.

Hungary fosters events and workshops of a wide variety of magnitude. Essentially, the community participates in events for education and networking reasons. In November 2021, an e-conference by Eurasia Forum Budapest took place by including blockchain for sustainable recovery. A conference hosted by Magyar Nemzeti Bank, Lamfalussy Lectures Conference, relates to financial subjects. As blockchain is a technology that disrupts the financial sector, it is one of the subjects that can be referenced during the conference. Another event for the community that was held in January 2022 was the Superweek with various topics, and blockchain was a subject in a speech. Finally, the Slovenian-Hungarian Blockchain Business Forum was part of the European Blockchain Week in 2021.



Hungary's community can disseminate their research through conferences, educate through associations, and hone their skills with hackathons. There are events coordinated by academia oriented towards research. In 2021, Debrecen University held the conference on Cryptology in Debrecen. The Blockchain Hungary Association is an organisation related to blockchain active in the country. Such associations can foster the growth of the ecosystem around the technology. Moreover, there are teams coordinating frequent meetups on various blockchain subjects like Hyperledger Budapest. Finally, there are opportunities in hackathons like NFT DEB for the community to test their skills.

AN INDICATIVE BUT NON-EXHAUSTIVE LIST OF BLOCKCHAIN COMPANIES IN HUNGARY

BitPadre: is a crypto exchange with its own wallet that facilitates users to transact fiat and digital currencies. The exchange business model differentiates from other exchanges, as it is EU-licensed. The exchange has an AML/KYC policy that sets a user verification process.

CoinCash: is a cryptocurrency brokerage that operates in Hungary and central eastern Europe. The company was established in 2016 and reported to run 13 Bitcoin ATMs in 2019.

ILGON: is a blockchain ecosystem for institutions and end users built upon the ILGON Network. The ILGON mainnet launched in January 2021. Despite being an Ethereum based project, the solution is efficient and handles off-chain storage and smart contracts. The roadmap for 2022 includes launching a bridge, NFT and DEX.

Kripteus: is a firm specialised in crypto taxation in Hungary. The expertise is on tax regulations on crypto trading and mining. The site accommodates material in blog posts and videos for the one interest on crypto subjects.

MularPay: is a platform facilitating cryptocurrencies payments and transactions established in 2019. The platform accommodates an ERC-20 token.

Natrix Blockchain Platform: is a platform that extends the financial world to the new crypto world by the deployment of a bridge. The platform describes in the lightpaper the design principles used as a basis to build on a consortium blockchain. The platform is powered by BlockBen.

Key Figures

FUNDS RAISED BY BLOCKCHAIN PROVIDERS

€69 097 546.32

DEDICATED BLOCKCHAIN SOLUTION PROVIDERS

68

Ireland

THE IRISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

Ireland is an island country in Northwest Europe, and the country's economy is robust, as described in European Commission's report. The economy is forecasted to grow during the following years. Generally, international and tech companies are present in Ireland. Especially in blockchain, Deloitte's blockchain lab is a notable example of international companies present in the blockchain.

The interest in blockchain is vivid in Ireland, as the business ecosystem and community grows in number each year. There have been public initiatives for blockchain adoption, such as the Irish Government's hackathon in the past. Private entities adopt blockchain for solutions in different sectors. Tracking craft beer, digital identity and urban mobility are only a couple of use cases for applications adopting blockchain.

Finally, the community is supported by several associations and organisations. There are public initiatives like ICT Skillnet to support the community. Moreover, private networks are formed to aid in raising public awareness of blockchain. The community can participate in large events on blockchain to learn about the latest blockchain subjects and network with other participants of the ecosystem.

TOWARDS MAINSTREAM ADOPTION

Blockchain adoption: Blockchain is a topic that gathers interest, as applications and experiments are ongoing. In a speech by Gabriel Makhlouf, blockchain was referenced as a technology driving change and innovation along with cloud for financial services. The national interest on blockchain is vivid, as initiatives like Blockchain Ireland were active during 2021 presented in an overview.

Apart from national initiatives on blockchain, there is a worldwide interest placed in Ireland. An example is the selection of Binance blockchain to enrol four entities in Ireland.

In May 2022, Ireland's strategy on blockchain, crypto and Web 3.0 was published by Blockchain Ireland as a proposal to the government. The published document has the overview and recommendations in categories like education, startups, developers and more as the groups formulated in Blockchain Ireland.

Legislation of blockchain: The Central Bank of Ireland has updated the consumer warning on virtual currencies (VC). It was clearly stated that cryptocurrencies are unregulated with no legal tender status. The warning stated the involved risks of VC, namely extreme volatility and absence of protection. Moreover, the warning highlighted the unregulated nature of the VCs despite the implementation of the Anti-Money Laundering/Countering the Financing of Terrorism (AML/CFT) on virtual asset providers.

The Central Bank of Ireland has mentioned crypto assets in monthly Q&As for Undertakings for Collective Investment in Transferable Securities (UCITS) and Retail Investor Alternative Investment Fund (RIAIF). The questions clarify the direct or indirect investment in crypto assets. The answer divides the crypto assets between tokenised traditional assets and crypto assets based on intangible underlying. Consequently, the two categories vary in characteristics and the underlying risks. The appropriate risk management and meeting the eligible asset criteria are to be reviewed for the direct or indirect investment. The Central Bank is

open to discussing the crypto assets investment but accepting such an investment is highly unlikely. The chances of acceptance are slim due to specific risks and risk assessment by retail investors. The Bank's approach will be kept under review, follow discussions around the subject, and may change in the future.

Regulations defining the taxations on cryptocurrency gains are in place. The tax rates have not significantly updated, as activities relevant to cryptos like exchange tokens and mining. An overview on the tax rates is in the Revenue's report.

Blockchain in academia: People interested in learning about blockchain can seek ongoing training programmes from Technology Ireland ICT. The organisation supports webinars, short-duration programmes with certificates, and long-duration programmes like Master Programmes. A website with upcoming and previous training programmes can help people pinpoint their desired training to participate.

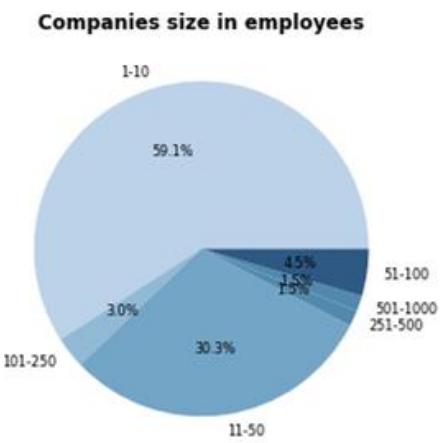
A joint project between Blockchain Ireland and Digital Futures commenced in 2021. In a call for participation, the initiative describes its purpose to be the research on the skills development around blockchain in UK and Ireland and sets two objectives.

In 2021, learning pathways were available for blockchain trainings published in Blockchain Ireland. The pathways aimed to provide knowledge on the blockchain to two audiences, business practitioners and developers. The learning pathways were involved with the IBM technology, as the business pathway awarded an IBM SkillsBuild badge and the developers' one was focused on Hyperledger.

Universities are active in educating the public on blockchain subjects, as individual courses and dedicated programmes are available. Dublin City University facilitates a part-time master on blockchain lasting two years with on blockchain scalability and cryptography courses. Another choice is the diploma in Blockchain introduced by Dublin Business School, which aims to support learning and include CBDC and technical considerations. Similarly, Dundalk Institute of Technology provides training on Fundamentals of Blockchain and Blockchain and Distributed Ledger Technology. It is evident that programmes for blockchain education increase and are communicated to the public in Ireland.

Blockchain across key industries: The technology sector is strong in Ireland, with the presence of international companies to be obvious. Blockchain has been applied in a handful of applications, while the most mature sector is the financial sector, gathering most of the startups.

BLOCKCHAIN STARTUP AND BUSINESS SCENE



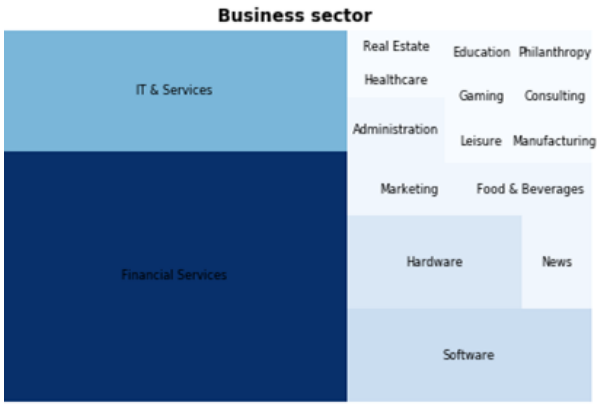
Ireland fosters an environment that has attracted well-known and established international technology companies, such as Twitter and Airbnb. The startup ecosystem is supported by research labs and academia to produce experts, and there are investment opportunities for technology companies to grow in Ireland.

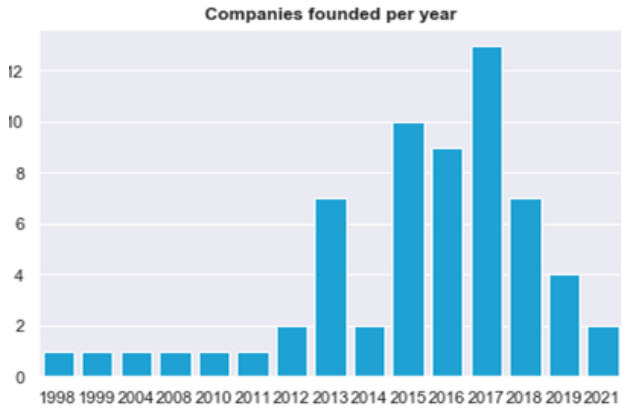
There are venture capitals for funding startups in Ireland that are keen to include blockchain startups in their portfolios. An initial example is Norio Ventures, established in Dublin and focused on financial services. There are different activities established as options described, such as funding, product, customers, enterprise level. An interesting approach in Ireland is Cosimo X, a tokenised venture capital fund that aims to be active in the decentralised trust economy.

Techstars collaborates with Alphabit and Launchpool to establish an accelerator programme focused on blockchain in Dublin, per The Irish Times. As the applications concluded in December 2021, the timeline sets the start in April 2022 and the demonstration for June. Another

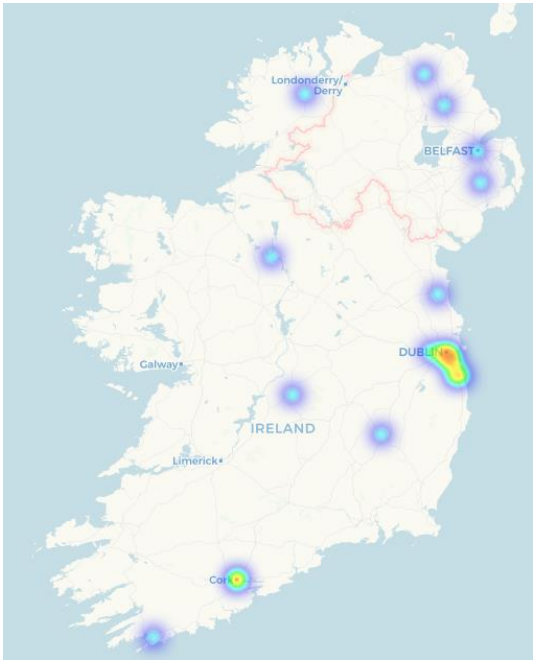
accelerator is NadiFin, which is present in Dublin and Luxembourg and aims to aid entities with financial services grow. As blockchain startups operate in the FinTech sector, they can address this accelerator. In the past, the CorkBIC has organised an accelerator programme on blockchain and applications in different sectors.

Ireland fosters a growing ecosystem of startups on the blockchain, with the wide majority established from 2015 and the following years. The number of startups is an indicator of an ecosystem that is past its infant and early stage, as a moderate number of companies employ more than 50 professionals. Moreover, the wide range of industry sectors is an indicator of talent finding ways to adopt blockchain into sector-specific applications. The financial services accumulate the most applications of blockchain.





BLOCKCHAIN COMMUNITY



The blockchain community in Ireland is vibrant, with initiatives and associations to foster its growth. The initiatives are an indication that there is a community of experts on blockchain established in Ireland. This is to be expected as big technology companies, and technological hubs are established in the country and research the adoption of new technologies. The experts around blockchain establish networks to support the community and raise public awareness of the technology.

The Central Bank of Ireland has established an Innovation Hub with a wide range of activities, as indicated in the 2020 update. The Bank is committed to active engagement with innovation firms and aims to continue its activities with the Innovation Hub. Apart from the Hub, the blockchain community can address to Blockchain Association of Ireland, established in 2016. The association defines that it facilitates business leaders, educators, policymakers, and citizens to actively learn about blockchain and its applications. Another association with actions around blockchain is Blockchain Ireland, founded in 2015. The association is formed by private and public entities with the scope of promoting blockchain as a technology. Moreover, the association expands its network outside of Ireland with links to INATBA, Slovenian Blockchain Innovation Ecosystem, and other similar entities.

Blockchain Ireland organised its annual event in May 2021, titled Blockchain Ireland Week. More details on the event are offered in a blog post and a video from the event. The event will hopefully repeat in 2022 to foster the community's interest in the blockchain. Moreover, there are events with different blockchain subjects held by organisations. For example, BlockW organises events to promote awareness of the technology. Moreover, organisations like ICT's Skillnet have meetings and discussions on blockchain for the community to participate in. Finally, events on technology could accommodate discussions on blockchain, like Dublin Tech Summit in June 2022 and Tech Connect Live in September 2022.

Organisations in Ireland hold events about blockchain and its impact and applications in different sectors. For example, the Central Bank of Ireland organised a virtual event in collaboration with the Innovation Hub, and the subject was on the VASP regime in November 2021.

An indicative but non-exhaustive list of Blockchain companies in Ireland

bloXmove: is a company founded in 2021 with the vision of revolutionising urban mobility. The decentralised platform is the tool to revolutionise urban mobility. The blockchain brings the immutability of data and payments reliance to support a trustless environment between third parties. The vision for the future of mobility is described in the collaborative whitepaper with Orange Business Services and Ciklum. The company was selected to participate in SAP.iO's Accelerator Program in January 2022.

The Crypto Climate Exchange: criteria in place for funding projects; which are the project's utility, service delivered by an established company, and providing long-term value. The marketplace has deployed nodes on Binance and Tron blockchains.

Cryptoprocessing: is a company providing API for secure and fast access to blockchains. The provided solution can aid merchants to accept payments in cryptocurrencies. The API handles incidents like double spending or duplication of transactions.

NadiFin: is an accelerator programme for FinTech ideas established in 2019. The programme is supported by MiddleGame Ventures, LHoFT, and Brown Brothers Harriman and Standard Chartered Ventures. Blockchain is one of the technologies included in the programme.

INSIGHTS FROM INDUSTRY EXPERTS

Professor Joyce O' Connor is the Founding President of the National College of Ireland

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Ireland? Has the recent growth of the cryptocurrency markets facilitated familiarity?

While diving into Ireland's ecosystem, one key area to focus on is awareness. The subject of awareness applies to the whole European level, as presented in the CHAISE report. Essentially, awareness is a big issue for blockchain and its applications. The impact discussed in the report is that the citizens and workers are not aware of blockchain and DLT technologies. As a result, the adoption is harder for the industry. That is the reason for creating awareness to enable the adoption.

There are several initiatives by different groups aiming to create awareness. There is a concern that the crypto and digital assets industry has much backing; hence, the focus is on crypto. The result of the continuous discussion on digital assets is for the public and civil services to link the technology with the assets. While recognising that crypto is part of the blockchain (e.g., Bitcoin), the impact of the technology will be different from the application of cryptocurrencies. In particular, the impact will be on business and societal benefit.

The differentiation between digital assets and technology needs to be addressed to foster technology adoption. Citizens and industries should recognise the impact to be willing to adopt the technology. Ironically, the adoption is a matter of trust in the technology. The irony lies in that technology is all about trust, accountability, and traceability.

Among the numerous initiatives, BlockW is one based in Ireland, where the focus from the very beginning was to create awareness for the public. Through the initial organised meetups, a finding was that the issue of inclusion and diversity did not lay solely on the gender, but other characteristics are involved, such as different ages, industries, backgrounds, and socioeconomic. So, fostering a broader audience and addressing more general issues than gender became the focal point for the meetups. The key subjects of these events were diving into blockchain applications in business and societal impact, and other subjects were financial services, future implications of blockchain, and regulatory subjects.

Due to the pandemic, BlockW focused on two partnerships to spread blockchain awareness. The first partnership was with the Institute of Banking, where a micro-learning library for their members was developed. The second group was with ICS (Irish Computing Society), with most professionals coming predominantly from ICT areas. Another action of BlockW is the creation of a national certification at level seven in cooperation with the Nation College of Ireland on emerging technologies, including blockchain. The resources from the ICS were available for students of that program. That was a good development as blockchain does not operate on its own but operates within other innovative technologies in a stack of like AI, robotics, cybersecurity, and more. Another action was to mesh with a Committee of Science, a politicians' interparty, to introduce them to the concepts and applications of blockchain. That was the beginning as we realised that once-off intervention is not enough. The constant interaction is necessary, and there is a need to present to your audience things that they can relate to.

Another thing is the interaction with different groups and the ways blockchain can aid and benefit their use cases. An example is the collaboration with police groups around domestic violence to present the ways to use blockchain to address this issue. The application used was developed by a cofounder of HeHop, Sandy Beky.

Educational material via courses and certifications is paramount in fostering the public awareness for blockchain and its applications. The impact of these courses can be greater by targeting use cases rather than being general. An interesting project from the technical university works with academics, researchers, and industry to introduce the university to the blockchain. It is a way of upskilling academics but linking with

industry as well. Another example comes from GMIT, which developed an accounting course using digital technology. This is a four-year program starting in September. Another interesting initiative for awareness undertaken by the industry is Block DAEMON, a multinational company. As developers are the most well-versed group with blockchain, they attend a short introductory course on the technology that is linked with their customers. As a result, their customers should understand the technology.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Ireland?

The Ireland ecosystem is a developing one with interesting Irish and multinationals companies based in the country. In essence, big companies like IBM and Deloitte have operation and run laboratories in Ireland. Moreover, they link the country with their international network. Apart from these companies, there are interesting indigenous companies in Ireland.

An example is AID:Tech where their work is international with a recent award from the UN global women's bank for a project in Philippines. Ireland Craft Beer is another intriguing project using blockchain for tracking craft beer and whiskey in the supply chain. They were the first company to deploy the solution on blockchain. Another group called Equideq is a startup to reach the public for owning parts of horses. Moreover, they have added collectibles around the horse and looked into racing in terms of horses, jokeys, and races activities. The other area is the stud farming where genetics are involved. They try to develop a total industry solution within using blockchain.

On the funding side for startups, it is true that one of the problems in all startups is funding and is not specific on blockchain startup ecosystem. Enteprise Ireland focuses on exporting businesses, primarily startups, and give innovation vouchers to startups to hire expertise and more. Recently, vouchers are used to bring in consultants in the area to see the way blockchain along with other emerging technologies can be used. There is a national research and digital research centre working through different innovation labs throughout the country particularly in Dublin and Galway with an established innovation process workshop system. This system is focused on working with their idea and pitch the project to VCs and founders at the end of the process. So, there are mechanisms in place for funding, but I think it would be true to say that like all European countries that funding is always an issue for startups.

What measures has Ireland taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

There are initiatives proving that the public sector is interested in blockchain. Last year, the Department of Public Expenditure and Reform established a fellowship with the Science Foundation Ireland to explore use cases within the blockchain. The research was on the application for the public sector and produced a booklet for blockchain in the public sector.

An interesting area is the Institute of Banking, the Bank of Ireland, Allied Irish Bank and Ulster Bank, along with Deloitte, which have produced an application of blockchain for all the employees in this network in terms of their educational qualifications, compliance, and regulation. So, they are using blockchain to keep their qualifications up to date and abide by the plethora of banking regulations. The initiative is called EDQ , and it is the first in Europe to do something like that between a network of enterprises.

Skillsnet Ireland is the infrastructure to link the higher education with SMEs and increasingly develop apprenticeships in this area. The Irish Minister Simon Harris sees the importance of different levels of training and education intervention through the system.

On the legislation side, Ireland's department of finance released a discussion paper called virtual currencies and blockchain technology to explain the whole area in 2018. The paper did not feature any actionable relations and the path to move forward.

In terms of legislation, the work has been mainly focused on the MiCA regulation but the other side of cryptocurrencies. The Irish government classifies cryptocurrencies as crypto assets, while the European Union's 5AML extends money laundering and counters financing of terrorism, and covers obligations to entities providing service in relation to virtual assets. On the 21st of April, Ireland transposed this European law with the Criminal Justice, Money Laundering and Terrorist Financing Act, amendment act 2021. The provision of the 2021 act establishes the virtual assets service providers (VASPs). But the legislation is welcomed by the Irish community for blockchain, crypto, and digital assets. The larger enterprises typically have access to in-house legal experts and call upon their legal counsel to interrupt that. But there has been no legislation per se, except those European ones. In 2020, the revenue commissioner released a tax manual titled taxation of cryptocurrencies transactions.

I think that Ireland and the Central Bank have been cautious around the development of legislation in that area. The Central Bank has an innovation hub to allow people to experiment and explore options.

The focal subject for industry and all the development agents is the ability to establish a framework of regulation enabling companies to set up in Ireland. Small and medium-sized companies look into other applications of blockchain more and more, such as farming, supply chain, education, and healthcare. It is in the early stage of development, and experimentation with new ideas is possible

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

I think the development agency, whether it is the IDA or Enterprise Ireland, is present in the ecosystem as an infrastructure to help promote and attract industry. They are aware of the opportunities, so one of the key issues in this is the talent and skills area. The recent National Digital Strategy emphasises four areas (infrastructure, skills, enterprise, and government services). In other words, the government is looking at strategies within those areas to develop the skills for emerging technologies like blockchain.

The EU Chaise project is a really helpful initiative that documents the European situation. Recently, it showcased a major skill shortage for blockchain. Essentially, the skill shortage is a result of the mismatch between the present skills and the great demand. Governments have started noticing that subject while this work only happened recently. Such research showcases the room for blockchain to grow. Moreover, the fact that Europe regards blockchain as a core technology among the emerging ones and aspires to make Europe a central part of technology. The recommendations from that project can be proved integral in building the sector.

The mismatch provides details for education and training institutions on the nature of the necessary interventions. For example, the industry needs graduates that can be workers who can be upskilled. It is not just the need for technical skills, but there is the need for business and transversal skills. It is often for programs within universities and training centres to really focus on the technical side. While the technical skills are integral and at the core of the programs, there is a need to leave room for growing business and transversal skills like communication, leadership, and collaboration. Such skills can allow blockchain practitioners to grasp the business context and the scales for the applications and solutions. Overall, collaboration is critical for blockchain and emerging technologies.

A future publication by CHAISE is on the blockchain skills strategy that can aid Europe in building that strategy. I think that a European strategy will co-exist with national strategies in each member state, including Ireland. The other output will be a five-year semester program as a career guidance program with a clear definition of a blockchain profile. In Ireland, the group for forecasting needs and defining the different types of jobs are the ESRI, the Economic and Social Research Institute. Their first publication should be out in the next couple of months.

Europe has been very proactive, starting with the overall vision of the digital and green agenda and finally following the blockchain strategy. Within all that, all the structures support the development within the Member States, the detailed study of blockchain skills and the requirements for the creation of infrastructure in Europe for collaboration and cooperation.

Why do we need the communication skills so much? Is the composition of teams of multiple backgrounds one of the reasons?

It is critical to take a step back to the programs and introduce at an early stage the importance of communication and collaboration across a network of different specialities within the workforce. Understanding the need for communication on different occasions is important. While working with the developers tends to be focused on technical aspects, bringing people into the sector requires a different approach and communication plan so that people can engage and adapt.

What does the future hold for the Ireland blockchain and cryptocurrency ecosystem?

I am an optimist by nature, so I think that we are now waiting for a public sector digital strategy in Ireland following the national digital strategy and AI strategy. The role of blockchain will be positive, as it is an emerging technology addressing issues in the public sector, academia, and industry and has a general social impact.

Once that movement begins, the understanding will be built based on a skills development path and public awareness. I believe that we are taking this direction, and we are at the beginning of this process to set out the roadmap for the development of this area. As blockchain is a novel, a parallel with mixed jigsaw pieces can be drawn. There are pieces available, but the effort should be made to connect them. In that path, the regulation will play a critical in the development, but Europe will guide the legal part to create a unified approach for the region. The European Digital and Green Agenda is a context that I see to be part of, as the government looks at blockchain in terms of digital transformation. The attention is not on the technology per se but on the benefits of these emerging technologies in addressing problems. Web3 approaches with other opportunities arising and the development of all the emerging technologies. Greater understanding will set the floor for developing applications in the future.

I believe that there is a chance for Ireland to become a national and international hub for blockchain and emerging technologies. This development can be underpinned by skills development and the ability to adapt.

Flexible interaction with other sectors is needed during this initial development stage. So, I strongly believe that parents and children need to be introduced to blockchain and emerging technologies at a very high level. Showcasing the impactful way how these technologies can transform their lives is critical. This engagement is quite different to programs like master or doctorate. That is why it is important to be flexible in creating programs.

All in all, Europe looks to formalise the process around blockchain and emerging technologies; member states can prepare themselves for that by fostering awareness and talent development.

Key Figures

TOTAL FUNDS RAISED

€47.3 million

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

THE MOST ACTIVE SECTORS

Finance, Supply Chain, Agriculture

BLOCKCHAIN SOLUTION PROVIDERS AND STARTUPS

97

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 Organisation for Economic Co-operation 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.

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. 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).

While blockchain adoption has been expected mainly from governmental or financial use cases, in Italy, it is proved that football might bring Italians closer to adopting the blockchain technology. A use case that has evolved are the fan tokens, focusing mainly on football fans which grant to supporters of football clubs with actual decision-making rights. For the most part, these decisions are on the periphery of a club’s operations. At least six mainstream Italian football clubs(Lazio, Inter, Juventus, Milan, Roma, Napoli) maintain their own fan tokens, while also smaller tams are stepping into this direction. This trend has led many blockchain firms to sponsor major athletic events such as the final of Italy’s soccer cup competition, Coppa Italia.

TOWARDS MAINSTREAM ADOPTION

Public Sector, Regional Governance & Policymakers:

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.

There are no large-scale public sector initiatives in Italy attempting to establish a blockchain ecosystem for blockchain approaches or blockchain clusters.

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

The second implementation initiative of a DLT technology, again by the MEF 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 within different phases. The first phase will onboard up to 2 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 in particular from the Horizon 2020 programme.

In 2018, Italy has been amongst the seven southern EU members which have signed a declaration to promote “Distributive Ledger Technology”. The Mediterranean Seven believes blockchain technology can be a “game changer” in boosting the efficiency of their economies.

Italy signed the declaration creating the European Blockchain Partnership on 27 September 2018.

In 2019, the MiSE instituted a high-level expert group to discuss a National Blockchain Strategy.

The expert group started work in January 2019, organised in Sub-working Groups, namely:

- SG1 - Use cases: infrastructure, mapping, and replicability conditions
- SG2 - Regulatory framework: sandboxes and vulnerability
- SG3 - Digital coins, payment system, and Fintech
- SG4 - Education, skills, and awareness
- SG5 - Strengthening of public administration services

The draft document has been finalised by the experts and it will provide the basis for the Italian National Strategy on Blockchain.

Documents leaked on the dark web, revealed that Chainalysis cooperated with the Italian Law Enforcement with meaningful leads related to IP data associated with a relevant cryptocurrency address. The original leak involved a cache of documents allegedly obtained from the Italian Guardia Di Finanza’s Nucleo Speciale Frodi Tecnologiche’s dark web team. The leaked materials identify the presentation as a component of an investigation into Berlusconi Market. Berlusconi Market was a darknet market that Italian authorities took down in 2019.

Other Public-Private Initiatives:

The Ministry of Economic Development (Ministero dello Sviluppo Economico) partnered with IBM in 2019 to develop a first case study focusing on the traceability of the "Made in Italy", in the textile sector in Italy. The objective of the feasibility study was to test a platform, based on the private permissioned infrastructure of IBM Hyperledger Fabric, to provide a solution for the various stakeholders in the textile supply chain, one of the most important for the "Made in Italy".

A pilot project was launched by the Ministry of Agricultural, Food and Forestry Policies (MiPAAF) in 2017 for the traceability of the wine supply chain. The project, called "Wine Supply Chain 4.0", included also Agea (Agricultural Dispensing Agency), SIAN (National Agriculture Information System), and Almaviva as a private partner. The system, based on Ethereum, was aimed at protecting the origin of Italian products in the wine supply chain, guaranteeing quality and safety in the production process.

The Ministry of Education, University and Research (MIUR) prepared in 2018 a white paper for "Diplome", a system for recognition of educational qualification based on DLTs.

Legislation focused on blockchain and cryptocurrencies

Regulators as Bank of Italy, CONSOB, and Tax Authority (Agenzia Delle Entrate) have issued various official documents to clarify issues related to cryptographic assets. The scope of those clarifications has been solely limited to the cryptocurrencies, rather the applications of the 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. But "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 crypto transactions.

Looking into the Italian Legislative Decree no. 90 Series of 2017, regulations imposed on traditional money exchanges also apply to cryptocurrency exchanges, giving cryptocurrencies the same treatment with foreign currency.

On 7 February 2017, the Parlamento Italiano swiftly approved a bill submitted by the Senate last January 23 defining blockchain technology and distributed ledger technologies, or DLT. The crypto regulation bill to be known as "Decreto Semplificazioni" is now under the Agenzia per l'Italia Digitale tasked to create specific technical standards for the legal compliance of smart contracts.

"Legislative Decree No. 90 of 2017 subjected virtual currency providers to the regulations established for traditional money exchange operators. To that effect, Legislative Decree No. 90 charged the 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 which provides a legal definition of both DLTs and smart contracts and recognises their full legal validity and enforceability.

As a result, Italy is one of the first countries to introduce legislation that rules that smart contracts are deemed by law to be equivalent for certain purposes (i.e. consensus formation and evidentiary value) to traditional written contracts to the extent that the digital authentication of the parties.

On 14 June 2021, Commissione Nazionale per le Società e la Borsa Italy's securities market regulator has said the increasing use of cryptocurrencies outside of a regulated marketplace may have negative

consequences. “If it takes too long at a European level to come up with a solution, (Italy) will have to take its own measures,” he said.

On 15 July 2021, Italy’s securities regulator Consob declared that the cryptocurrency exchange Binance is unauthorised to offer services in the country. On 30 July 2021, Binance has announced that it will no longer offer crypto futures and options in Italy.

According to interpello n. 788/2021, issued in November 2021 by the Revenue Agency, the tax authorities reiterate the equivalence of cryptocurrencies to foreign currencies.

Academic Courses & Professional Qualifications and Research Initiatives:

According to the website Edurank, researching publications in the categories: Blockchain and Cryptography, a graph of 253 000 citations received by 11.7 thousand academic papers made by 42 universities in Italy. Among the top three ranked universities are the Polytechnica University of Milan, the University of Bologna, and the Sapienza University of Rome.

Politecnico di Milano - Osservatorio Blockchain & Distributed Ledger: Established in 2018, the mission of the Blockchain & Distributed Ledger Observatory is to generate and share knowledge on Blockchain and Distributed Ledger related topics and contribute to the development of the Italian market, creating debate and meeting and comparison opportunities for the main players that are active in this field. Due to 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.

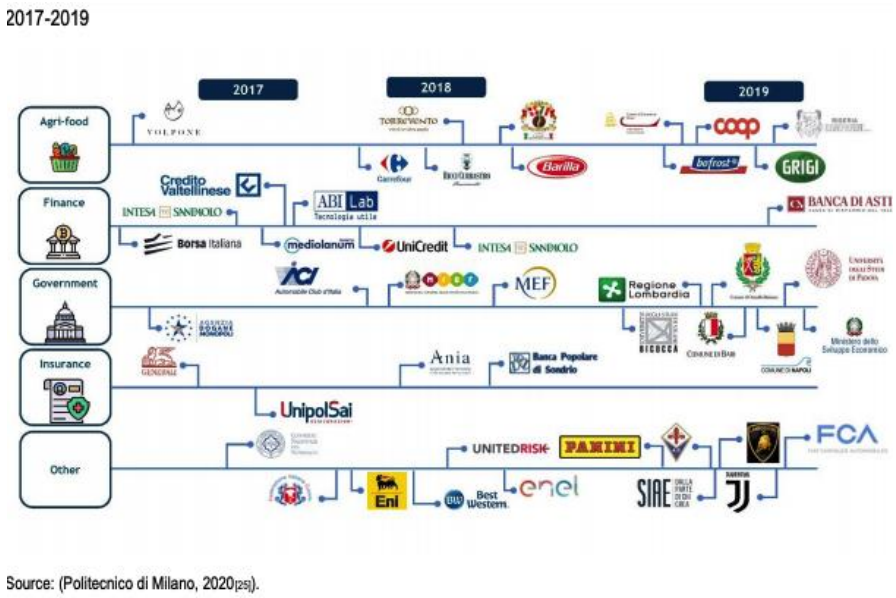
University of Florence: The University of Florence has started a professional course on blockchain and blockchain technologies. The intent is to go beyond Bitcoin, understand the technology underlying the first cryptocurrency. Students will have the chance to update their competences, tracking the innovations that blockchain will bring for economy and society. This is the goal of the course in economy and law of digital assets, which has been activated by the Department of the signs of economy and business of the University of Florence

Lewis Business School: has launched advanced University course named blockchain business revolution. It is aimed at executive directors’ managers entrepreneurs as well as officials of public administrations. In addition there are a number of other courses , master courses on blockchain technology blockchain innovation and blockchain technology management from different private and public universities in Italy amongst them the link campus University , the University of Roma 3, Associations, The University of the Italian Chambers of Commerce, several universities from the North of Italy: Verona and Padua.

SDA Bocconi/ School of Management: The Blockchain Education Network Italia is Founded at the end of 2014 and became a non-profit in 2016, promotes the study and use of Blockchain technology through conferences, courses, and project development. Oriented to the university environment, it collects memberships from students, teachers, and researchers, and collaborates with companies and public administrations. Scientific dissemination and education on the technology underlying Bitcoin and other cryptocurrencies constitute the mission of the BEN.

Blockchain across key industries: A key characteristic of the Italian economy is a large number of SMEs, and the advancement of the export-oriented industrial sectors.

Blockchain Experimentation by large firms in Italy: 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.



Source: (Politecnico di Milano, 2020[25]).

Ten Italian enterprises are already using blockchain successfully: Ania which is working with IBM and reply has developed the sandbox project. Anya is the Association of insurance companies and sandbox is a protected virtual space where a dispute resolution procedure is experimented, basing it on blockchain technologies. In short parties have interest in taking part in the project, since this guarantees faster resolution of disputes.

Mediolanum bank is using the Ethereum blockchain to certify the originality of the non-financial declaration [a document which collects for example information on environmental and social policies], publishing the hash off the document on the institutional website of the bank. Mediolanum is also studying other possible applications for document authentication.

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

The municipality of Bari the municipality is collaborating with SIA and has started a project based on blockchain technology which aims to Digitalise the process to manage guarantee policies in public procurement. This project allowed to dematerialise the issue of guarantees on the part of banks, financial intermediaries, insurance companies, which are certified in an unambiguous and Irrevocable way.

CREA is a body supervised by the ministry of the agricultural policies which has the task to undertake research in the agribusiness field. It has adopted blockchain solutions by Microsoft to develop an application for the trace ability of wood, from the tree to the consumer. The entire supply chain has been simulated starting from the planted trees until the final product including the cutting and processing processes of the wood/

The Italian post office has already invested in Conio, The Italian wallet for the purchase and exchange of Bitcoin. Furthermore, it has started the development of other projects with IBM and Hyperledger.

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

Italy's ANSA newswire is trialling an Ethereum-based system to track every article it publishes in an effort to prevent impersonators from publishing fake news under its banner. ANSAcheck registers vital details including an article's title, timestamp, content hash, ID and publication event on the Ethereum blockchain. It makes this information available through a little green graphic emblazoned at the bottom of nearly every newly published piece on the site.

Italian Bank Banca Generali led the $14 Million Series B for Bitcoin Wallet provider Conio. As part of the investment, Banca Generali has also signed a commercial agreement with Conio, which will offer its Bitcoin trading and custody services to the bank's customers.

While not directly immediately related to the blockchain technology, the football club Inter Milan has signed a EUR 85 million sponsorship deal with a blockchain FinTech firm. As Inter's "official global digital-banking partner," Zytara will develop the club's mobile app to integrate directly with Zytara's banking technology and enable access to crypto-based products. A similar deal has been conducted with the AS Roma football club.

As disclosed in October 2021, European cryptocurrency exchange Bitpanda is collaborating with Italian open finance provider Fabrick to offer digital asset trading services to Italian banks and FinTechs. Fabrick is a part of Sella, Italy's largest group of banks, and has 510 application programming interfaces (API) available on its platform that allow banking applications to communicate with each other. The APIs connect over 500 Italian banks.

The Spunta Banca DLT solution, built on Corda Enterprise by SIA, NTT Data and governed by ABI – the Italian Banking Association – is live with over 100 Italian banks, representing 91 % of the nation's banks. In the first 6 months, Spunta Banca DLT has processed 204 million transactions with an automatic match rate of 97.6 %, transforming the interbank reconciliation process.

Supply Chain Management

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

The consortium of red Sicilian oranges has used blockchain to implement a tool to fight food frauds and enable consumers to recognise the originality of the citrus fruits through a simple scan off the IGP mark attached to each box or net of oranges with the smartphone. It is possible to cheque the field where the fruits have been produced, the date of collection, the modes of conservation and distribution.

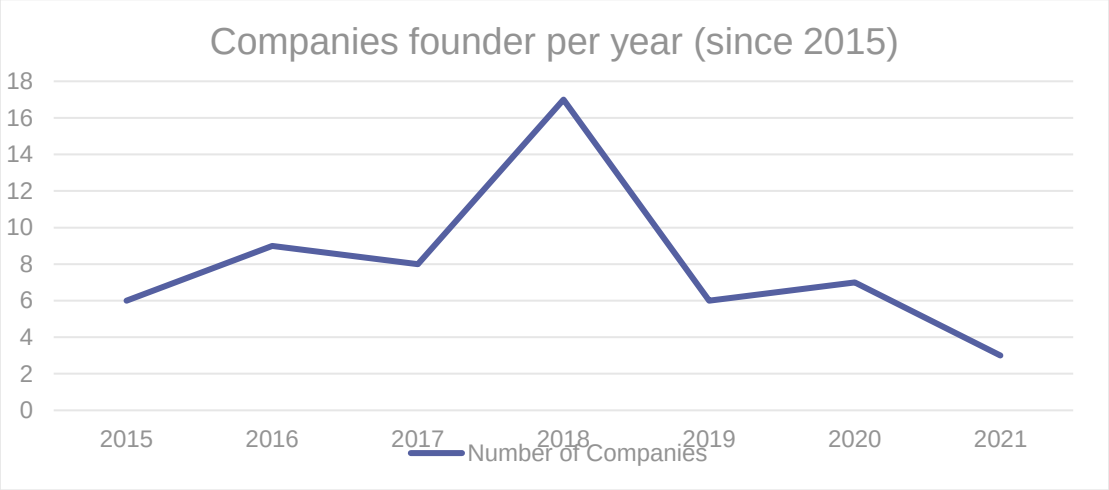
Barilla is working together with IBM to develop a pilot project, which exploits blockchain technologies to guarantee the origin, the quality of products and of raw materials, from the field to the table. The first application was developed for Italian fresh basil.

THE 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 could be identified. CoinATMradar counts 72 Cryptocurrency ATMs spread throughout Italy.

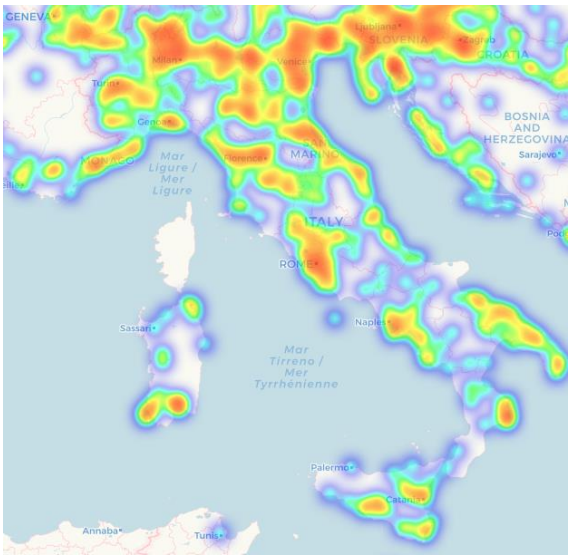
According to Crunchbase, which is EUBOF's data tool for our cross-country benchmark, there are 97 blockchain-focused companies.



THE 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 approximately 3.5 million to 4.1 million observers according to Facebook's audience metrics system.

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



NOTABLE BLOCKCHAIN COMPANIES

Cynny: Cynny is 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 us to create new types of personalised video-based experiences, within the device's browser

Young Platform: Young Platform is a new cryptocurrency exchange that allows you to buy and sell digital assets (e.g. Bitcoin, Ethereum) with FIAT money (euro and pounds) safely, quickly, and easily!

Volvero: Volvero is an app that provides access to a USD 200 billion market, enabling vehicles owners to earn by sharing them from one day on leveraging a secure DLT system and Big Data technologies for vehicles monitoring and users' awareness.

EvenFi: EvenFi is the regulated peer-to-peer crowdlending platform that connects valuable SMEs interested in financing their growth projects with lenders looking for excellent investment opportunities.

EcoSteer: EcoSteer is an IoT and Blockchain software company that enables the deployment of IoT projects securely. 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: With Poleecy you are always just a few clicks away from insuring your life events. Poleecy sells policies using the digital channel, that cover 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.

Prosume Energy: Prosume is a platform that aims to revolutionise the exchange of electricity from both renewable and fossil fuel sources. Prosume connects independent power producers, consumers, utility companies and energy communities in a locally shared market where each peer is free to interact in a multi-tenant ecosystem. The main goal of the project is to promote the decentralisation of power models and empower energy communities. In order for this to happen, the project focuses on the implementation of P2P energy exchange policies, targeting possible solutions for existing energy framework barriers (both from a physical and legal standpoint) and investing in continuous R&D in order to offer state-of-the-art hardware and IoT devices related to smart metering/billing, smart grids, energy routers and devices.

Key Figures

BLOCKCHAIN STARTUPS

+15

EMPLOYED IN IT

30 000

NOTABLE INSIGHTS:

- **Lack of regulations in the country**
- **Presence of experienced blockchain-based development companies**
- **Strong local blockchain community**

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 cryptocurrencies 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. StartUp Latvia 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 cryptocurrency. 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.

In general, Latvia is moving in the right direction. It is at the initial stage of building an innovation hub, but largely outperforming Western Europe in terms of readiness for new technologies and a robust ecosystem for entrepreneurs.

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.

Virtual 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: Academic qualifications in Latvia are not well established. Latvian 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 DLTs 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, amongst 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 cryptocurrencies as a payment method. airBaltic started selling tickets for cryptocurrencies in 2014, ss.lv sells cars, while the city.lv real estate website sells housing for cryptocurrency.

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 500 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

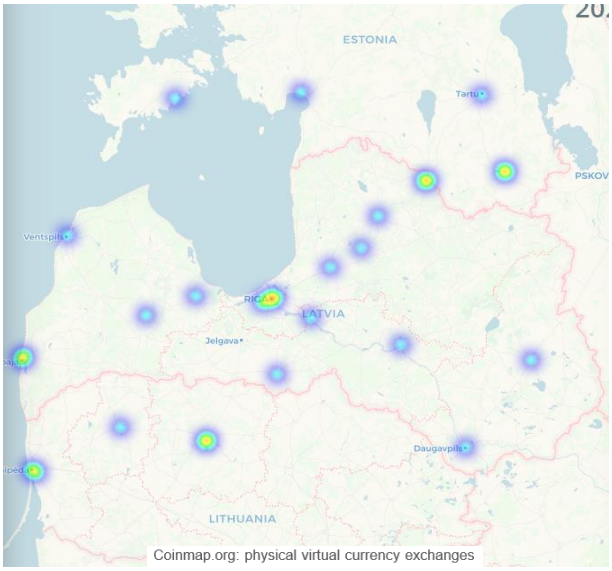
Latvia ranks second in the Organisation for Economic Co-operation and Development (OECD) for the attractiveness of its tax system, with the lowest financial requirements for startup founders. Startups can also receive additional tax benefits (EUR 200 000) if they manage to raise no more than EUR 30 000 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 virtual 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 third 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 cryptocurrency 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 are around 35 companies that accept cryptocurrencies as a payment method, 25 of which are based in Riga.

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: The Latvian blockchain community is small relative to Europe, but moderate compared to the region, with 482 LinkedIn professionals registered as working with or in the industry. With just 2 regular Meetup groups and 500 Meetup attendees, the enthusiast community is rather small. A Facebook marketing campaign indicates the audience for blockchain-related terms is 35 000.

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, the world's leading emerging technologies company has been at the forefront of the blockchain scene for almost a decade. It is registered in the US 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 cryptocurrency brokers and cryptocurrency exchange that includes Binance, Bitfinex, Bitstamp, Poloniex, Kraken and Currenex, amongst others.

HodlHodl: Global P2P cryptocurrency 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

While the hype of blockchain and its potential applications are driving the transformation to the internet of value, there is limited insight into what companies are doing to reap its benefits. Representatives from the largest blockchain startups in Latvia describe the great opportunities and challenges the Latvian blockchain ecosystem faces. A generally positive attitude towards new technologies and ease of doing business makes it relatively simpler for Latvian startups to launch. However, it is hard to expand without sufficient funding.

Inokentijs Isers, founder and CEO of CryptoCash, thinks that it is important for the Latvian government to play more active role in experimenting with the new technology. It is also important to educate the public on what blockchain is and what role it can play in their lives.

Aleksejs Petrovs, former CTO of Bitfury, believes that blockchain solutions can significantly improve Latvian state governance: “Blockchain suits more instances in state institutions than just document circulation. It is a very handy solution, but more importantly a more effective and affordable system for a wide variety of registers and election platforms. Latvia can certainly be competitive and successful in implementing blockchain in the public administration.”

Ģirts Ozolins, CEO and founder of Eventech, expressed his views on the startup environment in Latvia:

“Riga, as the largest city in the Baltics and a major hub in northern Europe, serves as home base for many software and hardware startups. In recent years, the ecosystem here has been booming and the government recognises the role it must play supporting the environment.”

Read more: “https://www.letera.lv/en/biedruzina/exploring-a-world-of-sound-with-erica-synths-girts-ozolins/”

Deniels Pavluts, Latvia’s former Minister of Economics, believes that Latvia is heading towards the right direction, but there are many things to be learned from neighbours:

“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.”

Read more: “https://www.eu-startups.com/2016/05/riga-a-great-place-for-startups-to-start-going-global/”

Key Figures

> approx. €500 million funding

22 Registered TT providers

Liechtenstein uses blockchain to reshape the finance industry

Its legislation unlocks the technology's innovative potential

Trust and control problems in the system can be solved

Liechtenstein

THE LIECHTENSTEIN BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Liechtenstein is Europe's fourth smallest country but has managed to establish a growing blockchain community, mainly due to its legal basis within the Tokens and Trusted Technologies Service Provider Act (known as "Blockchain Act") ([7]).

Both existing companies and startups appear to be enjoying favourable conditions and support for blockchain-related projects and activities. More specifically, the Blockchain ecosystem in the country is supported by a constellation of organisations, such as the Office for Financial Market Innovation and Digitalisation ([8]),, aiming to support market participants, the government, and regulatory authorities, the Financial Market Authority, working on financial market laws and the Entrepreneur Service, providing information about how to set up and how to operate a business in Liechtenstein.

Furthermore, as part of the overall innovation ecosystem of the country, innovation clubs have been set up, supporting companies in sharing their ideas and help develop a supportive and clear legal and regulatory environment.

Since early 2020, Lichtenstein has put in force the Blockchain Act in an effort to provide a comprehensive regulatory framework for the token economy. This is a clear reflection of how open and supportive the government of the Principality of Liechtenstein is towards FinTech projects.

"With the Blockchain Act, Liechtenstein is a pioneer and is one of the first countries to create legal security in this important future field" ([9]).

Since the Blockchain Act was introduced, the number of TT Service Providers that have registered with the Liechtenstein Financial Market Authority has increased tremendously, while

([7]) https://www.legal500.com/guides/chapter/liechtenstein-blockchain/

([2]) Established by the Ministry of General Government Affairs and Finance.

([3]) The Liechtenstein Bankers Association.

([4]) Source: https://www.legal500.com/guides/chapter/liechtenstein-blockchain/

([9]) https://www.legal500.com/guides/chapter/liechtenstein-blockchain/

there are several businesses that have relocated their headquarters to Liechtenstein to improve legal certainty ([10]).

The Innovation Club initiative has been introduced to help further improve the framework conditions in the country; this is an initiative promoted by the government, aiming to involve key innovation actors, including companies and individuals, in pitching their ideas for improving legislation, ordinances, procedures or official practice.

TOWARDS MAINSTREAM ADOPTION

Blockchain is considered as a key enabler for innovation and is being adopted within both the business and the public sector. The Blockchain Act should be seen in the larger context of the "innovation framework", which aims to improve the innovation capacity of the private and public sectors. The application of Blockchain is spreading in various sectors, especially the financial sector, for example with "Blockchain Banking". There is a wide range of products and services offered.

Regulation and policymaking: The Law on Tokens and TT Service Providers (known as TVTG or the Blockchain-Act) provides a comprehensive and technology-neutral approach to regulating the entire token economy. The aim of the TVTG is to protect users and to ensure confidence in digital legal transactions. The Act details both rights and obligations of service providers who perform activities on TT systems. These providers are subject to registration and supervision by the FMA. The TVTG creates a new civil law for tokens and the legal basis for the ownership, possession and disposition rights over tokens on VT systems. It does not only cover digital assets (such as Bitcoin), but creates the legal basis for the tokenisation of analogue assets (https://impuls-liechtenstein.li/en/blockchain/#tvtg).

The Blockchain Act also offers the possibility of tokenizing property itself, i.e. valuables, works of art, classic cars or other fungible items. making them accessible to a new group of investors. This is currently receiving a lot of attention and popularity.

Business Environment: Liechtenstein has established an innovation framework aiming to ensure a dynamic and continuous development of the framework conditions and at the same time provide a high degree of legal certainty for individuals and enterprises (https://impuls-liechtenstein.li/en/innovations-framework/).

To this end, several support agencies have been put in place, such as the Office for Financial Market Innovation and Digitalisation and the Regulatory Laboratory at the Financial Market Authority, while a number of different initiatives such as innovation clubs and LVC have been set up.

Blockchain in academia: the University of Liechtenstein acts is a major player for the country's blockchain ecosystem. It acts as an innovation centre and is actively involved in several projects and programmes, providing support for business, policy as well as society.

Currently, there exist two certificate programmes related to blockchain:

- Blockchain and FinTech certificate course
- Certificate course Digital Legal Officer

([10]) https://www.fma-li.li/en/client-protection/safeguarding-client-protection-in-different-sectors/tt-service-providers.html

BLOCKCHAIN STARTUP AND BUSINESS SCENE

The economy of Liechtenstein is quite diverse, with several small and medium-sized enterprises. The key sectors that move the economy are industry and the financial services ([11]). Liechtenstein over the years has created a favourable and competitive environment for establishing and operating a business offering, as well as an attractive taxation system and a well-regulated environment. This has attracted and fostered an international FinTech, blockchain and crypto community in the country. In January 2020, the Principality was the first in the world to enact a law specifically addressing blockchain technology governance and the token economy.

FinTech is one of the most supported sectors, and a specialised department was created to support financial technologies, including blockchain. Given the stability offered both at financial and regulatory level, Liechtenstein has become a pole of attraction for FinTech, blockchain and crypto companies.

Despite the fact that there are not financial incentives for crypto investors, the framework conditions and the support provided by regulatory and taxation frameworks, suffice for setting up an environment that makes them feel welcome.

The Liechtenstein FinTech/Blockchain Companies in numbers:

Since 1.4.2019 the Liechtenstein Commercial Register shows 107 entries pertaining to companies directly or indirectly related to fintech/blockchain pursuant to their corporate purpose. This includes foundations, changes as well as deletion of the respective companies.

Additional 20 companies are currently active pursuant to the TT-Service Provider Register maintained by the FMA.

Internal surveys reveal that between 2016 and end of 2021 approximately:

Amount ICOs	**107***
Amount STOs	15
ICO Volume	384.9
STO Volume	104.5
Highest single Market capitalization	10000

* All numbers in Mio EUR

a total of maybe around 500 Mio EUR was invested in domestic FinTech/Blockchain companies via ICOs and STOs in Liechtenstein.([12])

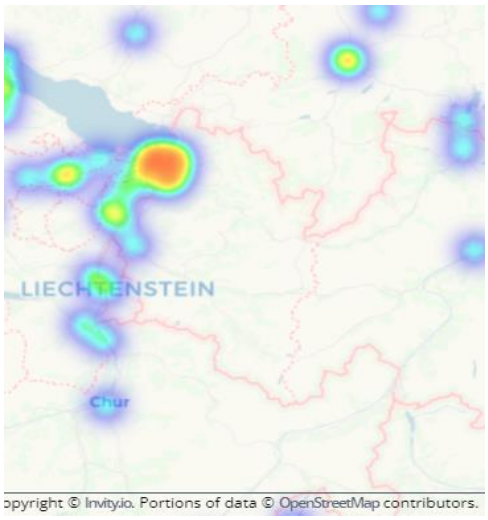
BLOCKCHAIN COMMUNITY

One of the most prominent blockchain communities in Liechtenstein is the Blockchain Meet-up Liechtenstein with more than 900 members, who have held 27 events so far. The community is well recognised and is being sponsored by seven blockchain enterprises and organisations, i.e. Blockchainbuero, Business Angels

([11]) See: https://www.llv.li/files/as/liechtenstein_in_figures_2020.pdf

([12]) The numbers above should not be considered entirely representative as they result from an internal survey.

Club Liechtenstein, BWB Attorneys at Law Ltd., Ganten Group, NÄGELE Attorneys at Law LLC, Sirius Trusted Technologies and SwissBorg.



Source for audience: Facebook audience, ages: 16-65+, location: Liechtenstein, keywords: Block chain (database), cryptocurrency, Bitcoin, Ethereum)

THE FINTECH/BLOCKCHAIN ECOSYSTEM IN LIECHTENSTEIN

The FinTech and Blockchain ecosystem in Liechtenstein is a diverse and dynamically developing field. The market participants are blockchain service providers, technical infrastructure providers, adjunct service providers such as specialised lawyers and tax consultants, financial service providers such as banks, investor structures specialised in crypto and tokenization as well as a wide range of innovation related events, education, research and training offerings in the field of emerging technologies, innovation and digitalisation. (https://impuls-liechtenstein.li/en/)

A list of market participants can be found on: the website of the Office for Financial Market Innovation and Digitalisation: https://impuls-liechtenstein.li/en/,the website of Liechtenstein Marketing: https://www.liechtenstein-business.li/en/economic-area/blockchain-liechtenstein/blockchain-oekosystem and the Liechtenstein Blockchain-Blog ico.li: https://register.ico.li/firmenverzeichnis/.

All FinTech/Blockchain service provider have to register with the Liechtenstein Financial Market Authority before becoming operationally active. The FMA maintains databases and lists of the domestic financial intermediaries and of the financial intermediaries operating in Liechtenstein from abroad which fall within its scope of competence: https://fmaregister.fma-li.li/search

INSIGHTS FROM INDUSTRY EXPERTS

Our questions were sent to Dr Clara Billek, Deputy Director of the Office for Financial Market Innovation of Liechtenstein.

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Liechtenstein? Has the recent growth of the cryptocurrency markets facilitated familiarity?

Clara Billek: Liechtenstein has early on recognised the potential of blockchain technologies. As such we have been amongst the first countries to proactively deal with them and have introduced the world's first comprehensive legal framework ("The Law on Tokens and Trusted Technologies Service Providers", "TVTG"). This has contributed to a generally high public awareness of the technology in Liechtenstein and further fostered the development of an ecosystem of innovation. However, the practical adoption and engagement in the everyday life takes time and it is still very early in the whole development.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Liechtenstein?

Clara Billek: The governmental and regulation set-up and framework is the most mature in the world in this sector, creating the elemental foundation for innovation. There also is a broad-based ecosystem for innovative companies that has developed in the recent years – flanked by research, education, events and adjunct service providers. It is still a niche but a rapidly growing industry, enriching and expanding the services, value creation and possibilities of mainly the traditional financial market and the commerce and industry sector.

Only respond if specific measures have been taken – What measures has Liechtenstein taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

Clara Billek: Apart from the introduction of the blockchain act "TVTG" (entry into force on 1.1.2020), the Office for Financial Market Innovation and Digitization continuously works on a further development of legal and regulatory framework with its unique state innovation framework. Formats, i.e. like the "Innovation Club", bring forth changes in laws, ordinances, procedures or official practices. The monthly SFID Blockchain & Innovation Circle (BIC) is an event series to provide information on concrete FinTech, blockchain and innovation applications and issues. A revision of the TVTG in preparation of the EU MiCA Regulation is currently in the works. It has been clarified and facilitated that the foundation of a company can be done with cryptocurrencies. Research programmes of the University of Liechtenstein (in the fields of finance, civil law and corporate law and financial market law).

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

Clara Billek: Trust and use follows understanding. Hence, to provide even more educational, awareness and information work as well as better user experience would go a long way in public adoption. For entrepreneurs, legal clarity and certainty is key, followed by a harmonised legal and regulatory landscape for an inherently borderless baseline technology.

What does the future hold for the Liechtenstein blockchain and cryptocurrency ecosystem?

Clara Billek: We are looking forward to seeing the innovation ecosystem further evolve and to flourish and to foster and strengthen the Liechtenstein financial centre. We also thrive to contribute to the shaping of the legal and regulatory framework and creating the best possible framework conditions for these technological developments for innovation.

Key Figures

BLOCKCHAIN STARTUPS

31

RAISED BY THE LITHUANIAN BLOCKCHAIN STARTUPS

€1.1 bn

NOTABLE INSIGHTS:

- **Favourable legal framework & guidelines**
- **Strong support amongst politicians**
- **Model for cooperation between the government, the industry and NGOs**

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 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.

The country does not rest on its laurels and continues to develop its blockchain ecosystem. 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 policymaking: 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 amongst 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, amongst 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.

Virtual 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 cryptocurrency 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 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.

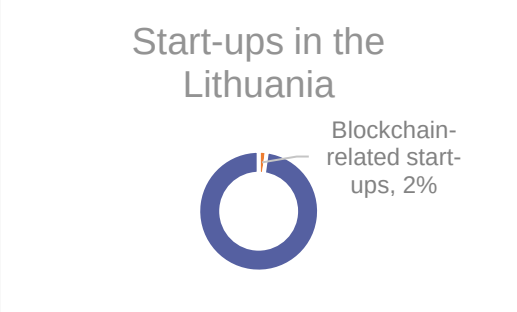
Attracting world-class researchers to Lithuania is not only a national, but also an EU-wide priority. The activity is managed by the country's Research Council and the ministry of education and science.

Blockchain across key industries: Lithuania is one of the top 30 of Europe's biggest startup hubs. The FinTech and ICT sectors have the highest growth and count with well-established startups. The Bank of Lithuania (BoL) opened a pre-sale for the world's first digital collector coins – dubbed "LBCOINs".

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.

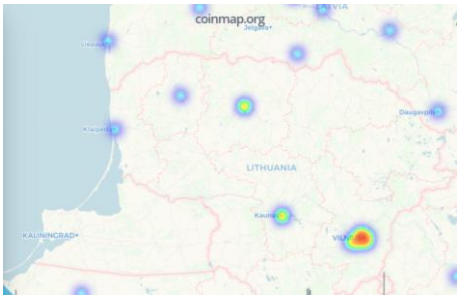


According to data compiled by crunchbase.com, 1 465 startups have been founded in Lithuania, 20 of which are related to blockchain.

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 more than 600 full-time equivalents), Unity, 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 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. As many as 935 LinkedIn professionals are currently registered as working with or in the industry. There are also 7 regular Meetup groups and 4 354 Meetup attendees, making this community relatively active. What's more, a Facebook marketing campaign indicates the audience for blockchain related terms is 70 000.

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 focused 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 cryptocurrency 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 cryptocurrency 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 cryptocurrency 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 cryptocurrency 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 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.

Development of the industry in Lithuania will largely depend on sufficient funding for successful new projects, as well as continual regulatory progress expected from the Lithuanian government.

Gabrielius Bilkštys, who serves as the Chief Business Development Officer at Mistertango, a payments and cryptocurrency startup, noted that he is concerned about the rising regulatory hurdle of operating a crypto business. He stressed there is a lot of legitimate activity occurring in crypto space and that increased compliance requirements risk strangling the nascent market (while criminals will always find ways to circumvent the regulations).

Vytautas Karalevičius, the CEO of the highest valued Lithuanian blockchain startup, Bankera, holds a different view than Bilkštys. He noted that the burden of increasing regulation is manageable. Improved KYC and AML checks will reduce criminal usage of cryptocurrencies and blockchain and will help establish blockchain's image as a tool for the good.

For Karalevičius, the key to further development of blockchain in Lithuania hinges on the elimination of regulator uncertainty. He also notes that several Lithuanian teams have decided to incorporate their projects abroad to avoid regulatory risks.

As an advisor to the Board Member of the Lietuvos bankas, the country's central bank and the main regulatory authority, Jekaterina Govina leads the Bank of Lithuania LBChain project (blockchain sandbox/accelerator). She supports a measured approach where new solutions are tested on real customers in the "sandbox" regime and the lessons learned from the testing are applied to develop regulations. Govina also favours EU-wide and global regulatory initiatives such as the Global Financial Innovation Network – a global sandbox for FinTech startups and finance industry incumbents attempting to create new solutions. She also mentioned that she sees the next steps in the regulations as addressing inefficiencies in such areas as investments and insurance.

Antanas Guoga, *Member of Parliament, founder of Blockchain Centre Vilnius, 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."

Read more: "https://www.theparliamentmagazine.eu/news/article/antanas-guoga-blockchain-can-empower-lots-of-people-to-help-change-the-world"

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."

Read more: "https://www.pymnts.com/news/b2b-payments/2020/bankera-crypto-business-banking/"

USEFUL RESOURCES

Blockchain Partners – Articles, interviews and guides on Bitcoin and the blockchain space

EU Startups – Startup-related content, including on blockchain

Cryptocurrency Tax Information – Interactive map of cryptocurrency taxation per country

Blockchain Centre Vilnius – Blockchain hub in Lithuania

Coinmap.org – Website containing information on physical virtual currency exchanges (ATMs)

Blockchain technology group website – a leading research and educational institution in Lithuania

INDIVIDUALS INTERVIEWED

Gabrielius Bilkštys – Chief Business Development Officer of Mistertango

Vytautas Karalevičius – CEO of Bankera

Jekaterina Govina – an advisor to the Board Member of the Bank of Lithuania (Lietuvos bankas)

Key Figures

TOTAL FUNDS RAISED

€507,19 million

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

THE MOST ACTIVE SECTORS

Securities, Fintech, Insurance

BLOCKCHAIN SOLUTION PROVIDERS AND STARTUPS

38

Luxembourg

THE BLOCKCHAIN ECOSYSTEM IN LUXEMBOURG AT A GLANCE

Luxembourg is one of Eurozone's financial centres and the second largest investment fund capital in the world. Luxembourg remains constantly Europe's centre of excellence in wealth management, corporate, commercial, and depositary balking, 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, and more precisely the No 1 in Europe, and only the second in the world, with EUR 4.8 trillion AUM in investment funds (as of January 2020) ([13]). 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 Luxembourgish Stock Exchange in over 64 currencies, counting 2100 issuers from 100 countries, and an 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, AirBnb amongst the leading startups incorporated in the country.

Luxembourg's advanced financial and startup ecosystem is the result of a responsive regulator and EU-wide licensing, along with a politically stable country. According to the Eurobarometer, Luxembourg is the most multilingual country in Europe, with an average of 3.6 spoken languages, partially since 48 % of the population are foreigners, which ranks first when it comes to highly skilled workers in the world according to the World Economic Forum (WEF).

According to Luxembourg for Finance, the agency for the Development of the Financial Centre, Luxembourg has emerged as a key European payment and e-money hub, underpinned by the relocations of major brands in the context of Brexit. With the advent of PSD2, Luxembourg aims to strengthen its role as home to one of the largest open banking platforms in Europe with specialised providers of API gateways catering to the needs of banks.

Luxembourg is committed to adapt its legislative framework to encourage innovation by the financial industry and push for the development of the European legal framework in new finance sectors such as tokenisation.

([13]) See: https://www.alfi.lu/

All those factors constitute favourable conditions for the growth of the blockchain scene in the country. The Luxembourg House of Financial Technology (LHoFT), a public-private sector initiative that drives technology innovation for Luxembourg's financial services industry, is featuring 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 with four major directions: Education, Banking Relationship, Legal & Process & Mentoring. One of the Members of the Board is the Ministry of Finance, which is receiving updated feedback directly from the market.

The Luxembourg financial regulator Financial Sector Supervisory Commission (CSSF) was the first authority in the financial sector that was in favour of the regulation of platforms for the exchange of virtual 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 virtual or other currencies, the provision of payment services using virtual or other currencies, and the creation of a market (platform) to trade virtual or other currencies, are to 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. We have located 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 further, educate the professionals about prospects and applications across numerous domains.

In the whitepaper 'Smart Contracts, A Luxembourg Perspective, Assessing Key Legal Opportunities & Challenges'. published in July 2021, the non-profit organisation LëtzBlock outlined the potential areas of legal uncertainty and associated challenges related to smart contracts.

In January 2022, the Luxembourg financial sector supervisory authority, the Commission de surveillance du secteur financier, published a white paper on DLT and Blockchain sharing its advice on assessing the risks when designing or implementing a project using DLT**.**. The publication of this whitepaper is a reaction to a considerable number of solicitations of the CSSF from different market participants, ranging from well-established institutions to startups, wishing to use DLT and blockchain for various purposes.

TOWARDS MAINSTREAM ADOPTION

Public Sector, Regional Governance & 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 amongst the most innovative EU countries, with a liberal and progressive mindset, embracing new technologies by the innovation through law mindset. Luxembourg has been the first EU country that has licensed virtual currency exchange platforms as financial institutions. In April 2016, Bitstamp Europe SA has been authorised to exchanges Bitcoins, euro and US dollars. This authorisation is the outcome, from the opinion issued by the CSSF, which was the first regulator that has advised that virtual 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. This initiative, called Blockchain Lab, includes:

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

Prime Minister Xavier Bettel stated during the Luxembourg Blockchain Week 2021, that the country is planning to "keep looking forward" and "keep taking risks" when it comes to innovative technology like blockchain. "My government's goal is to make out of Luxembourg the digital frontrunner it already is," said the Prime Minister. "It is in the frontrunner's nature to keep progressing, rather than preserving the lead of the moment."

Legislation for virtual currencies that might affect blockchain: Luxembourg's Chamber of Deputies has passed a bill to "offer greater certainty for investors and to make the transfer of securities more efficient by reducing the number of intermediaries. The BILL 7363 provides a legal framework to the financial market participants by bringing transactions performed using blockchain and DLTs at 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 securities accounts world, 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 instrument representing the security.

According to PWC CEO's Agenda, while the Amendment 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 Amendment refers only to the holding and circulation of securities, not their issuance. This constitutes clear that the Bill 7363 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.

On 29 November 2021, in issuing guidance composed of a communiqué and an FAQ on virtual assets, the CSSF confirmed its ambition to frame and promote innovation in the financial sector. As summarised by Laurent Fessmann and Catherine Martougin in their memo Luxembourg: Crypto-assets - Luxembourg regulator paves the way for alternative investment funds to invest in virtual assets, the purpose of the communiqué is to introduce the CSSF's general guidance on virtual assets. UCITS and UCIs addressing non-professional customers and pension funds are not allowed to invest directly or indirectly in virtual assets. Alternative investment funds (AIFs) may invest directly and indirectly in virtual assets provided that the following conditions are met: the AIF markets its units only to professional investors. If the AIF is managed by an authorised AIFM, it should have obtained from the CSSF the extended authorisation for this new investment strategy. In response to the specificities of the virtual assets and associated risks (i.e. volatility, liquidity and technological risk, etc.) which may affect the risk profile of the AIF, the CSSF expects that proper assessment be made at the time of the integration of virtual assets in the investment policy, that it shall be ensured that adequate internal control functions are implemented and that investors are properly informed in a transparent and timely manner.

Academic Courses and Professional Qualifications: 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 organising 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 aim to improve the security of digital assets, business news outlet Luxembourg Times reported 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, LHoFT, Laurent Marochini, Head of Innovation at Societe Generale 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 is a FinTech and Investment structuring expert blockchain that could affect the following industries: Payments, Big Data, Insurtech, Regtech, Lending. The experts have referred to three startups in the following industries Tokeny, Stokr and Stampify which are all on their way to become the first Luxembourg unicorns.

Cryptocurrency Exchanges:

- EU Passporting License, two cryptocurrency exchanges already licensed
- Partnership with Key Fintech hubs around the world

Tokenised Securities:

- Law on blockchain and the circulation of tokens as dematerialised securities.
- Flexible company law. In Luxembourg, as an issuer, one can manage their own securities register.

Other notable use cases gathered by media releases/mentions:

Music Royalties:

ANote Music is a European Marketplace for buying and selling songs that aim to connect investors with owners of music rights. The startup is restructuring how music is funded and creating a liquid, transparent and integrated market for music rights.

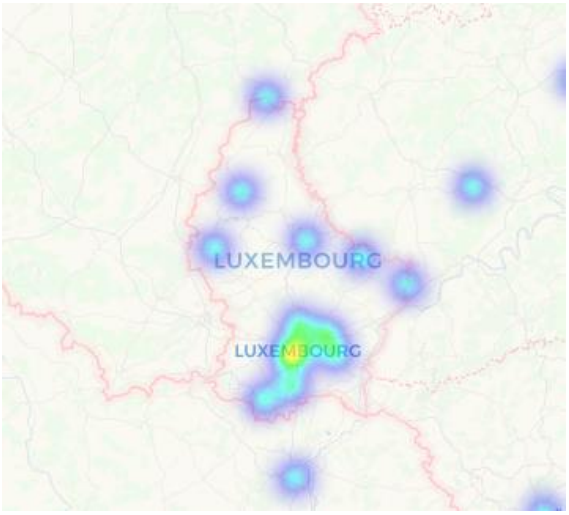
Real Estate Tokenisation:

Property Token S.A., co-founded by Creahaus S.A. and Espace Invest S.A., two key real estate players in the Grand Duchy, has successfully launched the first issuance of a Luxembourg real estate token. The first example has been the tokenisation of an office complex located in the Grand Duchy.

THE BLOCKCHAIN STARTUP AND BUSINESS SCENE

According to LHoFT, there are 55 companies in the Luxembourgish blockchain ecosystem. The equivalent report which is used as a benchmark for our report suggests 38 companies, which have raised collectively a little more than EUR 507 million. The difference between the Crunchbase report and the following map is mainly due to the Holding Company registration.

THE BLOCKCHAIN COMMUNITY



The Luxembourgish blockchain ecosystem is prominent, featuring high-growth opportunities due to the active engagement opportunities in the scene, and the large number of organisations advocating to support the blockchain technology. The community consists of 30 300 to 35 600 observers, or a general audience loosely interested in blockchain and virtual currencies.

Source for Observers: Facebook Audience. Ages: 16-65+, Locations: Luxembourg, Keywords: Block Chain, Cryptocurrency, Virtual Currency, Bitcoin | Source for Enthusiasts

NOTABLE BLOCKCHAIN COMPANIES

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 is 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 is a public-private partnership. The organisation is supported by the Government of Luxembourg, by Luxembourg For Finance who assist to promote FinTech around the world, and the Chamber of Commerce of Luxembourg. LHoft has a task force dedicated to the blockchain with seven members and one of the key challenges is also to issue a recommendation to the Board of the LHoft.

Bitstamp is the world's longest-running cryptocurrency exchange, continuously supporting the Bitcoin economy since 2011. With a proven track record and mature approach to the industry, Bitstamp provides a secure and transparent venue to over 4 million customers and enables partners to access emerging crypto markets through time-proven infrastructure.

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

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

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.

Key Figures

TOTAL FUNDS RAISED

€141 million

INTERESTED IN BLOCKCHAIN AND CRYPTOCURRENCIES

26 000 people

(6.3 % OF THE POPULATION)

FOR BLOCKCHAIN AND DIGITAL CURRENCIES

360° regulation

Malta

THE MALTESE BLOCKCHAIN ECOSYSTEM AT A GLANCE

Malta 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's innovation-driven economy 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 enacted three laws 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 educational degrees and register of local businesses. The largest university in the country, the University of Malta, started offering a master's programme in blockchain and DLT in 2019.

Following initial enthusiasm, Malta's change of leadership in early 2020, coupled with the inability of many companies to comply or receive necessary licenses, 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 UN 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, 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.

Malta was the first country to install an Blockchain based IP Register and transfer 60 000 records using the blockchain network. Thereafter, the Government of Malta announced three new blockchain projects to be implemented, covering: a project for the certification of food products produced in the island of Gozo; a blockchain based property planning system for ensuring transparency of processes; and a blockchain based copyright and IP system.

Regulation was deemed necessary to realise the country's ambition for blockchain to account for 10 % of its total GDP by 2027. The key authorities responsible for the trio of laws collectively referred to as the Innovation Framework include: the Malta Digital Innovation Authority (MDIA), and the Malta Financial Services Authority (MFSA). Furthermore, the Malta Gaming Authority (MGA) announced a digital asset focused sandbox thereafter. 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 empowers the MDIA to oversee the registration of technology service providers in the blockchain space and the certification of DLT and related software, and the Malta Digital Innovation Authority Act, which establishes the MDIA and outlines its roles.

The Malta Digital Innovation Authority launched a Technology Assurance Sandbox. A flexible environment within which new types of technologies and operations (e.g. NFTs and DAOs) can raise levels of trustworthiness through supervision of a national authority through a staggered and gradual approach in aim of reaching full certification.

As in most European countries, digital currencies are not considered legal tender in Malta. However, unlike most other nation-states, the country's financial regulatory framework (including the VFAA) 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 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 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:

The **Centre for Distributed Ledger Technologies of the University of Malta** offers a Master of Science in Blockchain and Distributed Ledger Technologies allowing students to specialise in either ICT, Law and Regulation, or Business and Finance. Students of the programme have reportedly developed and launched a blockchain voting platform. In 2022, the university announced the Malta Blockchain Summer school (MBS) which offers an Introduction to blockchain, DLT, cryptocurrencies, NFTs and beyond.

In addition, the Leadership and Management Institute offers blockchain courses and programmes, including a Master of Science in Blockchain and Cryptocurrency.

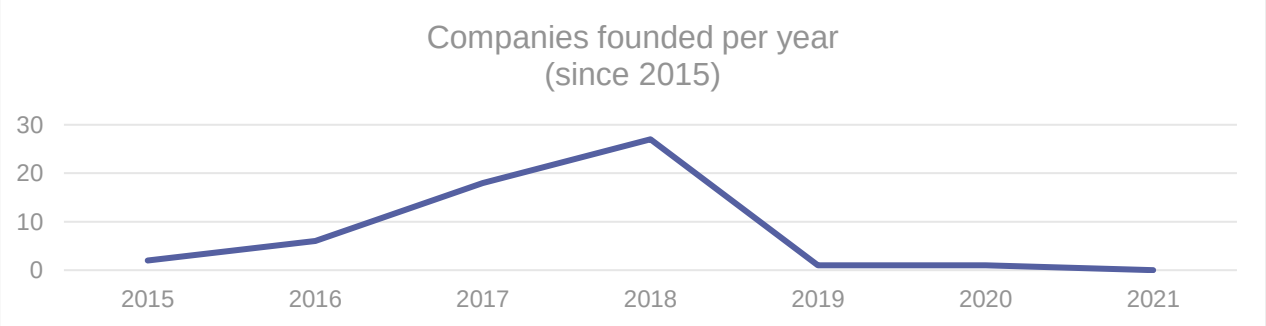
Blockchain across key industries: Maltese regulation and guidelines were some of the first in the world to provide a framework for ICOs at a time where excitement around alternative forms of financing was high. Various local startups took advantage of this newly found market for ICO services by beginning 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 come to an end, 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 a 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 EUR 141 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

Source: coinmap.org

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 former attracted 12 000 attendees from over 80 countries in 2021.

The number of citizens interested in blockchain and cryptocurrency adds up to 33 500 people, or a notable 6.3 %.

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

INSIGHTS FROM EXPERTS

Joshua Ellul, Director Centre for Distributed Ledger Technologies. Senior Lecturer, Department of Computer Science.

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Malta? Has the recent growth of the cryptocurrency markets facilitated familiarity?

Given Malta's effort towards providing a regulatory framework for Blockchain and Cryptocurrency related activities, there is a high level of general awareness regarding the existence of cryptocurrencies. Albeit many are not interested in the sector (like all countries) and/or lack depth in regard to what cryptocurrencies actually are (and how blockchain differentiates from it). However, given the initial interest from various sectors (from tech, legal, finance, business, and other related sectors) many professionals have general awareness of blockchain and crypto. At the same time there is a large and ever-increasing interest from younger generations in cryptocurrencies and NFTs. Overall, based on my experience I would say that the local population has a high level of general awareness.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Malta?

Initially when the laws were enacted, many companies came to Malta, and as well since some left – I believe a large part of this is because Malta put in place a robust regulatory regime adequate and proportionate for the types of operations being regulated, which some may have not expected. With EU laws in the process of being harmonised (through the digital finance package), of which I have heard many states see how many aspects being proposed are inspired by Malta's regime, now Malta is in a good place to be in line with such laws and presents a suitable jurisdiction to gain EU-wide recognition. That said, in the meantime there are quite a few large players operating from Malta. In my opinion, the current ecosystem is a suitable size for sustainable growth in the area. Especially as we investigate new innovative regulatory tools and regimes – for example, MDIA's Technology Assurance Sandbox which provides for a flexible and adaptable environment for new technologies and sectors, such as NFTs and DAOs.

What measures has Malta taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

The recently launched Technology Assurance Sandbox (TAS) aims to lower costs associated with technology assurances targeted for startups and operations and activities that are lower risk. We envisage that the TAS will be a useful tool for innovative blockchain activities to operate under the oversight of a

national authority to gain user and investor trust in early stages. Furthermore, three national blockchain projects were announced that will help spread awareness as well as provide assurances in (the specific) public sector processes –- for which the public may begin to realise what guarantees blockchain offers and hopefully in future expect our public system to provide further such assurances in public sector services.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

Education is key – and education at various levels. With cryptocurrencies and blockchain likely to change aspects of some of our lives over the next few years, especially with central bank digital currencies (CBDCs) being proposed to be launched, governments (national and EU level) should: (i) provide general awareness training for decision-makers and advisors (you cannot regulate what you do not understand) – and thereafter once policymakers and advisors realise what this technology brings and its potential impact, we would hope that they would then delve into further promotional policy to ensure that EU becomes the leader in blockchain, DLT and crypto sectors; (ii) fund initiatives for general public training and (upskilling) for specialisation in the sector.

Furthermore, initial test projects should be rolled out – to both help raise awareness as well as to put governments through the learning curve with respect to development (likely procurement) of blockchain projects, and to familiarise with all activities associated with their operation.

What does the future hold for the Maltese blockchain and cryptocurrency ecosystem?

Breaking it down into the various stakeholders, I foresee the following for:

- **Business ecosystem:** there are already large players operating from Malta which is great, but we need to see more smaller startups in the sector, try, fail, try again, potentially fail, and keep going to see successes. Malta is making progress in this regard with various new initiatives to promote startups and raise funds. As blockchain/crypto will start to transform aspects of businesses (around the world), Malta can be at the forefront of such adoption given the high level of awareness.
- **Education:** The University of Malta runs a multidisciplinary Masters in Blockchain and DLT, that allows students to both specialise in their field, but also gain an understanding and literacy of the other fields. The programme is attracting an international cohort of students which will help strengthen the ecosystem. Undergraduate courses have also been included in curriculum. Further courses to provide general awareness to the public and to professionals is lacking though, however we see this gap being filled in the near future.
- **Regulators:** The Malta Financial Services Authority (MFSA) already have in place a crypto regime, the Virtual Financial Assets (VFA) framework, providing regulatory clarity and market and consumer protection – and given similarities emerging from EU's digital finance package, I envisage that Malta will be at a good position to be in line with harmonisation requirements.
- **Government:** The government continues to invest in blockchain-based solutions in the public sector. By continuing to do so, public awareness should increase with respect to the benefits of blockchain, and once enough people understand the benefits it brings it should lead to a demand for more blockchain based systems and decentralisation.
- **The people:** We are already seeing a large interest in people investing in, building or taking a general interest in cryptocurrency and NFTs. Besides some naysayers who may have lost funds due to bad investments – or generally do not understand the beneficial societal change that the technology can bring, I only see interest in it increasing – for the benefit of the local and EU societies at large.

Key Figures

BLOCKCHAIN STARTUPS

160+

TOTAL FUNDS RAISED

€370+ million

MEMBERS IN THE LARGEST BLOCKCHAIN MEETUP COMMUNITY IN THE COUNTRY

~20 000

NOTABLE INSIGHTS:

- **A European magnet for qualified immigration**
- **Multiple tax incentives**
- **Favourable regulation, especially for FinTech**

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 more than 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, and (v) 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 virtual 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 licence criteria if it only wants to conduct money transfers.

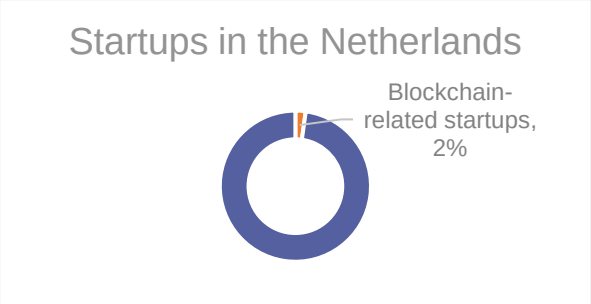
Blockchain in academia: Notable examples of dedicated blockchain educational programmes include the Blockchain Summer School offered by the University of Utrecht School of Law and blockchain masterclasses from the University of Amsterdam. There appear to be quite a few open positions for blockchain lecturers at all the leading Dutch universities, indicating that they are looking to create dedicated blockchain courses and/or 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 155 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 ICOs. 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 11 800 startups, 265 of which are related to blockchain.

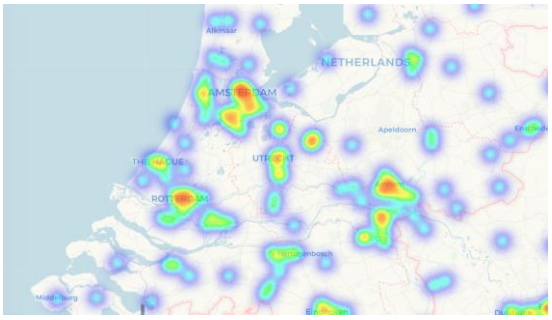
The key sectors where Dutch blockchain startups are present include FinTech (e.g. Finturi, a blockchain-powered trade finance platform), location services (e.g. UNL), decentralised marketplaces (SingularityNET) and entertainment (iCasting). Multiple companies work on the intersection of blockchain and 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 and 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 2 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 cryptocurrencies. With 188 venues, Arnhem has the highest concentration, followed by Amsterdam with 69. A significant concentration is also observed in the Rotterdam-The Hague area with over 45. The Eindhoven area, home to many high-tech companies, ranks fourth with 16. It is estimated that over 520 000 people, 3.04 % of the Netherlands' total population, currently own cryptocurrency.

Amsterdam is a major centre for conventions and conferences. 2020's Blockchain Expo was 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 and Bitcoin Wednesday Amsterdam, as well as more tech focused such as Ethereum Dev NL and Hyperledger Netherlands. The largest of these Meetup groups counts more than 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: The Dutch blockchain community is larger than the median European level, with 12 000 LinkedIn professionals registered as working with or in the industry. With over 50 regular Meetup groups and over 43 000 Meetup attendees, the community is quite active. A Facebook marketing campaign shows the audience for blockchain-related terms is 330 000.

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. It raised EUR 145 million in investor funding. In the latest round, the company was valued at around USD 1 billion.

Finturi: Blockchain-powered trade finance platform acts as an intermediary between businesses that 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. It was 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 public administration. It 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 1.7 million 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. It was founded in 2017 in Amsterdam and raised EUR 850 000 in financing.

Aurus: Creators of a gold-backed cryptocurrency underpinned by Ethereum blockchain. The cryptocurrency 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. It was founded in 2014 in Zwolle and raised EUR 850 000 in financing.

Recheck.io: 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. It was founded in 2016 in Geleen and raised EUR 850 000 in financing from investors, including AE ventures.

INSIGHTS FROM EXPERTS

Blockchain remains one of the most controversial technologies of our time. Some people oppose blockchain on the grounds that it is "hype" and a bubble. Yet other people's negative attitude towards blockchain is because cryptocurrencies can be used to conduct illicit activities. On the other hand, blockchain supporters tend to underestimate the complexity of technological and organisational hurdles that blockchain needs to overcome to become the backbone of the future programmable society.

This is why regular interaction with blockchain practitioners is essential for understanding the perspectives of the technology and its benefits. Only this way can a balanced view of the technology and its benefits be obtained.

Djuri Baars, head of the blockchain development team at Rabobank, described the biggest problem hindering blockchain adoption as "invisibility" to end customers. "Blockchain does seriously affect your internal processes, but the client is of course not so interested in that or the technology." He emphasised the importance of educating clients and other stakeholders about the benefits of the technology.

Another way of solving the problem of "invisibility" is shown by Ledger Leopard, the first healthcare blockchain application to be legally certified as safe to use. Its founder, Jeroen van Megchelen, recommends blockchain entrepreneurs focus on actual problems where current solutions clearly do not work. This is how he described the inspiration for his company's maternity app: "Cooperation between stakeholders in the healthcare supply chain is generally pretty inefficient: the data islands, different languages and diverse standards are all hard to connect, plus there's a huge administrative burden."

Rudolf van Ee, *Co-founder of Blockchain Talent Lab (BTL) and board member of the Blockchain Netherlands Foundation (BCNL Foundation)*

"Blockchain isn't about companies, it's a movement. Being part of BCNL is a great step towards being part of AND creating a healthy and inspiring ecosystem, and having a healthy ecosystem is part of our mission."

Read more: "https://bcnl.foundation/startups/"

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 cryptocurrency 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 DeFi 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/"

USEFUL RESOURCES

Blockchain Partners – Articles, interviews and guides on bitcoin and the blockchain space

EU Startups – Startup-related content, including blockchain

Cryptocurrency Tax Information – Interactive map of cryptocurrency taxation per country

Bitcoinmarketjournal – Information about blockchain community in the Netherlands and other countries

Coinmap.org – Website containing information on Coinmap.org: physical virtual currency exchanges (ATMs)

Blockchain Foundation – blockchain foundation in the Netherlands

INDIVIDUALS INTERVIEWED

Rudolf van Ee – Co-founder of Blockchain Talent Lab (BTL) and board member of the Blockchain Netherlands Foundation (BCNL Foundation)

Christiaan van Steenbergen – Founder of PayAccept

Djuri Baars – head of the blockchain development team at Rabobank

Jeroen van Megchelen – founder of Ledger Leopard

OTHER SOURCES

Finturi: finturi.com

UNL: https://www.unlinternetofplaces.com/

SingularityNET: https://singularitynet.io/

Attrace: https://attrace.com/

Aurus: aurus.io

iCasting: https://www.icasting.com/

Storro: www.storro.com/

ReCheck: recheck.io

Key Figures

TOTAL EQUITY FUNDING
€27 million

OVER
200 000 people
OWN CRYPTOCURRENCY
(I.E. 5 % OF THE POPULATION)

BLOCKCHAIN SOLUTION PROVIDERS
22

Norway

THE NORWEGIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Norwegian economy is a highly developed economy with government ownership in strategic areas. Although sensitive to global business cycles, the Norwegian economy has experienced robust growth since the beginning of the industrial age. The country has a very high standard of living compared to other European countries and a highly integrated welfare system. Norway's modern industry and welfare system rely on a financial reserve built up through the exploitation of natural resources, especially North Sea oil.

Although much of the highly controversial public debate about EU membership revolved around political rather than economic issues, it affected economic policy in several ways:

- Both politicians and the public have come to terms with the fact that Norway's economic development depends on exploiting its comparative advantage by specialising in certain areas for exports and relying on imports for everything else. This has had a significant impact on Norwegian agricultural policy, which has been redesigned to take into account population structure rather than self-sufficiency.
- The proceeds from oil revenues could not boost private or public consumption if Norway wants to maintain its prosperity when oil reserves run out.
- To participate in European markets, Norway had to open its domestic markets to European imports. Although some pricing and distribution issues (e.g. alcohol and automobiles) remain unresolved, Norway's consumer, capital and labour markets are increasingly converging with those of Europe.

Along with the other EU Member States and Liechtenstein, Norway has joined the EBP. The Partnership is committed to realising the potential of blockchain-based services for the benefit of citizens, society and the economy. The Partnership is building an EBSI. Its vision is to use blockchain technology in creating cross-border services for public administrations to verify information and ensure trustworthy services. Since 2020, EBSI has built a network of distributed blockchain nodes across Europe to support applications for selected use cases (e.g. for citizens to manage their own identities, education credentials, and document registration).

Although Norwegian regulators have not yet taken a definitive stance on blockchain technology, the Financial Supervisory Authority of Norway (FSA) has emphasised the risks associated with trading cryptocurrencies and the need for a strong regulatory framework if cryptocurrencies are to become a suitable investment vehicle for consumers. The use of digital tokens and virtual assets is not yet widespread in Norway, but Norwegian residents have shown an increasing interest in these assets, especially since 2021. The main reason that artists and collectors have turned to digital art by supporting blockchain technology (i.e. NFTs) was that the COVID-19 pandemic closed galleries, exhibitions, and other opportunities to buy and sell art. In addition, the pandemic has led Norwegian investors into new areas of saving and investing, including cryptos.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking: Currently, there are no laws or legal frameworks in Norway that specifically relate to blockchain technologies. However, there are a number of laws that apply to activities and services based on blockchain technology.

The Norwegian Personal Data Act (2018), which includes the GDPR, applies to blockchains that contain personal data. Key issues related to blockchain technologies and the GDPR include identification of controllers and processors, international transfers of personal data, enforcement of individuals' rights in relation to the processing of personal data in the context of blockchain and the need to conduct a data protection impact assessment before using blockchain.

When using blockchains for transfers of value (e.g. currency and financial instruments), the various blockchain concepts may be subject to money laundering and terrorist financing regulations (Money Laundering Act (2009)), taxes and duties, depending on their characteristics.

The advisory and supervisory authorities for the above laws are the Norwegian Data Protection Authority, the FSA, Norges Bank and the Norwegian Tax Authority.

Separately, the EU is considering a proposal for a regulation on a pilot scheme for market infrastructures based on a DLT pilot programme. If adopted, this proposal would likely make the pilot scheme applicable in Norway. The FSA has noted that a legal framework and rules for investor protection are needed if cryptocurrencies are to become a suitable investment for consumers. However, it is unlikely that Norway will enact additional legislation on cryptocurrencies until the EU adopts its flagship cryptocurrency legislation, the "Regulation on Markets for Crypto-Assets" (MiCA).

In June 2022, the Norwegian Government announced that they will be releasing a solution on public Ethereum: a cap tables platform for unlisted companies, becoming the first European nation to embrace public Ethereum.

Digital Currency Legislation: The FSA has established a regulatory sandbox to encourage FinTech innovation despite the otherwise stringent regulatory environment in Norway. One of the participants selected to participate in the regulatory sandbox was Abendum, a company developing a solution for storing and publishing audit evidence based on blockchain technology. Other companies had the opportunity to apply in October 2021.

If the EU adopts the DLT pilot programme, the regulatory sandbox for blockchain-based distribution and trading of traditional securities (e.g. stocks, bonds, exchange-traded funds, etc.) would likely be introduced in Norway as well. Norway, through its participation in the EEA Agreement, has committed to implement the relevant EU rules for the financial industry.

After completing the third phase of a study on CBDCs, Norges Bank announced in May 2021 that it will begin testing technical solutions for a CBDC over the next 2 years. One of the goals of the technical testing is to determine a preferred solution if the introduction of a CBDC becomes relevant in Norway. Norges Bank has been looking at CBDCs since 2017. In 2021, the central bank published a working group report recommending a CBDC in the form of registry-based token money. In the 2020 report, Norges Bank indicated that it favours a CBDC that is linked to a registry and can be accessed via cryptographic codes that are not linked to an identity. In practice, the user interface could provide easy and secure access to funds. Nonetheless, Norges Bank has emphasised that the introduction of a CBDC will require longer consideration and investigation.

Blockchain in academia: There is not much going on at the academic level with regard to pursuing blockchain-related skills and qualifications in Norway. The only courses identified are offered by the Knowledge Academy and are the following:

- Blockchain Training Course
- Bitcoin and Cryptocurrency Course
- Ethereum Developer training

Blockchain across key industries: The most notable applications of blockchain and other DLTs include cryptocurrency trading, secure information storage, supply chain tracing, public registries and oil, gas and energy trading. Notable examples of the above include:

- Centralised cryptocurrency trading and broker platforms, including Norwegian Block Exchange AS, Kaupang Krypto AS and Firi AS (formally known as MiraiEx) are regulated by the FSA.

- Decentralised exchanges (DEXs), including Uniswap, Sushiswap, dYdX and Raydium, which are smart contract protocols that enable users to trade cryptocurrency peer-to-peer, are accessible to Norwegian citizens. However, due to their decentralised architecture, DEXs are not actively regulated by any governmental authority in Norway.

- DNV, an international accredited registrar and classification society, and Deloitte have entered into a partnership which has led to a live blockchain solution for storing certificates.

- Norwegian startup Diwala has created a platform that enables educational institutions and organisations to safely and digitally issue and verify credentials, backed by blockchain technology.

- The Norwegian Seafood Trust is a national seafood tracking network launched in 2020 by the Norwegian Seafood Association and the Nordic IT infrastructure company Atea. The network utilises IBM blockchain technology to share supply chain data throughout Norway's seafood industry. As of 2021, Nova Sea and BioMar have joined the network.

- The Norwegian industrial company Hydro has also announced that it is piloting the DNV blockchain-powered "Tag. Trace. Trust." service to provide evidence of its sustainability claims for the aluminium it produces.

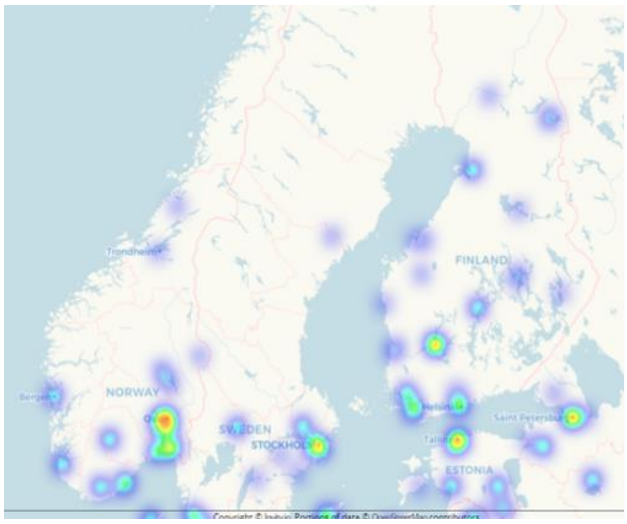
- The Norwegian Registry of Business Enterprises is building a solution for shareholder registers on the blockchain together with Symfoni (formerly known as Blockchangers). Symfoni has announced that it will launch "Symfoni" by the end of 2021 – a unified software collection for the development of interconnected services on the blockchain.

- Symfoni has also signed an agreement with the Norwegian Intellectual Property Office for the development of a license register and has developed a prototype for a property registry for OBOS BBL (the largest housing developer in Norway) which records real estate and ownership transactions using blockchain technology.

The public sector has a strong interest in Norway's oil and gas production and the Norwegian state is the main shareholder in publicly traded Equinor ASA. Equinor has tested GumboNet, Data Gumbo's proprietary blockchain platform, which encodes an immutable record of the operations at Equinor's oilfield to confirm transactions and pay suppliers.

THE BLOCKCHAIN COMMUNITY

Approximately 7 830 individuals interested in blockchain and cryptocurrencies could be identified, a number that amounts to 0.15 % of the total population. Community members are geographically split in the capital city of Oslo, along with Bergen, the second-largest city by population. There are 15 groups/communities of practice and these are the key organisers of most major community meetups.



Source for general audience: Facebook Audience. Ages: 16-65+, Location: Norway, Keywords: Block Chain (database), Cryptocurrency, Bitcoin, Ethereum | Source for Community Members

Source: Coinmap.org

NOTABLE BLOCKCHAIN COMPANIES

Norway's tech sector is quite promising, with many tech startups blossoming in Oslo but not only. However, the number of startups in the blockchain industry remains limited. The most promising ones include:

Choose: a cryptocurrency platform backed by CO_2 emission permits. The platform tokenises the carbon cuts and enables companies and people to monetise their CO_2 cuts. Users are rewarded for their climate positive efforts. The platform offers carbon neutrality by buying and deleting CO_2 emission quotas. Multiple plans are available on the platform based on different carbon cuts. The clients of the company include Designers Remix, Fortum, Telia, Santander and more.

VipiCash: VipiCash is an online platform facilitating global money transfers using blockchain technology. Users place their order on the platform and the goods are delivered to the receiver's address. Money can be sent for groceries, school fee, health service, energy, transport, etc. As of May 2018, the platform is in private beta.

Diwala: Diwala is a decentralised platform for skill verification of individuals. It allows users to create an unchangeable record of skills and achievements, which is verified with blockchain technology. Users can create a digital resume, showcasing their verified skills, education and sales. Moreover, it provides a private encrypted key to users, which enables sharing of verified details and documents.

UNISOT: UNISOT offers a blockchain-based ERP system. It provides complete business solutions using big data, cloud computing, blockchain, and machine learning. Furthermore, it provides supply chain solutions for

businesses such as transactions, traceability, product origin, etc. It offers both free and premium cloud-based ERP modules for business.

Taqanu: Taqanu Bank is a blockchain-based digital identity management platform. The platform runs alongside a railed attestation network called the Abacus Fabric. The network keeps track and keeps the record of secure identity transactions on the blockchain. Users can input identity facts, to be declared, sourced, audited and proven on the attestation network.

BitGate: BitGate is a mobile-based cryptocurrency wallet application. Allows users to buy, sell, secure and send cryptocurrencies and it provides electronic ID solutions for automated on-boarding. Users can purchase Bitcoin through integrated API from Safello.

HandleKrypto: HandleKrypto is an exchange platform for cryptocurrencies, which allows the user to buy, sell and exchange digital currencies with the help of an e-ID card. It supports the transfer of digital assets including Ethereum, Bitcoins and bitcoin cash.

Triwer: Triwer is a blockchain-based mobile application for last-mile deliveries. The blockchain application is powered by smart contracts and enables users to book-on-demand last mile delivery services. The request is routed to a network of crowdsourced delivery agents. Features include real-time tracking, proof of delivery, complimentary packages insurance, cryptocurrency payments and more. Its mobile app is available for iOS and Android devices.

Parsec Frontiers: Parsec is a multiplayer strategy game built on blockchain. The game is open-sourced and community governed. Users can make in-game purchases using the native Parsec token.

White Rabbit: White rabbit is a decentralised content monetisation platform, which allows its users to reward the films and series they stream, on multiple peer-to-peer content streaming platform. It offers users a personalised content library and a browser plugin. The platform recognises content and utilises blockchain to facilitate payment between the user and the films rights holders.

Sources:

https://www.legal500.com/guides/chapter/norway-blockchain/

https://www.globallegalinsights.com/practice-areas/blockchain-laws-and-regulations/norway

Key Figures

FUNDS RAISED BY BLOCKCHAIN PROVIDERS

€38 161 148.08

DEDICATED BLOCKCHAIN SOLUTION PROVIDERS

90

Poland

THE POLISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

Poland is located in central Europe and is the fifth Member State in population in the EU. The European Commission has published a forecast and indicators for the nation's economy. An overview of the Polish ecosystem has more than 3 000 startups, as indicated in Polish Development Fund. The Polish economy is well integrated with the EU and the world, as stated in the EC's report.

There is some initiatives indicating the intention for solid adoption of blockchain in Poland but updates on the development are scarce and hard to judge. The cases of blockchain adoption are in private and public sectors alike. The most notable case is the virtual sandbox and Innovation Hub by the Polish Financial Supervision Authority (UKNF).

The legislative frameworks in Poland around blockchain and cryptocurrencies focus on taxation and AML. The existence of simple joint stock mainly aims to promote innovation and can impact the blockchain sector. The current legislation frameworks follow the European frameworks.

The blockchain community can educate through courses and trainings available from academia. Moreover, there are associations supporting the community with events and workshops.

The interest in blockchain is vivid, and the blockchain ecosystem expands each year. This observation is a result of the increase in the number of startups and large-scale events for 2022.

TOWARDS MAINSTREAM ADOPTION

Blockchain adoption: There were updates from the public involving blockchain. As one of the hot subjects in Europe, Poland's Department of Digital Identity includes blockchain and DLT in the technologies to establish digital identities. Blockchain was included in the task force for breakthrough technologies to provide mechanisms of state involvement and research for activities.

The adoption of blockchain in the public sector is a subject of research, as blockchain can decentralise public administration and its processes. The adoption of technology by the public sector can accelerate its adoption by the rest of the sectors. In Poland, Olsztyn has adopted blockchain to improve services in tourism and emergency services. The system possesses a native token, CoperniCoin, that can be used in the different services in the municipal area, as stated in an article.

Another public authority experimenting on blockchain applications is Warsaw Stock Exchange (GPW), which aims to pioneer the deployment of a platform for settlements based on the technology. The memorandum between the Ministry of Digital Affairs and GPW in 2018 and the GPW Tech project in 2019 were initiatives for adopting blockchain in the public sector. But there are no updates on the development of the project's

developments. From a published interview, it became apparent that experiments are ongoing with a platform targeting small exchanges to be referenced during the interview.

The UKNF launched a virtual sandbox in 2021. The virtual sandbox was intended to simulate a number of banking operations and test solutions with the interaction with Open API for innovative payment services.

A Polish project, Student Coin, proceeded to an awaited launch with an ICO in 2021. In an announcement, the project announced that it reached its hard cap of USD 21 million in 58 days. Users will have at their disposal a tokenisation option for an educational token. Users of the system can be people and organisations that opt to launch a digital token.

Blockchain has the potential to disrupt the business models in different sectors. Sport teams experiment with the technology to change the activities and organise their structure to facilitate the supporters' involvement. There are established companies around Europe, but one can be found in Poland. The startup, Zetly, suggests a platform for issuing utility tokens. As reported in an article, the 's smart contract will be deployed on the Polygon network.

An interesting case for blockchain adoption is the idea of an established business accelerator, ReaktorX. A blog post referred to the idea of shifting to a DAO format for the accelerator. The concept will be based on three groups of stakeholders and establish an internal digital currency to facilitate the purpose of the accelerator.

NFTs exploded in popularity during 2021, and the public still learns about their implementations and applications. Similarly to sports, there is activity around NFTs at a national level. A startup using NFTs featured on national website is SmartVerum, as their application is based on art tokenisation.

Legislation of blockchain: Poland has in place a tax policy for blockchain and cryptocurrencies, but there is no a specific framework for the sector. General legislation like AML and Simple Joint Stock can impact on the sector are presented. A report on good practices for the cryptocurrency market was published in 2017 providing an initial study for a future framework.

The Office of the Polish Financial Supervision Authority published a warning in July 2021 on the Binance platform, which had traction in popularity. The warning was similar in fashion to other national supervisory authorities about Binance Markets Limited operation. The warning was more of a reminder to the public that the cryptocurrency market is neither regulated nor under any supervision, and there are risks involved in investing in them.

Cryptocurrency regulations have introduced a new AML regulation for entities operating in the cryptocurrency space. The blog post by Schonherr details the regulation and notes that companies need to register in the Register of Virtual Currencies curated by the Polish Ministry of Finance. There is a fine for those that do not abide by the regulation.

It should be noted that the regulatory framework has introduced the Simple Joint Stock since 2020. This new type of entity aims in promoting ideas to startups and aid innovation in Poland. A nominal company capital makes it easy to establish an entity along with an online registration process. There are more characteristics that can impact the business scene in the long run.

BLOCKCHAIN IN ACADEMIA

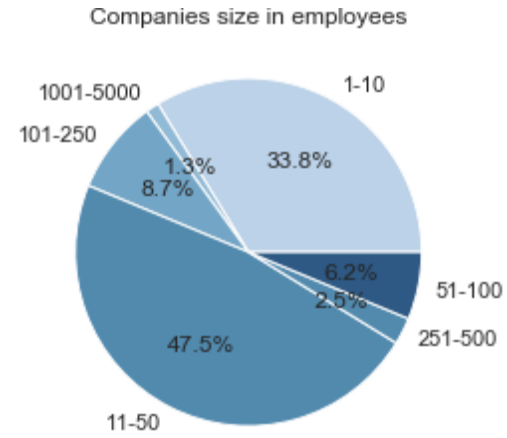
This section expands the previous report's educational initiatives. There are dedicated programmes for educating the public on the blockchain along with research initiatives. Only an indicative number of academic programmes and research initiatives are presented in this subject.

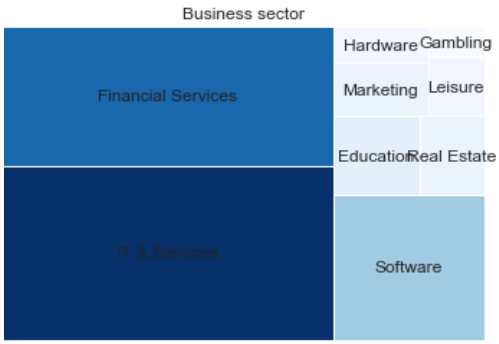
Initially, the SGH Warsaw School of Economics facilitates a postgraduate blockchain programme addressing the business, law, and technological aspects of technology. The participants will attend lectures and workshops to acquire up-to-date knowledge on different blockchain subjects, including smart contracts. Furthermore, the University of Gdansk facilitates a bachelor's degree for blockchain engineers per source. Another training programme is the IT technologies and business processes organised by Informatyka Akademica Gorniczo-Hutnicza. As blockchain is a general technology, the Poznan University of Economics and Business provide professional certificates to participants to Blockchain Fundamentals for Accounting and Finance. Individual courses are available in programmes for undergraduate and postgraduate students, such as the one from the University of Warsaw.

The research on the blockchain in Poland is rich with numerous works published works. The Wroclaw University of Economics and Business returns 110 publications on the term "blockchain". Moreover, the University of Warsaw facilitates the Cryptography and Blockchain Lab with emphasis given on cryptography. Finally, the Nicolaus Copernicus University researches the subject and has consequently published an empirical study for the uses of cryptocurrencies in the payment services.

Blockchain across key industries: The Polish economy is solid, and the forecast is to recover from the pandemic with positive growth rates. Blockchain is mainly adopted for providing IT and financial services. Blockchain is a component in the architecture of a solution that provides specific functionalities. Finally, the financial sector is one of the most active sectors in including new technologies.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

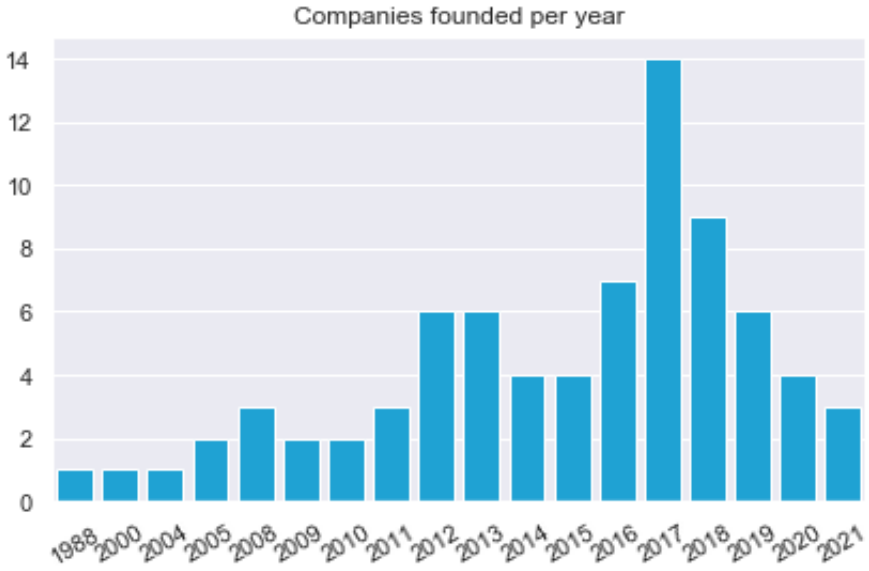




The blockchain startup in Poland grows with more entities entering the scene. Generally, this is due to the organised environment around funding companies, as indicated by Poland's Venture Capital Landscape. An interview from Szymon Janiak accommodated in Cyfrowa provided a brief statement of the blockchain scene in Poland. A notable point from the interview is the availability of the funds for early and later stages, but there are issues for mid-range funding to scale entities.

There are a couple of options in venture capital for entities to address funding. One choice is Black Pearl VC with a focus on early-stage venture capital firms in the technology sector. The VC has a blockchain solution in their portfolio with Autenti, an e-signature documentation. There is a chance for software founders to address Alfabeat for funding as an entity in analytics of cryptocurrencies, Coinfirm, is part of the portfolio. There are more choices in VCs focused on specific sectors like AgriTechHub that is active in the agricultural sector.

The business scene expands each year with new startups operating in Poland. While the number of startups created in 2017 and 2018 exceeds the rest of the years in our dataset, the rest of the years report moderate activity. Blockchain is a technology that gathers the interest of well-established entities as they expand their business and include blockchain solutions. The majority of the entities are considered small and medium enterprises due to the number of employees. Despite that, there are a couple of entities exceeding the number of 250 employees. Finally, the startup scene is involved in a wide range of business sectors, but the major sectors are IT and financial services.



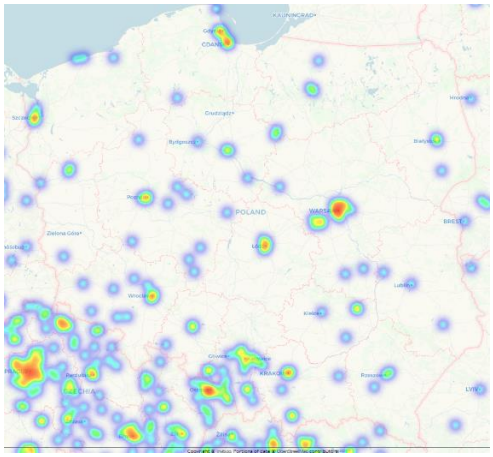
BLOCKCHAIN COMMUNITY

The blockchain community in Poland is vivid, as indicated by the associations and events in the country. The associations active in the country organise activities for educating the public and promoting the technology. There are large-scale events for the community to participate in to further expand their connections within the community.

There are private initiatives for promoting blockchain. One of them is the Polish Blockchain and New Technology Chamber of Commerce, that is a community driven initiative with the objective to open a dialogue with public authorities.

A detailed description of the initiative established in 2017 by 150 founding member is available online with objectives and areas of activities. An action by the Chamber is the Arbitration Court of the Blockchain as the first case in Europe to settle disputes in this novel area.

Associations are formed throughout Europe to support the community around blockchain with actions organised towards educating and informing the public. The Blockchain Poland Association (Blockchain Polska) was established in 2018 by a group of active blockchain participants. Apart from traditional initiatives, the association has established a community for women in technology named Blockchain Girls. The initiative has organised meetups for educating its audience on blockchain and cryptocurrencies. As reported in the last version of the report, Swiss-Polish Blockchain Association continues its activity with a range of activities like events and workshops. Moreover, this association aims to aid Polish initiatives to operate in a legal form based in Switzerland. Another initiative is the non-profit organisation, Blockchain Development Foundation, located in Łódź. Finally, another association is the Polish Bitcoin Association which has a long history, as it was established in 2013, and has a goal to demystify Bitcoin and blockchain as the underlying technology of the token.



The community has the opportunity to participate in conferences and events for learning and networking during those. In Poland, there is the cryptocurrency expo held in March 2022 with numerous speakers. The participants can choose to either participate physically in Warsaw or pick the online version. Another event for the community is the World Blockchain Summit held in Warsaw with speakers from around the globe. Additionally, the FinTech and InsurTech accommodates discussions and presentation on blockchain subjects. Another event is the Digital Money and Blockchain that is an annual event with the 9th taking place in June. Finally, workshops are held by the different groups and associations. For example, Blockchain Devs held a webinar on NFTs in March 2022.

AN INDICATIVE BUT NON-EXHAUSTIVE LIST OF BLOCKCHAIN COMPANIES IN POLAND

Cryptiony: is an application deployed in 2021 that aids users to overview their cryptocurrency taxes. Profits from crypto trading are regarded as monetary capital and are taxable, so it is important for users to keep a track record of their transactions. The applications uses exchanges' API keys which are provided by users, and the application generates a tax report once the application collects the data.

Formation.Fi: is a protocol for cross-chain risk parity smart farming established in 2021. The protocol allows users to diversify their portfolios depending on their risk preferences. In a Medium post, the protocol has set seven principles; chain agnostic, low transaction costs, radical simplification, investment, communal effort, long-term focus, and constant innovation. The protocol has attracted a figure of over EUR 3 million for investing.

TRUSTT: is a platform launched in 2021 and aims to be a marketplace for cannabis and hemp. The platform relies on technologies like blockchain and GS1 framework. Blockchain is selected for its immutability for data and metadata storage, while GS1 should improve the safety and efficiency across supply chains as a data quality framework.

Terra Land: is a real estate platform launched 2020. Initially, the platform was named FCQ Platform, but rebranded to the current name in 2021. The platform is based on blockchain and facilitates the sale of real estate properties in their entirety or individual parts. Despite the initial launch on Ethereum blockchain, the project migrated to Terra in 2021. The published roadmap sets the goal of introducing NFT for real estate in 2022.

DAC.Digital: is a developers studio that delivers information technology services founded in 2009. One of the technologies that the studio is involved with is blockchain. The studio participated in the Block.IS programme.

REXS.IO: is a startup established in 2020 that offers a technology stack based on blockchain for the notarisation of existing data. The software aims to abstract the interaction with the DLT ecosystem and mitigate the complexity. Moreover, the functionality is delivered to be technology-agnostic to be used in different cases. The startup participated in the BlockchStart programme.

INSIGHTS FROM EXPERTS

Filip Pawczynski, founder and the Chairman of Polish Bitcoin Association and Blockchain Advisor at Polish Ministry of Digital Affairs.

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Poland? Has the recent growth of the cryptocurrency markets facilitated familiarity?

Poland's involvement with blockchain and cryptocurrencies is close to the beginning of the technology. A growing community was established in 2010. In 2011, Bitomat was a small cryptocurrency exchange and one of the first in Europe and worldwide. As the community grew, the Polish Bitcoin Association officially formed from the Polish community in late 2013. It was a step from a fragmented collaboration to a systematic approach. This association was one of the first worldwide initiatives, as only associations in US and Israel were formally established.

Generally, the Polish business market is large, considering users and banking operations. Between 2013 and 2016, the number of companies related to cryptocurrencies grew four times, from 3 to 20 companies. The majority of them were exchanges, but there were enough tools, wallets, or payment processing systems developed by the community's continuous efforts. By 2016, the market has matured, proven by the pair PLM/BTC volume being among the top five worldwide. In the same year, the government paid attention to the technology as the turnover of the crypto exchanges was higher than Warsaw Stock Exchange. The Ministry of Digital Affairs published taxation of the capital from cryptocurrencies.

Apart from the taxation, an interdisciplinary program between the Ministry of Digital Affairs, Ministry of Finance, and Ministry of Growth occurred between 2016 and 2018. The stream about blockchain and digital assets amassed the largest number of researchers, and some of the subjects were digital signatures, invoices, and other public services. The stream established an educational group for educating and fostering awareness among the public. The last stream was about regulation and taxation, introducing the minimal standards of cryptocurrency exchanges acting as a community pillar for regulation. The work from the community, established in 2014 and compared only to the Bit License from New York, was extended in that stream. The regulatory environments from Switzerland, Singapore, and China were used as references for the legislative work. The program was not continued after a change in the Minister's role.

As blockchain is a universal technology, the Swiss Polish Blockchain Association is established to support the community and widen the range of choices for business operations. Switzerland is prepared to accommodate enterprises despite the strict procedure, as regulation is in place.

Finally, the Blockchain and New Technologies Chamber of Commerce was established in 2018. The initiative aims to facilitate any future dialogue for legislative actions with public authorities by providing its opinion. The Chamber of Commerce's legal form is different from the association's as it necessitates its inclusion in the public opinion for legislative creation or update.

While the community believes in the need for a proper regulation to develop businesses and avoid bad actors, Poland only has tax regulation on the gains from the digital assets activity. There is no need for VAT payment, but the taxes are personal taxes. Moreover, working with digital tokens can be a tipping point for a Polish company with the law. So, it is common to run business operations from abroad while the developing team is based in Poland.

How would you evaluate the public awareness to blockchain and cryptocurrencies? Apart from the public, do you feel regulators have at their disposal material to guide learn about the technology?

Public authorities are interested in different applications of blockchain and a wide range of them can be found in the work from the work with the Ministry of Digital Affairs. Despite the interest, the adoption and deployment is slow like the register by the Stock Exchange. There is a running project by the PKO Bank with a private tamper-proof blockchain. Another bank, Alior, uses Ethereum for tamper-proof of documents. Billon is another company in blockchain with close sourced code projects. The public displays its interest on the technology with events on the technology. For instance, more and more schools request a lecture from the Chamber of Commerce.

Generally, there are two general groups of people relating to blockchain and cryptocurrencies. One group has a short-term goal of profit from trading, while the other group envisions changing the world through technology. The community grows every year even without regulation, and more and more know about cryptocurrencies.

Public awareness can be fostered by sharing knowledge and clarifying information on the news. Educational programs separate blockchain and tokens into the technological and economic side, respectively. The cryptocurrencies result from the technology allowing for building trust systems and identification in a decentralised network. Misinformation about blockchain creates confusion and can harm the adoption. There were cases in the media in the past of misinformation.

Reports, conferences, and workshops are means to share knowledge. In 2013, the Bitcoin Association created and maintained one of Poland's biggest cryptocurrency and blockchain expert groups. Social media groups and the Polish Bitcoin Forum are additional tools for the association. Finally, the association tries publishing warnings on nefarious projects to protect the public from harm.

Additionally to educational programs and conferences, influencers like YouTubers have gathered public attention with crypto popularisation. The influencers' work impacts the community as people search for material, but the purpose of their material is different.

People in Poland use services like international exchanges (Binance) to dive into cryptocurrencies. The public gets more familiar with the technology via the use of user-friendly interfaces of the exchanges.

In my opinion, there is educational material about the technology with information for regulators. The main issue for me lies with the interests of the different stakeholders and the business model that will be shaped. Blockchain can disrupt the way that contemporary markets work, and the role of stakeholders can change in these new business models. For example, a decentralised system based on the blockchain can contradict the current banking system.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Poland?

The exact number of Polish projects is hard to be determined, as projects run by Polish developers and entrepreneurs are operated from abroad. For example, Golem is a notable long-term project, but it operates in Switzerland despite the founders and team being Polish. Golem was notably one of the most remarkable projects in the ICO era in 2017 for Poland. Currently, Uniqly.io is one of the most prominent projects and is about the NFT.

There are competent developers who are interested in the different underlying blockchains and use them, and some examples can be on Solana or Avalanche. The most experienced people come from Bitcoin and Ethereum and still work on chains. Projects relate to Poland as the Polish developers have built an understanding of the technology.

Obtaining a fair view of Polish projects is hard as developers relate to many projects. The report by Chainalysis gives an overview and provides exact numbers, including Poland. For example, the DeFi Adoption Index and crypto adoption index indices rank Poland in a good position compared to other European countries.

Do you think that there are risks about the future of the blockchain?

The general problem lies in marketing projects for financial gains via social media, while the decision to change the approach mandates knowing about the impact and benefits. This is evident from the people's mentality of quick gains from cryptocurrencies. People dive into projects without prior knowledge and may lose money, triggering regulators to take a strict approach to safeguard investors.

Another general issue that can be considered a risk is the financial education of the public. People turn to influencers for easy profit and disregard basic economic and entrepreneurship knowledge. The lack of knowledge makes it hard for the public to grasp the differences between the traditional and digitalized economy. Finally, the public can miss out on the social impact that the technology might have.

Another issue that can block the adoption can be the education of higher-level employees from public authorities. While there are material and events, the constant change of personnel does not give time for people to learn about the technology and dive deeper.

All in all, education and awareness can drive the adoption and alleviate such issues.

What does the future hold for the Polish blockchain and cryptocurrency ecosystem?

I think that the current trends in Poland are to continue as we wait for a European regulation like MiCA. The government will have a wait strategy where the discussions will be postponed for the future when there is to be a set of regulation. Despite that, people will keep working and experiment with blockchain in projects. Security will be a focal point as companies will seek for attracting funds. Regulations can ease and protect investors and consequently allow the technology to flourish as more investments will take place. Essentially, regulations will improve the stability of the sector, rule out bad actors, and persuade people to pursue running their businesses from Poland rather than selecting foreign countries.

Key Figures

FUNDS RAISED BY BLOCKCHAIN PROVIDERS

€44 006 294.64

DEDICATED BLOCKCHAIN SOLUTION PROVIDERS

28

Portugal

THE PORTUGUESE BLOCKCHAIN ECOSYSTEM AT A GLANCE

Portugal is a European country located on the Iberian Peninsula. The country is part of the European Commission and the economy is forecasted to recover from the pandemic in the next years.

There is interest in Portugal to adopt blockchain, as presented in the following section on adoption. Moreover, the country is to establish a node to join the EBSI, as reported by European Commission.

Portugal is reported to have friendly legislation towards cryptocurrencies holders, as the Portuguese Tax & Customs Authority (PTA) announced that it is tax-free to exchange cryptocurrencies. There is legislation to support innovation via the blockchain application.

The startup ecosystem and community seem to have grown since the last version of the report. The startup scene has several options in funding, as contribution from North America is available per Portugal Startup Outlook. The blockchain community is supported by associations organising events and other actions. Detailed descriptions are included in the following chapters for Portugal.

All in all, the blockchain ecosystem is really active and grows each year. The main sectors for blockchain are application development and appliance in the financial sector.

TOWARDS MAINSTREAM ADOPTION

Blockchain adoption: The public has interacted with blockchain technologies mainly through cryptocurrencies, extending to exchanges. Exchanges are an easy way for the public to purchase cryptocurrencies with fiat. Portugal's Central Bank granted the first operating licenses for crypto exchanges to Criptoloja and Mind the Coin with an official statement.

The financial sector is a prime sector that researches and applies blockchain in different scenarios. In Portugal, Deloitte has developed a platform for distributing funds. The initiative is related to the Portuguese Association of Investment Funds, Pension Funds and Asset Management. The aim of such a platform is to facilitate the payment procedure and alleviate issues encountered in the procedure.

Public administration takes action for adopting the blockchain in the public sector. A use case is the participa.gov platform with the objective to aid in the citizens' participation via a safe and reliable manner. Apart from public administration, the agricultural sector applies blockchain for tracking food products while enhancing safety. The Portuguese Veracruz entity has collaborated with Arabyka to apply blockchain in the supply chain.

Blockchain has applications in sports, and Portuguese teams are part of the initiative. Some examples are the news about the national football team collaboration with Socios for launching a crypto token and teams like Porto.

Legislation of blockchain: There are updates from the previous report about legislation in Portugal. Generally, Portugal applies European legislation and suggestions on the blockchain. Generally, cryptocurrencies are not tried as legal tender, but there is a division between utility tokens and security tokens based on the tokens' functionality.

Blockchain and its implementation gather interest and are discussion topics in events. The Central Bank of Portugal accommodates a speech by Governor Mário Centeno, where crypto assets, DeFi, and digital euro were referenced briefly. Another source is the keynote from the speech by Governor Mário Centeno at CIRSF Conference 2021, where legislation frameworks and digital euro were discussed.

Entities active in virtual assets provision have to adhere to requirements to operate within the Portuguese territory. The central bank presents the requirements including Article 112-A of Law No 83/2017 and Notice No 3/2021. The Notice sets in its scope that regulates the provisions of the previous article and involves entities to exercise in a professional capacity activity with virtual assets.

Additionally, there are two Ministerial Resolutions from 2020 relevant to the blockchain, as stated in the Global Legal Insights Portugal report. In more detail, Resolution 29/2020 sets the principles for establishing Technological Free Zones, while Ministerial Resolution 31/2020 has the Digital Mission Structure as its subject. Both resolutions can aid the country to be better prepared for the digital age and make the most of the challenges and opportunities that will arise.

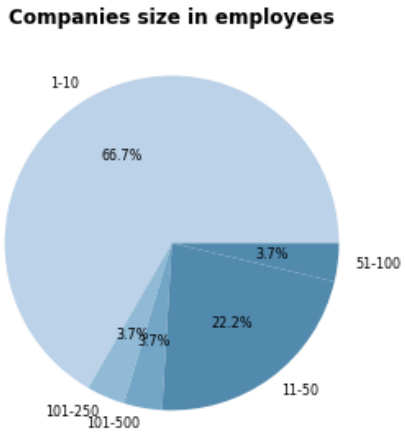
Blockchain in academia: The pandemic impacted the events as they remained digital during 2021. Webinars are held to support communities on blockchain subjects. Specific examples for webinars in Portugal were the Euro Digital and opportunities and challenges for companies from blockchain and smart contracts.

In an extension from the previous report, there are opportunities to educate on the blockchain via individual courses. In 2021, a collaboration between Microsoft and Algarve Uni For example, a training course took place on for March 2022 by Católica Lisbon School of Business & Economics and IST Técnico+. The training course has two subjects eluded by its title "Blockchain & Smart contracts".

There are programmes supported by European Commission to support people interested in venturing in the blockchain ecosystem. Specifically, DCentral Lab is open to submissions for students and recent graduates aiming to conduct research on blockchain. Details on the internship programme can be found on the BIG ERA chair.

Blockchain across key industries: The adoption of blockchain is concentrated in two sectors, which are service delivery and financial services. Services use blockchain as a component in this underlying architecture for benefitting from blockchain's characteristics. Blockchain is usually included in the FinTech ecosystem as one of the technologies to digitalise the economy.

BLOCKCHAIN STARTUP AND BUSINESS SCENE

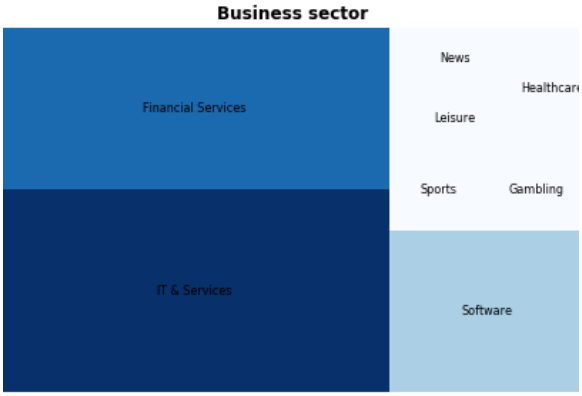


Portugal has a vibrant startup ecosystem with active entities in different sectors. There are entities that gathered the media interest and attracted funding for their operations. Ancorage is an international startup raised to unicorn status and has connections with Portugal, as it has operations established in the country. Another example of a Portuguese startup covered in the news was TAIKAI with a EUR 2 million funding round.

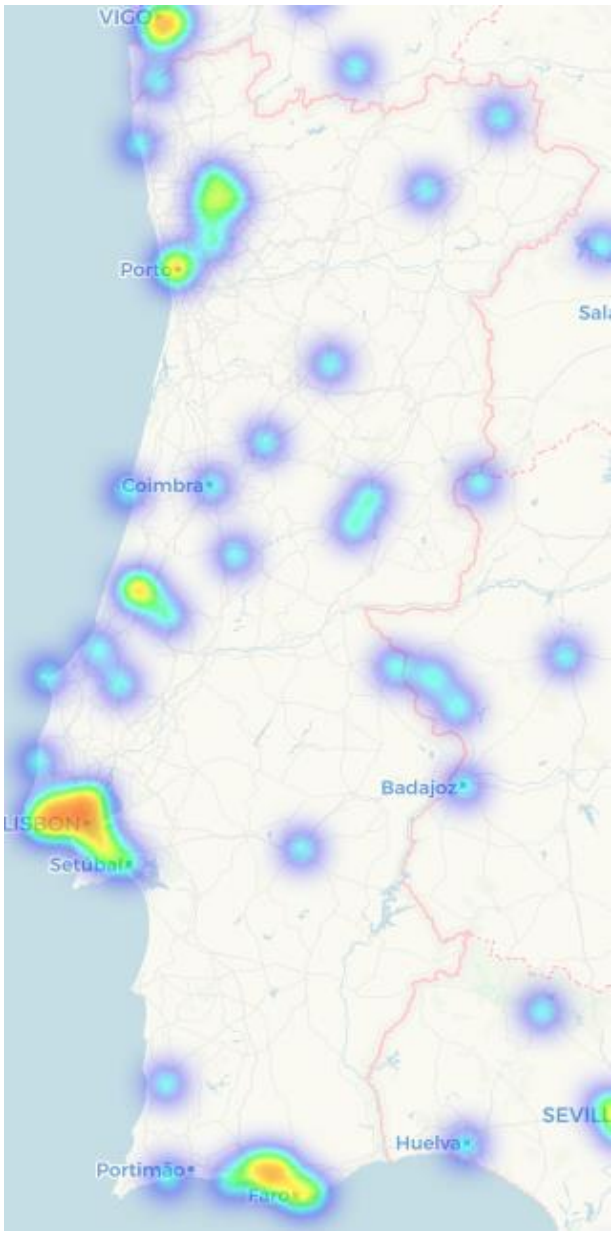
There are different initiatives to support the blockchain ecosystem. Some accelerator programmes were included in the last version of the report. An active accelerator is organised by Bright Pixel supporting blockchain. Bright Pixel participates in recent events of the pan-European programme BlockStart.

Venture capitals can support the startups to grow and reach new audiences. In Portugal, there are venture capitals active in boosting the blockchain ecosystem. A dedicated blockchain venture capital led by Portuguese partners is Lightshift Capital, with a news article referring to the availability of funds for investing in blockchain.

The blockchain startup ecosystem consists of small and medium companies in Portugal. This is a fact to be expected as technology startups have small and shift teams while achieving great impact with their developed applications. A great number of startups was established in 2018, but more startups are established each year expanding the startup ecosystem. The main sectors that startups are active in are the services and financial sectors. In essence, blockchain is adopted in applications to deliver functionality for users.



BLOCKCHAIN COMMUNITY



The Portuguese community rapidly grows and aims to extend their operations on the global scale. The community can opt in participating in associations, events, and hackathons focused on blockchain.

Associations are formed in Portugal to foster the growth and support the needs of the community around blockchain. The last version of the report included the Portuguese Blockchain Alliance, which is still active with news, events like the seminar on smart contracts, and partnerships for blockchain adoption like the public administration sector. Another association active in Portugal is the Associação Portuguesa de Blockchain e Criptomoedas with vivid interests in blockchain and cryptocurrencies. An association founded in 2021 and focused on the digital economy is the Instituto New Economy. Technologies are to disrupt and revolutionise the way of business operations and the institution will support the national ecosystem and its global standing.

The Portuguese community is interested in a wide range of blockchain subjects, and there are events to accommodate the variety of interests. Last year, a topic that gathered the public's interest was the non-fungible tokens. A 2-day conference on the subject was held in April 2022 in Lisbon. The community had the opportunity to participate in a larger-scale event in October 2021 as the Lisbon Blockchain Week facilitated different discussions and presentations on blockchain.

There are hackathons for the community to test their skills. The recent events are usually held digitally, with participation to extend further than a single country. The Portuguese VC Faber participates in the organisation of a WEB3 hackathon running until March 2022. In 2021, the hackathon, ETHLisbon, was held for developing ideas on the Ethereum blockchain. The hackathon lasted for 4 days and was held on the premises of Fintech House.

AN INDICATIVE BUT NON-EXHAUSTIVE LIST OF BLOCKCHAIN COMPANIES IN PORTUGAL

Anchorage Digital: is a company founded in 2017 with offices established in Portugal. The company offers a financial platform and is an infrastructure provider for digital assets. It aims to help institutions to invest in digital assets in a secure manner and with regulatory compliance.

Catappult Console: it introduced as an app distribution console established in 2019. It is based on a subscription to allow developers to distribute their applications across numerous stores. Essentially, developers sign their APK to be managed by the protocol.

Knowtary: is a company founded in 2020 with participation in BlockStart. The main goal of the company is to support any entity that deals with contractual agreements, signatures, and essentially provides the public with document certification. The documents are notarised with the use of blockchain. The transition to digital documents along with the efficiency in the processes can alleviate bureaucracy and lessen the environmental burden. The company solution has been adopted in SMEs as indicated by BlockStart.

NAU21: is a developers studio established in 2015. The studio consults projects on cutting-edge technologies and one of them is blockchain.

Polkastarter: is introduced as a decentralised protocol to launch new ideas established in 2020. The protocol is an IDO (Initial DEX Offering) extending the previous well-known ICO structure. The project's documentation clarifies that projects can set fixed swap pools to raise funds. The protocol implements cross-chain swaps and runs on Polkadot due to speed, scalability, interoperability and governance. An IDO's advantage is the community establishment to invest in inspiring projects.

Revault: is a multiparty vault architecture established in 2020. The protocol is open-source with the code available in Github. The protocol aims to enhance security to the key management method of Bitcoin to mitigate thefts and other threats. Moreover, multiple stakeholders can delegate the fund management to selected managers. A paper in Github clarifies the idea and architecture of the project.

Sense Finity: is a company established in 2013 that works in the supply chain. During BlockStart, the company has introduced a blockchain-based solution for food provenance certification. The solution is in place to track food's distribution with sensors and trackers. The blockchain offers data immutability and is based on Hyperledger. The solution allows consumers to accurately inform about their food.

Key Figures

FUNDS RAISED BY BLOCKCHAIN PROVIDERS

€7 443 370

DEDICATED BLOCKCHAIN SOLUTION PROVIDERS

36

Romania

THE ROMANIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

Romania is a country located in the eastern part of Europe. The country fosters a growing economy as indicated by the economic forecast and indicators reported by the European Commission.

The ecosystem around blockchain is active in Romania. Moreover, there are news and events indicating that has grown since the last version of the report. In detail, blockchain adoption takes place in the public and private sectors. For instance, the Romanian Digitalisation Authority has an initiative for adopting blockchain along with other technologies in the public sector.

The private sector accommodates a unicorn with the entity Elrond. The entity's activity is multidimensional, as it includes different sectors. Elrond, along with other private entities, moved forward with acquisitions described in the business scene. Another entity was Human.AI with news like Initial Dex Offering (IDO) and the inclusion of its token in KuCoin.

Romania has established regulations mainly around cryptocurrencies to protect investors. The most notable point in the regulation is that the introduction of the emergency ordinance has made stricter for institutions in payment methods.

The following sections aim to provide indicative information on Romania's adoption, business scene and community around blockchain.

TOWARDS MAINSTREAM ADOPTION

Blockchain adoption: Countries can be hesitant over blockchain adoption despite the activity around technology. On the other hand, there are countries experimenting and adopting blockchain as a driver towards the future. Romania implemented blockchain to safeguard the integrity for parliamentary elections in November 2020. Blockchain is used as a trust layer to guarantee that no interference occurs in the election process. Moreover, two systems benefiting from data immutability are deployed on top of the blockchain for monitoring election's turnout and producing reports that are publicly available on the site.

Romania's public sector fosters interest in implementing and experimenting with blockchain technology. The strategy for 2021-2023 published by the Financial Supervisory Authority includes several mentions of the blockchain. The report mentions that "the Authority aims to cut red tape by implementing Blockchain" and synchronise with requirements by ESMA, EIOPA and ECB. There are initiatives that will deliver material on the blockchain, like the Romanian Digitalisation Authority for public administration. In 2021, the Digitalisation Authority organised a conference for e-government tools' development as part of the initiative.

Blockchain is the subject of discussion in research and legislation more often. But vivid and active examples are indisputable cases for the public to grasp the different uses for blockchain. A major music festival in Romania, Untold, announced in August 2021 that the audience could pay with Elrond's crypto eGold for

purchasing tickets for the event. Furthermore, the event has minted NFTs inspired by the Transylvania's myths. The NFT collection launched in collaboration with Stakeborg and is accommodated on the OpenSea marketplace. It is refreshing to witness art events to experiment with NFTs, as they are envisioned to revolutionise the art sector in different ways. While only being an initial step in the blockchain ecosystem, NFTs collections can act as a funding means for art institutions.

Apart from brand initiatives, projects mentioned in the previous report still grow. For instance, Restart Energy has issued the MWAT token with the aim to democratise the energy sector with the use of blockchain.

Legislation of blockchain: The last version of the report included a warning and an announcement from the National Bank of Romania. The National Bank published an updated press release in April 2021 about virtual currencies, as their popularity keeps growing. The National Bank has previously published two press releases in 2015 and 2018. In the current press release, the currencies are referred to as speculative and very volatile, hence being very risky investments. It reminds that entities active in the exchange of virtual to fiat currencies have to abide by Law No. 129/2019 along with the inclusion of MiCA regulation.

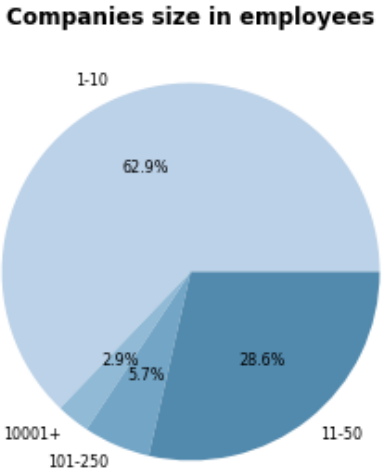
Law No. 129/2019 focuses on AML and is supplemented by the emergency ordinance ('GEO'). In a blog post, the regulation is briefly described, along with the definition for digital wallet providers. Finally, the regulation around cryptocurrency taxation is at a 10 % rate equal to the income taxes rate as included in Law 30/2019.

Blockchain in academia: A report about the Romanian Blockchain Ecosystem by Carmen Holotescu include details on academia courses and research initiatives. The dedicated courses in universities' curriculums mentioned in the report are in different institutions like "Ioan Slavici" University of Timișoara, Alexandru Ioan Cuza University of Iași and Babes-Bolyai University Cluj-Napoca. The courses are varying on the subjects as the subject of the courses can be programming or smart contracts. The report includes modules and online courses like Modex collaboration with Polytechnic University for a blockchain course and the postgraduate programme for entrepreneurship in Universitatea de Vest (UVT).

An online educational initiative is available for executives to grasp blockchain and drive innovation. The initiative is a collaboration between universities and companies in blockchain like IOTA foundation and Modex. The initiative is named Executive Blockchain Laboratory and the available course on blockchain consists of five modules.

Blockchain across key industries: The majority of the companies are active in the financial sector. There are different reasons attributing to that fact. The regulations in the financial sector are well established, and the reasoning and procedures are clear, making it easy to code in programming logic. Moreover, blockchain and its ledger fit well to document the transactions by alleviating issues like double-spending. Finally, blockchain is a component in complex architecture that delivers a specific functionality like data immutability, security and others. The inclusion of IT services as the second sector is logical, as users select services based on their functionalities and can be oblivious to the underlying technologies.

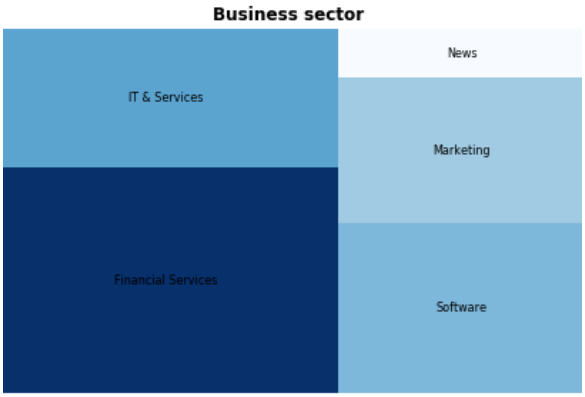
BLOCKCHAIN STARTUP AND BUSINESS SCENE



Companies realise that blockchain can be a disruptive technology for any sector. As this realisation sinks in with the administration members, larger companies look for experimenting and exposing themselves to the technology. Acquisitions of smaller and independent companies can help larger companies, as the acquisition involves an experienced team with hands-on experience in the technology. A couple of notable acquisitions reported in Romania were Zitec's acquisition of Udev, Elrond's Portuguese startup Utrust and Softbinator Technologies' WiseUp.

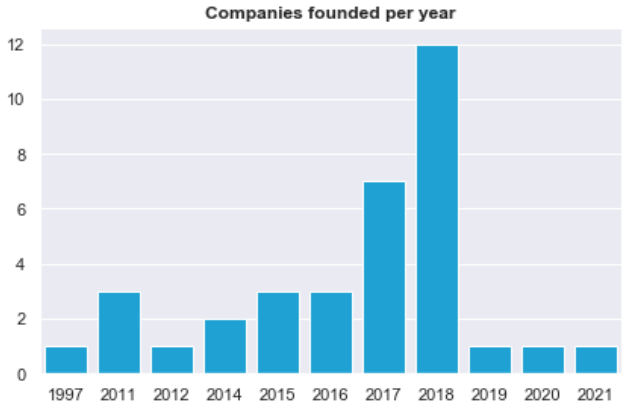
Independent projects and teams can benefit from innovative ways to find the necessary funding to grow. The innovative way of fundraising, IDO, refers to the process of launching a token on a DEX through a liquidity pool. Humans.ai is a startup with a platform based on blockchain that raised over a million Euros in half an hour via Polkastarter. Polkastarter is known as a cross-chain token pools for launching projects.

On the other hand, there are contemporary finance routes for startups and companies to find monetary funds. For example, crowdfunding is an option for raising funds from a large audience. In 2021, Rōnin added as a choice for a platform that blends the traditional crowdfunding method with blockchain to provide transparency. The platform envisions in becoming a community of Romania entrepreneurs who will grow together.



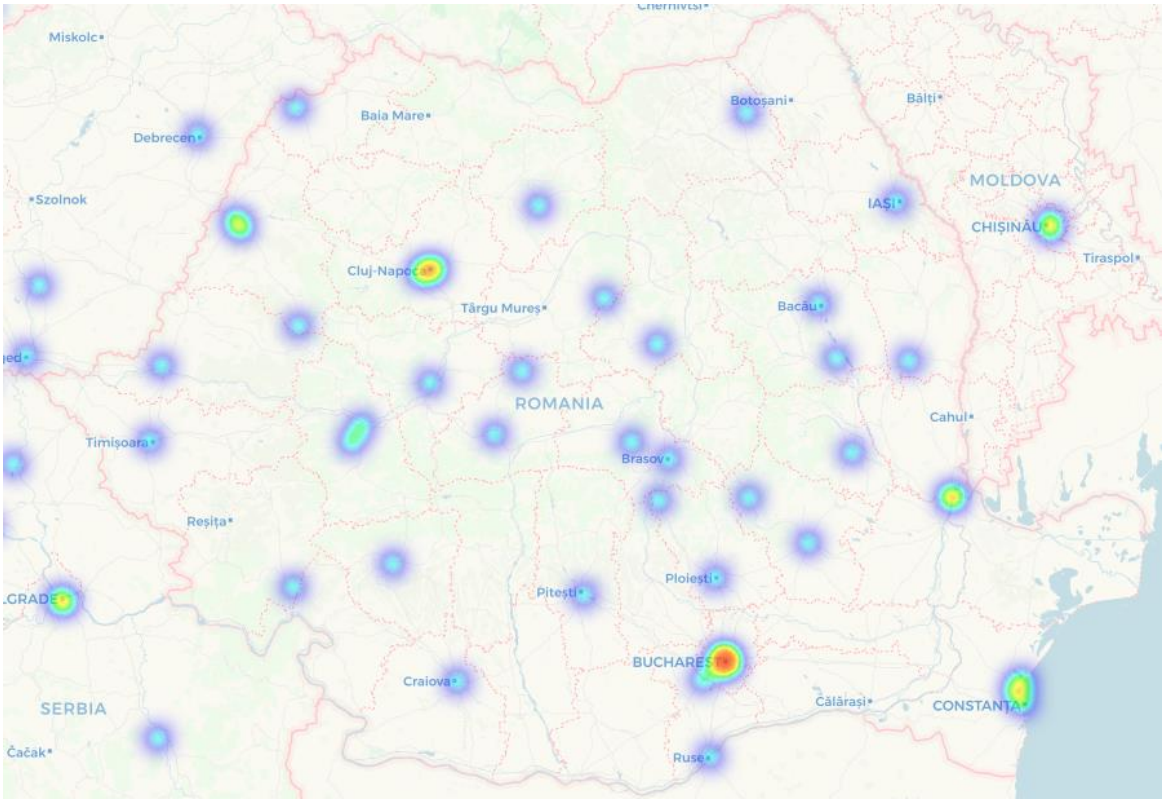
VCs are another valid option for projects to raise funds. Traditionally, venture capitals specialise on specific sectors to pinpoint the best options to invest. Startups and companies can generally look for venture capital in the technology sector for funding. The Romania-based VC Clever Capital has funded projects related to blockchain, like Mina Protocol.

The startup ecosystem in Romania is generally composed of small and medium companies, as indicated by the number of employees for each company. The majority of companies was established in 2017 and 2018, but the popularisation of blockchain as a technology has attracted the attention of established companies. As with other countries, the financial sector is the predominant area to apply blockchain technology.



BLOCKCHAIN COMMUNITY

The interest in blockchain and its subject are vivid as the community in Romania grows each year. The majority of meetups and events take place in cities like Bucharest, Cluj and Timisoara. The community in Romania can interact in associations, events and hackathons.



The community of people interested in blockchain has the opportunity to participate in organisations fostering the blockchain ecosystem. In Romania, there are several organisations and associations to promote blockchain and educate the public on the technology. Asociatia Blockchain Romania was included in the last version of the report, but there are other communities also included in the Romanian blockchain ecosystem. Blockchain Romanian Community is a community supported by BlueDrive, but there are few updates on its activity. The mentioned report on the Romanian ecosystem includes Legal Blockchain Association by Alexandru Pop for legal practitioners to learn about blockchain.

One of the biggest events on the blockchain is the Romania Blockchain Summit. The event seems to be affected by the pandemic, as the 2020 version was postponed for 2021. Another event held in June 2021 was the 4th workshop on blockchains for inter-organisational collaboration. The aforementioned workshop was paper-oriented with a wide range of subjects and the application of blockchain. Finally, an event by the Horizon 2020 project Fintech was organised in Bucharest. Finally, the conference "Critical Infrastructure protection and resilience Europe", that took place in March 2022 allocated time for a presentation for the use of blockchain in smart grid security.

The blockchain participants have the opportunity to participate in hackathons to test their skills around the technology. Cluj Startups and Spherik Accelerator curated an open hackathon under the European project B-hub for public sector challenges.

AN INDICATIVE BUT NON-EXHAUSTIVE LIST OF BLOCKCHAIN COMPANIES IN ROMANIA

DiplomaBlock: is an innovative startup established in 2020. As the platform's name implies, the platform aims at revolutionising universities' diplomas. The platform is based on the open-source stack Hyperledger Fabric to support storage and permit diplomas' authentication and validation. The idea uses the universities as a point of truth for businesses trying to authenticate the validity of candidates' diplomas. The idea is accommodated in the BlockStart incubator.

Euroledger Solutions: is a company established in 2019 that participated in BlockStart. The company focuses its efforts on users' identities and tools for marketplaces. A key component of the solutions from the company is the transferability of the reputation from other platforms in a verified way. During BlockStart, the company demonstrated the Capena, a SaaS tool based on blockchain that is compliant with GDPR and W3C Standard.

Herity Network: is a seeding platform established in 2021. The platform has launched a native token on the Binance blockchain for crowdfunding early-stage projects. Projects are to be nominated to tokens' holders after a review and an audit from the project's team. Additionally, the platform has an NFT marketplace for artists to accommodate their art. Finally, charity events can be hosted on the platform. The project has laid a roadmap to follow for 2022, which includes stacking the native token, bridging with the Polygon network and more auctions.

Sourceless Blockchain: is a project founded in 2020 that aims to build a hybrid blockchain. The idea is to combine public and private blockchains' functionalities to control access while providing freedom over actions. The project has launched its native token on Binance blockchain. The whitepaper describes the projects' benefits and case studies for its use. The project's hybrid blockchain has been adopted in University management and Wisp.

vTrader: is a crypto exchange platform founded in 2019. Platform users can easily interact with the platform via a launched mobile app. The exchange automatically establishes crypto wallets to hold cryptocurrencies, and users can transfer their cryptocurrencies from other wallets to the platform.

INSIGHTS FROM EXPERTS

Prof. Carmen Holotescu, Dean of the Faculty of Engineering and Director of the Center for Open Education and Blcokchain at 'Ioan Slavici' University of Timisoara, Romania.

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Romania? Has the recent growth of the cryptocurrency markets facilitated familiarity?

One can note a significant increase in the public awareness and adoption of blockchain and cryptocurrency in Romania, especially in the last 2 to 3 years. As drivers for this process can be considered:

- an important number of events, conferences, and webinars, with national and international participation;
- active specialized social media channels/influencers, many articles on visible sites or magazines;
- active communities of interest and practice, and associations;
- in education, there are innovative initiatives, projects, university and postgraduate programs, MOOCs, productive research teams, and also policy proposals;
- a visible presence in media and social media of successful and innovative Blockchain companies and projects, their participation in different national and worldwide (e-)events; also their support and partnership in academic programs or hackathons;
- NFT phenomenon and some interesting Romanian projects of NFT and crypto art;

- some government projects, initiatives, and working groups - organized by the Ministry of Communications and Information Society prior to the Romania Blockchain Summit in 2019, by the Authority for the Digitalization of Romania at the end of 2020 and the one gathered in January 2022 by Sebastian Burduja, the new nominated Minister of Research, Innovation and Digitization, for drafting a law project for the regulation of crypto-assets.

According to recent market research conducted by IPSOS Romania for Tradesylvania and published in January 2022, 96% of Romanians heard about crypto, 50% know about NFT and 40% have or had cryptocurrency. Two-thirds of people familiar with cryptocurrencies believe that they can represent both the future of online payments and the future of investment.

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Romania? Has the recent growth of the cryptocurrency markets facilitated familiarity?

Romania has a growing number of experienced companies, innovative startups and projects, and active accelerators. Besides the unicorn Elrond, experienced Modex and Zitec, innovative Restart Energy and Humans.ai, there are tens of companies and startups developing blockchain projects. As for accelerators, the notable ones to mention are Techcelerator, AgTech TM, Spherik Accelerator and other specific accelerator and funding programs for startups developed in academia. Many companies and universities are involved in blockchain projects with EU and national funds. The most active blockchain centers are Bucharest, Cluj-Napoca, Timisoara, Iasi, Constanta, Sibiu, and Brasov. Also, an important number of startups founded by Romanians are active in Europe, Asia, and USA, with a strong presence in media and events. The growing business ecosystem is supported by the numerous educational programs offered by universities at undergraduate, master, doctoral and postgraduate levels, also by training companies.

Only respond if specific measures have been taken - What measures has Romania taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

In July 2020, eConsultare launched a Blockchain platform developed by the Ministry of Environment, Waters and Forests with Modex, through which citizens are consulted and can vote on ministry projects and initiatives. Additionally, Romania is the first EU country to use a voting reporting tool that is based on Blockchain technology for national elections. The national parliamentary elections, held on December 6, 2020, used Blockchain technology to guarantee the integrity of the electoral process and strengthen its transparency in a system implemented by Special Telecommunications Service (STS).

A Blockchain reputation mechanism for the EERIS European Research Infrastructures System (2020-2022) is implemented in the project “Increasing the capacity of the RDI system to respond to global challenges. Strengthening the anticipatory capacity for evidence-based public policy making”, coordinated by UEFISCDI.

In the autumn of 2020, the Ministry of Finance launched tenders for studies and implementation of “Automatic Exchange of Information” system extension with components on Blockchain for data security. Another tender for the Digital Transformation of Public Administration in Romania was open by the Authority for the Digitalization of Romania in order to implement the policy above in December 2021, the chapter for Blockchain being funded with 3 million Euro for 4 years. A note published later specifies that the tender was postponed.

In April 2022, as part of the digitalization process, the Financial Supervisory Authority announced that it was carried out a pilot project testing the Blockchain technology to improve and reduce the volume of manually processed data. As a result, it was found that the institution’s existing reporting and data collection processes can be successfully improved, digitalized and secured using this technology. The same month, the National Institute for Research and Development in Informatics – ICI Bucharest started the implementation of the Romanian National Blockchain Framework; the universities in the country were notified and invited to host nodes of the network.

"EBSI4RO: Connecting Romania through Blockchain" is a CEF Telecom Blockchain project, which runs between April 2021 - March 2023, partners being the Executive Unit for Financing Higher Education, Research, Development and Innovation - UEFISCDI and Politehnica University of Timisoara - UPT. The central scope of the project is to create an extendable and sustainable ecosystem to facilitate and accelerate the awareness, knowledge and adoption of the EBSI by the Romanian citizens, businesses, institutions and administration. The project team implements a national system for issuing digital credentials and micro-credentials on EBSI, integrated with the National Student Enrolment Registry and will conceive policy proposals. Three EBSI validator nodes were set up, thus Romania becoming one of the countries with the most EBSI nodes and the premises to adopt EBSI use-cases. The nodes were set up by the National Institute for Research and Development in Informatics - ICI Bucharest at the end of 2020, EBSI4RO in July 2021, and Special Telecommunications Service - STS in December 2021.

Starting with December 2020, the Authority for the Digitization of Romania, together with the Technical University of Cluj-Napoca, implement the project “Strategic framework for the adoption and use of innovative technologies in the public administration 2021-2027 – solutions for business efficiency” – project website, with a duration of 30 months and a value of 3.5 million Euro. Among other results, the project will develop an operational and legislative framework associated with Blockchain technologies and a national Blockchain strategy for the public administration, including a financing programme for the 2021–2027 financial period.

In the Public Policy for e-government, conceived in a project funded by the European Social Fund, and adopted by the government in June 2021, one of the measures is the development of non-sectoral projects to horizontally support the development of e-government (projects of Big Data, AI, Blockchain, high performance computing, quantum computing), under the coordination of the Ministry of Research, Innovation and Digitization. On October 12, 2021, the Authority for the Digitization of Romania had initiated the public consultation procedure for the Digital Transformation of Public Administration in Romania, worth over 30 million euros; a chapter is related to Blockchain for exploring the technology in order to identify the most effective ways of application at government level, and for piloting the implementation of technology in institutional projects.

In a report “Barriers to Digitization of the public and private environment in Romania“, published by the Authority for the Digitalization of Romania in April 2021, it is stated the Romanian micro-enterprises are close to the European average in terms of the use of Big Data Analytics, AI and Blockchain, at a higher level than the use of other emerging technologies. The National Recovery and Resilience Plan (the plan in Romanian), approved in September 2021, specifies measures related to the digitalization of public administration and SMEs through the use of emerging technologies, including Blockchain and the development of training programs for these technologies. At the end of March 2022, the Ministry of Research, Innovation and Digitization has published for consultation the Applicant’s Guide for “Improving / retraining employees in SMEs in order to use emerging technologies”. A report published by the Authority for the Digitalization of Romania in April 2022 shows that the digitalization degree of the state is at 21%, the target being 100% in 2030, according to the Commission’s 2030 Digital Compass.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

For the wider development of the Romanian blockchain ecosystem, we consider that the following issues require solutions:

- a clear regulatory regime in areas pertaining to crypto-assets and blockchain-based applications, aligned with European and worldwide initiatives; this makes blockchain a much more approachable industry, giving companies and startups clear definitions for how they should proceed and providing protections for investors; as already mentioned above, the project “Strategic framework for the adoption and use of innovative technologies in the public administration 2021-2027 – solutions for business efficiency” is expected to develop an operational and legislative framework; also a working

group was gathered in January 2022 by Sebastian Burduja, the new nominated Minister of Research, Innovation and Digitization, for drafting a law project for the regulation of crypto-assets;
- blended Blockchain training programs, integrating Massive Open Online Courses, Open Educational Resources, collaboration with universities and companies having experience in blockchain, and not the sterile transmission of information in f2f courses; the standards defined by INATBA and CHAISE should also be considered;
- transparency of participation in the EBP, informing companies and universities which could be involved in the development of EBSI and decentralized applications; Romania is the only country having 3 EBSI validator nodes;
- a dynamic system for supporting startups, companies and universities offering educational programs in the field
- communication of the ministries and agencies that implement projects in the field, and transparency in organizing efficient working groups.
- More collaboration, sharing of experience and best practices, dissemination of the ongoing projects, and a more pro-active approach are needed for those acting in the Blockchain field, from administration, business and academia.

What does the future hold for the Romania blockchain and cryptocurrency ecosystem?

The development of the ecosystem will accelerate, having the premises presented above. Since November 20, 2020, when EU Blockchain Observatory published the report EU Blockchain Ecosystem latest developments, there has been huge progress on all the four axis favouring Blockchain development mentioned in the report: work towards regulation, the ongoing development of a national Blockchain strategy, strong steps for an innovation-friendly climate, and multiple programmes for a skilled workforce. Some of the developments are included in a broader report for the Romania Blockchain Ecosystem, where I was part of along with co-authors. The report is accommodated by the EBSI4RO and aims to provide a general overview in initiatives in Romania.

Key Figures

MARKET CAPITALISATION

8 blockchain solution providers and startups

TOTAL FUNDS RAISED

€ 13.7 million

MOST ACTIVE SECTORS

Cybersecurity

Cryptocurrency Exchanges

Software Development

BLOCKCHAIN PROFESSIONALS

113

BLOCKCHAIN SOLUTION PROVIDERS AND STARTUPS

14

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 maintains an essential landmark in the history of virtual 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, an official partner of the Slovakian government sovereign fund Slovak Investment Holding, has invested in blockchain startups.

The country is home to a Bitcoin mining facility which converts human and animal waste into Bitcoin hash rate, securing the network while mining Bitcoin. AmityAge Mining facility uses human and animal waste to generate electricity for mining.

TOWARDS MAINSTREAM ADOPTION

There is no available data suggesting blockchain has significant adoption in the Slovakian public sector or regional governance.

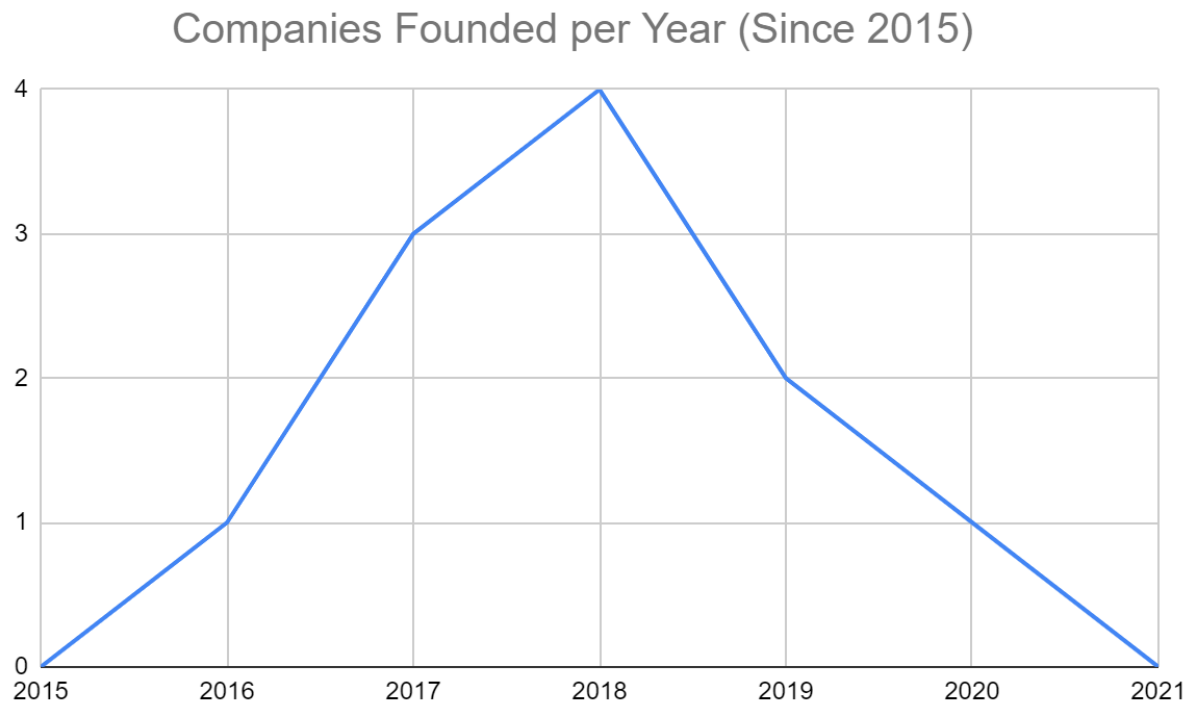
Legislation of blockchain: On 23 March 2018, the ministry of finance published guidance explaining that revenues stemming from cryptocurrencies need to be taxed. It said that any type of exchange, such as an exchange of a virtual currency for an asset or a service rendered or for another virtual currency, must be considered to be a taxable transfer. The guidance underlines that virtual 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 virtual currencies directly obtained from mining should be kept off the balance sheet until they are sold or traded. Earlier, the finance minister had pointed out that trade in cryptocurrencies, which is unregulated and anonymous, involves risks of terrorism and organised crime

Blockchain in academia: Beginning from the academic year 2020-2021, a full-fledged University-grade course for Computer Science classes focused on an in-depth understanding of bitcoin, Ethereum, Cryptocurrencies 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.

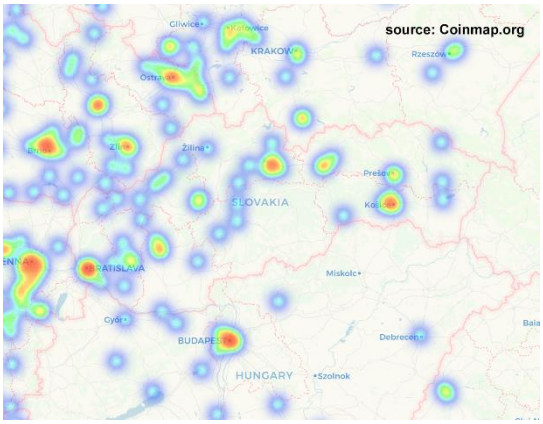
Additionally, Blockchain Slovakia, an educational non-profit organisation, aims to create a platform that brings together all the stakeholders in the country's crypto space. such as the regulators, developers, businesses, and the general public. The organisation is focused on raising awareness about cryptocurrencies 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 identifying malware along numerous blockchain and Virtual Currency projects. ESET began as a pioneer of antivirus protection, creating award-winning threat detection software. Given the company's expertise and size in the Slovak tech ecosystem, cybersecurity could be identified as one of the industries relevant to 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 14 blockchain startups and cryptocurrency-themed companies, accordion to data retrieved by Crunchbase,



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 Virtual 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 Virtual Currency 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. According to LinkedIn data, 113 professionals are directly or indirectly associated with the blockchain technology.

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, Cryptocurrency, Virtual Currency, Bitcoin | Source for Enthusiasts

NOTABLE BLOCKCHAIN COMPANIES

Mangata Finance: Mangate Finance enables easy and secure decentralized trading for Polkadot and Ethereum. The project claims to be the first decentralised blockchain exchange without insider trading and MEV.

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.

Fumbi Network: Smart and Safe investing in a dynamic portfolio of top cryptocurrencies for the general public.

SuperScale: SuperScale is an all-in-one Growth Platform that profitably scales games & blockchain apps to their maximum potential.

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 Cryptocurrencies in the University of Economics (Bratislava), and advisor in numerous Virtual 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 cryptocurrencies 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 Virtual 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 cryptocurrencies and blockchain.

In addition to this, there are a few successful Slovak companies in this field. The list includes Virtual 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 Virtual 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 Virtual Currency-specific laws that Slovakia has are related to taxation Virtual 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 cryptocurrencies. Given the educational efforts of the companies and NGOs in the field, the general public awareness is relatively high.

Key Figures

OF GLOBAL INVESTMENTS IN BLOCKCHAIN PROJECTS

5%

MOST ACTIVE SECTORS

FinTech, Supply Chain

BLOCKCHAIN SOLUTION PROVIDERS AND STARTUPS

32

BLOCKCHAIN PROFESSIONALS

286

Slovenia

THE SLOVENIAN BLOCKCHAIN ECOSYSTEM AT A GLANCE

The Republic of Slovenia, while small in size, is renowned worldwide for its blockchain companies. The country promotes its economy as “Green, Creative, Smart” and one that leans towards higher adoption of blockchain technology.

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 sectors. This also provided the country with the opportunity to actively participate in the development of use cases implemented on the European Blockchain Services Infrastructure. Slovenia became 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.

The University of Ljubljana, a major research and education organisation in Slovenia, participates in Next Generation Internet projects such as the scientific and technical coordination of the ONTOCHAIN project and the Europe-South Korean project DECENTER. Slovenia currently presents at the Expo Dubai 2021 with its collection of memorabilia that takes the form of Non-Fungible Tokens - IfeelNFT.si. It is the the first country in the world to issue NFT tokens which serve to promote the Slovenian economy and tourist destinations.

An aggregated cryptocurrency index published by CryptoHead has ranked Slovenia in the seventh position worldwide when it comes to its capacity to fully adopt cryptocurrency assets, along with metrics such as Google searchers, crypto ATM saturation and legislation.

In August 2021, the Slovenian Finance Authority announced a proposal to tax cryptocurrency participants with 10% of their assets income - particularly on purchasing and selling activity. Under the current legislation method, the authority analyses an individual's digital asset activity case-by-case basis by trawling through their buy and sell transactions. In October 2021, the Slovenian Finance ministry sought a public opinion regarding crypto tax laws. The proposed bill will impose a 10% tax rate on every fiat-crypto conversion and payments made with cryptocurrencies if signed into law under Slovenia's Income Tax Act. However, the threshold for tax liability will be set to 15,000 euros ($17,387) for the calendar year. Investors within the limit will be exempted from crypto taxes.

TOWARDS MAINSTREAM ADOPTION

Regulation and policymaking In November 2019, the launch of the SI-Chain was established by the technology provider company Hashnet in cooperation with Telemach, the telecommunication solutions provider, helped Slovenia's public sector make significant progress toward blockchain adoption. Moreover, Blockchain Think Tank Slovenia, established in 2017, serves as an open forum that enables individuals, organisations, and 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.

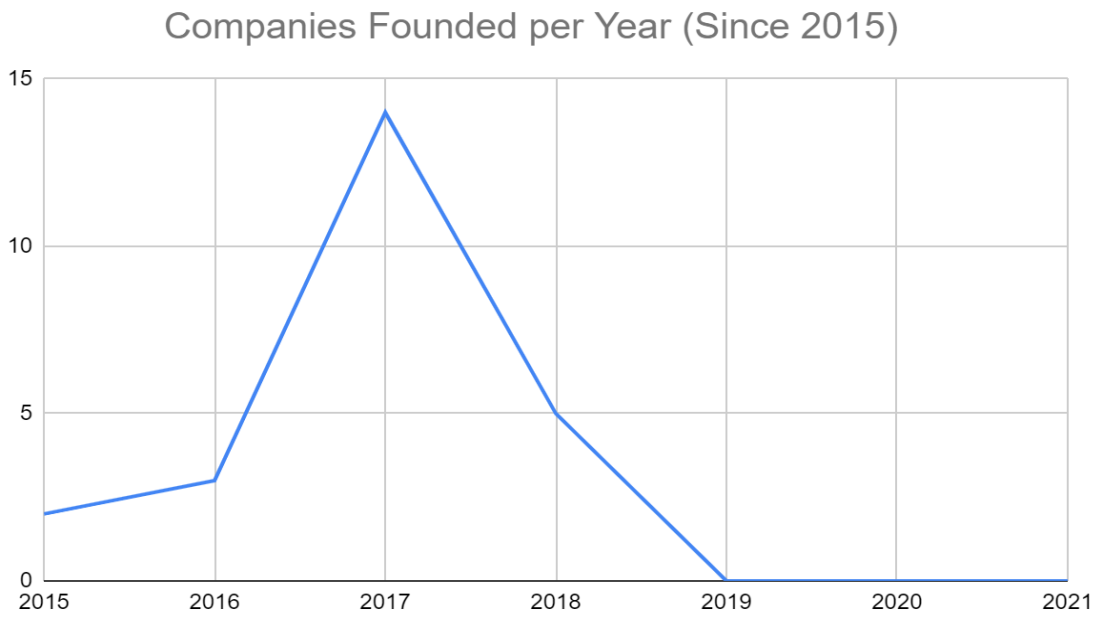
Recently, Danfoss Trata Slovenia and Blockchain Think Tank Slovenia agreed to collaborate on a joint project focusing on identifying blockchain companies and projects in the wider region that are developing technological solutions within the energy industry.

Legislation of blockchain: The Financial Administration of the Republic of Slovenia clarifies that the profit received by individuals from trading virtual currencies (due to fluctuations in the virtual 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 derived from movable property or disposal of derivative financial instruments. Taking into account that virtual 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 University of Ljubljana is the scientific and technical coordinator of the Next Generation Internet project ONTOCHAIN and participates in the European Union-South Korean project DECENTER. The Digital Innovation Hub Blockchain for Trusted Data Ecosystems was also formed in 2021 as an initiative of the University of Ljubljana, the Technology Park Ljubljana and the company Hashnet. These stakeholders organised the European Blockchain Week in the second half of September 2021. The Blockchain Lab of the University of Maribor is also a 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 lab's focus is on promoting and accelerating the use of blockchain technology in developing 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 offer professional training related to blockchain and virtual currencies.

Blockchain across key industries: While blockchains startups operating in Slovenia cover a wide spectrum of sectors and businesses, those focusing on financial and virtual currency make up the majority. Of these, Bitstamp is the most notable virtual 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

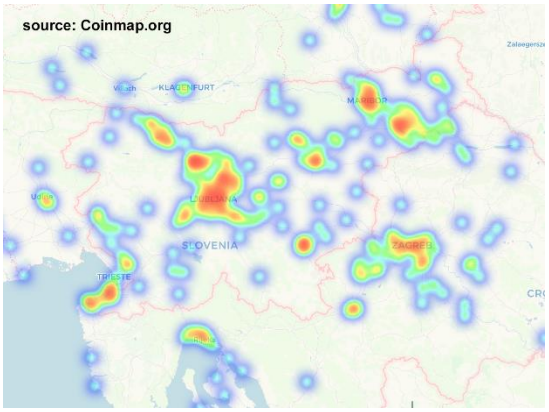


Relative to its size and population, Slovenia hosts a large and vibrant blockchain ecosystem. This is no surprise, as some of the most significant EU blockchain companies emerged from the country's capital. The fast-paced growth of the blockchain startup and business scene is attributed to the fact that since 2017, Slovenian projects have received over 5% of global investments in the country. 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 to 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. It was 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 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 wishing to participate 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 virtual 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 organises various events and training courses. It also cooperates with government authorities in the field of 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. Based on LinkedIn data, 286 professionals are directly or indirectly associated with blockchain technology.

The number of blockchain startups in Slovenia, according to Crunchbase, is 32.

NOTABLE BLOCKCHAIN COMPANIES

NiceHash: A virtual 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.

0XCert: The vision of 0xcert is to provide an open framework with the protocol for standardized and certified unique assets to a broader tech audience. With the 0xcert Framework, you can build your decentralized applications on top of distributed and decentralized systems, employing the complete 0xcert toolset, development framework, and a set of conventions for various use cases.

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.

Elly: 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.

Blocksquare: Blocksquare is a developer of blockchain-based tokenization system for commercial real estate properties. Blocksquare's vision is to provide real estate businesses with the world's best real estate tokenisation system with all required tools and modules for the creation, issuance, sale, distribution, management, tracking, and trade of tokenised properties.

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 virtual currency investment platform. It supports bitcoin, Ethereum, Ripple, etc. It offers multiple virtual currency indices for investments including Incrypt Fundamentals, StrongCoindex, Hive Index, Solidum Prime, etc. It also offers a mobile app to buy and sell virtual currencies and digital portfolios.

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. The company tracks the performance of artists and venues through online channels and generates analytics based on the same.

INSIGHTS FROM EXPERTS

Quote from 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.

Quote from 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.

Quote from Tadej Slapnik – Director, Tolar HashNET

Slovenia is a country of successful blockchain companies, always on the global frontiers of blockchain development and implementation.

USEFUL RESOURCES

Slovenian Blockchain Association – Website of the Slovenian Blockchain Association

Bitcoin Association Slovenia – Website of the Bitcoin Association Slovenia

Blockchain Alliance Europe – Website of the Blockchain Alliance Europe

Blockchain Think Tank Slovenia – Website of the Blockchain Think Tank Slovenia

Noordung Blockchain Hub – Website of the Noordung Blockchain Hub

Digital Innovation Hub on Trusted Data Ecosystems - Website of the Digital Innovation Hub DataTrust

ONTOCHAIN project - Website of the Next Generation Internet project ONTOCHAIN, University of Ljubljana

DECENTER project - Website of the EU-South Korean project DECENTER, University of Ljubljana

IfeelNFT - Website of digital NFT memorabilia prepared for Slovenia's Expo Dubai 2021

Blockchain Lab of University of Maribor – Website of the Blockchain Lab of the University of Maribor

Virtual currency Tax Regime in Slovenia – CEE Legal Matters

Key Figures

TOTAL FUNDS RAISED
€87 million

OFFERING PROGRAMMES RELATED TO BLOCKCHAIN
11 universities

COMPANIES ACTIVE IN THE BLOCKCHAIN SPACE
200+

Spain

THE SPANISH BLOCKCHAIN ECOSYSTEM AT A GLANCE

Spain is the second largest country of the EU 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 amongst 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 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 200 companies and startups in the blockchain and cryptocurrency space. These companies are active in a variety of verticals, with only financial services presenting a high amount of concentration. Approximately 2.3 % of the country's population is interested blockchain and digital currencies. Despite that, no less than eleven 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 17 September, 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. Eighteen total projects have been selected to participate in the sandbox, half of which utilise blockchain technologies in their operation. Of the 67 applicants in total, 10 correspond to the Bank of Spain, 4 are from the Directorate-General for Insurance and Pension Funds, and another 4 from the National Securities Market Commission.

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 Market 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 27 March 2019, the National Securities Market Commission stated that the agency has never approved or authorised projects active in the ICO sector to that date. In February of 2021 the Bank of Spain issued another warning to the public, which besides reiterating on points made in 2018's announcement, also warned against malicious advertisements and cryptocurrency derivatives. Most recently the National Securities Market Commission issued guidelines on the content and format of promotional campaigns for cryptocurrencies in an attempt to ensure that "the advertising of the products offers true, understandable and nonmisleading content, and includes a prominent warning of the associated risks."

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 focusing 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, some of 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 focuses on the areas of game theory and blockchain application development, with a primary focus on Ethereum. It also offers the "Master in Blockchain Engineering" programme, offered in Spanish as well and it is mainly focused on understanding, designing and developing models defined by the blockchain technologies, such as Ethereum, Bitcoin, etc.

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, focusing 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, focusing 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 focuses 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 – "Masters and Fintech in Blockchain": With a duration of 6 months, the postgraduate programme offered by Universidad Europea de Madrid teaches the fundamentals of blockchain design, development and implementations. The same university also offers an in-person 3-month bootcamp on blockchain technologies.

Universidad de Salamanca – "Master in Blockchain Technologies and Smart Contracts": With a duration of one academic year, it mainly focuses on Cryptography, Blockchain, Bitcoin, Smart Contracts and the Regulations surrounding them.

Universidad Internacional de Andalucia (UNIA) – "Master of Permanent Training in DLT & Blockchain": a postgraduate programme recently approved to start this year, jointly organised by University of Jaen, Alastria Association and UNIA. It is expected to start in October of 2022 and run until June 2023,recurring every academic year. Mostly, the master programme will focus on DLT and blockchain standards, network architecture, protocols and associated technologies, tokens and DeFi, self-sovereign identity and data protection in PDLs, and cybercrime. It aims to touch upon the technological, economic and legal aspect of blockchain and it is addressed to predoctoral or master alumni or any blockchain professionals who specialise in one or more of the three aspects above.

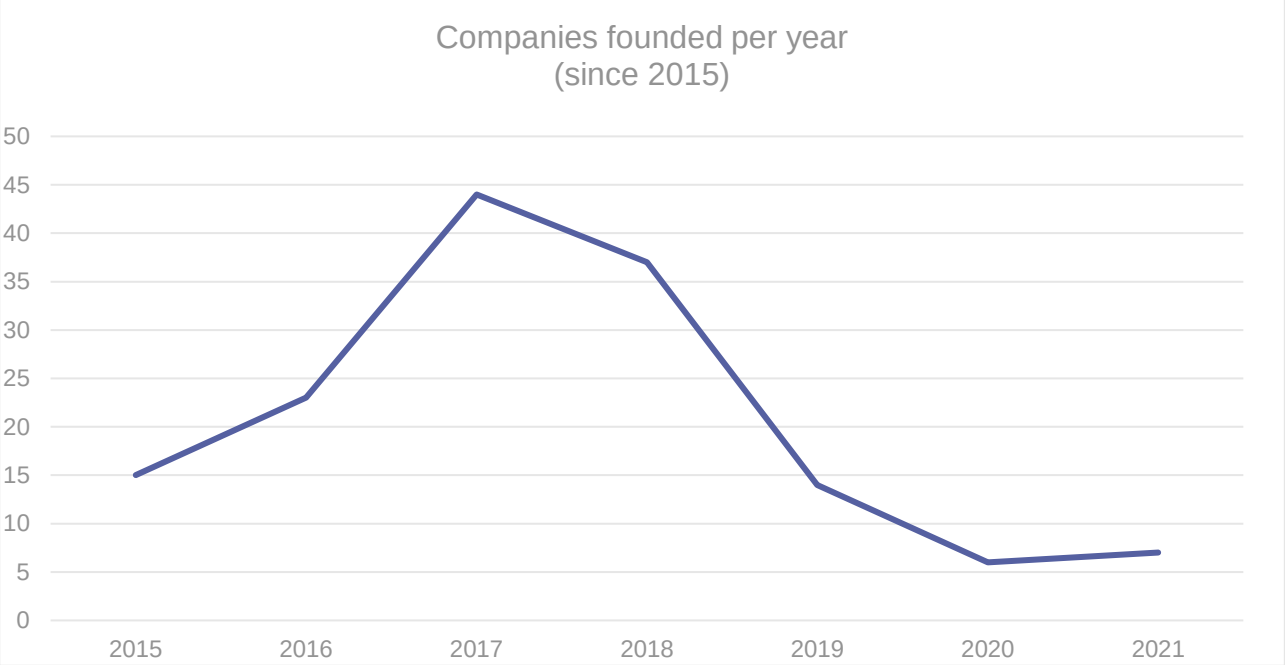
Universidad Cardenal Herrera (CEU) – "Certificate in Fintech and Cryptoactive": An online programme that lasts for 8 weeks and runs every 4 months. The certificate focuses on the areas of FinTech and crypto assets and it is mainly appealing to audiences with banking background. On the first edition of the certificate, in October 2021, the programme awarded 19 students, while in the February 2022 edition the programme was expected to surpass the number of 25 participants.

Blockchain across key industries: Spanish banks were some of the first entities in the country to explore blockchain-powered applications. BBVA issued a EUR 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

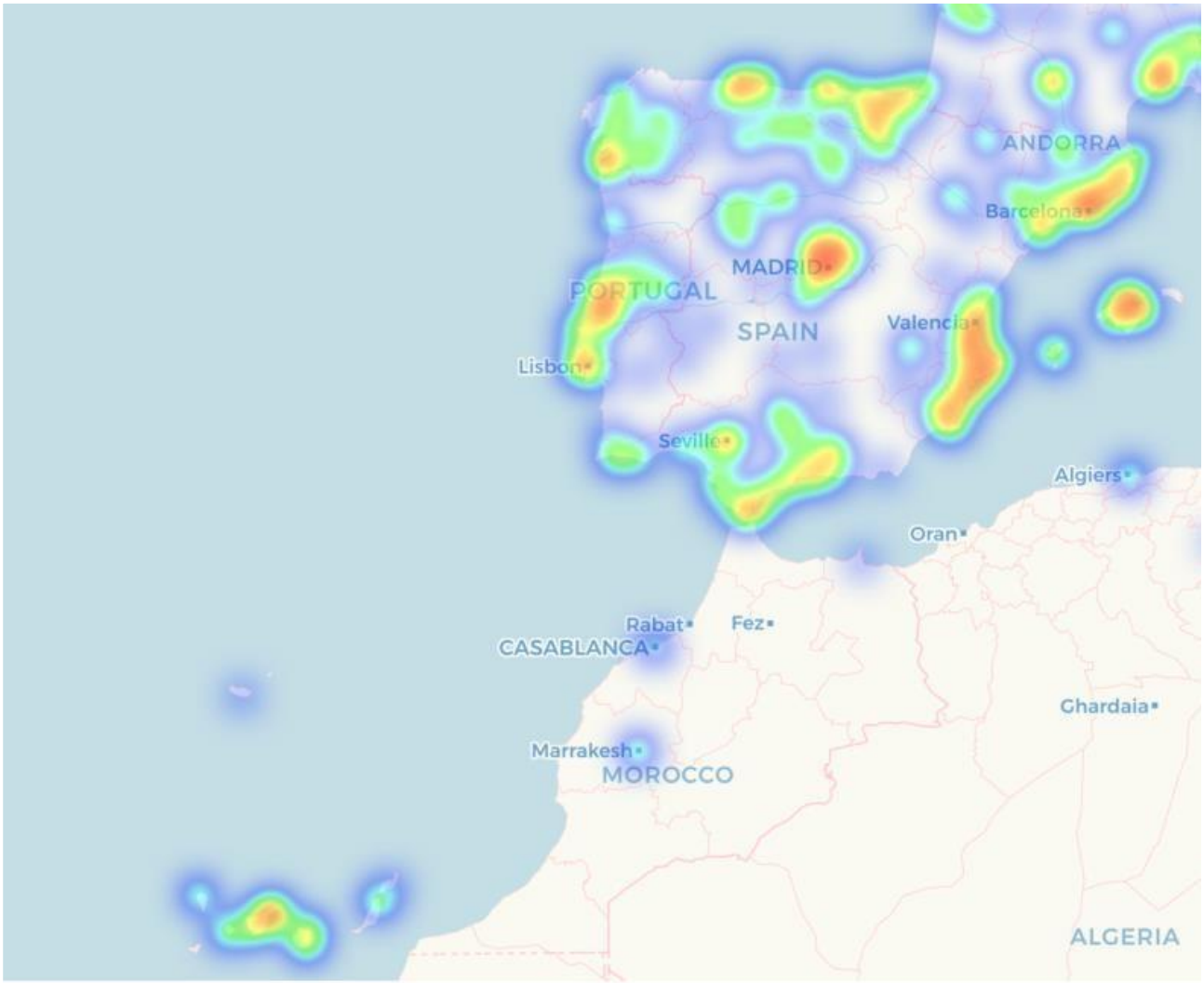
The Spanish blockchain startup and business ecosystem is active with initiatives from prominent players in traditional fields such as banking, energy, shipping, telecommunications and even sports. In 2017, 70 of the largest Spanish companies from the areas of banking, energy and telecommunications came together to form Alastria, a non-profit consortium aiming to accelerate digital transformation through blockchain technology. Today, Alastria counts more than 500 members from the private and public sectors and has developed a digital identity model, Alastria ID. In 2018, BBVA became the first global bank to issue loans utilising blockchain. In 2020, CaixaBank implemented the we.trade blockchain platform allowing smart contract-enabled trade and payments.

Spain is home to more than 212 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 EUR 80 million in funds primarily through venture funds. Blockchain companies are active in a wide range of areas, from financial services and IT to gaming and energy. Apart from financial services, no 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. Approximately 1 100 00 individuals interested in blockchain and cryptocurrencies could be identified, a number that amounts to 2.3 % of the total population.



Source for general audience: Facebook audience, ages: 16-65+, location: Spain, keywords: Blockchain (database), cryptocurrency, bitcoin, Ethereum)

INSIGHTS FROM EXPERTS

Urko Larrañaga Piedra, Blockchain Lead, IZERTIS

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Spain? Has the recent growth of the cryptocurrency markets facilitated familiarity?

In general, citizens will make use of the services offered to them, whether they are blockchain and cryptocurrencies or not. However, I do believe that in the last year the public became more interested in cryptocurrencies. Many citizens have become aware of the existence of other digital assets beyond Bitcoin and are starting to see them as a medium for alternative investments.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Spain?

In the European context, the level of maturity and size of the blockchain and cryptocurrency business ecosystem is good. Companies are constantly adapting their services and solutions making the use of blockchain easier through SaaS, PaaS or BaaS modalities. Likewise, there is also a wide range of entities that offer solutions in the field of tokenisation. Banks such as Santander and BBVA have also emerged as strong players, offering consumer facing crypto services. Despite this, it seems that the Spanish business ecosystem has slowed down lately.

What measures has Spain taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

The following initiatives are representative of Spain's crypto strategy over the last year:

- Ley 11/2021: law that legislates the obligations of crypto asset owners and service providers, regarding virtual currencies. In this law there is also a definition of what is considered a virtual currency.
- Press Release - Joint Declaration Spain Germany: a press release where Spain and Germany announce that they join forces on the development of a cross-border, decentralised digital identity ecosystem.
- The UNE standard for Digital Identity (December 2020): UNE71307-1:2020 Digital Enabling Technologies. Decentralised Identity Management Model based on Blockchain and other Distributed Ledgers Technologies. Part 1: Reference Framework.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

I believe that the key lies in providing a trust framework where services and solutions based on this technology can be built and tested. This trust framework could be completed by blockchain systems and networks that will be accepted by institutions. On the other hand, a Blockchain Sandbox could be proposed, with the objective of advancing in the validation of the solutions that have been built. In this way, it would be provided a reference trust framework for entrepreneurs.

What does the future hold for the Spanish blockchain and cryptocurrency ecosystem?

I believe that blockchain technologies have room to grow and mature in several sectors. However, the ultimate success will depend on institutional support which can come in the form of public-private partnerships. This will be true regardless of whether Spain's influence diminishes or not.

Key Figures

BLOCKCHAIN STARTUPS LAUNCHED

15+

INDIVIDUALS ORGANISED IN VIRTUAL CURRENCY COMMUNITIES

8 000+

RAISED BY BLOCKCHAIN ICOS IN SWEDEN

€40+ million

NUMBER OF ICOs IN SWEDEN

2

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. 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 central bank to promote a safe and efficient payment system. According to the dGen report, Sweden has already made significant progress in a CBDC 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. In 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.

Virtual currency legislation that applies to blockchain: The adoption of blockchain and other DLTs 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 Riksbank to work on e-krona.

Blockchain in academia: There is quite a limited number of entities that 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.

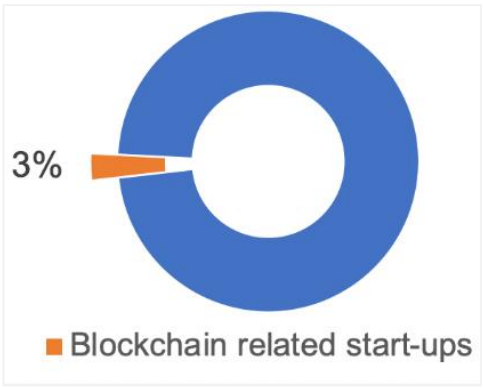
Blockchain across key industries: There are a limited number of technological startups that utilise blockchain as their underlying technological infrastructure. However, the FinTech sector intends to move forward with modern market development and evolve blockchain technologies. The government, larger 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.

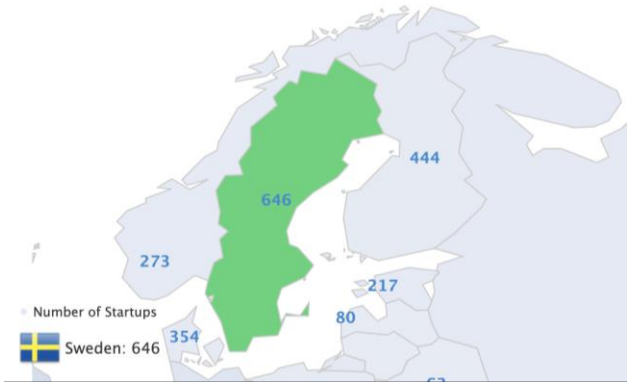
There are not many large-scale industrial blockchain applications. However, there is one project that is particularly notable. Axfoundation, together with Martin & Servera, SKL Kommentus, Sustainable Procurement (a collaboration between Sweden's provinces) and Kairos Future, collaborated to map blockchain's 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 and 20.

According to data, as for now there are 16 blockchain startups or almost 3 % of the total number of startups in Sweden.

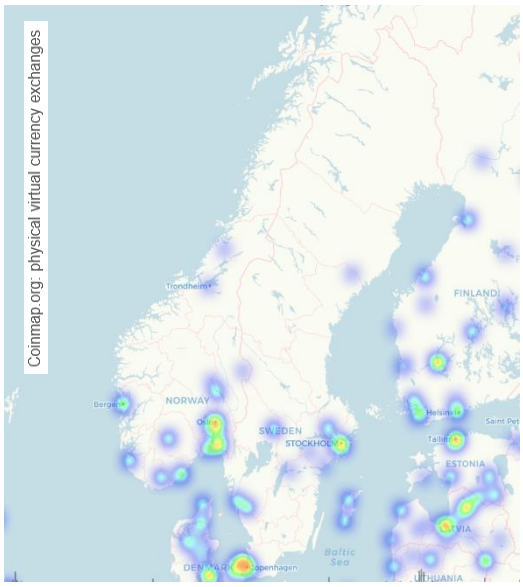




Business opportunities in the space were identified as early as 2012, with most companies founded between 2014 and 2016. Revenue numbers are hard to come by, both due to their small volume and the variety of income generation mechanisms employed by those companies and startups. The issues with identifying exact figures are amplified due to the use of virtual 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 (Swe. 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 virtual currency mining and businesses that offer trading venues for virtual 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 cryptocurrency 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: The Swedish blockchain community is mid-sized, with 2 600 LinkedIn professionals registered as working with or in the industry. With 15 regular Meetup groups and 4 500 Meetup attendees, the community is quite active. A Facebook marketing campaign indicates the audience for blockchain-related terms is 190 000.

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 cryptocurrency 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 virtual 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; and 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, euro 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: Cryptocurrency exchange platform allowing users to buy and sell Bitcoin, Ethereum, Litecoin and Monero. Offers news, analysis and explanatory texts on cryptocurrency exchange.

INSIGHTS FROM EXPERTS

The hype of blockchain and its potential applications is driving the transformation to the internet of value. Yet, there is limited insight into what companies are doing to reap its benefits.

Following interviews with experts from Sweden, it is clear that the biggest interest comes from software integrators and innovation departments wishing to reduce the operational costs from legacy software and expand their market supply. They see a tremendous marketing opportunity.

David Suomalainen, who works as an advisor to the Swedish Ministry of Infrastructure with a focus on the digitalisation of the public sector, commented that he is optimistic about blockchain implementation, but the whole implementation process will take a lot of time and other resources.

Maria Marenco, a blockchain and digital health consultant, feels enthusiastic about the possible implementation of blockchain technologies in the healthcare industry. She insists on the production of educational resources that can promote best practices and guidance around its adoption and implementation of the technology in the healthcare field.

David Suomalainen on blockchain adoption for government:

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.

Read more: "https://northsearegion.eu/bling/interviews/interview-1-david-suomalainen/"

David Suomalainen highlighted the following use cases for blockchain implementation at EU level:

- to audit bills
- for diplomas
- for self-sovereign identity
- for data sharing

Read More "https://northsearegion.eu/bling/interviews/interview-1-david-suomalainen/"

Maria Marenco on blockchain contributing to a healthcare solution:

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 cryptocurrencies.

Read more: "https://blockchainhealthcarereview.com/feature-interview-with-maria-marenco-the-state-of-blockchain-in-healthcare-in-the-uk-sweden/"

USEFUL RESOURCES

Legal500 – Articles, interviews and guides on legal activity

chainEurope – blockchain startups in Europe

Cryptocurrency Tax Information – Interactive map of cryptocurrency taxation per country

Coinmap.org – Website containing information on physical virtual currency exchanges (ATMs)

Startup Ranking – Information about startups around the world

OTHER SOURCES

Tracxn: tracxn.com

Goodfirms: goodfirms.co

Swedish Blockchain Association: swedishblockchain.se

Safello: safello.com

ChromaWay: chromaway.com

Norbloc: norbloc.com

Axfoundation: axfoundation.se

INDIVIDUALS INTERVIEWED

David Suomalainen – advisor to the Swedish Ministry of Infrastructure

Maria Marenco – blockchain and digital health consultant

Key Figures

TOTAL FUNDS RAISED / TOTAL VALUATION OF TOP 50 COMPANIES (Q1 2021)

€3.7 bn / €254 bn

DEDICATED BLOCKCHAIN SOLUTION PROVIDERS (960 INCLUDING LIECHTENSTEIN)

877/960

(PROJECTS VALUED AT ABOVE $1BN)

11 unicorns*

Cardano, Polkadot, Cardano, Solana, Cosmos, Tezos**

**Ethereum, Cardano, Polkadot, Aave, Cosmos, Solana, Tezos, Dfinity, Near, Nexo, Diem.*
***Open, public, permission-less blockchains are not owned or controlled by any singular organisation and are jurisdiction-agnostic.*

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 blockchain hotspot. The Swiss economy is amongst the most advanced 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 2021, Switzerland is reportedly home to 877 companies active in the blockchain and cryptocurrency space (960 when counting Liechtenstein), valued at EUR 254 billion in total. The top 50 companies are valued at USD 254.9 billion in total. Amongst those companies, the country counts 11 "unicorns" or projects valued at above USD 1 billion. These included the Ethereum Foundation, DFINITY, Polkadot, AAVE, Tezos, Cardano, Cosmos, Solana, Near, Nexo and Diem. Apart from initiatives in the blockchain protocol and infrastructure sectors, companies in the financial services cluster are driving innovation too. Switzerland is home to the first two blockchain banks SEBA and Sygnum, with a banking license from the Swiss Financial Market Supervisory Authority (FINMA).

The large 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 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 and 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. Those changes to existing laws came fully into force.

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 DLTs. In September 2020, the Swiss

Parliament passed the DLT blanket act, which selectively adapts 10 existing federal laws. In August 2021 one of the key changes came into force, a licence for DLT trading facilities. This is a financial market infrastructure for DLT securities that can admit other companies and persons to trading in addition to financial intermediaries. 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 reap the benefits of blockchain, 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. In September of 2021 the Swiss government started a public discussion on E-ID where one variant is self-sovereign identity. 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 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 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.

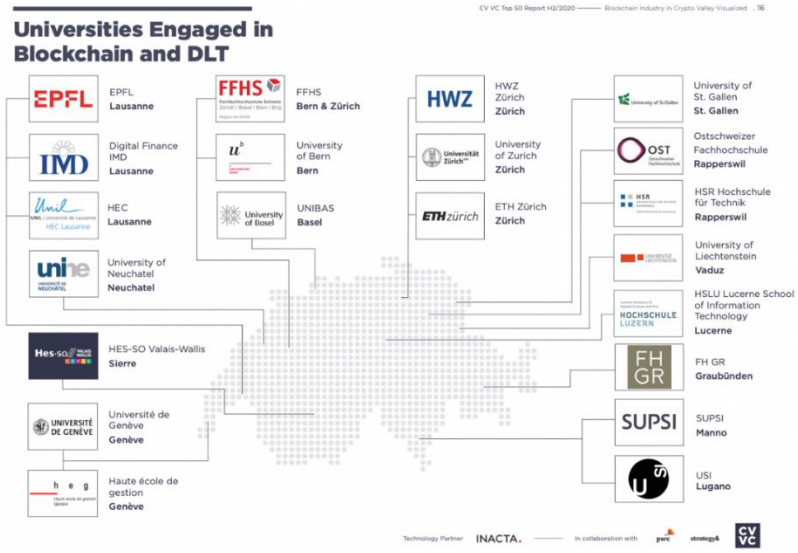
Tax rates and rules vary between the individual cantons. Digital currencies are generally treated as foreign currencies for the purposes of wealth taxation. Their exchange value is determined by the Federal Tax administration at the end of the year, with assets that do not receive an official evaluation 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.

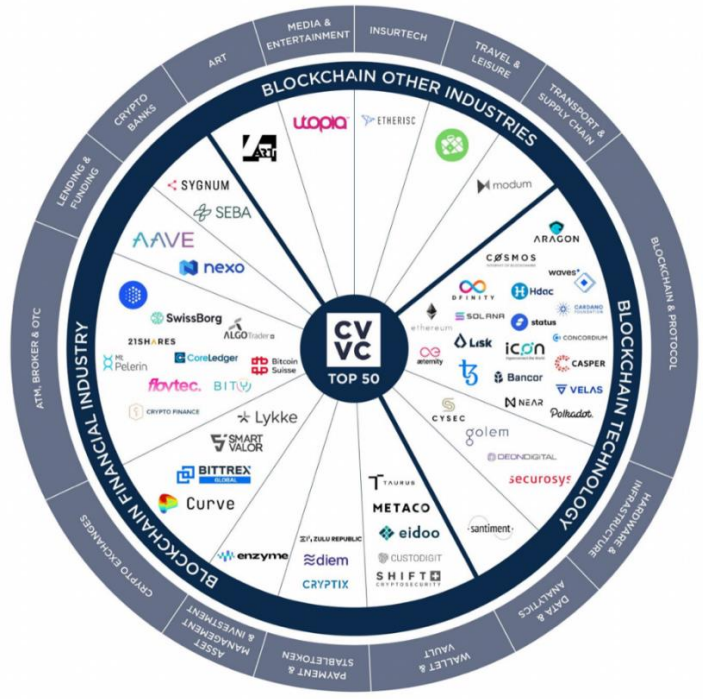
Blockchain in academia: Currently, blockchain education in Switzerland primarily comprises singular courses often concerning blockchain in addition to other transformative technologies, offered by both companies and universities. While many such initiatives exist, some indicative programmes offered by 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.

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.



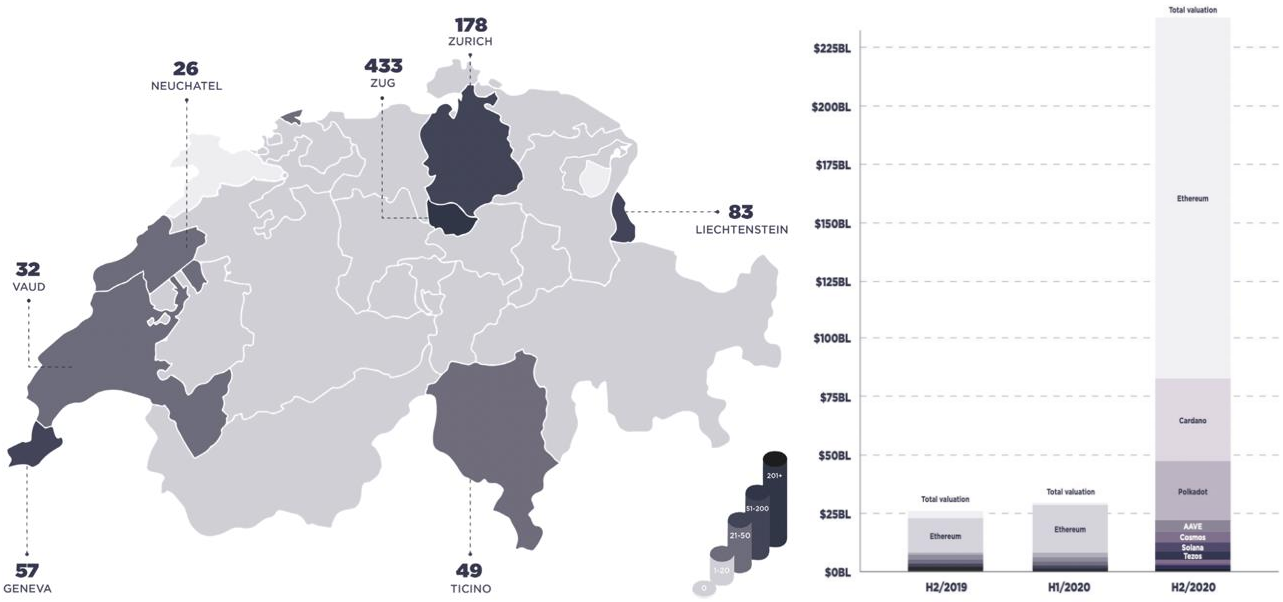


Crypto Valley Top 50 companies per sector

BLOCKCHAIN STARTUP AND BUSINESS SCENE

Data primarily derived from CV VC's Q1, 2021 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 877 blockchain businesses that employ 5 184 individuals are active nationwide. The top 50 organisations in the country have received upwards of USD 3.7 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 US.



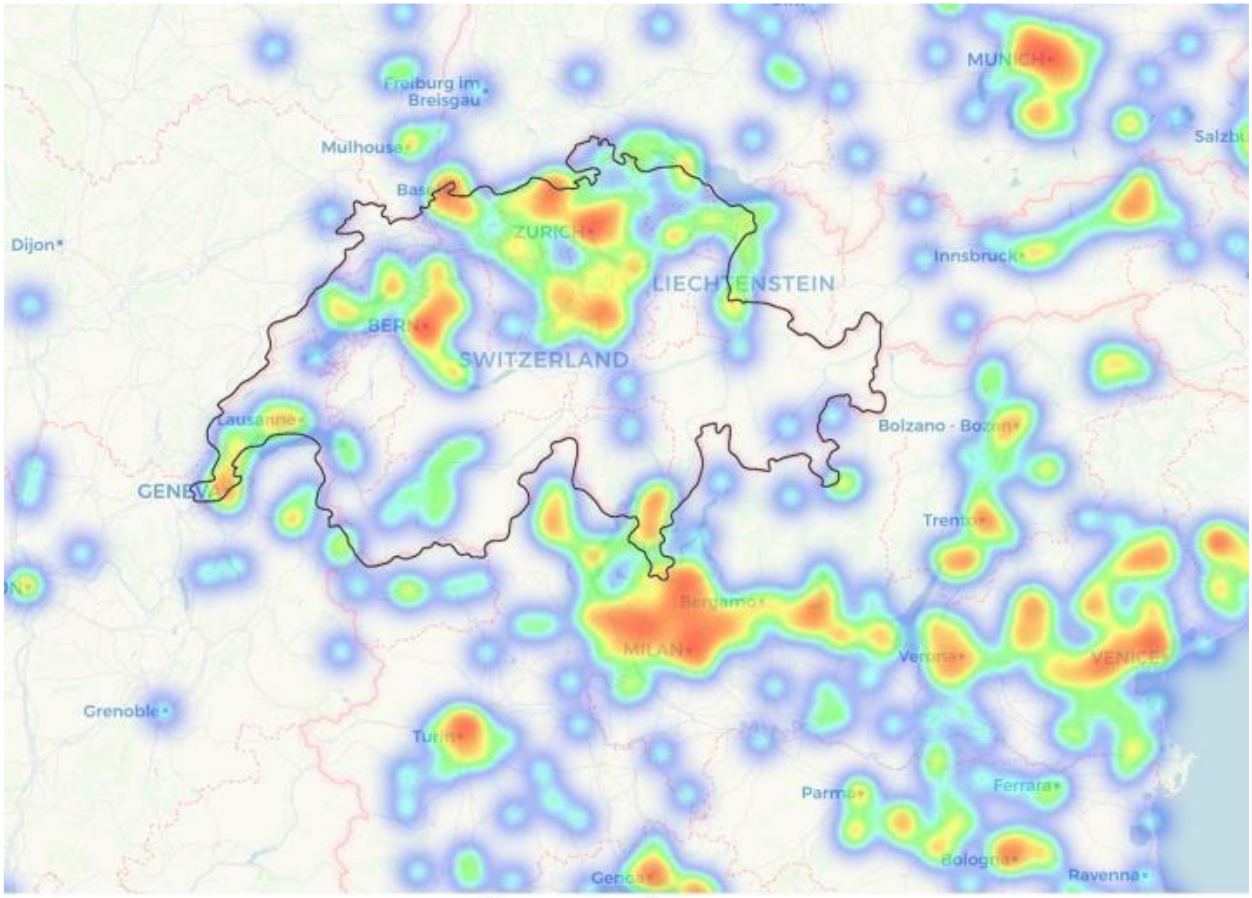
The so-called Crypto Valley, an area spanning the canton of Zug to Liechtenstein, is presenting the highest concentration of blockchain businesses. CV VC's biannual report highlights seven crypto hotspots in Crypto Valley: Zug, Zurich, Geneva, Ticino, Liechtenstein, Vaud, and Neuchatel. As of February 2021, the area counts at least eleven "unicorns": Ethereum (USD 157.2 bn), Cardano (USD 40.6 bn), Polkadot (USD 29.3 bn), Aave (USD 3.9 bn), Cosmos (USD 3.8 bn), Solana (USD 3.3 bn), Tezos (USD 2.6 bn), Dfinity (USD 2 bn), Near (USD 1.1 bn), Nexo (USD 1.1 bn) and Diem (USD 1 bn). The valuation of the Crypto Valley top 50 companies has increased 680 % to USD 254.9 billion from USD 37.5 billion. Companies are active in a wide range of verticals, In total, CV VC's report identifies six verticals of digitalisation where blockchain technology is used: 1) future of work, 2) lifestyle & health, 3) education & science, 4) security & identity, 5) e-commerce & logistics, and 6) finance & investing. The growth of DeFi has also influenced demand for enterprise crypto custody and brokerage solutions, contributing to the growth of crypto banks, such as SEBA and Syngum.

BLOCKCHAIN COMMUNITY

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 or Blockchain Federation have emerged as blockchain hubs for blockchain enthusiasts and businesspersons alike. Subject matter communities like DIDAS (self-sovereign identity), Swiss Association of Crypto Investors, Bitcoin Association or Multichain Asset Managers Association enrich the ecosystem and drive topics forward. Conferences on blockchain technology and related topics are hosted regularly too. Fears about bankruptcy of Crypto Valley's firms due to the COVID-19 pandemic were not confirmed.

While past reports suggested that more than two thirds of Crypto Valley's firms were likely to go bankrupt due to the COVID-19 pandemic, in practice the Crypto Valley proved resilient. The COVID-induced digital transformation was a boon for the crypto market. The number of companies in the Crypto Valley increased, as did the number of employees (from 4 780 to 5 184). There is a total of 136 blockchain groups and communities of practice.

(Source for Community Members: Facebook Audience. Ages: 16-65+, Locations: Switzerland, Keywords: Block Chain (database), cryptocurrency, Bitcoin, Ethereum | Source for Community Members)



Source: coinmap.org

INSIGHTS FROM EXPERTS

Tim Weingärtner, Lucerne University of Applied Sciences and Arts

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in Switzerland? Has the recent growth of the cryptocurrency markets facilitated familiarity?

The public awareness for blockchain is constantly rising. This is due to the legal changes, NFT hype, DeFi market, rising cryptocurrency prices, growing number of blockchain projects, and public discussion on blockchain related technologies like SSI (self-sovereign identity). You find a lot of blockchain-related reports in newspapers and media. There is often an ambivalent discussion due to energy consumption of Bitcoin.

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in Switzerland?

Switzerland has one the most mature blockchain and cryptocurrency ecosystems in EU if not the world. There are two crypto banks (SEBA and Sygnum) with banking licences and a new licence for a crypto exchange (SDX). Switzerland has as very blockchain-friendly jurisdiction and due to the legal changes a high legal security.

In the last years the number of non-cryptocurrency projects are rising.

What measures has Switzerland taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

- Adaptations to existing laws
- There is a public discussion e-ID and their implementation using SSI
- Banking licenses for crypto banks and crypto exchange.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

The most important aspect from my point of view is blockchain education. There is still a lot of ignorance and false knowledge in the public. Like digitalisation, a basic knowledge on blockchain needs to be spread to all population segments. In Switzerland, there are some initiatives to bring the blockchain topic into schools. Furthermore, there is an initiative for a blockchain certification (DEC). The COVID pandemic has also greatly increased the number of company startups in Switzerland.

What does the future hold for the Swiss blockchain and cryptocurrency ecosystem?

There are some interesting projects in discussion or in the pipeline, like Cardossier, an e-ID, etc. The growing digitalisation and growing demand for digital ecosystems promote blockchain-based implementations. Furthermore, hyped topics like NFT foster the discussion on applications outside the art market (supply chain, music, etc.). Finally, DeFi is a fast-growing market and gains attraction. 2022 will be a very interesting year and we will see many new projects and implementations.

Key Figures

TOTAL FUNDS RAISED

€3.8 bn

DEDICATED BLOCKCHAIN SOLUTION PROVIDERS

1 000+

OF THE ADULT POPULATION AWARE OF BLOCKCHAIN AND CRYPTOCURRENCIES

78 %

United Kingdom

THE UK BLOCKCHAIN ECOSYSTEM AT A GLANCE

Located off the north-western coast of Europe, with a population of 67 million, the UK is the second largest European economy and the fifth largest in the world by nominal GDP, with its growth primarily driven by financial services. The UK constitutes one of the most important financial centres of the world.

Country officials showed great interest in blockchain and DLTs 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 introduced no specific cryptocurrency laws and have adopted a neutral approach towards blockchain and DLT.

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 1 000 companies and startups active in the space, primarily active in the financial services space. Those have collectively raised north of EUR 3.8 billion in funding through a combination of venture funds and alternative forms of blockchain crowdfunding. London in particular, has emerged as a definitive hub and is home to the vast majority of blockchain companies.

TOWARDS MAINSTREAM ADOPTION

Regulation and 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 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."

Blockchain Industry in the UK: Government Agencies and Hubs

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. The Legal Statement on the Status of Cryptoassets and Smart Contracts by the UK Jurisdiction Taskforce of the LawTech Delivery Panel (the UKJT) has been instrumental in legal discussions on blockchain and DLT and, crucially, leading the way in defining crypto assets as property across several jurisdictions. Legislation is not, therefore, the only place to focus on developments in the law on crypto assets, or by extension blockchain and DLT. Yet, 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.

Cryptocurrency 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. Stand-alone courses exist too, such as:

a) "Blockchain Software Engineering" and "Oxford Blockchain Strategy Programme" course by the University of Oxford

b) "Blockchain and Digital assets" course by City, University of London

c) "Blockchain Programming" by the University of London

d) "Blockchains and Distributed Ledgers" curriculum course by the University of Edinburgh

e) "UCL Blockchain Rules Online Programme" by University College London

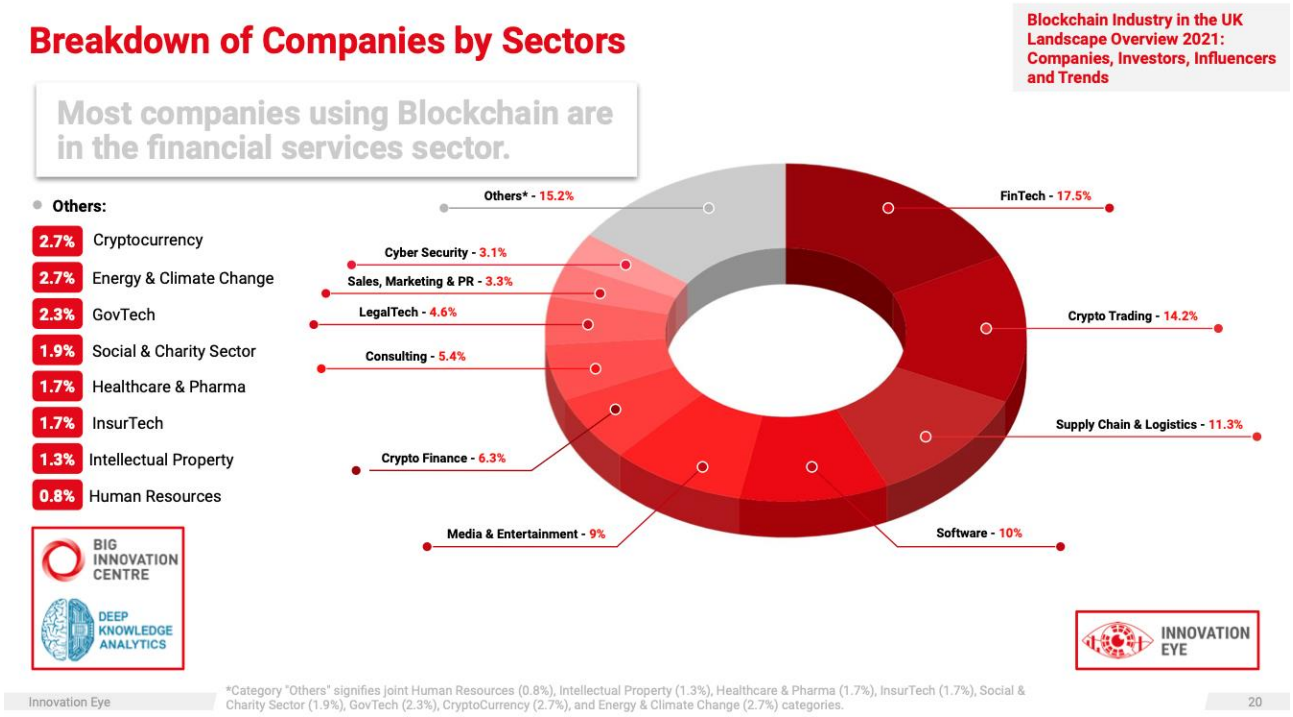
f) "Distributed Ledger Technologies: Foundations and Applications" curriculum course by the University of Cambridge

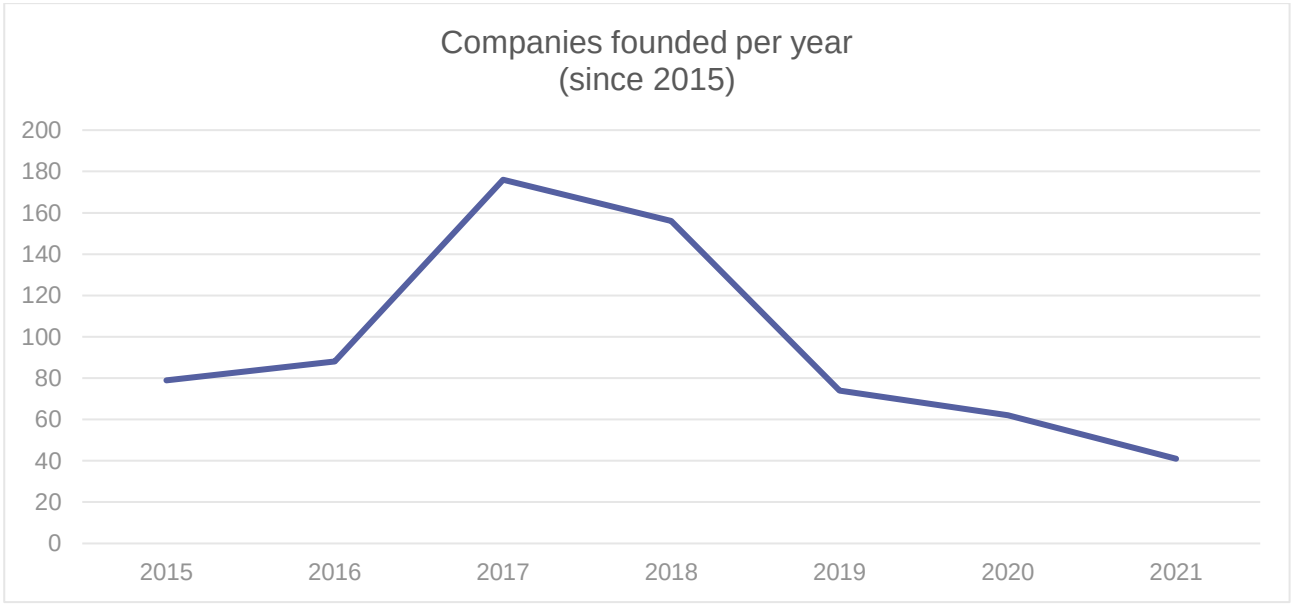
g) "Blockchain Technology: Foundations, Applications and Implications Masterclass" by Imperial College London

h) "MSc Financial Technology (FinTech)" by the University of Exeter

i) "Introduction to Blockchain and Distributed Ledger Technology (DLT)" by the UCL Centre for Blockchain Technologies

Blockchain across key industries: Taking advantage of the country's large financial services sector, blockchain companies have leveraged existing expertise and infrastructure in their offerings. The majority of blockchain startups and initiatives fall, one way or another, under the financial services or FinTech sector. The energy and creative industries are two emerging sectors in terms of blockchain application.

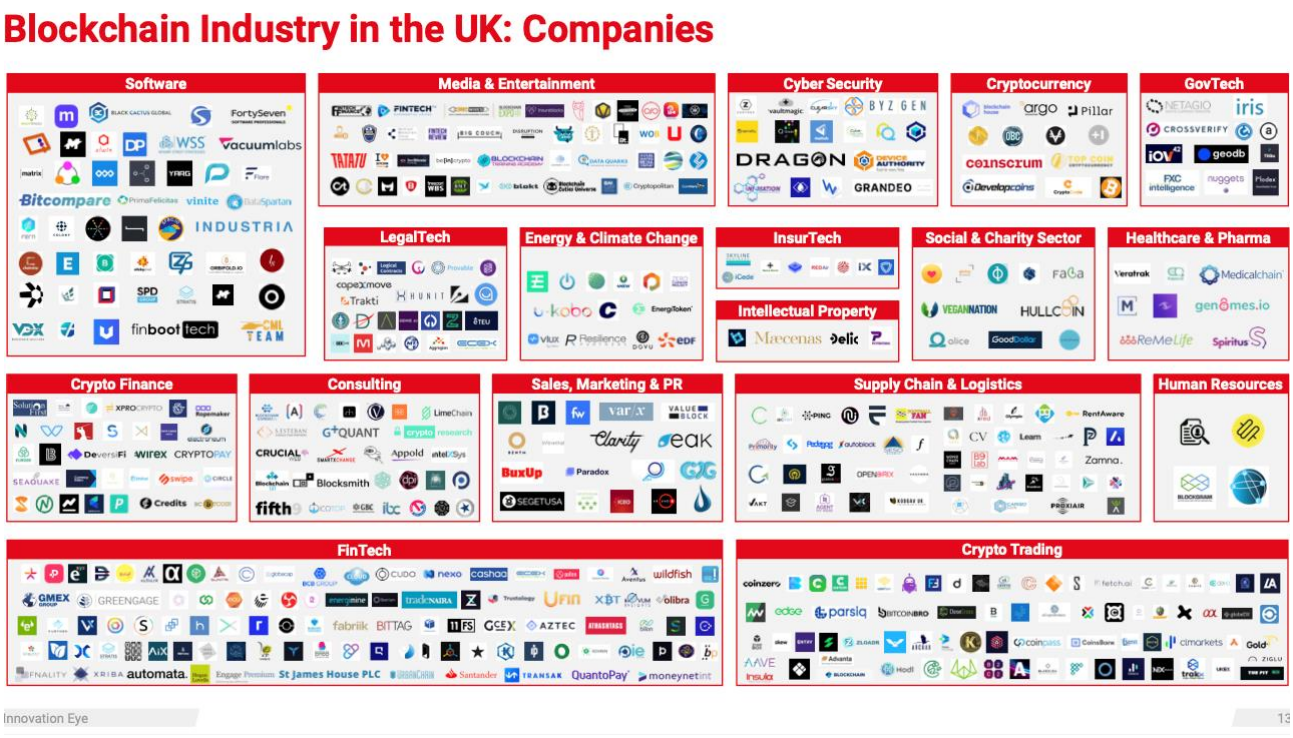




BLOCKCHAIN STARTUP AND BUSINESS SCENE

Following initial enthusiasm for ICOs, the number of blockchain companies in the UK rose rapidly from 2015 to 2017, before declining sharply to pre-2015 levels. More than 300 companies have raised north of EUR 3.8 billion, with an average of 4 investors per company.

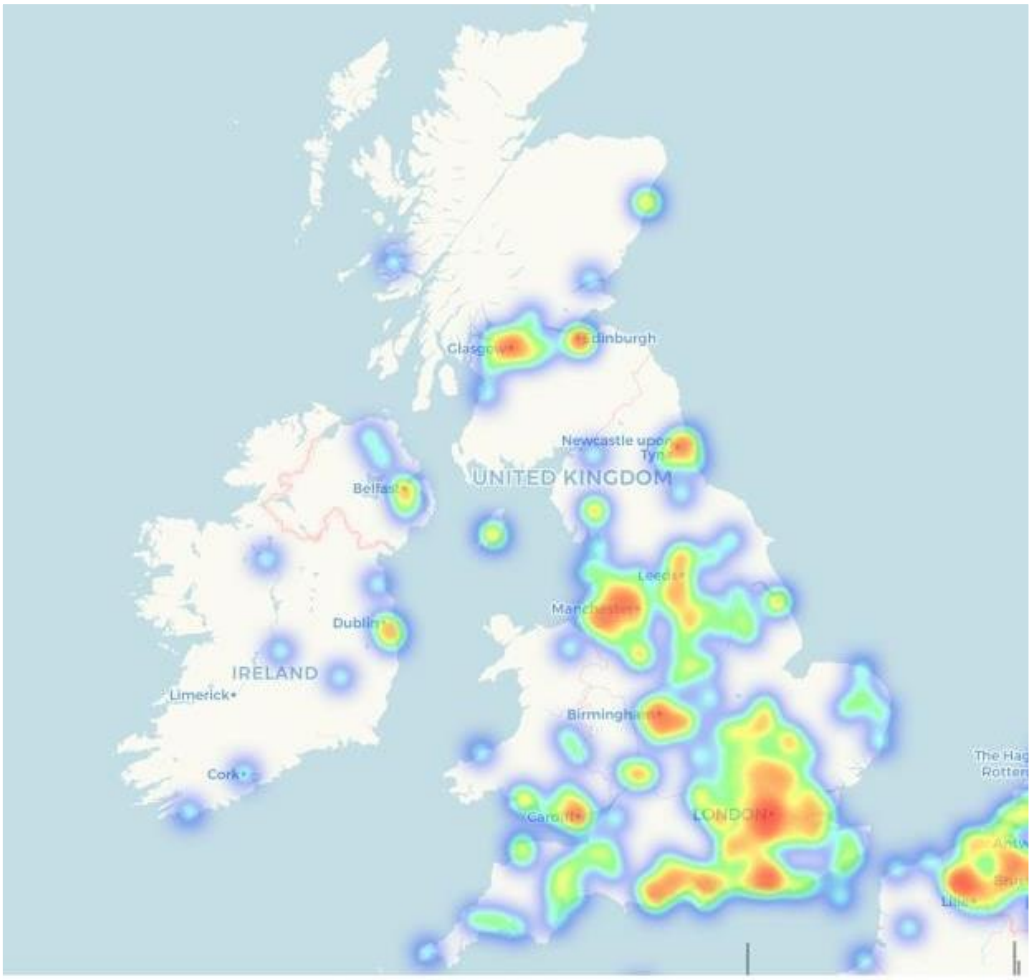
Reports from the All-Party Parliamentary Group on Blockchain (APPG Blockchain) and the digital technologies agency Digital Catapult further reaffirm the above. In Digital Catapult's report, the lack of regulatory clarity and a deficit of legal experts in the field were highlighted as key sources of concern 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 2021 consumer research report, 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 4.4 % of the adult population own digital currencies at present (up from 3.9 % in 2020).

The median holding has also risen from EUR 310 in 2020 to EUR 360 in 2021. Additionally, 78 % of the adult population reported having heard of cryptocurrencies and is less likely to cite them as a gamble. Digital currency owners are predominately male, over 35, who acquired digital currencies as a gamble, or alternative investment. More than half of cryptocurrency users plan to buy more, citing that "they know they will make money at some point". Additionally, participants in the updated review seem less well versed on the technicalities of cryptocurrencies.



Source: coinmap.org

INSIGHTS FROM EXPERTS

Robert Herian, Senior Lecturer in Law, Open University. Co-founder Law Information, Future, Technology (LIFT) research group and the Equity and Trusts Research Network (ERTN)

How would you evaluate the public awareness and adoption of blockchain and cryptocurrency in the UK? Has the recent growth of the cryptocurrency markets facilitated familiarity?

In the last 24 months, media coverage of cryptocurrencies in the UK has increased significantly, with more mainstream discussion of cryptocurrencies and blockchains (e.g. BBC news). Although cryptocurrencies inevitably grab headlines ahead of other uses for blockchain because of an inability for cryptocurrency (i.e. Bitcoin) to shake off associations with criminality and a reputation for wild instability and high-risk investment. In the last half of 2021, media interest in non-fungible tokens (NFTs) has contributed to interest in blockchain-based technologies.

The UK Parliament, spearheaded by the All-Party Parliamentary Group on Blockchain (APPG Blockchain), in collaboration with the Big Innovation Centre, continues to promote and develop industry and entrepreneurial initiatives, including those relating to crypto finance (DeFi), currency, trading, and FinTech assuming, collectively, the largest share of activity. Such activity aims to influence and drive consumer uptake, albeit with some degree of critical oversight from regulators and academia. And from a critical perspective, promotion of blockchain along these lines arguably informs the notion that the technology remains, in many use cases, “a solution looking for a problem”. Familiarity with and growth across collective crypto finance markets is notable. Currency platforms, in particular, have been beneficiaries of the public’s increased awareness, with over 2 million people in the UK now actively involved in crypto investment and trading, although average investment amounts remain modest to low (approximately GBP 300).

How would you evaluate the overall size and maturity of the blockchain and cryptocurrency business ecosystem in the UK?

The APPG Blockchain / Big Innovation blockchain landscape report for the UK at the close of 2021 points to four key factors that show blockchain in the UK is a growing and maturing business ecosystem. Although, as I describe in my answer to question 1, most businesses are dealing with cryptocurrency trading, which may generously be said to include FinTech and DeFi solutions. The four factors are increased investor confidence in blockchain; notable transition from concept to use case in sectors, including energy; growing talent pool; better alignment between businesses and regulators. The UK remains at the early stages of each of these four indicators of business maturity and, although the overall size of the blockchain and crypto business ecosystem is growing; it is not doing so only, but integrated into existing business models. To that extent, it is perhaps more accurate to refer, at least, to non-currency blockchain applications as an evolution in existing “back-office” systems (applications layers) rather than growth in standalone businesses. Blockchain as a service (BaaS), which is yet to come to fruition, may be transformative. Although there is an obvious risk that BaaS becomes dominated by a single actor (i.e. akin to AWS- Amazon Web Services).

What measures has the UK taken over the past year in terms of public sector initiatives and legislation to promote blockchain and cryptocurrency adoption?

Whilst no legislation yet exists regarding blockchain, DLT or cryptocurrency, the UK government and Law Commission have both been looking at the need for specific legislation or law reform in areas concerning the technologies. Research and discussion are ongoing, but the tone is one of acceptance of self-regulation at present and that existing law can capture and deal with the novel issues the technologies may create. See, for example, the Law Commission report on smart contracts. There are many initiatives underway in the UK, driven by the various hubs within the Big Innovation blockchain ecosystems. The British Blockchain Association’s “Roadmap” also ties in with UK government initiatives aimed at furthering the uptake of blockchain across different public and private sector organisations.

What measures can be taken at a national and European level to promote blockchain and cryptocurrency adoption by the public while also making it a more appealing option for entrepreneurs?

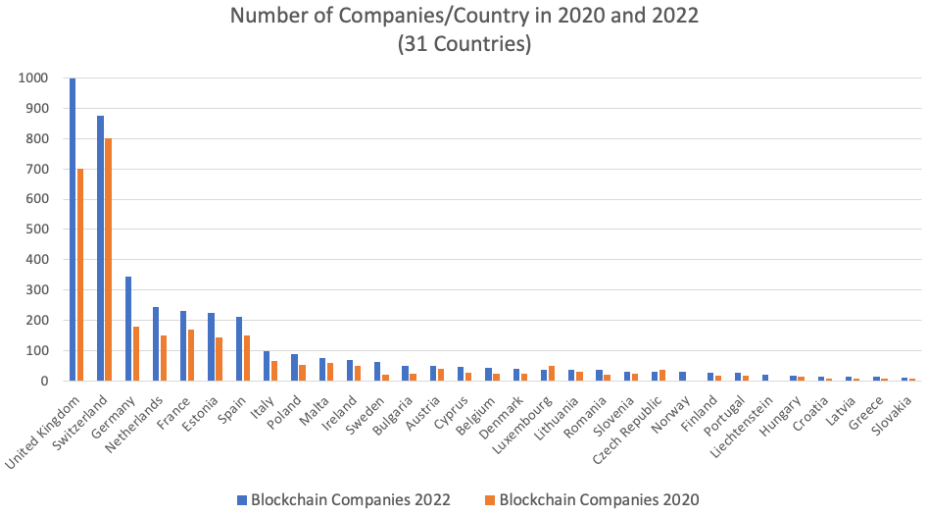
This is an interesting question because it implies misalignment between the desires of entrepreneurs and those of the public. Is it ultimately a question of what technology is relevant and/or necessary in today's societies? I point again to the criticism that blockchain (and, perhaps, by extension other technologies it supports, notably cryptocurrencies and NFTs) are a solution looking for a problem. Public enthusiasm for a technology can be influenced, but better a technology is useful and, therefore, a social and economic good. Measures taken to promote blockchain pervasively and expansively should be directly proportionate to the public benefit, not for the gratuitous advantage of a small portion of stakeholders. To help achieve this, I have spoken previously of the need for "critical regulators" that take seriously public benefit (see: Robert Herian. 2018. Regulating Blockchain: Critical Perspectives in Law and Technology. Routledge).

What does the future hold for the British blockchain and cryptocurrency ecosystem?

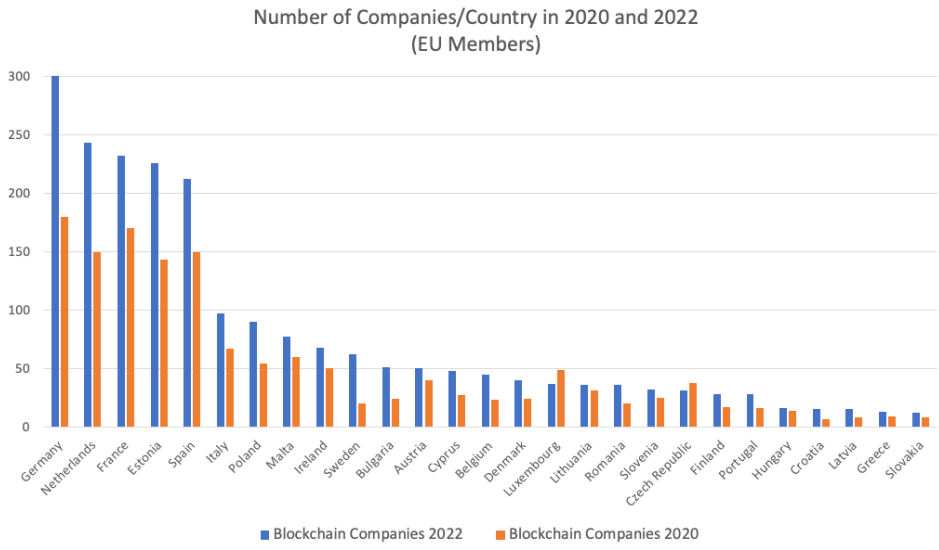
As a global leader in financial services, I'm sure many would like to see the UK lead in blockchain and crypto ecosystems. I'm not convinced existing cryptocurrency markets are a desirable endgame for public or private stakeholders in the UK. From the government perspective, there is a keen interest in seeing how far CBDCs can develop and whether there is an appetite for integrated payment systems for public sector revenue streams such as tax and welfare. It is perhaps less clear how effective or successful non-cryptocurrency blockchain and DLT solutions will be in the UK. Supply chain provenance, for instance, has long been an area many see would benefit from blockchain integration. If such integration happens, it will be low key, done with very little fanfare, and simply because of economic rationality. Because blockchain and DLT provide a more cost-effective means of conducting business, including international trade and shipping. However, I believe there may be a small window of time in which present blockchain and DLT solutions across financial and non-financial sectors can prove themselves. This is because quantum computing, including quantum computing as a service (which may also lead to quantum blockchains as a service), will prove far more effective at optimising business models.

BLOCKCHAIN ECOSYSTEM GROWTH & COMPARISON WITH PAST REPORTS

The European blockchain ecosystem continues to grow fast. Initiatives to standardise regulation at the EU level enables EU Member States to benefit from the momentum of the growing blockchain and cryptocurrency space. Individual countries continue to issue their own legislation and guidance for blockchains and cryptocurrencies to develop their domestic ecosystems. In this section we will showcase the growth of the blockchain and cryptocurrency ecosystem across the observed countries by comparing the updated data collected in December of 2021 and included in this report on the blockchain ecosystem, with that collected in Summer of 2020 and included in the previous report.

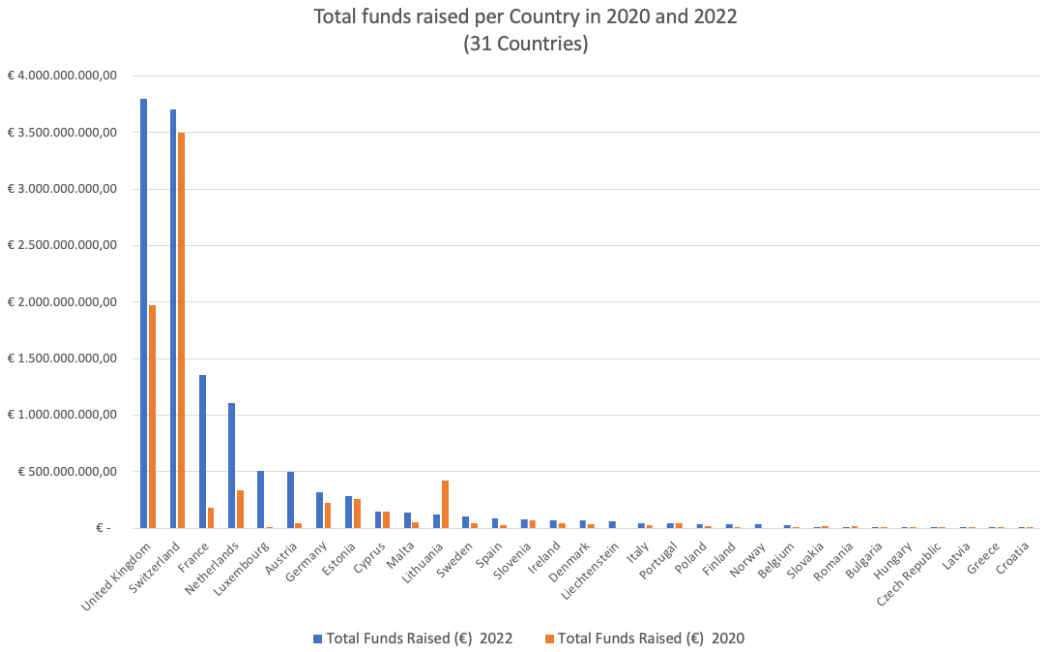


In terms of the business ecosystem, the number of blockchain businesses in Europe, Switzerland and the UK increased by 39 % from 2 924 in 2020 to 4 060 in 2020. Norway and Liechtenstein account for 30 and 20 blockchain businesses, respectively, bringing the total up to 4 110, of which 46 % are registered in EU Member States.



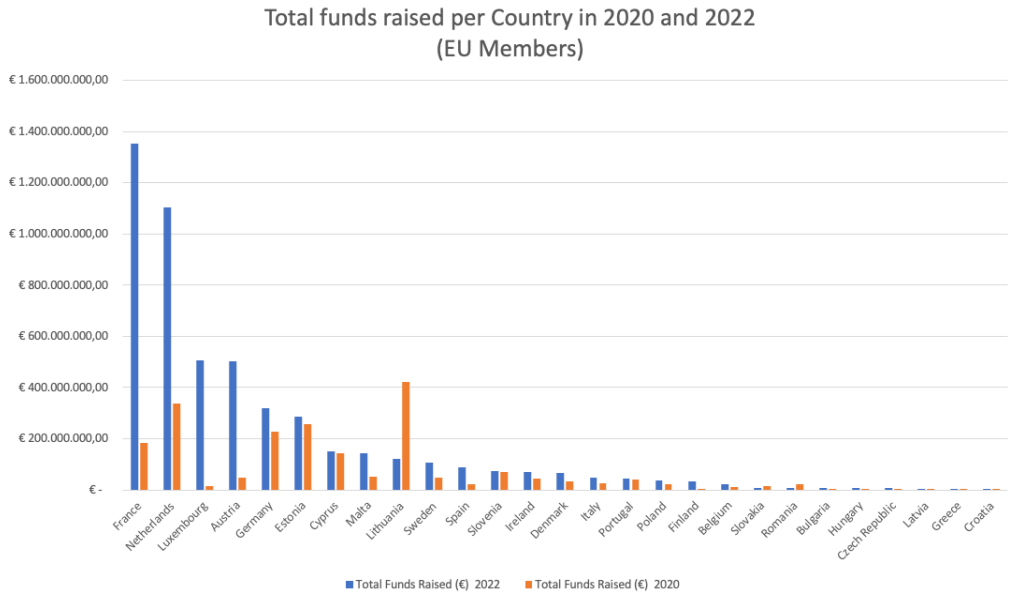
European countries exhibited the largest increase in the number of blockchain companies with Sweden, Croatia and Bulgaria at the top. The average growth across the 31 countries was 56 %.

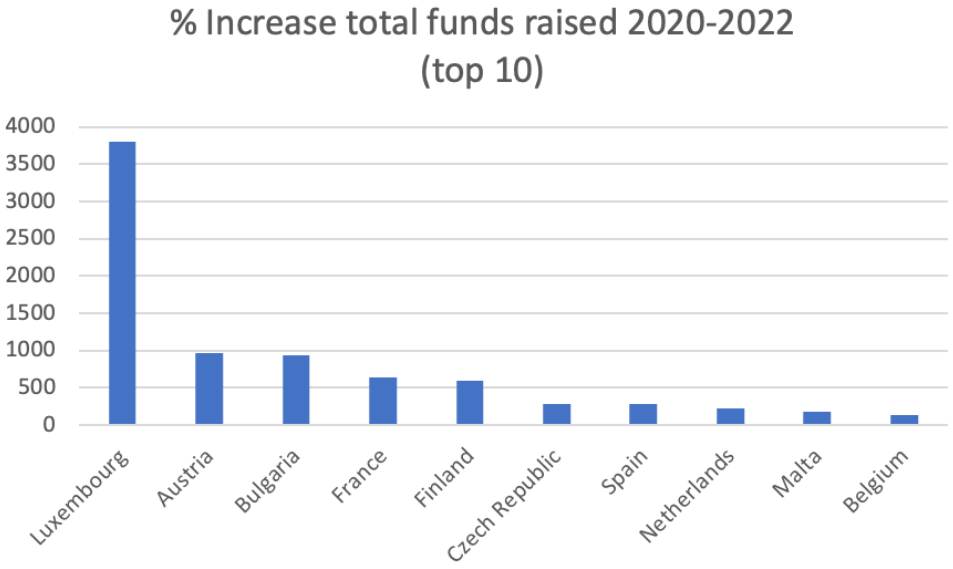
The total number of funds raised by companies in the 29 countries analysed in both reports amounts to EUR 12.6 billion in 2022, an increase of 70 %. The addition of Norway and Liechtenstein bring this number up to EUR 12.7 billion.



Total funds raised by companies established in EU Member States add up to EUR 5.1 billion, or 40 % of the total funds raised by the 29 countries observed.

The average increase in total funds raised across the 29 analysed countries amounts to 173 % (excluding the extreme case of Luxembourg). As with the number of blockchain companies, EU countries again exhibited the highest increase, with Luxembourg, Austria, Bulgaria, France and Finland in the top 5.





No pattern can be identified regarding the increases in the number of companies or funds raised, possibly hinting to the natural expansion of the industry, and the Union's moves towards standardising regulation.

Finally, the table below summarises our findings regarding the number of blockchain startups in each EU Member State (plus Norway, Liechtenstein, the UK and Switzerland), as well as the total amount of reported funds raised by these companies. The list provides a first categorisation 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 (€)		Funds Per Capita (€)	
	2022	2020	2022	2020	2022	2020
Austria	50	40	€ 501.332.070,00	€ 47.000.000,00	56,22079464	5,305339203
Belgium	45	23	€ 22.616.844,80	€ 9.500.000,00	1,956474464	0,828970332

Bulgaria	51	24	€ 6.389.974,80	€ 620.000,00	0,922435007	0,088571429
Croatia	15	7	€ 104.922,40	€ 50.000,00	0,025924689	0,012321341
Cyprus	48	27	€ 149.739.879,52	€ 142.000.000,00	168,6259905	162,1189634
Czech Republic	31	38	€ 5.516.757,00	€ 1.450.000,00	0,515584766	0,135640786
Denmark	40	24	€ 65.156.044,80	€ 32.300.000,00	11,17331083	5,563210472
Estonia	226	143	€ 285.012.344,32	€ 257.000.000,00	215,6064666	193,3784801
Finland	28	17	€ 31.906.170,56	€ 4.600.000,00	5,768899991	0,833635375
France	232	170	€ 1.353.542.531,00	€ 181.500.000,00	20,0847425	2,709359606
Germany	343	180	€ 320.576.878,16	€ 227.500.000,00	3,851211864	2,740963855
Greece	13	9	€ 151.360,00	€ 147.000,00	0,014125267	0,013712687
Hungary	16	14	€ 5.594.029,76	€ 4.000.000,00	0,573760765	0,409290904
Ireland	68	50	€ 69.097.546,32	€ 45.000.000,00	13,83411809	9,176182708
Italy	97	67	€ 47.391.179,44	€ 25.600.000,00	0,795767934	0,424121935
Latvia	15	8	€ 2.135.012,00	€ 2.000.000,00	1,122774579	1,041666667
Liechtenstein	20	N/A	€ 63.168.348,32	N/A	16562,23081	N/A
Lithuania	36	31	€ 119.557.315,00	€ 422.000.000,00	42,78001753	151,0379384
Luxembourg	37	49	€ 507.196.331,84	€ 13.000.000,00	802,1831367	21,17629428
Malta	77	60	€ 141.781.173,60	€ 51.000.000,00	269,9154234	99,1130355
Netherlands	243	150	€ 1.102.503.952,00	€ 337.000.000,00	63,21283769	19,50231481
Norway	30	N/A	€ 30.512.868,00	N/A	5,54806755	N/A
Poland	90	54	€ 38.161.148,08	€ 20.000.000,00	1,005542652	0,52673163
Portugal	28	16	€ 44.006.294,64	€ 40.000.000,00	4,270150738	3,891050584
Romania	36	20	€ 7.443.370,00	€ 20.000.000,00	0,385944399	1,030396703
Slovakia	12	8	€ 7.612.306,24	€ 13.700.000,00	1,394494102	2,510076951
Slovenia	32	25	€ 73.782.085,52	€ 67.700.000,00	35,13215159	32,53243633
Spain	212	150	€ 87.126.423,12	€ 23.000.000,00	1,82082389	0,489987218
Sweden	62	20	€ 105.450.373,00	€ 47.330.000,00	10,18505666	4,626588465
Switzerland	877	800	€ 3.700.000.000,00	€ 3.500.000.000,00	421,7179261	408,4014002
UK	1000	700	€ 3.800.000.000,00	€ 1.970.000.000,00	56,53475571	29,55738935

**All data on funding figures sourced from the crowdsources database of Crunchbase in December of 2021. Keywords used: Figures converted from US dollar to euro exchange rates at a rate of 1:0.88.*
Data on Switzerland sourced from CV VC's Top 50 Report

Education initiatives

European universities have offered academic programmes focused on blockchain and virtual currencies since 2013 (the University of Nicosia's MSc in Digital Currency being the first such programme in the world and the largest to date), while the number of programmes 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 programmes, an increased interest by PhD candidates, as well as numerous professional and

executive qualification courses. We have identified more than 20 postgraduate programmes (at the master's level) that focus on blockchain and virtual currencies, offered by universities in 14 European countries, with Spain leading the pack with no less than 10 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. Programmes can be segmented in three distinct categories and their combinations:

- Programmes that focus on the technology of blockchain and distributed ledgers.
- Programmes that focus on virtual currencies and digital assets.
- Programmes that incorporate blockchain and/or virtual currencies under a wider umbrella that includes FinTech, RegTech, the digital economy, international management, and other so-called exponential technologies, such as AI, 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. Moreover, many UK universities, including the universities of Strathclyde, Sussex, Manchester, Stirling, SOAS, Coventry, Oxford, LSE and City, follow a similar approach, as well as many Spanish universities like University of Barcelona, Universidad Europea de Madrid, University of Girona, Universidad Internacional de Andalucia and many more. If this trend is to prevail, one can expect an extended incorporation of blockchain and virtual currency educational material in relevant existing curricula, and less new stand-alone programmes, 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 programmes are taught in English, with only a few exceptions. From the above, we can denote those programmes in the field have an international focus.

There is a 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, 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 UNIC's offerings have expanded to also include 8 professional training and academic certification courses, in addition to the MSc degree. In 2021, UNIC introduced the first MOOC on DeFi in the world as well as the UNIC Open Metaverse Initiative.

There is a total of 10 universities in Spain offering postgraduate programmes and stand-alone courses on blockchain and virtual currencies. Through their academic programmes, these institutions cover a wide range of topics in the blockchain space, including, but not limited to: smart contracts, decentralised autonomous organisations, game-theoretical elements, regulation, tax, cryptography and monetary policy. Most programmes 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 programme for blockchain graduates and counts over 30 university members.

Covering an area of 316 km^2 and counting a population of 500 000, Malta is the smallest country in Europe that offers more than one dedicated blockchain programme. The three-semester MSc in Blockchain and DLT

technologies offered by the University of Malta is one of the programmes that focuses on the technical aspects of blockchain, while offering specialisations 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, as well as the Leadership and Management Institute offering eight stand-alone courses and postgraduate programmes in total.

The Wirtschaftsuniversität Wien (WU), with its Master's in Digital Economy and a professional certificate in Blockchain Transforming Business, is an indicative example of academic institutions incorporating blockchain and virtual currency education under a wider umbrella. WU has also introduced the Institute of 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 programmes in the field of FinTech and Blockchain from the University of Strathclyde, University of Exeter, 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, stand-alone courses on blockchain are offered by London School of Economics and Business, University of Oxford, City University of London and the UCL Centre for Blockchain Technologies. There is also a sizeable PhD student population undertaking research in blockchain and virtual currencies in the country.

In Poland, the Warsaw School of Economics also offers a postgraduate programme in blockchain, covering the fields of business, law and technology, and the Gdansk School of Banking is one of the few initiatives that offer a bachelor's programme in blockchain engineering. Moreover, 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.

Additionally, Hungary offers a digital Master on FinTech and some stand-alone courses, while Greek and Romanian universities have created a variety of blockchain and crypto-related courses.

Last but not least, what seems to be interesting is that, besides the academic courses offered by the University of Luxembourg, there don't seem to be any other educational initiatives yet in the country. The same goes for the Czech Republic, where, besides independent courses and certificates, only the University of Economics in Prague offers a blockchain-related course.

BLOCKCHAIN REGULATORY GROWTH & COMPARISON WITH PAST REPORTS.

In terms of regulatory developments, of the 29 countries included in the first iteration of the report, 14 exhibited no major changes in terms of regulation and public sector initiatives, two issued only warnings, with the rest of the countries implementing moderate to sizeable changes. Starting with the later, Cyprus issued guidelines for the tax treatment of cryptocurrency, furthered its national blockchain strategy and established its position as an Early Adopter of EBSI. At the same time, Switzerland introduced a new blanket act for DLTs, adapting various federal laws and enabling the introduction of blockchain-based securities.

Poland launched a FinTech sandbox overseen by the country's Financial Supervision Authority (KNF) and run by a collection of business entities under what has been described as a decentralised model. Luxembourg issued the "CSSF guidance on virtual assets" paving the way for alternative investment funds to invest in cryptocurrencies. Portugal refined its taxation regime, exempting the exchange of cryptocurrencies from taxes, with Hungary revising its tax rate on profits from cryptocurrencies. Bulgaria introduced new relevant AML regulations. Finally, Romania's and Denmark's authorities released public sector and investor warnings on the dangers of cryptocurrency investment.

From the incremental shifts in policy on a national level, it is clear that the EU is taking definitive and satisfactory policy steps at a supranational level. EU Member States are expected to gradually implement overarching policies in a more harmonised regulatory environment across the Union.

Most European countries still do not have a holistic regulatory framework for blockchain and cryptocurrencies. This is especially true for countries where the small size of the domestic ecosystem has not necessitated such provision. Providing a unified EU-wide framework has the potential to bring all EU members "up to speed" and eliminate cases of regulatory arbitrage that was in part responsible for runaway growth only in some EU members.

Where no specific regulatory framework exists, Member States have adopted taxonomies or characterisations of virtual assets to identify the most applicable existing regulatory treatment in each case. For example:

- In Malta, the country's Digital Innovation Framework recognises 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 categorised as a payment, an asset or a utility, thus allowing the digital token to be regulated under existing laws.

- In the UK, the Cryptoassets Taskforce, which consists of HM Treasury, the Financial Conduct Authority (FCA) and the Bank of England, has created a framework for the characterisation 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 AML and countering terrorist financing provisions are applied to virtual currencies. The following table summarises the most important communications, guidance, regulations and laws that are applicable to virtual assets and blockchain in the various countries. Updates from the previous report are marked in red.

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		
Bulgaria	Anti-Money Laundering regulation in 2020	Regulation
Croatia	No regulation/guidance	N/A
Cyprus	National Strategy, and umbrella legislation for DLT and blockchain, co-developed with the business and academic sector - Blockchain bill published for public consultation - Early adopter of the EBSI - Guidelines for the tax treatment of cryptocurrencies are also being prepared by the Tax Department	National Strategy
Czech Republic	KYC/AML	Guidance
Denmark	No regulation/guidance. Danske Bank's notice 2021 urged users to exercise caution when trading digital assets	N/A
Estonia		

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 dispositive 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 dispositive 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		
Greece	No regulation/guidance	N/A
Hungary	No regulation/guidance. Revision of the tax rate on cryptocurrency profits	N/A
Ireland	No regulation/guidance	
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
Liechtenstein		
Lithuania	Bank of Lithuania • Position of the Bank of Lithuania on Virtual Assets and Initial Coin Offering • Guidelines on Security Token Offering	Guidance
Luxembourg	Paving the way for alternative investment funds to invest in digital assets, CSSF Guidance 2021. Bill on Blockchain-held or "dematerialised" 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 (ICOs): serious risks InnovationHub, Regulatory Sandbox, à la carte licences	Guidance
Norway	No regulation/guidance	N/A
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 • Launched a virtual sandbox in 2021	Guidance
Portugal	• Portuguese Tax & Customs Authority (PTA) announced that it is tax-free to exchange cryptocurrencies in Portugal • Virtual currencies • Comissão do Mercado de Valores Mobiliários (CMVM) • Questions and Answers for Entities on Cryptoassets	Guidance

Romania	No regulation/guidance. The National Bank issued a statement in 2021, where cryptocurrencies are referred to as speculative and very volatile, hence being very risky investments	Guidance
Slovakia		
Slovenia		
Spain	National 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 Parliament: Distributed ledger technology (DLT) blanket act	Legal framework
	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	
United Kingdom	Financial Conduct Authority (FCA) • Guidance on Cryptoassets • Digital sandbox that includes blockchain initiatives	Guidance

Conclusions

State of the union: a country-level analysis of 31 countries

Recent attempts at harmonisation of regulation across the EU have yet to take full effect across the Union. As a result, not all EU Member States are at the same level on the overall blockchain and cryptocurrency maturity curve.

We have analysed the current situation in each EU Member State (as well as Norway, Liechtenstein, the UK, and Switzerland) in two dimensions:

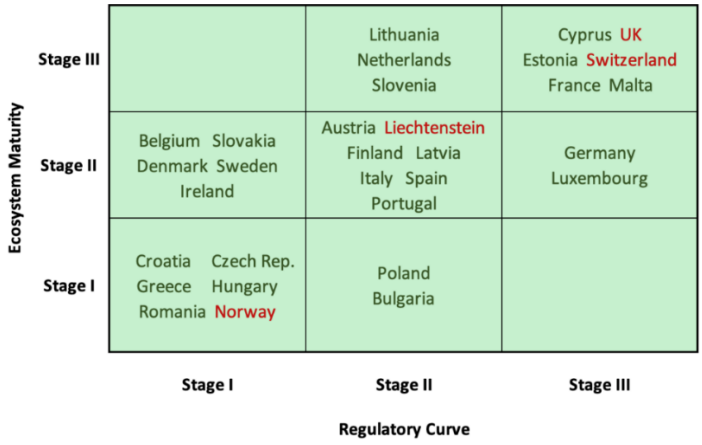
Regulatory maturity curve: this dimension measures the degree of top-down support provided by national or regional government. We have grouped countries into three broad categories, namely:

- **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 31 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, especially as regulation becomes more standardised. Notwithstanding this, the matrix is a helpful instrument in assessing the current status of the European blockchain ecosystem at the middle of 2022.



Compared to the previous iteration of the report, we notice incremental shifts across the regulatory curve, with bigger moves on the ecosystem front. This coincides with empirical findings that ecosystem growth precedes regulatory action. In other words, regulation is usually introduced as a response to growing demand from the private sector. Overall, all but six countries maintained their past positions on the matrix. In terms of the regulatory maturity curve, most countries, except for Bulgaria and the UK, introduced no major new legislation. Bulgaria was promoted from Stage I to Stage II due to its adoption of AML legislation that relates to cryptocurrencies, and the UK from Stage I to Stage III for its imminent adoption of a stablecoin act, and CBDC research output. On the ecosystem front, shifts were predominately informed by increases in the number of companies and associated funding, which in most cases coincided. Belgium, Finland and Slovakia were promoted to Stage II from Stage I and France to Stage III from Stage II, due to increases in their business ecosystem, the most notable of which was in France. The new additions, Norway and Liechtenstein, were placed on Stages I and II of both ecosystem and regulatory maturity, respectively, based on the criteria described above. Below we can see the difference between the tables of the current and prior report.