

# **Application of cryptocurrency innovation beyond the financial world. The case of the blockchain as a medium for organization of Academia-Business cooperation**

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**Abstract:** *The true potential of the crypto currencies is still not yet fully revealed, expanding far beyond the financial sector with promising blockchain-based projects being presented in different fields of economy, ranging from transportation to creative industries, even public governance (Ovenden, 2016). Within the current research article, the “Open Source University” (OS.University / OSUni) project is closely reviewed, serving as a case study on leveraging this technology for the purposes of University-Business cooperation. Within the “Open Source University” ecosystem, the innovative “OSUni” token (EDU) is intended to facilitate the connections throughout the distributed network of universities, learners, and businesses, organizing innovative massive open online courses (MOOCs) and standard on-campus learning experiences in meaningful learning pathways, available globally through the blockchain. The aim of research is to achieve better understanding about the application of the blockchain technology within the academic sector for the benefit of the partners within the knowledge triangle - educators, researchers, businesses. The objectives of research are to analyse the organizational, as well as the technological aspects of the piloting project (figure 1), in order to raise awareness among the interested stakeholders.*

**Key words:** *cryptocurrency, innovation, university-business cooperation, open source*

**JEL codes:** *O31*

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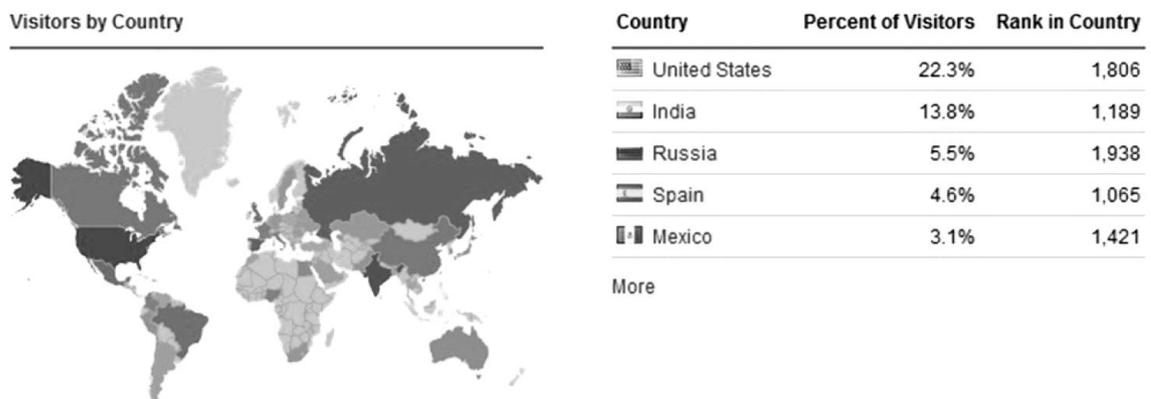
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## 1. Introduction

Billions of Internet users, especially young people from all around the world, living in turbulent times of social and economic unease, related to the transformation of the global economy (WEF, 2016), are still awaiting for a scalable solution to revolutionize the way they learn, advance, and succeed in the dawn of the 4<sup>th</sup> industrial revolution. Despite the technological progress, millions are being left behind, due to flaws in the classic system of education (Daskalov, 2017). Not because there are no suitable development opportunities for them in the digital era (UK Government, 2016), but because of the lack of a proactive, pioneering effort, which is successful enough to power a sociotechnical solution that brings these dispersed opportunities closer to end users (learners, educators, businesses, governments), allowing adaptation and adjustment, according to a diverse set of personal needs, growth aspirations, social lifestyles, economic and environmental constrains. A solution that never the less, brings the stakeholders closer together, given the existing gaps in the information coordination relationships that are needed to match skills to jobs (EY, 2017).

Only now, with the rise of the blockchain technology, such a complex solution is starting to look implementable from system design perspective, due to the decentralized approach that enables one such educational protocol to connect strategically the expanding knowledge production and knowledge consumption systems. „Coursera“, provided as an example of this rapid growth (fig. 1), having been founded only 5 years ago, has more than 23 million learners (students and life-long learners), coming from 190+ countries, signed up for its learning experiences that include 1,700 active online courses, delivered across all continents.

**Figure 1: Distribution of registered users of popular Massive Open Online Courses (MOOCs), accessible on Coursera (Source: Alexa.com, as of March 19<sup>th</sup> 2014)**



The numbers below (actual as of 2016) highlight the success of some of the other leading content providers in an extremely saturated market with more than 200 existing platform solutions, operating on the global stage<sup>1</sup> without mentioning the 26,000 higher education institutions on top of which they are built (or as an alternative to which they exist). Such numbers speak for the great need to support and advance the expansion of the sector for the good of society in general, but also of the challenges that this fragmentation within the broader „ocean of information“ leads with itself from organizational, verification and validation perspectives:

- **Open edX** is an open source platform that powers thousands of online courses with more than 10,000,000 registered users.
- **Udacity** was launched, based on a successful online pilot in Stanford that quickly attracted 160,000 students from more than 190 countries.
- **Udemy** has over 7 million learners, more than 30,000 courses in 80+ languages, and more than 16,000 registered instructors/tutors.

The case study though which the article addresses the challenges that the system is facing, i.e. the Open Source University project (at OS.UNIVERSITY), views the future of the Academia close to what it was initially intended to be – a community. Such an approach would allow stakeholders to join forces in their common strive to achieve and preserve excellence, given the ever more dispersed pool of resources and the problems, surrounding the established institutions that once operated without facing contenders, external to the traditional academic system.

Today, despite living in the information age, on-campus university programs of quality remain far from affordable in many developing and developed economies, because of high tuition costs and overwhelming debt (Daskalov, 2017), leading to the point that experts start to look at the higher educational market as the next big bubble to go bust (Capital, 2016). While in the same time, those same on-campus programs, either public or private, are starting to lose relevance for a growing number of learners, especially in attractive fields, such as IT, in which young professionals are entering into the workforce, often before formally finishing their studies, having to choose between aspiring careers and fulfilment of their academic degrees (Shapiro, 2014).

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<sup>1</sup> Numbers include end-user oriented platforms (not b2b or internal corporate solutions) that are addressing predominantly English-speakers and do not include a wide variety of platforms on national level. Numbers are based on a preliminary research, conducted by the author.

## 2. Theoretical and practical foundations for the case-study project

One of United Nations' Sustainable Development Goals (SDGs) is to ensure inclusive and quality education for all and promote lifelong learning. The crypto-revolution that is happening now has the potential to achieve that goal by making education more affordable (by lowering transactional costs) and simpler to organize and deliver (OEB Insights, 2016). According to the Open Source University project, decentralization and smart-contracts are the new solutions for people to be educated and qualified through, in a situation of constantly changing business demands. The project promises to bring the educational process to „*its next level*“ where businesses, students, and universities find „*common ground, pushing the economy forward in a unison*“.

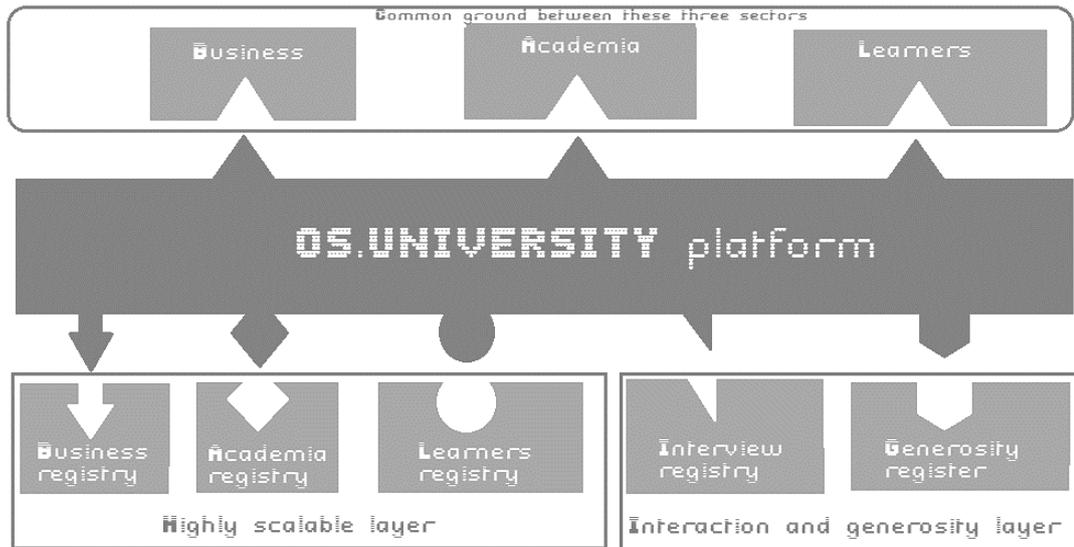
Having in mind that “Universitas” stands for “the whole, the universe, the world” OS.UNIVERSITY intention is simple – to re-establish this classical community of teachers and scholars in a way, which it is fit for its purpose of the Digital era, given that the technological and learning capabilities, our means and opportunities to connect, are far beyond those, according to which the 11th century learning community was designed castled and siloed. In contrast, OS.UNIVERSITY is designed to be a distributed education and certification platform, operating on the public Ethereum blockchain. The current research focuses on understating better its underlying promise - “*to enable businesses, learners and universities to collaborate in a transparent manner with the help of 3 main networks*”. More precisely, the article looks into outlining and analysing the processes of:

- Enabling the integration of massive open online courses (MOOCs) and other high-quality learning opportunities, distributed over a number of online platforms and providers, leveraging smart contracts.
- Defining distributed educational programs – “open source degrees”, representing the demands of businesses, which publish them on the Ethereum blockchain, thus allowing the learners to complete the learning pathways and receive formal recognition of their achievements.

While the topics of open collaboration and open innovation are not new to the academic community (Agranoff; McGuire, 2003), with many best practices in the public and private sectors when it comes to engaging Academia in cooperation with other entities within the knowledge triangle (OECD, 2016), conducting this collaboration through the blockchain is an entirely new approach, already praised by

ones (EdTech, 2017) and rejected by others (HackEducation, 2016). Despite the differences in the views on the subject, there are currently no solutions, comparable to the value proposition behind the Open Source University platform setup (fig. 2), despite both „Sony“ on the corporate side (Sony, 2017) and the „Open University“ on the academic (Open Blockchain, 2017) are working on early-stage experimental designs. Therefore the need to study the pilot in details and the eco-system that surrounds it.

**Figure 2: OS.UNIVERSITY scalability diagram**

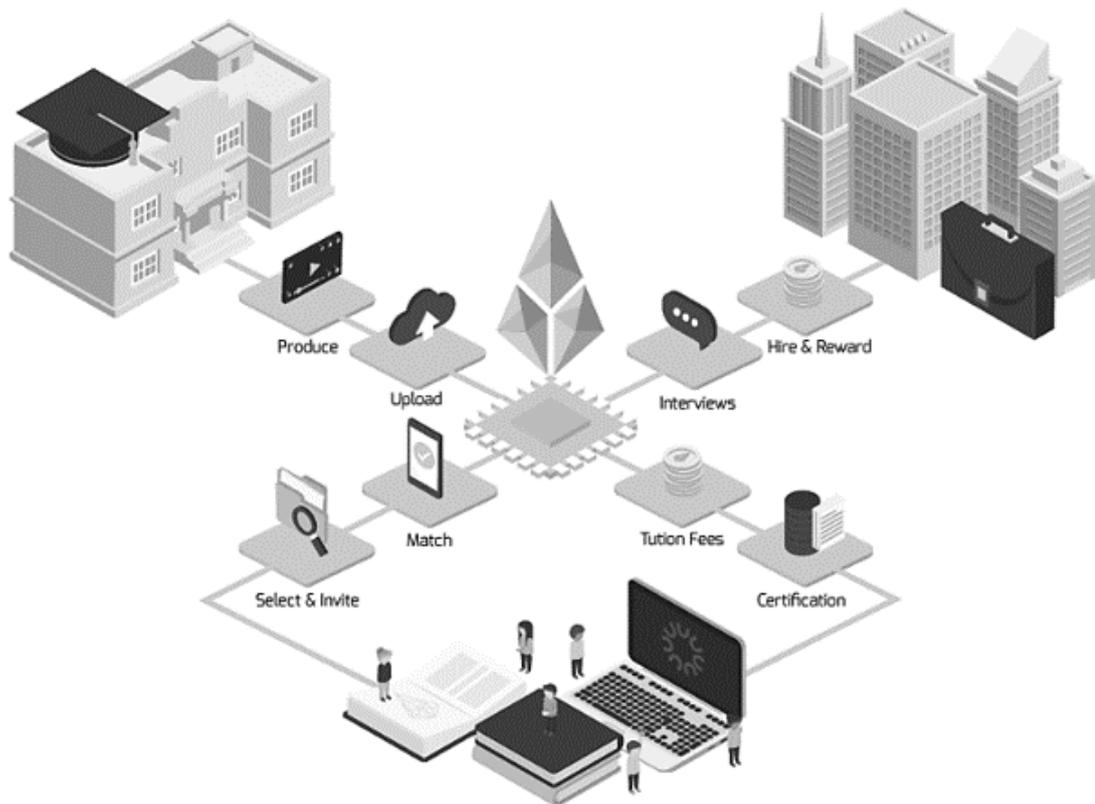


When it comes to the eco-system, the preliminary research reviewed 50+ platforms, providers of open educational content that are established online brands – universities, networks of universities, etc., but the main idea behind such platforms is to provide opportunities for educational content creators to attract learners for their course offerings. OS.UNIVERSITY value proposition, however, is different. It builds upon this base, providing the opportunity to aggregate different learning opportunities within the blockchain, enabling stakeholders to organize them into meaningful cross-institutional programs, so that there is an end-to-end learning experience that can be pursued, achieved, and recognized for its excellence. Last but not least, there are useful online aggregators, such as “Course Talk”, “Class Central”, „Course Buffet“ which do help learners navigate within the dispersed content environment, and there are projects that go on step further, such as „Udacity“, which organizes its courses into bigger and broader offerings - “nano-degrees”. But none of them empowers users to organize their learning and development journeys in a decentralized manner, enrolling in tailor-made programmes, endorsed and recognized around the world, either as fully-fledged alternatives or as useful extensions to traditional closed-source / in-house education.

### 3. Methodology of research

To research the mechanisms of organization of an educational project that enables aggregation and delivery of learning experiences, coming from providers from all over the world, in a variety of different languages and platforms, the best way would be to analyse the stakeholder relations and interactions on every step of the process of organization of the learning opportunities, spread across the network, and the engagement of learners, universities, and businesses as described on fig. 3.

**Figure 3:** Model of organization of the relations among the distributed network of stakeholders within the Open Source University (OS.UNIVERSITY) blockchain:



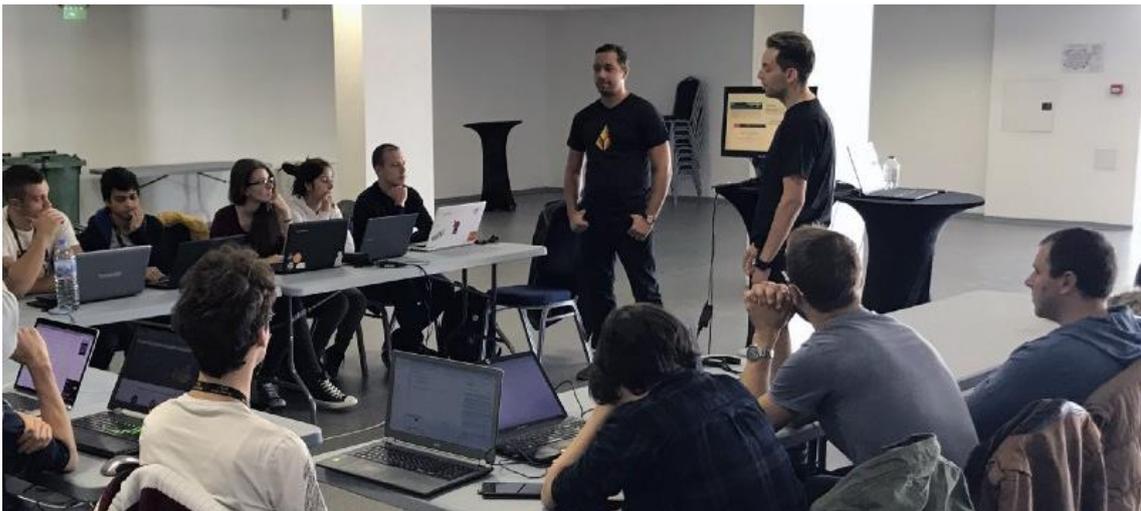
As part of our approach on the research, we are going to approach the review of the partnerships within the network of stakeholders the same way the OS.UNIVERSITY project is approaching learners, academia, and companies in its quest to gain traction - on strategic, tactical, and operational levels of engagement.

Some of the potential partners that the OS.UNIVERSITY team outlines within its project whitepaper (on the ed.tech vertical) include „Coursera“, „EdX“, „Udemy“, „Future Learn“, „Open 2 Study“ and others. As business partners, OS.UNIVERSITY intends to approach “Fortune” technological companies, working closely with their

HR/L&D departments to flawlessly adopt the technology, while in order to build traction among students, OS.UNIVERSITY approaches international, national, and local-level technology-oriented / representative student bodies, including: ESU (European Students Union), ESTIEM (European Students of Industrial Engineering & Management), BEST (Board of European Students of Technology), and others.

While the article looks at what is planned, it also reviews the progress achieved thus far in order to extract valuable insights on where the project is in terms of actual execution on the promised innovation. As an example, it relies on observations from „HackConf 2017“ — one of the biggest events in the IT world, bringing learners, academia and businesses together. During the conference, OS.UNIVERSITY project team organized an Ethereum Smart Contracts workshop, preparing a fully featured Ethereum Smart Contract, together with the learners themselves.

**Picture 1: Workshop on smart contracts, based on the principles of OSUni - open learning, direct interaction and sharing within a broader network**



The workshop that is subject of review was organized on September 29<sup>th</sup> at Sofia Tech Park. Jordan Jambazov and Dobromir Kovachev from OS.UNIVERSITY team opened the event with presentation on the blockchain, sharing various details, related to the technology and its implementation that are mentioned within the research – foundations of trust in a decentralized environment, existing cryptocurrencies, distributed systems, and the Ethereum platform as such. The practical part of the workshop included an actual Ethereum smart contract that participants initiated by setting up the so called „Truffle Framework“ on their machines, and then scaffolding their project — „Ethereum Pet Shop“. At the end of the workshop, important feedback from the learners was generated in regards to the OSUni project itself.

## 4. Research Findings

The review of OS.UNIVERSITY design plans and project papers, available at the attention of the broader audience in connection to its ICO /initial coin offering/ as of October 10<sup>th</sup> 2017, shed light on the specific benefits it intends to bring into the system:

- **Businesses** would benefit from shaping candidates/employees expertise and from directly approaching their learning and development needs in a distributed manner. “Men in the middle” would be excluded from the process, thus reducing business expenses and lead-time.
- **Academia** would benefit from scaling their target audiences (hence the economy of scale, given the law of diminishing marginal utility is not applicable in the field of learning), gaining competitive advantage through modernization and automation of operations, combined with customization of the educational experience.
- **Learners** would benefit from receiving higher quality education (adequate to the needs of economy) and from directly approaching employers when it comes to matching the expectations with the individual learning and development profiles - all done directly through the Ethereum blockchain (without a middle-man).

### 4.1. Strategic Level

The whole education technology market spans into more than 40 discrete market segments, involving different parties (EdTech Landscape, 2017). The Open Source University strategy is to involve all the parties into a distributed platform without any specific centralized dominant. The main parties benefiting from the project are the above mentioned<sup>2</sup>, but their motivation to engage should be explained systematically:

#### 4.1.1. Businesses

Operating in fast-changing times requires proactive stand on the human capital development side, considering that in a single generation businesses had to adapt to entirely new (digital) marketing channels, decide on how to invest in (and utilize) new technologies, and compete on a global stage — things that were barely imaginable a few decades back. Things have changed a lot since then and will continue to change with the rise of the 4<sup>th</sup> Industrial Revolution, hence the need of continuous L&D on-demand.

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<sup>2</sup> It should be noted that the list is not exclusive, given that society as a stakeholder on its own is not mentioned, but for the purposes of the article analysis is limited to Academia-Business cooperation only.

Strong corporate organizations are based on highly educated and motivated employees, which are turning ideas that seem to be impossible today into a reality tomorrow. Businesses would benefit from the Open Source University project by exploring and leveraging existing learning opportunities in a systemized manner, and by organizing new learning pathways, so called “open source degrees”, targeting and preparing the right candidates for the job.

#### **4.1.2. Learners**

As a decentralized software solution, OSUni would take care of handling the information for students’ courses, certifications, and grades (coming from different learning providers – institutional, but also non-formal education, corporate training, etc.). Students would benefit from the system, given that their credentials would be organized in the blockchain and distributed to organizations that provide academic and professional development opportunities. The strong social innovation aspect of OSUni lies in finding the right development opportunities for the technically savvy, but also for the ones that are socially excluded or from underprivileged groups. For those that are not traditionally enrolled in higher education, incl. displaced migrants, people with disabilities, an even growing number of elderly, incarcerated, low-income households.

#### **4.1.3. Academia**

OSUni intends to replicate the success of GNU/Linux in the world of Academia, providing opportunities to open source different areas of Academia governance, related to the interaction with students and the private sector. It intends to do so, by introducing the social entrepreneurship approach - inviting Academia partners to be part of a global movement, not of a privately run business project, which either fails or succeeds on its own. Hence, there is an open call to action / manifesto for Academia representatives to join *‘a path to revolutionizing the educational system by turning it into a distributed network of contributors’*.

Benefits for the Academia are structured around the digital transformation of the old inefficient system of paper registers, manually tracked information, and numerous dispersed platforms through which it is hard to find and organize content, into a single, yet decentralized space where all the information, related to each learner would be stored, curated, and available on demand. It would be like a ‘personal wallet’ for the learners, but instead of financials, containing information, associated to degrees, specializations, and courses that a certain participant has gained over the years. For Academia, this would be a suitable vehicle for expanding their production markets.

## **4.2. Tactical Level**

Since the Open Source University project is a complex sociotechnical system (Fox, 1995), part of the tactical issues that are being investigated by its team are related to the gas consumption model that needs to be implemented in order to stimulate all parties to be involved into the learning process, and encourage them to provide content that is adequate to the market demands. According to project's documentation, the decision taken in that regards is to distribute gas consumption expenses as described:

### **4.2.1. Academia**

The gas used for synchronizing courses data into the Ethereum blockchain would initially be paid by the Academia, which provides the predominant amount of MOOCs and other learning experiences within the system. Whenever Businesses start to combine these into learning pathways, the associated expenses would be refunded to the Academia. In addition, businesses would pay interest rate, according to what is defined by the learning providers, whose offerings are being leveraged.

### **4.2.2. Businesses**

The gas used to create and modify degree blocks into the Ethereum blockchain would be paid by businesses (and/or other organizations that are leveraging the system from knowledge consumption perspective). Businesses would eventually be covering the gas, consumed by Academia. In case a learner wants to approach a specific business organization, but there is not a match between skills' supply and demand (i.e. all courses and requirements, defined by the business degree blocks are not met), gas used for the communication would have to be covered by the student. Whenever there is a match (students that completely cover business-defined learning pathways) and there is a communication ongoing, between student and business parties, gas expenses would be covered on the corporate side, presuming the profits would be on the corporate side.

### **4.2.3. Learners**

Gas expenses, related to personal profile updates, courses progress, and payments for courses would initially be covered by the students. In the future, based on the 'Generosity' concept of the OS.University, after a mutual agreement, businesses would be able to cover students' expenses - partially or entirely. Certifications would automatically be written into the blockchain, cutting the bureaucracy and allowing all stakeholders to focus on the important aspects of life and business. Any personal information of the parties involved would be stored in an encrypted & secure way.

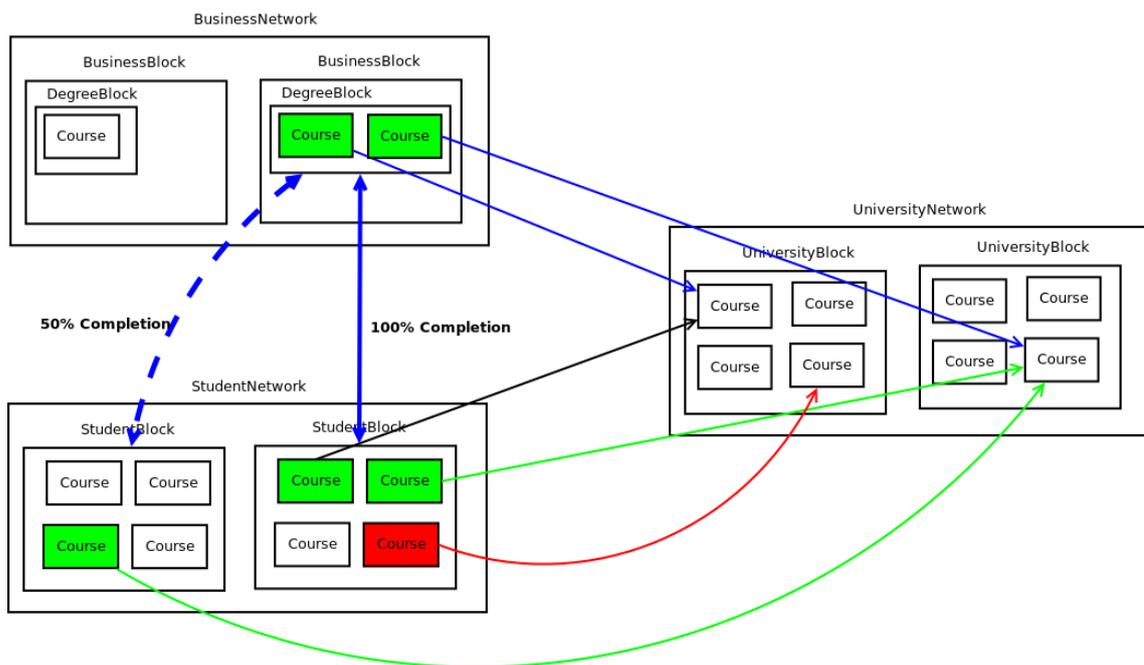
### 4.3. Operational Level

OS.UNIVERSITY, being a distributed education and certification platform, operating on the public Ethereum blockchain, distinguishes 3 main networks where businesses, learners and Academia collaborate on operational level.

An example of such collaboration is enabling MOOCs and other high-quality learning opportunities, which are distributed over a number of online platforms and providers, to be openly integrated into the OS.UNIVERSITY platform, using smart contracts. This would allow students to benefit locally from the global opportunities in a structured, and systemized way. Businesses on the other hand, would be able to define distributed learning pathways and publish them on the Ethereum blockchain, allowing learners to complete those „open source degrees“ and receive certification that is distributedly preserved and guaranteed. In case of a degree match, students and businesses will be able to communicate directly.

The critical set of smart contracts, facilitating the most important operational interactions between businesses, students and Academia, is called “OSUni Core”. It would be kept small and highly modular in order to mitigate the possibility and impact of potential „bugs“ in smart contracts. “OSUni Core” is intended to be publically available (under an open-source license) and would go through multiple security audits on each release to ensure the users that the project pursues the highest quality possible.

**Figure 4:** Representation of the modular organization of the OSUni Core





### 4.3.1. System architecture of the OSUni Core

Already 2 years in research, recognized as one of world's top 10 social innovation projects by the Living Progress Challenge of Hewlett Packard Enterprise, OSUni harnesses the power of the decentralized blockchain to address what “Ernst & Young” (2017) found to be “*the main bottleneck in matching skills to jobs*” – information coordination relationships between academia, learners, and businesses. In order to achieve its goals, OSUni team has implemented the following architecture:

- **OSU Token:** the ERC20 token used to trade courses and degrees
- **OSU Business Registry:** handles information about company profiles & their degrees
- **OSU Academia Registry:** handles information about Academia & their courses/ degrees
- **OSU Learner Registry:** handles information about students, progress & certification
- **OSU Interview:** handles communication between businesses & learners
- **OSU Generosity:** handles education related donations for courses and degrees

### 4.3.2. OSUni Core versioning scheme

Given that all operational transactions are to be enabled through an ‘EDU’ token, Open Source University’s own token, this opens up potential for scaling up a decentralized social innovation project into world’s biggest educational marketplace where transactional costs are brought down to zero. Not to mention that geographic, socioeconomic and institutional borders simply do not apply. Starting with an audience of 60+ million learners, enrolled in more than 7000 massive open online courses, OSUni as a solution has the potential to reach up to 3 billion Internet users across the world. But in order to do so, it needs well-organized maintenance and servicing processes. Therefore, in order to integrate users and functionalities flawlessly, OSUni Core is going to use semantic versioning model. Below is an overview of the model.

Given a version number MAJOR.MINOR.PATCH, increment the:

- MAJOR version when incompatible API changes are made;
- MINOR version when backwards-compatible functionality;
- PATCH version when backwards-compatible minor improvements.

Additional labels for pre-release and build metadata would be available as extensions to the MAJOR.MINOR.PATCH format.

#### **5.4. DAPP & hyperlog**

Detailed data is planned to be kept in the blockchain in a multi-master, append-only database called ‘hyperlog’ based on ‘MerkleDAG’ objects, composed by many DAGNodes that are linked using Ethereum blockchain technology. To ensure consistency, the overall result would be verified through the ‘OSU Interview’ module. Involved parties would be able to log information which will be used during every business  $\Leftrightarrow$  learner “*interview*” process. Exchanging private data sets peer-to-peer would redefine the Ethereum blockchain network and bring much needed privacy for the sensitive information, along with full transparency of the transactions.

Never the less, this approach is expected to improve scalability, because ‘hyperlog’ functionality is essentially an equivalent to sharding. The “Scalability” review contains more details on how the data would flow among the stakeholders, whose profiles are briefly outlined from content perspective below:

##### **- Business profiles**

When it comes to recruitment, businesses would be able to target the right candidates for a specific position by organizing all the learners that are available in the blockchain under unique addresses. ‘OSU Business Registry’ would be taking care of recording company profiles into the blockchain, aggregating students by skills and using ‘hyperlog’ (peer-to-peer connection) + ‘node-rsa’ (for generating 512 bit-length keys for the sensitive information) in addition to ‘MapReduce’ (condensing large volumes of data into useful aggregated results) in order to handle big data smoothly on the client side. One of the most valuable benefits is that ‘OSU Business Registry’ saves significant amount of time and money for the businesses in the process of connecting the right candidates, excluding the third parties.

##### **- Academia profiles**

Academia would eventually start to rip the benefits or joining the blockchain the moment the businesses start to add preferable learning experiences, aggregating blockchain data, according to their needs and requirements. When businesses combine specific courses into custom specializations, adapted to their profile, fees that are already set would be paid to the institutions and experts, supplying the content. The fee (when such is charged) would be decided upon by the educators and would be publicly distributed over the Ethereum blockchain. It needs to be highlighted that for the initial upload of new content, educators supplying it would cover the gas consumption.

## **- Learner profiles**

It would be possible for the students to pay for specific courses or programs/ specializations/ open source degrees (i.e. block of courses) with all conventional currencies including ETH, BTC and LTC. Within the structure, information for every learning opportunity will be specified and available for recording onto student's profile when enrolled/subscribed.

### **5.5. Security**

Securing OSUni Token and sensitive information distributed over the blockchain is of highest priority when it comes to turning a highly innovative project (to the point of being experimental) into a success. Therefore, OSUni team is planning to make three step security audits. First step would be a detailed internal test for information security vulnerabilities like reentrancy bugs, ponzi schemes, manipulation of smart contract outcome etc. Second step would be to test every new version and upgrades of the contracts over test network consulting with private already launched successful ICOs. It is known that developers of smart contracts must be more security focused than their traditional software counterparts as over the blockchain design and programming paradigms evolved exponentially. Unlike traditional software lifecycle, where version upgrades is the norm, smart contracts are immutable once deployed. Smart contract architecture must be highly modular foreseeing future changes, if any, can be isolated to small areas. OSUni testers of smart contract security are fluent in the new paradigm of distributed trust computing, showing proficiency in frameworks, such as Open Zeppelin and Oyente, and strongly believe that *'raising awareness and responsibility on smart contract security are essential steps in building a solid defense against future attacks'*.

### **5.6. Scalability**

A further perk of keeping data into the blockchain only shared between businesses/ learners, would be that only they will get access to the messages, handled by 'OSU Interview' module.<sup>3</sup> In conclusion, it can be highlighted that from operational perspective, the "OSUni" network will have several layers, the first one being the 'OSUni exchange', which would be built on Ethereum smart contracts, containing few solutions allowing us to have flexibility adding few layers on top of one scalable base.

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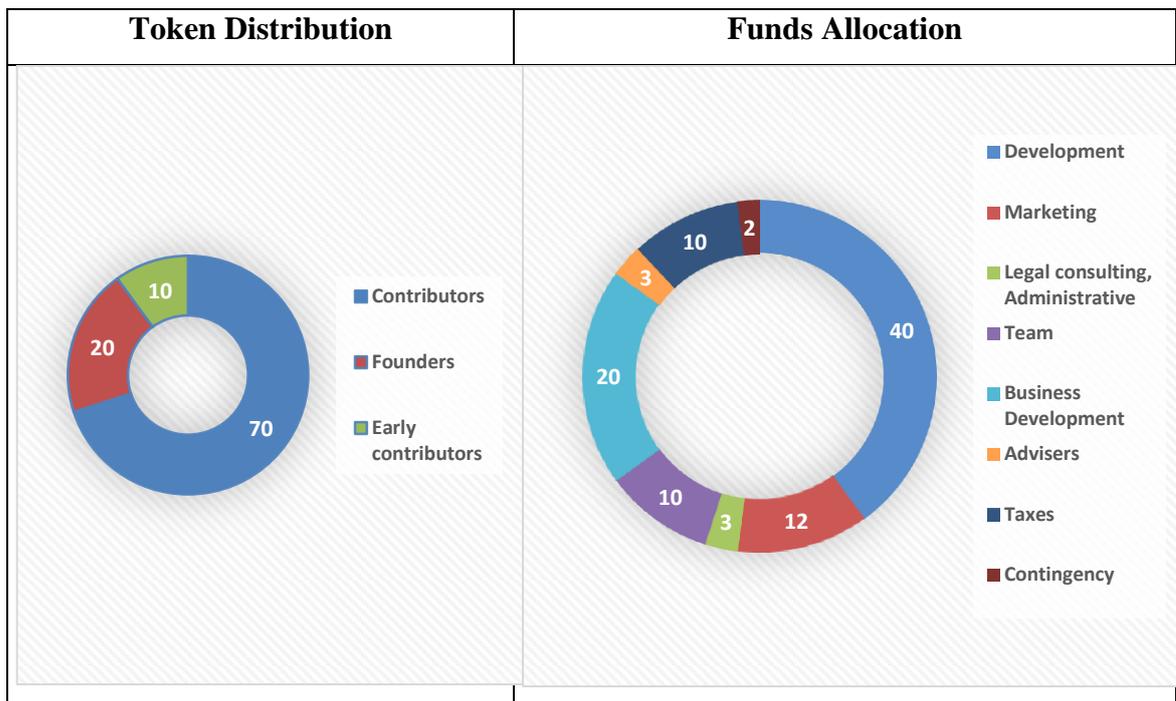
<sup>3</sup> However, the general public would still see on the blockchain recorded tags and data of all the learning experiences (course, programs, etc.), related to a specific address, but nothing more.

In short, OSUni is adding unique functionality to an already working Ethereum blockchain. By nature its extension, using hyperlog and ‘MapReduce’, will be processing and aggregating big data sets to retrieve the right information to OSUni clients, and will remain scalable and maintainable - by all nodes in the ecosystem.

### 5.7. Financing

Finally yet importantly, the form of financing the OSUni project operations was analyzed. For its strategic agenda to be transformed into an operational plan with clear milestones set and followed (*according to the attached Gant chart*), an ICO will be held on the OS.University platform in the period of November - December 2017. It is planned to end either when a ‘hard cap’ of 30,000 Ethereum or on a specific date, according to industry best practices. 33,000,000 EDU tokens<sup>4</sup> are planned to be distributed during the ICO with a price set at the rate of 1 Ethereum = 740 EDU coins. It would be possible to take part with cryptocurrencies, alternative to Ethereum, such as Bitcoins and Litecoins. The funds are projected to be invested in the following way:

**Figure 5: Token distribution and funds allocation models**



<sup>4</sup> OSUni team have invested in seeking out legal and compliance expertise to ensure that EDU token meets the new regulatory rules of the Initial Coin Offering at the ICO-stage. According to the professional opinion of its legal advisors, based on the Howey Test, EDU tokens should not be deemed as securities and do not need to be registered as a security. OSUni team underlines within its project documents that it focuses on the legislative regulation of the ICO, digital tokens and operations with cryptocurrencies to provide its users and contributors safe and reliable solutions for ‘Crowdfunding 2.0’.

## 5. Conclusion

Nowadays e-learning content providers (with products ranging from MOOCs to master degrees) are making significant progress in innovating within the academic world to strengthen the relationships among the key stakeholders. They are building high quality courses and alternative learning experiences, such as „*micro-masters*“ or „*nano-degrees*“, covering the practical applications of the skills every learner needs to gain. Harvard, MIT, Berkeley, among others, are some of the schools that learners have at their fingertips by accessing the „EdX“ platform<sup>5</sup> over the Internet, for free. 400,000+ certificates have been proudly earned by edX students (as of 2015). „Coursera“, another of the top projects in terms of numbers and credentials, is partnering with the U.S. State Department to create “learning hubs” around the world – a project through which students get internet access, take courses from 100+ top universities and other educational providers, and participate in weekly in-person study groups to make learning even more collaborative. Such social innovations are materializing on a daily basis, but they lack strategic direction on a global level, which is hard to formulate without a common infrastructure that enables spillover effects.

Within the decentralized OS.UNIVERSITY ecosystem, the OSUni token (EDU) will be used to help shape all these opportunities into vendor-neutral knowledge products that are scalable, transferable, and considered trustworthy across institutional and national borders. It is here where the parallels with „free money“ theory and practice are strongest – in both cases highest effectiveness is expected to be achieved when centralized institutions are not leading the way, i.e. they are separated (Nenovski, 2001). The OSUni token will facilitate the connections within the educational system, bridging the gap between businesses, learners and academia (providing MOOCs, but also traditional learning experiences). The current study outlined OSUni main value propositions, looking at project’s strategy, tactics, and operations agenda:

- **Academia** will be able to create courses and programs and feed key information, related to those, into the blockchain, expanding its market.
- **Learners** who enroll into specific courses or learning pathways (provided for free or with a fee) will have all the information about their expertise and progress systemized within the blockchain.

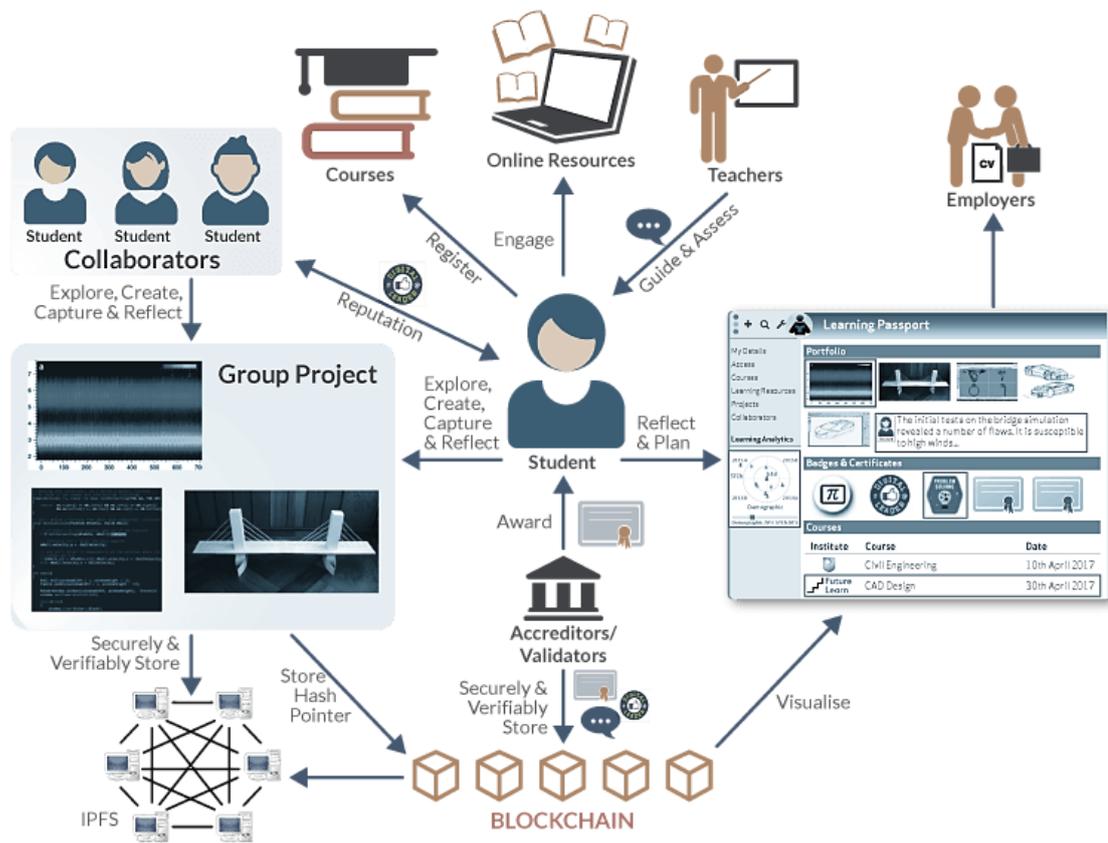
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<sup>5</sup> OSUni team is planning to extend the Open edX platform functionality with special add-ons, allowing courses and certifications to be followed through the blockchain.

- **Businesses** will therefore be able to target the right candidates upon common agreement, while private information will be kept secured behind the addresses of transactions<sup>6</sup>.

More insights can be gained and analyzed only when the number of participants within the OSUni system increases sufficiently, given the space for exponential growth and potential applications of one such platform (as outlined on fig. 6). The OS.UNIVERSITY Token is capable of bridging the gap between business and academia by bringing transparency and reducing costs – something that the technology it relies on, i.e. the blockchain, has the potential to achieve beyond the financial world. However, we are yet to witness if/when this technology is going to deliver.

**Figure 6: View on potential scenarios for stakeholders’ interactions within the blockchain. Source: *The Open University, Open Blockchain***



**Acknowledgement:** *Project materials, reviewed and analysed for the purpose of this case study, are collaboratively developed by the OS.UNIVERSITY project team, which means that apart from the author, credit should be given to: Jordan Jambazov, Dobromir Kovachev, Petar Angelov, Momchil Jambazov, Vladimir Tassev.*

<sup>6</sup> According to project plans, businesses will also be able to publish courses and open source degree blocks, and refund the educational process for promising candidates/employees (partially or entirely).

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### Internet resources:

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<http://www.un.org/sustainabledevelopment/education/>
2. Higher Education Technology Landscape Research 2017, *available at:*  
<http://www.eduventures.com/2017/02/introducing-2017-higher-education-technology-landscape/>
3. Semantic Versioning, *available at:*  
<http://semver.org/>
4. Open Blockchain, *available at:*  
<http://blockchain.open.ac.uk/>
5. Open edX, *available at:*  
<https://open.edx.org/>
6. Crypto-JS, *available at:*  
<https://www.npmjs.com/package/crypto-js>
7. Is there a bubble in the higher education?, *available at:*  
[http://www.capital.bg/politika\\_i\\_ekonomika/mnenia/2016/09/09/2824477\\_ima\\_li\\_balon\\_vuv\\_vissheto\\_obrazovanie/](http://www.capital.bg/politika_i_ekonomika/mnenia/2016/09/09/2824477_ima_li_balon_vuv_vissheto_obrazovanie/)
8. 10 ways Blockchain could be used in education, *available at:*  
<https://oeb-insights.com/10-ways-blockchain-could-be-used-in-education/>
9. Experts See New Ways to Track Learning Experiences with Blockchain:  
<https://edtechmagazine.com/higher/article/2017/09/experts-see-new-ways-track-learning-experiences-blockchain>
10. The Blockchain for Education: An Introduction, *available at:*  
<http://hackeducation.com/2016/04/07/blockchain-education-guide>
11. Node-rsa package for encrypt/decrypt, *available at:*  
<https://github.com/rzcoder/node-rsa>
12. Ethereum Smart Contracts Workshop by the Open Source University team:  
<https://medium.com/@opensourceuni/ethereum-smart-contracts-workshop-by-the-open-source-university-team-bb7435d9603d>
13. Blockchain and Education: A Big Idea in Need of Bigger Thinking, *available at:*  
<https://www.coindesk.com/blockchain-education-big-idea-need-bigger-thinking/>
14. By the numbers: MOOCs in 2016  
<https://www.class-central.com/report/mooc-stats-2016/>
15. HPE Living Progress Challenge 2016, *available at:*  
<https://livingprogresschallenge.hpe.com/idea-awards/>

**Attachments:**

Operational plan for implementation of OSUni Core

	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020
<b>Markets</b>												
TokenMarket	█											
BITCC		█										
Coinsquare			█									
Kraken				█								
BitMarket					█							
Poloniex							█					
<b>Implementation</b>												
EDU Business Registry		█										
EDU Academia Registry	█											
EDU Learner Registry	█											
EDU Interview			█									
EDU Generosity		█										
OS.UNIVERSITY platform			█	█								
<b>Academy</b>												
EdX					█							
Coursera						█						
Udemy							█					
Future Learn								█				
Alison									█			
Open 2 Study										█		
Rest of the Academia											█	
<b>Businesses</b>												
Hewlett-Packard									█			
Microsoft									█			
Approaching new business partners												█