OPEN SOURCE PROJECT MANAGEMENT, BASED ON CRITICAL SUCCESS FACTORS EXPLORATION: THE CASE OF OS.UNIVERSITY

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Abstract: *The European Commission proposes eight scenarios for the application of distributed ledger technology (DLT) in an educational context, based on the current state of technology development and deployment. According to their recent report, the blockchain technology may disrupt institutional norms in the field of education and empower learners in line with the needs of Industry 4.0. The article looks into the theoretical and practical aspects of the "OS.UNIVERSITY", a project announced in 2016 as one of the "Top 10 Social Innovation Ideas" by Hewlett Packard Enterprise's "Living Progress Challenge". By following a pre-defined set of critical success factors (CSF) for managing the end-to-end project, OS.UNIVERSITY aims to create a distributed platform on the blockchain that turns the potentially disruptive scenarios into real-life opportunities for modernization of Academia, enablement of businesses, and empowerment of students, employees, life-long learners.*

Keywords: *open source, project management, key success factors, blockchain, os.university*

INTRODUCTION

The OS.UNIVERSITY distributed application (DApp) bridges the gap between businesses and education through blockchain (used for validating and verifying learners' credentials) and smart contracts (managing content purchases and other marketplace transactions, as well as HR processes). The project applies open source technologies and principles of collaboration to re-engineer the current-state educational model by building a system to enable smarter transactions of information & value through institutional, national borders [3].

Based on findings from the open source innovation body of knowledge, the results from a previously conducted directed qualitative analysis [4] are used within the current research. The identified set of key success factors - applicable practices/elements/areas that are perceived to be of high importance to the successful engagement of key stakeholder groups (see attachment), originates from the analysis of interviews with social innovation stakeholders and is now used to guide the practical implementation of an open innovation technology project such as OS.UNIVERSITY. By managing the project, based on the success factors exploration, the author expects to achieve a successful market implementation of the end product – a distributed blockchain-based platform.

The topicality of the case study research is related to the launch of the alpha version of the OS.UNIVERSITY platform at the beginning of June 2018. The bold vision for "OSUni" unveils plenty of opportunities for mutually benefiting partnerships of commercial, but most importantly – of social value, that have the potential to address successfully what the consultants at "EY" (Ernst & Yong) describe as '*school-to-work-transition*' challenges [7]. It is an opportunity for all stakeholders to advance forward – socially and technologically as the more use cases the research community brings forward to make this institutional transition happen - the bigger the leap would be.

CASE STUDY

1. Project Overview

The mission of the OS.UNIVERSITY project is to help learners claim and advance their academic and professional identity beyond borders by providing them a learning and development passport on the immutable blockchain. This comes in recognition of the fact that the true potential of cryptocurrencies is still not fully revealed and expands far beyond the financial sector. The Ethereum[1] blockchain technology brings trust between untrusted parties and can facilitate potential agreements and all kinds of communication between businesses, educators and learners [3]. That in turn saves time, money and any misunderstandings are avoided. Nowadays these benefits are one of the most valuable assets an organization could have [9]. Thus, this new technology introduces transparency and removes delays as well as third party commissions between businesses, educators and learners.

Blockchain enables the project to guide participants and give them more options in this distributed microenvironment by introducing clear and highly customizable framework to connect them all. In addition, all information, which is saved on the blockchain, is immutable and transparent for everyone. The technology promises real-time information about the most important KPIs of all the participants. As an example, it can give real-time information about the performance of every single employee in a business (which is part of the OS.UNIVERSITY network). A highly customized set of smart contracts takes care of verifying and storing all of the learners' certificates on the blockchain, making them immutable and accessible to all businesses/organizations. This particular feature is for "*innovators who dare to change the old rules and bring benefit to all valuable parties*".

The OS.UNIVERSITY project is not alone in its quest to modernize Academia by applying open source blockchain technologies. Universities such as the Open University, University of Nicosia, MIT, along with corporations, such as Sony, are all working on their own pilot projects that are subject of ongoing research. According to OU's Knowledge Media Institute (KMI): "*the blockchain technologies may hold an answer to collating the outcomes of the new distributed learning reality*". Therefore, KMI intends to explore the possibilities that this IT infrastructure provides[2].

Further on, the University of Nicosia has been issuing academic certificates whose authenticity can be verified through the Bitcoin blockchain since 2014 [3]. These certificates are being issued to students who successfully completed or participated in "*DFIN-511 Introduction to Digital Currency*", which is the first university course offered on the topic of cryptocurrency. In parallel, by 2015, Philipp Schmidt, the Director of learning innovation at the MIT Media Lab, had begun issuing internal, non-academic digital certificates to his team. Schmidt, according to his words, had realized that, despite the rise of decentralized, informal online learning opportunities, there was no digital way to track and manage these accomplishments. He says he became interested in finding a "*more modular credentialing environment, where you would get some kind of recognition for lots of things you did throughout your life*."

According to the vision of OS.UNIVERSITY project team, all of the above mentioned are invaluable future partners to the project, given that its multi-chain character and its Platform-as-a-service (PaaS) model are providing the opportunity to integrate with other private and public projects for the advancement of the common cause.

[1] Visit https://www.ethereum.org/
[2] Visit http://blockchain.open.ac.uk/

2. Product Overview

The OS.UNIVERSITY platform that is the main outcome of the OS.UNIVERSITY project offers potentially transformative value generating proposals to all three participating categories of stakeholders in the education and professional development value chain. To give a better overview of the counterparts, we provide an explanation about the used terms and what they represent as per project's technical white paper:

- *Academia* - includes high schools, universities, MOOC platforms, corporate training and non-formal education providers, independent experts, etc.
- *Business* - includes small, medium and big companies operating in all areas of science, technology, services, manufacturing, etc. as well as NGO and even the public sector.
- *Learners* - includes students and employees gaining new knowledge, lifelong learners and curious minds who are seeking new academic or professional paths.

According to industry data [9], the education technology market encompasses more than 40 discrete market segments, involving numerous other stakeholders. The strategy behind the platform is to involve all of these parties in a distributed platform without any specific centralized dominant:

A. Academia is to:

- Market their offerings globally and at ultra-low cost, given that attracting students via conventional methods in the Digital era is increasingly difficult and inefficient;
- Benefit from the reliable transferability of L&D achievements, reducing admin. costs and assisting smooth continuance of learning for mobile students and life-long-learners;
- Modernize educational operations—from organizing distributed offerings to improving internal record keeping.

B. Businesses are to:

- Receive instant access to a global pool of talent with credentials verified through the ultra low cost system build on top of the distributed database;
- Leverage highly specific search facilities, allowing business to identify and seek to contact qualified candidates, therefore disintermediating conventional slow, expensive and less specific recruitment methods;
- Generate massive cost savings in corporate L&D operations—from finding and paying for educational services to monitoring the progress of employees' certification.

C. Learners are to:

- Access some of world's best L&D opportunities irrespective of where the learner is, no matter what barriers exist—geographic, social, economic, or political;
- Get incentivized in the knowledge that potential employers are more likely to find them through targeted searches on the platform than via conventional recruitment methods;
- Learners would control the access to their secured credentials information, but would be able to promote their blockchain-validated portfolio of accomplishments.

The critical set of smart contracts facilitating the most important interactions between business, students, and educators is called "OSUni Core". It is intentionally being kept small and highly modular in order to mitigate the possibility and impact of potential bugs in the smart contracts.

3. Project Use Cases

The above mentioned recent report by the Joint Research Center (JRC) of the European Commission looks into other case studies for implementations of blockchain in education from various players, but each of these other implementations is in its piloting phase. As the Commission reports: "*Even from these early pilots, it is possible to suggest that blockchain has the potential to disrupt the education market by loosening the control current players have over this market in line with open education's sharing and transparency principles and by empowering learners.*"

This research highlights OS.UNIVERSITY as one of the earliest and most prominent pilots, given the big diversity of use-cases it covers and its broad partnership network, resting on an in-depth design thinking product modelling [10]. As part of OS.UNIVERSITY's sustainability and traction building strategy, the team is systematically approaching and building partnerships with businesses, academic institutions and students' organizations.

- Some of the potential partners that are recognized on the ed.tech vertical and are mentioned within the project's white paper on a number of occasions are: Coursera, EdX, Udemy, Future Learn, Open 2 Study and others, listed in the document "*Research on the existing EdTech business landscape*", accompanying project's documentation.
- As business partners, OS.UNIVERSITY intends to approach and work with all the "Fortune 500" technological companies - a dedicated team is to be working with them, so that „*a flawless adoption of the technology can occur*".
- In order to build traction among students, the team is approaching directly international, national and local (technology-oriented) representative student bodies, including: ESU (European Students Union); ESTIEM (European Students of Industrial Engineering & Management); BEST (Board of European Students of Technology); NASC (National Association of the Students Councils).

In conclusion, "OS.UNI" is open to partnering with different stakeholders who share its vision that is summarized on project's website by Prof. John Domingue, Director of OU Knowledge Media Institute: "*We envision a world in which the awarding and validation of qualifications no longer occur exclusively under the management of an education institution or an employer and individual students, teachers, and peers take more ownership of the learning experience and its outcomes".*

Table 1. Early adopters of OS.UNIVERSITY blockchain technology in different pillars and use-cases

Pilot use cases	**Academia**	**Learners**	**Businesses**
Educational Marketplace	University of Insurance & Finance (VUZF)	The National Students Union (NPSS); Association of Bulgarian Leaders & Entrepreneurs (ABLE); Bulgarian Association for Management of People (BAUH)	IO Era Ltd; ReChained Ltd
Self-Sovereign L&D Identity	Technical University of Sofia (Center for Open Science)		Job Tiger; Jamba Job Marketplace
Hiring and Recruitment	Mandalay International University (MIU)		Job Tiger Recruitment; Investor Media Group (Bloomberg Bulgaria)
Corporate Learning & Development	Brain Workshop Institute		Cobden Partners; Navigato

4. Key Findings

As an outcome of the OS.UNIVERSITY project, a diverse team of academic, corporate, and technology experts is rolling-out out a global education and professional development platform, based on the Ethereum blockchain that serves two main product functions:

- As a distributed credentials database that enables Academia, learners, and businesses to record and verify educational and professional development accomplishments. This in turn enables (for those learners who desire so) for businesses to locate suitably qualified learners through highly targeted searches.
- As a global decentralized marketplace upon which high quality academic and broader L&D offerings are being made available - bought and sold with the help of the EDU token that enables transactions of value on the platform.

Starting with the integration of 700+ of world's top universities and 60+ million MOOC learners, the blockchain-based platform is introducing the concept of the "Distributed University" in times of record-breaking access to higher and further education, yet times of historical highs in youth unemployment as well [6] – a paradox of the transformation towards Industry 4.0 than needs solutions with smarter, more flexible design [8]. A setup that enables transferability of knowledge & skills throughout institutional and national borders, reduces operational costs and opens up the access to high quality education and career development opportunities to hundreds of millions.

In addition to the successful launch of the distributed platform, additional traits of excellence were taken into consideration (across the entire course of the execution of the project) in confirmation of the positive impact of the underlying critical success factors' exploration, serving as a foundation for project's governance:

- **2015** - The OSUni research project is initiated at the Faculty of Management within the Technical University of Sofia, resulting in scientific publications on the subject, published in Bulgaria, Latvia, The Czech Republic. The OSUni proof-of-concept phase is initiated, along with corporate partners from the Bulgarian industry and software development sectors, resulting in early versions of the system's architecture and design.
- **2016** - OSUni is announced among the top 10 social innovation ideas globally, in competition with 400 technology concepts and 130+ project proposals as part of the Living Progress Challenge of Hewlett Packard Enterprise. The project receives positive reviews and engages in expanding its partnership network under programs for young entrepreneurs support, led by the Ministry of Economy and the Open Society Institute.
- **2017** - OSUni is announced as a 2017 "YouthSpeak'' forum winner in Latvia, based on a scaled-down prototype, resulting in a 2-month distributed learning program implementation project at a community center in Sao Paulo, Brazil. OSUni development phase reaches an important milestone, leading the way to an initial coin offering (ICO) as a innovative mean for crowdfunding crypto/blockchain innovations.
- **2018** - OS.UNIVERSITY receives an important recognition as the project is nominated among the best IT projects of 2017 by the Bulgarian Association for Information Technology (BAIT). In the second half of 2018, universities, online platforms, and other L&D providers are to be onboarded, along with their educational offerings.

CONCLUSION

As the paradigm of open innovation goes, organizations should leverage external ideas, along with internal ones, in order to advance their products, services and operations [2]. "OS.UNIVERSITY" – a project that seeks to answer whether it is possible to replicate the success of the open source approach of software engineering in other fields of science for the benefit of society at large, represents an open platform, suited for that purpose, especially when it comes to research and education, given the fact that it enables the distributed innovation process [11].

The current case study research highlights that "OSUni" is not only a vehicle for open innovation in the academic sector, but also that it does benefit from its open source project setup and the resulting community engagement (educators, learners, businesses), guided systematically through the lifespan of the project by a well-defined framework for management, based on an underlying key success factors exploration. These factors, while not the subject of the case study, are proven to be of value, given the success in producing the main outcome of the project, the OS.UNIVERSITY platform, along with a number of external recognitions, received throughout the course of the project.

The main conclusions of the article (technology-wise) are related to the fact that in order for the "OS.UNIVERSITY" platform to become a leading edtech. innovation when it comes to innovating in Academia, it does need to roll-out its technological value proposition for mutually benefiting partnerships of social and commercial value [5], adapted according to the needs of the different groups of stakeholders, which we found to be articulated in a general agreement across the network of partners[3].

While the exploration of the set of key success factors is proven sufficient for the project to produce a viable product that is live on the Ethereum network as of June 2018, there is no proof that these factors are sufficient for the project to achieve its long-term vision and mission, the ultimate success indicator [1]. Further exploration is needed in that direction.

While the managerial and technology insights on the "OSUni" project, generated collaboratively throughout a diverse community of stakeholders, are in support of the initial hypothesis that was brought forward, the in-depth development of the right technological solution is still a 'work in progress' – this is at least until the launch of the open-sourced beta version, scheduled for late 2018, according to project's roadmap available at www.os.university. The development process itself represents an interesting theme for further research, especially in the light of the ever expanding application of decentralized blockchain technologies, which due to their disruptive pee-to-peer model of production are gaining popularity far beyond the fintech. community.

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[3] Information on the subject is acquired from the exciting case studies on each of the pilot use-cases. Each of OS.UNIVERSITY pilot integrators has an assigned key account manager and a represantative at the advisery/ambassadors' board to assure smooth implementation from system and business perspectives – a possible reason behind the general alignment. However, the situation might change as upon initial integrations, platform's onboarding of organizations and end users will be open to all (classic platform-as-a-service model). Custom integrations and support services will be provided on demand to complement the otherwise open PaaS model.

ATTACHMENTS

Critical success factors for managing stakeholders' engagement in open source projects

Category	Context
Legal strategy	Includes all that is required to enable project's success by creating, adapting and complying with the comprehensive legal framework that surrounds the projects. Both inward- and outward-oriented strategies apply[4].
Contextual awareness	Requires raising the understanding of the surrounding environment and the embedded problems and opportunities. It may include conducting preliminary research, coalition-building efforts as foundation for sustainability of the project, awareness of the marketing and other key contextual elements of the project, beyond the implementation of project's core activities.
Value-oriented communication and collaboration	Suggests understanding of the drives for participation in the project and the existing value-creation models from personal and broader social perspective. It requires two-way communication within the broader stakeholder community, including active promotion of the mechanisms and benefits of solving the problem in an innovative manner.
Community building agenda	Consists of measures, oriented towards nurturing community's identity (belonging and common values), organizing and conducting common events, providing mentoring, support, and opportunities for growth.
Openness in project practices	Stands for openness and transparency, surrounding the project, demonstrated through communication, documentation, online presence, how business matters are being run, among others.
Coherent contributor engagement strategy	Means that recruiting newcomers to ensure sustainability of the project community, with clear responsibilities assigned, should be preceded by a problem-oriented basis for the project, and resonating mission statement, intended to activate the various stakeholders.
Strategic project setup	Defines a consistent planning and execution approach, sometimes beyond the lifecycle of the project itself. From strategizing and commitment around achieving project's goals to implementation of the right governance/decision-making model, this strategic setup requires application of proven project management practices and a comprehensive network strategy.
Comprehensive tackling of intra- and intergroup conflicts	Speaks for the need of a project leadership that addresses group interests within the community, perceived to be conflicting, and manages growth (and growth-related challenges) successfully. Apart from the managerial implications of intra- and intergroup conflict resolution, a project lead would also need to rely on charter-based governance for stronger control in conflicting situations.

[4] An inward-oriented strategy in case of open source projects may include trademark protection measures, project licensing and managing its implications, attracting and managing financial donations, etc. While an outward-oriented strategy would tend to influence the institutional context, in which the project is taking place.

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