BitDegree

WHITE PAPER

Revolutionizing Global
Education with Blockchain

CONTENTS

SUMMARY

The conventional centralized higher education system takes 4-6 years to educate a person and there is no guarantee of employment afterwards. We believe that the digital industry today lacks workforce because higher education institutions are not responding to the needs of actual labor market. Most of the skills needed by the digital industry don't even require a degree in higher education. Workforce that has practical digital economy skills and willingness to learn is needed. That is why today more and more tech-savvy teens get freelancing jobs and earn more than their parents do.

BitDegree is world's first blockchain-powered, smart-incentives based online education platform which will revolutionize global education and tech recruiting. The main purpose of the BitDegree platform is to let Students acquire skills that are currently required by the labor market. The way to do it is not to ask business what skills they need in the far future (3-5 years), but to respond to explicitly expressed skilled labor demand quickly. BitDegree will directly align the incentives of students and anyone who wants them to become knowledge workers in digital economy - like current or potential employers, digital service providers and sponsors. Smart-incentive is a smart contract on Ethereum network ensuring the exchange of tokens between a sponsor (the Incentive Creator) and a student (the Incentive Taker), who is committing to study a specific subject in order to receive tokens (the Incentive). The BitDegree platform will offer students online courses with a clear and transparent blockchain-based reward system and achievement tracking. Our use case for blockchain is not sensitive to prolonged waiting periods before transactions get are committed, thus, overall platform overhead (as in expenses) of using Ethereum network for transactional and immutable data storage needs, will be low. To make the learning process as exciting as playing Minecraft we will use Octalysis framework of gamification design.

We see BitDegree as a unique tool for business to recruit tech talent and shape global education to its needs through smart-incentives. National government Job centers will be able to track the demand of skills without having to involve scrupulous report gatherings from businesses and also help jobless citizens by subsidising studies for skills on high demand. Think about it as Coursera and HackerRank merged together, powered by blockchain technology. The main benefit of BitDegree platform to Incentive providers is the possibility to initiate and maintain dialogue with upcoming talent and reward them for achievements through smart-incentives. Smart-incentives on the BitDegree platform will range from small to large and be location and topic targeted. From the student's perspective, it means getting paid to learn new skills based on local demand, which not only incentivizes but can actually be a viable escape from unskilled work.

Building quality, interactive, and engaging learning experience is essential to every successful education platform. There are attempts to solve the problem: i.e. Coursera and CodeCademy. Despite the fact that these frontrunners face abysmal course completion results, similar to the entire MOOCs industry – just 5%, these two companies together are worth more than $1 billion today. Our proposed

incentive alignment approach was not tried in any of educational platforms we are aware of. A merit based rewards, currently practiced in existing platforms, does not substitute income needed to support a student while studying.

We will be pursuing our vision to go forward with the development of BitDegree platform even in case of unsuccessful ICO. We anticipate a closed testing, involving incentive providers in [2018Q3] and open launch of BitDegree in [2019Q1]. The capital available to the development of the platform will determine functionality and choice of the course material available. The anticipated capital raised during ICO, will enable us to directly compete with existing education platforms even prior the benefits reaped by the popularity of BitDegree platform. Companies creating technologies used in digital economy should consider contributing to development of the platform, and ensure technologies they create are represented in the course material available to millions of students.

WE BELIEVE THAT:

01. Everybody in the world deserves access to proper education, no matter the gender, race, age or religion;
02. The key to success of any technology business is to hire the best and well educated talent, therefore, business is ready to invest in talent;
03. The state education system is flawed and needs to be democratized, decentralized and otherwise disrupted;
04. Blockchain-powered smart-incentives and gamification features they enable are the game changers.

02. SCOPE OF THE PROBLEM

When we first started to analyze reasons behind and difficulties of hiring tech talent, we looked for possible solutions and then wondered who else would benefit from the approach in which we would take to address the problem. We then incorporated those parties to synthesize new problem scope and tried to find the solution to newly defined problem. As in any of those exploratory endeavors, one must not forget to limit the problem scope to minimum, and to look for solutions providing maximum benefits to parties involved. We settled on a very small group of parties that are benefiting greatly from synergetic solution.

2.1. Employers looking for tech talent

The shortage of tech employees is undeniably global and increasing. According to a Jobvite research, HR professionals report that it's becoming increasingly difficult to fill open positions, and 65% of recruiters claim that talent shortage represents the biggest challenge in hiring[1]. Everybody knows that the key to success in any tech company is talent acquisition. By everybody we also mean the talents themselves. Though the salary levels in tech and IT industry are constantly growing, it has been proved not to be a sufficient incentive to attract the best employees and keep them loyal. Companies compete raising and maintaining the employer profile, offering the perks unimaginable in other industries. In the next five years, it is expected for the demand of talent to deliver on new capabilities, to significantly outstrip the supply[2]. It is estimated that the entire recruitment market is worth over $200 billion worldwide and $4,000 is the average amount spent by a U.S. company to fill an open position[3].

2.2. Service provider looking for educated customers

Service providers invest money and effort to understand the real-world problems and to create solutions to those problems. Most often, many companies provide similar solutions with some specific differentiating features. Their solutions usually become known to new users/adopters via advertising and old-fashioned word of mouth. Companies are spending significant amounts on advertising in order to attract new customers, and to spread the word about their distinct ways of providing value to their customers. For example, a service provider spends on average 300 USD on Google adwords to acquire one new web hosting client. This is a huge amount in a low margin business. By accepting BitDegree tokens, various web service providers, such as Hostinger, will be able to attract a new flow of targeted customers in the most cost-effective way. Naturally, the service and product providers shall also grow the interest to sponsor BitDegree users instead of giving service discounts or vouchers. Tech savvy students and users are valued clients targeted by various

1 http://www.gethppy.com/
2 http://www.mckinsey.com/
3 https://www.forbes.com/

industries. By providing incentivised courses that explain the problems and the approach, taken by the company to solve them as implemented in their offerings, they can nurture well informed potential clients. Students with BitDegree scholarships will become undoubtedly qualified clients, with a proven interest in learning technology, and willing to spend money on various products and services. Qualified clients require less hand-holding from technical support teams, and do not inflate service provider's support related costs. As more and more SAAS buying decisions are made by a person, directly working to automate some tasks for his employer, the preexisting exposure to service provider offerings can influence buying decisions of the employee's company.

Hostinger is the 1st service provider which agreed to accept Bitdegree Tokens in exchange of their services. Any user who will learn digital skills on BitDegree platform will be able to order domain names and web hosting services, and put newly acquired knowledge in practice.

2.3. People seeking knowledge and digital economy based employment

Unskilled labor force is replaced by the automation more and more. The Automation forces unskilled people to acquire new skills in areas where the automation does not provide cheap alternatives. Most areas requiring knowledge, creativity, feel for aesthetics, and problem-solving skills are becoming better paid, because of the shortage of qualified candidates. So how one is demanded to develop new skills in the market today? We have a higher education industry caring for those in need of knowledge, and willing to work hard to develop their skills.

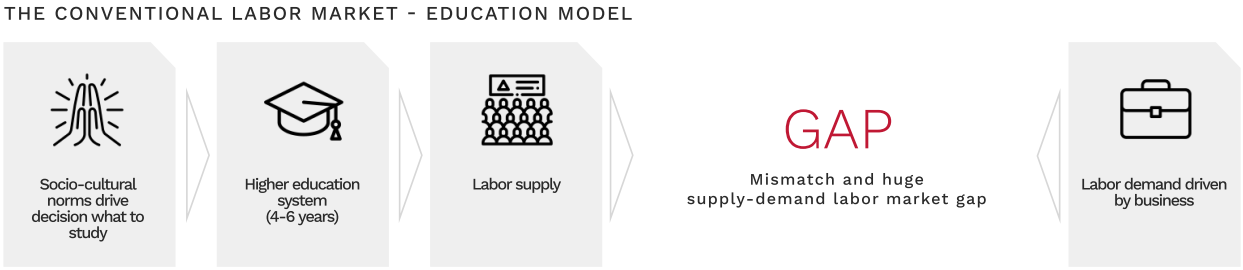

Figure 1. The conventional labor market education model

Internet enabled us to reach the universal knowledge pool, interact directly and informally with the greatest minds of our age. However, the entire global education system became still, using centuries-old methods, that are virtually proved to be non-effective. There is a global need for the attempts to disrupt the status quo. It is not a surprise to anyone that higher education institutions are universally failing to fulfil their mission - to transfer know-how, and let students develop practical skills that are necessary to guarantee successful employment. Current education model has its problems:

Education is expensive. Each year the price of education is growing. Students have to distribute their time between the studies and unqualified jobs they undertake, still ending up with huge debts for

their education. The high price combined with the lack of incentives result in the decline of motivation to continue studies. Students need an extra push to the right direction. In recent years have seen the rise of fintech startups dedicated to student loan financing, which is unavailable to the majority of the world. We think that the loan approach is morally wrong and everyone should have the opportunity to educate themselves without the risk of defaulting.

Educational system so far offers mostly long-time incentives - the unspecified promise of future employment. However educational institutions rarely analyze and link business needs with their curriculum. The gap between the needs of employers and student knowledge already exists and is widening. This results in the need for business to provide the post-graduates with long-term and expensive trainings. We are building BitDegree to enable the direct and mutually beneficial communication between business and future employees.

Students lose motivation. One way to increase students' motivation is to use gamification in the educational process. A lot of small incentives make learning interesting. The use of games in the educational process attract the student at the beginning and keep the attention throughout the game. Gamification can reduce problems caused by low concentration and help to learn information more effectively. Research has shown that no more than 20% of information is processed while reading, compared to 90% by using gamification[4].

According to study, conducted by Pew Research Center and Elon University, the majority (53% of respondents) were confident that gamification will be very common in all areas of life by 2020[5]. Another research has shown that 75% of teachers believe that digital learning content will totally replace printed textbooks within the next 10 years[6].

The constant and growing need for continuous learning. Thomas Picketty, the economist and author of "Capital in the 21st Century" concludes that over more than 300 years of history, the only predictable factor that drives individual earnings potential is "skills and knowledge". Today learning is a part of economic survival. However getting education is not enough - if we don't stay current, up to date, and continuously re-skilled in our professions (regardless of what they are), we fall behind. We believe to be able to achieve and provide the continuous learning possibilities with the smart-incentives.

2.4. Synthesis of the problem worth solving

The industry needs educated users as much as it needs skilled employees. A continuous learning is not an option, but a necessity to stay responsive to market needs. However, the conventional education industry is taking too long to satisfy these demands. Looking from the user's perspective, there is lack of clear incentive, especially when the conventional education process is ingrained in the culture.

4 http://voxmate.ru/

5 http://voxmate.ru/

6 https://www2.deloitte.com/

Digital industries such as the recruiting and the lead generation are worth hundreds of billions each, but fail to be integrated properly to support education, even though there are clear synergies. The reasons for failure are numerous: currently non-digital nature of education, legacy systems of who-knows-whom, reputation and trust issues, geographic and cultural challenges (if global perspective is taken into account), etc. These synergies can be reaped by overcoming the obstacles with the bias and neutral technology. It is essential to start with the most advanced area of the education sector, the digital economy skill development, before tackling the issue in a mainstream way, and our team is up to the challenge.

03. BITDEGREE: IT IS ALL ABOUT EDUCATION

We are proposing a digital incentivized studying platform as a new tool to grow the global tech talent pool. Companies in need of tech talent will provide financial incentives to students willing to participate in training courses and to develop their skills. Companies seeking to get people familiar with newly introduced technology or services, will provide financial incentives to students willing to spend time to learn and to try the company's offerings. By providing incentives, any company explicitly signals the demand for certain qualifications, or informs about knowledge and skills needed to effectively use newly introduced technology/products/services. People looking for new opportunities will learn new technologies, develop practical skills in demand, and get familiar with existing technological solutions provided by solution providers. Job seekers will enroll to subsidized courses to get more knowledge and to develop skills within selected technology topic. The course materials and learning process will be made interactive and in a highly engaging way by following field-proven gamification methods. Students will be able to communicate with other students and course mentors, to pose questions, and seek for more detailed explanations. All course material and progress assessment will be divided to small chunks in order to enable short-term effort in the reward cycle. In addition to subsidized course material, each student showing learning progress will be rewarded with platform Tokens. Companies providing incentives will be able to get in touch with students enrolled in subsidized courses, and possibly offer employment positions for good performers. Companies, offering to accept Tokens for services, will allow students to deepen newly acquired skills, while using commercial services offerings. Students will also be able to exchange Tokens on exchange platforms. The BitDegree platform will register progress of each student, and will provide ways the students can prove they overcome the challenge of developing and applying skills to solve problems. BitDegree will rely on Ethereum platform to enable incentives scheme and to store transparent record of all achievements made by students

THE PROPOSED BITDEGREE PLATFORM LABOR MARKET - EDUCATION MODEL

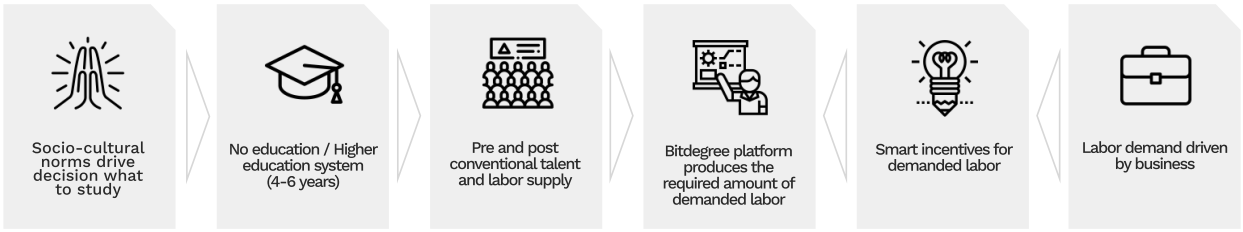

Figure 2. The proposed BitDegree education model

3.1. Introducing smart-incentives

Smart-incentive is an Ethereum blockchain based smart-contract ensuring exchange of value (tokens) between the *incentive creator* (sponsor) and the *incentive taker* (student). Incentive taker is committing

to perform *study effort* in order to receive the *incentive* (tokens). *The underwriter* of this smart-incentive is the BitDegree platform, which will provide *the proof of study effort verification*. Any company (like a potential employer or a technology/service provider), government institution, (like a school, job centers or prisons) and even ordinary citizens can become an incentive creator. Smart-incentives will be created by Incentive Creators who will provide sponsorship amount and define maximum number of applicants, date and time of when students can begin enrollment to course, when enrollment becomes unavailable, and how long the incentives are left available to enrolled students. Incentive Creator will be able to set prerequisites for candidates, availability and intensity of incentives for selected regions or even specific areas e.g. Tampa, Florida, US. Incentive Takers will be able to lookup what kind of Study courses are available to them in their locality with respect to their track records of achievements. All student engagement with smart-incentive will leave tamper proof trail in the blockchain. The smart contract will provide assurance of incentive payment. The use of Token enables us to serve the economic incentives to any student in the world, which is not possible with flat money due to high transaction costs

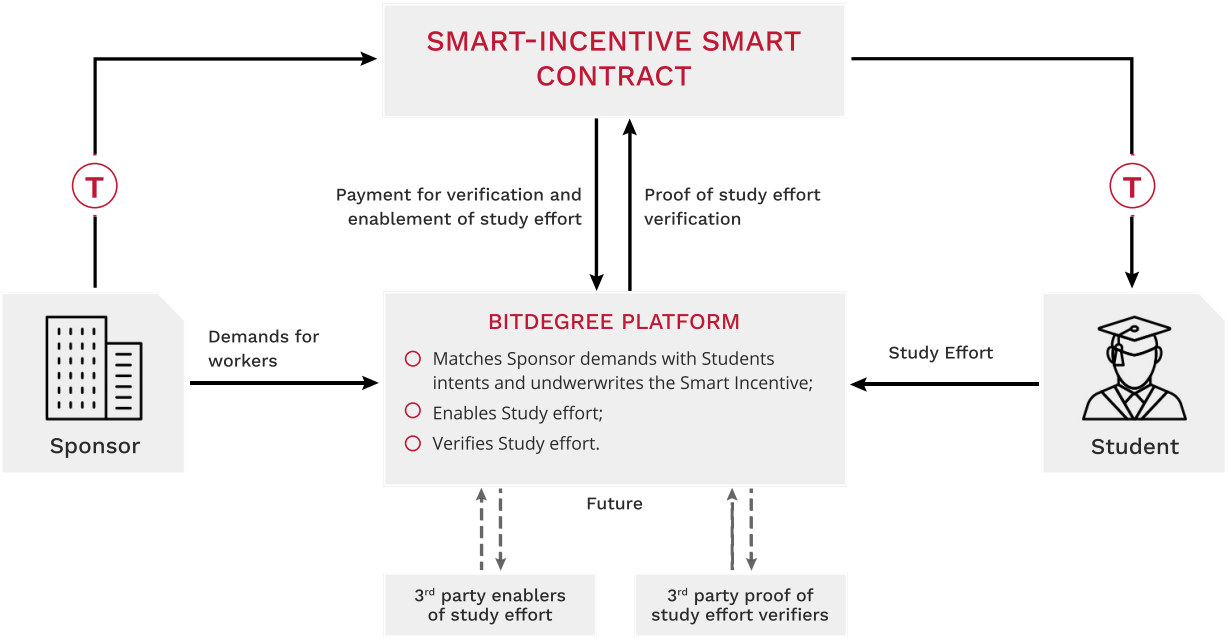

Figure 3. How Smart-incentives work

Proof of study efforts. BitDegree platform will provide proof of study effort verification for all courses hosted on the platform. We will implement several familiar verification mechanisms like tests, problem solving, creative assignments and others. Majority of the verification mechanisms will be automated. In the future, for specific types of Study efforts, the BitDegree platform will open up to 3rd party Proof of Study effort verifiers, that will provide study effort assessment and will be incentivized to operate with compliance to quality of service requirements. The incentive to verifiers will be based on a feedback of perceived evaluation quality as experienced by Incentive Creators. Study efforts verification work will be compensated with a small part of the Incentive (tokens). Study

effort definition and enablement (preparing and running the course for the Student to study) is also rewarded with a part of the Incentive (tokens).

Study effort enablers (Course authors and mentors). We anticipate the use case where 3rd parties will create part of study courses. In this case the BitDegree will remain the Underwriter of smart-incentives. For example, Courses can be created by 3rd parties on demand or in their own discretion, like in Coursera, and the creators will earn tokens for usage and teaching of their courses. Once again, course material, mentorship, and verification will be measured and judged according to requirements of quality of service, and incentivized accordingly.

Chaining smart incentives together. Smart-incentives can be combined together to form a graph of mandatory and/or at least one in predefined set prerequisites. eg. student enrolling to frontend course should learn HTML and any of style setting alternatives (CSS/SASS/LESS/...) as well as any of languages targeting EcmaScript/DOM (JavaScript/TypeScript/Elm/..) to claim final frontend capability reward. Smart-incentive can be applied for work of any length: a single action, a task, an extensive assignment, a degree. This enables continuous learning for big bodies of knowledge and different studying paths to achieve similar skillsets.

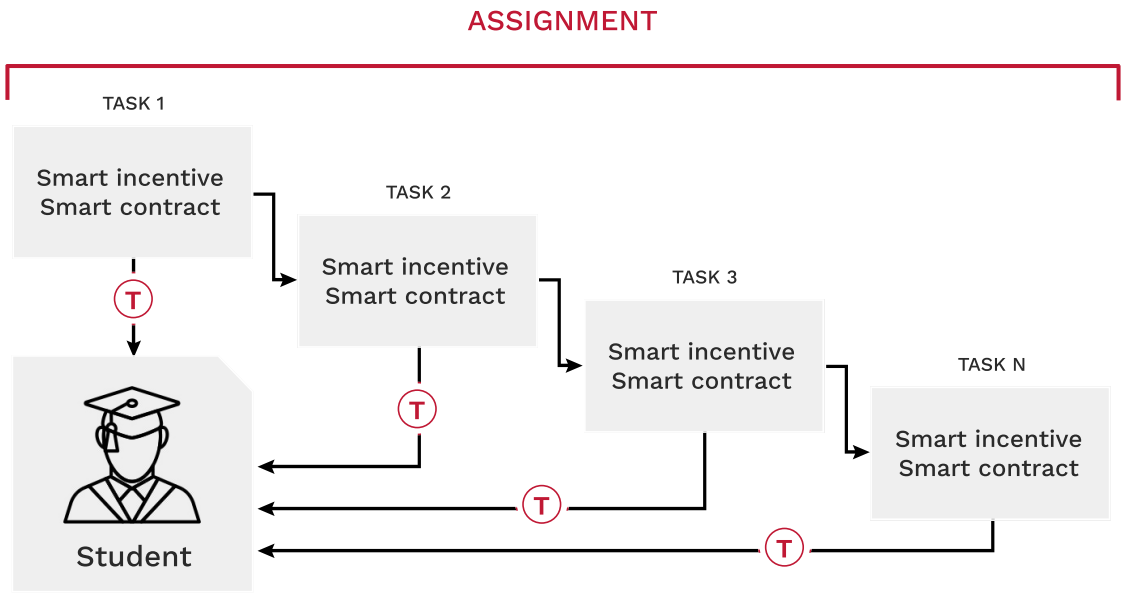

Figure 4. Example of serial chaining of smart-incentives

Smart-incentives types. We will work with gamification specialists to design various smart-incentives: i.e. rewards, incentive prizes and competitions, etc. We particularly believe in the Octalysis framework and will apply it to various aspects of BitDegree. In the future, the smart-incentives may be designed by 3rd parties, including Sponsors, to be tailored to the needs that we cannot foresee right now.

Smart-incentives have many favorable qualities and provide solutions to some of the problems we are aware of:

- they signal topics/skills in demand;
- they offer small rewards for small achievements and keep students engaged;
- they record all student achievements;
- they provide transparent records of how sponsorship was spent;
- they may offer rewards to course material creators;
- they may offer rewards to human evaluators assessing student's progress.

3.2. Gamification as a cornerstone of the platform design

Smart-incentives have great gamification properties. As smart-incentives can underwrite exceedingly small tasks. Nowadays, gamification is a key driver of student's motivation. It helps students to actively engage in the process and makes learning as fun as playing computer games. Students become more productive because a small incentive is always near – like collecting XP points and raising your Level. Gaming industry has proved that this concept works effectively and brings financial success to entertainment products, responsive to human conditions: stress induced by impatience, feelings of pride to be the first to achieve a goal or a need to belong with some group. We will tap into the same subliminal pathways that our students so effectively exercise each time they play computer games by implementing gamification through smart-incentives.

Yu-kai Chou defines gamification as "Human-Focused Design", as the process takes into account humans' feelings along with reasons why people want to do or not want to do certain things. Yu-kai Chou elaborated a gamification framework called Octalysis, which represents eight Core Drives of people's motivation. Octalysis framework is octagon shaped with the Drives on each side.

According to Yu-kai Chou Core, Drives of people's motivation are:

1. **Epic Meaning & Calling.** If a person is engaged in a process and believes that it is the mission of great importance, he/she is ready to put a lot of effort, free time into pursuing this goal.
2. **Development & Accomplishment.** People like to see the results of the performed activities, receive some bonuses or prizes for their accomplishments, and get to the leaders' list.
3. **Empowerment of Creativity & Feedback.** None of the awards matter to a person if the goal can be easily obtained. Only those rewards matter, for which a person overcomes difficulties.
4. **Ownership & Possession.** When a person possesses something, he/she instinctively tries to multiply the possessions and/or improve them.
5. **Social Influence & Relatedness.** The fifth factor incorporates all social elements motivating people: mentorship, social acceptance, companionship, competition, and envy. When we see a

friend reach a high level in the game, we, as a rule, wish to catch him/her up and overtake.

6. **Scarcity & Impatience.** The sixth factor that motivates a person is the desire to possess something simply because of its scarcity.
7. **Unpredictability & Curiosity.** Curiosity encourages people to continue progress, because they want to know what will be next.
8. **Loss & Avoidance**. The majority of people prefer to act immediately because of fear of losing the possibility forever.

The intelligent use of such drivers within the BitDegree platform, will enable us to not only attract new students, but will also to contribute towards sustaining the interest of existing users.

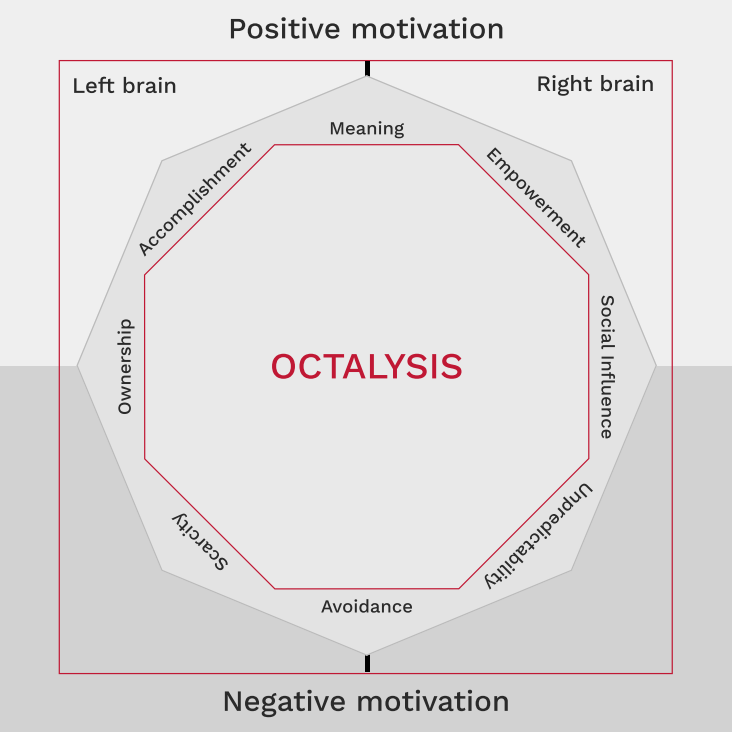

Figure 5. Octalysis framework

04. THE BITDEGREE PLATFORM

We love the idea of running BitDegree platform on decentralized blockchain fueled internet. We believe in decentralization and self-sustainable architectures, however, we see the need for centralization of certain aspects of the platform (at least in the beginning) in order to enable shorter development and deployment cycles and to ensure faster market adoption. After evaluating the current technology capabilities, such as blockstack.org we have decided to start with mature, conventional web technology. With time, we will aim to decentralize such things as course creation, course mentorship, verification of study, smart-incentives creation and others. At first, we want to make platform that is operational and we already have the basic implementations of some of the components in place up and running. Initially, the platform will provide minimal set of complete and functional services, essential to sustainability of the platform but we have a bold general plan for the future.

4.1. Roadmap and a Bold vision for the BitDegree platform

We practice agile development and therefore carefully plan for the immediate goals and draw general plans for the future according to the vision that we want to achieve. We share the motto of Jeff Bezos – "We are stubborn on vision but flexible on details". We see at least 3 essential stages of platform development. We have clear plans for v1, however, what will happen in v2 and v3 will depend on the lessons learned in v1.

We follow core guiding principles for the platform design:

1. decentralization,
2. transparency,
3. inclusion,
4. sustainability,
5. growth,
6. disruption.

We will use these principles when deciding on the strategic direction of the platform and new functionalities.

ROADMAP

2007-2016 - 29M+ user base

Reached 29 million users on 000webhost - free web developement learning platform, and Hostinger - web hosting services. Biggest part of users are young tech-savvy with deep will to learn, build and grow. Users love us as an online learning platform already.

2017 spring - Web fundamentals

Summary of 500+ articles about web coding fundamentals was prepared. Polishing of the business strategy. Approaching first business partners. Consulting with numerous universities and blockchain companies to develop first courses.

2017 summer/autumn - BitDegree ICO

Period of building Ethereum Smart Contract for upcoming BitDegree ICO event.
An ERC20 token, auditing SM code. Development of MOOC Educational expertise partnerships. Marketing. BitDegree Token Crowdsale & Distribution Event.

2018 winter/spring - Best online IT Learning Courses

Launching the first Blockchain course material. Hire field experts to manage project expansion. Source the best tutors. Blockchain identity registry research and implementation. Onboard 3rd party providers. Course material repository and structure generalization.
Launch first 100 courses with world's best online learning experience.

2018 Q2/Q3 - Hype on Student sector

Continue Blockchain knowledge improvement. First token scholarship issued. First partners accept token in BitDegree ecosystem. Start full-stack marketing activities, oriented on student engagement with strong influencers community & Alumni partnerships. Achievement and gamification tracking for students. Tools enabling verification of study effort. Study area and student achievements viewer. Smart incentives contract implementation. Mobile platform development. Students as mentors. 3rd party content. 3rd party assessors.

2018 Q4 - Business Platform launch

Developed & launched platform for Sponsors. Business development towards strong sponsorships with emphasis development of courses with a focus on skills in-demand. Creating sourcing pool for talent. Course material index. Sponsorship area. Course chunks mapping and career paths building area.

Future

3rd party integrations. Digital Service Provider SDK Development. Building SDK for a third party Digital Service Providers to integrate Bitdegree Tokens as a mean of value exchange into market cycle. At this point in time blockchain technologies are already widely adopted. Tools for token integration into 3rd parties is already present. BitDegree for Business. BitDegree Jobs. BitDegree Certification. BitDegree Decentralized Diploma. BitDegree education AI assistant. Decentralized diploma viewer. BitDegree training. BitDegree young talent aquisition. BitDegree Braille (blind education). BitDegree for Third World countries.

Figure 6. General plan for platform development

We anticipate that version 1 of the platform will provide a set of essential services: identity registry, course material repository, course material index, assessment tools, sponsorship area, study area and student achievements viewer.

4.2. Identity registry

All platform users, willing to interact with the platform, will be able to create password derived cryptographic pseudo-identity. To enjoy full functionality of the platform, users will be able to use 3rd party service providers to link user's pseudo-identity to government issued identity and provide other information needed to become eligible for sponsored courses. We value personal privacy a lot, and so we will enable students themselves to choose their position in a trade-off of disclosing more personal information for becoming eligible to enroll to more subsidized courses. All student interactions with smart-incentives will only record pseudo-identities. The linked government issued identity will become viewable to sponsors when student enrolls to subsidized course, or to other 3rd parties, when student shares student achievement verification link with above mentioned 3rd parties. Companies and other organizations will have to disclose their registered identities when providing sponsorship. Private citizens will be able to choose if they want to disclose their government issued identity when providing sponsorship.

4.3. Course material repository

Enrolling into a course will give students a permission to use the course material hosted on the platform. Initially, course material will be created or licensed from content creators based on demand from sponsors. The course material will be created in small chunks (think of a scope of single Wikipedia page). Each chunk will contain summary of the content, tags for indexing, explanation of concepts and theory, description of ways theory can be applied to solve specific problems, examples of practical applications, challenges for students to apply theory in practice, and criteria/dataset for automated verification of understanding/skills developed. All chunks will have associated knowledge base for frequently asked questions and answers, alternative explanations and other user contributed material. Content chunks can be joined to form continuous paths of educational experience tailored to specific carrier positions and roles required by sponsors. Many positions and roles require similar but slightly distinct paths of learning experience, thus, reuse of course material will allow to reduce overall costs of course material preparation. Additional learning paths can be cheaply assembled by reusing existing chunks and creating only missing pieces. Student can also benefit from the reuse by skipping assessment step in case they already have successfully completed same chunk while in pursuit of other path and, thus, only in need of short memory refresh.

4.4. Course material index

Course material index is a database used to store and search chunk meta information and semantic

links between all content chunks. There will be many content chunks available, and as a result finding something that will fit your career path could be difficult. While tailoring specific learning paths to our sponsors we will be able to detect and name repeating learning paths to be later reused as a coarse path on other paths. To make search somewhat more manageable, the semantic relations of chunks to path and paths to path will be recorded and continuously maintained. BitDegree will maintain public global naming space for chunks and paths but each sponsor will be able to define their own naming or import chunks and paths from global naming space. Selected paths can be enhanced with conditions and synthesized to smart-incentives. By immutably storing all publicly used paths, we can easily version course material while retaining chunk reusability and student achievement history pointing to all chunks used to complete the course.

By managing chunks in a fashion resembling a semantic web, we can also gain more insights in what other related concepts could be beneficial to students. We will be able to track what chunks are mostly used in critical path of many courses and improve them more often compared to less used chunks. A chunk public index will need constant curation which will be provided by BitDegree employees driven by recommendations and inputs from platform users.

4.5. Assessment tools

A fast and guiding self-assessment is crucial to maintaining motivation. We will generate individualized chunk scoped or path scoped test for student self-assessment based on testing datasets provided in each chunk. For automatically evaluable programming tasks, this may include runnable code to test code written by students. Automated assessment will recommend which topics/chunks to repeat to improve results. Many assignment types require demonstration of creative thinking and have many known and unknown ways to solve problems given to students. Human evaluation is necessary for those types of assignments and we are looking for economically balanced ways to incorporate human verifiers (at first, course mentors) into assessment.

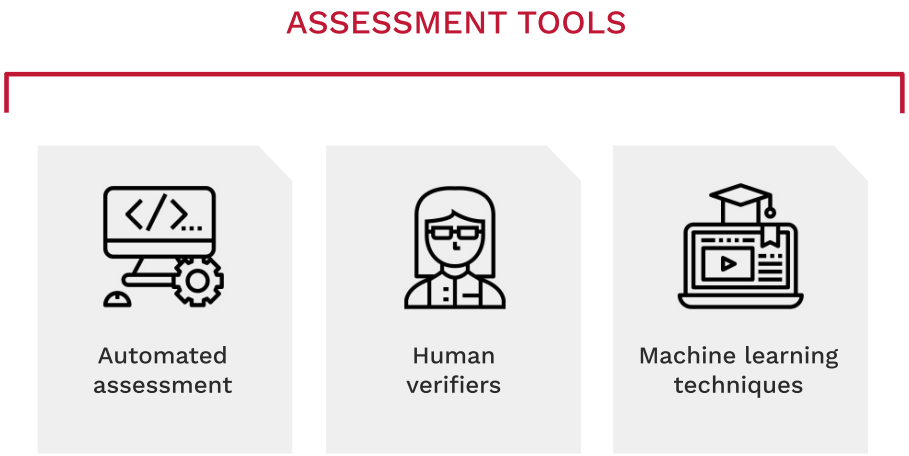

Figure 7. Course asignment assessment tools

Assessment process will also try to detect cheating by applying machine learning techniques to consume exhibited student behavior, like time taken to familiarize with material and complete exercises, tendency to ask questions and not wait for the reply before trying to assess his skills, and infer risk rating. The rigor and scrutiny applied to assessment will depend on inferred risk. Each assessment will work as a challenge response mechanism and positive evaluation will result in signed achievement certificate, which later will be used to claim reward from smart-incentive.

4.6. Sponsorship area

Identified and authenticated sponsors will get the access to platform's sponsorship area. They will be able to use guided process to express their needs in a form of campaigns. An example campaign would encode information on budget available (X tokens worth 8000 USD), satisfactory results (prepare two candidates for unfilled front-end positions), qualification barrier for candidates in a form of learning paths successfully completed (developers with demonstrated experience of using angular2 to implement web shopping cart application). Another campaign example would encode budget allowance, limits on number of students enrolling and topics (eg. covering use of sponsor's product) sponsored. We are looking into many ways sponsors will be able to define their satisfactory results, constraint factors for student's eligibility, rules of splitting sponsorship amount to rewards to join campaign (enroll to courses), and dynamic management of sponsorship available (within budget scope) depending on results of ongoing campaign. Sponsors will be able to increase budget and targeted student scope of campaign at any time.

The campaign will be publicly announced after it has been defined and planned, campaign budget collected (paid for). The platform will try to match students that have expressed interest in topics covered by sponsored courses and will notify them first ahead of slightly delayed public announcement to other qualified students. Given sufficient budget allocation to help mentor new talents and openly disclosed compensation for positions offered, the students with achievements matching required qualification, and willing to receive position offers will be notified about newly opened positions. Sponsors will be able to track overall student enrollment and individual progress of each enrolled student. Automatically triggered notifications will be sent to sponsors when campaign results are being partially or fully matched e.g. one or several students successfully completed all assessments, proving their qualification for open positions).

4.7. Study area

Identified and authenticated students will be authorized to access study area of BitDegree platform. During the first visit to the area, students will be asked to create student's profile. They will be asked to disclose some personal information, to set their privacy settings, to rate study fields and topics in order of interest and select ways they can be contacted by the platform. Personal information includes mandatory information, like government issued identity (name, surname), birth date, coarse

location of residence, and may include optional factors like native language, proficiency in foreign languages, and other personal factors. Privacy settings will allow to restrict when and what personal information can be disclosed to other parties. For example, some sponsorships may only be made available to residents of certain area, therefore the platform will not offer enrollment to students who prefer to hide their location of residence. Students will be asked how they can be reached (by email, facebook, text message, etc.) in case new sponsored studies, matching their interest would become available, when new employement positions matching student's achievements become available and other listed cases and all other unlisted cases. Any such case can be enabled or disabled individually.

After completing their profile students will be able to lookup available sponsored study courses and read about rewards and perks (like job offer for the first or best achiever) associated with successful participation and completion of each sponsored course. Students can access selected course material by enrolling in a particular course. Enrolment process may include answering some questions, such as how much time you can spare to study selected course. This will allow sponsors to estimate the time till completion of the course. Students will access course material and complete self-assessment exercises whenever they feel ready for it. Students are able to communicate to other students or course mentors if they are unable to answer any questions.

Sponsors will be tracking progress of students enrolled to courses and will be able to initiate a dialog with any enrolled student. Students will get notified when such communication is desired by sponsor and will be given means to accept and continue the dialogue.

4.8. Student achievements viewer

In the perspective vision we see BitDegree being used as the main platform to attract talent, yet old-fashioned ways may also be in use. When responding to old-fashioned job applications, BitDegree student will be able to generate and include a link to achievements viewer page on BitDegree showing a summary of student achievements, made on BitDegree platform. Students will be able to select what achievements they want to be visible to the viewers, as some may not be needed for the employer or job application. Every prospective employer can receive distinct and custom-tailored link. The achievement viewer will display a verified government issued student identity, course taken and successfully completed without disclosing student's pseudo-identity. Although no direct link between pseudo-identity and government issued identity will be disclosed on achievements viewer, this may not prevent highly motivated employer to look for correlations of disclosed achievements and matching achievements on the blockchain to reveal pseudo-identity and, thus, all other undisclosed achievements on the platform.

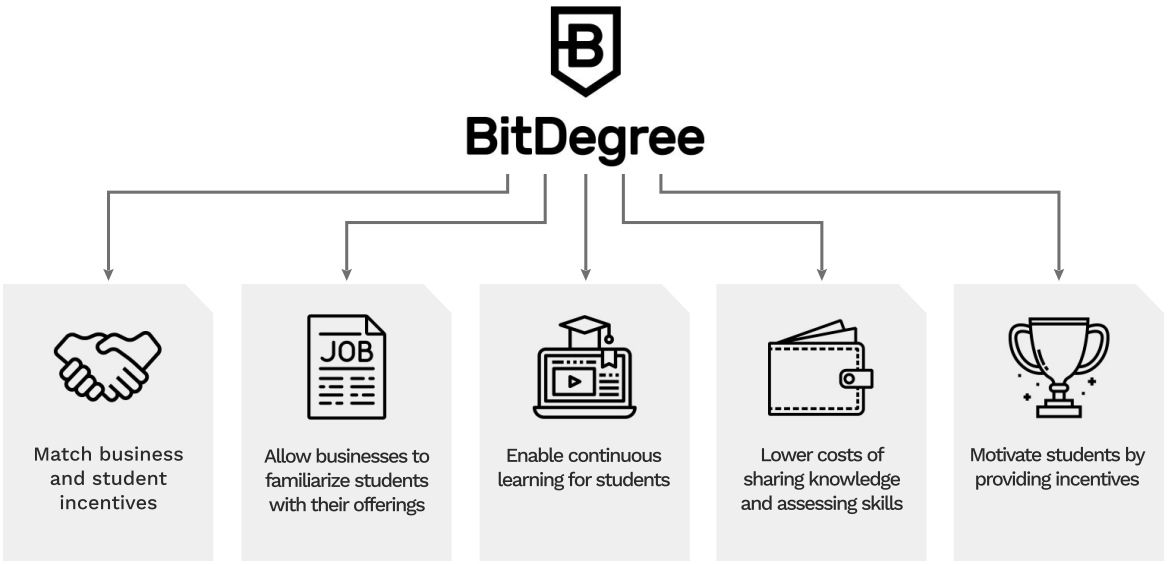

Figure 8. Bitdegree platform benefits

Version 1 of BitDegree platform will provide solutions to most of the problems we are set to solve:

- It will match business and student incentives;
- It will allow businesses to familiarize students with their offerings;
- It will enable opportunistic, continuous learning for people striving to gain new desired skills and knowledge;
- It will lower costs of sharing the knowledge and assessing knowledge/skills;
- It will help motivate students to continue with their study efforts and will provide incentives to those progressing forward.

In the future, large and detailed data sets of information about BitDegree users will enable the most useful features of the BitDegree platform - algorithmic study, career guidance and employment-fit matchmaking. Imagine students being able to completely ditch the conventional education system and be guided to their most profitable and/or exciting career options based on how well they are studying micro-courses. Moreover, we could steer Students toward course choices that guarantee employment right after the completion. BitDegree will become an essential tool to unlock this unprecedented potential and to disrupt outdated education system. This is the future that we believe in and will do our best to bring it to reality.

In the scope of **Version 2** of the BitDegree platform we will increase choices of content available, introduce localized version of course material, scale mentorship and assessment functions. We would like to include more human touch and guidance to the learning process. Only open and flourishing ecosystems can grow beyond the area of origin and opening up the platform will be main objective for us.

4.9. Inclusion of third party course material

We aim to establish a live ecosystem of content creators contributing to success of the platform. Third parties will be able to contribute in a scope of a single chunk, a series of progressing chunks or even a complete course covering a specific area of expertise. Contributors could register their fields of expertise and receive requests to create content for new or trending topics and/or improve existing content in exchange for compensation. Unsolicited opportunistic content creation could also help cover less trendy but nonetheless important topics (as in COBOL developer course or OpenVMS administrator training material).

Contributors will have to adhere to contribution guidelines for course material to be accepted. The guidelines will cover acceptable forms of knowledge transfer methods supported by platform, requirements for datasets used to assess completion, conflict resolution processes, acceptable content licensing terms and other details.

We are looking into secure schemes of providing fair and reasonable incentives to contributors.

Conventional learning platforms with standard reward to contributors scheme have certain weaknesses that can be abused. In such abusive schemes, giving rewards directly to content providers does not make actual benefits to students. Testing and research into aligning interests of all parties involved will be needed. We would like to test ways to measure how helpful 3rd party supplied material is to learn a subject under the study via implicit (passive observation) feedback from students, A/B testing of same content from different content providers. We believe that rewards collected for continuously provided contributions to platform could become a source of steady income for any active contributor.

4.10. Third party assessors

Intricate and complex the topic requires more flexible and responsive assessment only humans can provide (at least today). The standard testing practices may not reveal talented students by giving lots of false negatives by assessing only minor details and overlooking the broader picture of the persona. That is why a second opinion from a human assessor may be the last chance to keep student from dropping out. As more and more content for different fields of science and technology will become available on platform, an inevitable need for human assessors will become evident. Some advanced qualifications may even require 3rd party assessors to verify knowledge/skills in controlled environment and with physical presence of the student. Many 3rd parties provide professional assessment services and we will tap into market for existing solutions.

4.11. Students as mentors

Most of us had an enlightening experience of finally understanding some complex topics with just

a little push and help from other student or a master of the craft, when books and blogs failed us to deliver the final missing piece of the whole picture. By allowing distinguished students to mentor other students can greatly benefit them both. To help someone else to understand new concepts, one must look for several ways to present concepts and their relations to other concepts. This practice deepens mentor's understanding and sometimes leads to new insights. Different deep perspectives delivered by mentor can shorten time it takes for a student to grasp the concept and its utility to solving problems. We will be researching technological solutions for students to solicit help from mentors, to enable seamless mentor-student communication and looking for suitable incentives model to apply.

The path to the 3rd Version of the platform will lead to even more broader content available to students as a result of strategic partnerships with other education platforms.

4.12. Integration with 3rd party education platforms

Integration with 3rd party education platforms would provide mutual benefits to BitDegree and its partners. BitDegree would tap to recurring sponsorship from major employers to match students with the best studying options available and not limited to content available on BitDegree platform. We would seek for assessors that are independent from 3rd party platforms to organize intermediate/ final assessments.

05. TOKEN CYCLE AND BENEFITS TO PARTIES INVOLVED

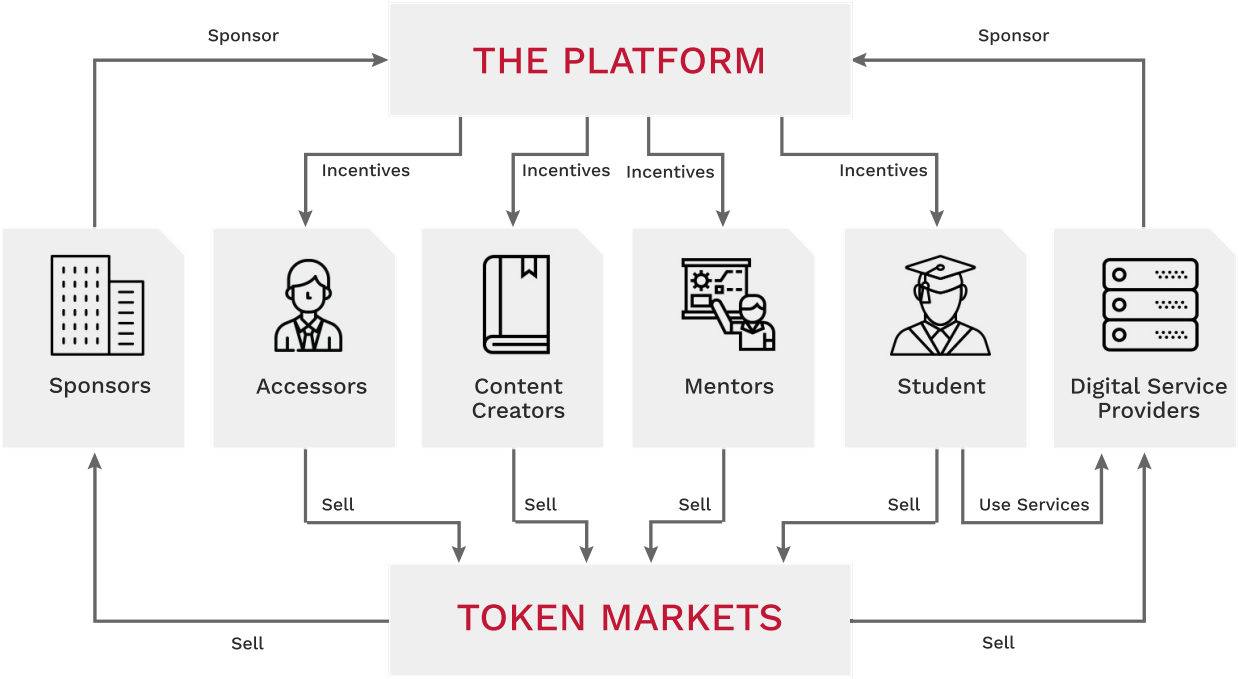

Figure 9. Token flow

Sponsors are the main economic fuel for sustainable BitDegree economy. The economic incentive for Sponsors to buy BitDegree tokens is the targeted platform for the employer branding and recruitment of tech talent. Corporate and private employers, HR companies, government and non-government organizations, other talent acquisition and talent growth structures/agents will be buying tokens to initiate, fund and create courses, establish scholarships and other rewards targeting exact topics and areas of study. For the spent tokens, Sponsors will be able find, train and recruit talent. Digital service providers, who want to familiarize users with their products, would buy tokens to sponsor the students willing to spend time to learn the products offered. By providing sponsorship to BitDegree platform and accepting BitDegree tokens IAAS/SAAS and other digital service providers will be able to attract freshly minted technology power users. The BitDegree platform will spend tokens to incentivize students, content providers, assessors, mentors and to cover marketing and other operational expenses.

Content providers, assessors and mentors will receive compensation (in a form of tokens) for their contributions to the platform and for helping to organize educational process. We anticipate most of the compensations received will be sold in token markets.

People looking for new opportunities or jobs will study on the platform. **Students** will receive tokens as rewards for choosing to study topics in demand and for continuing to show learning progress

in a form of tokens. Good performers are likely to receive offers to join sponsoring companies. Students may also accept offers to familiarize with services provided by **digital service providers** for a fee (in a form of tokens). Students will be exchanging tokens for the services and products of the digital service providers, to spend tokens on BitDegree.org platform (for premium or non-sponsored courses, funding of courses of interested topic, etc.) and exchange it to fiat on token markets.

The amount spent by a U.S. company to fill an open position is close to 4,000 USD and the entire recruitment market is over 200 billion USD worldwide. We do not doubt the liquidity of BitDegree Token.

06. WHY BITDEGREE IS SUPERIOR TO ITS ALTERNATIVES

There are many well established companies providing remote learning experience like Coursera, Khan Academy, EdX, CodeCademy, FutureLearn, XuetangX, Udacity and others. These companies run platforms to provide access to content, assess student knowledge, enable student to mentor communication. Each company has its take on how to cover its running expenses, for example: by being supported by consortium of universities, providing paid course or paid assessment, providing company and product branding. By being pioneers in the new field, those companies burned through huge amounts of investments to learn about things that does work together and things that does not fit well. Sadly, after becoming very popular, they become too big to risk introducing radically new ideas to get funded, introducing new forms of training material, or experimenting with new communication patterns. The current success of these companies is staggering and allows to measure the size of market we are about to enter. Top 10 of these companies have in excess of 110 million cumulative registered users with some companies showing revenue in excess of 60M USD.

We are coming late to the market. Coming late to the market allows us to study history and attempts of each company to test ideas, techniques and to create user centric focused workflows. Being small allows us to rapidly test new ideas and ways we respond to the needs of our students, sponsors and contributors. We studied most of well-established remote education providers by enrolling to courses and learned best practices used but also experienced many difficulties. We analyzed availability and price of certification, availability of scholarship, value provided to scholarship sponsors and a level of gamification employed in educational process.

	BitDegree	codecademy	coursera	edX
COURSES FREE OR PAID?	Free	Free	Paid	Mostly free
CERTIFICATES	BitDegree ID	For CodeCademy Pro Intensive only	Yes, but paid	Yes, but paid
SCHOLARSHIPS/ EARN TO LEARN	Earn to learn	No scholarship available	For individual courses only	For individual courses only
VALUE TO SPONSORS	• Receive high-skilled workers • Advertise their products and services	• Receive high-skilled workers	• Increase number of users • Advertise their products and services	• Increase number of users • Advertise their products and services
GAMIFICATION	Extensive	Little	None	None
BLOCKCHAIN BASED	Yes	No	No	No

Figure 10. Bit Degree advantages matrix

Although gamification techniques are well tested and proven to help motivate the consumers in other fields it is still seldom used by existing competitors, who stick to more old style, tried and true academic approaches. We will assemble current best practices of providing free access to teaching material and augment it with learning process gamification, human mentorship, free and verifiable assessment, financial incentives to students and employer-student matching capabilities together not employed by any of our competitors.

We are not a big threat to existing market players as education market is wildly expanding and can accommodate additional players. Each player brings in exclusive features, which allows to attract customers but strategic partnerships are common to allow exchange of training material. However, with time we believe our gamification and incentives based model will show its benefits and lead to capturing a significant share of remote education market.

6.1. The market potential of BitDegree

It is easy for everyone to observe the rapid expansion of remote education and e-learning market. We believe that with the new incentivized learning model, the BitDegree brings the next wave of e-learning adoption, which will spur the growth of the user base. We estimate user base to double every two years.

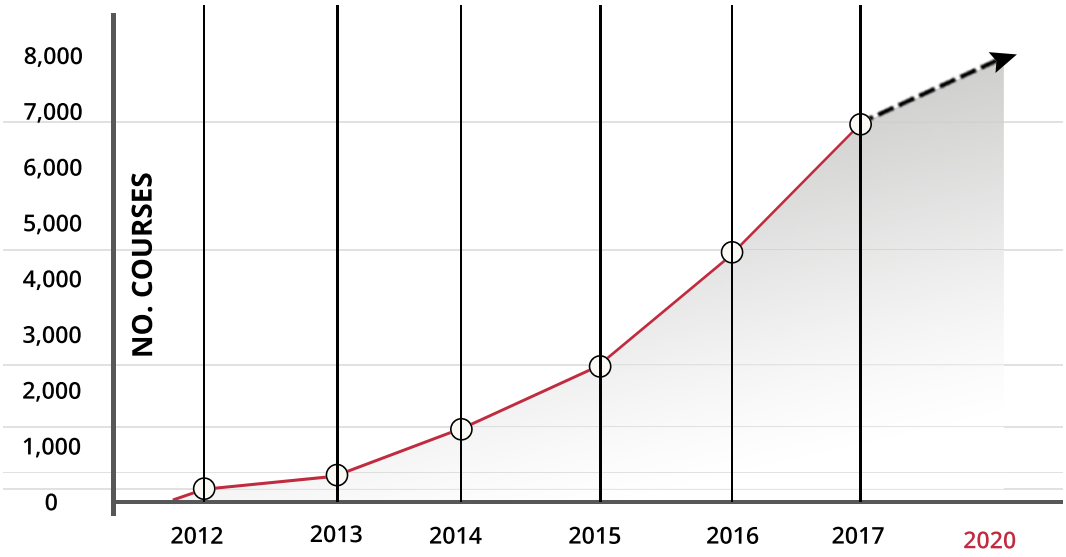

Figure 11. The rise of the MOOCs courses. (Source: Class Central)

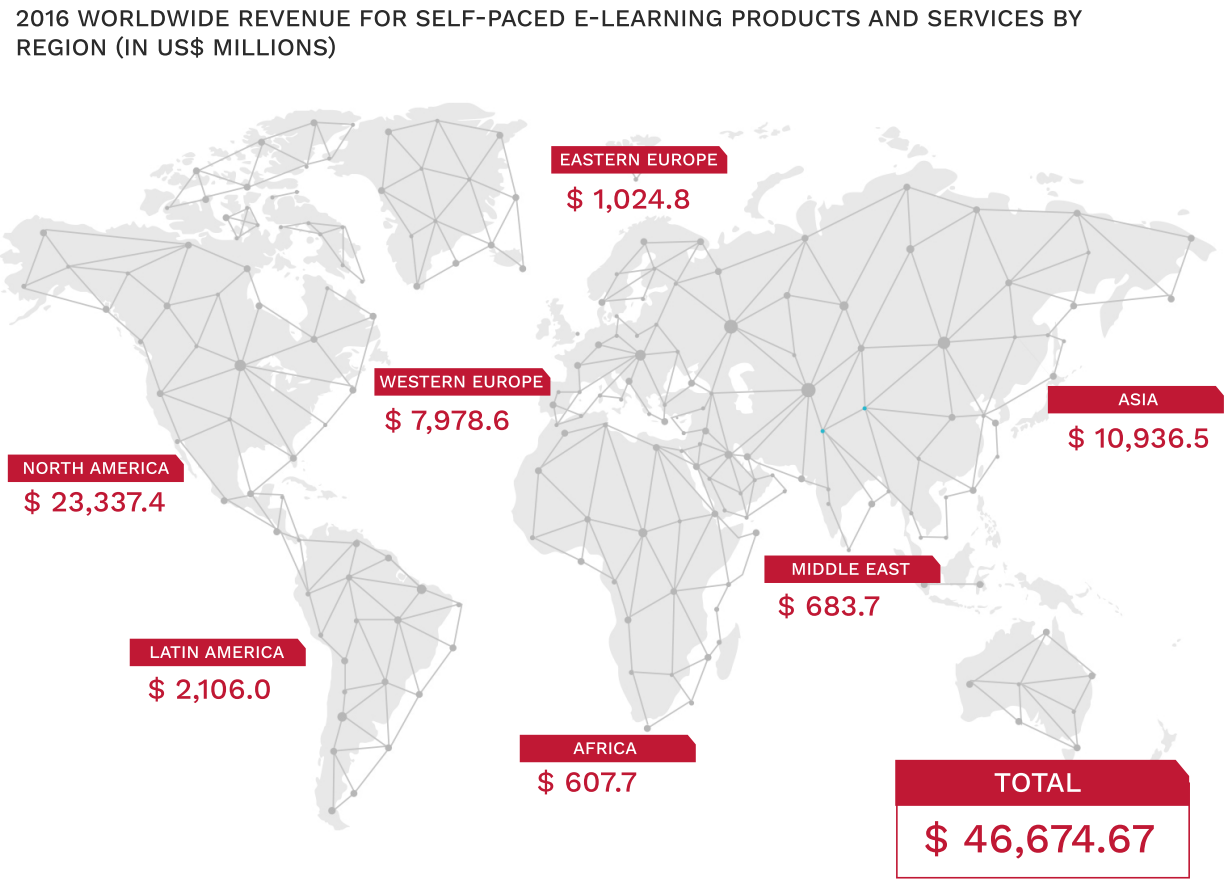

Figure 12. Worldwide revenue for self-paced e-learning

By aligning interests of potential employers and students using the education platform we enter talent sourcing market as well. There is a growing demand for digital professionals, which only in EU is expected to reach 9 million by 2020, while globally this figure is expected to be 3-5 higher. This huge demand and short supply is the reason why in the US, it costs on average 4000 USD to fill a vacancy.

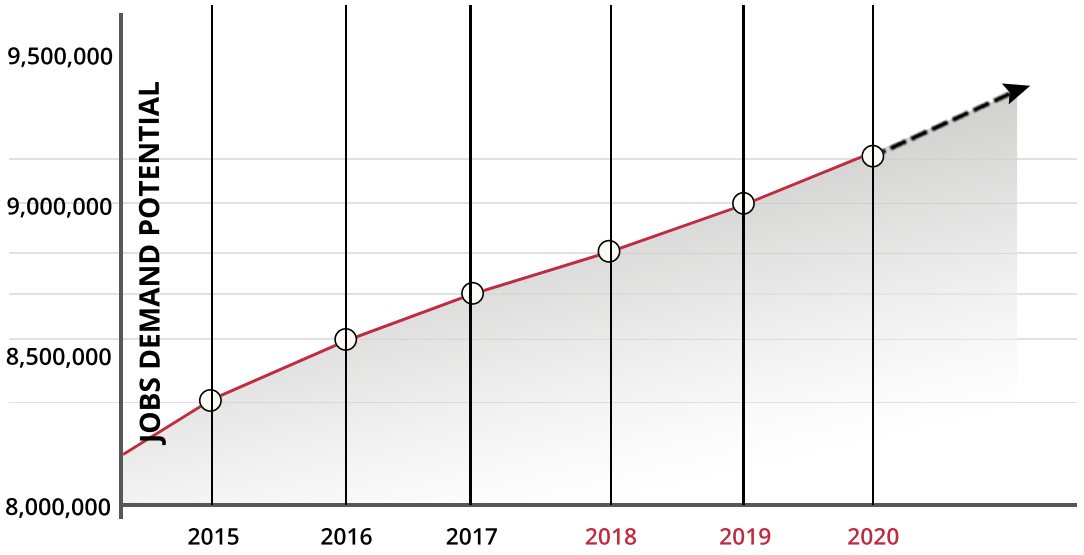

Figure 13. Rise of the demand for digital professionals (vacancies) in the EU. (Source: IT professional and Innovation leadership labour market data and forecast for EU28)

In fact, we expect a severe shortfall in digital talent around the world by 2020, when according to a Gartner study, 30% of tech jobs will be unfilled, owing to digital talent shortfalls.

We believe that these trends warrant the BitDegree's business model and there is clear demand for our value proposition.

DIGITAL STAFFING GAPS (NUMBER OF EMPLYEES)

JOB PROFILES	2016	2017	2018	2019	2020	2021
Front-end developer	20	-4	-7	-9	-26	-82
Digital Product Manager	4	-1	-2	-12	-73	-63
Solution Architect	5	0	-1	-1	-1	-2
Back-End Developer	15	-5	-27	-9	-45	-52
UX/UI Designer	30	-15	-62	-62	-71	-74

Shortfall (%) -75 -50 -25 -15 -5 5 10 15 20 25 >25 Surplus (%)

Figure 14. Digital staffing gaps. (Source: BCG analysis)

07. TOKEN LAUNCH

BitDegree will issue an ERC20 compatible token, which will be used to provide incentives to students and contributors of the platform. We plan to offer anyone sharing our vision to contribute to the development of BitDegree by buying BitDegree tokens during the Initial Coin Offering event, which will be held on November 7th, 2017. BitDegree goal is to raise a minimum of 5 million USD and to stop accepting contributions when 25-30 million USD will be collected. Some of the numbers may change due to ETH/USD exchange rate volatility, but the following numbers are best estimates as of September, 2017.

- **Maximum financing:**
  75,000 ETH - may change due to exchange rate changes;
- **Minimum financing:**
  16,000 ETH - may change due to exchange rate changes;
- **Exchange rate:**
  1 ETH = 1,000 Bitdegree Tokens - may change with ETH exchange rates;
- **Token contract address:**
  Will be published **only** on website bitdegree.org 48hrs before the crowdsale launch date;
- **Launch date and time:**
  Date to be announced soon. Block number will be published on website. Dates may be prone to change;
- **Token launch time-frame:**
  30 days.
- **Token launch completion:**
  Token launch will end when either the maximum number of ETH is raised or 30 days have passed. If less than the minimum of ETHs are raised, ETH can be retrieved by holders of BitDegree Token;
- **Contributors sending ETH to BitDegree Smart Contract address will immediately receive tokens.**

Token Distribution

- **BitDegree foundation:** 150 million;
- **Scholarships pool:** 375 million;
- **Token available to public at launch:** 765 million;
- **Team:** 150 million; locked for 360 days;
- **Bounties / Advisors / Partners:** 60 million;
- **Tokens in total:** 1,5 billion.

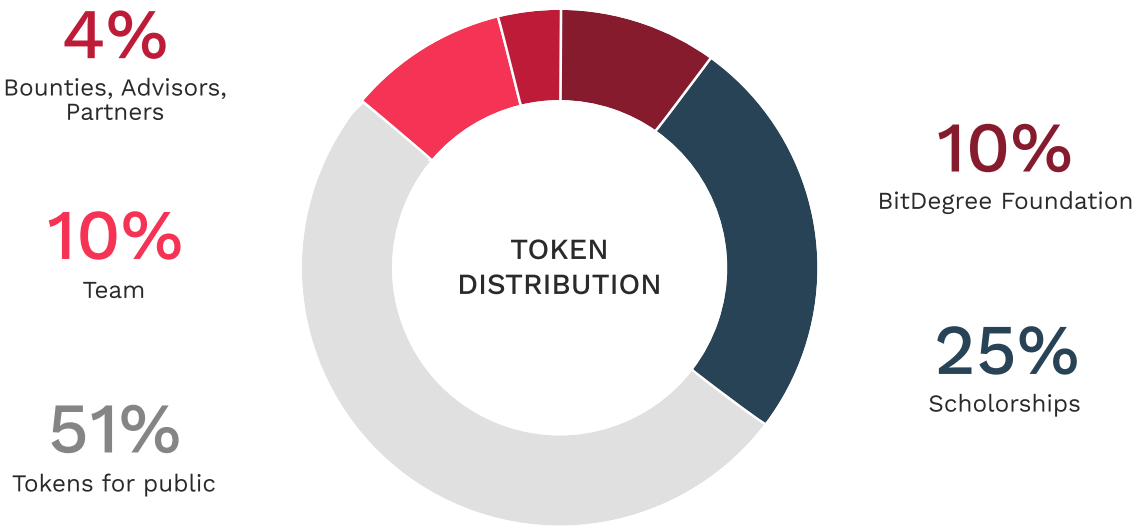

Figure 15. Token distribution doughnut chart

Scholarships.

Scholarships pool will be used to incentivize users to participate in the BitDegree ecosystem in the early days of its operation. No new tokens will be created once the user growth pool is exhausted.

Budget Allocation

- **BitDegree Platform: 30% of budget.**
  The team consists of over 10 engineers [DS8] and MOOC experts fulfilling the key roles in the company – sales, marketing, legal and others. This financing allows the rollout and operations of the BitDegree platform;
- **Courses development: 30% of budget.**

These funds will be directed at third-party education professionals, offering online courses and content production;;

- **Marketing and business development: 25% of budget.**
  Marketing will focus on expanding awareness and adoption of the BitDegree platform and the platform solution among users, publishers and advertisers. This also includes the growth and maintenance of the world-wide community. Marketing, growth-hacking, PR, partnerships, affiliate programs and more;;
- **Operational: 8% of budget.**
  Consists of BitDegree legal, security, accounting and other associated administration costs;
- **Security: 2% of budget.**
  This part of the budget is set-aside for auditing software.
- **Reserve: 5% of budget.**
  This part of the budget is set-aside for unforeseen expenditure.

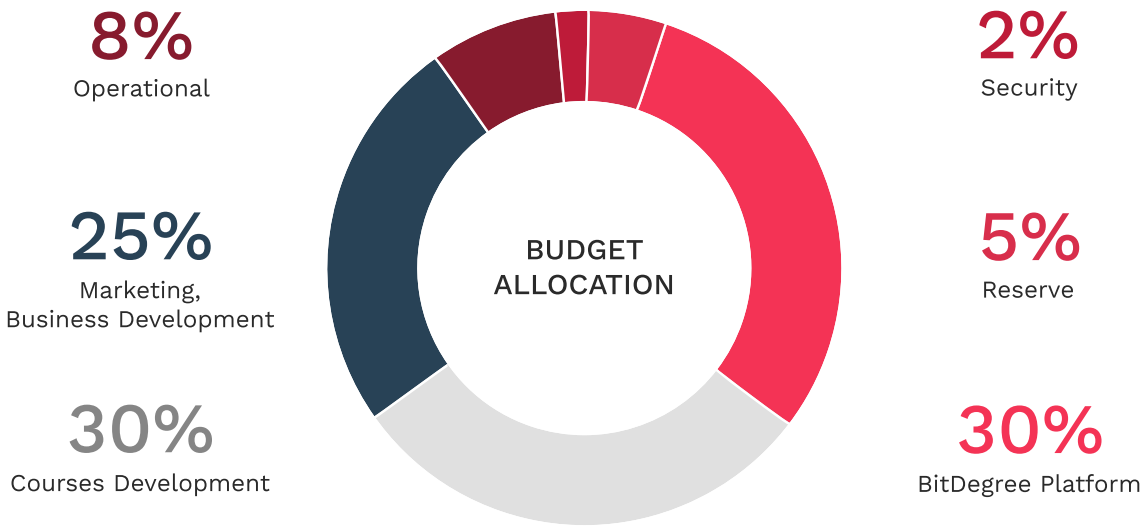

Figure 16. Budget allocation chart

08. LEGAL

This White paper should be read in its entirety. To the best knowledge of the authors, this White paper contains information that is provided only in compliance with the requirements of applicable laws, rules and regulations.

All product and company names are trademarks™ or registered® trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement by them.

Content of this document includes forward looking statements with respect to BitDegree financial and technical viability. The effects of regulation by the governments of countries in which it may wish to operate. Expectations regarding the operating environment and market conditions. Forward-looking statements are sometimes, but not always, identified by their use of a date in the future. Forward looking statements are predictive and involve risk and uncertainty. Forward-looking statements are not guarantees of future performance and are based on assumptions.

09. BITDEGREE TEAM

The need for the BitDegree solution was recognized by the team behind Hostinger - one of the top global web hosting providers. Hostinger works to enable millions of people around the globe to unlock the power of Internet by giving them tools to learn, create and grow online. The most popular Hostinger services can be reached online at: www.hostinger.com, www.000webhost.com, www.hostinger.es, www.hostinger.com.br, www.hostinger.ru, www.hostinger.co.id, www.hostinger.fr.

Marketing of BitDegree will start from the existing 29 million user base of Hostinger and 000webhost - loyal, web-passionate, learning and innovation open, worldwide community. Our confidence in BitDegree success comes from more than 10 years of experience in analyzing the needs and challenges faced by the millions of Hostinger customers worldwide.

9.1. People behind BitDegree

The team is comprised of multi-skilled professionals that have worked with each other in various capacities and became friends. This joins the project that everyone in the team is highly passionate about. This is the time when everyone dreams big and goes big. Most of the team has already worked together scaling solutions that reached millions of users and stumbled upon the need to educate them, whereas some others have worked on the educational initiatives experience, which can be directly applied to BitDegree.

Andrius Putna, *CEO, co-founder*
11 years in software engineering. Blockchain advocate. Person behind the success of 000webhost - world's first and biggest free cloud hosting platform designed for learning, testing and experimenting. Hostinger product architect.

Danielius Stasiulis, *CBO, co-founder*
Head of Startup Division at Civitta (7 years) - the leading management consulting firm in Eastern Europe. Advised 300+ startups and worked with many startup programs, including Berkeley Skydeck in Silicon Valley. He focuses on ICO and blockchain-based business models.

Ervinas Rimdeika, *CLO, co-founder*
Ervinas is a FinTech fan and has extensive practice in related fields of corporate, intellectual property and business transaction law questions as well. He worked not only at a few well-known law firms, but also at one of the largest company's group in Lithuania and Baltic States. In previous years Ervinas Rimdeika was a member of one of the top raising Baltics FinTech startups and reached impressive results, where Lithuanian Supreme Court changed case-law and formed new interpretation rules on financial lease and other matters. Clients and colleagues especially value Ervinas Rimdeika for deep legal knowledge, critical and strategic thinking, in-depth analysis of the

problems as well as rational approach.

Rio Asatiani, *CMO, co-founder*
With more than 14 years of experience in effective customer acquisition fields, working with new brands and startup launches, Rio is a growth-hacking guru & Google Certified Partner who led 000webhost and Hostinger to an international success in more than 40 countries by attracting 29+ millions of new users. He joined the BitDegree project having a strong vision in innovative acquisition channels and a solid experience in growth-hacking. Rio ensures the success of BitDegree on an international level.

Darius Rugevičius, *Partner in Prime Block Capital Investment Fund*
Darius is experienced in building successful technology based business, having sold two of his previous start-ups in the past 4 years alone. Using his skills to implement effective marketing strategies, propel execution, and meet deadlines, he has assisted companies operating in the blockchain, fin-tech, robotics and biotech sectors. In the past year Darius has worked with numerous blockchain projects, helping them to develop successful strategies, networking and outcome.

9.2. Advisors

Arnas Stuopelis, *COO, co-founder*
Arnas is the CEO of Hostinger. Prior to taking the role of the CEO, for 6 years Arnas was responsible for business development at Hostinger. He successfully expanded Hostinger on a global level as well as played an important role when creating one of the most successful web hosting brands in Indonesia - Niagahoster.co.id. With his profound entrepreneurship skills and a solid experience in business development, Arnas knows how to scale a project to a global success.

Ričardas Pocius, *Technical advisor*
Ričardas is a passionate distributed systems engineer who enjoys sharing his experience and knowledge with others. Determined on keeping magic out of the systems. Organiser of Erlang workshop/meetup in Vilnius,LT.

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