BLOCKCHANGE

BLOCKCHAIN TECHNOLOGIES FOR SOCIAL CHANGE

CASE STUDY:

Creating Immutable, Stackable Credentials Through Blockchain at MIT

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PROJECT DESCRIPTION

Problem Definition



Step 1 of 5 Computing local hash [DONE]

Step 2 of 5 Fetching remote hash [DONE]

Step 3 of 5
Comparing local and remote hashes [DONE]

Step 4 of 5
Checking Merkle root [DONE]

Step 5 of 5 Checking receipt [DONE]



Public Key 1HYPitzbwR83M3Smw6GWs5XeQzBWoJAEes

Blockchain Address 4bf64ff1517554dac3496e9da0a28ca9ae492682b0898e384ea17 e7f90ee1295

A diploma from the Massachusetts Institute of Technology (MIT) is a valuable piece of paper (or collection of pixels). An MIT degree can open a wide array of doors to new opportunities, including further studies and competitive job positions. It is perhaps no surprise, then, that MIT has experienced some challenges related to 'fraudsters' as Registrar and Senior Associate Dean Mary Callahan put it.¹ Adding new layers of security and confidence to the authentication and verification process for MIT graduates is an ongoing—and highly desirable—objective.

Additionally, the organizers behind the initiative described here saw the current credentialing system as lagging behind other information-sharing platforms with which students were already familiar. For example, Chris Jagers of the Learning Machine, a blockchain-for-education startup, recalls that: "We heard of students trying to Snapchat their grades to admissions; they didn't understand why they couldn't just text a picture. It should be that easy to share records."²

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At a broader level, massively open online courses (MOOCs), bootcamps, and other emergent training systems are raising questions regarding how to provide credentials that reflect new learning journeys and types of expertise. The traditional model of a centralized institution (e.g., a university) providing a single, authenticatable credential is becoming less and less consistent with the way people actually learn today. Philipp Schmidt, the director of learning innovation at the MIT Media Lab, described the goal of creating a "more modular credentialing environment,' where you would get some kind of recognition for lots of things you did throughout your life."³

The traditional credentialing approach at MIT involves the registrar providing paper diplomas to graduates, and access to academic transcripts upon receiving a request from the graduate. In order for graduates to authenticate their academic achievements with a new employer or school, for example, they must contact MIT, and request that their information is shared with the relevant party.

This approach is generally seen as lacking in user friendliness, as direct engagement with the MIT bureaucracy is required to access and make shareable degree information. In addition, the approach is lacking in individual agency and control of personal information, as students are reliant on the MIT system to provide and validate their own information and credentials. The traditional model of a centralized institution (e.g., a university) providing a single, authenticatable credential is becoming less and less consistent with the way people actually learn today.



Blockchain Use

Launched summer of 2017, the MIT Digital Diplomas project offered an initial cohort of 111 graduates the opportunity to receive a blockchain-based digital diploma in addition to the traditional paper credential.⁴ The initial pilot provided digital diplomas to 85 master of finance and 26 master of science students.⁵

The MIT Digital Diploma, developed by the Learning Machine, in partnership with MIT's Registrar's Office, is a new approach for credentialing that seeks to address personal agency and user-experience issues with the legacy system, while also ensuring the effectiveness and legitimacy of MIT credentials.⁶

Using the Bitcoin blockchain, MIT Digital Diplomas are immutable representations of a graduate's degree, which can be accessed through the Learning Machine's Blockcerts Wallet mobile application, and shared by the user with potential employers or other parties seeking to verify their credentials.⁷ While the Blockcerts Wallet is the primary way that graduates can guickly and conveniently access their degrees, the centerpiece for most others interacting with the blockchain-based MIT Digital Diploma is a web portal run on the MIT domain (credentials.mit.edu/). The portal allows any individual to submit a "Credential URL" and authenticate whether or not a corresponding MIT degree was awarded. The Credential URL acts as a public key, which can be shared with potential employers, schools, or anyone else over email, text, or social media. Without engaging the Registrar's Office or any other intermediary, anyone with the Credential URL can verify an individual's degree. The portal taps into the blockchain database using the Credential URL, verifies that the information exists on the chain, and confirms that the diploma entry has not been altered.8

Without engaging the Registrar's Office or any other intermediary, anyone with the Credential URL can verify an individual's degree.

Blockchain Value Proposition

The central goal of the MIT Digital Diplomas project is to leverage blockchain technology to create a trusted mechanism for increasing graduates' ability to gain greater control over their identity as it relates to academic achievement. According to Registrar and Senior Associate Dean Mary Callahan, "From the beginning, one of our primary motivations has been to empower students to be the curators of their own credentials."⁹

The MIT use case is also seen as a pilot that can be built upon in a move toward a more dynamic credentialing ecosystem. For this project, MIT plays an obvious and essential role given that the university not only formally grants students their degrees, but also sets the expectations and requirements for earning those degrees. While MIT's central institutional role is the current reality for the project at hand, the Learning Machine (itself a vendor) views the Digital Diploma project as an initial step toward "independence from vendors and issuers." Natalie Smolenski, VP for Business Development at the Learning Machine, argued in a presentation that, "The only way to achieve student independence is with a standards-based approach to records, within an open-source ecosystem."¹⁰

Relatedly – and likely less relevant for the foreseeable future – Jagers from the Learning Machine argues that the Digital Diploma approach means that MIT is now issuing "official records in a format that can exist even if the institution goes away."¹¹ The central goal of the MIT Digital Diplomas project is to leverage blockchain technology to create a trusted mechanism for increasing graduates' ability to gain greater control over their identity as it relates to academic achievement.



PROJECT ANALYSIS

Risks and Challenges

As described above, the project was developed in part based on the belief that modern students expect a greater level of user-friendliness when accessing or sharing their records, as well as additional agency and the ability to create "stacks" of credentials and experiences over time.

While it remains to be seen how effective this framing will be in incentivizing individual use going forward, a key question for the Digital Diploma project, and for blockchain as a means for authenticating identity and education credentials more generally, involves what parties (e.g., employers and schools) will ultimately determine the value of such a credential. No matter how easy the Digital Diploma system is to use, it is unlikely to reach a critical mass of users without a demonstrated commitment from the types of entities (e.g., recruiting companies, large corporations, and post-secondary schools) that seek authentication of educational attainment. This raises a separate but related issue of incentives.

As is the case with many identity projects, privacy represents a key area of risk. While a diploma does not contain much in the way of sensitive personal information, MIT and the Registrar's Office possess a great deal of sensitive information that could be attached to an individual whose diploma is publicly accessible (to anyone with the correct Credential URL) through blockchain. Some also question the true value of the system and the amount of disintermediation or decentralization that it actually represents. Matt Levine in Bloomberg, for example, argues that "All the blockchain stuff, for now, is just for show."¹² He bases this assessment on the hypothetical situation where a potential employer is unsure of the trustworthiness of an applicant's MIT Digital Diploma. He posits that in such a scenario, the immediate and natural response would be to "just call up MIT to check, same as they would if you gave them a photocopied paper transcript."¹³

Next Steps and Opportunities for Scaling

As mentioned above, and particularly from Learning Machine's perspective, the MIT Digital Diploma effort is a first step toward a larger scale micro-credentialing approach using blockchain.¹⁴ The Learning Machine is seeking ways, for instance, to link multiple credentials from multiple institutions and to embed links or other personal information into a new "meta-record."¹⁵ Building upon the initial MIT pilot project to create more multi-faceted representations of individuals' identity and achievements, while maintaining the individual agency benefits of the first pilot, could lead to a truly transformative approach for credentialing.

ENDNOTES

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- 2 Lindsay McKenzie, "MIT Introduces Digital Diplomas," Inside Higher Ed, October 19, 2017, <u>https://www.insidehighered.com/news/2017/10/19/mit-introduces-digital-diplomas</u>
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