IBM/NSC Blockchain Project

December, 2019

IBM has been a visible and forceful proponent of blockchain technology. This is an outgrowth of its deep participation in open-source software development. IBM recognized the emergence of Linux as a platform for innovation among a large set of young developers in 1999, and in 2000 made a strategic commitment totaling $1 billion to foster Linux development and support it on IBM servers. It did so not by absorbing the development into IBM but by inserting IBM-paid developers into the open source community. Through this IBM learned community leadership required influence in place of control and embraced the diversity of the Linux community, benefiting the open-source community and itself enormously.

Building on its partnership with the Linux Foundation, IBM has become a primary sponsor of the Hyperledger Project, a collection of disparate open-source blockchain initiatives addressing a range of topics -- from supply chain management and decentralized encrypted shared database architecture to digital self-sovereign identity. While much of this work has remained at its core open-source, one branch, Hyperledger Fabric, has emerged as the commercial path for IBM to leverage software customization and promote IBM cloud services to host them.

Unfortunately, lessons learned working within the open-source community have over time eroded as pressure to boost ROI and commercial success grew. A clear example was first seen in the overhyped potential of artificial intelligence (AI) with IBM Watson promoted as a solution of mass personalization in medicine, education, insurance and other industries\(^1\). Blockchain has been swept into their hype machine, pushing IBM to aggressively seek blockchain partners before identifying use cases well-suited for the technology.

\(^1\) [https://www.itpro.co.uk/business-operations/32768/ibm-to-put-watson-workspace-out-to-pasture-over-lack-of-adoption](https://www.itpro.co.uk/business-operations/32768/ibm-to-put-watson-workspace-out-to-pasture-over-lack-of-adoption)
The rapid emergence of technology-enabled workplaces has dramatically accelerated retraining needs in developed economies. This demand has pushed for shorter, more focused training to meet employer needs, a departure for higher education institutions focused on the degree and certificate. The buzzword for this is the “skills gap,” and programs like coding boot camps to address the gap in IT workplaces have turned out entry-level developers far faster than traditional four-year college degree programs.

The pace of change has also increased student mobility as advancement by short work engagements is increasingly backed by documentation of skill development through digital credentials. Employers can check the authenticity of these asserted achievements through verification of these blockchain registered credentials. IBM has turned to the largest holder of traditional learner credentials, the National Student Clearinghouse (NSC), to explore how to layer blockchain’s guarantee of authentic credentials with the NSC’s enormous repository of university transcripts.
Efficiency The NSC characterizes itself as a “public utility” of college degrees and transcripts. Pairing the direct dissemination of learner/worker achievements with the guaranteed authenticity of the blockchain eliminates the university as the middleman. This grants learner/worker greater flexibility, autonomy and efficiency in their pursuit of work.

Scale Both IBM and the NSC are among the largest players in the U.S. in their landscapes. They have the investment capacity to understand and build for national delivery.

Solving the wrong problem While on the surface improving learner/worker agency to share credentials is a step in the right direction, the fundamental confusion of what the credential means to a prospective employer remains unaddressed. Transformation requires more than delivering the same credential faster. Credentials need to be made more useful to prospective employers. As an example, 15% of last year’s IBM hires did not have university degrees. Furthermore, BurningGlass found 14 of the largest employers in tech, retail, hospitality, publishing, food service and finance have stopped requiring college degrees.

Learner/Worker Agency is more than becoming the sender of their credentials - learner/ workers do need greater agency to narrate their own story and demonstrate personal value to employers. A richer representation of what learners can do -- including demonstrations of work they have done that employers will value -- must be coupled with the ability to personalize their story with verifiable examples substantiating their claims.

The Wrong Partners While the NSC is currently the largest current aggregator of U.S. college credentials in a world of decentralized, distributed ledgers (a.k.a blockchains), they are the middlemen the blockchain is threatening to replace. The issuers and the learner/worker may not need that friction. Further, ASU can attract a broader coalition of higher education and industry partners -- not just one mid-sized community college -- with the resources and depth of expertise to advance blockchain solutions from the community itself.

---

ASU should monitor the work by IBM, the NSC and partners. We have a close tie to the project manager at the NSC who can keep us informed. If there is an opportunity to become an external advisor to the project, that may be worth considering.

The goal of the IBM/NSC et. al., project is, however, different from that of the Trusted Learning Network (TLN).

- **Leveraging Existing Networks of Trust** - ASU’s initial focus has been leveraging trust networks that already exist among institutions that need to exchange learner credentials among themselves. This is a first step toward a much broader application of the TLN to support communities as diverse as refugee populations receiving formal education and non-profit groups such as the Girl Scouts of America, as well as the high school concurrent course students.

- **Learner Agency** - ASU is interested in blockchain for the security and agency that it can provide to the learner/worker to share their credentials directly.

- **Trusted Learner Record (TLR)** - ASU is equally, if not more interested, in the data model that represents the richness of the learner/worker formal education leading to issued credentials, as well as to other forms of structured, semi-structured and informal learning that contributes to an individual’s abilities. ASU is also cognizant of the emerging skills taxonomies that could add value to the individual’s learner record.

- **Implications to College Curricula** - ASU is innovating for the Universal Learner and building approaches to support a life-long curriculum.

ASU’s perspective spans credit-seeking learners of all ages, and workers whose training, formal and informal will be a lifelong journey.
Recap: What we’re actually doing in blockchain

Salesforce Collaboration - The Trusted Learner Network (TLN) is built with Salesforce on a blockchain architecture that will be made freely available to all non-profits to host a life-long Trusted Learner Record (TLN) and applications that use it to enable the curation and selective sharing of verifiable achievements.

Building Community - Establishing an inclusive TLN Community of diverse community of secondary and tertiary education and training providers, companies, non-profits, foundations, government departments, libraries and interested others to articulate use cases, the services the blockchain requires to support them, and governance policies that are needed to effectively and equitably manage this process.

Creating a Testbed for Blockchain Apps - A Co-Laboratory from a subset of the TLN Community to will design and build prototypes of applications for the blockchain testing the utility of suggested use cases.

Partnering with others - groups working on interoperable learning records, verifiable credentials, and digital identity will be strengthened by ASU’s leadership in and learning from these projects. This includes participating in:

- MIT Digital Credential Initiative, Phil Long as Technical Liaison from ASU
- T3 Network program (US Chamber of Commerce Foundation), to identify interoperability standards for learner/worker records
- Department of Education - Blockchain and Identity in Education Working Group (Phil Long and Kate Giavacdhini representing ASU)
Where are we now

We have:

- A working blockchain system based on Hyperledger Sawtooth, Postgres and IPFS integrated with the Salesforce CRM
- Prototype of the Trusted Learner Record data model that supports university and high school course records, developed in collaboration with the ASU Registrar
- Prototype of two blockchain applications — Reverse Transfer and Concurrent High School Enrollment
- Presented ASU TLN work to national meetings (Educause, Higher Education Summit) and tech conferences (TrailheaDX and Dreamforce), and provided demonstrations to interested adopters (e.g., MCCCD, Foothill-DeAnza California Community District, State of North Dakota, US Dept of Education, RMIT, SUNY System, UMass System, and others)

2020 Milestones

- Open Source RT Reference Application (Jan)
- MCCCD RT Production Implementation (Jan - June)
- TLN Community Unconference at Skysong (Mar 2)
- TLR data model v1 - integrated as appropriate with IMS CLR (Mar)
- Concurrent Course Enrollment Prep Digital (Mar - May)
- TLN Co-Lab (Apr → on-going)
- Self-Sovereign Identity pilots with UTO Cloud and Advanced Network Engineering Services: 1) Guardianship; 2) Refugee Learners; 3) ASU Campus Identity Mgmt (oauth2, SAML2, social media logins; Jan - June)
- RT Demonstration Site, Github Code Repositories/Documentation (Jan - Feb)
- Credential Verification Services
  - Learner Credential Management
  - Dissemination of Credential Sets (June - August)
- Open Source Architecture Deployment Strategy and Repositories (Nov)