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**ACADEMIC CREDENTIALS
IN AN ERA OF DIGITAL DECENTRALIZATION**

**ACADEMIC CREDENTIALS
IN AN ERA OF DIGITAL DECENTRALIZATION**

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Published in conjunction with the panel discussion

*Why the Blockchain will Revolutionize
Academic Credentialing*

Educause, October 22, 2016, Anaheim, CA

@ Learning Machine 2016
Publication Design: Chris Jagers and Dimitrios Arhontidis
Editing: Dan Hughes
Printing: Millet the Printer

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PREFACE TO THE SERIES

By Dan Hughes

In much of the world, research is undertaken in the organizational context of the think tank, consultancy, foundation, or University with the express purpose of rigorously considering a topic in a manner that is not overdetermined by the day-to-day motivations of markets or politics. There is something of the distinction that is made between science and engineering in this common separation of purpose that would place thinking on one end of the spectrum and action on the other. Ideas, in this view, are the domain of strategy organizations, while their build-out and operation are taken on by industrial and political powers.

Learning Machine is actively tearing down this artificial barrier between ideas and action. We take thinking and formation to be a single composite act—a movement of composition. In our view, building is a synthetic movement of design that is only ever described in its discrete components of theory and skill when something is in need of emphasis. For us, the action and the frame are one: Making is thinking is making.

The best work we do in the world comes from bringing our whole selves into diverse environments that expose us to the making-thinking of others. This generative presence of diverse skills and frames together generate outcomes that are often orthogonal to sector norms and specifically capable of forming market expectations rather than conforming to them. In our experience, anything approximating extraordinary comes via this path. As such, we eschew the conventional distinctions between theory and practice by simultaneously taking up the responsibilities of each, developing a deep horizon for the work we do and wielding our materials from out of this background while refactoring the frame itself in the material feedback from what is made.

Being a technology company requires more than technical skill. It requires an understanding of, and responsiveness to, the human social milieu which the company's technology is designed to serve. The research in this series gives an account of the social functions served by the technology that Learning Machine is producing. Ultimately, our joint goals are to improve human systems and to empower the participants in these systems with self-determination, leverage, and insight.

This is our work at Learning Machine, beginning in the contexts dedicated explicitly to human formation: education and vocation.

We invite your thinking as we all continue to learn.

INTRODUCTION

By Natalie Smolenski

The credential has a storied role in the development of human industry and science. During the European Middle Ages, the credential emerged from the economy of the guild: as a permission to practice one's trade granted by senior guild members, whether that guild was the University professoriate, carpentry, or law. Guilds were closely connected with religious brotherhoods and functioned from the logic of "fellows"—a tradition that is kept alive in the University practice of granting Fellowships. In the Islamic tradition, which deeply influenced the development of European Universities during the Middle Ages, this history is still preserved in the designation of the *ijaza*—literally, permission—to legally interpret the scriptures.

Today, we live in an era that has seen the Industrial Revolution break up the control of guilds over industry and learning; later, the Information Age dissolved the monopoly of the factory and centralized governments and corporations on the trajectory of an individual's professional development. We are now witnesses to a historically unprecedented level of individual mobility and professional flexibility, which carries with it also the shadow of precarity and the indeterminacies of internet-based jurisdictional spaces.

Increasingly, the credential has emerged as a transnational, interdisciplinary signal of capability and skill in an environment where other characteristics—language, nationality, religious identity—cannot be presupposed. Under these circumstances, Learning Machine's long-term project involves facilitating the exchange of knowledge and skill not only between computational systems, but between human beings and social collectives. That is how we build intelligence.

The essays in this volume give an account for the social functions served by the achievement, trust, and credentialing technologies that Learning Machine is producing. They ask what capability means and what credentials do in the social collectives that find them significant. Finally, they highlight the importance of individual self-determination under informational and organizational conditions in which issues of data invasiveness and control are central, if often technologically hidden, to the social fluidity that characterizes our time.

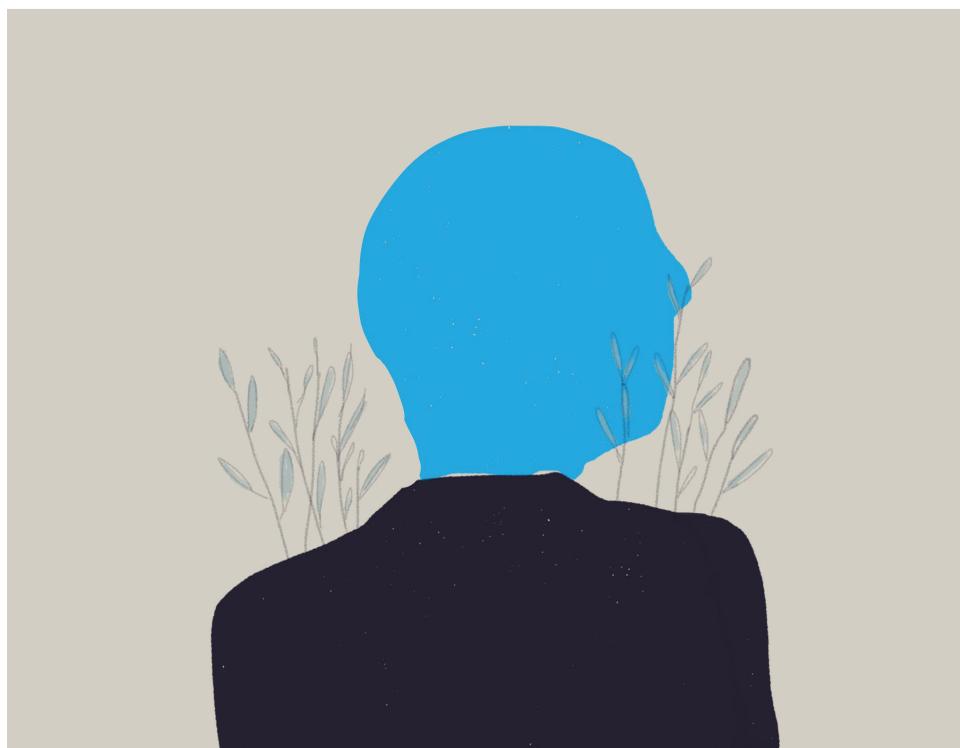


Illustration by Oyeperdona

A DSM FOR ACHIEVEMENT

Capability-Based Approaches to Standardization

The Diagnostic and Statistical Manual of Mental Disorders (DSM) is a thematic and precise way to catalogue and document disabilities. What if we could do the same for capabilities?

At the 2016 Parchment Conference on Innovating Academic Credentials, Arthur Levine, President of the Woodrow Wilson National Fellowship Foundation, delivered the Education Keynote Address.^[1] Levine recounted a sweeping history of the transformation of American education over the past two centuries and ended his speech with a call for profound reform in the way academic credentials are conferred.^[2]

In Levine's view, the current credit-based model of educational credentialing relies on the outdated logic of the early 20th century, when the need to ensure that people with the same credentials had received the same level of education led to the development of a system which measured qualifications in terms of *instruction time*: credit hours. This decision emerged in the context of an industrial economy in which uniformity of process was presumed to lead to uniformity of outcomes, a logic epitomized by the factory assembly line. However, as has become amply clear since that time, the correlation between *instruction time* and *actual skill* is tenuous at best. Not only are credentials based on instruction time misleading, but they create many—often prohibitive—inefficiencies for both students and institutions. Levine proposes that in the information economy we now inhabit, the relevant variable to measure is not located within the (teaching) process, but in the (learning) outcome: the capability itself. Shifting what is measured by credentials from what has been taught to what has been learned may sound radical, but is actually a fitting response to the transformations in global education that are already well underway.

¹ Arthur Levine, "Summit | Education Keynote." *2016 Parchment Summit: Innovating Academic Credentials*. Feb. 17, 2016. Posted on April 11, 2016. <https://www.youtube.com/watch?v=-1ODeGElN-Y&feature=youtu.be>.

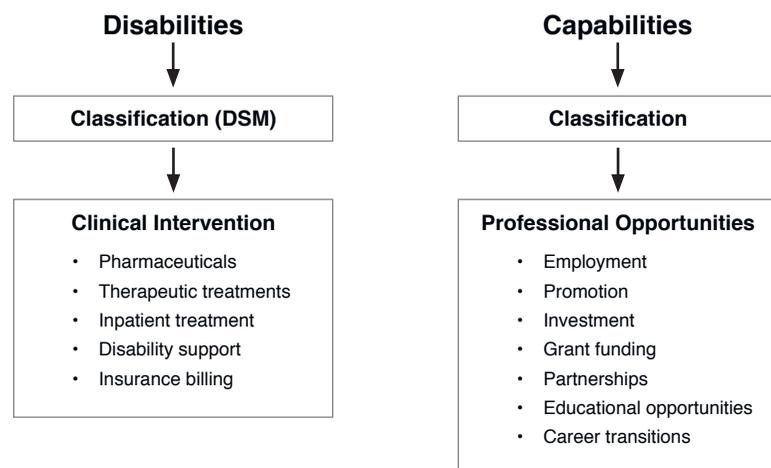
² Arthur Levine, "The Evolution of Education." *Learning Machine Blog*. June 2, 2016. <https://medium.com/learning-machine-blog/the-evolution-of-education-eebd828b2b29#.1y00pd3gx>.

The DSM as a Model

Towards the end of his address, Levine says,

“What we really need to do is achieve common definitions of competencies. What we really have to do is create the equivalent of the DSM in psychiatry: the Diagnostic and Statistical Manual of Mental Disorders. It offers a common language and standard criteria for classifying mental illnesses. We need that for competencies. When we talk about competencies, we have to be talking about the same thing, or it’s just another buzzword. We have to develop assessments that measure student progress and attainment of the standards or the outcomes and help us prescribe to students what it is they need to do in order to achieve those competencies.”

In other words, while the DSM employs classification of particular disabilities and difficulties as a heuristic to determine the most effective clinical interventions, a standardized credentialing system would give employers, granting agencies, professionals, researchers, and creative workers a heuristic to more effectively distribute of all kinds of labor across the landscape of generative human possibilities:



As A DSM model for capability-based credentialing will likely bring up a couple of immediate objections, based on traditional objections to the DSM itself:

1. **The classifications of mental disorders in the DSM are highly subjective and subject to ongoing change, and are therefore imprecise and unstable.** Although all diseases, disorders, and disabilities are classified based in part on how they are experienced socially by human beings, mental disorders above all others are distinguished by their social manifestations. In other words, many things that have been

pathologized as “disorders” (from runaway slaves to female self-assertion to homosexuality)^[3] were perfectly healthy behaviors that were not considered normal or socially acceptable in the cultural context that framed them as diagnosable. There may very well be clusters of behaviors and inner experiences that today are considered disorders which, over time, will prove to be healthy. An inevitably evolving understanding of health and disease does not mean, however, that it is impossible to gauge disturbances to psychological and emotional health in a systematic way. Likewise, our understanding of what causes mental disorders has changed over time, in a manner no different from our understanding of “physical” disorders. To demand that we have perfect knowledge of the etiology, prognosis, and trajectory of every form of human suffering before we classify it would presume an impossibility that is at odds with scientific practice.

2. **The DSM has not proven to be a reliable tool for diagnosis because medical professionals still vary widely in their interpretation of mental disorders.** While this may be the case, numerous field trials and research initiatives have been launched to measure discrepancies and standardize diagnostic practice, including ever-greater coordination with the International Classification of Diseases (ICD),^[4]
3. **The DSM is an instrument of the pharmaceutical, medical, and insurance industries to perpetuate the medicalization of human distress for profit, which compromises both its scientific value and its capacity to change over time.** There is no doubt that the insurance industry, pharmaceutical companies, and psychiatrists rely on DSM classifications to determine and subsidize clinical interventions, which can lead to treating mental disorders like objectified entities “out there in the world” that afflict people in the same way bacteria or viruses do. Not only that, but because the prevailing hypothesis about the etiology of mental illness is neurobiological, pharmaceuticals continue to be the treatment of choice prescribed by mental health professionals and covered by insurance companies. The weight of this institutional framework certainly lends it inertia and can inspire conservatism in those who make use of it. However, as stipulated by the first objection, DSM classifications are continually evolving under the combined influence of new research and social change. Classifications—as well as corresponding treatment recommendations—thus constitute a provisional structure whose contours are always changing.

³ Gary Greenberg, *The Book of Woe: The DSM and the Unmaking of Psychiatry*. New York: Blue Rider Press, 2013.

⁴ The American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders: 5th Edition. DSM-5*. Washington, D.C.: American Psychiatric Publishing, 2013.

In other words, the DSM strives to *both* reflect current scientific consensus and be a “living document,”^[5] amenable to change with progress in our understanding of the etiology, prognosis, and nature of mental disorders. The same approach will be taken to capability-based credentialing. Because skills are only meaningful in social context, any given classification of skill is a provisional judgment of pragmatic value within an economy in which such values can be productively leveraged and exchanged. Moreover, because the kind of skill that credentials record is at root a unit of value that has been conferred to a particular individual or entity by another, it can be recorded in any ledger that records transactions of values.

This is precisely what the Bitcoin blockchain protocol does. It records three things: the value itself, who conferred it, and to whom it was conferred. Because what the protocol records is transactions of value as such, the actual content of that value can be specified on the application layer. In the case of Bitcoin, this value is often thought of in terms of currency (“I’ll send you \$35 in Bitcoin.”). Rather than serving a currency function, however, blockchain-based credentialing records which credentials have been issued to which learners by which institutions. These records are fixed and immutable, but the content of credentials can vary endlessly over time and across different professional and cultural contexts. This gives impetus to the call for standardized definitions of skills in order to streamline the evaluation of qualifications in what is already a global information economy.

Solving Concrete Problems in Education and Hiring

Not only will the shift toward a standardized, competency-based credentialing system allow us to address the social question of what constitutes skill with some consistency and reliability, but it will also decouple credentials from any particular institutional arrangement, in particular the over-reliance on university degrees as arbiters of skill. This solves several major problems in education and hiring:

1. **The problem of uneven quality of instruction across institutions.** This is a problem that equivalent numbers of credit hours mask. Public knowledge of this reality leads individual and institutional actors to lean heavily on prestige as an alleged guarantor of quality instruction.^[6] Not only is prestige *not* such a guarantor,^[7] however, but a prestige-based economy of

5 Ibid., p. 13.

6 Kevin Carey, “Here’s What Will Truly Change Higher Education: Online Degrees That Are Seen as Official.” *The New York Times*. Mar. 5, 2015. http://www.nytimes.com/2015/03/08/upshot/true-reform-in-higher-education-when-online-degrees-are-seen-as-official.html?_r=1.

7 Mary Nguyen Barry and Michael Dannenberg, “Out of Pocket: The High Costs of Inadequate High Schools and High School Student Achievement on College Affordability.” *Education Reform Now*. Apr. 2016. <http://educationpost.org/wp-content/uploads/2016/04/EdReformNow-O-O-P-v7.pdf>.

credentialing^[8] is one of the most effective mechanisms^[9] of reproducing social inequalities.^[10] In a competency-based credentialing system, there is no shortcut or stand-in for the skill itself.

2. **The problem of academic programs that are too broad to be useful to evaluators looking for particular skills.** For instance, the dataset used by the Computing Research Association to measure racial discrepancies in the hiring practices of major tech companies uses a B.S. in Computer Science degree as a measure of skill.^[11] Yet “Computer Science” is as broad a designation as “Natural Science.” The particular labor needs of a technology company cannot simply be mapped to “Computer Science graduates,” in the same way that a particular hospital’s needs cannot be mapped to “Natural Science graduates.” Conversely, program requirements may inhibit students from cultivating other related or unrelated skills they wish to develop by prescribing a “just in case” course of study (in Levine’s words) which is not all necessary or useful to that particular student.
3. **The problem of non-transferability of credentials from one country to another.** Millions of professionals around the world are prohibited from practicing their trades outside of the countries in which their credentials were conferred because other countries have no way of evaluating what skills those credentials entail. This results in massive losses of productivity and hinders international cooperation on vital issues. A standardized set of global definitions would render an already *de facto* mobile workforce empowered to practice wherever in the world they are.
4. **The problem of (exclusively) top-down educational models.** Such models presume that learning is a transfer of knowledge from those who have it (usually older generations) to those who don’t (usually younger ones). This presupposition creates social hierarchies in which students are treated like clients rather than independent seekers of knowledge. Under the new credentialing models, Levine says, people will be able to acquire credentials through a combination of “experience, self-instruction, formal and informal education offered by a host of providers.” Top-down educational structures would endure in some situations while falling away in others. Learning would be acknowledged as the organic and multifaceted process it always is.

8 Jerome Karabel, *The Chosen: The Hidden History of Admission and Exclusion at Harvard, Yale, and Princeton*. Boston: Houghton Mifflin, 2005.

9 Joanna Pearlstein, “The Schools Where Apple, Google, and Facebook Get Their Recruits.” *Wired*. May 22, 2014. <http://www.wired.com/2014/05/alumni-network-2/>.

10 Jeff Guo, “Billionaires show that going to a top college isn’t very important.” *The Wall Street Journal WonkBlog*. Nov. 27, 2015. <https://www.washingtonpost.com/news/wonk/wp/2015/11/27/why-top-journalists-are-better-educated-than-billionaires/>.

11 Elizabeth Weise and Jessica Guynn, “Tech jobs: Minorities Have Degrees, But Don’t Get Hired.” *USA Today*. Oct. 13, 2014. <http://www.usatoday.com/story/tech/2014/10/12/silicon-valley-diversity-tech-hiring-computer-science-graduates-african-american-hispanic/14684211/>.

5. **The problem of the purpose of the university.** The current four-year degree model is premised on the presupposition that four years at a university is the right amount of time for all students to come to a kind of vocational preparedness through scholarship. This presupposition—that scholarship is the path to vocational preparedness and that four years of it are necessary—is belied by the actual economic behavior of college students and prospects. For some students, dropping out of college to become entrepreneurs is the consummate badge of honor,^[12] while many others spend years after graduation struggling to find entry-level positions^[13] in industries completely unrelated to their courses of study, all the while carrying extraordinary burdens of student debt.^[14] Finally, there are the many who either never enroll or just drop out. And while employers compound the problem by taking advantage of a “buyer’s” labor market^[15] to demand university credentials for jobs that could easily be filled without them,^[16] they then complain that their college-educated hires in fact lack the skills they need to be successful at their jobs.^{[17] [18]}

The problems and solutions presented above are, of course, all economic in nature. Another view of the purpose of the university holds that college is a time dedicated to the exploration of self and world via scholarly deepening in a spirit of humanistic inquiry and collegial bonding with fellow-students. Four years has become the American convention within which this spirit of discovery and friendship-formation is said best to flourish. Those who hold this view assert that the true value of a college education is intangible.^[19] It seems clear that four years (or more) spent in a pedagogical and collegial environment that privileges critical thinking, intellectual and interpersonal experimentation, and friendship-building can be profoundly valuable and transformative, not only personally and interpersonally, but also rendering the student a more innovative and effective professional. However, the extraordinary price tag attached to this time of experimentation and growth renders it a great luxury for most Americans. And,

12 Diasuke Wakabayashi, “College Dropouts Thrive in Tech: Quitting school to start a company used to be seen as risky; now an honor.” *The Wall Street Journal*. Jun. 3, 2015. <http://www.wsj.com/articles/college-dropouts-thrive-in-tech-1433323802>.

13 Janet Lorin and Jeanna Smialek, “College Graduates Struggle to Find Employment Worth a Degree.” *Bloomberg*. Jun. 5, 2014. <http://www.bloomberg.com/news/articles/2014-06-05/college-graduates-struggle-to-find-employment-worth-a-degree>.

14 Leah McGrath Goodman, “Millennial College Graduates: Young, Educated, Jobless.” *Newsweek*. May 27, 2015. <http://www.newsweek.com/2015/06/05/millennial-college-graduates-young-educated-jobless-335821.html>.

15 Lorin and Smialek, “College Graduates Struggle.”

16 “Credentials Gap. Moving the Goalposts: How Demand for a Bachelor’s Degree Is Reshaping the Workforce.” *Burning Glass*. Sep. 2014. <http://burning-glass.com/research/credentials-gap/>.

17 Jeffrey J. Selingo, “Why are so many college students failing to gain job skills before graduation?” *The Washington Post*. Jan. 26, 2015. <https://www.washingtonpost.com/news/grade-point/wp/2015/01/26/why-are-so-many-college-students-failing-to-gain-job-skills-before-graduation/>.

18 Douglas Belkin, “Test Finds College Graduates Lack Skills for White-Collar Jobs.” *The Wall Street Journal*. Jan. 16, 2015. <http://www.wsj.com/articles/test-finds-many-students-ill-prepared-to-enter-work-force-1421432744>.

19 “Peter Gregory from Silicon Valley on the value of college.” YouTube. Aug. 25, 2014. <https://www.youtube.com/watch?v=O-4subKdR84>.

as employers have made clear,^[20] this personal development often occurs at the expense of or with disregard for building employable skills.

In practice, a capabilities-based credentialing system would isolate the question of practical skills, leaving students and professionals free to pursue whatever practices of personal formation they choose, whether that is a university education; global travels; creative production; volunteer work; athletic training; or anything else. The notion that universities should provide all of these things—academic, interpersonal, spiritual, physical—for all of their students places an onerous burden on the institutions, and by proxy the students and families paying for them. It also ensures that universities fall short of fulfilling these numerous expectations, leaving many students and their families disappointed and indebted. Capabilities-based credentialing would free up institutions to do what they do best, rather than trying to be all things to all people.

Conclusion: Beginning the Implementation

Open-source blockchain-based credentialing is currently being rolled out^[21] by the MIT Media Lab^[22] and Learning Machine^[23] as part of a collaborative project.^[24] The ethos behind this rollout is similar to the ethos of Bitcoin itself: empower a decentralized community of learners with full control over their trusted credentials and transcripts. These secure records can be shared directly with any other person or institution, at any time and at any level of granularity, and be immediately validated without a third party. The use value of credentials differs from the use value of currency in that they are deployed differently in human societies, but they are both conferrable, ownable, and translatable into concrete projects of creation, discovery, and building.

The technology is now in place for educators and credential-granting entities to begin collaboratively thinking through and building out a DSM-style approach to the standardization of skill definitions. Some have already taken up the call to create a universal taxonomy of all credentials: Jamie Merisotis, CEO of the Lumina Foundation, has recently outlined a detailed project to do just that,^[25]

20 Scott Jaschik, “Well-Prepared in Their Own Eyes.” *Inside Higher Ed*. Jan. 20, 2015. <https://www.insidehighered.com/news/2015/01/20/study-finds-big-gaps-between-student-and-employer-perceptions>.

21 MIT Media Lab, “What we learned from designing an academic certificates system on the blockchain.” *MIT Media Lab Blog*. <https://medium.com/mit-media-lab/what-we-learned-from-designing-an-academic-certificates-system-on-the-blockchain-34ba5874f196#qq034xyt0>.

22 MIT Media Lab Learning Initiative. <http://learn.media.mit.edu/>.

23 Learning Machine. <http://www.learningmachine.com/>.

24 Chris Jagers, “Verifiable Credentials on the Blockchain.” *Learning Machine Blog*. <https://medium.com/learning-machine-blog/blockchain-credentials-b4cf5d02bbb7#1kl7ca3a7>.

25 Jamie Merisotis, “Credentials Reform: How Technology and the Changing Needs of the Workforce Will Create the Higher Education System of the Future.” *Educause Review*. May 2, 2016. <http://er.educause.edu/articles/2016/5/credentials-reform-how-technology-and-the-changing-needs-of-the-workforce-will-create-the-higher-ed?platform=hootsuite>.

for many of the same reasons we have outlined here. As the world's labor force becomes increasingly mobile; college costs spiral ever-higher; and skill sets are less confinable to the disciplinary boundaries of university programs; a standardized set of definitions would direct aspirants to the knowledge and experiences they must acquire in order to qualify for particular credentials. This, in turn, would provide employers with clear signals that a particular applicant has what they need to be successful on the job. The result is that people and institutions that have previously been both overextended and undervalued are more focused, more flexible, more cooperative, and more empowered.



Illustration by Joey Gao

CENTRIPETAL STANDARDIZATION

Top-Down and Bottom-Up Vectors of Value Creation

Introduction

Standardization of capability-based credentials has the potential to better preserve and communicate the value of an individual's skills over time and across geographic, cultural, and even linguistic barriers. An analogous project, the Diagnostic Statistical Manual of Mental Disorders, has been invoked as a model for credential standardization because it represents an effort to arrive at a *common language* to describe mental illness and prescribe clinical interventions, placing doctors and patients around the globe in conversation with one another to build an ever-evolving understanding of mental health.

The DSM evolved in response to a social need to catalog, document, and alleviate mental and behavioral impairment in the United States. The obverse question is now being asked by some educators and industry actors: is it possible to standardize capabilities? The impetus for this question is emerging from a market economy in which potential employers, investors, and partners want to understand how an individual's skills will translate into value for their businesses. These actors are increasingly finding the traditional degree model of measuring achievement, based on grades and credit hours, to be an imprecise indicator of skill—and therefore of value. Yet no more precise system of measuring skill has yet emerged.

In this white paper, I attempt to think through this impasse by developing a sociologically-informed account of standardization processes, which are in fact social processes of value creation. I draw on examples of standardization to construct a theory of “centripetal standardization,” which articulates how value is created through simultaneous top-down and bottom-up processes of exchange between individuals and communities attempting to meet their needs and secure desired outcomes while negotiating the openings and closures of trust. The paper goes on to hypothesize that the resulting standards can be mapped along a power-law distribution, which reflects not only the inertia of cultural inheritance but also differential authority distribution between the communities that comprise vectors of standardization.

Neither top-down nor bottom-up approaches to value creation are “better.” Rather, they solve for different aspects of the ongoing social process of standardization. In some instances, however, standardization processes may skew far toward one or the other pole, potentially to the detriment of the communities making use of the resulting standards. For this reason, foregrounding standardization as a *centripetal* process—dependent on vectors emerging from

opposite sides to coalesce around a center-in-motion—should give educators, industrialists, craft practitioners, and government a framework that helps them steward processes of standardization toward resulting standards that are precise, widely-accessible, and reliable while remaining agile, able to quickly adapt in response to the needs of the communities who make use of them and are impacted by them.

1. Defining Standards and Standardization

Standardization is an *ongoing social process that produces bases for comparison*.

Standards are *bases for comparison* which enable exchanges of information conveying *what* is valued and *how* it is valued by the communities which engage in standardization.

Standardization must be considered prior to standards themselves. This is because standards are not fixed, eternal entities, but the result of ongoing social processes. From a functional standpoint, *standards serve the purpose of facilitating exchange* in the context of uncertain and fluctuating values, a state of affairs which characterizes any form of group sociality.

1.1 Standards of Content and Standards of Exchange Value

In order to facilitate exchange, standards may convey information about two things:

1. *What* is being exchanged
2. *For what* it is being exchanged

The first type of information—“*What* is being exchanged”—refers to a *standard of content*. For example, when I say that I want to trade my car for something else, I am relying on a standard cultural understanding of what a car is. However, the word “car” can encompass a whole range of meanings which may or may not include what I mean by car, or what my potential trade partner means by car, in this particular instance. This is where legal instruments like legislation and contracts can establish more precise standards where necessary.

The second bit of information—“*For what* it is being exchanged”—refers to a standard of exchange value. That is, it expresses the terms in which the subjective *worth* of the first object can be expressed. I may choose to trade my car for a diamond ring, or a thousand sacks of flour, or \$3,000 in cash, depending on the social context and its appraisal by standardizing parties (an antique car broker, Kelley Blue Book or Sotheby’s). Alternatively, I may be coerced into exchanging my car for something which I do not consider to be of equal or proximate value

in order to avoid an unpleasant outcome—which then factors into the exchange value equation.

1.2 Currency as Translating Idiom of Exchange

Price is a designation of exchange value. Accordingly, price is a standard. Most people are familiar with price fluctuations and understand that they convey information about the changing worth of an object or set of objects over time. Price is, in turn, often expressed in terms of currency, which itself is an object fluctuating in value—currency itself is a standard.

Prices expressed in terms of currency have the advantage of facilitating exchange in much more precise ways than prices expressed in terms of barter-based object equivalencies because currency functions as a translator, able to create more reliable equivalencies between very different categories of thing, the exchange of which may otherwise involve protracted and uncertain negotiation—often to the point of infeasibility. Although many currencies in circulation today used to be pinned to material standards of content, like gold or silver, today the content of most currencies has been reduced entirely to their authorial representation of the fiat of a nation-state. In other words, fiat currencies are substrate-independent, though they may be represented by various authorized substrates (i.e. paper, coins, digital tokens); their only real content, however, is sovereign will: they are “legal tender” whose deployment the state is obligated legally to enforce. The overriding function of fiat currencies is, of course, indexing exchange value. Their exchange value is, in turn, influenced by sovereign will qua monetary policy, but this has limited control in determining precise exchange value.

With the advent of Bitcoin, however, a quasi-currency now exists whose content has been shorn even from the will of any sovereign entity. Though it is materially-mediated through machines forming a peer-to-peer network running a cryptographic protocol establishing a blockchain of transactions, it is not recognized as legal tender by nation states, who, accordingly, do not guarantee transactions conducted through it. Bitcoin’s exchange value is, therefore, dependent exclusively upon the degree of its adoption as an idiom of translation for exchanges of all kinds. Which is itself tied to the mutability resistance of Bitcoin’s blockchain (how hard it is to change the past by rewriting the chain in such a way as to convince all other computational participants that the amended chain is the ground truth).

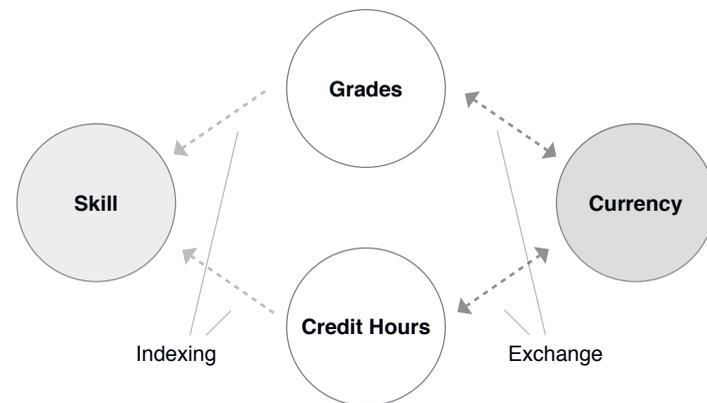
The absence of state backing has not proved to be an obstacle for Bitcoin, but an asset: cryptocurrency has leveraged significant levels of public mistrust of sovereign power, including its ability to fairly and responsibly enforce a monetary policy beneficial to the public rather than exclusively to social elites. Bitcoin is thus perhaps the first example of truly “pure” (that is, contentless) exchange value in human history—precisely in response to the corruptibility of top-down regimes of standardization.

1.3 Grades and Credit Hours: Translating Idioms of Exchange

But currency is not the only medium which can facilitate exchange as an idiom of translation; any unit which serves as a rubric of value may do so. In the context of credentials, which is our subject here, two traditional units of value have been employed in recent history: the grade and the credit hour. Both have been used to index skill in learning contexts.

However, as students shift from a context where skill is translated into grades and credit hours to a context in which skill is exchanged for currency (i.e. employment), many are discovering that the worth of their skills in terms of currency may have little to no correlation with how it stacked up in terms of grades and credit hours. Individuals with many credit hours of instruction behind them and high grades are not necessarily more valuable to employers than are those with fewer credit hours and lower grades.

As imperfect as grades and credit hours are for indicating the content of skills or their exchange value, they continue to be employed as indices of skill in part because they are denominated in quantities and therefore easily translatable (that is, exchangeable) into currency values (price) by the education industry. Accordingly, because degrees are functions of both grades and credit hours, their exchange value can also be quantified with relative ease.



The translation of skill acquisition into currency, and vice versa.

For their part, potential employers, investors, and business partners often lack the time or wherewithal to explicitly measure skill. A degree or certification then becomes a general (though unsatisfactory) indicator of the graduate's capacity to persevere through a long-term project to completion with some success. Moreover, the institution which conferred the credential may also index other social values like prestige and social class, giving their graduates an advantage in the professional opportunity market. Prestigious institutions may then factor the value of their prestige into the price of tuition.

It has become increasingly clear in recent years that while prestige certainly fuels economies by virtue of its exchange value, it doesn't necessarily produce other valued outcomes: utility, profitability, agility, long-term growth, innovation, loyalty, camaraderie, skillful leadership. A growing number of representatives of various industries claim that they can't find graduates with the skills they need to fill important positions. In light of these concerns, is there a way to standardize the *content* of capabilities that better indicates what an individual can actually do?

2. Content Standardization as a Process of Verification

Content standardization is a process that establishes, verifies, and modifies what is meant by a particular standard in a particular social context. Accordingly, individuals who rely on or are impacted by a standard generally trust that process of standardization if they trust the standard that is its outcome. Trust in the process of standardization means, in turn, trust in at least some of the social vectors by which it proceeds:

Vectors of standardization are the *currents of meaning-making formed by aggregates of differently-weighted authoritative actors, including communities of verification and impact.*

In the sections that follow, I outline what is meant here by communities of verification and impact and how they constitute vectors of standardization.

2.1 Communities of Verification: Top-Down Vectors of Standardization

Because no individual can independently verify every standard on which they rely, they distribute their trust among social bodies whose responsibility is verifying certain standards of content. Philosopher of language Hilary Putnam noticed this pattern long ago with regard to one set of social standards: words. He proposed a "hypothesis of the universality of the division of linguistic labor," which he clarifies in more detail as follows:

"Every linguistic community exemplifies the sort of division of linguistic labor just described: that is, possesses at least some terms whose associated 'criteria' are known only to a subset of the speakers who acquire the terms, and whose use by the other speakers depends upon a structured cooperation between them and the speakers in the relevant subsets."^[1]

In other words, I may not know the difference between an oak tree and an elm tree, but there are people who do, and they are the social "keepers" of this distinction. They are what this white paper calls a "community of verification."

¹ Hilary Putnam, "The Meaning of 'Meaning.'" *In Mind, Language and Reality*, 215–271. Cambridge: Cambridge University Press, 1975. p. 228.

The vector of standardization emerging from communities of verification is *top-down*; it reflects the distribution of social authority to that body to define what is meant by particular standards of content.

A community of verification is a social body to which authority has been delegated to define standards of content. This community may be as small as one person or as large as all of humanity, though it is usually a small subset of members of the social group that makes use of the standards in question (see communities of impact, below). Communities of verification influence standardization processes from the top down, usually on the basis of knowledge, experience, and skill. These characteristics are, in turn, verified by members of a community or communities of verification—and secondarily by communities of impact.

2.2 Communities of Impact: Bottom-Up Vectors of Standardization

However, trust in communities of verification is often tenuous, not only because those communities may be unknown or only dimly-known to the individual, but because they are bodies whose interests the individual may perceive to be at odds with their own. However, there are always simultaneous, *bottom-up* vectors of standardization: these emerge from wider “communities of impact” who make use of, engage with, or rely upon the standards in question. Although communities of verification may have leveraged impact because of the authority delegated to them, that impact may be heavily influenced or even overridden by common usage or pushback from communities of impact. In short, communities of verification are authorized, not only by other communities of verification but by communities of impact—and that authorization may be contested or revoked.

As authorizers of both communities of verification and standards themselves, communities of impact may have significant leverage in standardization processes. For example, as Ethan Zuckerman has recently written, the impetus for the co-design movement has emerged precisely in response to the disjunction between product standards developed by communities of verification, comprised of engineers and technologists, and actual use of those products by communities of impact.^[2] A stronger bottom-up vector of standardization may be precisely what is needed in situations where a product or service simply is not catching on—or is being used in ways that are completely at odds with the intentions held by the community of verification. The disciplines of consumer and market research are dedicated to making bottom-up standardization vectors more impactful.

A community of impact is a social body that makes use of, engages with, or relies upon standards. Communities of impact often delegate standardization

authority to communities of verification; however, this delegation is never complete. Accordingly, communities of impact may influence standardization processes from the bottom up by checking top-down standards against their own experiences and needs, and employing or not employing them in particular use cases. In some cases, communities of verification may even become coextensive with communities of impact, resulting in a standardization process skewed more heavily by the bottom-up vector.

2.3 Centripetal Standardization and the Power-Law Distribution

There is no hard and fast social boundary between communities of verification and communities of impact; these terms simply describe ideal poles of how the “authorizing function” is socially distributed. Because processes of standardization are always both top-down and bottom-up, standardization itself may be described as “centripetal”: the result of forces moving in opposite directions which in combination produce a circular vector coalescing around a center-in-motion.

Centripetal standardization is an ongoing social process that produces bases for comparison as a result of inputs from differently-weighted authoritative actors.

Complicating matters, however, is the reality that communities of verification and impact are often highly fragmented, which leads to the existence of multiple competing standards of value circulating in the same social space. This fragmentation may be remedied by efforts at conscious community-building initiatives, such as the formation of a governing (standardizing) body (i.e. a government committee, professional association, nonprofit, advocacy group, etc.). However, this move often produces indifference, resistance, or defection on the part of competing communities of verification. Moreover, without authorization from communities of impact, creating communities of verification aspiring to determine a use of standards is likely to be largely ineffective or a violent imposition.

This paper hypothesizes that the distribution of values produced by this interaction of vectors of standardization in a social context can be characterized by a power-law curve:



Classic power-law distribution. Credit: Wikipedia

² Ethan Zuckerman, “The Perils of Using Technology to Solve Other People’s Problems.” *The Atlantic*. June 23, 2016. <http://www.theatlantic.com/technology/archive/2016/06/tech-and-other-peoples-problems/488297>.

A **power-law distribution** reflects a functional relationship between two quantities in which one quantity varies as a power of another. It is sometimes used to describe real-world probability distributions.

This hypothesis suggests a promising avenue for future research: mapping distributions of credential content and seeing if they do, in fact, describe a power-law relationship. If the relationship does hold, the standards that fall within the first 20% of the curve would likely be heavily determined by more leveraged communities of verification with significant buy-in on the part of communities of impact. The remaining 80%, or so-called “long tail,” would likely contain standards produced by less-leveraged communities. Although frequently remaining unknown by those outside of niche communities of practice or purpose, and at times regarded as less “reputable” by mainstream opinion, which accords significant weight to the first 20% of the curve, long-tail communities can be important sources of contestation and innovation in standardizing processes while also carrying forward unique methods, bodies of knowledge, and constructive outputs.

2.4 Standardization Case Study: The DSM

In the United States, over time, a community of experts has arisen in response to the social demand to document, understand, and ameliorate mental illness. This community arose during the 19th century in response to the demands of federal government census takers, who wanted to understand the prevalence of mental disabilities in the American population.^[3] Over time, however, the categories used to document mental illness became more precise, and the study of mental illness developed into a medical science, with both research and clinical practices.

This community of scientists and clinicians established academic training programs, professional societies, and government bodies with the intent to standardize and collectively develop the understanding of mental health and mental health interventions. The resulting communities of verification are highly leveraged in determining standards for what qualifies as a mental illness, accounts of etiology and prognosis, and clinical intervention. However, production of standard diagnostic criteria involves considerable collection of evidence from many broad communities of impact all over the world—patients, research subjects, affected families, populations *qua* survey data, etc. Scientific practice demands that conclusions be revised in light of new evidence, which can come from anywhere. Accordingly, the DSM is an ever-evolving artifact documenting standards for the identification and treatment of mental illness, which are developed in both top-down and bottom-up fashion and tend to fall in the first

20% of the power-law distribution through its influence on practitioner education and licensing standards.

However, the top 20% of a power-law distribution never exhausts the social process of standardization; the long tail includes initiatives of knowledge-creation and practice which exceed the social reach or methodological limits that derive the standards which fall within the first 20%. The DSM framework has never been accepted as a universal standard by all researchers and clinicians, even those working within the communities of verification that give rise to it. This is sometimes due to profound differences in philosophical and political orientation among professional practitioners. In addition, many approaches to the production of knowledge and therapeutic practices for addressing mental illness originate from outside of these communities of verification. Accordingly, countless alternative approaches to mental health proliferate, some of which are scientific practices while others are more pastoral or intuitive in orientation. Many of these have their own standardization and certification practices, all of which are collectively located in the “long tail” of the power-law distribution.

The DSM is, of course, far from the only example of ongoing standardization processes; they are ubiquitous. Technical specifications, business best practices, legal regimes, social norms, and educational testing and subject-matter content standards are all the products of standardization processes. Yet can standardization processes extend to capabilities themselves? It is this question—the one with which we began this paper—that will be the focus of the following section.

3. Can Capability Content be Standardized?

So far, we have reviewed how standardization works and taken the DSM as an example of this ongoing social process. Now we address the question of whether it is possible to design credentials that accurately reflect capabilities. To answer this question, first let us define “credential”:

A **credential** is a verifiable attestation that a certain set of capabilities, experiences, or characteristics has been attained by the credentialed person.

The purpose of a credential is to create confidence and trust in a person’s capabilities, experiences, or characteristics. The content of what is credentialed can be anything from registering a sole proprietor DBA (Doing Business As) to completing one’s Commercial Pilot certificate with Pilot in Command cross country instrument rating. Many credentials can only be conferred by communities of expert practitioners, such as a PhD in Biochemistry or an MD’s Board certification, while others can be conferred by anyone, or even automatically conferred once a person engages certain triggers. For example,

³ “DSM History,” *The American Psychiatric Association*. Undated. <https://www.psychiatry.org/psychiatrists/practice/dsm/history-of-the-dsm>.

millions of people have been ordained as clergy through the Universal Life Church by simply clicking on a link on their website; this legally authorizes them to perform weddings in the United States.^[4]

As is clear from these examples, some credentials are easier to standardize than others. The more complex the social function of a credential, the more complex the process of standardization becomes. Capabilities may be one of the more difficult content types to standardize because their social functions often shift rapidly. Accordingly, efforts at capability-based standardization have so far either created broad capability ranges or precise, practice-based definitions. In what follows, I examine a few current attempts at capability standardization, beginning with approaches that skew top-down and ending with a few examples that skew bottom-up, in order to better understand how both vector types function in this context.

3.1 Top-Down Standardization Efforts in Europe and the United States

Today, a major effort at standardizing capabilities-based credentialing is taking place in the European Union, where the European Qualifications Framework (EQF) is attempting to establish equivalencies across national and institutional boundaries. Since 2012, every credential issued within the EU has carried a reference to its EQF level. The communities of verification behind the EQF are national Accreditation and Quality Assurance bodies, who themselves are audited extensively by the EU before they are granted entry into the organizations responsible for the EQF standardization process: the European Quality Assurance Register (EQAR) and European Association for Quality Assurance in Higher Education (ENQA).

To gauge capability, the EQF draws on what could be called “level of instruction,” which roughly corresponds to educational tier. Thus, Level 1 corresponds to Primary School, while Level 8 corresponds to a PhD. Accordingly, the EQF also draws heavily on degree equivalencies developed by the European Credit Transfer and Accumulation System (ECTS),^[5] which is an attempt to standardize what degrees mean across EU member countries. The presupposition behind this rubric is that the higher the level of education, the higher the level of qualification. While there is some truth to this, it by no means exhausts the range of capabilities an individual cultivates through non-classroom means, such as work experience, family responsibilities, informal invention, etc.

A similar framework for standardizing capabilities, Connecting Credentials,^[6] has been devised in the United States by the Lumina Foundation, a nonprofit whose

stated aim is to increase the number of Americans with postsecondary education credentials. The Connecting Credentials framework also consists of eight levels which closely reflect those of the EQF (although it is unclear whether the Lumina Foundation drew on the EU as a model for credential standardization). However, unlike the EQF, skills are broken into three categories: Specialized Skills, Personal Skills, and Social Skills. In addition to developing Connecting Credentials, the Lumina Foundation has also worked closely with the Association of American Colleges & Universities (AACU)^[7] to develop a Degree Qualifications Profile (DQP),^[8] which specifies the skills a student should have upon receipt of a Bachelor’s Degree, Master’s Degree, and PhD. The DQP thus mirrors the impetus behind the ECTS as well.

These projects are formidable; however, their capability classifications are highly general owing to the broad scope of their intended applicability. They also proceed along different social trajectories, as the different ways the communities of verification involved are structured suggests. In the EU, the communities of verification comprise a transnational governing structure which leverages organizations of national governance to derive legally-enforceable standards. In the US context, it is nonprofit organizations, working closely with volunteer educational institutions, who are at the forefront of capability-based credential standardization.

All of these communities of verification, moreover, are located within the education sector. In other words, no industry-based communities of verification set standards for skills a college graduate must have in order to be employable in entry-level positions in their industry. That is why, from an employer’s perspective, it can still be unclear how, say, a Level 4 credential or a Master’s Degree translates into the ability to do those things required to be successful in a specific job. In other words, right now firms comprise communities of impact rather than communities of verification with regard to education credentials that fall within the top 20% of the power-law distribution. In practice, this means they are taken into account by universities and educational credential standardization bodies, but distantly and imprecisely.

In response, corporations often construct communities of verification outside the formal education system by developing their own credentialing frameworks; for example, AT&T or Google’s Nanodegrees (being offered through Udacity), Microsoft’s Certifications, and Motorola’s Six Sigma (developed by Motorola’s Bill Smith, but made famous by Jack Welch at GE). However, many industry credentials are designed precisely *not* to be translatable into other industrial

4 The Universal Life Church. Undated. <http://www.ulc.org>.

5 The European Credit Transfer and Accumulation System. *Wikipedia*. Undated. https://en.wikipedia.org/wiki/European_Credit_Transfer_and_Accumulation_System.

6 Connecting Credentials. *The Lumina Foundation*. <http://connectingcredentials.org/framework-detail/>.

7 “An Introduction to LEAP: Liberal Education and America’s Promise.” *The Association of American Colleges and Universities*. 2015. <https://www.aacu.org/sites/default/files/files/LEAP/IntroToLEAP2015.pdf>.

8 “The Degree Qualifications Profile.” *The Lumina Foundation and The Association of American Colleges and Universities*. <http://degreeprofile.org/download-the-dqp/>.

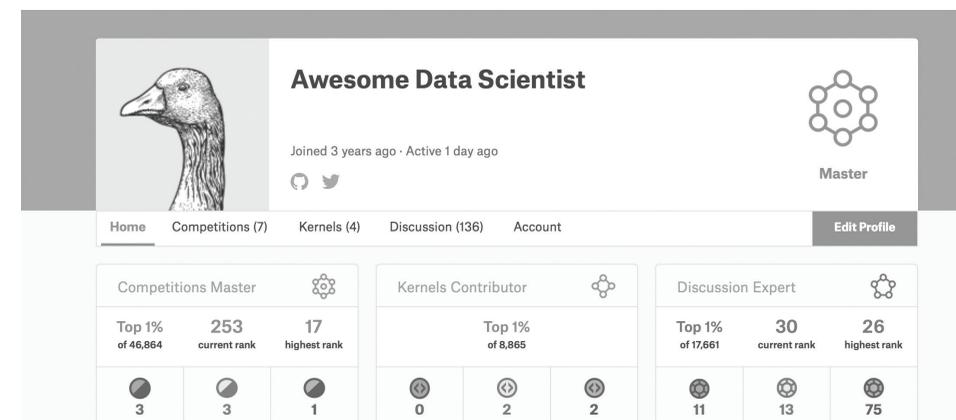
contexts in order to preserve the market advantage of the company issuing the credential by locking in its labor force. Thus, from the student’s perspective, an industry credential doesn’t necessarily have a higher exchange value in the marketplace than does a formal education credential. In fact, a formal education credential may, in practice, function as a *de facto* prerequisite for later industry credentials by serving as a prerequisite for jobs that form the precondition for the possibility of acquiring an industry credential.

The aforementioned initiatives are all centripetal; however, they are skewed toward their top-down vectors by relying on tightly-delimited communities of verification that exercise overriding influence in the standardization process. In what follows, I examine a few examples of capability standardization that skew toward more bottom-up approaches.

3.2 A Few Bottom-Up Approaches

New practice-specific capability-based credentialing frameworks are emerging that are expanding their communities of verification from a select body of expert practitioners to the entire body of practitioners of a discipline: that is, what is usually one of the most immediate communities of impact has become coextensive with a community of verification. This move has been made possible at larger scales by what amounts to an explosion of educational platforms experimenting with alternative certifications (such as the schools and companies using edX and Coursera), learning marketplaces (such as Quora, Stack Overflow, or Kaggle), or the countless mentoring, learning, and doing platforms (Skillshare, Masterclass, Instructables, P2PU) that go beyond simply delivering information. Many of these services are themselves built atop open-source software initiatives, which are increasingly proving to be a major avenue of democratizing access to processes of authentication and standardization. Like the Bitcoin blockchain, the underlying premise of open-source is that transparency and distributed verification will check the myopia and lack of agility engendered by concentrations of power. However, the prerequisite to being able to verify the processes and information that are being opened up to public access is a certain level of skill, thus protecting the standardization process from distortion by people who truly lack the capacity to evaluate value from the vantage point of a practitioner.

One recent example to consider is Kaggle, a platform created by data scientists to issue competency-based micro-credentials on the basis of specific achievements. This results in an “achievement dashboard” that is similar to a portfolio, but specific to the needs of data science practitioners. It tracks performance across three categories of expertise: competition, kernels, and discussion:



These categories of expertise then become the framework against which further skill in the practice of data science is built over time. In this way, the platform moves beyond static credentials to a record of the continuous accumulation of merit over time. Of course, Kaggle consists of top-down vectors as well. A small subset of data scientists and developers created the platform and specified the rules of engagement by which advancement occurs within it. Thus, there are multiple layers of community verification at work within the broader community of Kaggle-involved data scientists.

Another example of capability standardization skewed toward the bottom-up vector is the Open Science Framework, developed by the Center for Open Science.^[9] The OSF began with a project to crowdsource studies attempting to reproduce the findings of psychology studies in the wake of revelations about rampant misrepresentation of data and significant results in the field. However, it has since become a free, publicly-accessible platform in which researchers all around the world can share data, papers, and methods, inviting collaboration and critique from their community of peers regardless of political or institutional borders. Its just-launched publishing platform, SocArXiv,^[10] collects preprints of articles and datasets in the social sciences, creating an open-access forum for scholarly literature and dialogue.

Like Kaggle, the OSF quantifies participation, although not nearly in as precise or robust a fashion (currently it is limited to “activity points”). This rapidly-developing platform will likely undergo significant change as it is adopted more widely by social scientists in the coming years. It is a promising example of bottom-up capabilities-based credentialing, as the ability to contribute to the platform isn’t limited to those with institutional credentials but is open to anyone who has research to share. The community of practice then conducts organic

⁹ “The Center for Open Science.” *Wikipedia*. Undated. https://en.wikipedia.org/wiki/Center_for_Open_Science.
¹⁰ SocArXiv. <https://osf.io/view/socarxiv/>.

“peer review” insofar as it labels research found to be unreliable or irreproducible as such for public view, thus vouching for the skill of individual participants. The platform is also hospitable to the provisionality of research findings, allowing researchers to create versioned records of projects by continuing to upload new data and revised interpretations of existing research. In this way, it becomes one of the conditions for the further development of research capabilities.

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Examples of other bottom-up-heavy standardization processes are community healthcare initiatives that can be located in the “long tail” of the power-law distribution—those alluded to at the end of the DSM case study above. By this I mean healthcare that is more intuitive and pastoral, often curated by members of spiritual or religious traditions. Closest to the first 20% of the curve are practices like doula certification, some of which occur as part of formal medical education programs (including nursing certification programs) and some of which are performed as unlicensed community education initiatives. Particularly in the latter case, “certification” may be as much a product of word of mouth and reputation as it is of a formal seal of approval. Analogous to doula certification programs are religious psychotherapy training programs, which leverage scientific findings in the field of psychotherapy alongside a theological tradition. Deeper into the long tail are practices such as life coaching, traditional/folk healing, and magic, some of which offer certifications of skill, while many others do not.

3.3 Standardization Is a Social Process That May or May Not Be Scientific

What makes these long-tail standardization practices potentially more heavily bottom-up than traditional formal education is that there is often less of a divide between the communities of verification and communities of impact in terms of subject-matter knowledge and experience; there also may be significant overlap between them. However, the obverse is also often true. That is, the long tail can spur stronger top-down efforts at standardization, like legal or symbolic regimes guarded by exclusive communities of verification or even authoritarian or

cult-like organizations in which standardization proceeds by sovereign fiat.

This bipolarity characterizes community practices in which scientific methods have not made effective inroads: many competing standardization processes cause standards to proliferate widely, and in response, attempts arise to curb this multiplicity through practices of top-down control. Neither outcome is necessarily more effective or satisfying for solving the problems or meeting the aspirations that have engendered the development of long-tail communities of practice in the first place.

In light of these examples from the “long tail” of mental health treatment in the United States, is it important to foreground another characteristic of standardization: it is agnostic with regard to whether the resulting standards “hold” in a scientific sense. In other words, human societies are always standardizing knowledge and practices as part of the production of social norms, but these are not sufficient sources of knowledge in a scientific sense. Moreover, the scientific process usually only ever addresses a delimited case that doesn’t meet the full aspirations of the long tail community.

In other words, the power law distribution can be as much of an engine of politics and celebrity as it is of science. Not everything that lands in the top 20% of the distribution merits such placement from the standpoint of creating foundations of knowledge and practice that hold. This is why the character and practices of communities of verification and impact are so important—it is social collectives which are still the cradles and crucibles of human progress, despite radical changes in their technologically-mediated forms of organization.

Conclusion

This paper has outlined a sociological account of standardization practices with the aim of providing a framework for individuals and organizations attempting to think through how a process of standardizing capabilities may proceed in a way that meets the needs of different stakeholders in always interconnected and evolving spaces of exchange and commerce. The framework suggests that identifying the appropriate communities of verification and communities of impact is a fruitful place to begin. This identification foregrounds the social agents which engage in the standardization process, and therefore the communities to which the standards must in fact be useful.

However, identifying the communities involved in the standardization process, whether with prescriptive or descriptive intent, never exhaustively maps or enables control over the social vectors and mechanisms through which it actually proceeds. This is important to keep in mind because it helps prevent the pitfall of attempting to socially engineer the process of standardization in

an overdetermined fashion. One way of understanding Stewart Brand's famous utterance that "Information wants to be free. Information also wants to be expensive. . . . That tension will not go away,"^[11] is as an indicator of the vectors of standardization described here. Value-creation processes will always be underway; scarcity is a relational property that appears wherever anything is unevenly distributed. However, network effects always exceed top-down control. And networks are always nested in wider networks. The ultimate (human) community of impact in any standardization process is humanity as a whole, and its individual members are singular in the ways they form connections with other humans and non-humans and constitute value over time.

Nevertheless, delimiting communities of verification and impact creates heuristics which can help direct agentive work to bring processes of standardization more in line with, for example, scientific best practices. It can also serve as a simple feasibility check. For example, declaring all chemists around the world a community of verification for the purposes of a standardization project may prove either feasible or infeasible depending on geopolitical realities, institutional capabilities, technological resources, and other factors.

Identifying these communities is only one aspect of the work. As alluded to above with the example of scientific best practices, standards perform a social function. To revisit the discussion of the function of standards from the first section of this paper, standards facilitate exchange; however, whether this is an exchange of information/knowledge, objects, intangibles, currency, method, or anything else is not predetermined. The end in question, however, may profoundly influence the procedural means by which vectors of standardization establish the associated standards: it may produce high-centralized-touch mechanisms like the research-and-committee-heavy process of developing the DSM or low-distributed-touch mechanisms like activity-based capability scoring through algorithms and community, as in the case of Kaggle.

In other words, the answer to the question with which this paper began—Is it possible to standardize capabilities?—is yes. However, the centripetal nature of value creation suggests that, if capability standardization is to prove broadly useful, it cannot be an exclusively top-down exercise—that is, decided and enforced by communities of verification. It must leverage significant inputs from both major vectors of standardization. Such a task is facilitated by technological innovations that allow for increased peer-to-peer practitioner collaboration on a massive and highly-distributed scale. It remains to be seen how these materials will be recombined and evolved to make more intentional what are always ongoing, preexisting social processes of normalization and innovation.

¹¹ Roger Clarke, "Information Wants to Be Free . . ." July 13, 2012. <http://www.rogerclarke.com/II/IWtbF.html>.



Illustration by Joey Gao

IDENTITY AND DIGITAL SELF-SOVEREIGNTY

A New Paradigm for Sovereignty on the High Seas

In the year 1603, the Netherlands were at war with Spain and Portugal. Unlike most wars conducted between European powers until that time, however, one of its theaters of battle was not anywhere on the European continent but rather in East Asia, off the coast of Singapore. It was there that Captain Jacob van Heemskerck, an employee of the Dutch East India Company acting from what appeared to be his own volition, captured a Portuguese merchant vessel and returned its riches to Company shareholders. The DEIC was the world's first multinational corporation and had just been given its royal charter the year before—its structure and activity in the world were new and without precedent. The capture of the vessel engendered a protracted legal battle as Portugal sued for the return of its contents, a religious faction of Dutch East India Company; shareholders rejected the plunder on the basis of how it had been obtained; and Dutch law had no provisions for such an event.

In response, officials of the Dutch East India Company turned to the 20-year-old political theorist Hugo Grotius to draft a justification of the ship's seizure. Grotius realized that there was no legal precedent he could draw on to legitimize this event, which had taken place under the new reality of a globalized world of multinational corporations, naval power, and European colonialism. Instead, he would have to turn to philosophical first principles and reason from these foundations. Accordingly, he developed a theory of the grounds of legitimate warfare by elaborating a natural concept of justice. In other words, he argued that any particular law could only be legitimized insofar as it emerged from the conditions of justice that preceded the formulation of law. This argument became the underpinning of his theory of International Law, with its attendant "Free Sea" doctrine that postulated the independence of the seas from sovereign power.

During the following centuries, states competed with one another to establish as much control as they could over their adjacent bodies of water, resulting in today's system of gradated sovereignty: internal waters, territorial waters, and exclusive economic zones. Beyond that, however, lies Grotius's *Mare Liberum*, or Free Sea (also called the High Seas). Here jurisdiction belongs to both no state and all states, depending on the activities that occur and which state's vessels are involved.

Sovereignty on Today's High Seas: The Internet

The reality we are living today is, in some ways, parallel to that of the Early Modern Period: our cartography of the world and configurations of power are transforming with new technologies of mobility and navigation that are rapidly shrinking the globe. Today's new sea, however, is manmade: the internet, an infrastructure facilitating the movement of information, goods, and people across the world. Like the sea, the internet is an infrastructure that flows between widely differing and often contested jurisdictional spaces. And like the sea, it has demanded unprecedented legal formulations that rely on first principles-based accounts of justice and the grounds of legitimacy.

While most of the public controversies around internet law have centered on intellectual property rights; the business practices of internet service providers; online harassment; and the censorship practices of states; a quieter problem has been working itself out in the background: that of individual sovereignty with regard to digital identity. This problem has been recognized by those who want to break the monopoly of the vessel—that is, the internet-based application—on the control of the identity of its passengers/users. This movement has elaborated the notion of “self-sovereign” identity, meaning that any individual identity has administrative autonomy regardless of its location in digital space.

In other words, some digital thinkers are trying, in a technological idiom, to move beyond the classic political problem posed by nation-state citizenship and which is recapitulated in international law: the nation-state as the only sovereign actor. Under this model, it is nation-states who confer and enforce the rights of individuals. The political philosopher Hannah Arendt described this problem in *The Origins of Totalitarianism*: if “human rights” can only be legally enforced by nation-states for their own citizens, then they cannot meaningfully be called human or inherent. They are, rather, contingent on conferral and protection by some larger authority, in this case the nation-state.^[1]

It has been remarked by philosophers, most recently Benjamin Bratton,^[2] that web-based applications like Google, Facebook, and others are very similar to nation-states in this regard, only with the added sovereign power of completely constituting the identities of users, presetting their capabilities within the application, and even erasing their existence without recourse if they choose. For example, Facebook occasionally suspends accounts of users who don't use their real names in their profiles; when this happens the users have little recourse. Internet applications are not democratic political systems. They are accountable to their users insofar as without them their own existence is precarious, and so they

seek to please them; however, the legal terms of service agreements users agree to, and which are enforceable by the nation-state, grant users very few rights. Christopher Allen, a technologist at the forefront of the movement for digital self-sovereignty, has remarked:

It's central authorities all over again. Worse, it's like state-controlled authentication of identity, except with a self-elected “rogue” state.^[3]

Web-based applications increasingly form the infrastructure of modern life. They are the seas, roads, buildings, schools, and libraries within which we travel, socialize, learn, and express ourselves. They store data that is integral to our social and legal identities. Without them, a person is consigned to something like social death—not too different from the situation of a passenger of a ship on the High Seas. According to the international law that obtains on the High Seas, the flag flown by a vessel determines the jurisdiction it practices. Individuals on flagless vessels tend to be either pirates or humanitarian cases—and those on flagged vessels whose citizenship is revoked are likewise at the mercy of whatever jurisdictional regime they fall under.

Identity: A Precondition for Sovereignty

How does an individual recuperate sovereignty under the conditions of centralized authoritative institutions? To answer this question, we must begin with an account of identity itself. What do we mean when we speak of identity? The social usage of the word is often fraught with ambiguity. I argue here that identity carries two primary meanings which are often conflated:

- Continuity of self-sameness over time (predictable addressability)
- Particular characteristics (some of which can be represented as objects with transactional value)

Continuity over Time

What the first definition of identity means is that when you address something to someone—be it words, a letter, an action, a gift, a relationship—that individual continues to be the same one to whom such objects, intentions, and relationships have been addressed in the past, regardless of how much else has changed about them. Accordingly, an individual may remember being “a very different person” way back when, but their identity as the same person who had those earlier experiences persists. This is what allows people to develop over time without “ceasing to be themselves” every time they change.

¹ Hannah Arendt, *The Origins of Totalitarianism*. New York: Harcourt, Brace, Jovanovich, 1973.

² Benjamin Bratton, *The Stack: On Software and Sovereignty*. Cambridge, MIT Press, 2016.

³ Christopher Allen, “The Path to Self-Sovereign Identity.” *Life with Alacrity*. April 25, 2016. <http://www.lifewithalacrity.com/2016/04/the-path-to-self-sovereign-identity.html>.

Of course, many of these changes are major indeed, and sometimes they entail profound ruptures in the felt sense of who one is (i.e. graduating from college, getting married, experiencing a trauma, etc.). But even ruptures in sense of self don't necessarily disrupt identity as continuous self-sameness. The former is an experience; the latter refers to the structure underlying that experience which may or may not be perceived. When a person no longer feels continuous over time, when they cannot form memories or do not recognize previous states of who they have been as themselves, we are in the realm of either neurological disorders or psychological illness.

Particular Characteristics

The second definition of identity is often conflated with the first. In other words, we often equate characteristics—what a person looks like, their likes and dislikes, what they are good at, what groups they belong to, what their social roles are, what others say, write, or record about them—with who or what they are. This is because the representational content of identity carries social value and is used all the time in processes of social exchange. In hierarchical social arrangements, certain identity representations can be accorded higher value than others because they are assigned by authoritative bodies like governments, schools, and places of employment. If the US government, for example, loses all record of your Social Security number, the benefits of citizenship may be denied to you, and you may suddenly feel like a foreigner in “your own” country. However, despite this rupture, you don't cease to have a continuous sense of yourself as the same person who previously had a Social Security number, although figuratively you may refer to that past self as “dead” or “gone.” You can still be addressed, although others may have to use different means to do so.

Implications for Governance

This dual definition of identity has several implications for any structure of governance that privileges individual self-sovereignty. In what follows, I enumerate the basic characteristics such a structure must possess:

Identity as Continuous Addressability: Continuity of self-sameness over time is the most fundamental presupposition about identity which must be enshrined in a self-sovereign system of governance. Characteristics may change, including aliases, nationalities, accounts, visible markers, social classifications, predilections, habits, and capabilities, but the persistence of continuous selfhood will continue to be the foundation for all other forms of identity. Fragmented identities qua characteristics—for example, multiple aliases, disguises, self-concepts, and personalities—can be an important strategy of self-exploration, fun, and/or self-protection, but they all are constituted by the continuously-existing self. It is this

self which is described by characteristics, has inalienable rights, and is the locus of sovereignty.

Mutability of Particular Characteristics: However, this continuous self also transforms over time. In other words, the principle of continuity of addressability underlies flexible architectures that presume human mutability. Mutability characterizes any healthy human life and must be presupposed by structures of governance which do not seek to overdetermine characteristic-based individual identity.

Privacy as a Condition for Healthy Mutability: Mutability flourishes optimally under the conditions of privacy. Privacy, in turn, can be understood as self-directed disclosure. Under healthy social conditions, the process by which people get to know other people unfolds over time through practices of proximity, intimacy, and co-implication. Transparency, on the other hand, is socially pornographic and facilitates violence; this is why proponents of digital self-sovereignty have stressed that the individual must have administrative autonomy with regards to how he constitutes himself in digital space, deciding when and how to grant deeper access to the continuities of his life.

Social Reciprocity qua Verifiability of Investment-Based Claims: Continuity of self-sameness over time, mutability, and tiered privacy presume a community or network of social actors who may address the individual and to whom different aspects of an individual's identity may be revealed. Human collectives function from practices of reciprocity and exchange which may be codified into policies, rules, or laws. While many of these forms of reciprocity have congealed around parochial norms, the verifiability of socially-significant claims is a fundamental form of reciprocity because it underpins the integrity of a social network. Thus, while in the realm of individual privacy any kinds of claims about the self can be made, the point at which a claim about the self results in trust-based social investment—for example, “I am a doctor qualified to treat your sick child”—is the point at which verifiability becomes a reciprocal right. If truthfulness and good faith in self-presentation are not honored as part of these high-stakes engagements, trust in the entire social system may collapse, leading to potentially even more dangerous second-order effects.

Collectivity as the Condition for Self-Sovereignty: Because the habituated logic of a wider social network overrides the agency of any individual, and because even isolationist individualism manifests in social context, it is crucial to build a first-principles account of individual rights into communal policies and institutional frameworks. In other words, if digital self-sovereignty is to be real, it must be architected and encoded in a system that distributes authority so that it cannot be overdetermined by powerful social actors at the expense of individuals. Collectivities do not automatically accomplish this, and that is why forms of sociality that create the conditions for individual self-sovereignty

must be intentional. In other words, a mere sea is an infrastructure, but it is not sufficient to nurture individual self-sovereignty. Any habituated practice of the latter must also be social, pertaining to the human exercise of governmentality and jurisdiction across vast and unknown waters.

Blockchain-Encoded Credentials: A Step Toward Digital Self-Sovereignty

This is where the blockchain makes its fundamental intervention as a social and technological infrastructure. As a cryptographically-administered, distributed ledger beyond the control of any individual or group of individuals, the blockchain creates a jurisdictional space that cannot be gamed by powerful actors—something which is continually happening with law. Moreover, its pseudonymous key structure ensures that individual privacy is maintained through discretionary gating while preserving quasi-traceability in cases of illegal activity. This sets the precedent for digital self-sovereignty in a context of the collective right to verify investment-based social claims.

The blockchain has countless uses, but one instantiation of its capabilities is the ability to encode and verify credentials on the blockchain. Any developer may make use of this capability by employing the open-source software developed by Learning Machine and the MIT Media Lab.^[4] This code is a part of the Blockchain Certificates Project, or “Blockcerts Project,”^[5] which has set out to establish an open working standard for issuing certificates on the public blockchain. Blockchain credentials empower learners with decentralized, cryptographically-secured proof of their achievements that they control and that they can share directly with employers, graduate schools, or governments without needing to request official copies from the Registrar.

This technology is based on the principle of identity as continuous addressability through time. In other words, for a credential to be socially meaningful, the person presenting the credential must be the same person who was issued the credential—and the same person who qualified to earn it. This does not mean, however, that that person must be describable by the same characteristics that applied to them when the credential was issued. Since that time, they may have changed their name, moved to another country, undergone gender reassignment surgery, and completely overhauled their personality. However, their credential still holds.

⁴ Chris Jagers, “Verifiable Credentials on the Blockchain.” *Learning Machine Blog*. Jun. 3, 2016. <https://medium.com/learning-machine-blog/blockchain-credentials-b4cf5d02bbb7#.6abvia9ss>.

⁵ <http://www.blockcerts.org>.

In keeping with the principle of mutability and the verifiability of investment-based claims, however, institutions do have the power to issue, revoke, and modify credentials over time. And that mutability is co-determined by the credential recipient. Medical malpractice, illegal behavior, and gross negligence already often result in the revocation of credentials; it is possible to encode this revocation on the blockchain as well.

Following the principle of privacy, neither the granting nor the revocation of credentials is a public matter simply by virtue of the blockchain infrastructure. Rather, the pseudonymity of blockchain addresses ensures that the credential recipient is able to share, request, and preserve official records at her own discretion. These records would otherwise have been locked up behind a bureaucratic paywall, making the learner, in effect, the sole record keeper of all of her formally-issued credentials.

Accordingly, although blockchain-based ledger technology describes a stable, addressable individual, it doesn’t define that individual’s identity on the terms of any institution. Rather, it de-centers institutions from an authorial position in the life of the learner: they contribute to the mutability of an individual over time, but do not overdetermine this identity. Accordingly, Christopher Allen has suggested that the Blockcerts Project meets the ten criteria he has proposed for digital self-sovereignty.^[6]

Learning Machine is currently developing a commercial version of the Blockcerts Project that can be used by institutions without the need for the developer work that is currently a prerequisite for using the open source code. We hope other vendors will join us and do the same. This is the first step toward the widespread adoption of the new social technology represented by the blockchain’s distributed ledger. This technology represents a fundamental innovation in human governance which honors the integrity of both individuals and institutions over time while laying the groundwork for digital self-sovereignty.

⁶ Allen, “The Path to Sovereign Identity.”



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