

# Development of a Blockchain Based Digital Credential Framework for Competency Based Learning in the Veterinary Industry

Patrick Welch, DVM, MBA, DACVO<sup>1</sup>, Jason Johnson, DVM, MS, DACT<sup>2</sup>, Julie Noyes, DVM, MS, MA<sup>3</sup>, Jeff Johnson, M.Ed.<sup>1</sup>, Linda Fineman, DVM, DACVIM (Oncology)<sup>1</sup>, Ken Hubbell, MS, I.T.E.<sup>4</sup>

<sup>1</sup>Ethos Veterinary Health and VetBloom, Woburn, MA 01938, <sup>2</sup>College of Veterinary Medicine, Lincoln Memorial University, Harrogate, TN 37752, <sup>3</sup>Washington State University, Pullman, WA 641035, <sup>4</sup>Wish & A Prayer Studios, Raleigh, NC 27695



## Competency-based Medical Education

- Competency-based medical education is a learner-centered model that de-emphasizes equating competency with grades and focuses on abilities and achievement as salient learning outcomes.
- As veterinary education and post-graduate continuing education become progressively decentralized and our focus shifts to competency-based learning, the framework for capturing and sharing data related to these educational activities becomes critical.
- A challenge to the competency-based model of medical education is providing verification of skill acquisition in an appropriate format as well as developing an effective and efficient method of capturing, aggregating and sharing the resulting data.
- Our research seeks to develop a new-generation framework using blockchain technology to provide a secure, decentralized ledger that can support a digital credentialing system for the demonstration of competencies and standardization of learning and assessment strategies.

## Blockchain Technology

- Blockchain technology can provide solutions to the challenges facing implementation of the competency-based model of medical education by providing a trustworthy, digitized, decentralized ledger that creates a method for multiple distributed entities to issue and accept credentials that are portable, verifiable, shareable and discoverable.
- Blockchain enhances the ability for diverse individual organizations to transact with each other without the necessity of a central authority and create a healthy ecosystem where participants (even competitors) work together to solve the same problem.
- Digital credentialing systems can be developed in medical education based on this blockchain technology so that students receive a certification after being assessed for a specific competency which is then stored on the blockchain network.

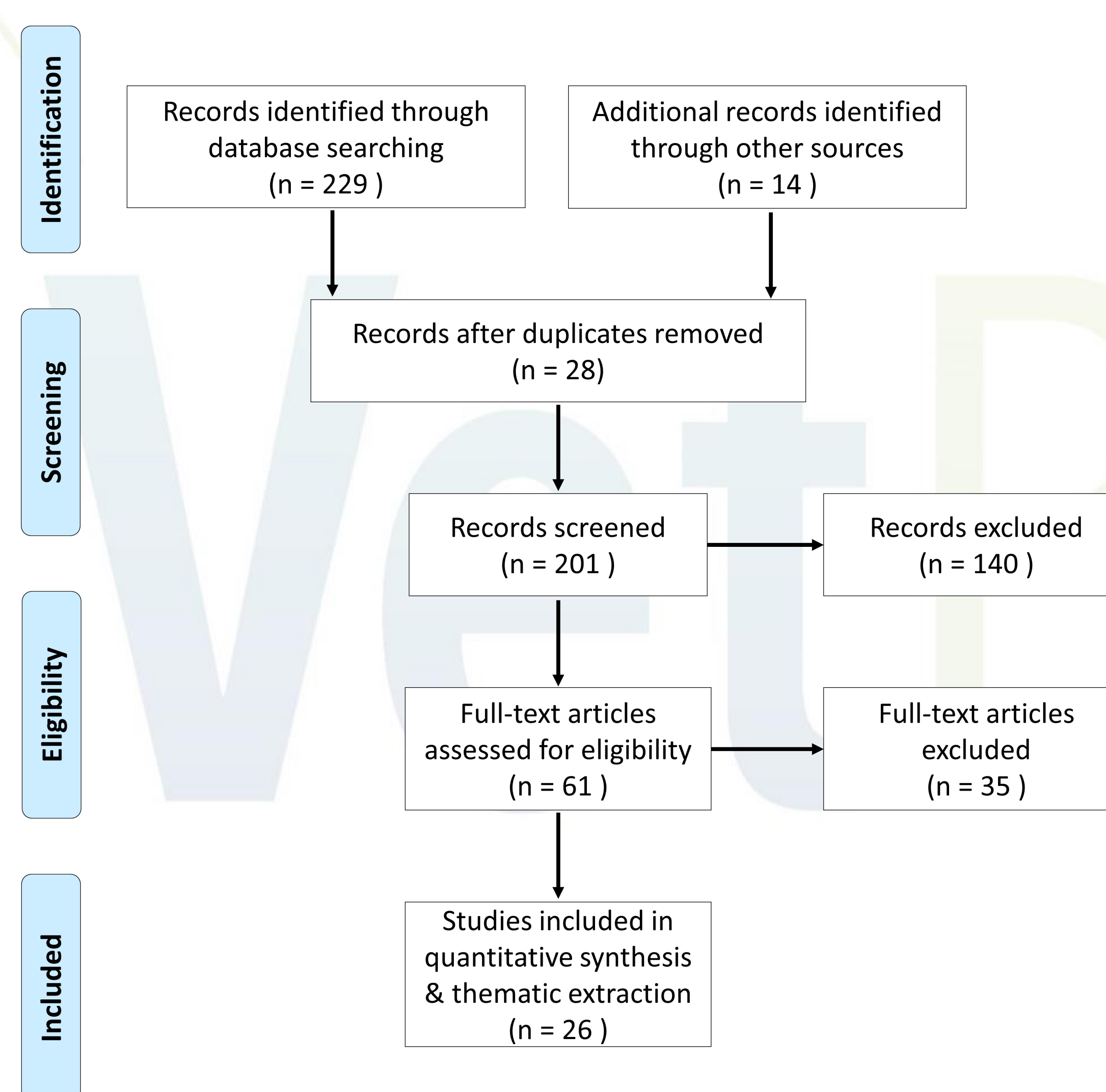
## Digital Credentials

- Digital badges represent an innovative strategy for credentialing competencies. They establish achievement criteria and communicate concrete evidence of skills, attributes, and accomplishments veraciously versus traditional grades.
- These badges have formal and experiential learning requirements that represent specific skills and are stored as Metadata. This provides a competency certification platform for veterinary medical professionals at any level of training who complete the requirements, and ultimately provides evidence for competency based on pre-established standards.
- This type of credentialing system based on a Blockchain framework can provide a secure system for demonstrating competencies in a variety of learning and professional domains.

## Systematic Review

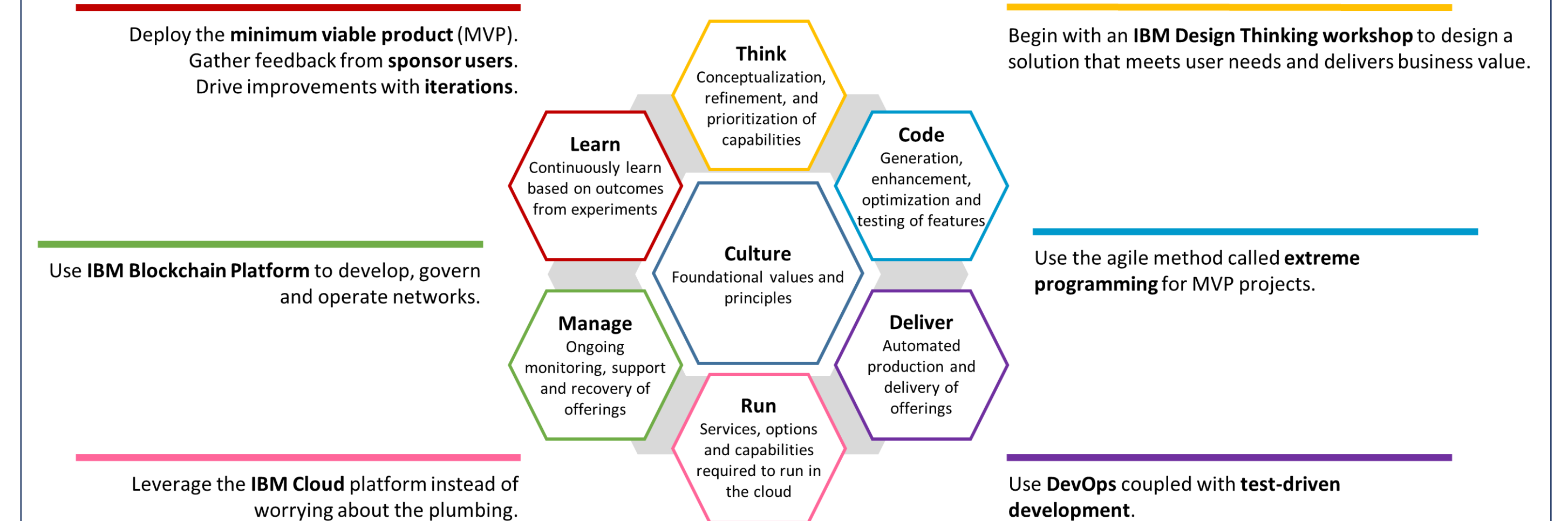
- Our initiative has been focused on a systematic review of the literature to comprehensively identify, critically appraise, and meticulously synthesize the relevant studies on the use of digital badges in medical education, as well as working with leading technology partners to create a prototype for this concept. This unique development strategy integrates theoretically supported models of learning with the practical application of an educational platform by stakeholders, resulting in empirically-based and feasibly operational instructional technology.
- A rigorous and systematic search of major databases (PubMed, Web of Science, CAB Abstracts), key journals, and previous reviews from 2008 to 2018 was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses standards of quality.
- Included comparative studies will be appraised and subjected to methodological scoring using the Medical Education Research Study Quality Instrument (MERSQI) and the Newcastle-Ottawa Scale (NOS).

## PRISMA\* Flow Diagram



\* Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

## Blockchain Design Process\*



\* From the IBM Blockchain Design Workshop Documentation

## Preliminary Results

Type of report	22 journal articles (84%), 1 dissertation (4%), 2 book chapters (8%), 1 conference proceeding (4%)
Publication Year	2018 (4), 2017 (7), 2016 (7), 2015 (6), 2014 (1), 2013 (1)
Research Design	17 review articles, 6 descriptive studies, 3 quasi-experiments
Content Area	18 General Medicine, 6 Nursing, 1 Pharmacy, 1 Veterinary
Study Quality	The mean (SD) quality scores averaged 9.0 (2.2) for the MERSQI (maximum 18 points) and 3.5 for all comparative studies for the NOS (6 points = highest quality)

- The results of the research synthesis revealed a relative paucity of empirically-designed research on the development, implementation, and effectiveness of digital badges in medical education.
- The included reports indicated a growing momentum towards utilizing digital badges as an innovative credentialing strategy to disrupt higher education and strive towards a new model of learner-centered, competency-based medical education.

## Future Directions

- Rigorously designed systematic reviews are necessary to identify gaps in literature and provide a foundation for evidence-based decisions regarding allocation of funds, educational policy, platform development and the direction of future research.
- The findings from this study provide an evidence-based foundation for our current work developing a blockchain based open digital credentialing system accessible to all veterinary professionals and students for the demonstration and standardization of competency-based learning.
- Blockchain is a team sport. We are currently seeking collaborators in the development of this ecosystem. To learn more, please reach out to Dr. Patrick Welch (Pwelch@ethosvet.com) or any of the other authors.