QualiChain: Decentralised Qualifications on the Blockchain

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Alexander Mikroyannidis
Knowledge Media Institute
The Open University
Milton Keynes, United Kingdom
Alexander.Mikroyannidis@open.ac.uk

Abstract—**This special track investigates the creation, piloting and evaluation of decentralised solutions for storing, sharing and verifying education and employment qualifications and is focused on the assessment of the potential of blockchain technology, algorithmic techniques and computational intelligence for disrupting the domain of public education, as well as its interfaces with private education, the labour market, public sector administrative procedures and the wider socio-economic developments.**

Keywords-Decentralised qualifications; Decentralised ePortfolios; Decentralised tutoring; Lifelong learning; Smart curriculum design; Professional recruitment; Public administration recruitment; Career counselling; Intelligent profiling; Competency management; Evaluation of blockchain technology; Blockchain semantics.

I. INTRODUCTION

The emergence of the Blockchain promises to revolutionise not only the financial world, but also education in various ways. Blockchain technology offers a decentralised peer-to-peer infrastructure, where privacy, secure archiving, consensual ownership, transparency, accountability, identity management and trust are built-in, both at the software and infrastructure levels [1]. This technology offers opportunities to thoroughly rethink how we find educational content and tutoring services online, how we register and pay for them, as well as how we get accredited for what we have learned and how this accreditation affects our career trajectory [2, 3].

The QualiChain research and innovation project focuses on the assessment of the technical, political, socio-economic, legal and cultural impact of decentralisation solutions on education. As shown in Figure 1, QualiChain is targeting four key areas for exploring the impact of decentralisation: (i) lifelong learning; (ii) smart curriculum design; (iii) staffing the public sector; (iv) providing HR consultancy and competency management services.
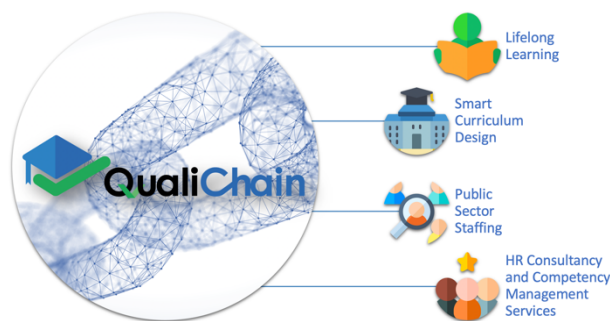

Figure 1.   The key areas targeted by the QualiChain project.

QualiChain investigates the creation, piloting and evaluation of decentralisation solutions for storing, sharing and verifying education and employment qualifications and focuses on the assessment of the potential of Blockchain technology, algorithmic techniques and computational intelligence for disrupting the domain of public education, as well as its interfaces with private education, the labour market, public sector administrative procedures and the wider socio-economic developments.

The QualiChain special track at eLmL 2020 explores how Blockchain technology can realise the vision of decentralised qualifications and how it can help transform the education landscape. In total, 6 submissions have been received, addressing a wide range of educational and employment use cases and applications of Blockchain technology. An overview of these submissions is presented in the following section.

II. SUBMISSIONS

In the first submission, entitled "Exploring Blockchain for Public Sector Recruitment" [4], the authors present a pilot case study of the QualiChain project, aiming to enhance the management of human capital resources in the Greek public sector, by addressing the challenges of optimizing the civil personnel recruitment process, increasing public integrity while enforcing the principles of

transparency, participation, accountability, effectiveness and efficiency. The core objective of this work is the design and activation of a central, unified Human Resources Management System (HRMS) both in terms of procedures, methods and IT infrastructure. The ways that Blockchain technology can be adopted for the needs of public administration recruitment in Greece and the expected results are described in this submission. The authors argue that this work offers a unique opportunity to explore an area that has not had much attention academically, i.e. the public sector recruitment process from the angle of embedding highly sophisticated tools. This work can therefore be treated as a breakthrough in contemporary recruitment processes, not necessarily restrained in the civil sector.

The second submission, "Blockchain Applications in Education: A Case Study in Lifelong Learning" [5], presents a pilot case study of the QualiChain project, aiming at supporting lifelong learning through the combined use of Smart Badges and personalised recommendations. The pilot case study uses Blockchain technology as a means to decentralise lifelong learning and provide lifelong learners with transparent and immutable educational accreditation. At the same time, lifelong learners are provided with personalised recommendations that help them reach their personal and professional learning goals.

In the third submission, entitled "Using Blockchain, Semantics and Data Analytics to Optimise Qualification Certification, Recruitment and Competency Management: a Landscape Review" [6], the authors perform a state-of-play analysis on tools, applications and frameworks used in the domains of Qualification Certification or Recruitment/ Competency Management. The majority of the tools analysed by the authors, are either commercial applications or country/domain-specific and are usually focused on specific functionalities that are useful in some steps of the processes required by students, job seekers, educational institutions and organisations of all types. The authors conclude that this gives credence to the QualiChain project's holistic approach and proves that there is a vacuum on the market of the domains tackled by the project. In fact, not only does QualiChain aim to fill a void in the market but also to advance the state-of-the-art by developing a holistic platform that provides open semantic interoperability and data privacy by extending the research in blockchain, semantics, data analytics and gamification.

The fourth submission, "Decentralised Qualifications' Verification and Management for Learner Empowerment, Education Reengineering and Public Sector Transformation: The QualiChain Project" [7], presents the overall approach and potential impact of the QualiChain project. Despite the fact that the project is still at an early stage, it has gathered the interest of the research community due to the innovative combination of technologies that it will leverage and the fact that it aims to create value to all stakeholders in the domains tackled. This is also reflected in the complexity of the

QualiChain project's technical solution and the number of distinct pilot cases in which it will be implemented.

The fifth submission is entitled "Towards A Blockchain-based Decentralised Educational Landscape" [8]. In this paper, the authors argue that Blockchain-based decentralisation can offer a passageway where educational institutions get to keep their individuality but participate in collaborations to help overcome the problems students face. The principal contribution of this paper is a conceptual educational landscape to show how institutions could potentially manage record-keeping, credential verifications, and continued career support in a decentralised environment. The authors propose a decentralised educational landscape, where institutions do not have to lose their individuality, but can still participate in collaborations. Using existing technologies, the authors demonstrate how record-keeping, credential verifications and continued career support can be provided in a decentralised atmosphere.

Finally, the sixth submission, "Digital Transformation of Education Credential Processes and Life Cycles – A Structured Overview on Main Challenges and Research Questions" [9], explores the challenges that arise in the use and management of education credentials. The authors propose a methodology to capture qualitative descriptions and measurable quantitative results that allow to estimate the effectiveness of a digital credential management system in solving these challenges. This methodology is applied to the QualiChain project pilots, thus allowing an in-depth evaluation of the project's performance. Based on the experience gathered in this process, the authors plan to extend this work to a full framework for the evaluation of the performance of education credential management solutions. This framework should be able to capture the whole life cycle of education credentials from creation and issuing over storage, management and access control, towards credential expiring or retraction.

III. CONCLUSIONS & NEXT STEPS

The QualiChain special track investigates the use of Blockchain technology for the development of decentralised employment and education qualifications. The submissions received in this special track cover a wide range of scenarios for the implementation, deployment and evaluation of decentralised qualifications. Additionally, the submissions of the QualiChain special track provide an outlook on the future trends of Blockchain technology and its upcoming applications in education, recruitment and competency management.

In the context of the QualiChain project, the authors of the special track will be addressing the requirements and challenges set out in their submissions, in order to deploy and evaluate decentralisation solutions for education and employment qualifications within various stakeholder communities. The outcomes of this work will provide a systematic assessment of Blockchain technology and its impact on a variety of use cases.

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