

# Roles, Responsibilities, and Value Flows: A Stakeholder Map of Micro-Credential Processes in Higher Education Ecosystem

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**Abstract** – Micro-credentials are transforming how learning achievements are recognized across formal and non-formal education. This paper maps the stakeholder landscape of micro-credential processes, clarifying roles, responsibilities, and value flows among participants. Drawing on stakeholder theory and ecosystem mapping, five core roles are identified: *earner, course provider, issuer, verifier/viewer, and policy maker*; and analyzed across four process groups: *learning and earning, issuance, verification and recognition, and maintenance*. The paper contributes by systematizing stakeholders and their interrelations, offering a structured view of value exchanges that supports the design of interoperable, transparent, and trustworthy micro-credential ecosystems in higher education.

**Keywords** – *micro-credentials, stakeholder theory, stakeholder mapping, higher education*

## I. INTRODUCTION

Micro-credentials have emerged as an innovative response to the evolving demands of higher education and the labor market, enabling learners to acquire, document, and verify specific skills and competencies gained through both formal and non-formal learning. In the context of digital transformation and lifelong learning, micro-credentials offer a flexible and transparent mechanism for recognizing learning outcomes that traditional diplomas and certificates often fail to capture. The Council Recommendation on micro-credentials for lifelong learning and employability [1] has positioned them as a key instrument for supporting the upskilling and reskilling agenda, fostering collaboration between higher education institutions, training providers, and employers.

However, despite the increasing adoption of micro-credentials across Europe [2], the structure of roles, responsibilities, and interrelations among stakeholders within this emerging ecosystem remains fragmented. Most existing frameworks emphasize pedagogical [3], technological [4], [5], or standardization aspects [1], [5], [6], while the functional and relational dynamics between actors, such as learners, educators, issuers, verifiers, and policymakers, are

insufficiently defined. Understanding these interactions is essential for ensuring interoperability, trust, and value creation in micro-credential ecosystems.

This paper aims to present a comprehensive stakeholder map of the micro-credential ecosystem in higher education and to analyze their mutual processes and value flows. Drawing on stakeholder theory and ecosystem mapping, the study distinguishes five key roles: earner, course provider, issuer, verifier/viewer, and policy maker. Additionally, their interactions have been decomposed across four core process groups: earning, issuing, sharing, and maintaining. The remainder of the paper is structured as follows: Section 2 outlines the theoretical background on micro-credentials and stakeholder theory; Section 3 presents the stakeholder mapping and process analysis; and Section 4 summarizes key findings and future research directions.

## II. THEORETICAL BACKGROUND

### A. Micro-credentials

Micro-credentials (MCs) have emerged as a flexible and competency-based form of recognizing learning outcomes across formal, non-formal, and workplace learning environments. They are typically defined as small, measurable units of learning that certify mastery of a specific competency or set of competencies [1]. MCs record learning outcomes that have been assessed against transparent standards and provide learners with evidence of skills that may contribute to larger qualifications.

A commonly used representation of micro-credentials is the digital badge (DB), a digital artifact that visually encodes evidence of learning, assessment criteria, issuer identity, and metadata [2], [7]. While DBs are not synonymous with micro-credentials, they are often treated as a specific form of MC, particularly in higher education (HE) where badges are awarded for the completion of modules, learning activities, or short courses.

Micro-credentials are considered an innovative pedagogical tool that aligns with emerging models of Higher Education 4.0, competency-based education, and personalized learning [8], [9]. They offer shorter, modular alternatives to traditional academic awards, and may serve as stand-alone credentials, complementary additions to formal degrees, or stackable components that can accumulate into larger qualifications [9], [10]. As noted [11], MCs must align with formal qualification frameworks such as Bachelor or Master levels, thereby reinforcing their academic legitimacy.

Several national and international bodies are working to define common standards and to integrate MCs into formal qualification systems. Examples include the European Council Recommendation for Micro-credentials [1], the European MOOC Consortium's Common Microcredential Framework [12], [13], the New Zealand Qualifications Authority [14], and emerging regulatory initiatives in Australia, the USA [15], and OECD [16] jurisdictions. These efforts aim to establish coherence, comparability, and a "common currency" for micro-credentials across borders.

Beyond their functional role, micro-credentials have been critically examined as part of broader shifts toward employability discourses and competency-based curriculum models. Scholars argue that MCs may further "discipline" higher education by reinforcing labor-market priorities and fragmenting disciplinary knowledge into smaller, instrumental units [6]. Drawing on Bernstein's concepts of classification and framing [6], micro-credentials have been analyzed as mechanisms that recontextualize educational knowledge towards human-capital logics and short-cycle skill acquisition.

Despite these critiques, MCs remain central to ongoing HE reforms, offering opportunities for flexible learning pathways, improved visibility of non-formal learning, and enhanced alignment between education and labor-market needs.

### B. Stakeholder theory

Stakeholder theory emerged as a response to the limitations of shareholder-centric views of the firm. Freeman [17] defined stakeholders as "any group or individual who can affect or is affected by the achievement of the organization's objectives," shifting attention from a narrow focus on owners towards a broader network of actors, including employees, customers, suppliers, regulators and communities. In this perspective, organizations are embedded in webs of relationships, and long-term success depends on understanding and managing these relationships rather than optimizing a single financial outcome.

Subsequent work [18] extended stakeholder theory from a descriptive idea ("who are our stakeholders?") to normative ("who should matter?") and instrumental questions ("how do stakeholder relationships influence performance?"). The salience model [19] ("Fig. 1") is particularly influential in explaining which stakeholders managers are likely to prioritize. They propose that stakeholder salience depends on the possession of three attributes: power (the ability to influence the organization), legitimacy (socially accepted or appropriate relationship to the organization), and urgency (time-sensitivity and criticality of stakeholder claims). Different configurations of these attributes produce latent,

expectant and definitive stakeholders, offering a dynamic lens for prioritizing attention and resources.

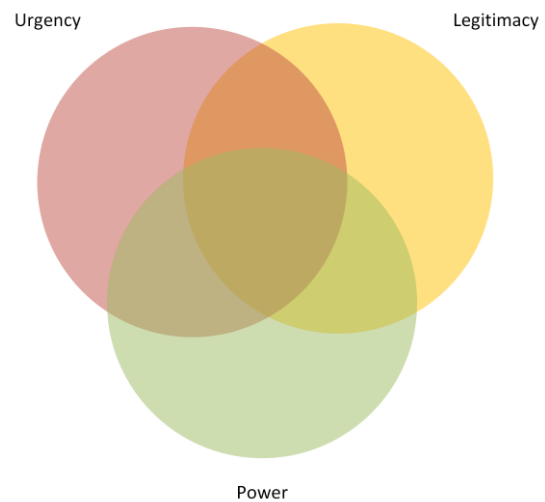


Fig. 1. Salience model

In parallel, stakeholder analysis and mapping methods have been developed as practical tools for strategy and project management. These approaches typically involve: (1) identifying stakeholder groups; (2) analyzing their interests, influence and expectations; (3) prioritizing them (e.g. via salience, power-interest grids or similar techniques); and (4) designing engagement strategies and communication channels appropriate to each group.

Having in mind a broad and complex educational ecosystem, stakeholder theory has been progressively adapted to the context of higher education institutions (HEIs). Universities are expected to address the expectations of a wide range of internal stakeholders (students, academic and administrative staff) and external stakeholders (employers, public authorities, professional bodies, funding agencies, local communities, civil society organizations, etc.) [20]. As HEIs have moved from relatively closed, autonomous organizations towards more market- and mission-driven institutions, stakeholder relationships have become critical for legitimacy, funding, regional development and innovation. Kettunen [21] operationalizes stakeholder theory in HE by proposing a stakeholder map that explicitly links stakeholders to the perspectives of the Balanced Scorecard: external impact, finance, processes and collaboration, and organizational learning. Internal stakeholders (students, academic and other staff) are distinguished from external partners and customers, and each group is positioned according to its role in regional development, funding, collaborative processes, and capability building. In this way, stakeholder theory in HEIs moves from abstract lists of "who matters" towards process-oriented models of how relationships are built, maintained and evaluated.

Recent bibliometric reviews [20] confirm that research on HEIs and stakeholder analysis has expanded substantially over the last 25 years, with major themes including stakeholder engagement, stakeholder management, stakeholder relationships and stakeholder perspectives. Within these themes, studies emphasize: (i) the triple helix of

government–industry–university; (ii) stakeholder involvement in quality assurance and sustainability reporting; and (iii) the role of students and employers as key stakeholders in curriculum design, employability and innovation.

For the purposes of this paper, stakeholder theory provides both a conceptual and a methodological foundation. Conceptually, it frames the micro-credential ecosystem as a network of interdependent actors whose roles, claims and value exchanges must be balanced rather than optimized for a single organization. Methodologically, it justifies the use of stakeholder mapping and process analysis to identify: (a) who the stakeholders are in micro-credential initiatives in higher education; (b) how their responsibilities differ across earning, issuing, sharing, and maintaining processes; and (c) where gaps, misalignments, or underserved stakeholders may exist. Building on this theoretical background, the next section develops a stakeholder map tailored to micro-credential processes and analyzes the associated process flows and value streams in the higher education ecosystem.

### III. MICRO-CREDENTIAL STAKEHOLDER MAPPING AND PROCESSES ANALYSIS

Building on the theoretical foundations of micro-credentials and stakeholder theory, this section examines the structure and dynamics of the micro-credential ecosystem in higher education through two complementary analytical lenses: stakeholder mapping and process analysis. While existing policy frameworks and institutional initiatives describe the functional components of micro-credential systems, they rarely articulate how different actors interact, how responsibilities are distributed, or how value flows across the lifecycle of earning, issuing, sharing, and maintaining micro-credentials. Understanding these interdependencies is crucial for designing interoperable, trustworthy, and learner-centred systems.

#### A. Stakeholder mapping

This paper conceptualizes the micro-credential ecosystem as a network (“Fig. 2”) of five core stakeholder roles: 1) earner, 2) course provider, 3) issuer, 4) verifier/viewer, and 5) policy maker.

Each role contributes to and depends on a set of processes that shape the validity, transparency, and usability of micro-credentials.

##### 1) Earner

In the broader context of lifelong learning, the earner is any individual acquiring new skills and knowledge across different learning environments. These environments span formal learning (primarily higher education programs) and non-formal learning, including structured or semi-structured educational formats such as professional certifications, bootcamps, summer schools, workplace training, and project-based or challenge-based learning opportunities. Earners engage with the micro-credential ecosystem by selecting learning pathways, completing required activities, undergoing assessment, and ultimately seeking recognition of their achievements.

##### 2) Course provider

Course providers represent all stakeholders responsible for designing and delivering learning experiences that enable earners to acquire competencies. In formal contexts, this includes higher education institutions and teaching staff; in non-formal contexts, it includes private training organizations, professional bodies, employers offering workforce development, and educators implementing project-based, problem-based, or challenge-based learning models. Beyond content delivery, course providers typically conduct assessments that determine whether the earner has met the conditions required for micro-credential issuance.

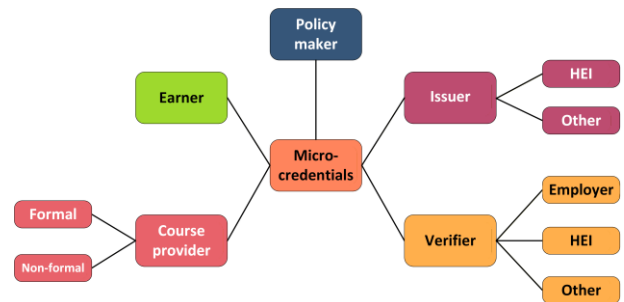


Fig. 2. Micro-credential stakeholder map

##### 3) Issuer

Although issuers may overlap with course providers, they perform a distinct function within the micro-credential lifecycle. Issuers are responsible for formally awarding micro-credentials, ensuring that all learning requirements have been fulfilled and that the credential is recorded, stored, and presented in a verifiable format. This separation reflects emerging practices in digital credentialing systems, where issuing authority, validation processes, and technological infrastructure may be centralized within dedicated institutional units or external platforms.

##### 4) Verifier/viewer

Verifiers and viewers are stakeholders who access and evaluate micro-credentials for decision-making purposes. While verification and viewing are conceptually different (authentication vs. inspection), they often occur together within processes such as employment screening, academic admissions, credential recognition, or professional licensing. These actors are typically external to the learning process, such as: employers, universities reviewing applicants, accreditation bodies, or other institutions requiring documented proof of competencies.

##### 5) Policy maker

As micro-credentials represent a relatively new and evolving credentialing format, policy makers play a critical role in establishing standards, regulatory frameworks, and quality assurance mechanisms. This group includes government ministries, national qualification authorities, accrediting agencies, professional associations, and higher education institutions acting collectively to define policies, metadata requirements, learning outcome frameworks, and interoperability standards. Their decisions influence the recognition, portability, and long-term sustainability of micro-credential system.

## B. Stakeholder processes and process flows

To understand how micro-credentials function within the higher education ecosystem, it is essential to examine the processes through which stakeholders interact and exchange value. A review of existing micro-credential systems and proposed models [1], [22]–[24] reveals a recurring set of operational activities across institutions and technological platforms, including student registration, assessment and evaluation, credential issuance, verification, and long-term maintenance. While these processes appear in different configurations across initiatives, they consistently converge around four overarching process groups: 1) earning, 2) issuing, 3) sharing, and 4) maintaining micro-credentials. These groups represent the functional backbone of the micro-credential lifecycle and define how responsibilities are distributed among earners, course providers, issuers, verifiers, and policy makers.

### 1) Earning

The earning process captures all activities an individual must complete to qualify for a micro-credential. This includes identity verification through institutional or digital authentication systems; selecting the learning opportunity; completing required instructional activities such as coursework, online modules, project-based tasks, or examinations; undergoing assessment; and obtaining confirmation of successful completion. Within this flow (“Fig. 3”), course providers play a central role by designing learning activities, defining outcomes, and conducting evaluations, while earners engage in learning and provide evidence of competency. The outcome of this process is a validated record of achievement that can be forwarded to the issuing stage.

### 2) Issuing

Issuing refers to the institutional processes required to formally create, register, and award a micro-credential. These activities include onboarding institutions to credentialing platforms, registering programs and courses, defining the metadata and conditions for each micro-credential, validating prerequisites and assessment outcomes, and generating the credential in digital form. The issuer – whether a higher education institution, a designated administrative unit, or an external credentialing authority – is responsible for assuring the integrity, security, and compliance of the issued credential (“Fig. 3”). In decentralized or blockchain-based systems, issuing also involves writing credential data to a distributed ledger for verifiability and long-term record preservation.

### 3) Sharing

Sharing encompasses the use of micro-credentials in academic, professional, or personal contexts. Earners may submit credentials as part of job applications, professional networking, further education, or recognition-of-prior-learning procedures. Verifiers and viewers, such as employers, universities, accreditation bodies, or professional registries, inspect the credential’s metadata and authenticate its validity through decentralized registries or verification

tools (“Fig. 3”). The sharing process thus represents the point at which the value of a micro-credential is realized, enabling stakeholders to trust that the documented competencies genuinely reflect the earner’s abilities.

### 4) Maintaining

Maintenance refers to the processes that ensure the continued validity, relevance, and accessibility of micro-credentials over time. This includes defining expiration periods, establishing mechanisms for renewal or re-certification, updating metadata and competency descriptions, and ensuring integration with broader systems such as academic records, qualification frameworks, or

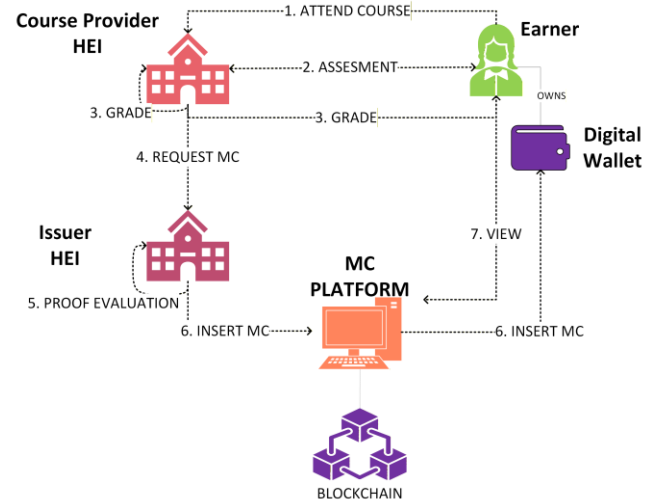


Fig. 3 Earn - issue - share process flow

workforce platforms. Policy makers and issuers play important roles in setting standards for longevity and interoperability, while earners may engage in re-training or re-assessment to maintain the validity of time-sensitive credentials.

Across these four process groups, value flows emerge in the form of validated competencies (from learner to issuer), trusted credential records (from issuer to verifier), recognition and opportunities (from verifier to learner), and regulatory alignment (from policy makers to all actors). Mapping these flows provides a structured perspective on how micro-credential ecosystems operate, reveals potential bottlenecks or misalignments, and informs the design of more transparent, interoperable, and user-centred credentialing frameworks.

## IV. DISCUSSION

Having in mind the in-depth stakeholder mapping and processes analysis, we can align stakeholder roles and responsibilities across the micro-credential process groups also defining value flows between the stakeholder groups.

TABLE I. STAKEHOLDER ROLES AND RESPONSIBILITIES ACROSS MICRO-CREDENTIAL PROCESS GROUPS

Stakeholder	Processes			
	Earn	Issue	Share	Maintain
Earner	Selects micro-credential Completes learning activities Provides evidence of	Confirms eligibility for issuance Approves the release of the	Shares micro-credential with employers/HEIs Authorizes verification	Renews expiring MCs Updates learning records Re-certifies when required



	competency Undergoes assessment	personal data for credential creation	requests Uses MC in applications and profiles	
<b>Course provider</b>	Designs learning pathways Delivers instruction (formal or non-formal) Conducts assessments Validates learner performance	Submits validated results to issuer Defines technical and pedagogical metadata	Supports interpretation of MC outcomes when needed	Updates course content linked to MCs Ensures alignment with current competency standards
<b>Issuer</b>	Receives validated assessment data Confirms prerequisite fulfilment	Registers programs and MC metadata Generates digital credentials Records MCs in centralized or decentralized systems	Provides verifiable credential formats Responds to verification requests Maintains audit trails	Ensures long-term data integrity Manages expiration rules Updates MC structures and metadata over time
<b>Verifier/Viewer</b>	-	-	Authenticates credential validity Reviews metadata and evidence of learning Uses MCs for decision-making (employment, admissions, recognition)	Provides feedback to issuers and policy makers regarding relevance and quality of MCs
<b>Policy Maker</b>	Defines qualification frameworks supporting competency acquisition	Establishes regulatory and quality assurance guidelines Defines standard metadata requirements	Sets interoperability and verification standards across institutions	Ensures alignment with national and international frameworks Updates policies based on labour-market and educational needs

The distribution of responsibilities shown in “Table 1” reveals not only functional interactions but also the value exchanges that sustain the micro-credential ecosystem. At the core of these flows is the transfer of validated competencies from earners to issuers, enabling the formal creation of trusted digital credentials. Issuers then generate verifiable credential artifacts, which are consumed by verifiers/viewers, who, in turn, provide recognition, opportunities, and decisions that return value to the earner. Course providers contribute pedagogical and assessment value, while policy makers establish regulatory and interoperability frameworks that shape system-wide trust, alignment, and long-term sustainability. These value flows illustrate the interdependence of stakeholders and underscore the need for coordinated governance mechanisms to ensure transparency, efficiency, and seamless use of micro-credentials across educational and professional contexts.

## V. CONCLUSION

This paper examined the micro-credential ecosystem in higher education through a structured stakeholder mapping and process analysis. By distinguishing five core stakeholder roles: earner, course provider, issuer, verifier/viewer, and policy maker; and aligning them with the four micro-credential process groups (earn, issue, share, maintain), the study demonstrated how responsibilities and value flows are distributed across the ecosystem. The analysis revealed clear interdependencies among actors, as well as gaps in coordination, standardization, and governance that limit interoperability and widespread adoption.

The contribution of the paper lies in systematizing stakeholder roles and clarifying their relationships within the micro-credential lifecycle, offering a foundation for the design of transparent, trustworthy, and learner-centered credentialing systems. Future work will extend this conceptual analysis through empirical research on stakeholder perceptions of value, trust, and usability. In parallel, ongoing research will focus on developing a prototype platform for decentralized micro-credential management and evaluating its implementation in higher

education settings. Such efforts will provide further insight into the practical feasibility, technological requirements, and institutional readiness needed to scale micro-credential ecosystems.

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