Master's thesis kick-off: Analysis of the state of the art and the practice of digital credentialing

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Key Facts

Title: Analysis of the state of the art and the practice of digital credentialing

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Outline

Motivation

Problem Statement

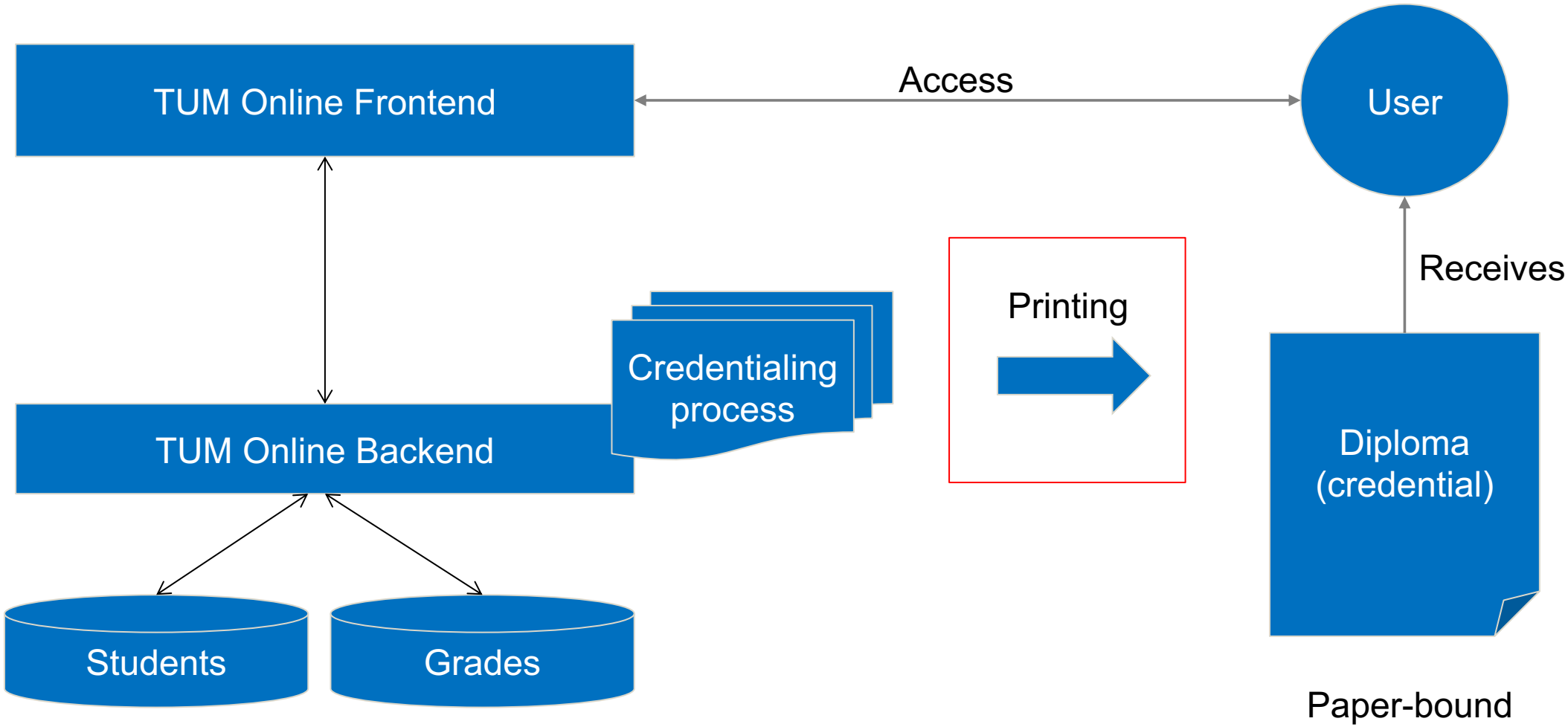
Research Approach

First Research insights

Timetable

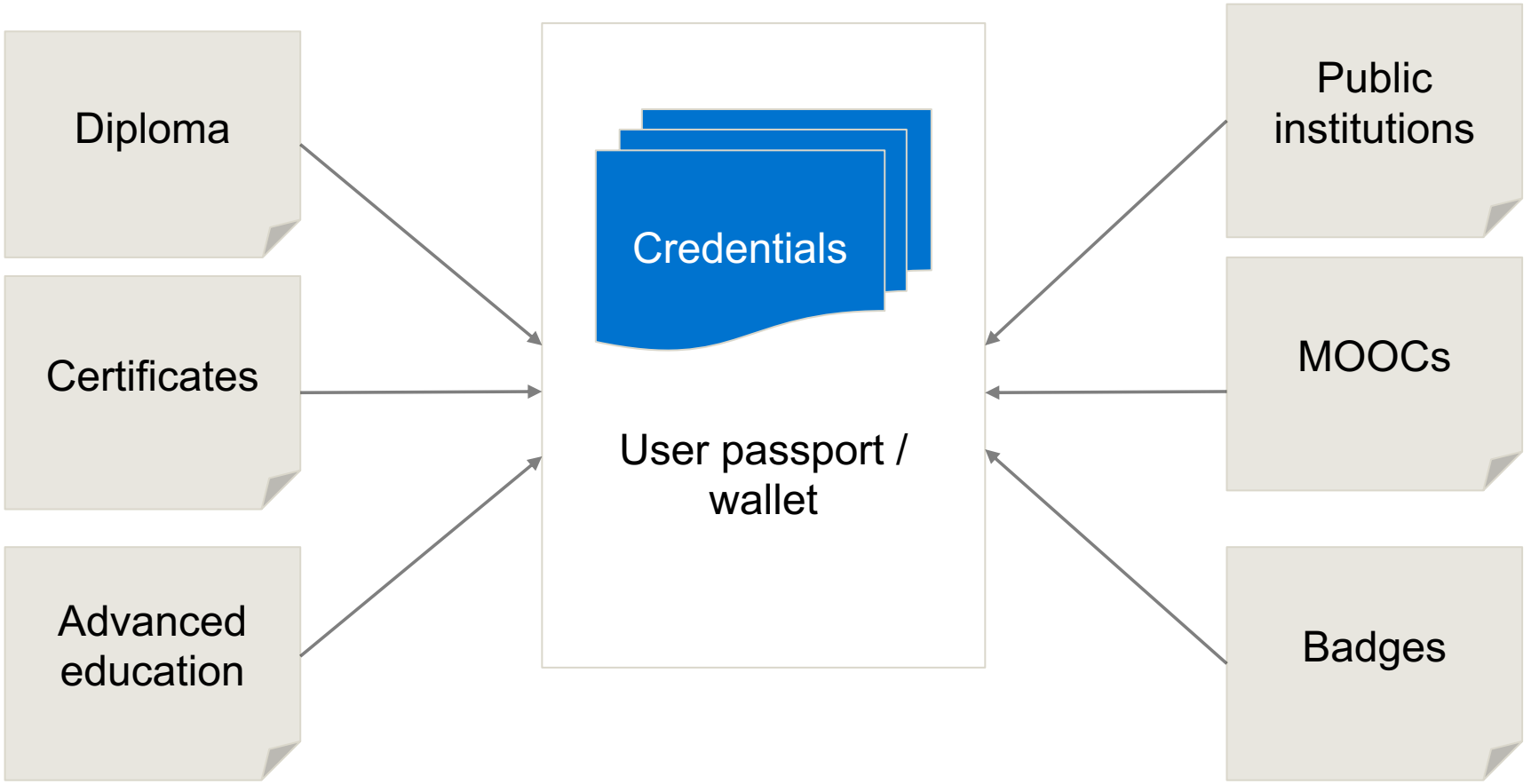
Motivation

Current TUM online infrastructure (simplified)



Motivation

The *Concept of lifelong learning* needs an infrastructure that enables lifelong credentialing [1]



Problem Statement

Institution’s scope

Diploma (credential)

Printing

Requirements (excerpt)

- Valid
- Personalized
- Secure
- Tamper-proof
- Portable
- Significant

Requirements are met by institution

User’s scope

Digitizing

Requirements are violated by e.g. scanning

Problem Statement

- Diplomas credit the highest form of education, thus have an immense value

- Sending out Diplomas in PDF format doesn’t solve the issue the following issues:
  - How is it made tamper-proof?
  - How can a diploma be revoked?
  - How can it be securely stored?
  - How can someone else verify the diploma?
  - How can it be accessed?

→ How is a system comprised that meets these requirements and still enables users to get their credential in a digital way?

Research Questions

RQ 1: What is digital credentialing and what can be digitally credentialed?

RQ 2: What are current solution approaches? Which ones are already on the market / in use?

RQ 3: What are current challenges to overcome in regards of digital credentialing systems?

Research approach

RQ 1: What is digital credentialing and what can be digitally credentialed?

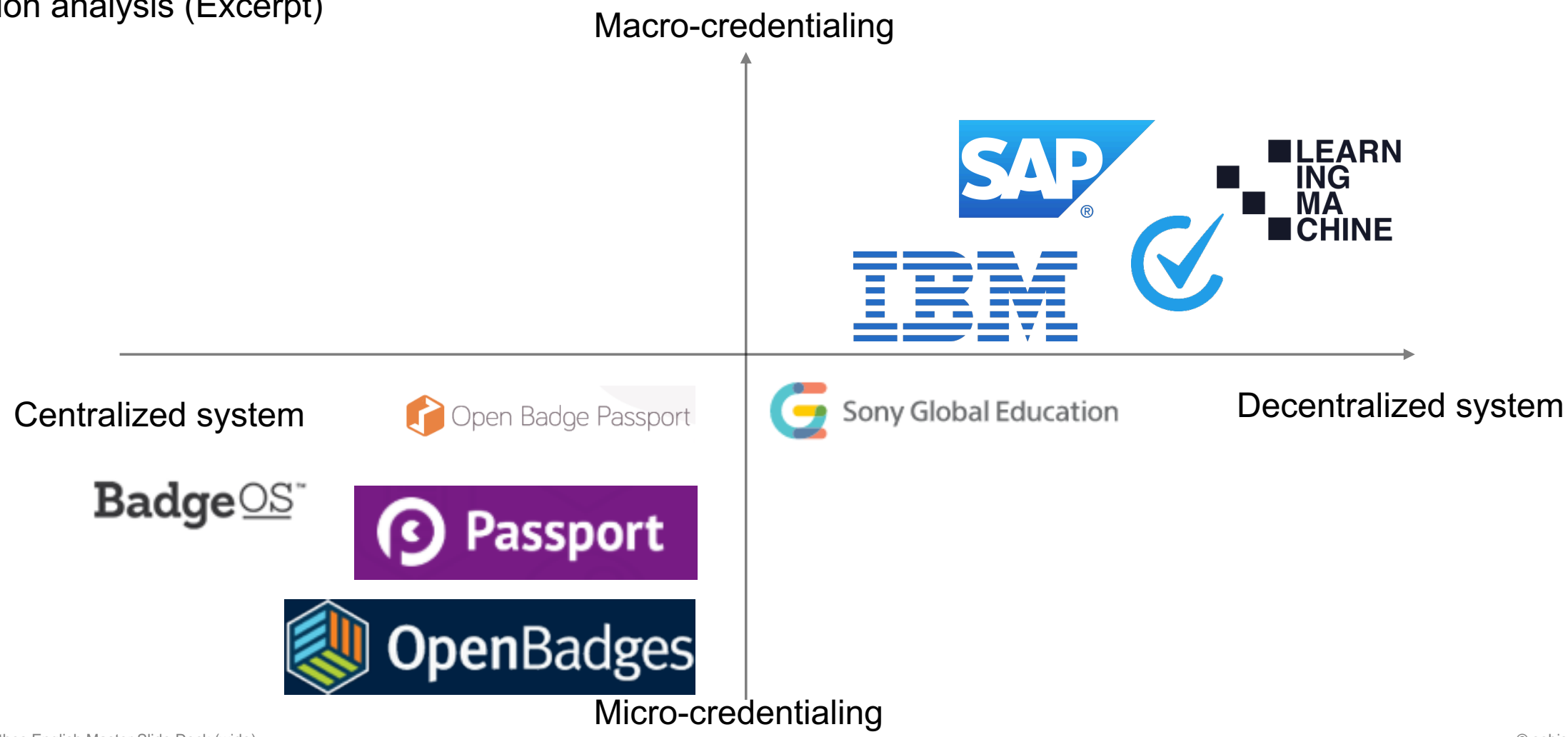
Literature Review:

- Definition of digital credentials?
  - Difference between Micro- and Macro-credentials
- Difference between analogue and digital credentials?
- How are digital credentials issued?
- What is the potential of digital credentialing?
- Challenges that have been overcome and are yet to overcome?

Research approach

RQ 2: What are current solution approaches? Which ones are already on the market / in use?

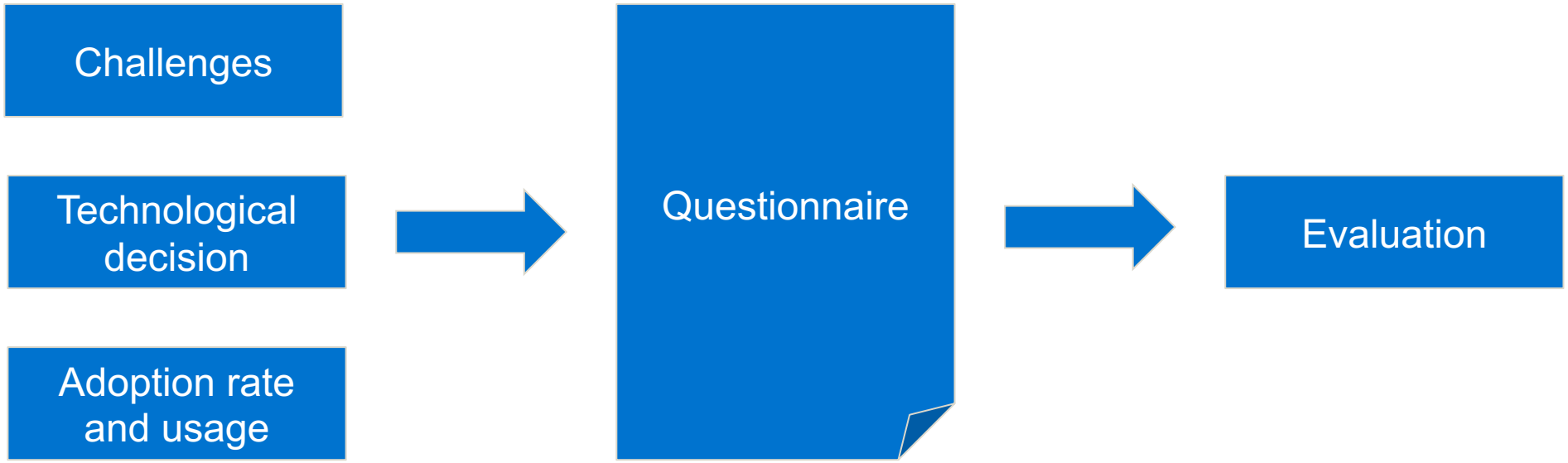
Solution analysis (Excerpt)



Research approach

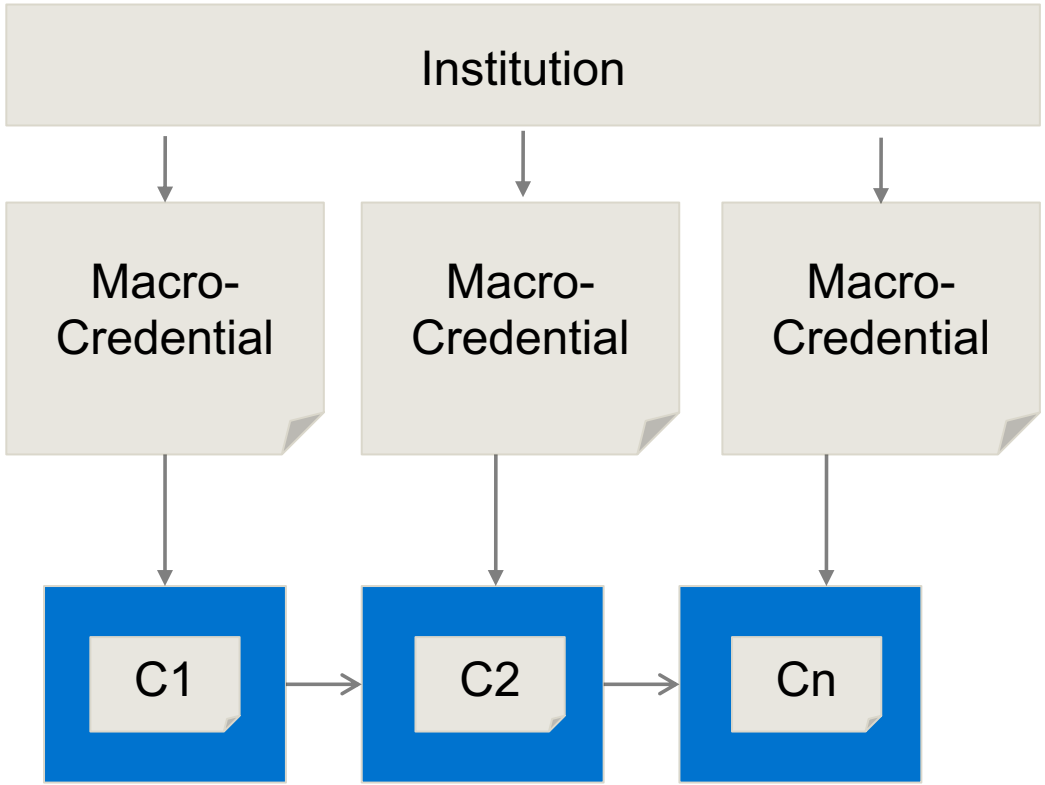
RQ 3: What are current challenges to overcome in regards of digital credentialing systems?

Contacting companies

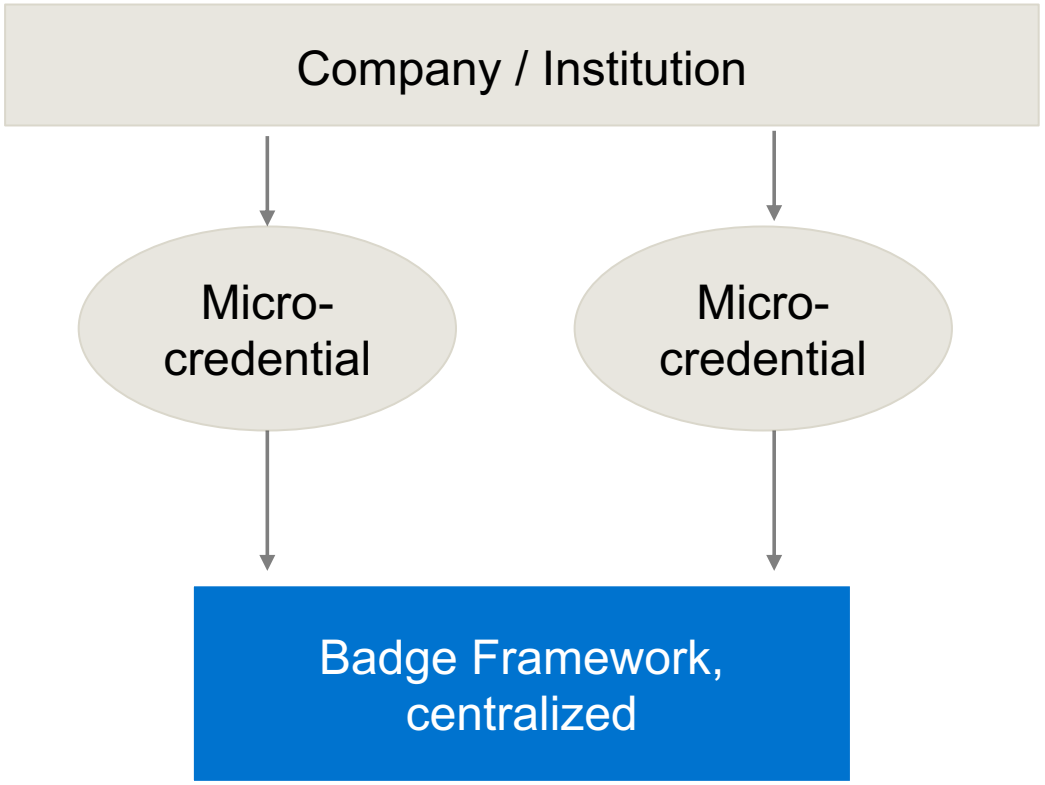


First research insights

Macro-credentialing vs. Micro-credentialing



Blockchain solution (Bitcoin, Ethereum, Own implementation) [2], [3]



Mozilla Open Badge Infrastructure, Purdue Passport etc. [4]

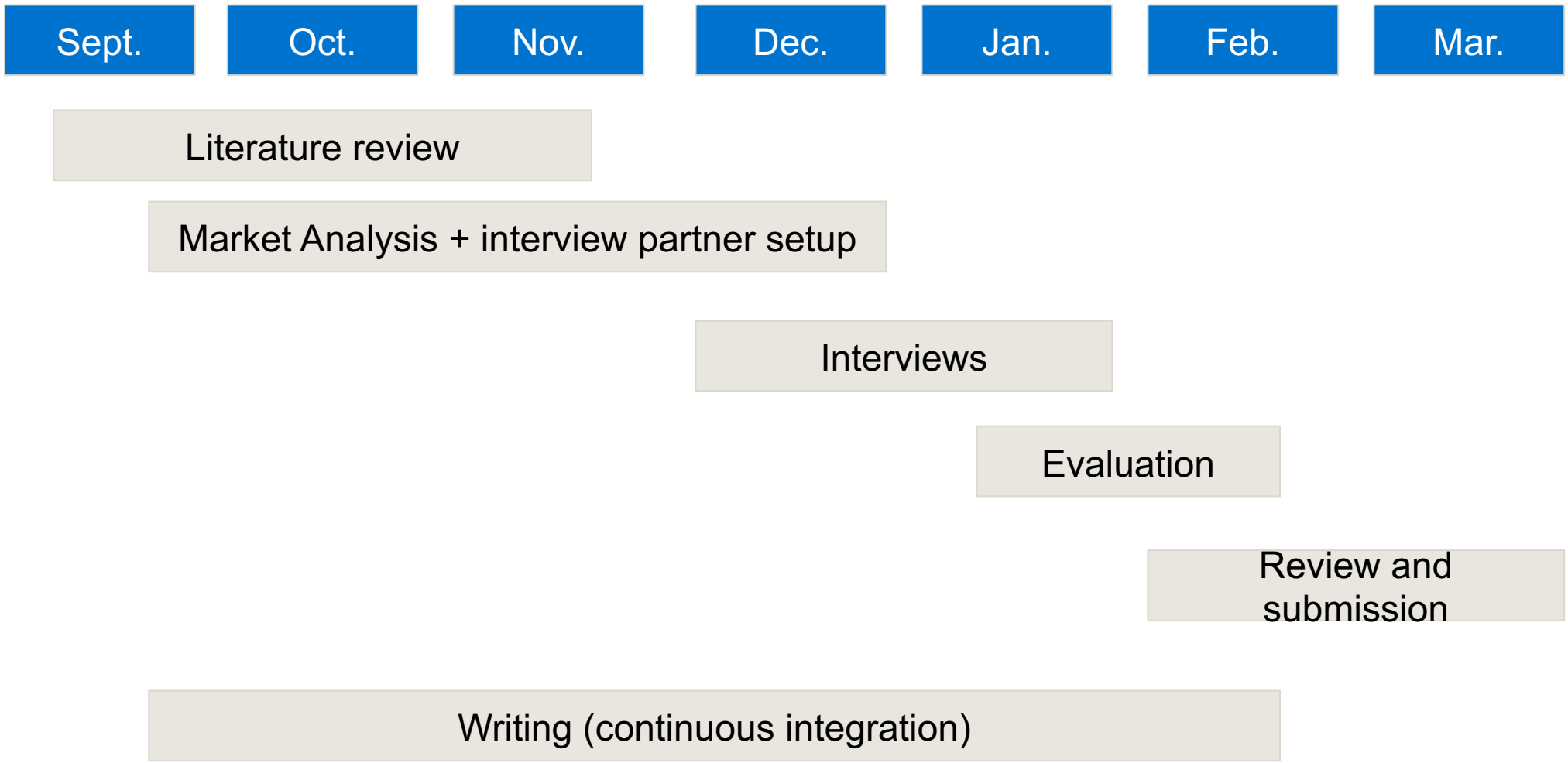
First research insights

- Macro-credentials have tougher requirements, thus the blockchain is the current go-to solution [5]
- Blockchain Features according to [1]:
  - Tamper-proof
  - Distributed
  - Validation process included due to mining

However, there are also major challenges [1], [5] :

- How to handle privacy of data according to GDPR?
- Different document formats
- Which blockchain system is suited best? Is there a need to develop a new one?
- Merkle-Tree as navigation structure too complex

Timetable



References

[1] M. Jirgensons and J. Kapenieks, “Blockchain and the Future of Digital Learning Credential Assessment and Management,” *J. Teach. Educ. Sustain.*, vol. 20, no. 1, pp. 145–156, 2018.

[2] C. Turcu, C. Turcu, and I. Chiuchișan, “Blockchain and its Potential in Education,” 2018.

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[4] D. L. Randall, J. B. Harrison, and R. E. West, “Giving Credit Where Credit Is Due: Designing Open Badges for a Technology Integration Course,” *TechTrends*, vol. 57, no. 6, pp. 88–95, 2013.

[5] W. Yang, E. Aghasian, S. Garg, D. Herbert, L. Disiuta, and B. Kang, “A Survey on Blockchain-Based Internet Service Architecture: Requirements, Challenges, Trends, and Future,” *IEEE Access*, vol. 7, Neural Engineering Informatics, pp. 75845–75872, 2019.

B.Sc.

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