



Mahidol University



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IDENTIFYING SOFTWARE ENGINEERING CHALLENGES IN SOFTWARE SMES: A CASE STUDY IN THAILAND

INDUSTRY ACADEMIA PARTNERSHIP PROGRAMME
(IAPP) 18/19 NO. 74

SANER 2022 INDUSTRY TRACK



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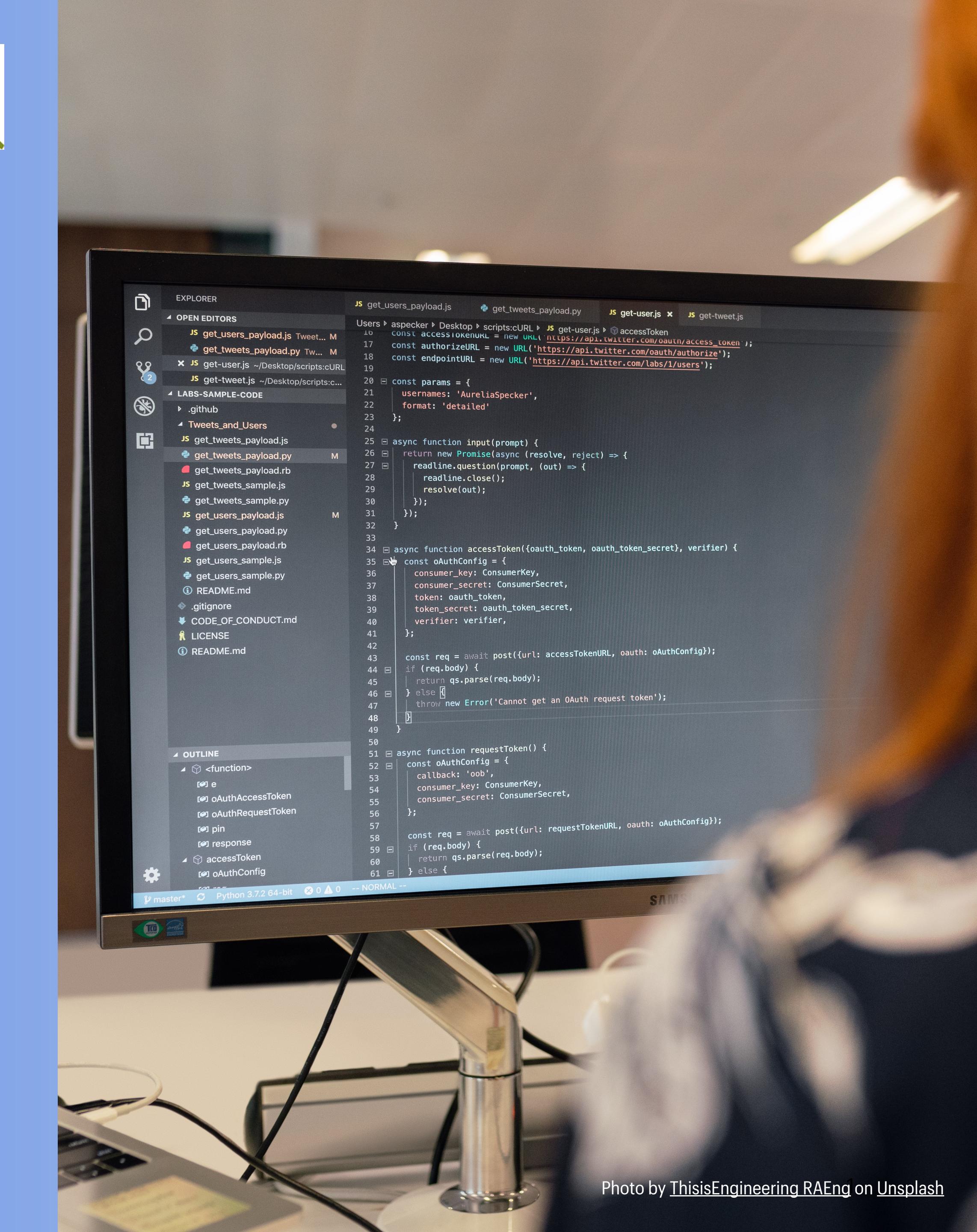


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SOFTWARE SMES (SSMES)

The main factors determining whether an enterprise is an SME are *

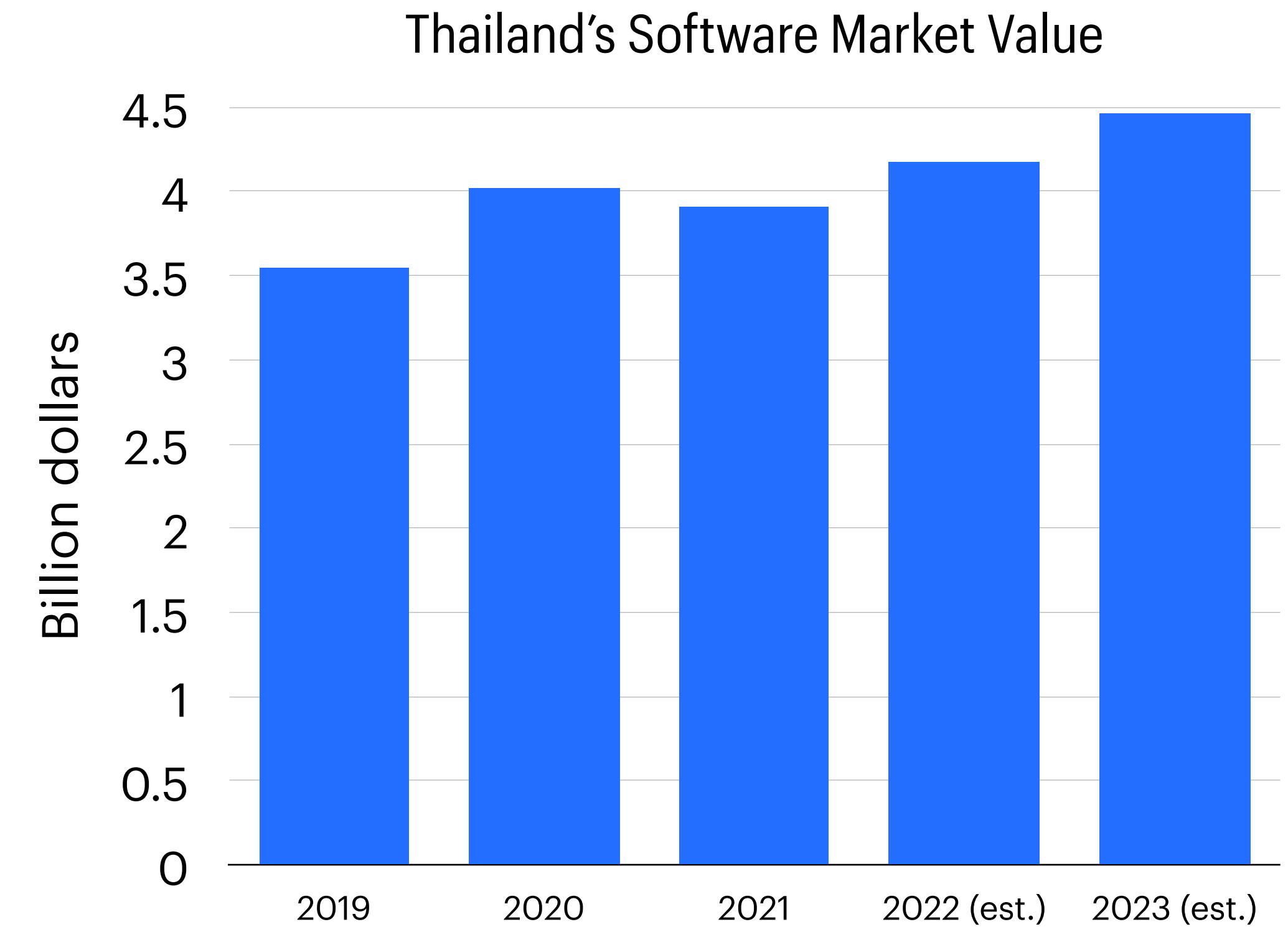
1. Staff headcount
2. Either turnover or balance sheet total

| Company Category | Staff headcount | Turnover | Balance sheet total |
|------------------|-----------------|----------|---------------------|
| Medium-sized | < 250 | ≤ € 50 m | ≤ € 43 m |
| Small | < 50 | ≤ € 10 m | ≤ € 10 m |
| Micro | < 10 | ≤ € 2 m | ≤ € 2 m |

SOFTWARE SMES (SSMES)

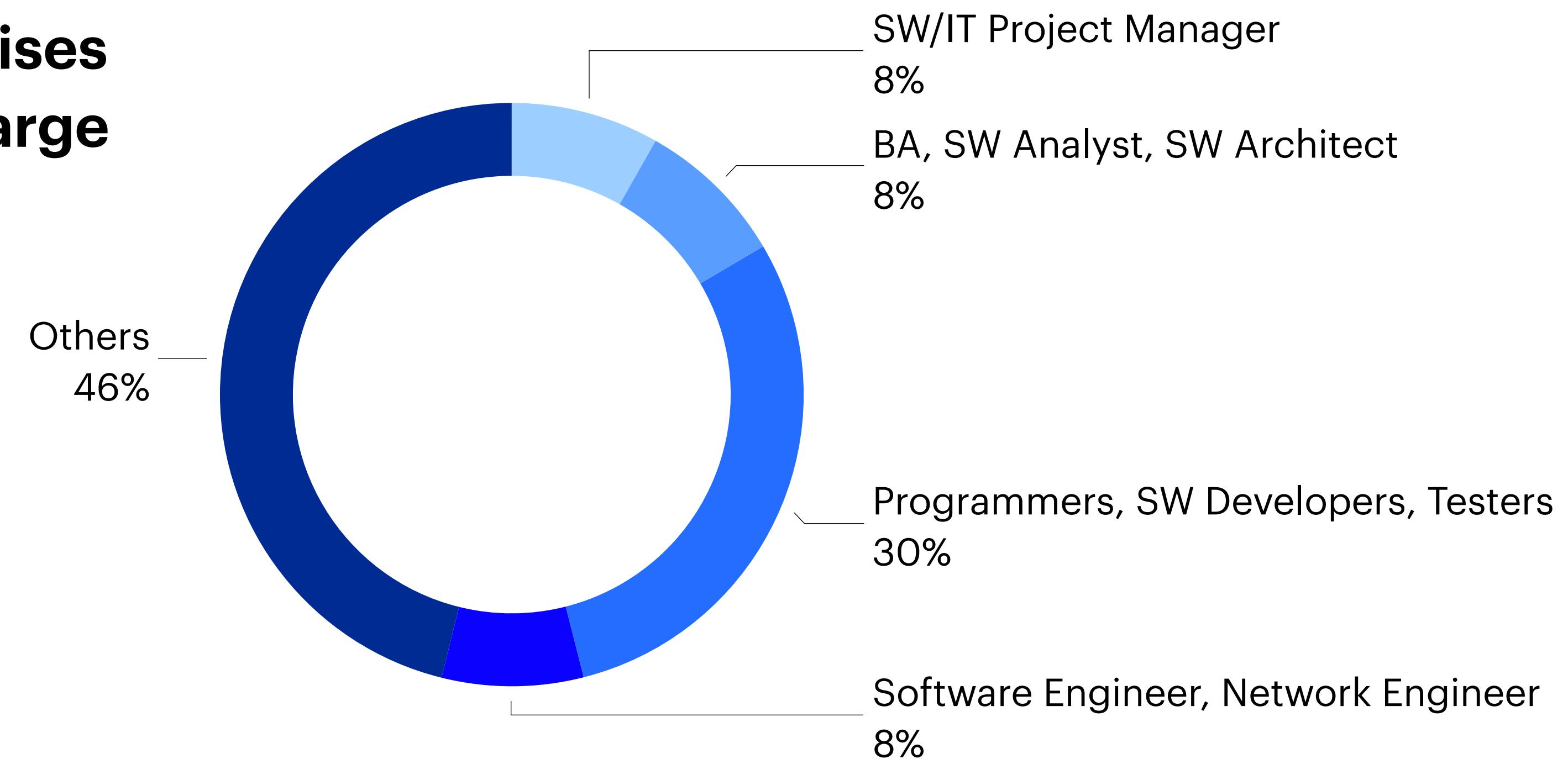
SSMEs including software startups are among the key drivers in software industry and important for a country's competitiveness and innovation (Larrucea et al., 2016) .

Thailand's software industry accounts for approx. \$4 billion in 2020 and 2021 (DEPA, 2021).



SOFTWARE SMES (SSMES)

The country's software sector comprises of over 8,000 software companies, large and small, with more than 100,000 employees (DEPA, 2021).



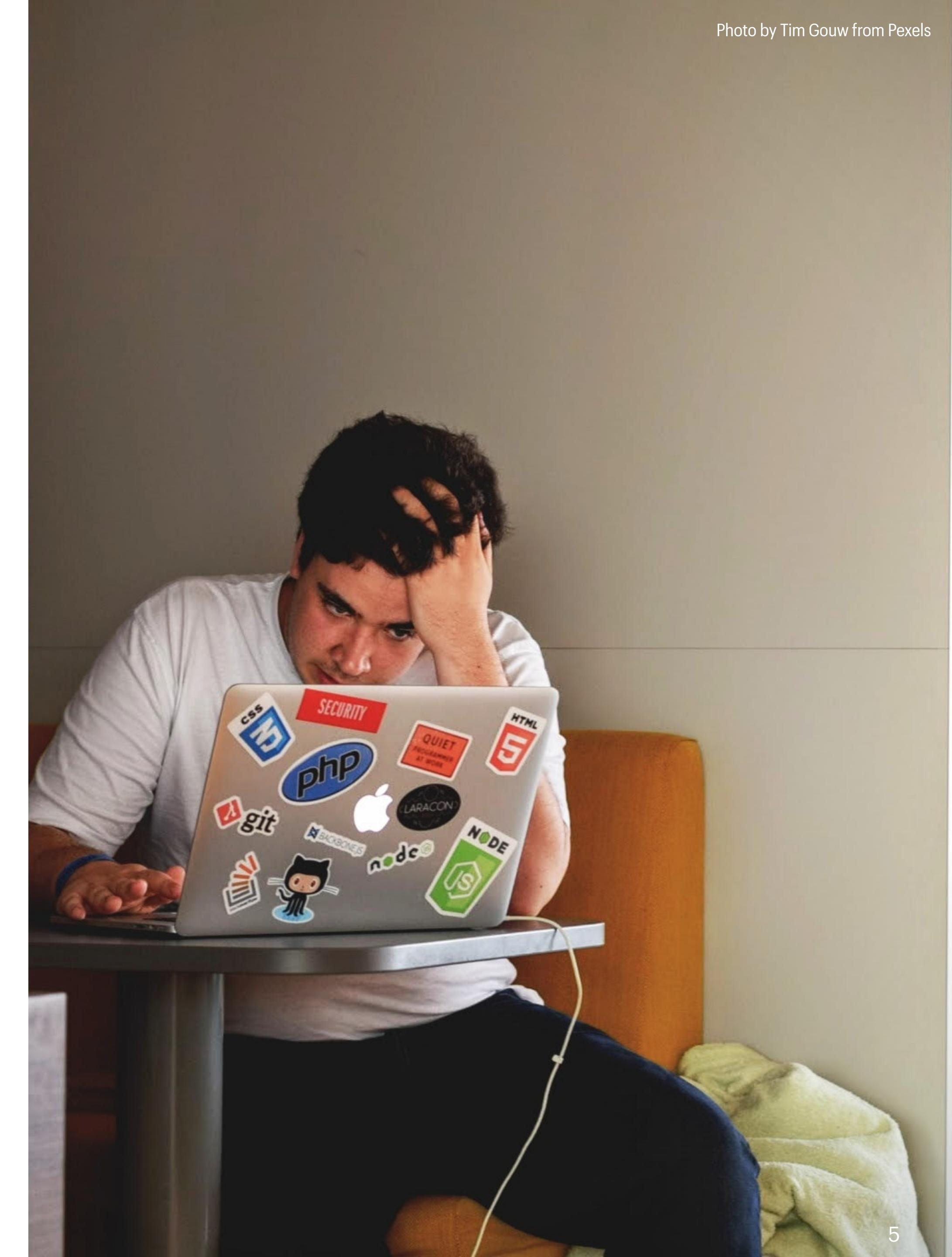
MAJOR WEAKNESSES OF SSMEs

An initial investigation (Sunetnanta et al., 2016) shows that major weaknesses of SSMEs in Thailand include

- Configuration management
- Quality assurance
- Project assessment and control

Rely heavily on manual tasks performed by their programmers.

T. Sunetnanta, S. Suwannaroj, and P. Sangpar, "ISO/IEC 29110 for Competitiveness - Challenges of Digital Cluster Development in Thailand," ISO/IEC JTC 1/SC 7 Software and Systems Engineering Working Group 24, Tech. Rep., August 2016.



GOAL OF THE STUDY

- 1. To investigate the software engineering challenges that specifically occur in SSMEs located in the Asian culture, especially in Thailand.**
- 2. To study their tool usage for future recommendation of automated software engineering (ASE) tools and techniques.**

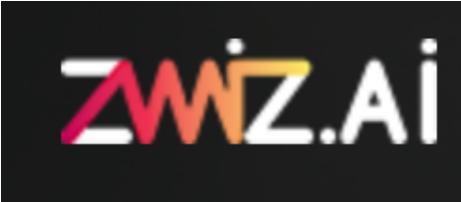


RESEARCH QUESTIONS

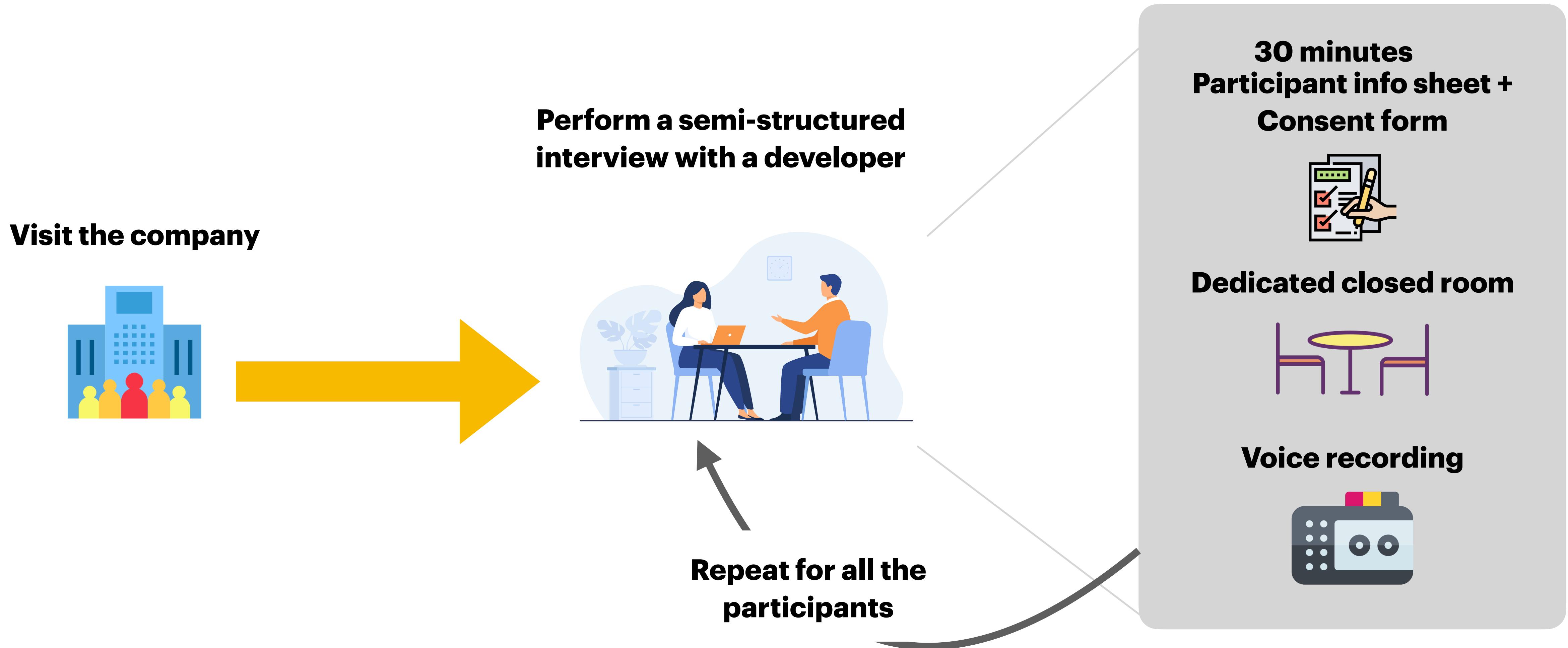
RQ1 (SE Challenges): What are the challenges in the SSMEs' day-to-day software development?

RQ2 (Current Practices): What tools are being used?

THE STUDIED COMPANIES

| Company | Products | No. of Developers |
|--|-----------------------|-------------------|
| Company A | E-Learning platform | 15 |
|  | Web and mobile games | 10 |
|  | Enterprise solutions | 40 |
|  | Enterprise AI chatbot | 6 |

METHODOLOGY: SEMI-STRUCTURED INTERVIEWS



INTERVIEW PARTICIPANTS

Company A



👤 CTO (6 yrs)

👤 Developer (2 yrs)

👤 Senior Developer (1 yr)

👤 COO (6 years)

👤 Developer (1.5 yrs)

👤 Managing Director & Technical Lead (11 yrs)

👤 Lead Developer (6 yrs)

👤 Project Manager (5 yrs)

👤 Developer (3 yrs)

👤 Developer (1 yr)



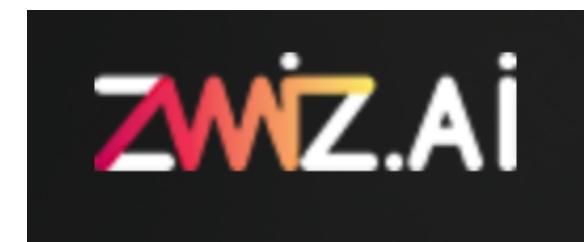
👤 CTO (5 yrs)

👤 Senior Developer (4 yrs)

👤 Senior Developer (2 yrs)

👤 Developer (2 yrs)

👤 Developer (0.7 yr)



👤 CTO (2 yrs)

👤 Developer (2 yrs)

👤 Developer (1 yr)

👤 Developer (0.25 yr)

👤 Developer (0.33 yr)

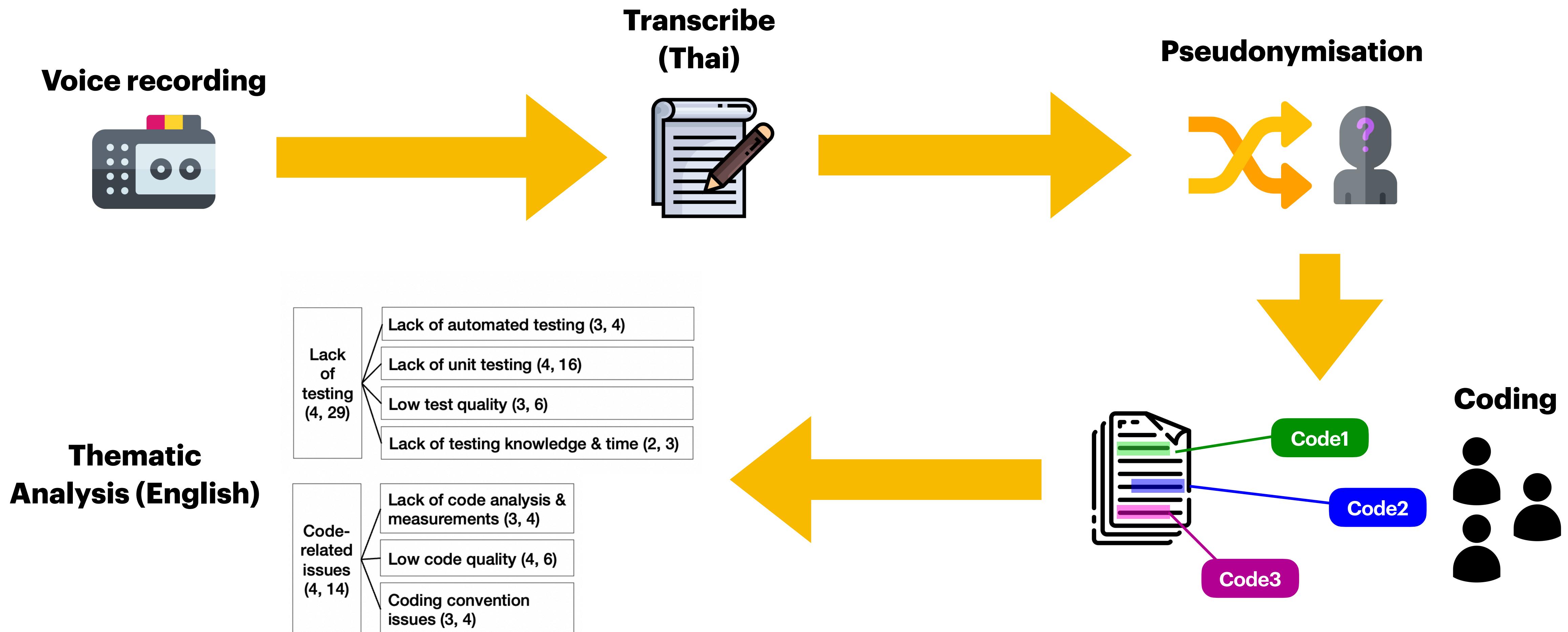
INITIAL QUESTIONS USED IN THE INTERVIEWS

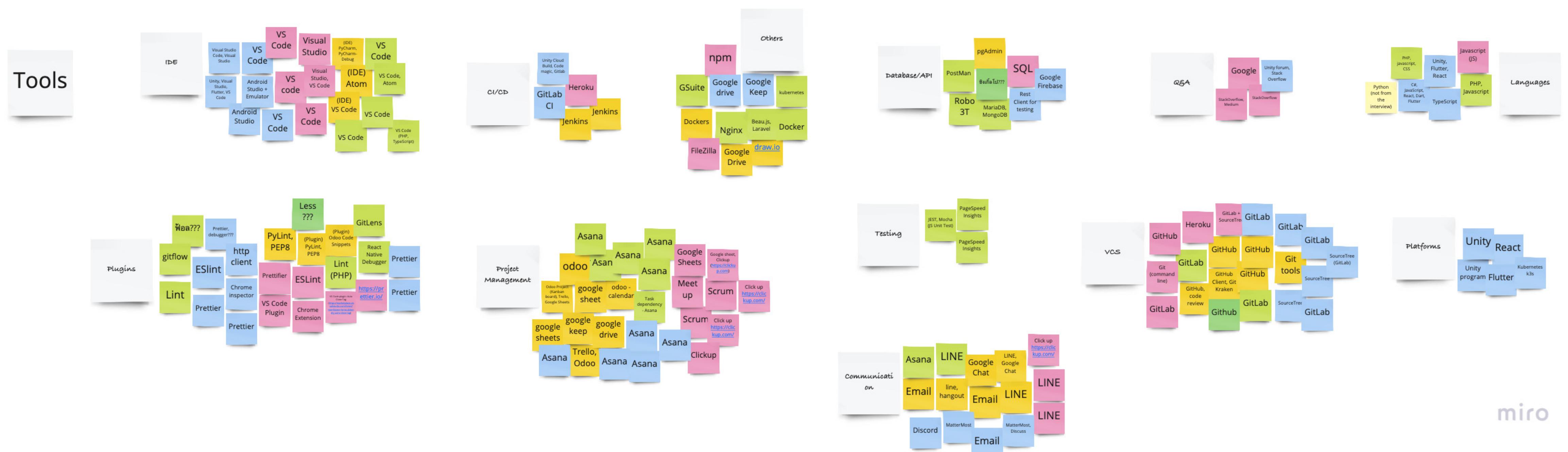
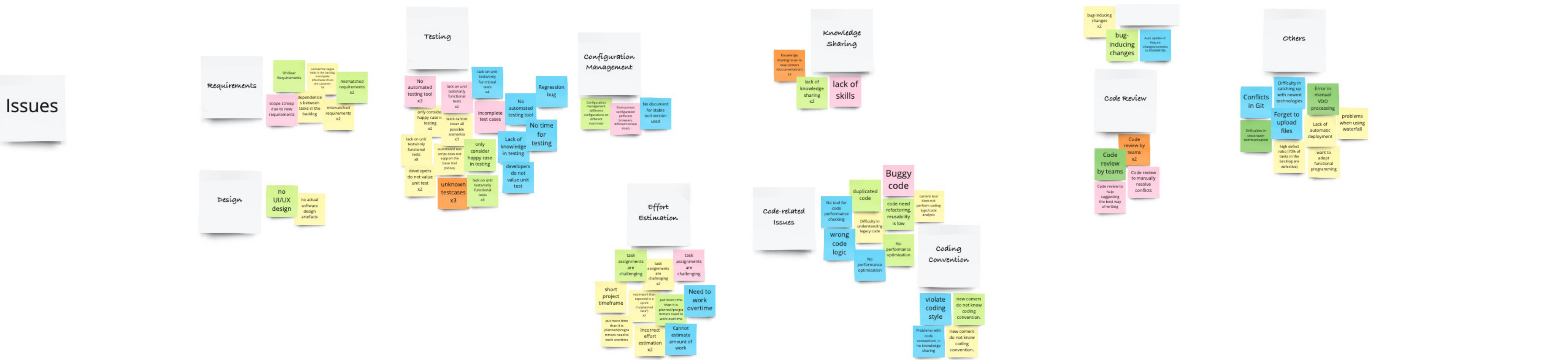
| | |
|------------|---|
| | <p>Please explain your role at the company. How long have you been working at the company?</p> |
| RQ1 | <p>Please explain your day-to-day activity. How do you develop the software product? What works well in your company's software development? What would you suggest to improve?</p> |
| RQ2 | <p>Please explain the tools you use during software development.</p> |

THEMATIC ANALYSIS

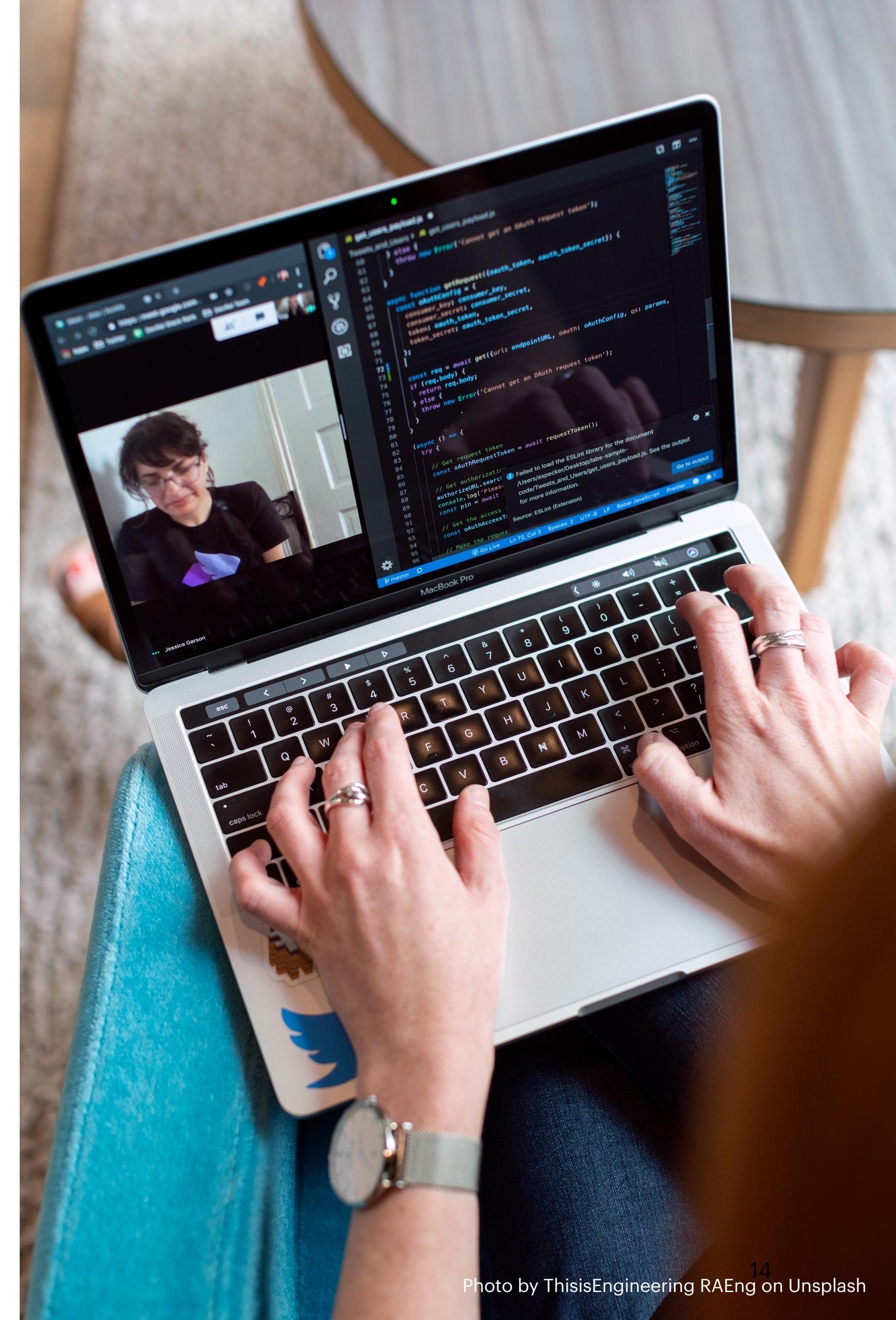
(Braun and Clarke, 2006)

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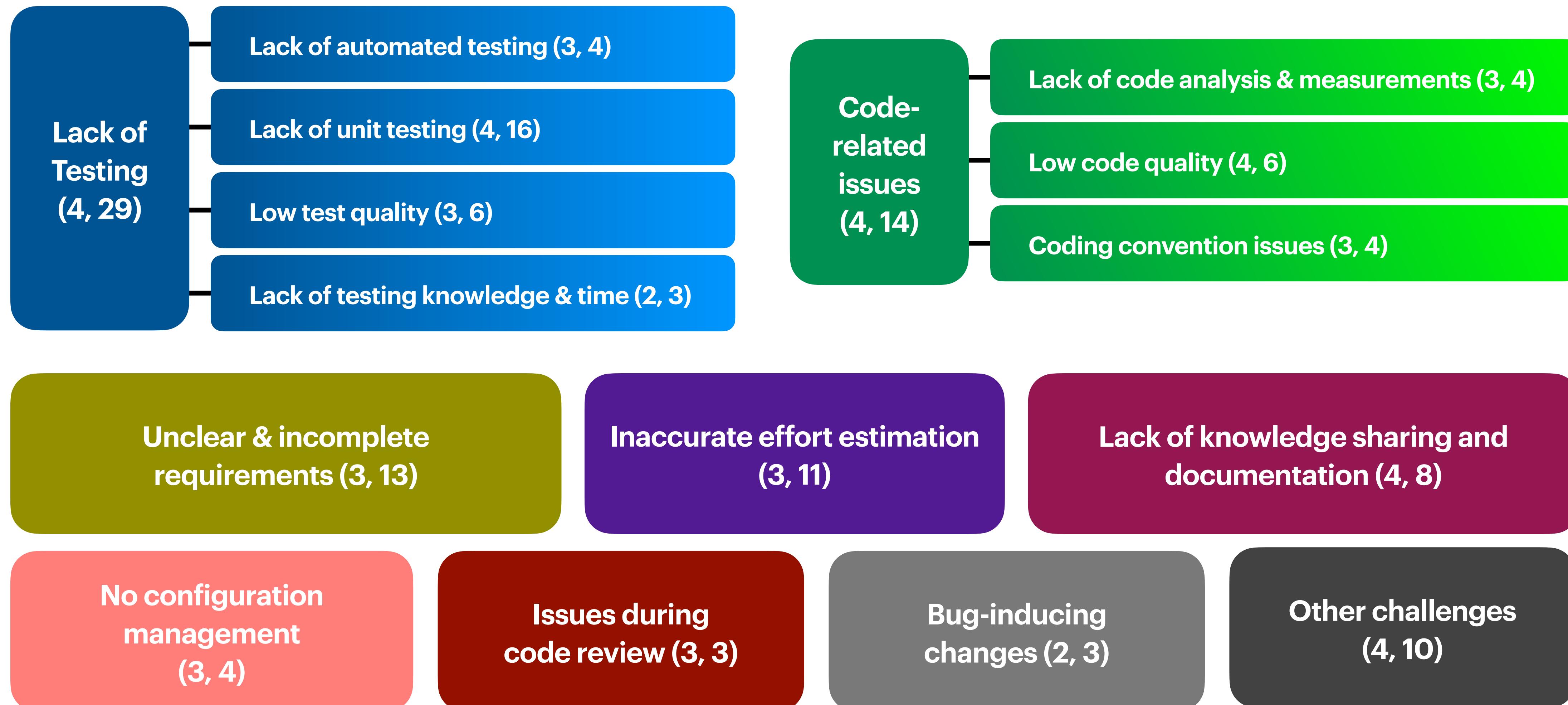




RESULTS



RQ1: IDENTIFIED SE CHALLENGES



RQ1: IDENTIFIED SE CHALLENGES

SSMEs in Thailand are facing several software engineering challenges in their day-to-day software development.

The four main challenges include lack of testing, code-related issues, unclear and incomplete requirements, and inaccurate effort estimation

RQ2: IDENTIFIED CURRENT PRACTICES

1. Lack company-wide adoption of unit testing frameworks.
2. Code structure and formatting are locally enforced.
3. Mixed use of project management tools.
4. Mixed use of communication tools.



LESSONS LEARNED

Before supporting SSMEs to adopt ASE tools and techniques, one must first ensure that the SSMEs have adopted contemporary best practices in software engineering.

Software engineering research should engage SSMEs more to facilitate the adoption of automated software engineering tools and techniques.

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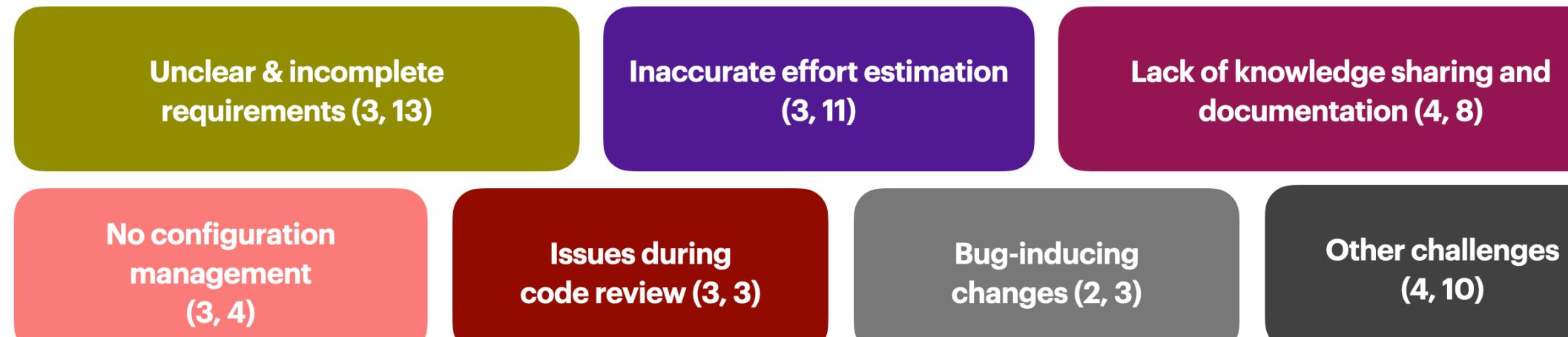
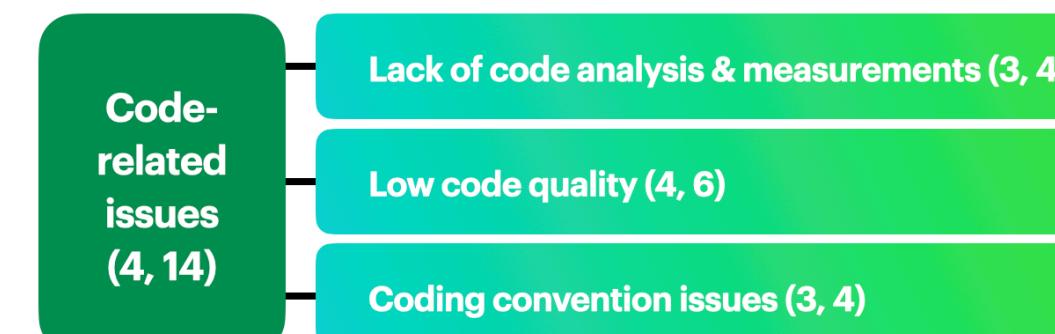
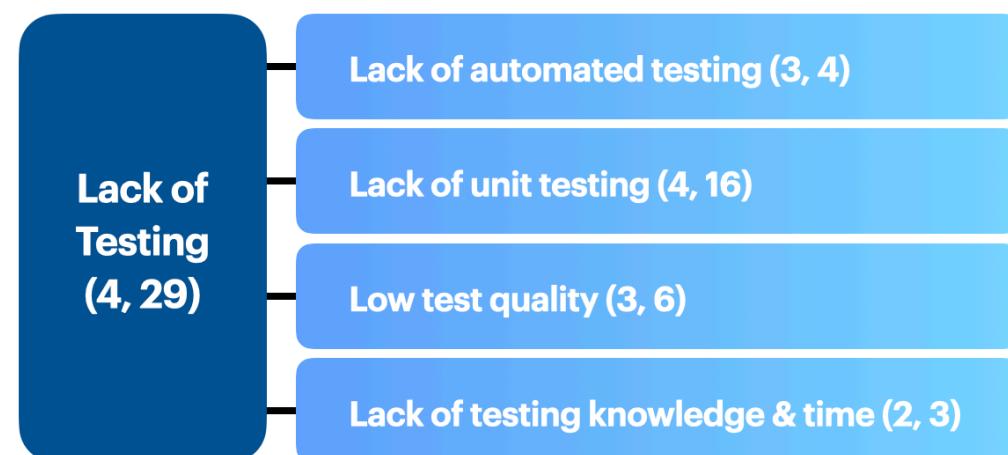
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| COO (6 years) | Developer (3 yrs) | Developer (2 yrs) | Developer (0.25 yr) |
| Developer (1.5 yrs) | Developer (1 yr) | Developer (0.7 yr) | Developer (0.33 yr) |



RQ1: IDENTIFIED SE CHALLENGES



RQ2: IDENTIFIED CURRENT PRACTICES

Some of the SSMEs have mixed use of dedicated project management and general purpose tools such as spreadsheets to manage their projects or personal chat applications for work.

Some tools are being used or known only at the individual level such as code formatters or linters, which may cause inconsistencies at the company level.