



Mahidol University



SERU



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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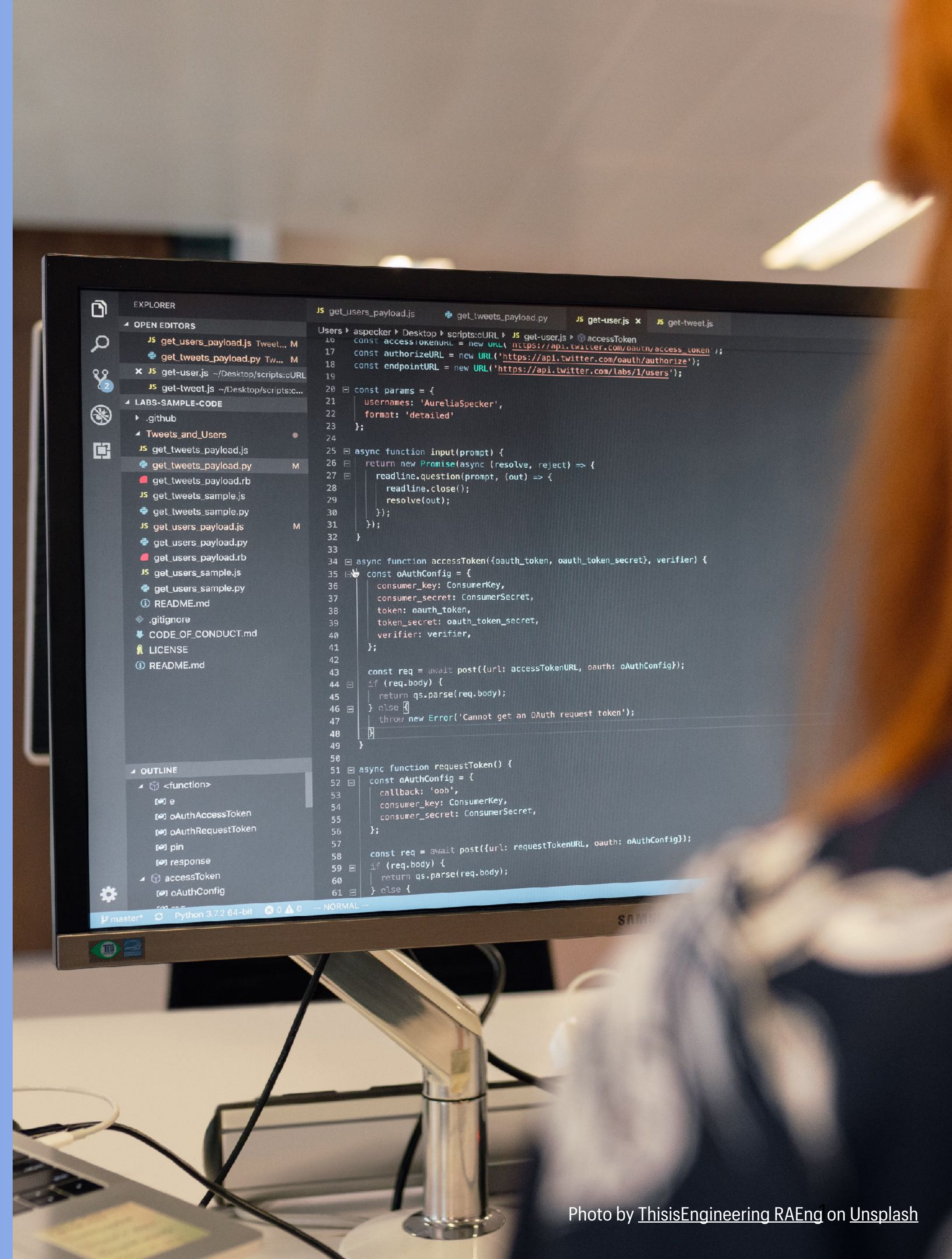


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SOFTWARE SMES (SSMES)

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

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

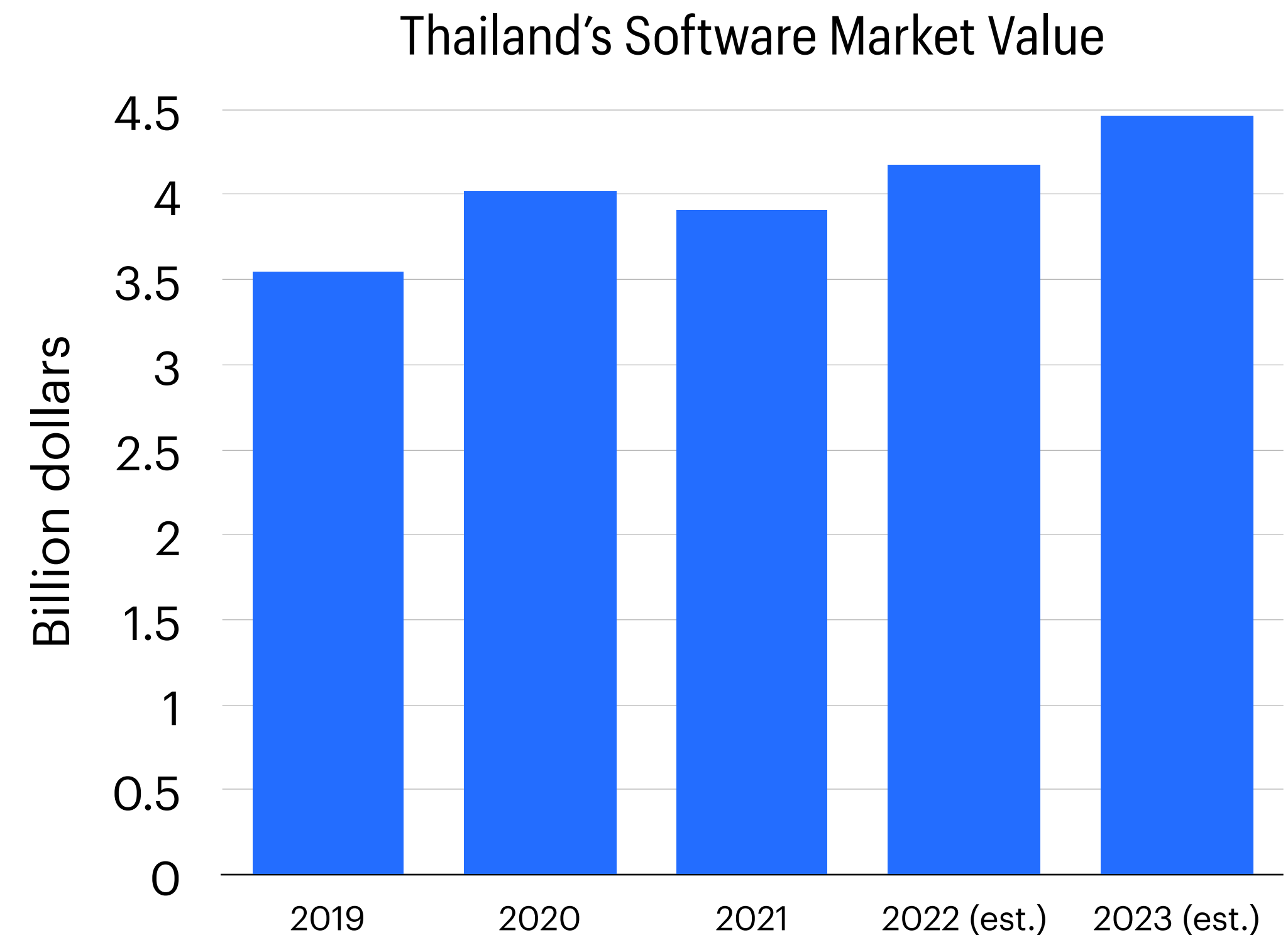
Company Category	Staff headcount	Turnover	Balance sheet total
Medium-sized	< 250	≤ € 50 m	≤ € 43 m
Small	< 50	≤ € 10 m	≤ € 10 m
Micro	< 10	≤ € 2 m	≤ € 2 m

* Reference: https://ec.europa.eu/growth/smes/sme-definition_en

SOFTWARE SMES (SSMES)

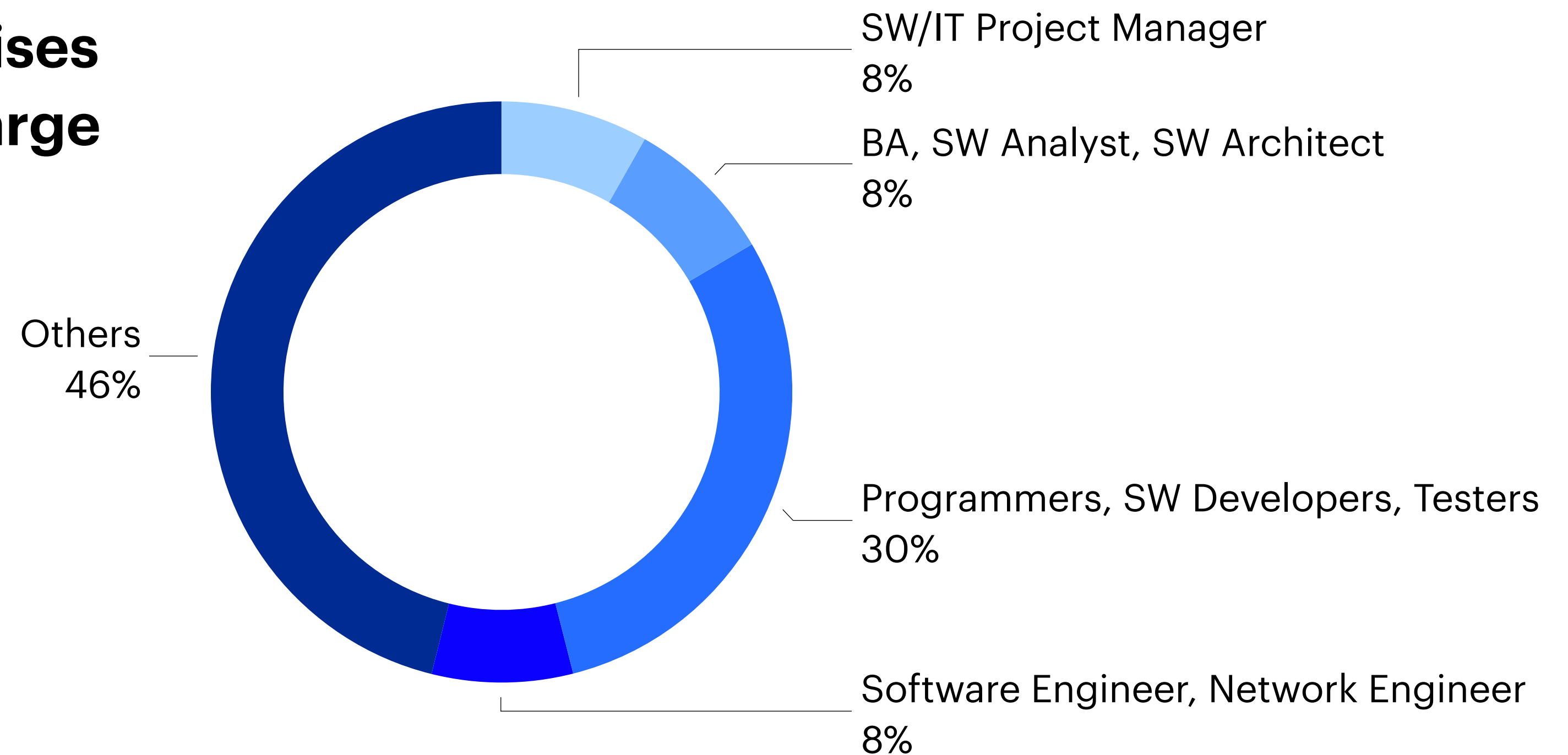
SSMEs including software startups are among the key drivers in software industry and important for a country's competitiveness and innovation (Larrucea et al., 2016).

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

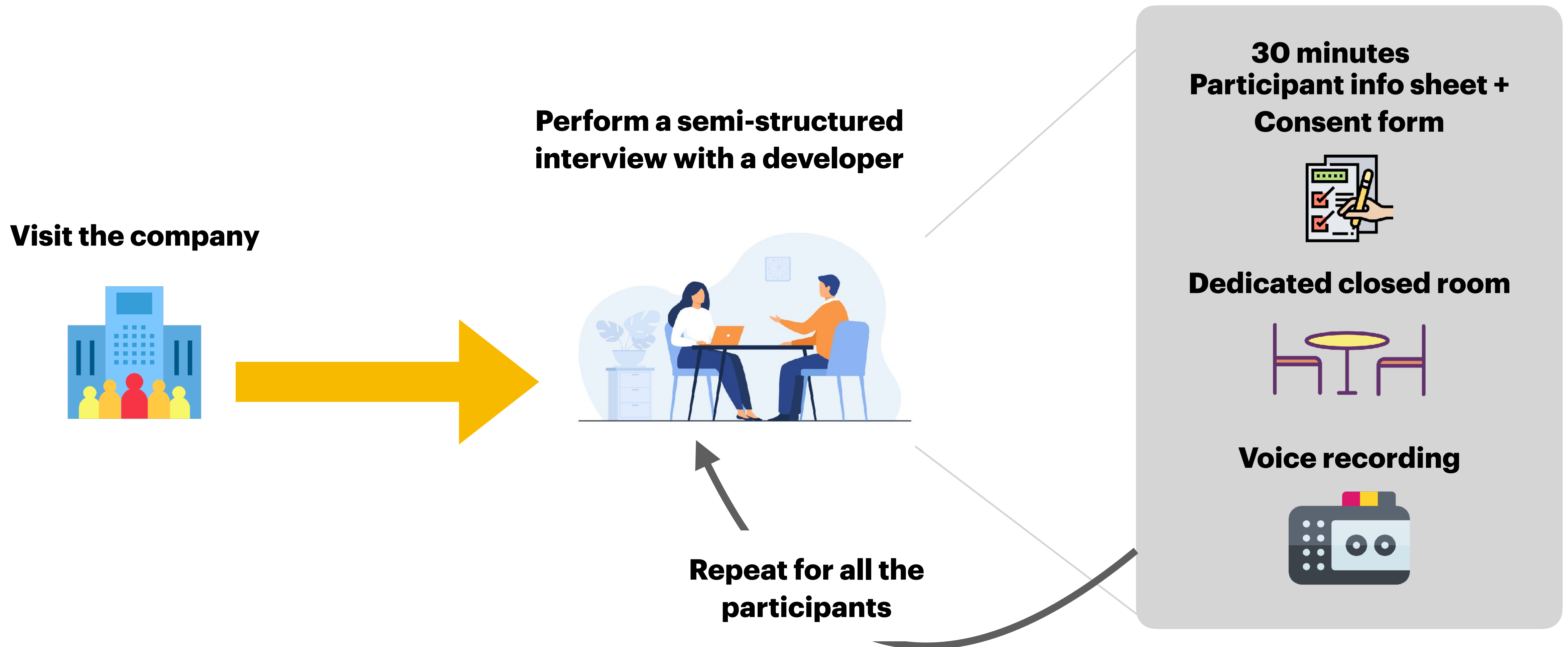
RQ1 (SE Challenges): What are the challenges in the SSMEs' day-to-day software development?

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)



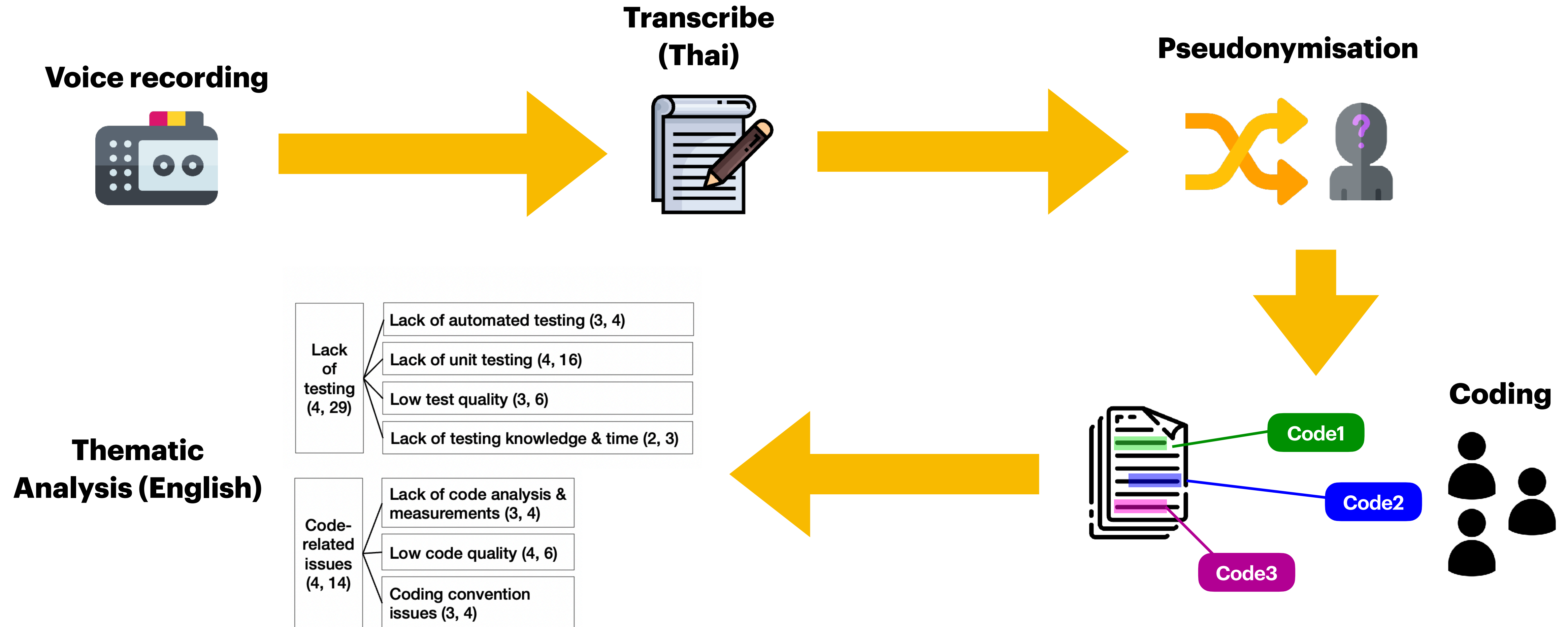
-  CTO (2 yrs)
-  Developer (2 yrs)
-  Developer (1 yr)
-  Developer (0.25 yr)
-  Developer (0.33 yr)

INITIAL QUESTIONS USED IN THE INTERVIEWS

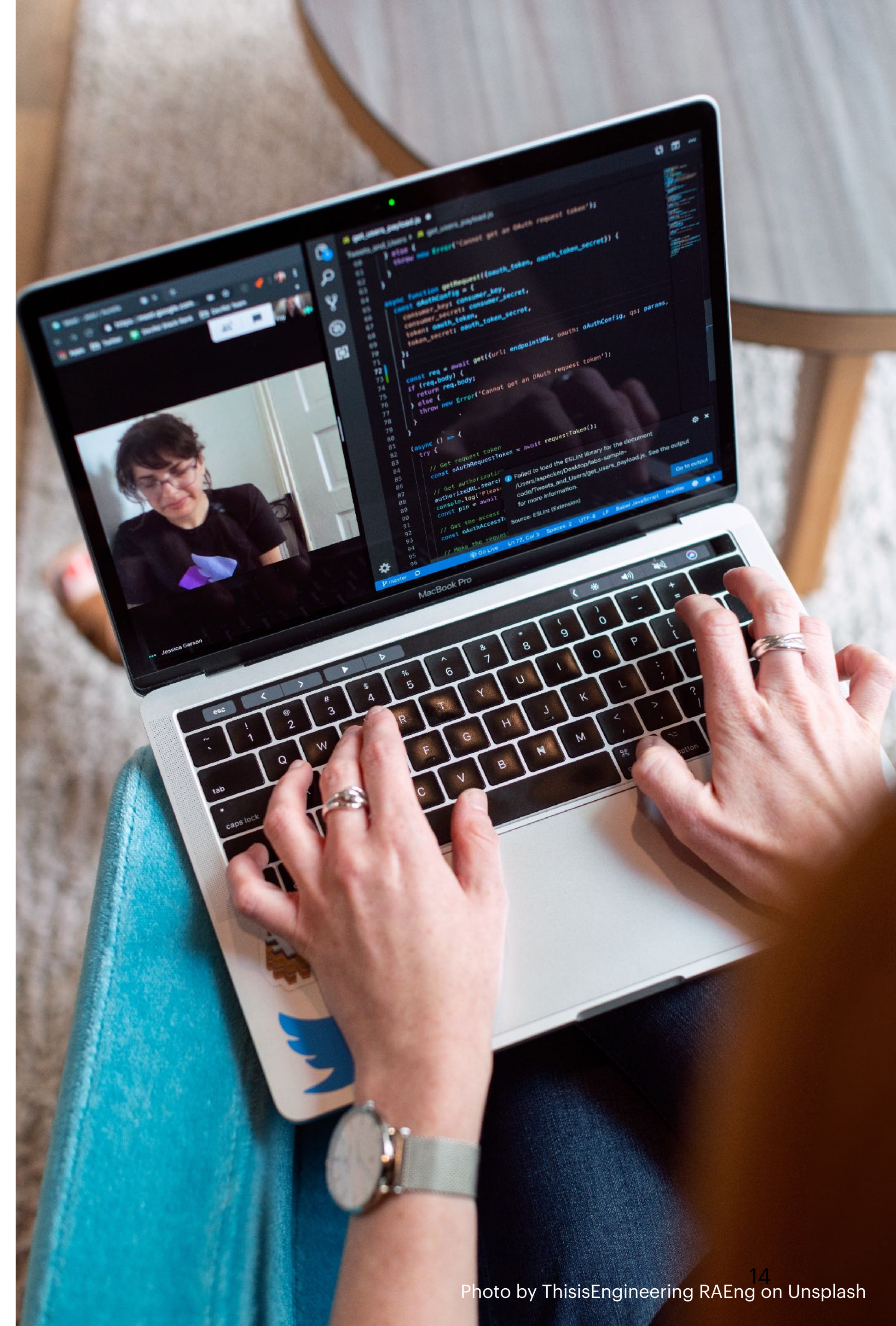
	<p>Please explain your role at the company. How long have you been working at the company?</p>
RQ1	<p>Please explain your day-to-day activity. How do you develop the software product? What works well in your company's software development? What would you suggest to improve?</p>
RQ2	<p>Please explain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

THEMATIC ANALYSIS (Braun and Clarke, 2006)

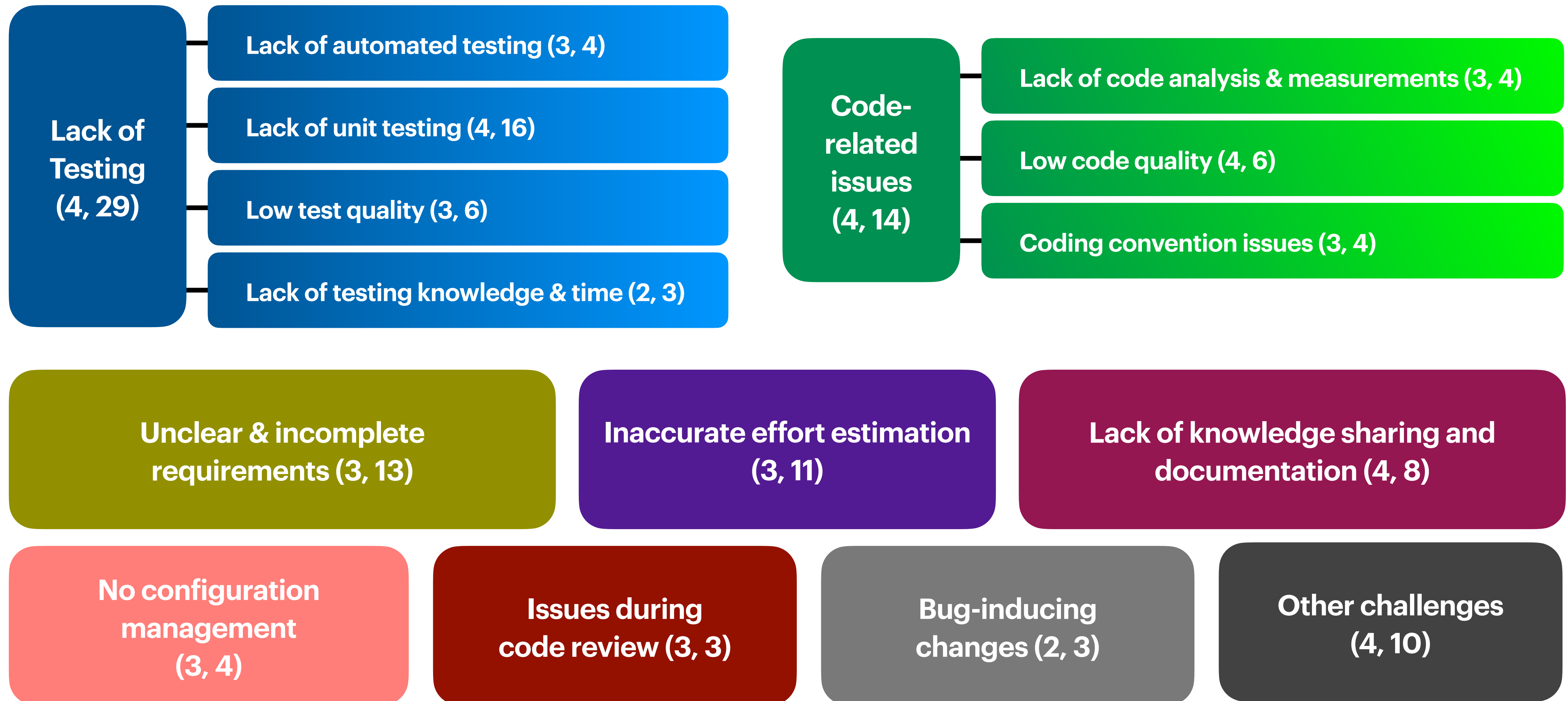
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RESULTS



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

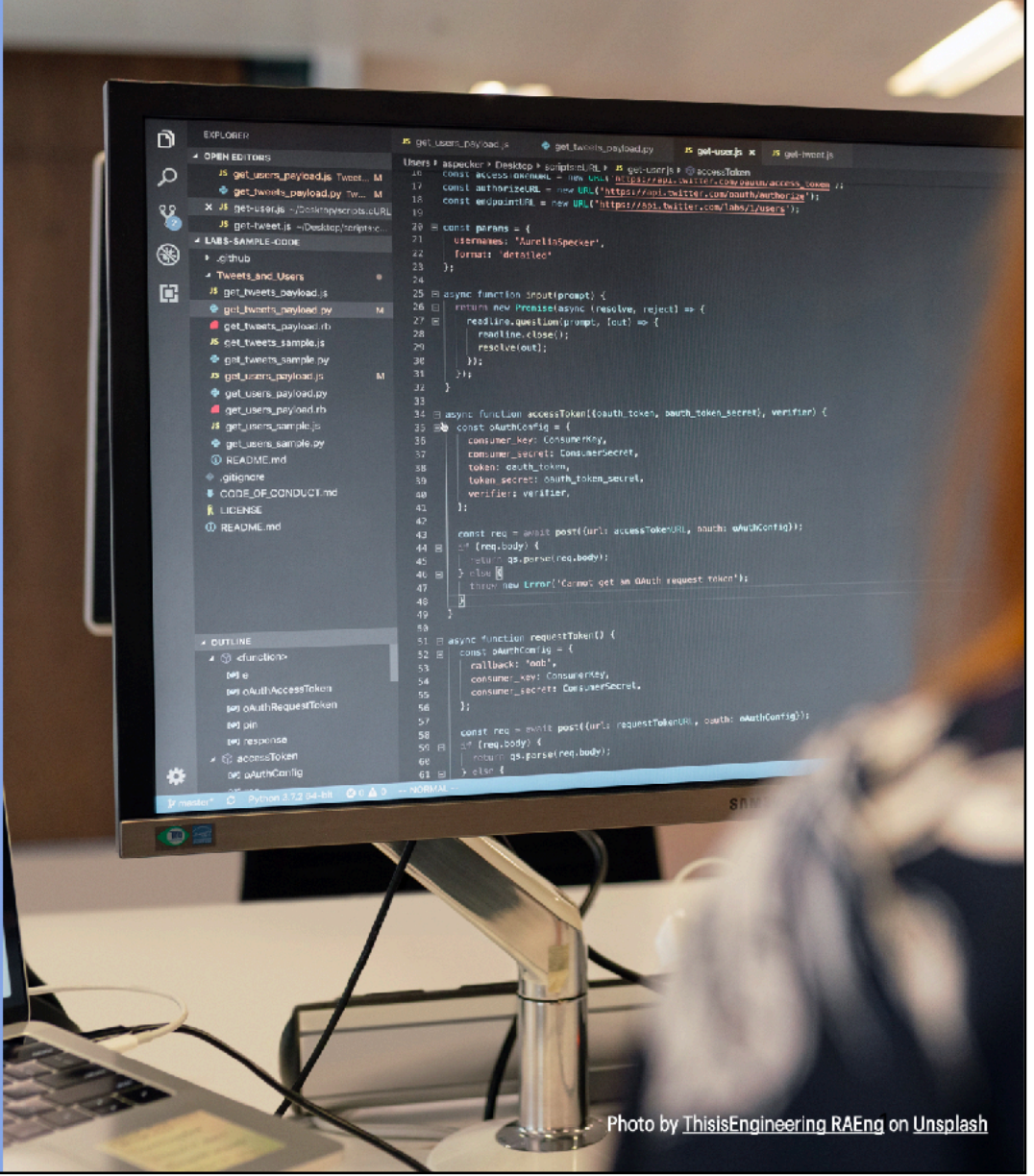
Before supporting SSMEs to adopt ASE tools and techniques, one must first ensure that the SSMEs have adopted contemporary best practices in software engineering.

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

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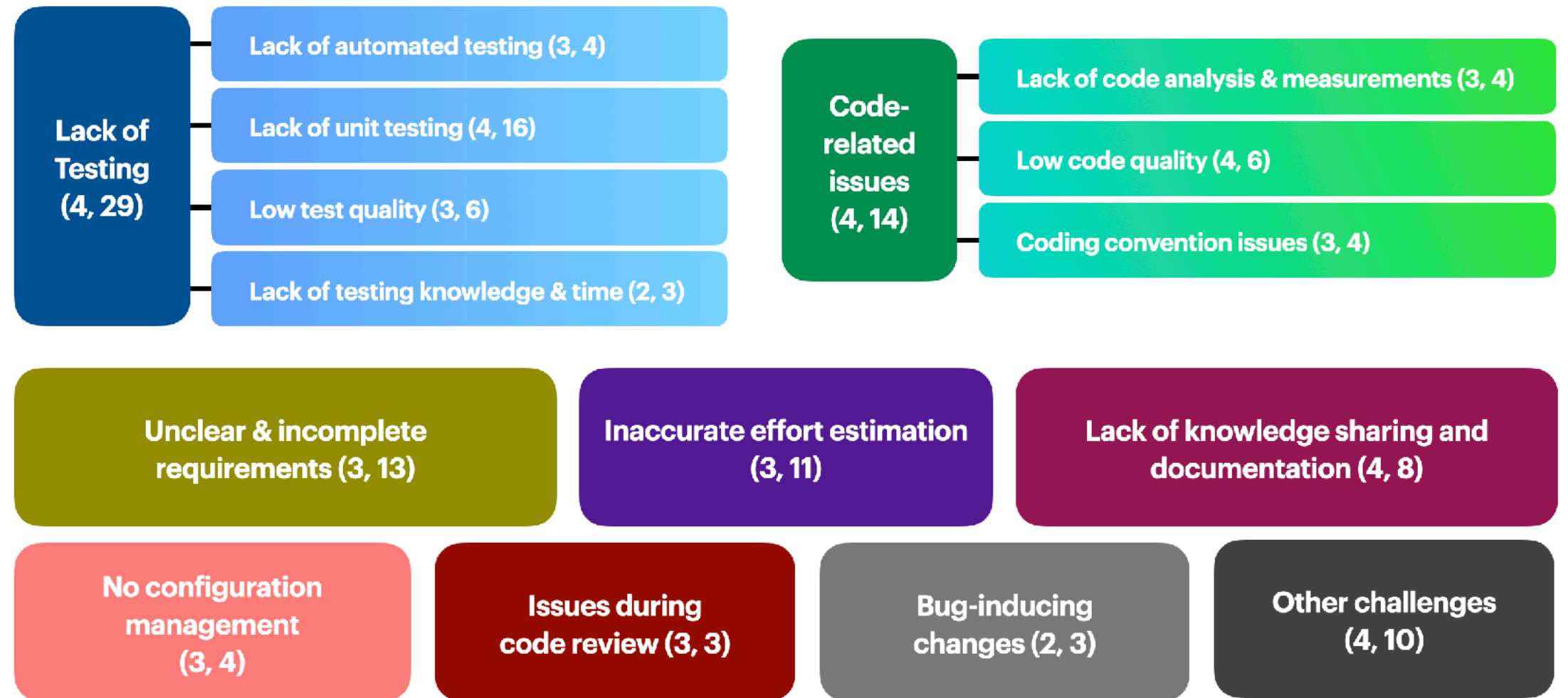
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INTERVIEW PARTICIPANTS

Company A	ProGaming	roots	ZWZ.AI
CTO (6 yrs)	Managing Director & Technical Lead (11 yrs)	CTO (5 yrs)	CTO (2 yrs)
Developer (2 yrs)	Lead Developer (6 yrs)	Senior Developer (4 yrs)	Developer (2 yrs)
Senior Developer (1 yr)	Project Manager (5 yrs)	Senior Developer (2 yrs)	Developer (1 yr)
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.