

Understanding **Self-Efficacy** in the Context of Software Engineering

A Qualitative Study in the Industry

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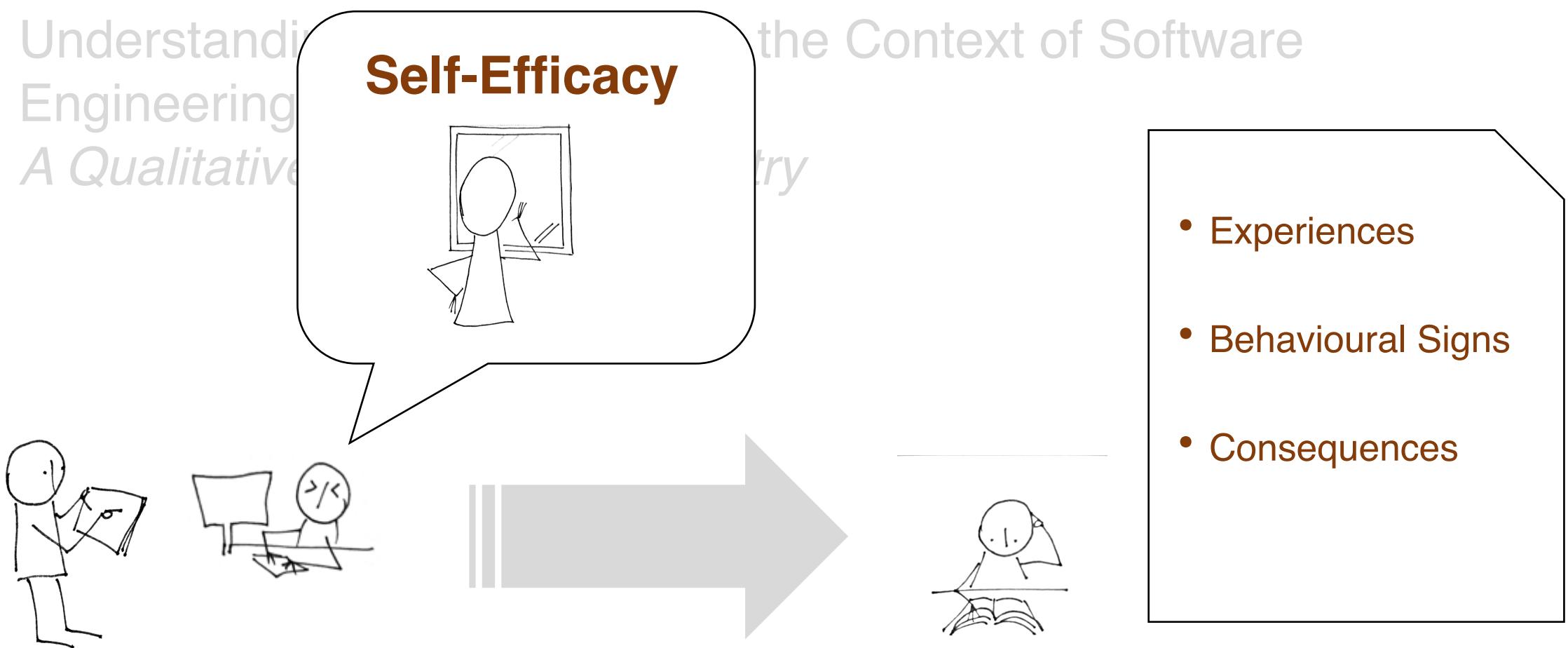
Understanding Engineering A Qualitative Study

the Context of Software



31 Interviews
Full time remote developers

Understanding Engineering A Qualitative Study



31 Interviews
Full time remote developers

Thematic Analysis



“

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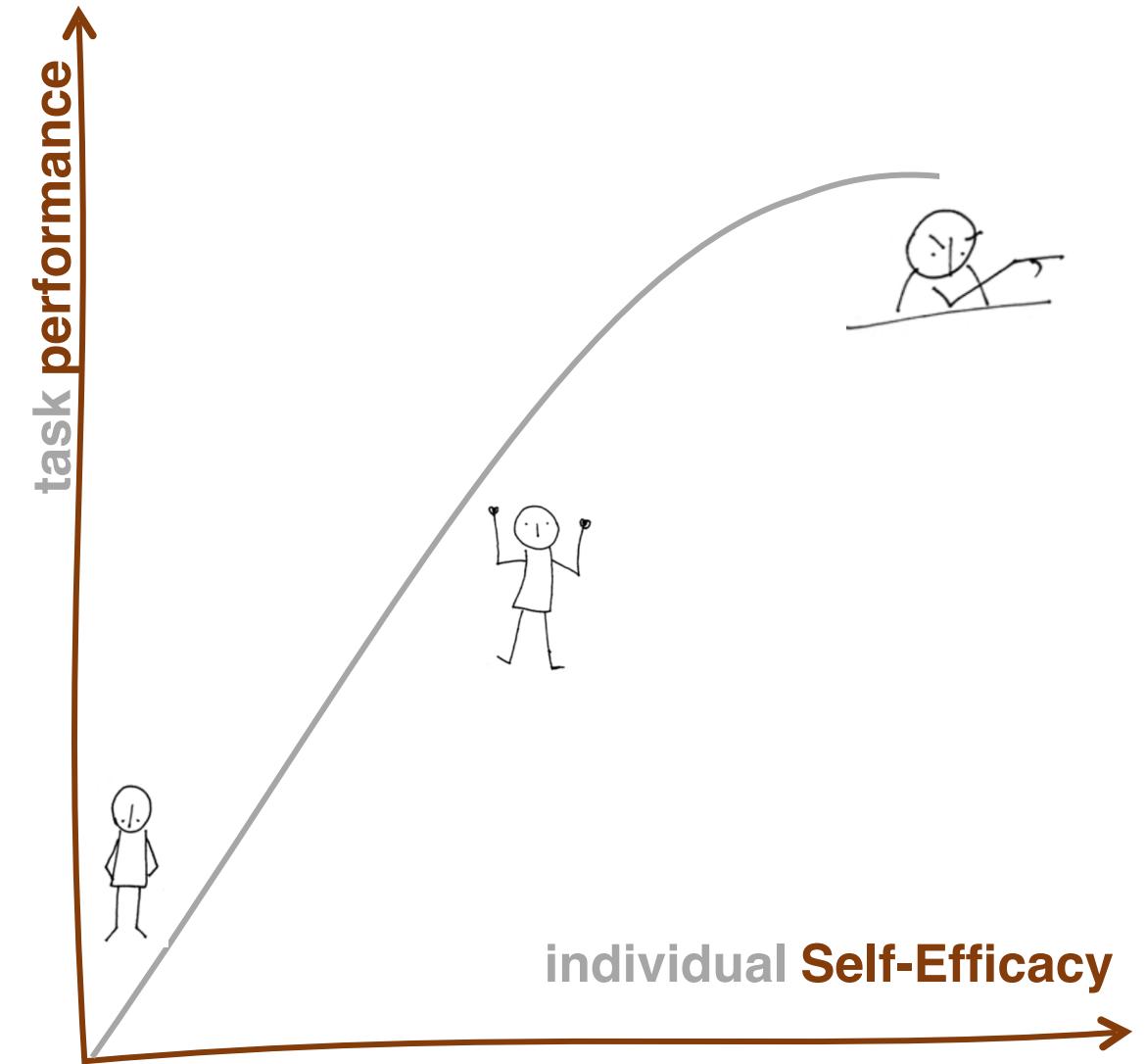
Self-Efficacy refers to how much an individual believes that s/he is capable of performing a specific task.

Albert Bandura. 1977. Self-efficacy: toward a unifying theory of behavioral change. Psychological review 84, 2 (1977), 191

Self-efficacy can change the perception of reality and how individuals behave

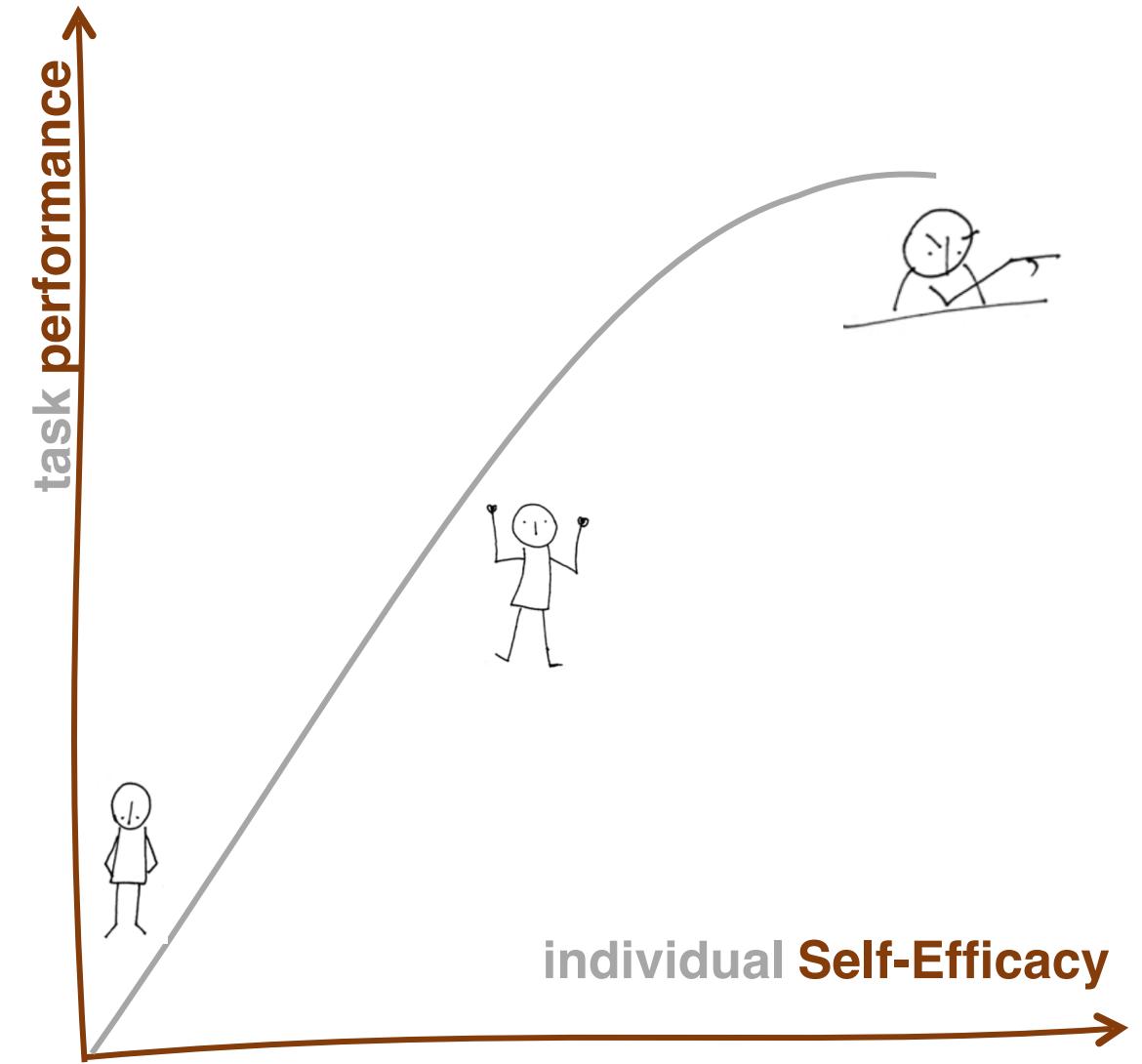
Self-efficacy can help to predict one's behavior and also one's performance

When a developer assesses that s/he is able to finish all the tasks by the end of the week, this developer is exercising their self-efficacy.

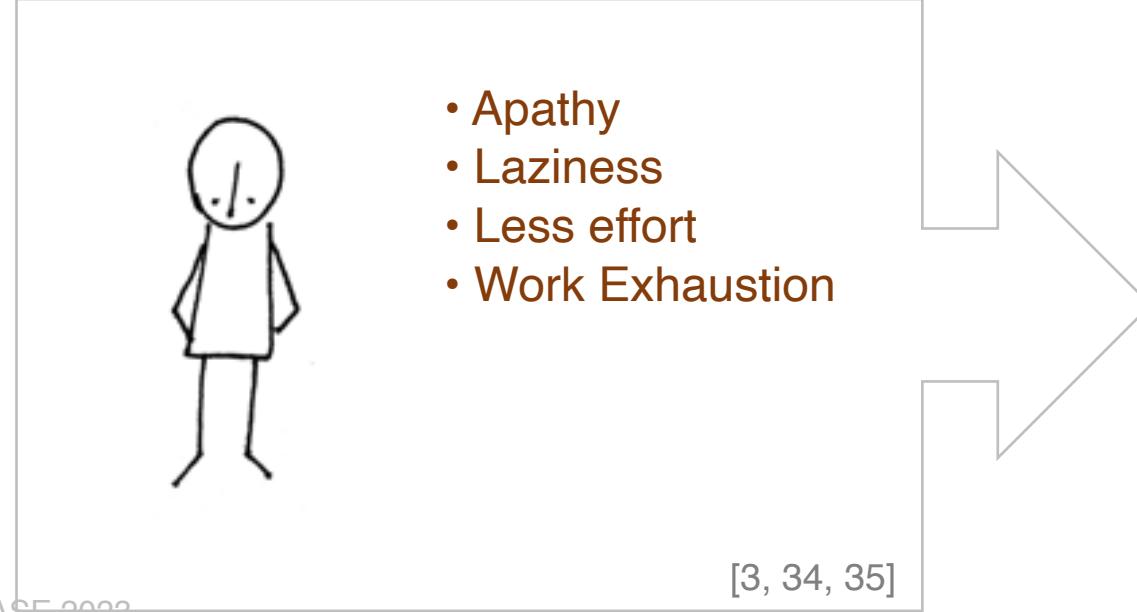


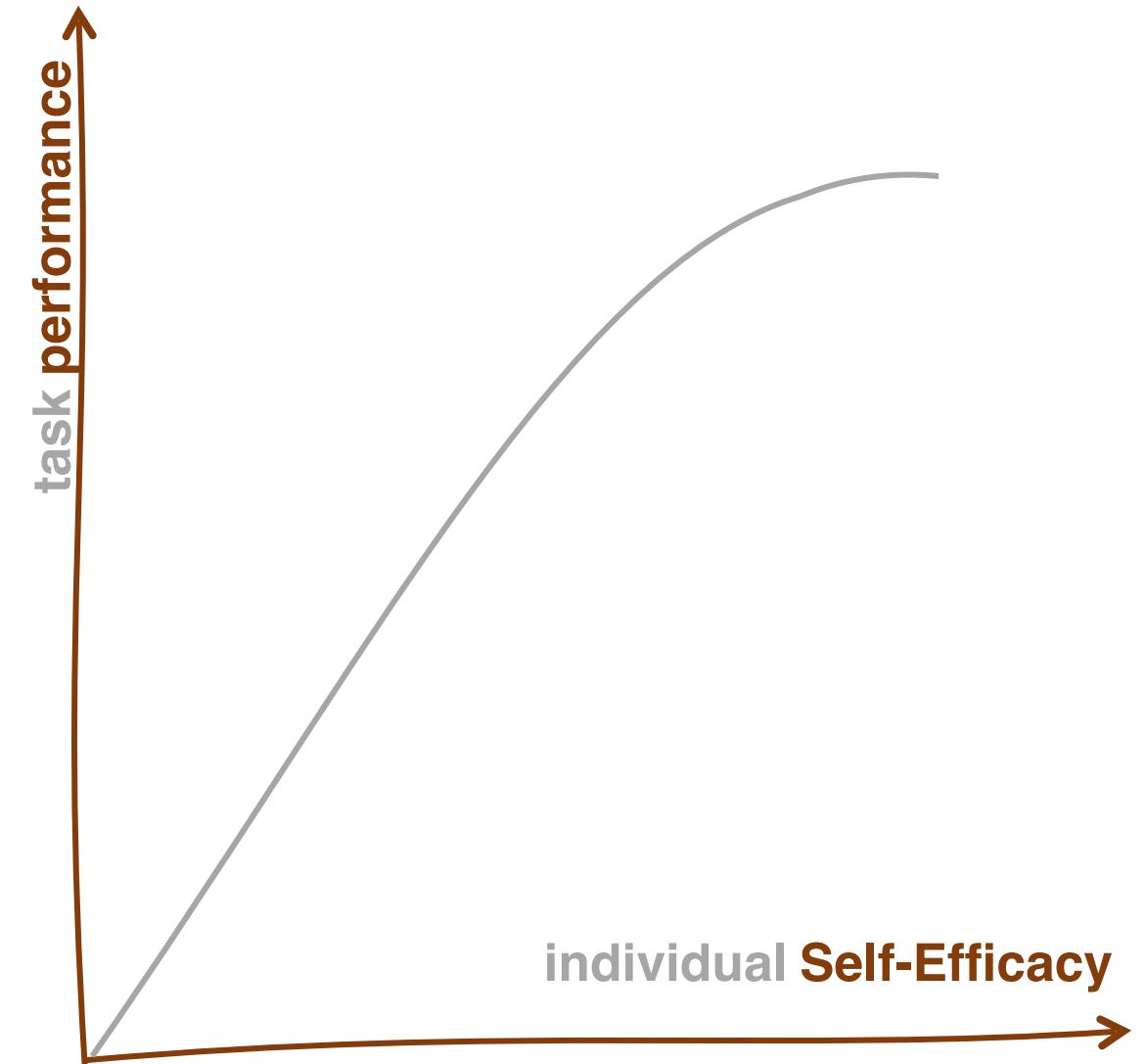
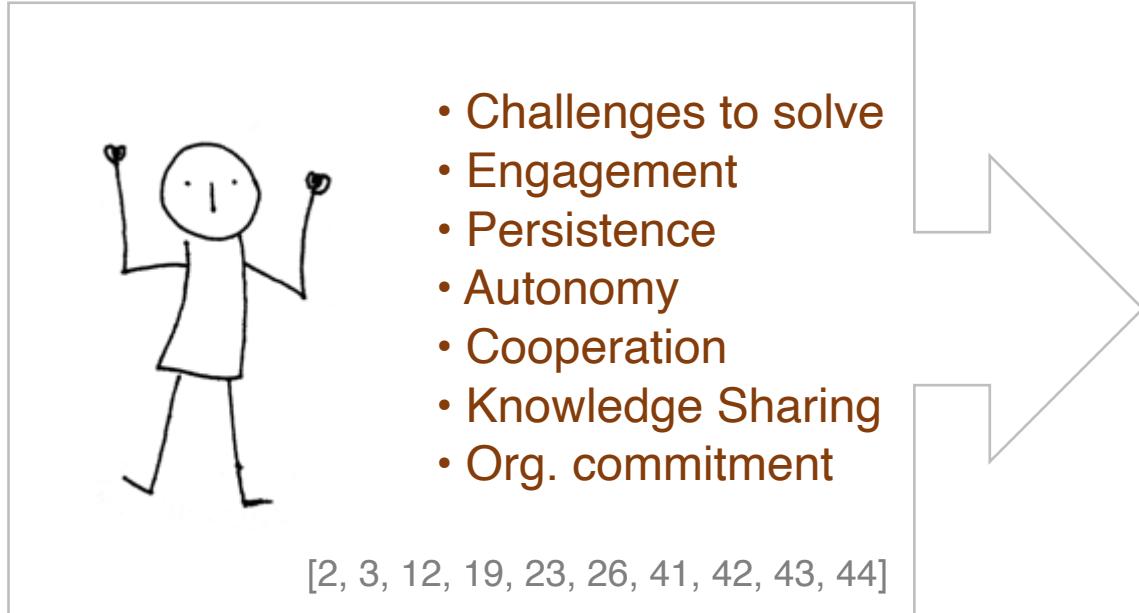
An individual with low self-efficacy tends to avoid difficult tasks or put less effort into completing a task

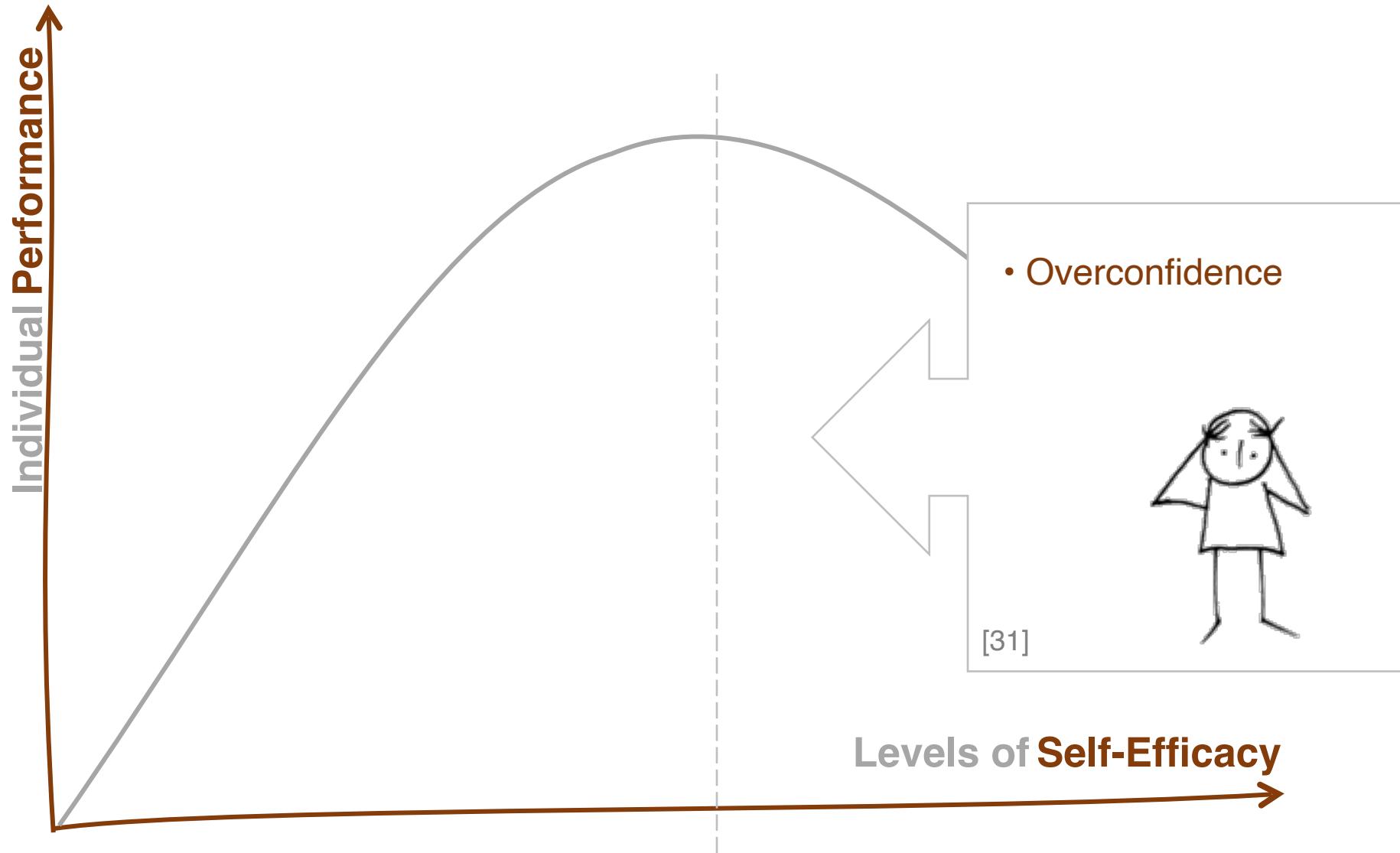
When individuals have a strong sense of efficacy, they trust that they can accomplish even the most difficult tasks.



an individual who has low self-efficacy tends to avoid difficult tasks or put less effort into completing a task









- 1. Mastery experiences
- 2. Vicarious experiences
- 3. Verbal Persuasion
- 4. Health and Emotional States

Sources of **Self-Efficacy**





- 1. Mastery experiences
- 2. Vicarious experiences
- 3. Verbal Persuasion
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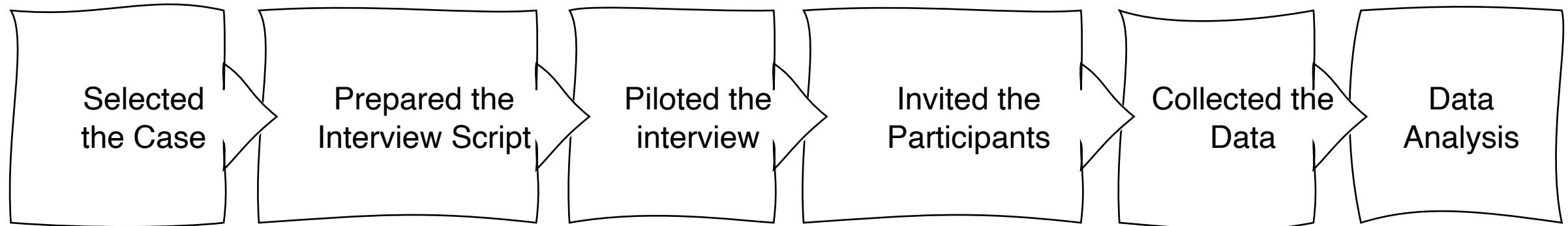


How can we help managers to deal with developers self-efficacy?

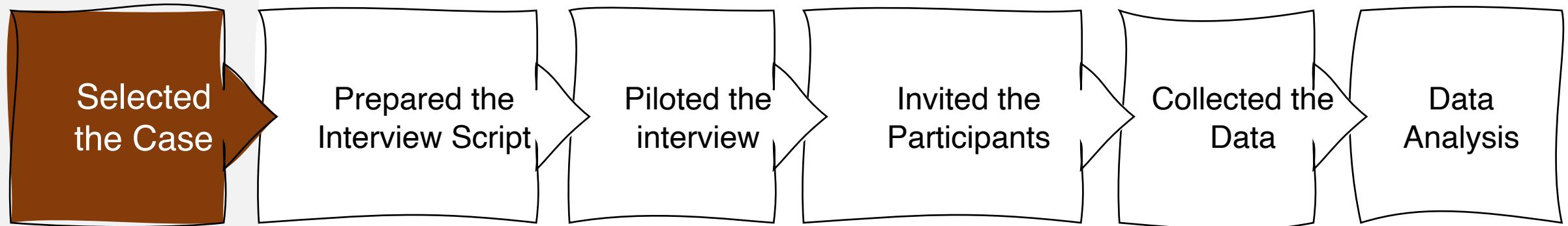
RQ1: What experiences influence software engineer's self-efficacy?

RQ2: How self-efficacy impact software engineers' behavior?

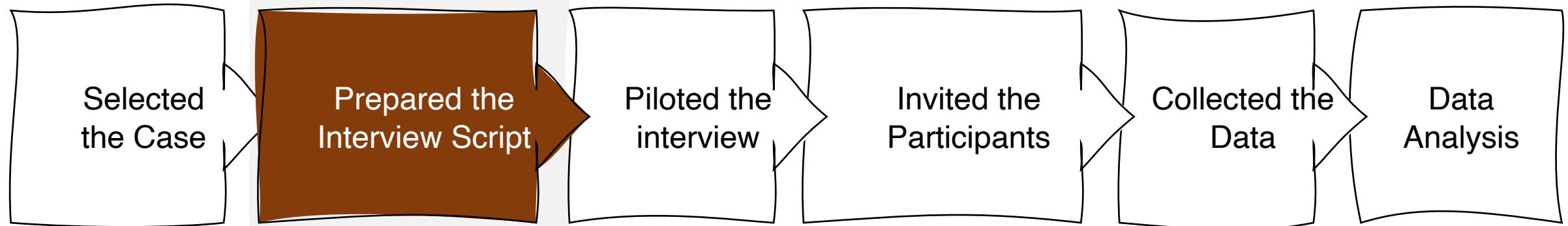
RQ3: How self-efficacy impacts the outcome of work in software engineering teams?



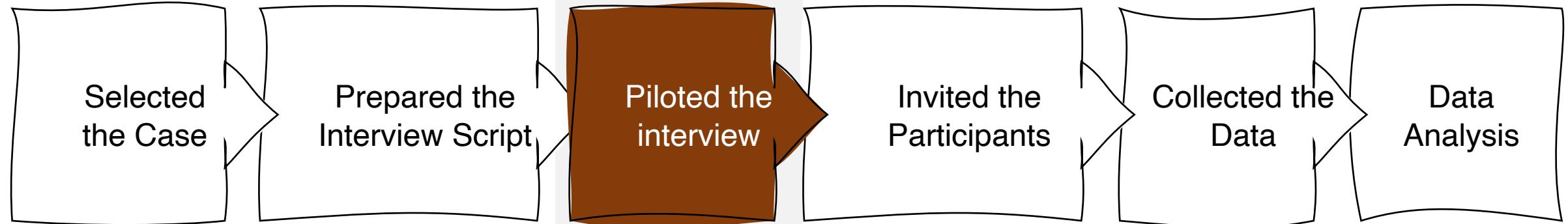
[29] Sharan B Merriam and Elizabeth J Tisdell. 2015. *Qualitative research: A guide to design and implementation*. John Wiley & Sons.



- Actual software development company
- ~3.000 employees
- Finance and other business domains



- Semi-structured interviews
- 12 question script
- Mixed questions (opinions and experiences)



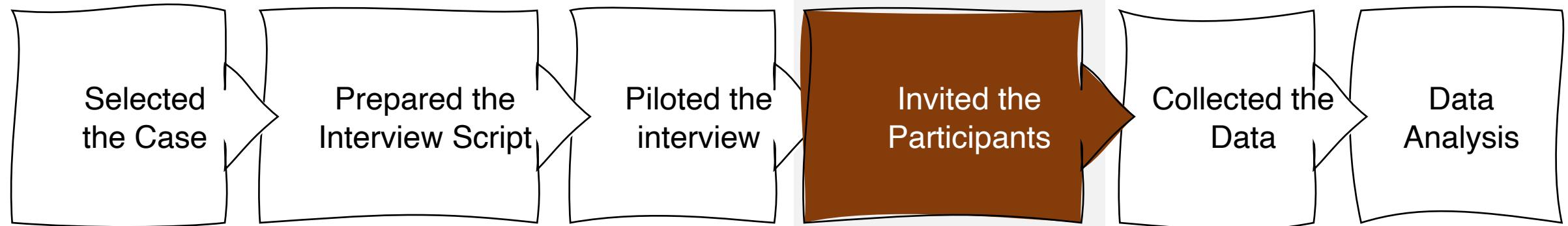
Three participants →

Selected by convenience →



→ Need to explain the concept of “self efficacy”

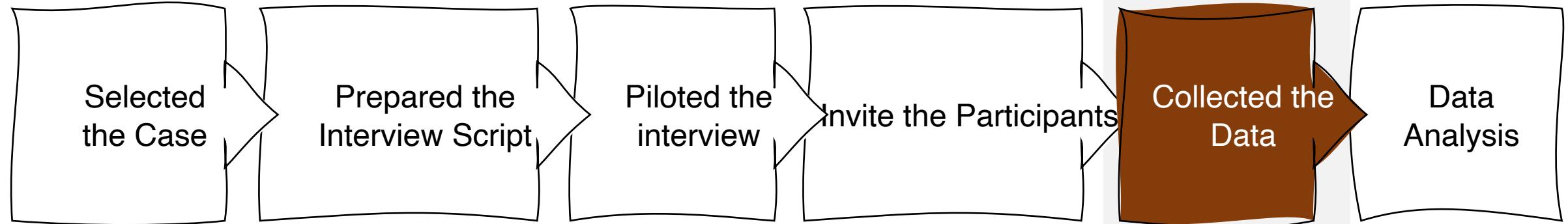
→ Identification of repetitive questions



2 months of work →
Ethics regulations and Consent Form →



→ 31 self-selected volunteers
(26 men and 5 women)



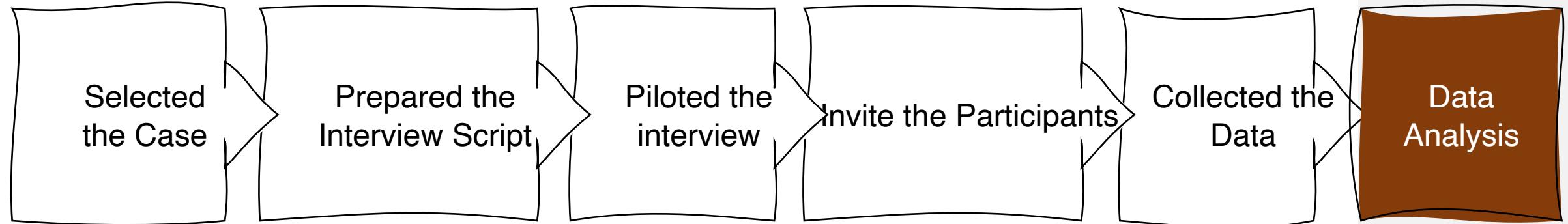
March 2021 ←

Online RT interviews ←

~20 hours of recorded data ←

PT_br ←

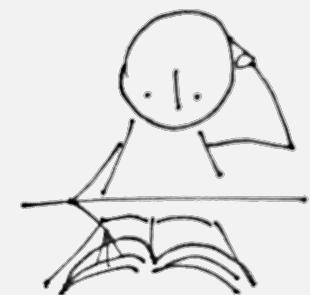




Thematic analysis / Constant Comparison ←

Multiple researchers and discussions ←

ATLAS.Ti ←



Results

RQ1: What experiences influence software engineer's self-efficacy?

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1. Mastery experiences

- + Achieving goals / Solving problems
- + Dealing with similar tasks to what they have done before, with success
- + Helping someone else

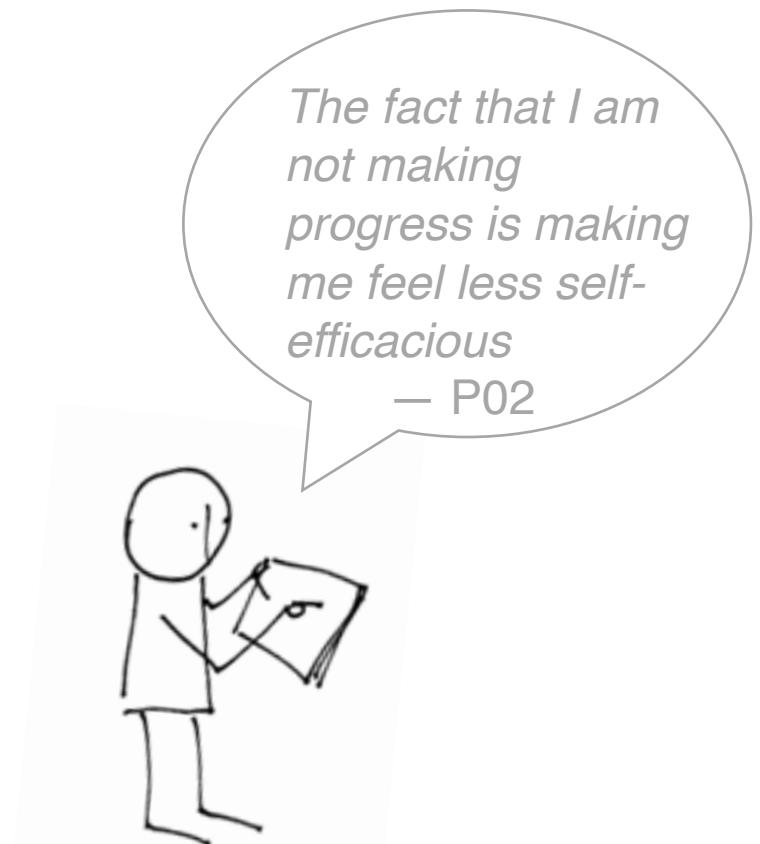
"What increased my self-efficacy was getting results in some difficult tasks" – P12



RQ1: What experiences influence software engineer's self-efficacy?

1. Mastery experiences

- + Achieving goals / Solving problems
 - + Dealing with similar tasks to what they have done before, with success
 - + Helping someone else
- Delays and bugs
 - Technical gaps



The fact that I am not making progress is making me feel less self-efficacious
— P02

RQ1: What experiences influence software engineer's self-efficacy?

1. Mastery experiences

2. Vicarious experiences

- + High skilled people on the team
- + Quality of documentations
- Inequity

"I know these guys here are really good, and I'll be well-supported if there's something I can't solve on my own"

— P009



RQ1: What experiences influence software engineer's self-efficacy?

1. Mastery experiences

2. Vicarious experiences

3. Verbal Persuasion

+ Positive feedback from Leaders/coworkers/mentors

"Having someone I can talk to and validate my solutions is very important for my confidence."
— P004



RQ1: What experiences influence software engineer's self-efficacy?

1. Mastery experiences

2. Vicarious experiences

3. Verbal Persuasion

4. Emotional States

- + Psychological Safety

- + Self-esteem

"whenever someone commented at the meeting, the leader always tried to value what was said. This kind of behavior increases not only my self-confidence but other meeting attendants as well." — P027



RQ1: What experiences influence software engineer's self-efficacy?

RQ2: How self-efficacy impacts software engineers' behavior?

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1. Social Dimension

- + Dependant
- Social Interaction



Low

"I think the person with low self-efficacy is always thinking they're wrong, even though they're right. If I do a service, something, it works, I keep thinking: 'but what if there's a better way to do it?' Something like that. Never trust what they are done". P022

RQ2: How self-efficacy impact software engineers' behavior?

1. Social Dimension

- + Dependant
- Social Interaction



Low

- + Backup behaviour
- + Communicative



Good

" [When my self-efficacy is high]...if a problem arises, I do not despair... I know how to solve it easily, and calmly, it's not the kind of thing that I'm going to get desperate... P009"

RQ2: How self-efficacy impact software engineers' behavior?

1. Social Dimension

- + Dependant
- Social Interaction



Low

- + Backup behaviour
- + Communicative



Good

- + Arrogance
- Open minded



Too High

RQ2: How self-efficacy impact software engineers' behavior?

1. Social Dimension

"He [ex-teammate with high self-efficacy] seemed to understand a lot of the things...sometimes he seemed to understand too much, but I think there was a negative point that it seemed that **other opinions didn't matter much**, I had a feeling, I don't know if that's really what was going through that person's head, but it seemed that he was saying: "I'm above average here". P025"



Too High

RQ2: How self-efficacy impact software engineers' behavior?

1. Social Dimension

2. Cognitive Dimension

- + Fear
- + Anxiety
- + Need for approval



Low

"The lack of ability to communicate your results or your point of view generates the fear of being misunderstood, which ends up reducing your self-efficacy. P010

RQ2: How self-efficacy impact software engineers' behavior?

1. Social Dimension

2. Cognitive Dimension

+ Fear

+ Anxiety

+ Need for approval



Low

+ Courage

+ Adaptability

- Stress



Good

"Having high self-efficacy motivates me to face new challenges and take responsibility. I am not afraid to expose myself. P021"

RQ1: What experiences influence software engineer's self-efficacy?

RQ2: How self-efficacy impact software engineers' behavior?

RQ3: How self-efficacy impacts the outcome of work in software engineering teams?

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- + Work overload
- + Delays
- + Rework
- Motivation
- Product Quality



Low

- + Shared knowledge
- + Deliveries speed
- Rework
- + Skills improvement
- + Product Quality



Good

So what?

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- # Drills or bootcamps to maintain mastery levels
- # Good documentation and knowledge sharing
- # Be careful with the team compositions
- # Watch the quality of feedbacks
- # Health connects to productivity in many different ways**