

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

*A Qualitative Study in the Industry*

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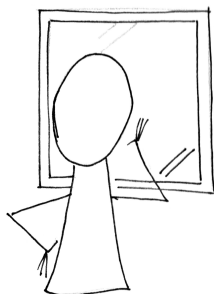


*Download the paper*



# Understanding Self-Efficacy in the Context of Software Engineering: A Qualitative Study

## Self-Efficacy

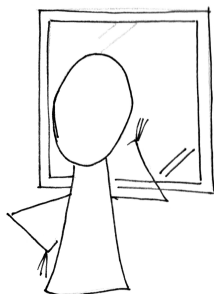


31 Interviews

Full time remote developers

# Understanding the Context of Software Engineering A Qualitative Study

## Self-Efficacy



Thematic Analysis

- Experiences
- Behavioural Signs
- Consequences

31 Interviews

Full time remote developers

“

”

**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

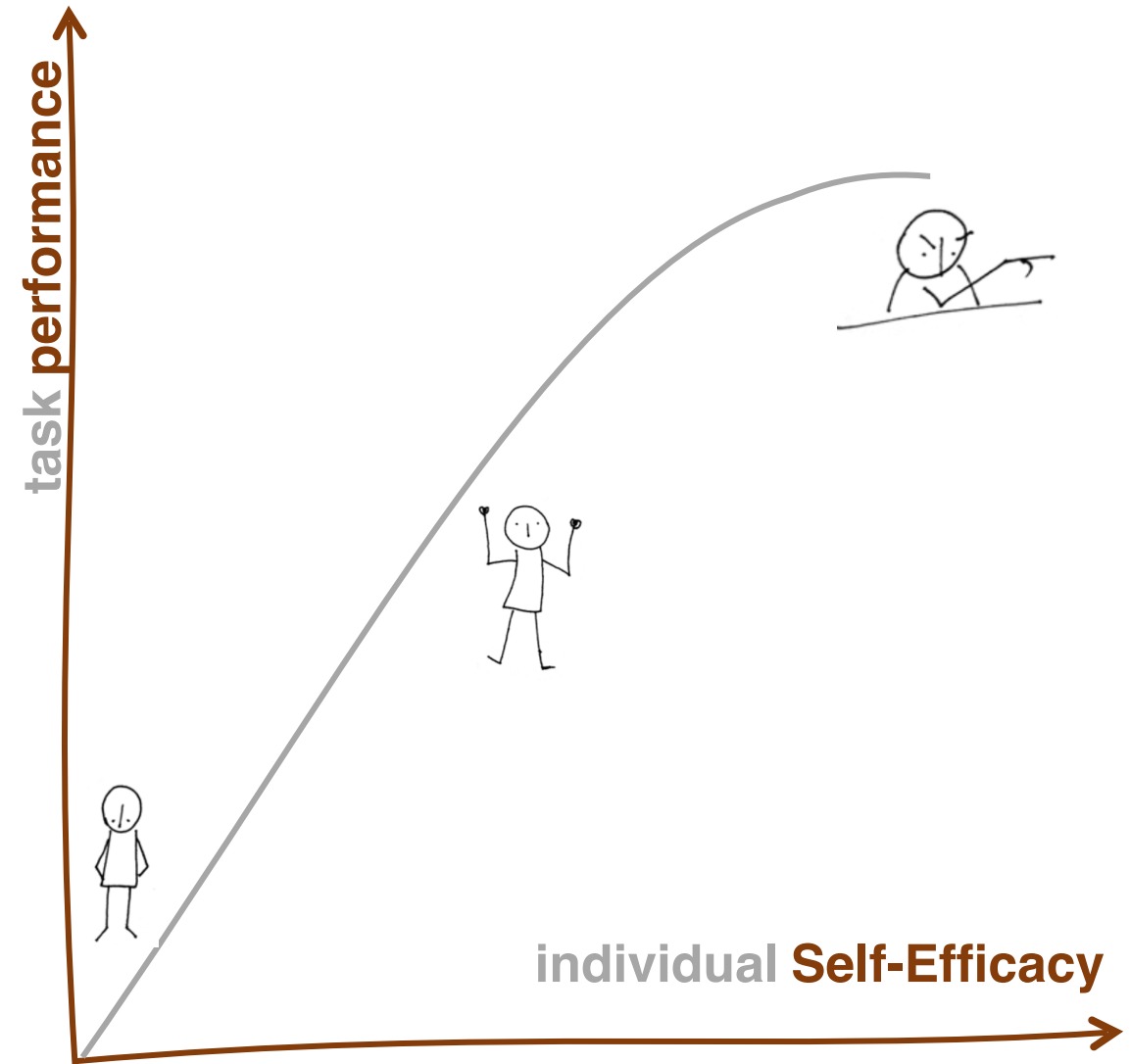
Self-efficacy can help to predict one's behavior and also one's performance

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.

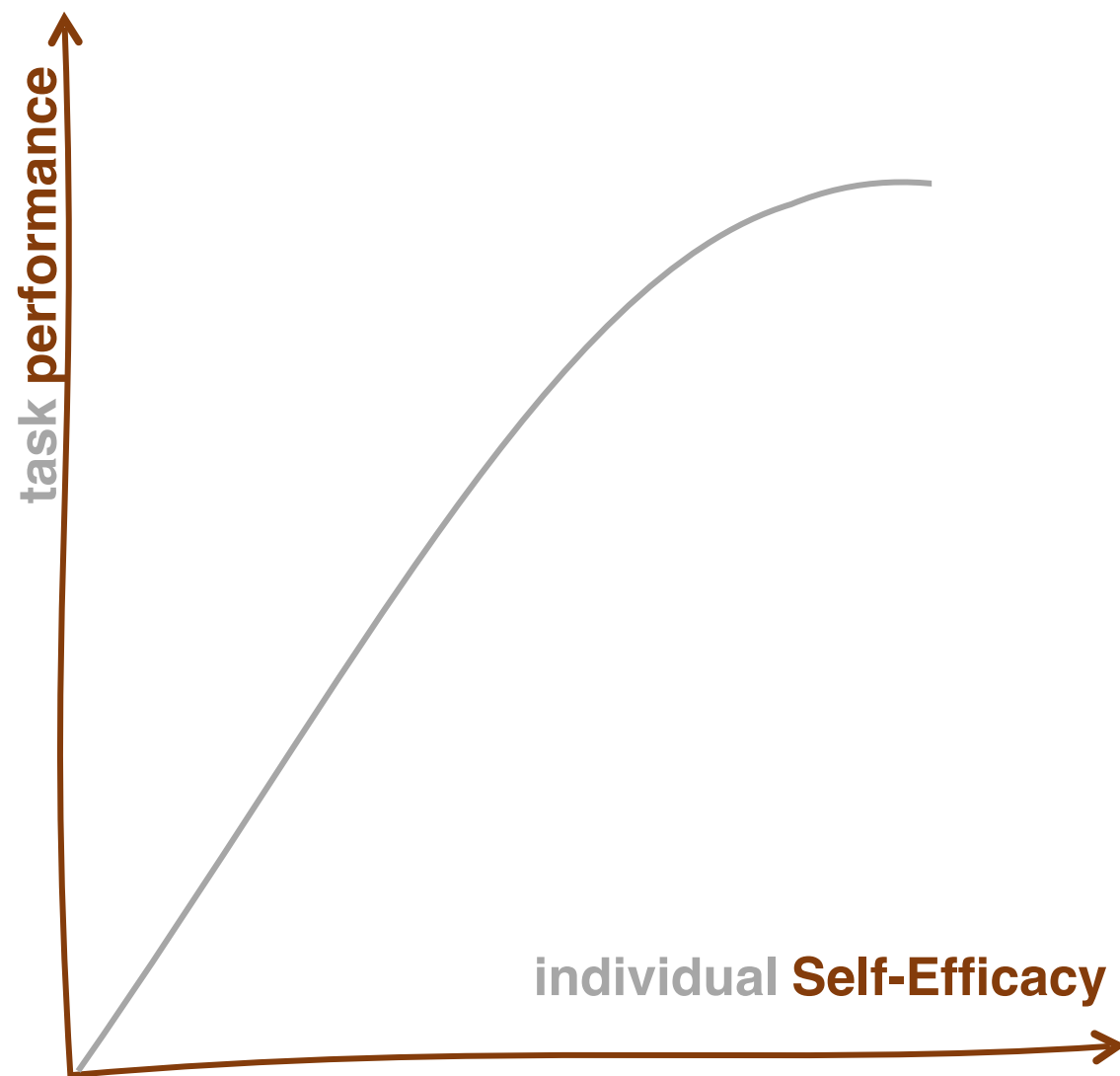


an individual who has low self-efficacy tends to avoid difficult tasks or put less effort into completing a task



- Apathy
- Laziness
- Less effort
- Work Exhaustion

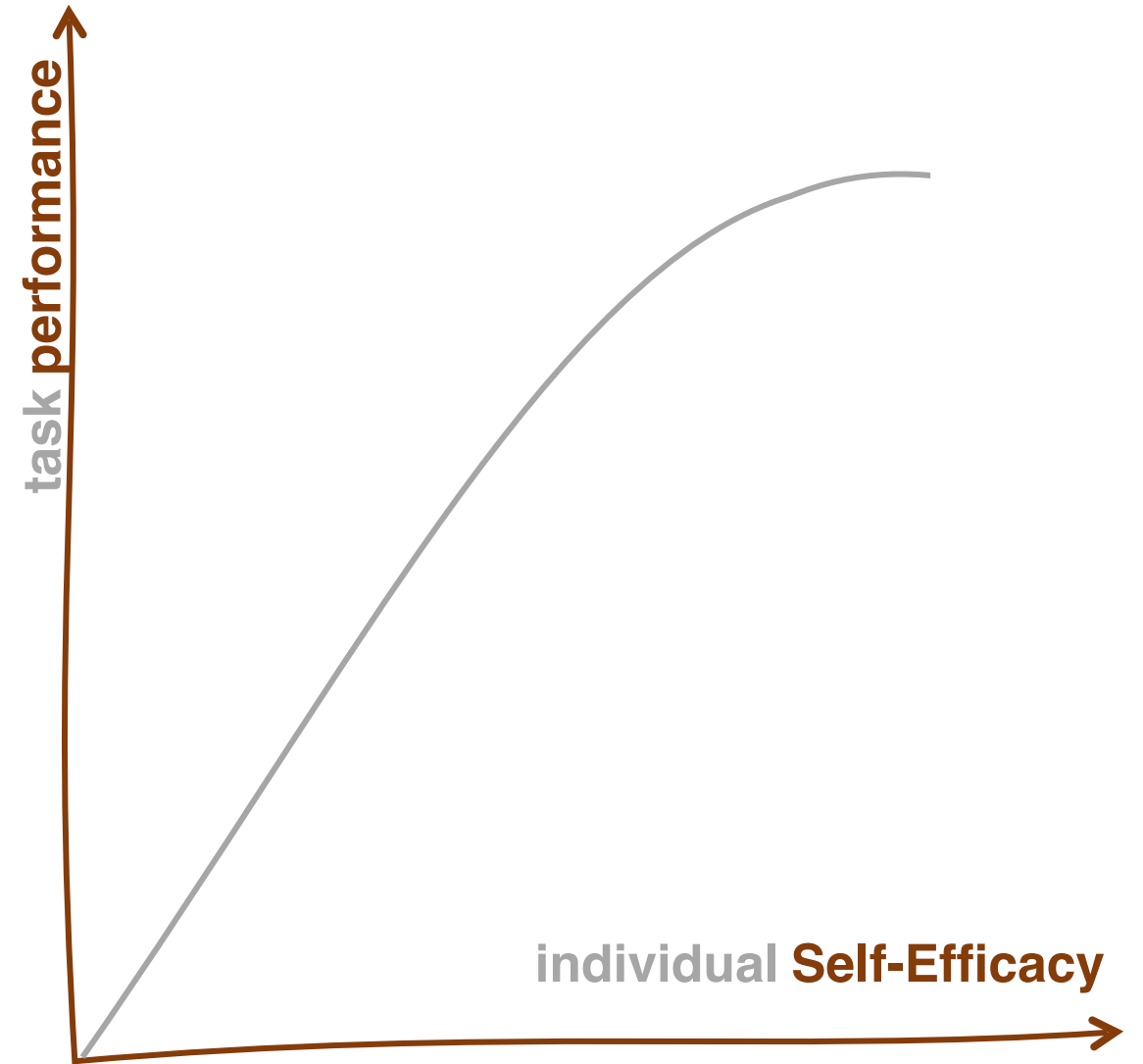
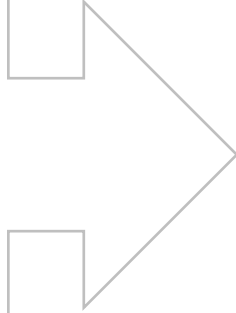
[3, 34, 35]

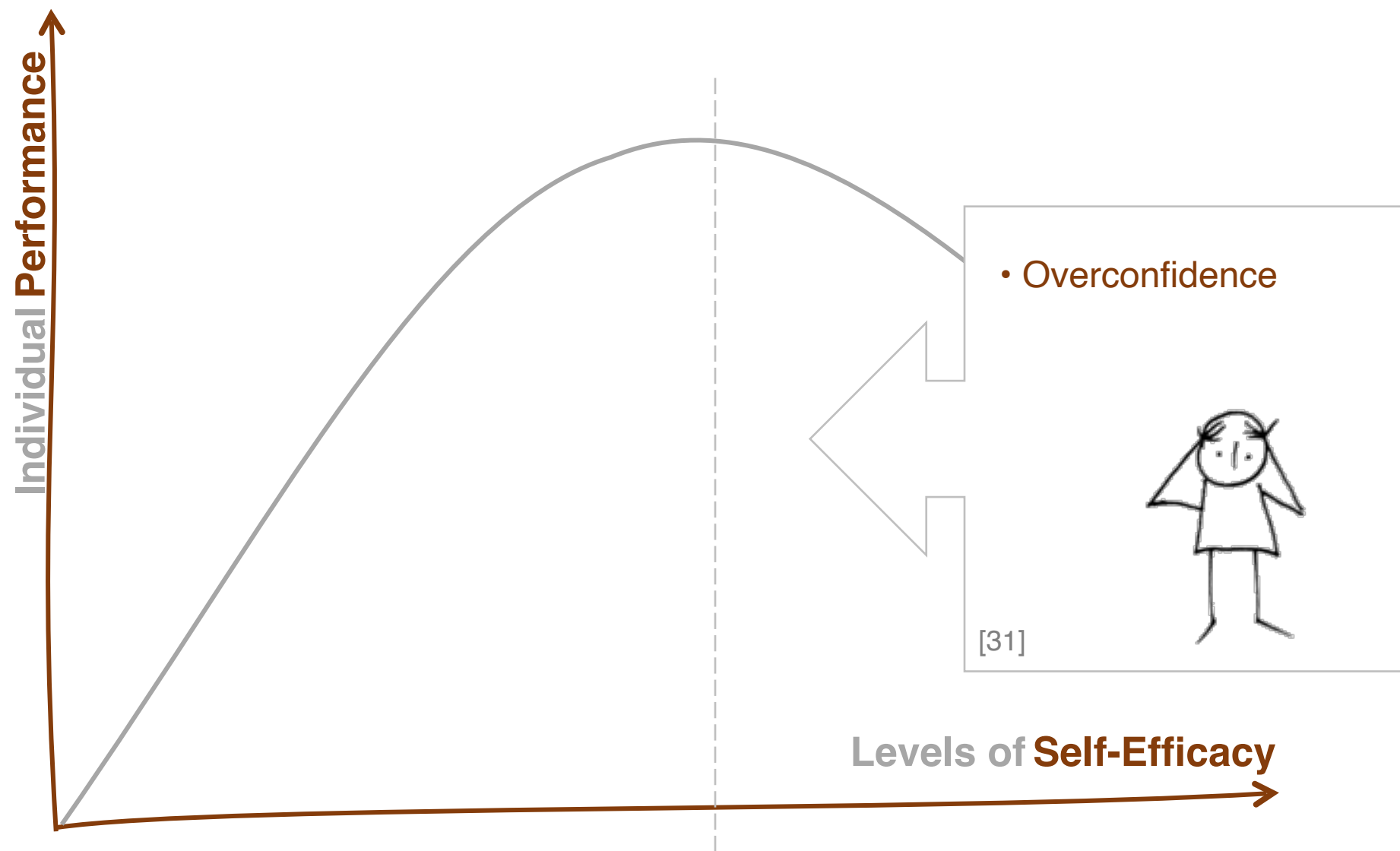





- Challenges to solve
- Engagement
- Persistence
- Autonomy
- Cooperation
- Knowledge Sharing
- Org. commitment

[2, 3, 12, 19, 23, 26, 41, 42, 43, 44]








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

Sources of **Self-Efficacy**





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  2. Vicarious experiences
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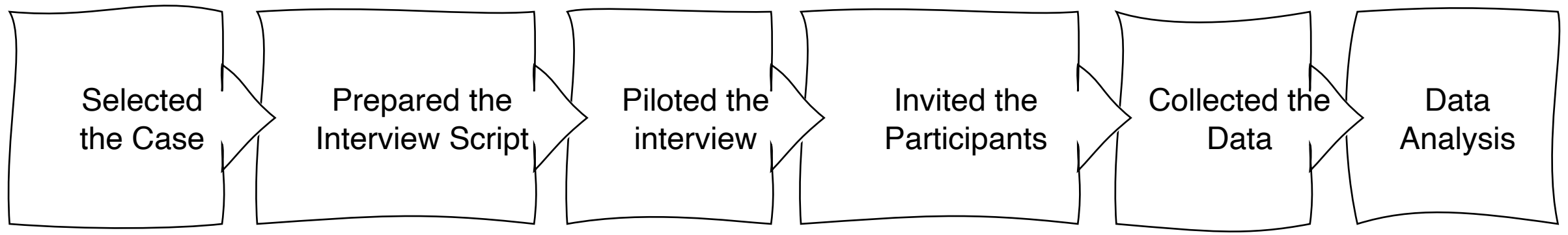


## **How can we help managers to deal with developers self-efficacy?**

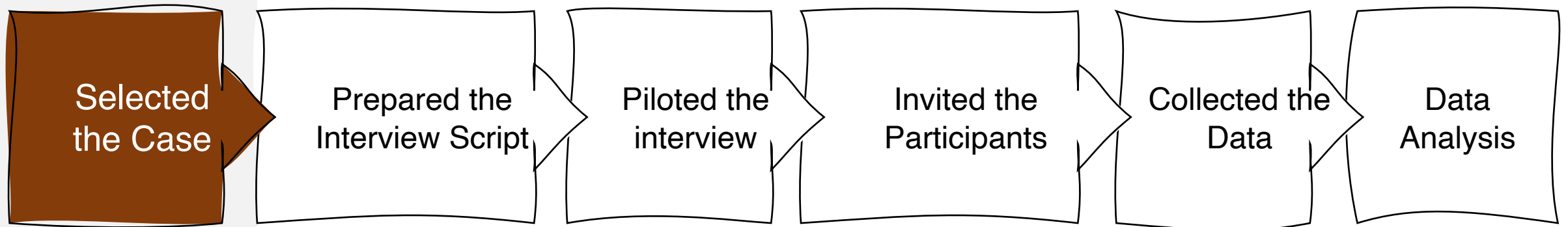
**RQ1:** What experiences influence software engineer's self-efficacy?

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

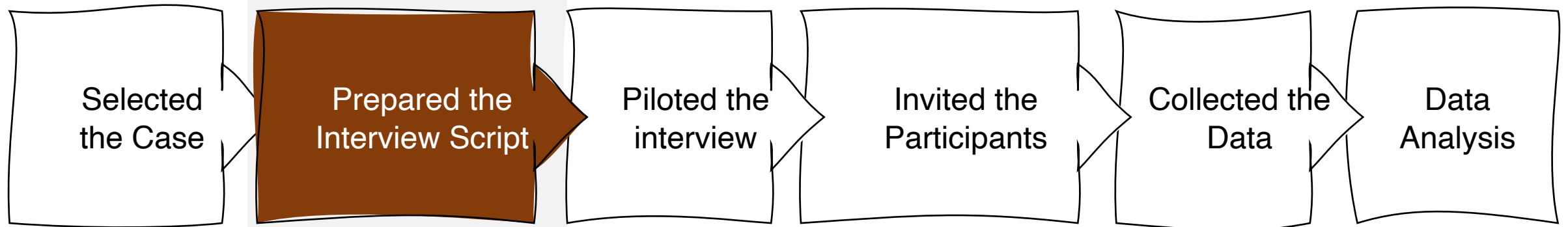
**RQ3:** How self-efficacy impacts the outcome of work in software engineering teams?



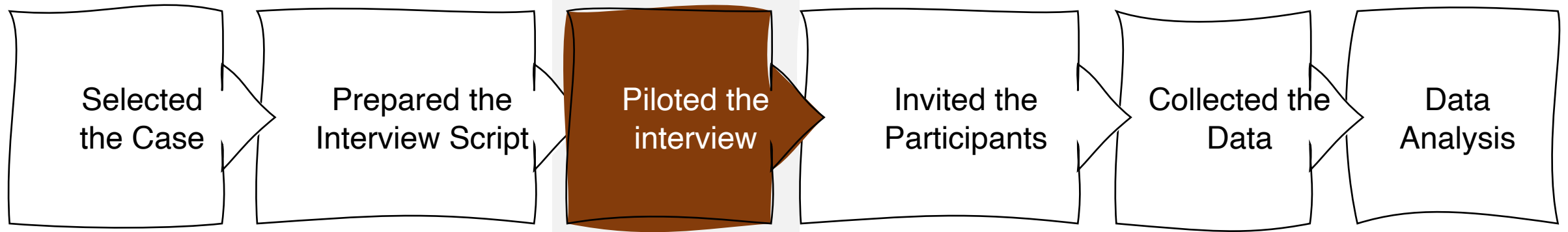
[29] Sharan B Merriam and Elizabeth J Tisdell. 2015. *Qualitative research: A guide to design and implementation*. John Wiley & Sons.



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



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



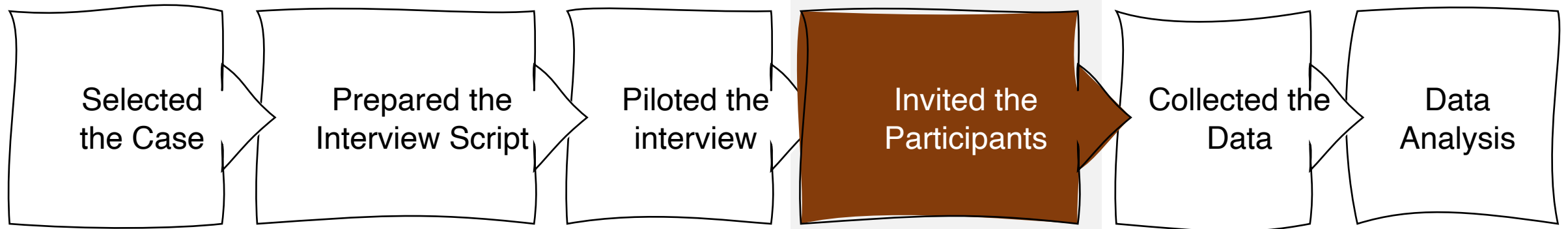
Three participants →

Selected by convenience →



→ Need to explain the concept of “self efficacy”

→ Identification of repetitive questions



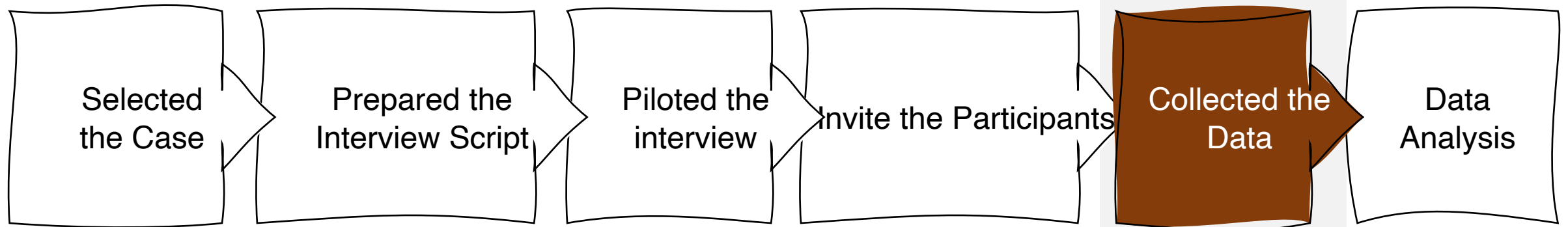
2 months of work →

Ethics regulations and Consent Form →



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





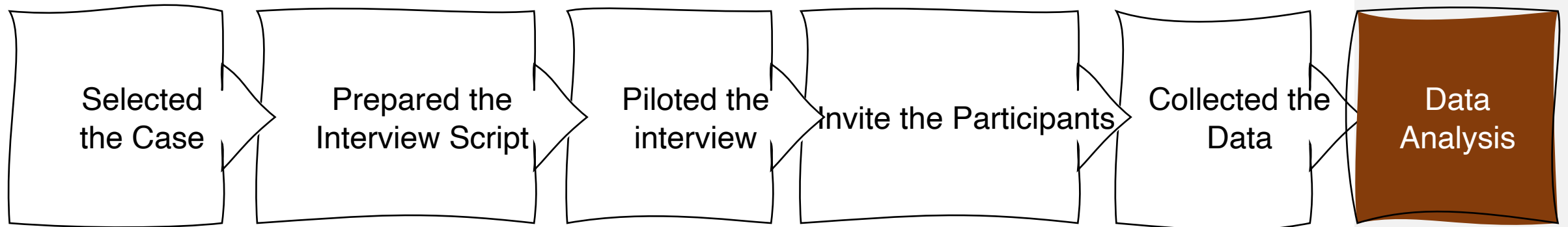
March 2021 ←

Online RT interviews ←

~20 hours of recorded data ←

PT\_br ←

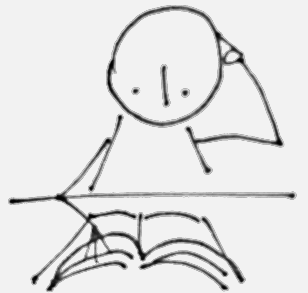




Thematic analysis / Constant Comparison ←

Multiple researchers and discussions ←

ATLAS.Ti ←



# Results

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

## 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

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

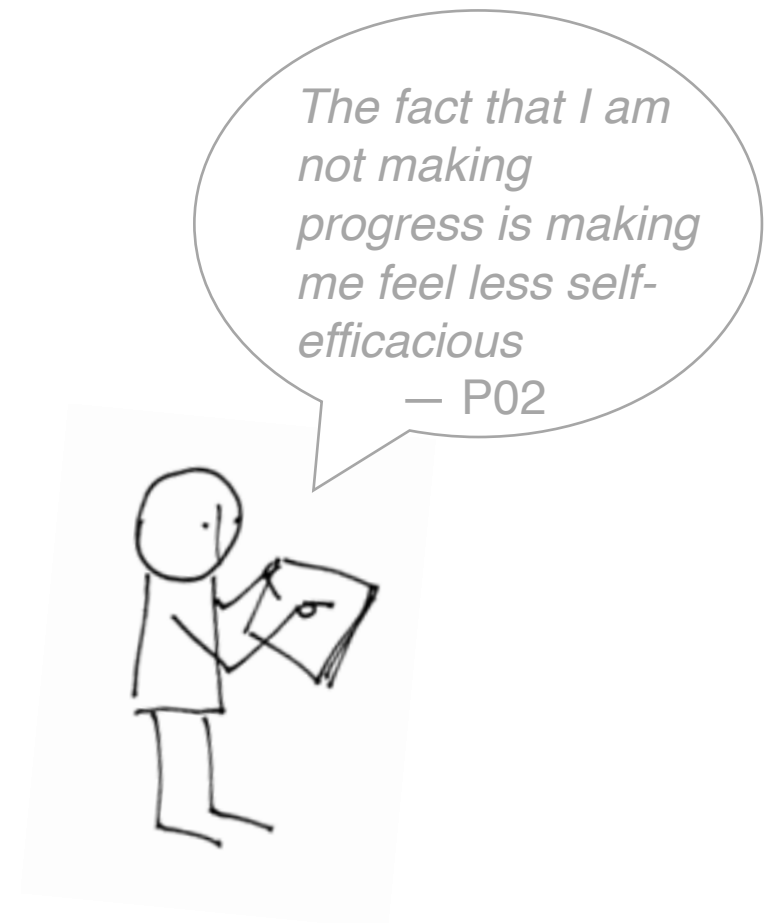
— P12



## 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



## 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?

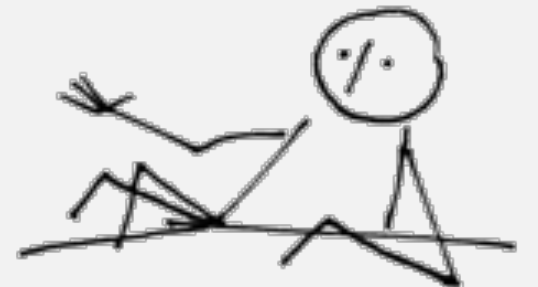
1. Mastery experiences

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?

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

### 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



*Too High*

"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"

## 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?

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

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



*Low*

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



*Good*

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- # Be careful with the team compositions
- # Watch the quality of feedbacks**

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