

# Identification of the Effects of Human Aspects on the Requirements Engineering Process



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## Motivation

- **Requirements Engineering (RE)** is a critical phase of software engineering (SE) which includes eliciting, analyzing, documenting, validating and maintaining software requirements [1] [2].
- An effective collaboration of individuals is needed when engaging in RE [3].
- Hence, it is vital to identify various human aspects and their impact on the RE process for the better or worse.

## Objectives

- Identify and categorize various human aspects on RE that have been studied to date.
- Systematically analyze the work done to identify the effects of human aspects on RE.
- Provide a set of recommendations for future research into the effects of human aspects on RE.

## Method

A systematic Literature review (SLR) was conducted following the Kitchenham and Charters' guideline [4] and Kitchenham's procedures [5].

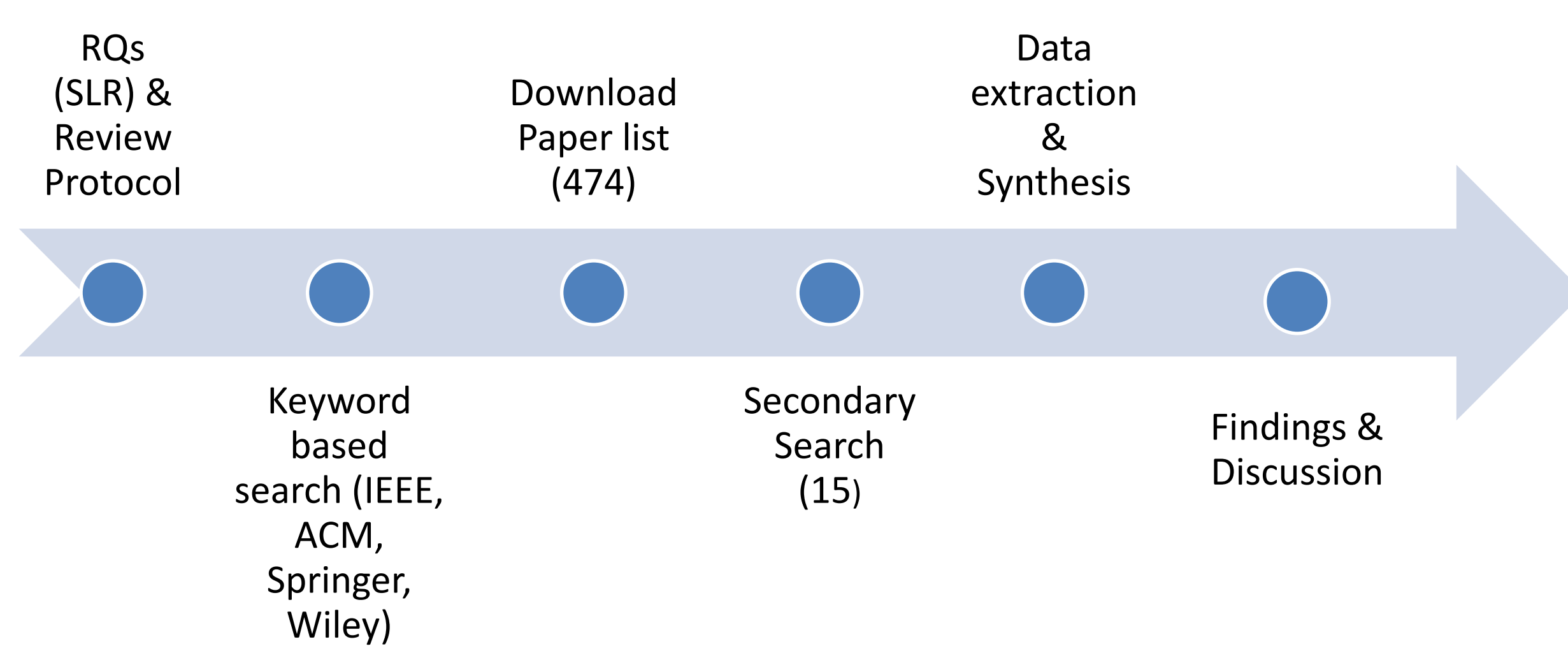


Figure 1: SLR Process

Table 1: Breakdown of the paper count [6]

	Resource Name	Initial Paper Count	Downloaded Paper Count	1 <sup>st</sup> Screening	2 <sup>nd</sup> Screening	3 <sup>rd</sup> / Final Screening
Primary Search	IEEE	128	127	56	36	27
	ACM DL	151	151	68	28	19
	Springer	124	123	34	21	16
	Wiley	71	71	22	7	4
	<b>Count</b>	<b>474</b>	<b>472</b>	<b>180</b>	<b>92</b>	<b>66</b>
Secondary Search	Snowballing	16	16	16	8	8
<b>Total final paper count (Primary + Secondary)</b>						<b>74</b>

## Results and Discussion

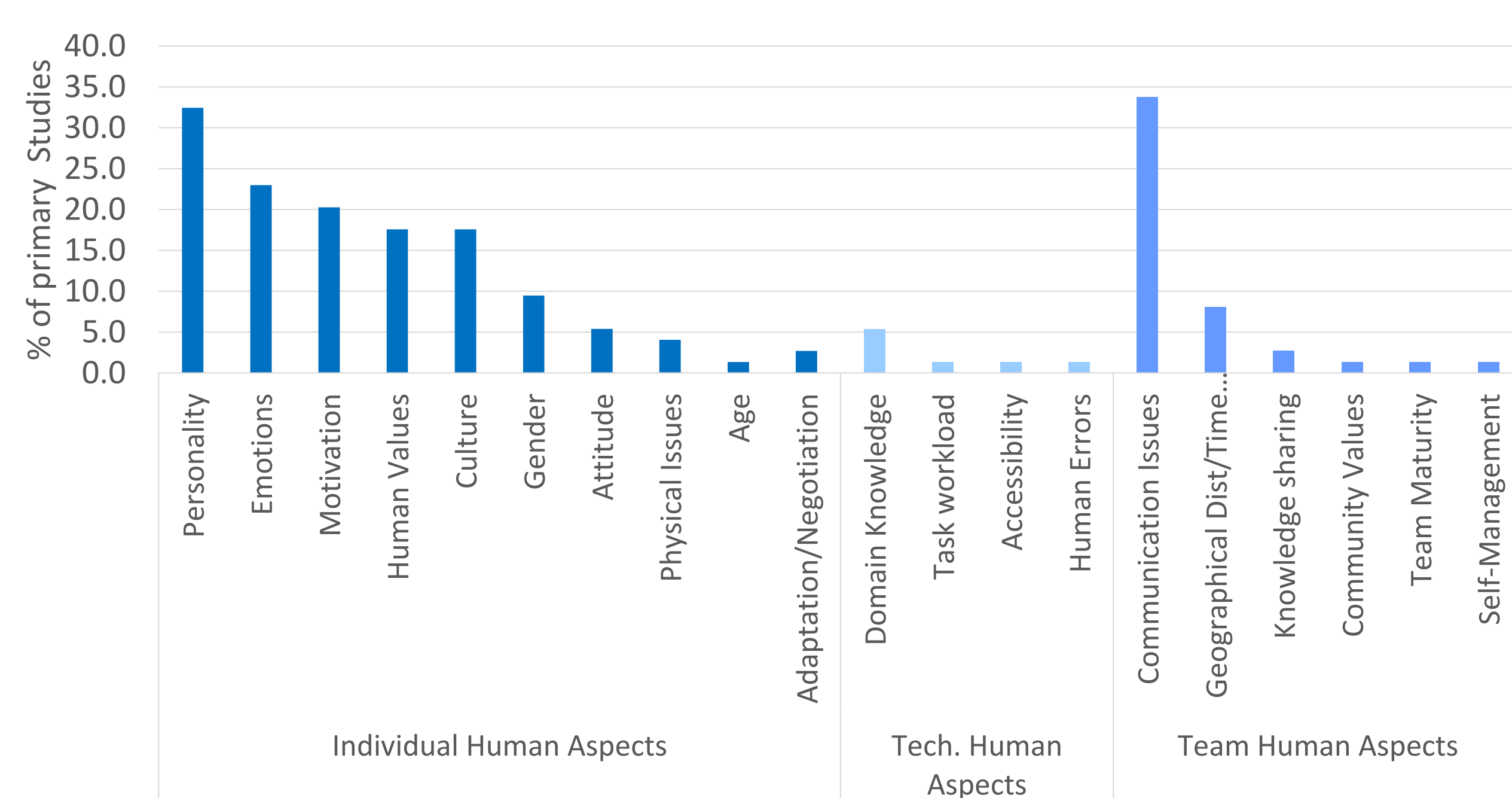


Figure 2: Categorization of the human aspects studied [6]

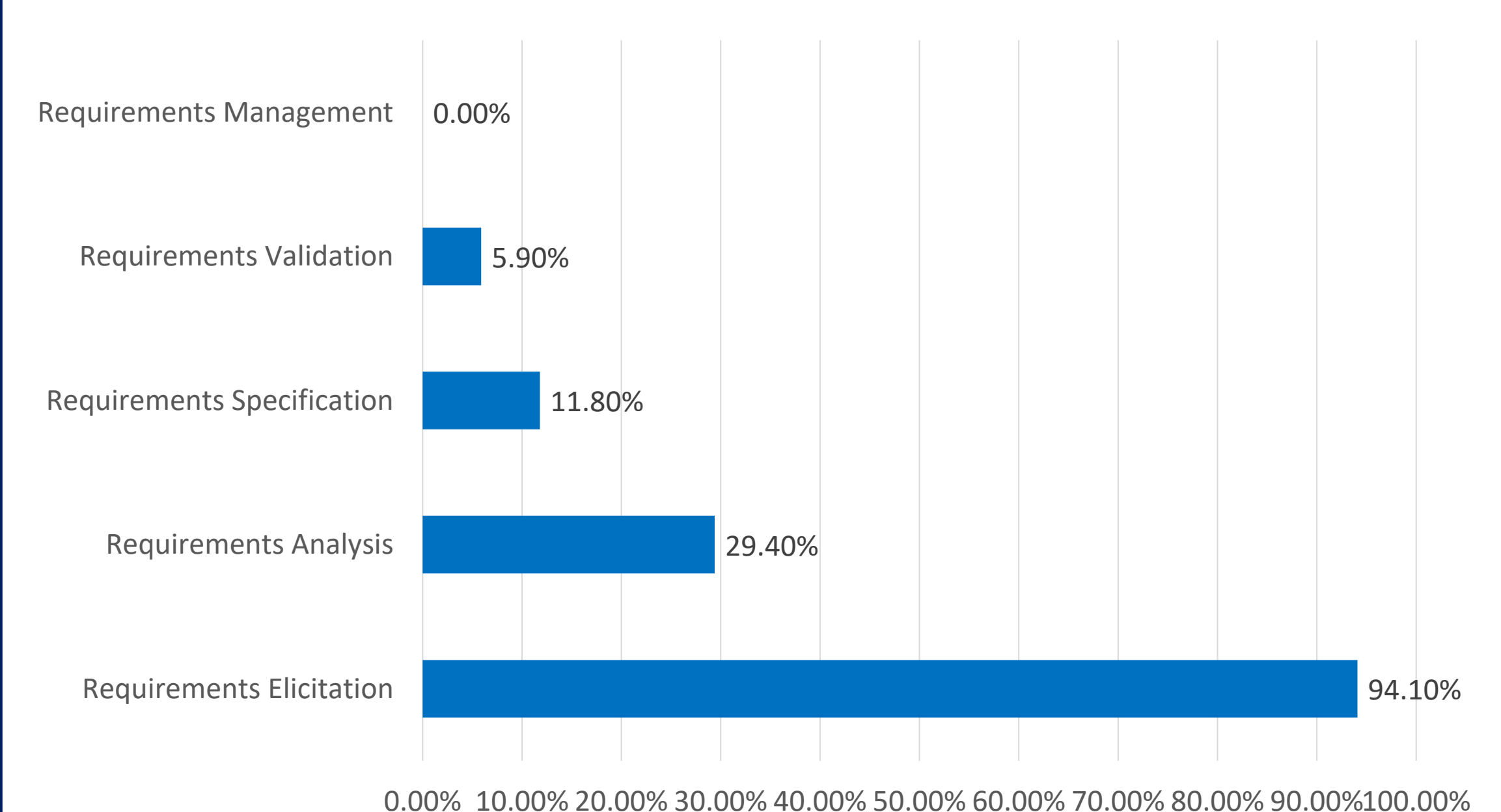


Figure 3: Research studies on how human aspects impact on different RE phases [6]

### Major findings of the study;

1. Identified set of human aspects related to RE that have been investigated to date –Human aspects were categorized into three groups –“**individual**”, “**technical**” and “**team**” related human aspects based on the definitions in SE context (Figure 2).

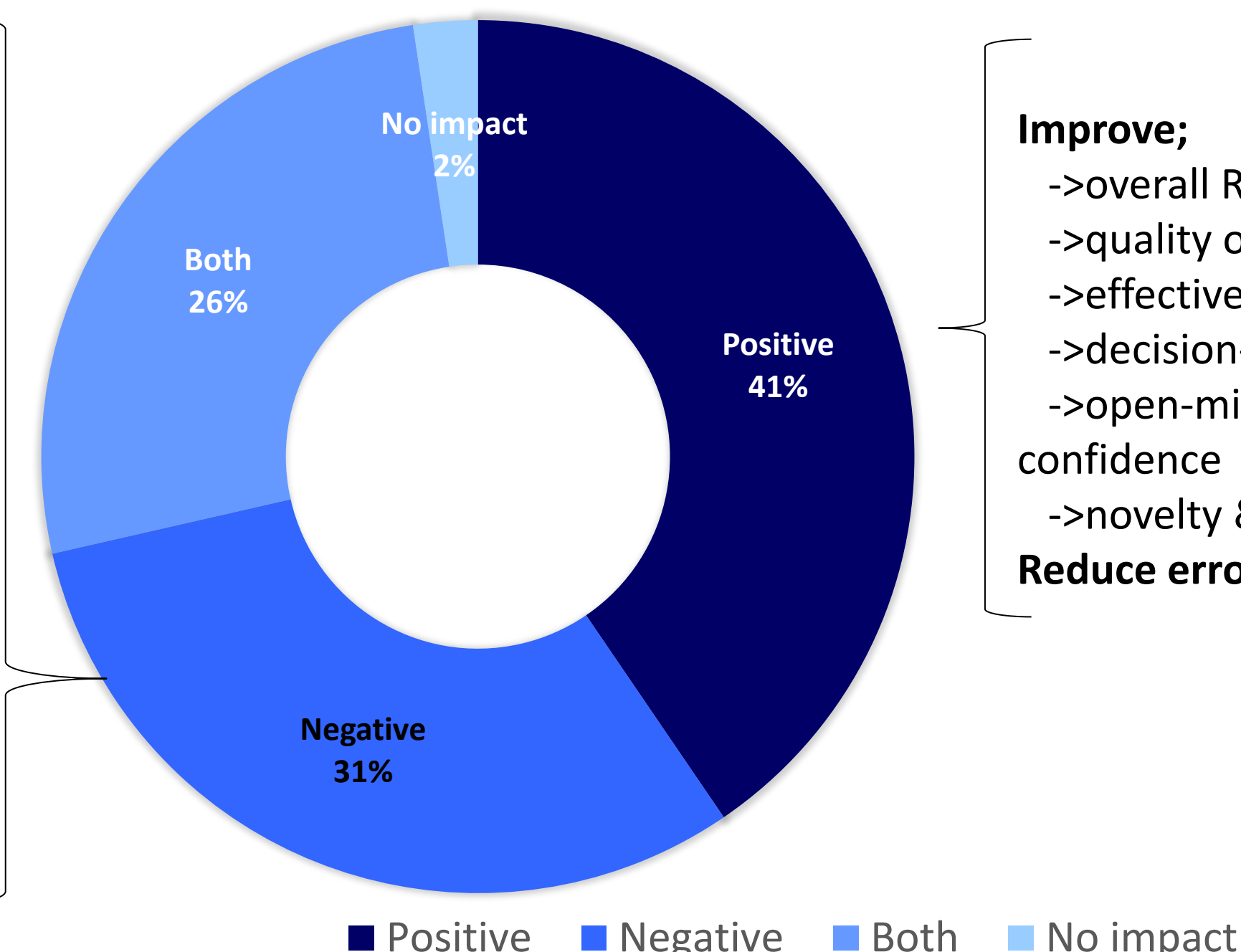
- Individual-related human aspects -> highest number of studies -> **Personality (32.4%)**, Emotions (23%), Motivation (20.3%), Human values (17.6%) and culture (17.6%) are the highest among them.
- Team-related human aspects -> second highest number of studies -> **Communication issues (33.8%)**, and Geographical distribution (8.1%) are the highest among them.
- Technical- related human aspects -> A very few studies -> Majority was about **Domain knowledge (5.4%)**.

2. Discovered the most affected RE phase due to human aspects (Figure 3).

- 24.6% of studies focused on identifying the most affected RE phases caused by human aspects.
- **Requirements elicitation** has been shown to be the most affected RE phase.
- No studies focused on the effect of human aspects in the requirements management phase.

3. Identified the **nature of the effect** of human aspects in the RE process; **Positive or Negative** (Figure 4).

- Negative emotions;**
  - >user rejection
  - >conflicts
  - >de-motivate individuals
- Communication issues;**
  - >lack of understanding of requirements
  - >missing/incomplete requirements
  - >>wrong collection of requirements
- Culture;**
  - >miscommunication
  - >fear/mistrust/social issues
- Geographic distribution;**
  - >difficulties in discussions
  - >difficulties in handling information
- Motivation;**
  - >risk of conflicts
  - >efficiency



- Improve;**
  - >overall RE process
  - >quality of RE process
  - >effectiveness of RE phases
  - >decision-making
  - >open-mindedness & confidence
  - >novelty & creativity
- Reduce errors in RE**

Figure 4: Nature of the impact of human aspect(s) on RE [6]

## Recommendations

1. More studies are needed to directly focus on the effects of human aspects on RE - most of the studies focus on the SE process in general, including RE.
2. More practical guidelines and recommendations are required based on real-world RE processes.
3. More studies are required that consider multiple human aspects impacting RE.
4. Identification of relationships between human aspects and their effects on RE.
5. Need for a more comprehensive and agreed taxonomy of human aspects - beneficial for the categorization of broadly different kinds of human aspects in SE in general.

## References

- [1] D. Pandey and V. Pandey, "Importance of requirement management : A requirement engineering concern," International Journal of Research and Development - A Management Review (IJRDMR), vol. 1, pp. 2319–5479, 2012.
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- [3] C. T. Wick, The importance of team skills for software development. Text, 1999.
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- [6] D. Hidellaarachchi, J. Grundy, R. Hoda and K. Madampe, "The Effects of Human Aspects on the Requirements Engineering Process: A Systematic Literature Review," in IEEE Transactions on Software Engineering, doi: 10.1109/TSE.2021.3051898.