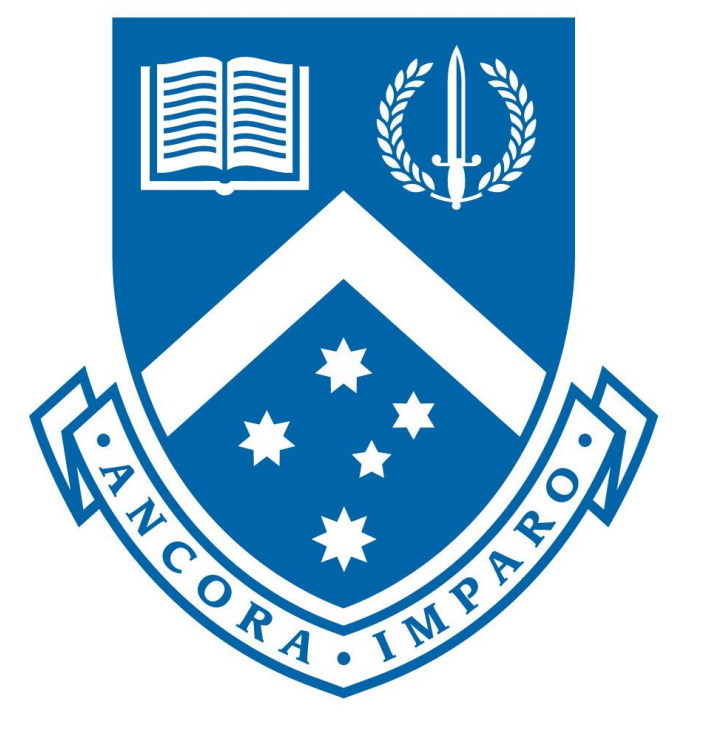


Identification of the Effects of Human Aspects on the Requirements Engineering Process

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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].

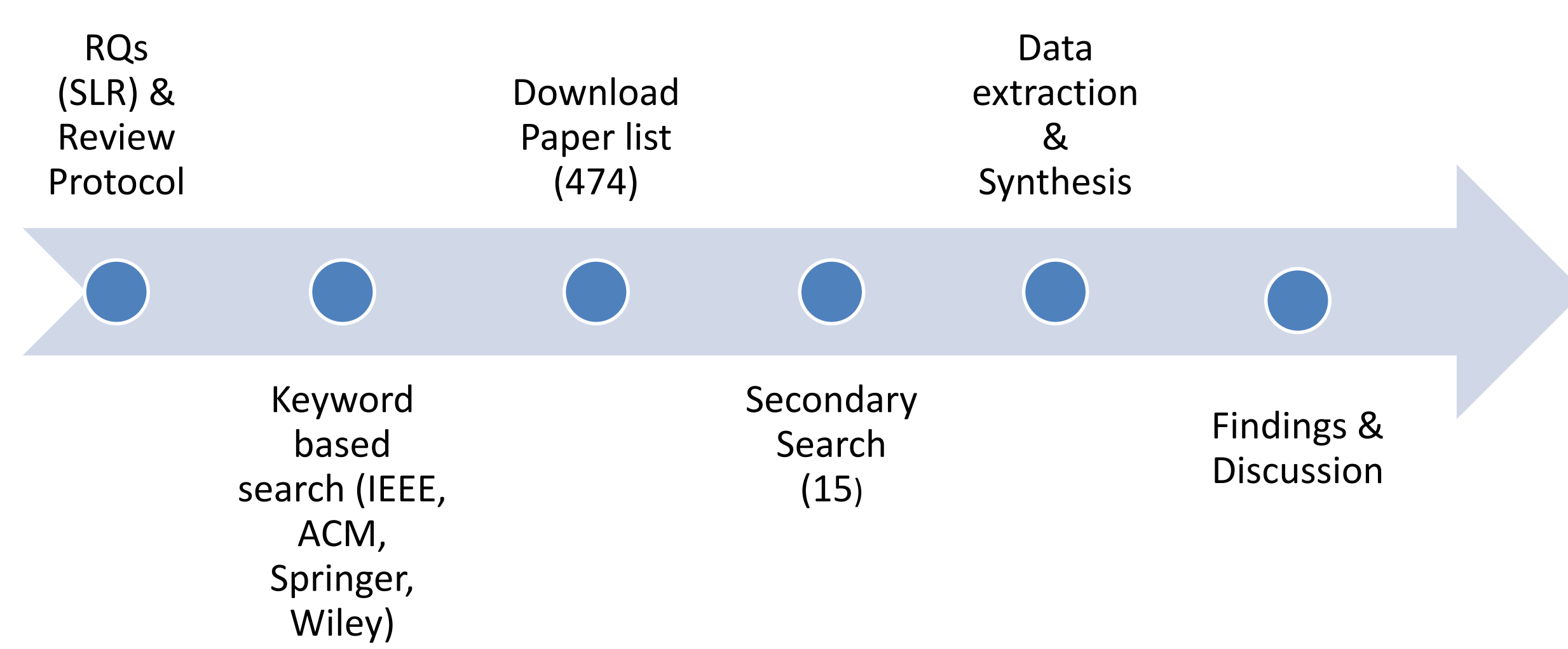


Figure 1: SLR Process

Table 1: Breakdown of the paper count [6]

	Resource Name	Initial Paper Count	Downloaded Paper Count	1 st Screening	2 nd Screening	3 rd / 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
	Count	474	472	180	92	66
Secondary Search	Snowballing	16	16	16	8	8
Total final paper count (Primary + Secondary)						74

Results and Discussion

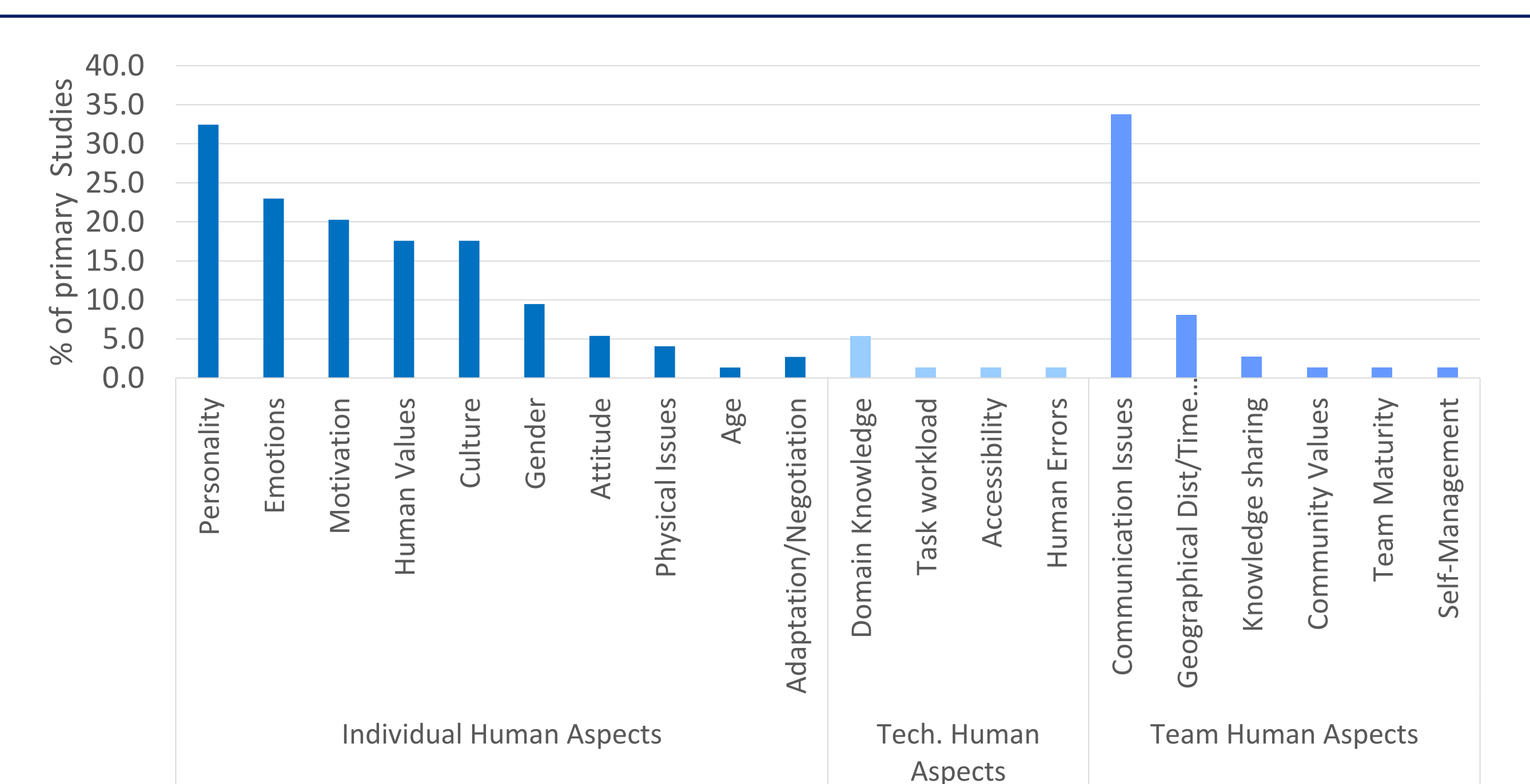


Figure 2: Categorization of the human aspects studied [6]

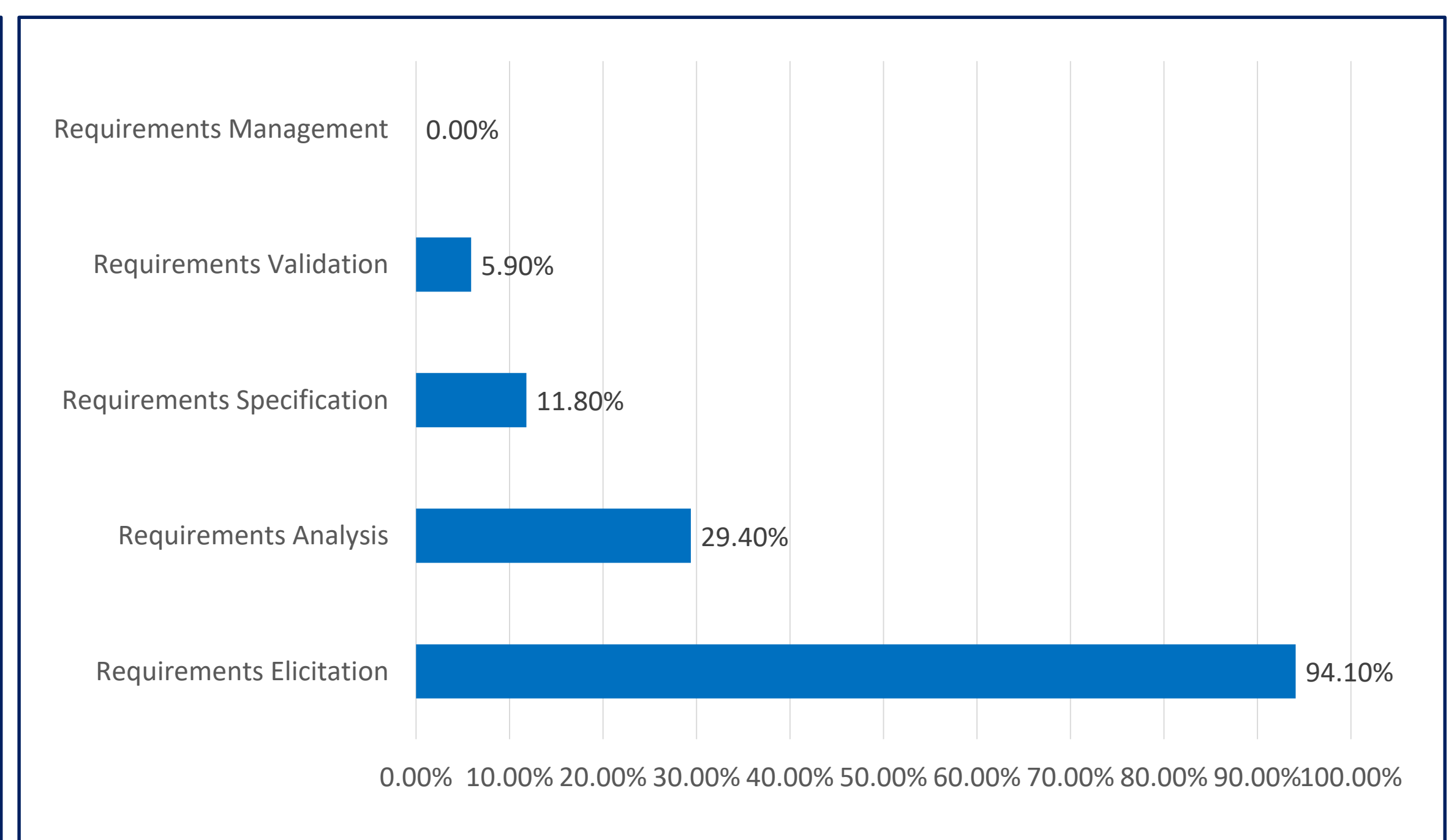


Figure 3: Research studies on how human aspects impact on different RE phases [6]

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

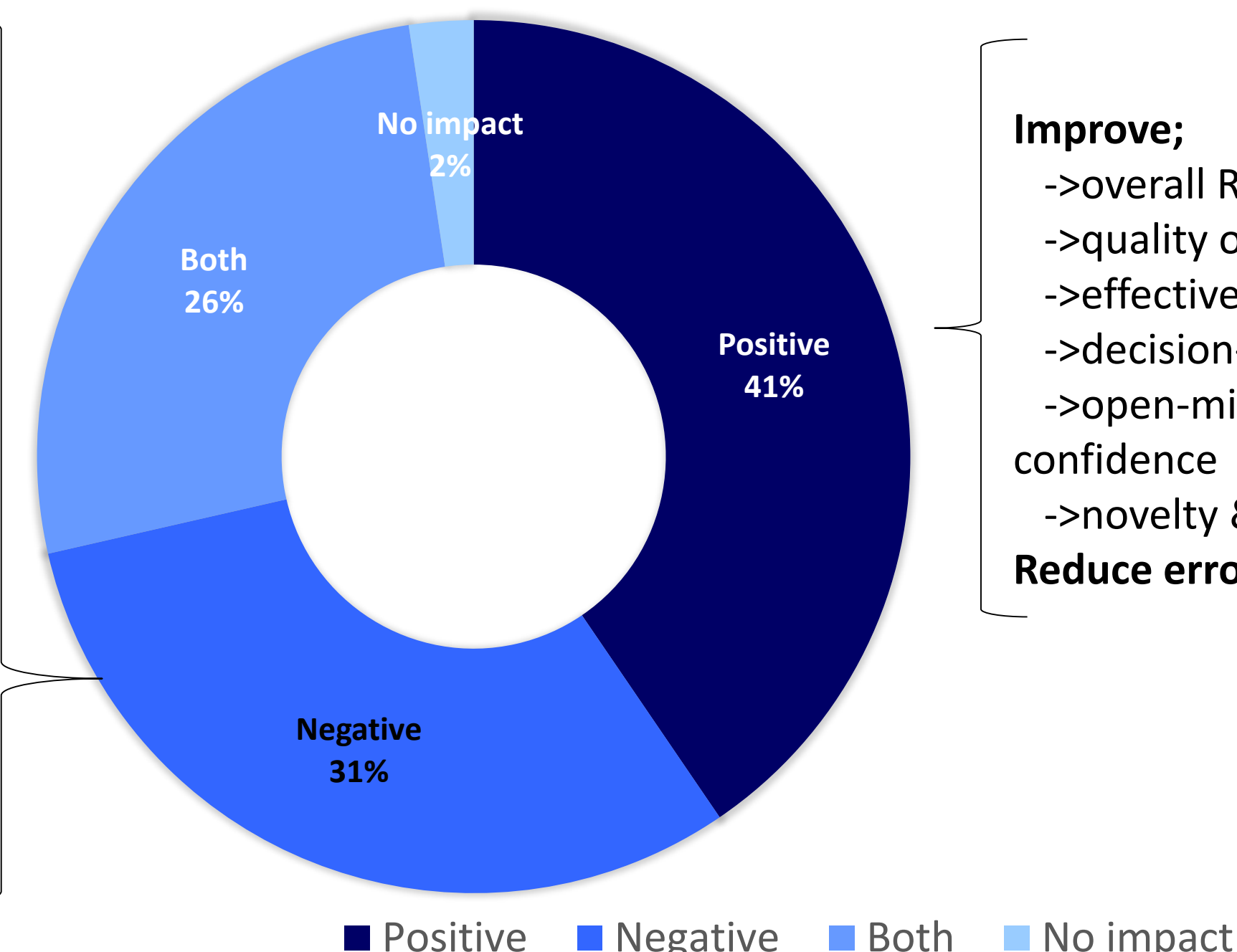


Figure 4: Nature of the impact of human aspect(s) on RE [6]

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

Recommendations

1. More studies are needed to directly focused 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 on RE.
4. Identification of relationships between human aspects and their effects on RE.
5. Need of a more comprehensive and agreed taxonomy of human aspects - beneficial for the categorization of broadly different kinds of human aspects in SE in general.

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