

Perceiving Objective Cycling Safety



Ana Karina de Barros Christ

anakinachrist@tecnico.ulisboa.pt

Supervisor(s): Filipe Moura¹, Carlos Roque²

1. Civil Engineering Research and Innovation for Sustainability, Instituto Superior Técnico, Universidade de Lisboa
Av. Rovisco Pais 1, 1049-001 Lisboa, Portugal

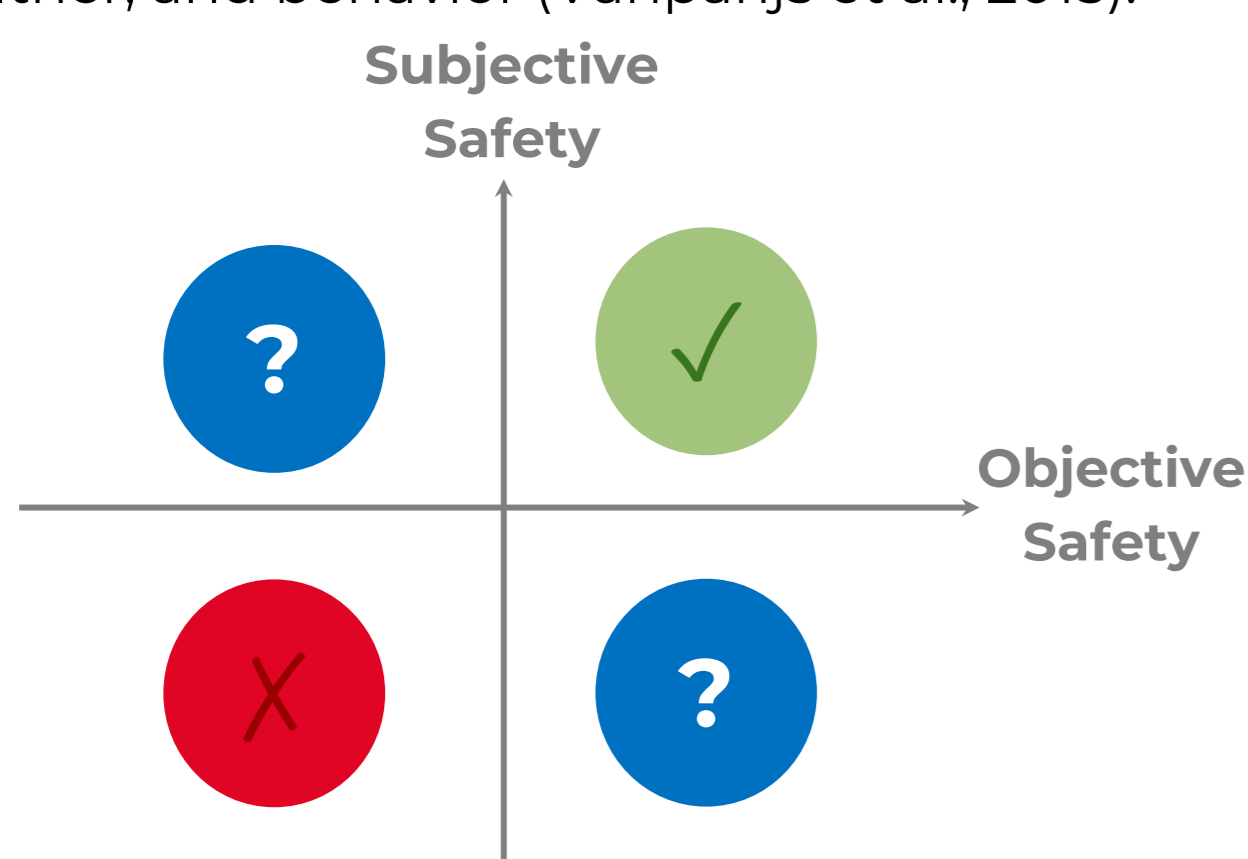
2. Laboratório Nacional de Engenharia Civil, Departamento de Transportes, Núcleo de Planeamento, Tráfego e Segurança
Av. do Brasil, 101, 1700-066 Lisbon, Portugal

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1 UNDERSTANDING

As the world population grows, greater pressure is expected on urban growth. Likewise, pressure on traffic in urban environments will increase. One possible solution to the resulting challenges would be to further expand highway capacity. However, given the increasing lack of space combined with growing environmental constraints, such a hypothesis is becoming increasingly unlikely. Therefore, active modes offer themselves as more resilient, safer, and sustainable alternatives for expanding the transportation capacity of cities. Active modes require significantly less space, but are often neglected (Lawson et al., 2015; Nilsson et al., 2017). One of the foundations for a sustainable city can be cycling, which offers social, environmental, and economic benefits. However, the lack of safety is one of the main obstacles to the use of cycling as a regular mode of transport, which is often related to the lack of adequate infrastructure (Félix et al., 2017). Therefore, it is necessary to rethink cities and provide adequate conditions and infrastructure for cyclists to make cycling safer and more attractive (Félix et al., 2020). While dedicated cycling infrastructure (e.g., bike lanes) has been shown to reduce the risk of collisions and injuries, most research on urban cycling safety focuses on other factors such as sociodemographics, built environment, weather, and behavior (Vanparijs et al., 2015).

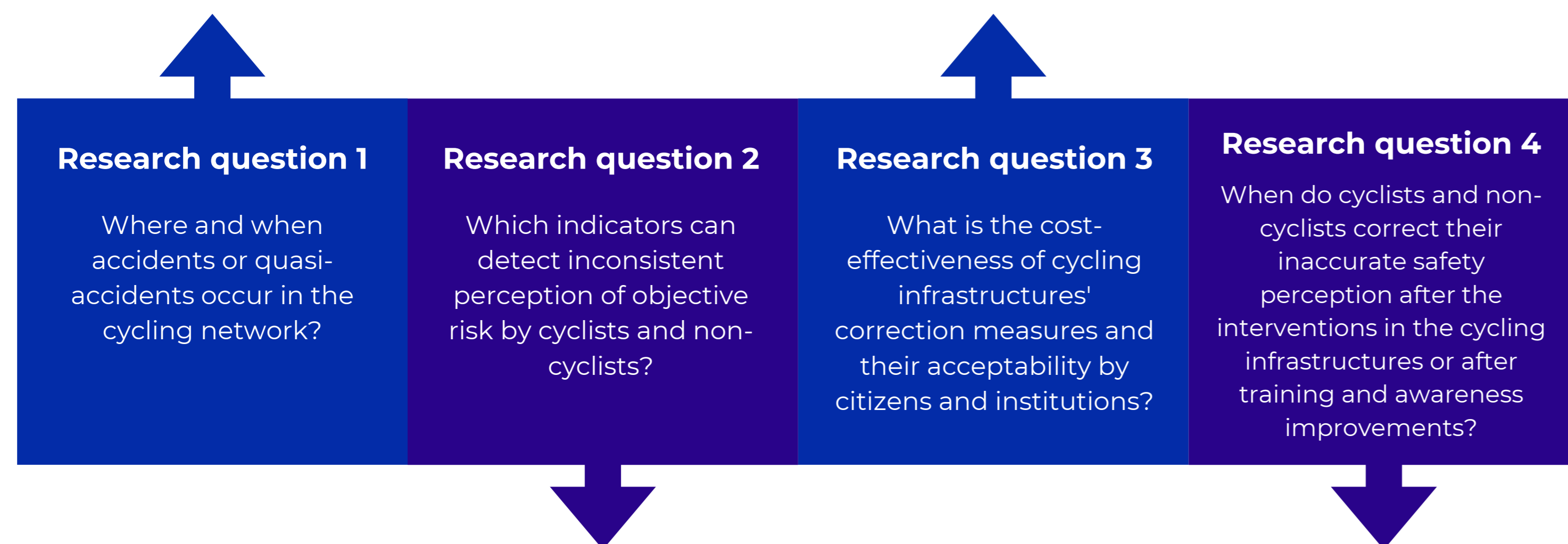


However, the objective safety of cycling (e.g., crash risk) may not be perceived by cyclists in the same way (subjective or perceived safety) (Heinen et al., 2011). When infrastructure is not safe and bicyclists believe they are safe, they are exposed to risk. Risk perception is influenced by both the likelihood of an adverse event (e.g., the risk of an accident) and the magnitude of the consequences (e.g., the severity of the injury) (Leiss and Chociolko, 1994)

Perceptions of safety directly affect intentions and decisions to use active transportation (Heinen et al., 2011). Thus, the decision to use a bicycle may be guided more by perception than by empirical data (Dill and Voros, 2007). Risk perception varies according to individual characteristics (age, gender, education, and attitudes), but is also influenced by cultural and social conditions and interactions, as well as the specific hazard (Sjøberg et al., 2004). Risk perception can influence whether one feels encouraged or discouraged to ride a bicycle. Therefore, perception should be taken into account (Noland, 1995). Therefore, analyzing and studying perceived safety is crucial for developing strategies to promote cycling.

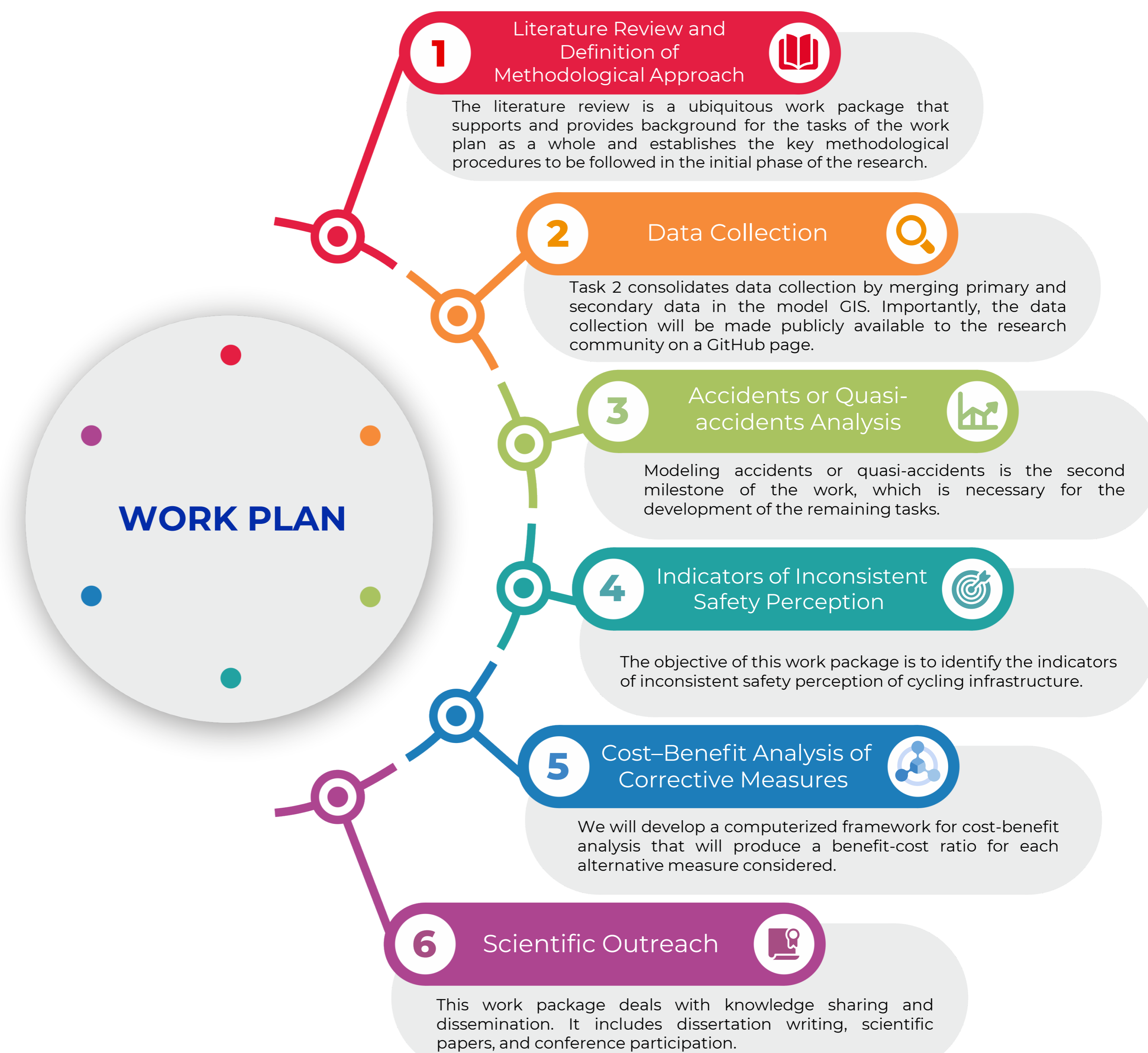
2 OBJECTIVE AND RESEARCH QUESTIONS

The research aims to fill a gap in the existing literature when subjective safety does not match objective safety and vice versa, resulting in cyclists being exposed to high risk without perceiving it or avoiding safer routes, justifying interventions in the cycling network. We need to know how to better plan and design cycling infrastructure to improve the attractiveness and safety of cycling. The state of the art also shows that we do not know which and how objective safety measures effectively influence subjective perceptions. In addition, we do not know how to evaluate the cost-effectiveness and acceptability of these measures. Four main research questions emerged from the literature review:



3 WORK PLAN

Six major work packages organize the methodology of this research plan. The tasks develop and answer the four research questions previously described by achieving their specific objectives.



4 CONCLUSIONS

The proposed research plan points out several gaps in existing studies on the objective and subjective safety of cyclists. The state of the science indicates that we do not know how objective safety measures affect subjective perceptions. It is generally accepted that bicycling promotes health and reduces air pollution. The government encourages people to bike by improving infrastructure and developing bike-share systems. Traffic conflicts limit bicyclists' and pedestrians' trips and prevent potential users from taking full advantage of active transportation. Providing adequate and safe infrastructure for bicyclists is a critical success factor in promoting bicycling as a mode of transportation.

The work plan and methods are consistent with the goal of the study and should provide reliable results on the stated research questions. We believe that this work brings innovative approaches to the current body of knowledge, as we propose to identify indicators to detect inconsistent perceptions of dangerous cycling locations by cyclists and non-cyclists.

We anticipate that the results of this research will benefit urban planners and policy makers as we propose a computerized framework for cost-benefit analysis of corrective measures to mitigate cycling problems and establish the appropriate benefit-cost ratio. We will also rank cost-effective corrective actions to mitigate cycling problems. Perhaps even more important than contributing to the design of measures to increase cycling safety is the expectation that the results will have policy implications for the design of comprehensive policy packages to increase cycling in the urban population. We believe that the methods and results of this study are transferable to other regions with the necessary adaptations.

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