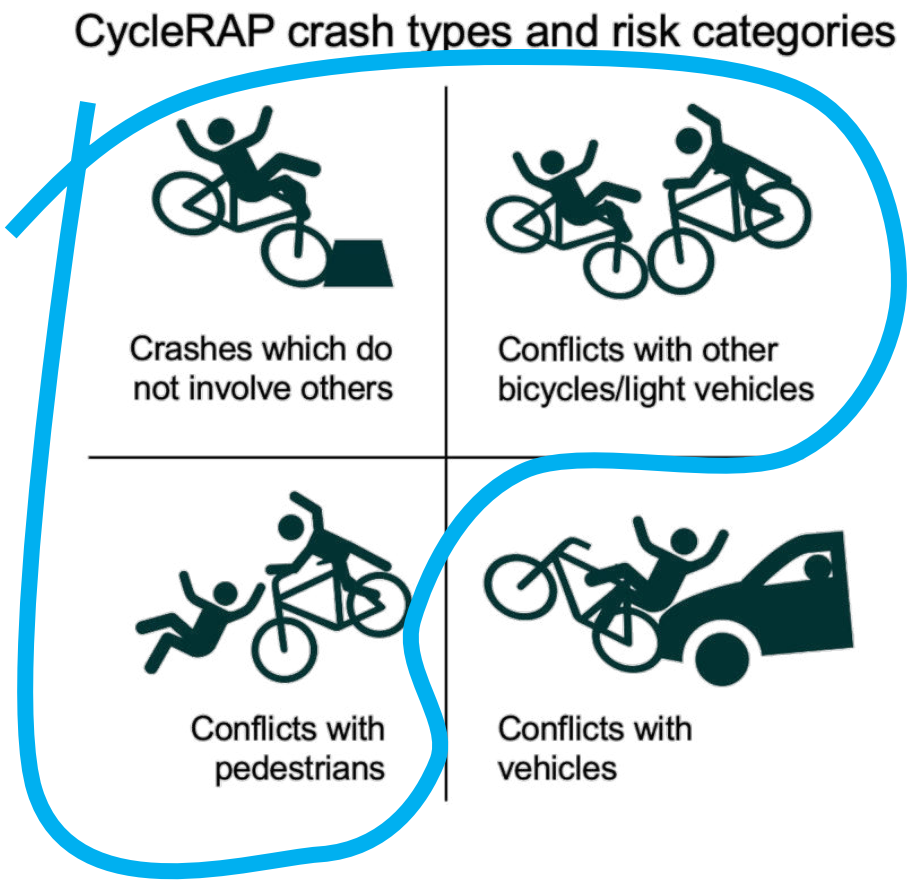
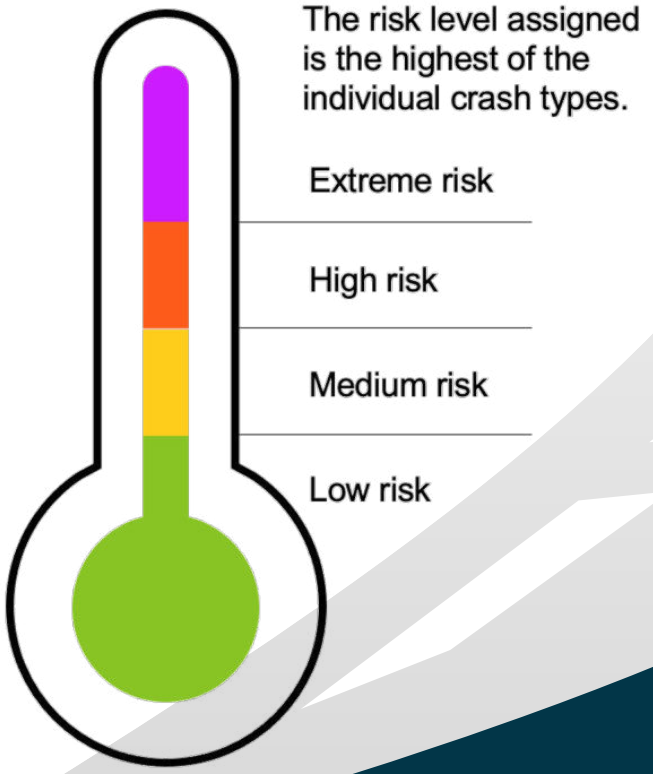
cycleraap

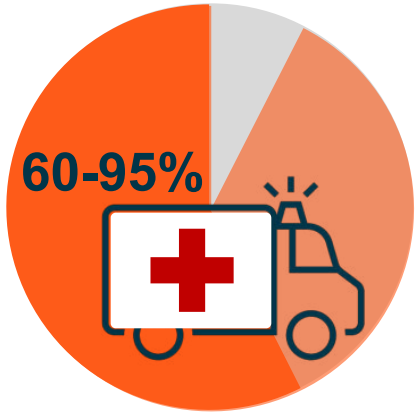
SHANNA LUCCHESI

IRAP

A risk evaluation & safety treatment model for bicyclists and light mobility users







Systematic review

OPEN ACCESS

An international review of the frequency of single-bicycle crashes (SBCs) and their relation to bicycle modal share

Paul Schepers,[1] Niels Agerholm,[2] Emmanuelle Amoros,[3] Rob Benington,[4] Torkel Bjørnskau,[5] Stijn Dhondt,[6] Bas de Geus,[6] Carmen Hagemeister,[7] Becky P Y Loo,[8] Anna Niska[9]

[1]Ministry of Infrastructure and the Environment, Delft, The Netherlands
[2]Aalborg University, Aalborg, Denmark
[3]IFSTTAR, Université de Lyon, Lyon, France
[4]Public Health (Bristol), Bristol, UK
[5]TØI Institute of Transport Economics, Oslo, Norway
[6]Vrije Universiteit Brussel, Brussels, Belgium
[7]Technische Universität Dresden, Dresden, Germany
[8]University of Hong Kong, Pokfulam, China
[9]VTI, Swedish National Road and Transport Research Institute, Linköping, Sweden

Correspondence to
Paul Schepers, Ministry of Infrastructure and the Environment, PO Box 5044, Delft 2600 GA, Netherlands; paul.schepers@rws.nl

Received 15 July 2013
Revised 26 November 2013
Accepted 15 December 2013
Published Online First 9 January 2014

ABSTRACT

Objectives To study cyclists' share of transport modes (modal share) and single-bicycle crashes (SBCs) in different countries in order to investigate if the proportion of cyclist injuries resulting from SBCs is affected by variation in modal share.

Methods A literature search identified figures (largely from western countries) on SBC casualties who are fatally injured, hospitalised or treated at an emergency department. Correlation and regression analyses were used to investigate how bicycle modal share is related to SBCs.

Results On average, 17% of fatal injuries to cyclists are caused by SBCs. Different countries show a range of values between 5% and 30%. Between 60% and 95% of cyclists admitted to hospitals or treated at emergency departments are victims of SBCs. The proportion of all injured cyclists who are injured in SBCs is unrelated to the share of cycling in the modal split. The share of SBC casualties among the total number of road crash casualties increases proportionally less than the increase in bicycle modal share.

Conclusions While most fatal injuries among cyclists are due to motor vehicle–bicycle crashes, most hospital admissions and emergency department attendances result from SBCs. As found in previous studies of cyclists injured in collisions, this study found that the increase in the number of SBC casualties is proportionally less than the increase in bicycle modal share.

Open access
Scan to access more free content

CrossMark

To cite: Schepers P, Agerholm N, Amoros E, *et al*. *Inj Prev* 2015;**21**: e138–e143.

INTRODUCTION

With increasing attention being paid to the promotion of active, low-carbon travel for health, environmental, social and economic benefits, it is important to understand the relationship between bicycle use and incidence of injury. Single-bicycle crashes (SBCs) are a significant[1–3] and (in some countries) increasing cause of serious transport related injuries.[3–5] SBCs cause injuries that result in emergency admission to hospital that are coded as 'non-collision incident' and 'collision with fixed and stationary objects' using the International Classification of Diseases 10. The problem of SBCs has remained hidden for a long time because SBCs are rarely reported in official road crash statistics[6–9] which do not regularly include hospital data. This may explain why research into SBCs, contributory factors and effects on bicycle use is at an early stage.[10] It is important to understand SBCs for at least four reasons: (1) SBCs are a significant cause of serious injury, see e.g. figure 1 showing that non-fatal injuries incurred by Dutch cyclists are, regardless of injury severity, mostly due to crashes that do not involve motor vehicles, the large majority being SBCs; (2) SBCs cause direct economic costs through absence from work and from productivity losses;[1 11] (3) the hazards that lead to SBCs such as poor infrastructure quality may discourage more active travel by bicycle, thereby preventing people from taking advantage of the health benefits of cycling;[12–17] and (4) there is a moral obligation to understand the risks of activities that are being promoted so that risks can be minimised or removed and potential participants can grant their informed consent to accept the risks that remain. The causes of SBCs are outside the scope of this paper as these are more fully discussed elsewhere.[2 3 9 10 18–21]

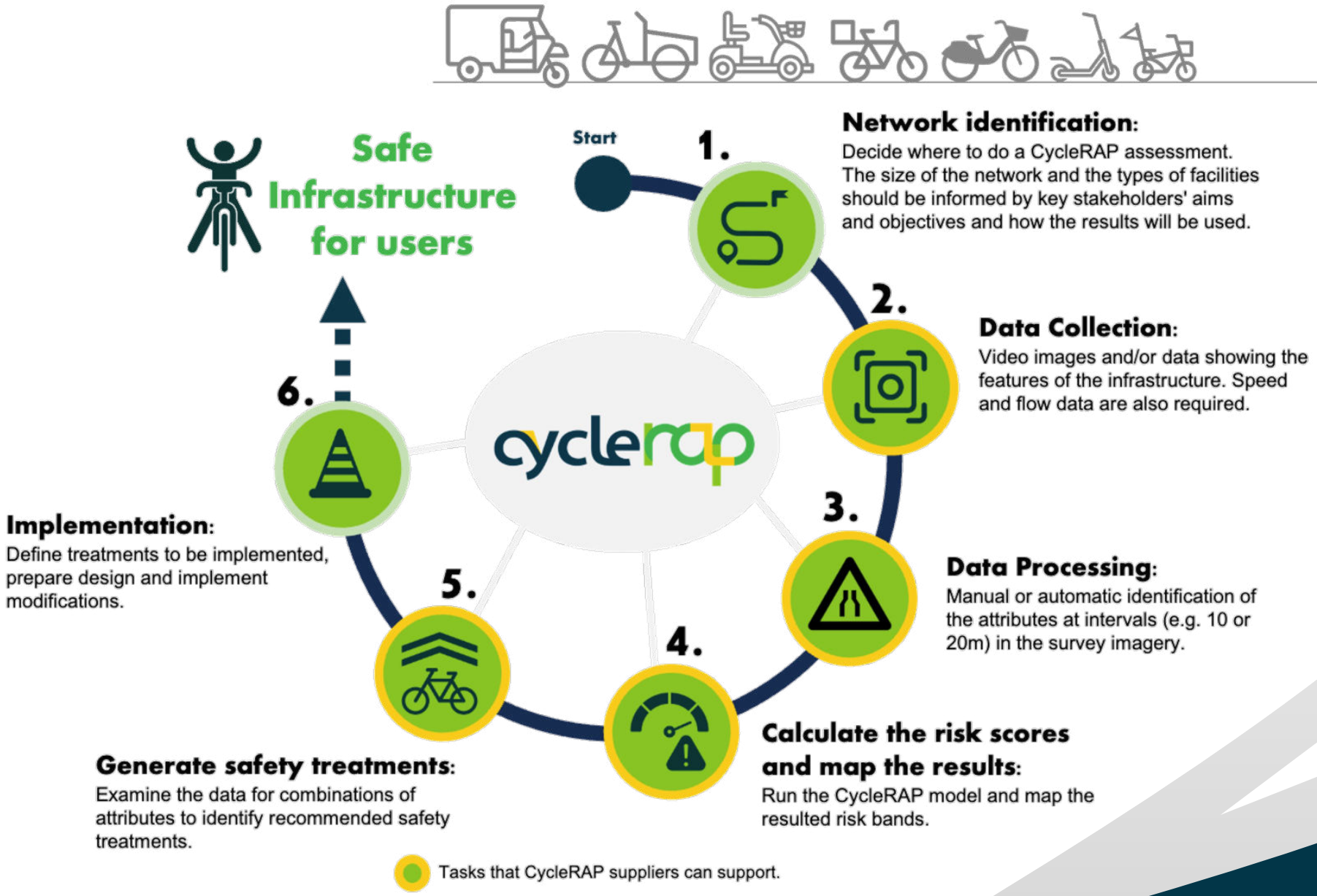
The relationship between increasing bicycle usage and bicycle crashes involving collisions has received significant research attention,[25–27] but, as yet, only one Dutch study by Schepers addressed this issue for SBCs.[28] Schepers found the increase in SBCs to be proportionally less than the increase in bicycle usage,[28] mirroring the 'non-linearity of risk' found for motor vehicle–bicycle (MV-B) crashes.[25 26] Most explanations for the non-linearity of risk relate to MV-B crashes. For instance, Jacobsen[25] suggests that motorists modify their behaviour when they expect or experience people walking and bicycling, which he called 'safety in numbers'. Different explanations may apply to the risk of SBC: local authorities may improve infrastructure as the amount of cycling increases[22] and vice versa.[29] Fewer crashes may occur as cyclists become more experienced and skilled.[28] To explore whether non-linearity of risk also applies to SBCs, we examined the frequency of SBCs in a sample of countries with varying amounts of cycling.

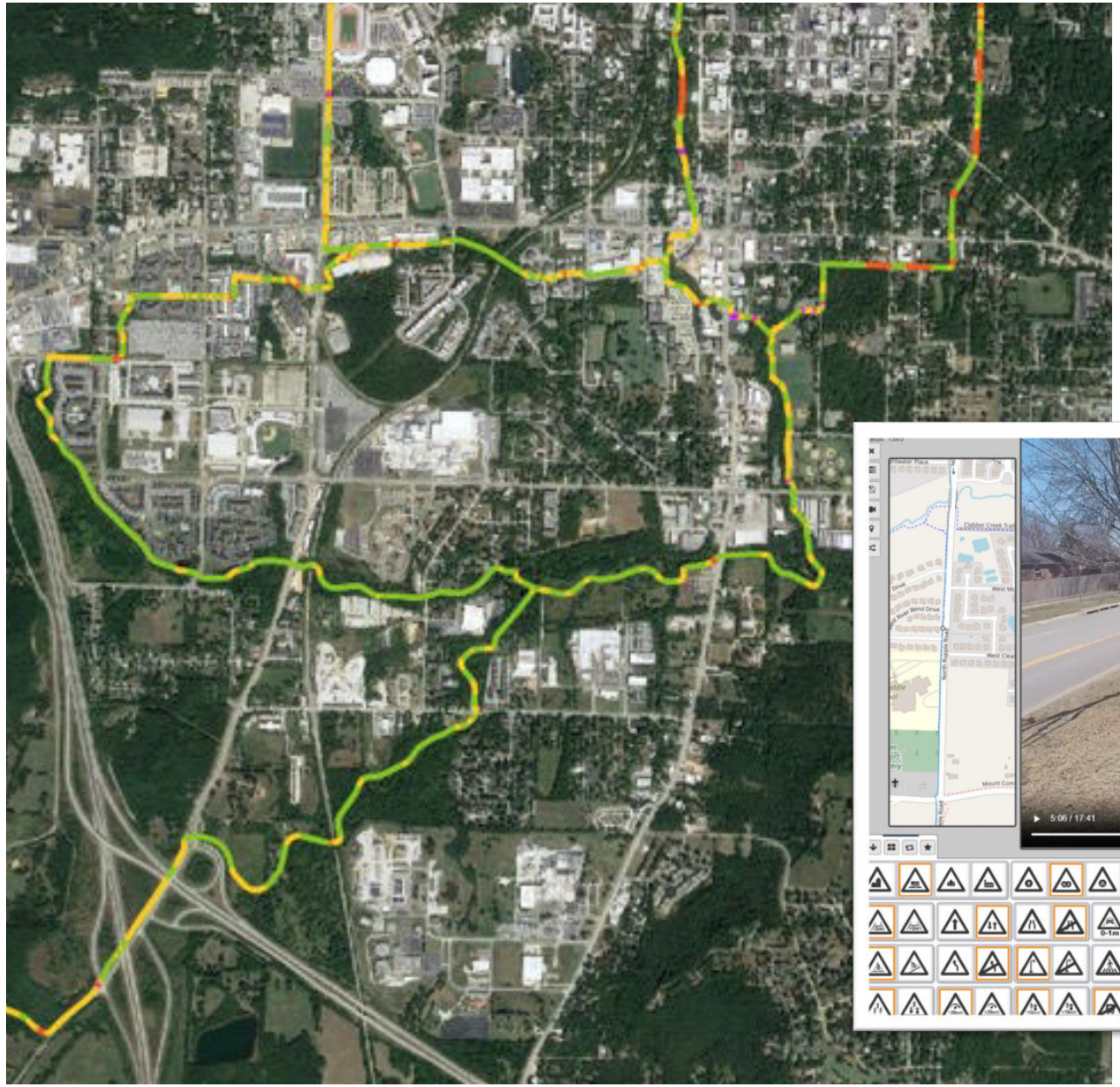
Using a literature search, we examined (1) the frequency of SBCs resulting in fatal injuries; (2) the frequency of SBCs resulting in severe non-fatal injuries (here defined as casualties who are admitted to the hospital (hospitalised) or treated at an emergency department (ED)); (3) how bicycle modal share is associated with the proportion of cycling injuries occurring in SBCs; and (4) the hypothesis that an increase in bicycle modal share is related to a less than proportional increase in the share of SBCs among all road crash victims. We aimed to include data from countries with varying

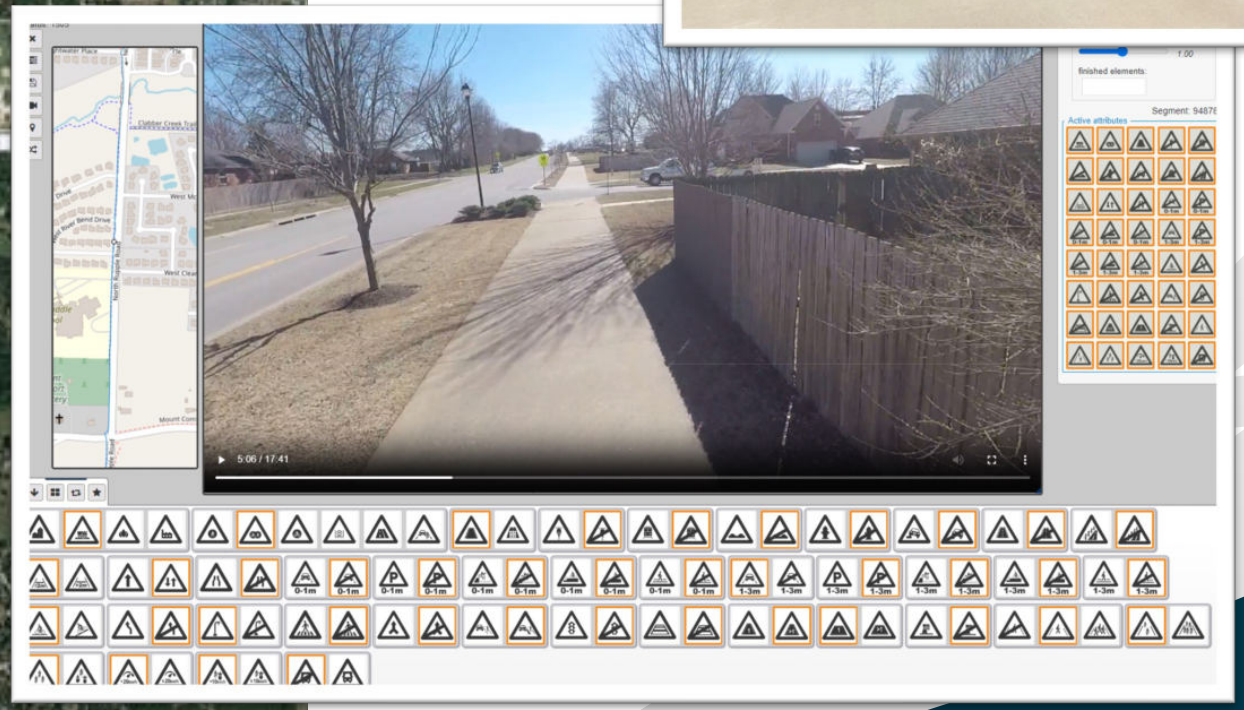
e138 Schepers P, *et al*. *Inj Prev* 2015;**21**:e138–e143. doi:10.1136/injuryprev-2013-040964 BMJ

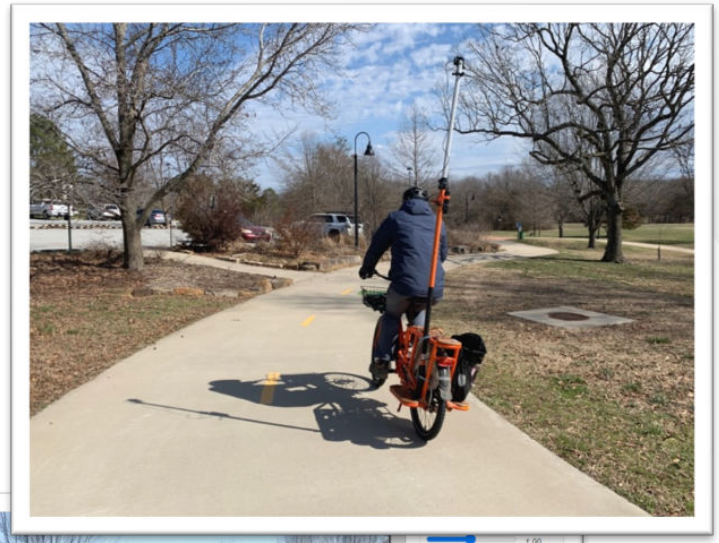
"Cyclists are now the biggest challenge we have in achieving Vision Zero"

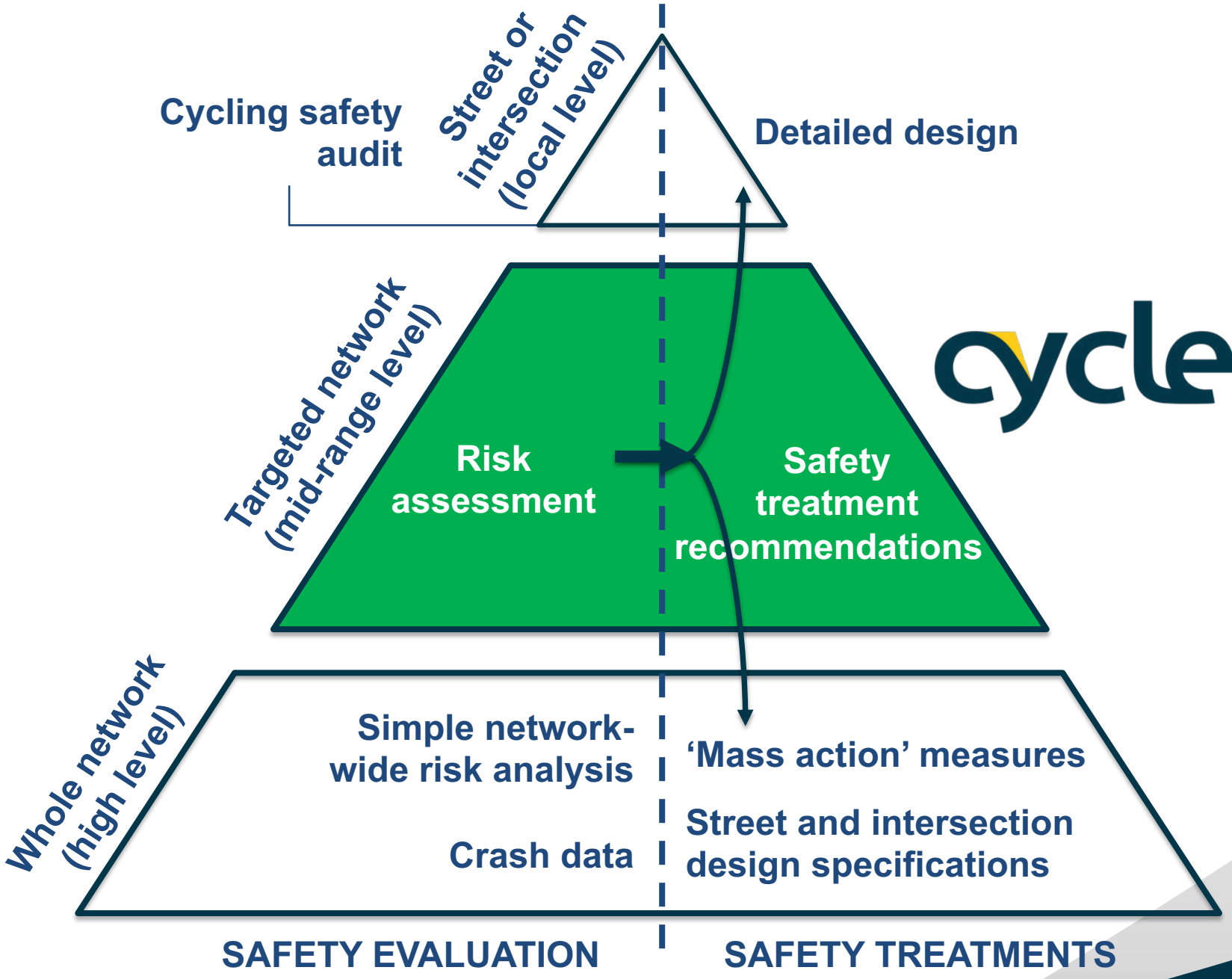
– Anna Niska, VTI Sweden


Safe Infrastructure for users
Start
1.
Network identification:
Decide where to do a CycleRAP assessment. The size of the network and the types of facilities should be informed by key stakeholders' aims and objectives and how the results will be used.
2.
Data Collection:
Video images and/or data showing the features of the infrastructure. Speed and flow data are also required.
3.
Data Processing:
Manual or automatic identification of the attributes at intervals (e.g. 10 or 20m) in the survey imagery.
4.
Calculate the risk scores and map the results:
Run the CycleRAP model and map the resulted risk bands.
5.
Generate safety treatments:
Examine the data for combinations of attributes to identify recommended safety treatments.
6.
Implementation:
Define treatments to be implemented, prepare design and implement modifications.
cycleRAP
Tasks that CycleRAP suppliers can support.



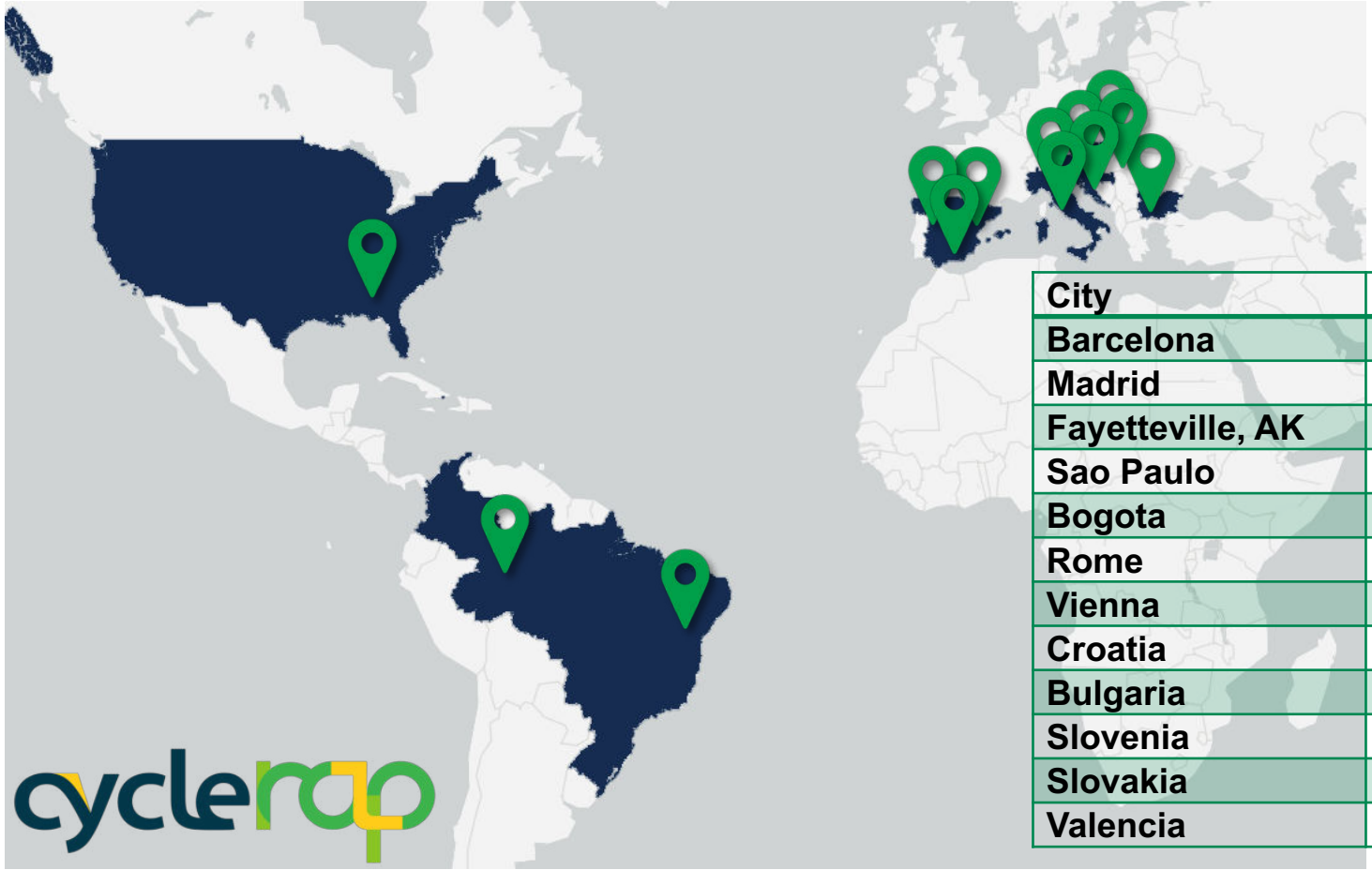

finished elements:
Segment: 94878
Active attributes
5:06 / 17:41





cyclerap

iRAP



- 10 countries
- ~1000km

City	Km assessed	Supplier
Barcelona	54km	Factual Consulting
Madrid	62km	Factual Consulting
Fayetteville, AK	80km	FPZ
Sao Paulo	1115 locations	iRAP
Bogota	50km	iRAP
Rome	<1km	FRED Engineering
Vienna	267km	FPZ
Croatia	248km	FPZ
Bulgaria	39km	FPZ
Slovenia	61km	FPZ
Slovakia	59km	FPZ
Valencia	-- km	Factual Consulting

Image by nextbike from Pixabay

iRAP A World Free of High Risk Roads

iRAP