

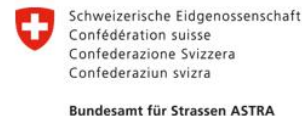
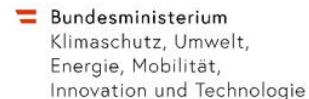
# VERA.

## Quantifying the shifting effects of newly built or improved cycling facilities

POLIS Conference, 27<sup>th</sup>-28<sup>th</sup> November 2024

Dr. Martin Loidl – Paris Lodron University Salzburg (PLUS)

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Newly built or extended cycling facilities

Mode shift

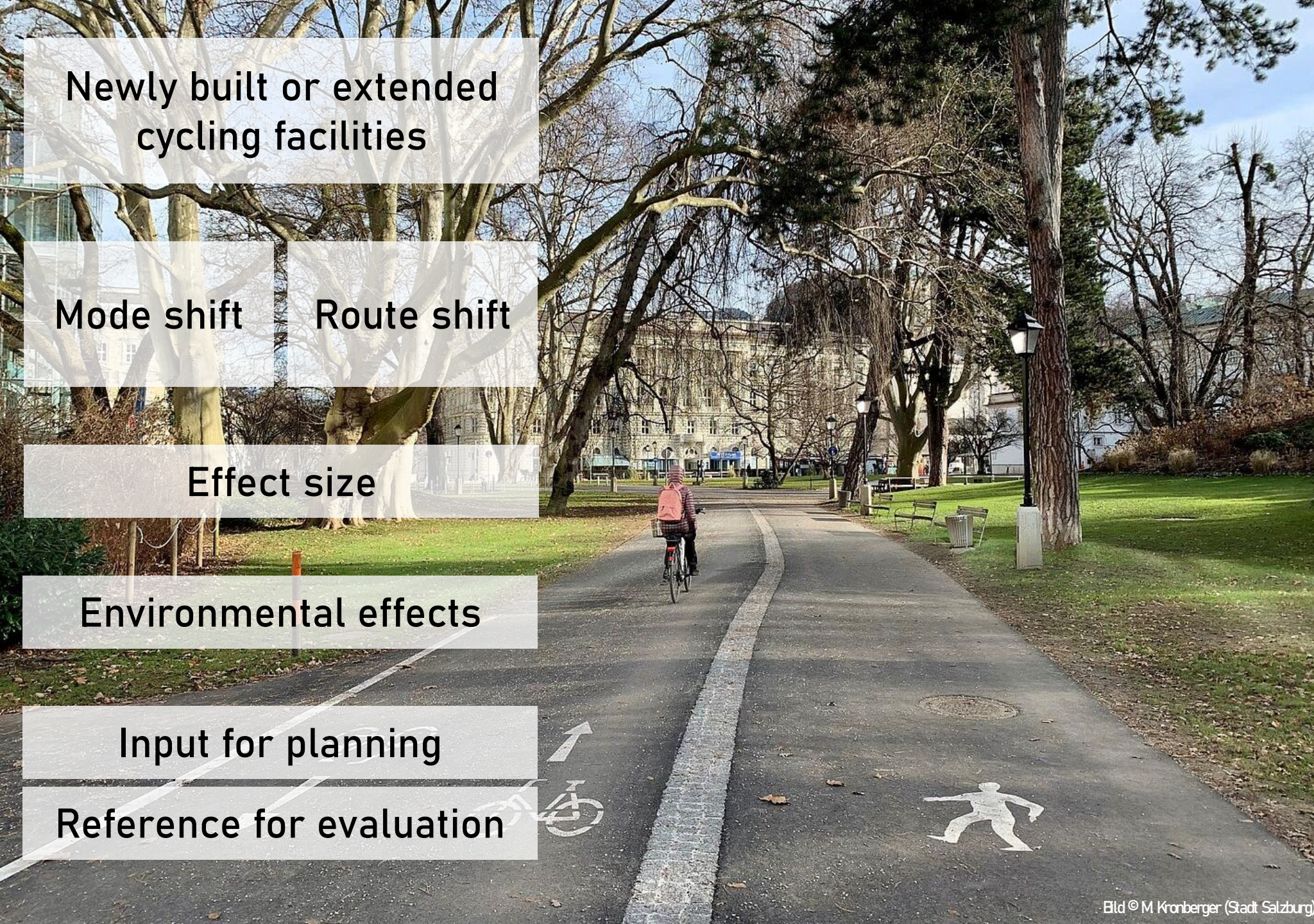
Route shift

Effect size

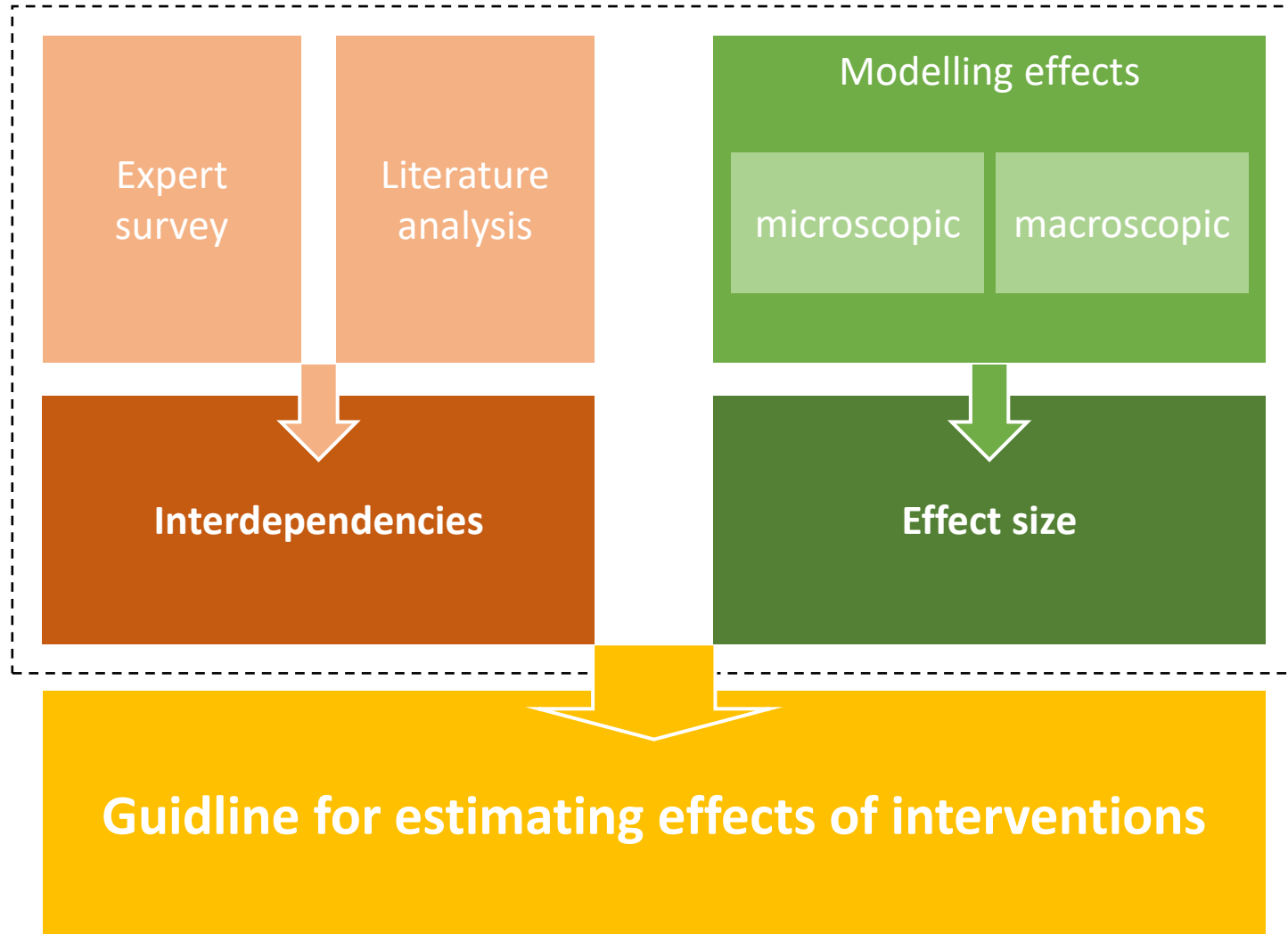
Environmental effects

Input for planning

Reference for evaluation



# VERA Approach



# Interdependences

## ■ Literature review

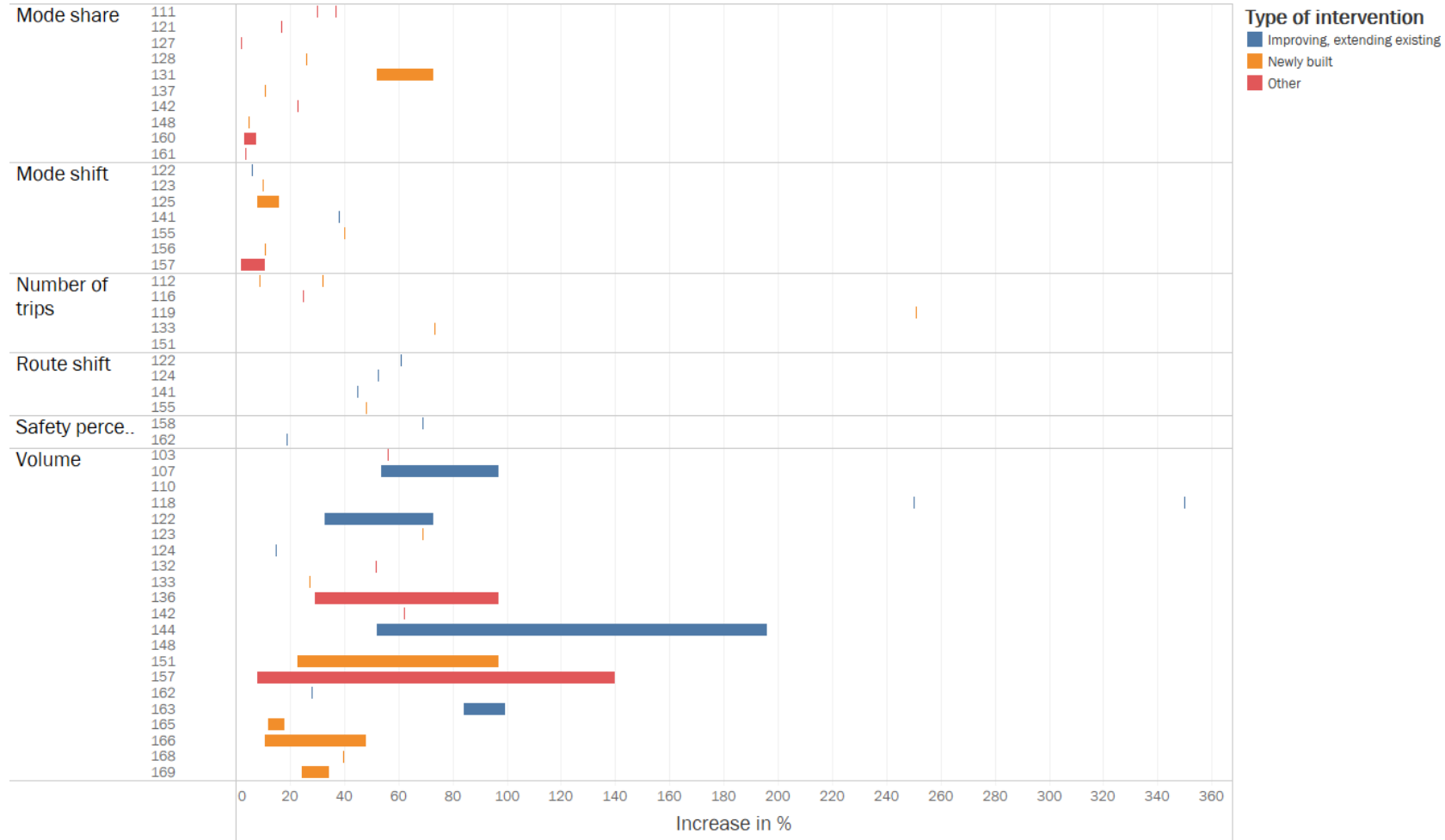
- 51 eligible papers
  - 25 newly built facilities, 11 extensions, 15 comprehensive extension and optimization projects
  - 7 studies from Europe, mostly from USA, UK, CAN
  - Cycling volume at the place of implementation as most oftenly measured effect

## ■ Consultation of experts

- Online survey
- 169 partly and 132 entirely finished
- Main target group / participants: public administration
- Experience and expert assessment as the primary evaluation method



# Literature Analysis



# Effect Matrix



# Empirical Model: Effect Sizes

- Level of detail: microscopic (intervention), mesoscopic (environment of intervention)
- Input for estimation model:
  - Demand data (cycling trajectories from different sources)

	Austria	Switzerland	Germany
Source	Österreich radelt zur Arbeit	Strava	Stadtradeln
Device	Smartphone (GNSS)	Smartphone (GNSS)	Smartphone (GNSS)
Geographical Coverage	Vienna	Zurich	Germany
Temporal Coverage	2013 – 2016	2019 – 2023	2018 – 2020, 2022 – 2023
Acquisition	Entire year	Entire year	3 weeks (slot for different towns)
Temporal Aggregation	Monthly	Monthly	Yearly
Map-Matching	OSM	OSM	OSM

- Type of intervention
- Street infrastructure (graph), demography, variable for fixed effect (ZIP, city, year, OSM-ID of segment)



# Effect Size Estimation

Maßnahmekategorie	$\beta$
Ausbau des Radwegenetzes	1.366+ (0,244)
Belagsanierung	1.480** (0,209)
Markierung von Radverkehrsanlagen	1.359 (0,345)
Neubau Radweg	1.720*** (0,275)
Öffnung von Einbahnstraßen	1.561** (0,248)
.theta	290.896***
.theta	(204.860<)
NumObs	696022
R2	0.295
R2 Adj.	0.238
R2 Within	0.204
R2 Within Adj.	0.204
AIC	5902595.5
BC	8456564.8



Estimation of effect of different types of interventions for entire DACH-region.

\*\*\*p ≤ .001 \*\* p ≤ .01 \* p ≤ .05 + p ≤ .1

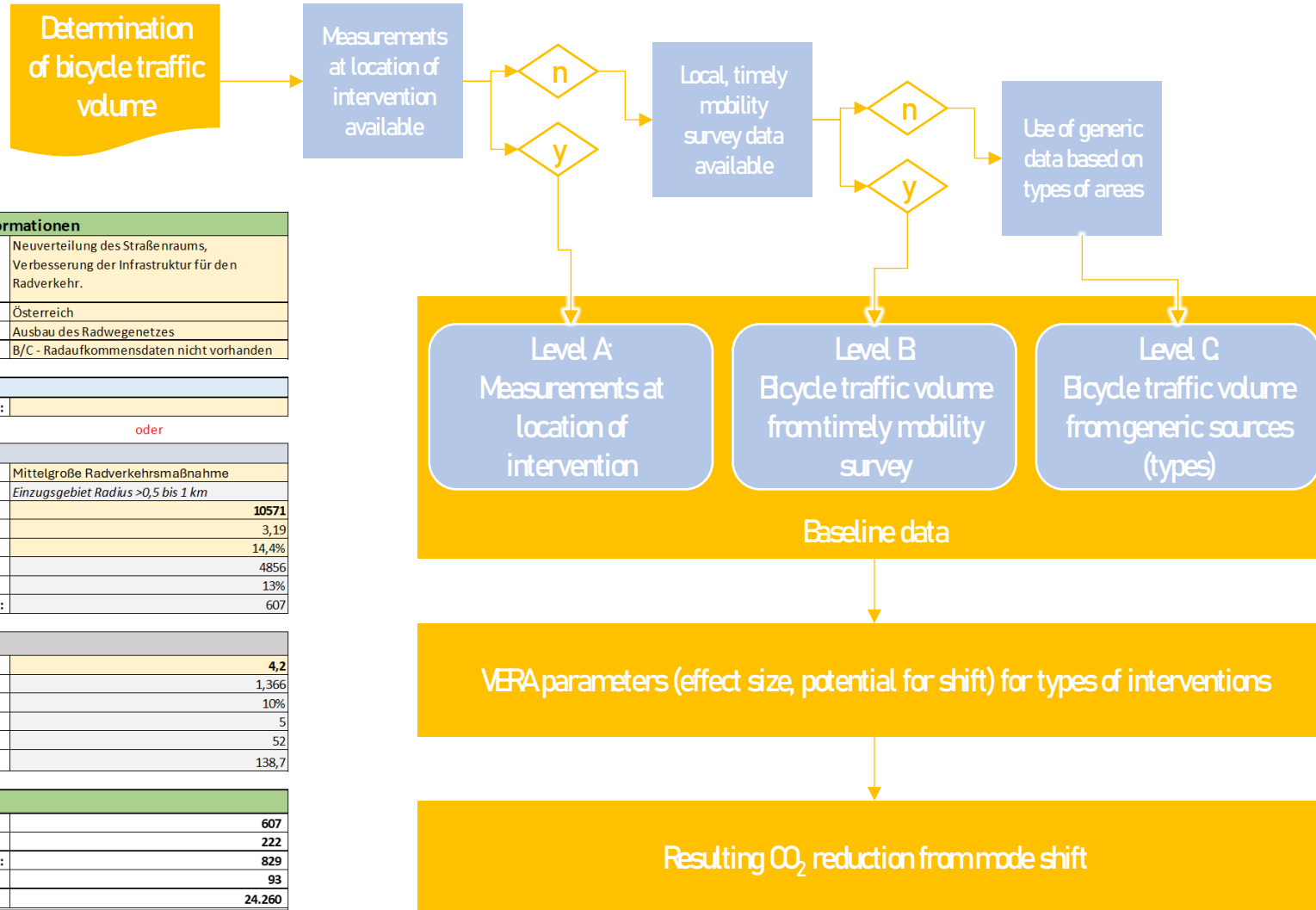


# Guideline

- Data-efficient, low-level estimation of shifting effects of interventions
- Target group:
  - Decision makers and planners in municipalities
  - Consultants and planning companies
  - Scientific institutions
  - National and regional administration (funding / subsidies)
- Four main steps:
  - Determination of bicycle traffic volume » Shifting potential of the intervention » Estimation of the shift effect » Estimation of the environmental effect
- Excel template for simple model application



# Guideline



Allgemeine Informationen	
Beschreibung der Maßnahme:	Neuverteilung des Straßennraums, Verbesserung der Infrastruktur für den Radverkehr.
Land:	Österreich
Maßnahmenart:	Ausbau des Radwegenetzes
Berechnungsebene:	B/C - Radaufkommensdaten nicht vorhanden

Level A	
Radverkehrsaufkommen am Ort der Maßnahme pro Tag:	

oder

Level B/C	
Maßnahmenumfang (Effektgröße):	Mittelgroße Radverkehrsmaßnahme
Einzugsgebiet Info:	Einzugsgebiet Radius >0,5 bis 1 km
Personenanzahl im Einzugsgebiet:	10571
Wege pro Person und Tag:	3,19
Radverkehrsanteil:	14,4%
Radwegeanzahl Wohnbevölkerung gesamt:	4856
Abschwächungsfaktor relevanter Radverkehr:	13%
Radverkehrsaufkommen am Ort der Maßnahme pro Tag:	607

Weitere Eingangsdaten	
Durchschnittliche Weglänge der Radwege:	4,2
Steigerungsfaktor aus VERA:	1,366
Pkw-Reduktionsfaktor VERA:	10%
Anzahl Tage pro Woche:	5
Anzahl Wochen pro Jahr:	52
CO <sup>2</sup> -Ausstoß pro Personen-KM in g:	138,7

Ergebnis der VERA-Abschätzung	
Radverkehrsaufkommen aktuell pro Tag:	607
Steigerung Radfahrtenanzahl pro Tag:	222
Erwartete, zukünftige Radfahrtenanzahl pro Tag absolut:	829
KM Pkw-Reduktion pro Tag:	93
Verlagerte Pkw-Kilometer pro Jahr:	24.260
Eingesparte Tonnen CO <sup>2</sup> pro Jahr:	3,36



# Conclusion

- Effect of single interventions
  - Hard to isolate and determine » challenge for transferability
- Documentation of interventions
  - Many municipalities do not document their projects in machine readable formats
- Data generation and accessibility
  - Trajectories, counting data, mobility surveys
- Evaluation of interventions as default
  - Mostly only post-hoc measurements
- Guideline as support for evidence-based approaches
  - Planning and monitoring



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