

**PROGETTO «P.A.C.T.
Province Attive per la Crescita dei Territori»**

**Workshop “Infrastrutture stradali provinciali: esperienze, buone pratiche e
linee guida operative”**

Giovedì 8 ottobre 2026 | ore 10.00 – 13.30 |

**Rettorato, Politecnico di Bari,
Via Edoardo Orabona 4, 70125 Bari**

**Estratto di una lezione di dottorato sull'applicazione pratica a un caso reale delle
teorie e tecniche di prioritizzazione degli interventi di manutenzione in materia
di sicurezza sulle infrastrutture viarie extraurbane in ambito territoriale e locale**



Prof. ing. Vittorio Ranieri



C@MI

Course @ LIA NextRIM for Mobility and Infrastructure
24/27 June 2024, Marne la Vallee, Paris



Metropolitan Areas: Road infrastructures intervention strategies

Vittorio Ranieri
Polytechnic of Bari, Department
of Civil, Environmental, Land,
Construction and Chemistry

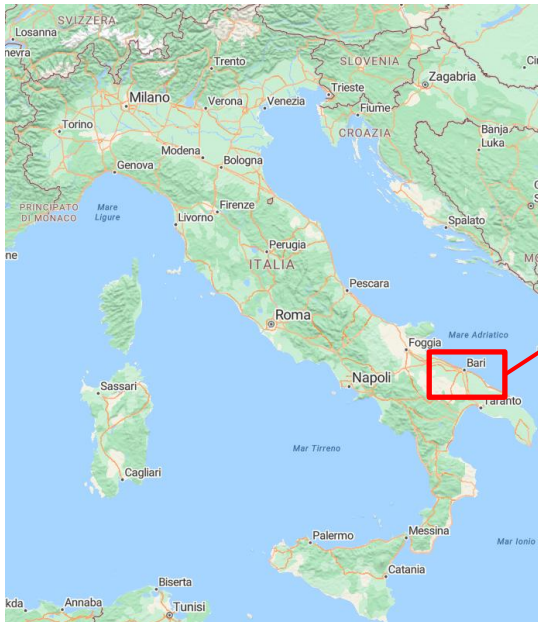
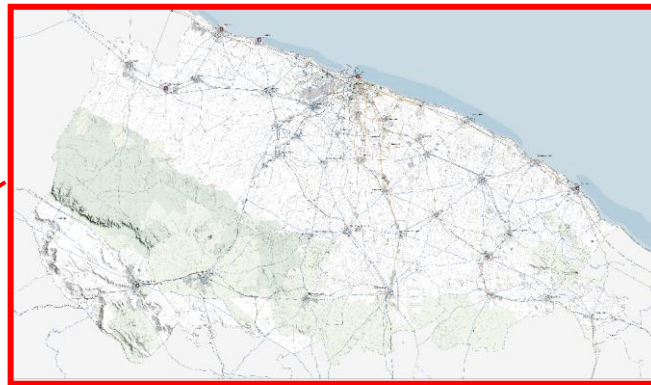
Date (26 June 2024)

Metropolitan and Urban Areas: Road infrastructures intervention strategies

Examples of applied research in this matter



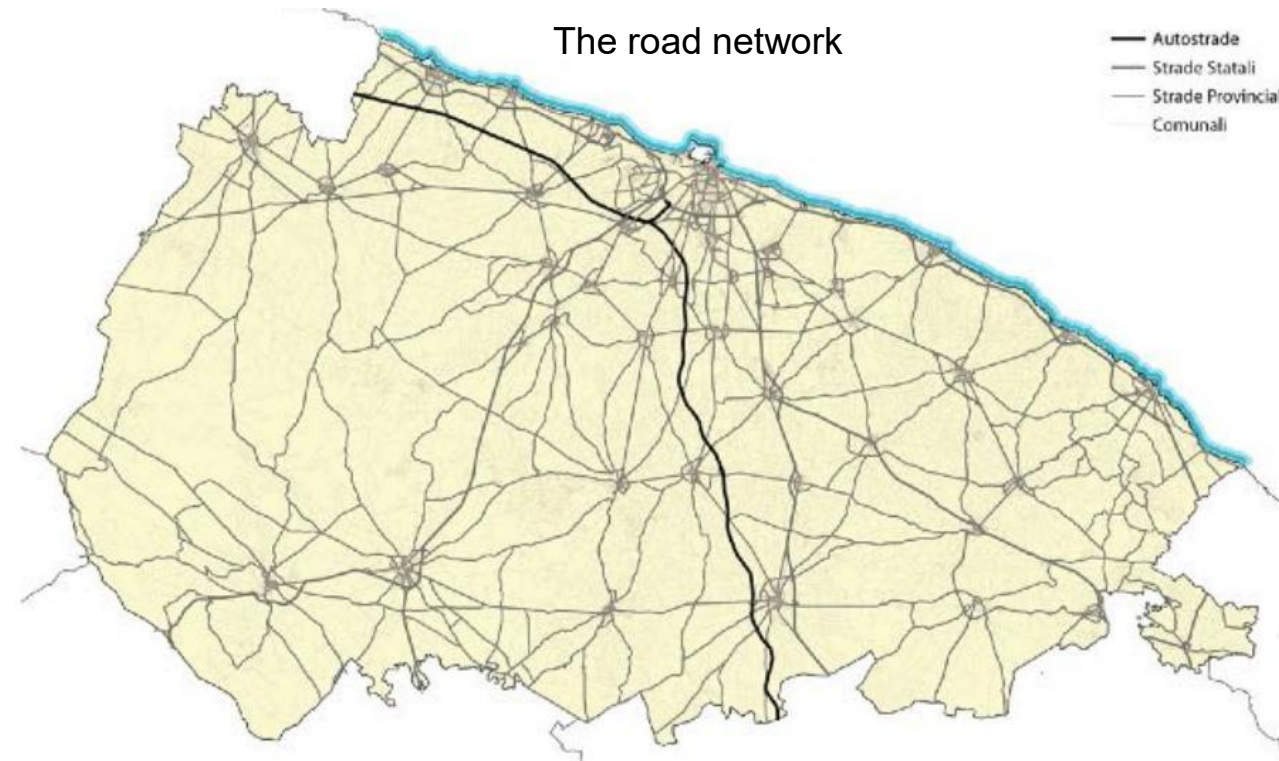
Metropolitan Area of the city of Bari (IT)



Research studies to identify and prioritize intervention under the **SAFETY** point of view

Metropolitan and Urban Areas: Road infrastructures intervention strategies

Metropolitan Area of the city of Bari (IT)

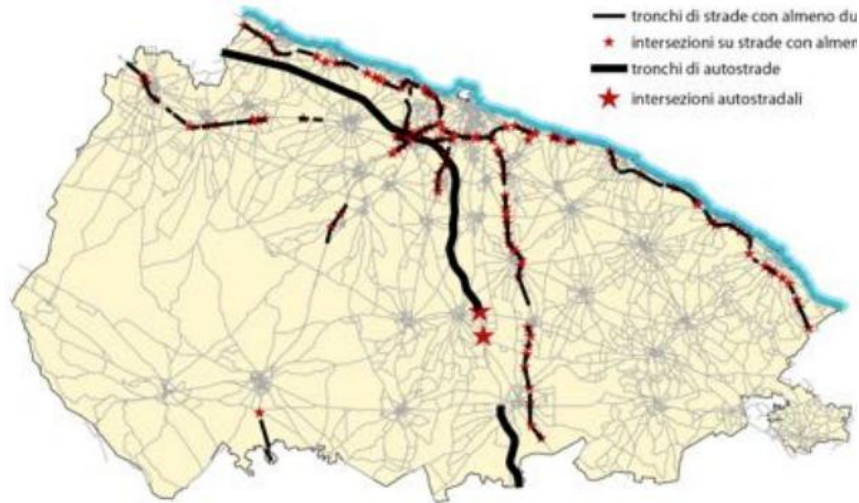


A specific methodology was set up

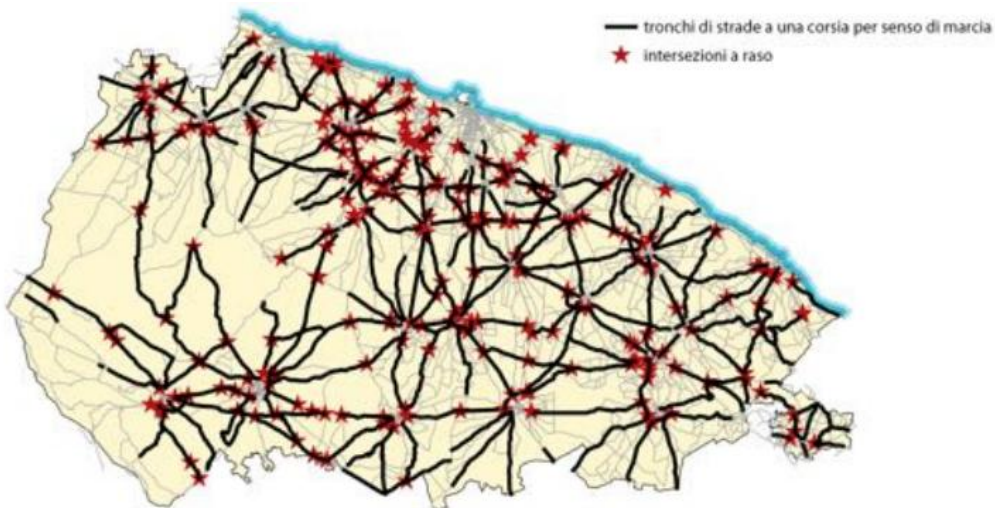
Intini, P., Berloco, N., Coropulis, S., & Ranieri, V. (2024). Optimal planning of safety improvements on road sites belonging to different categories within large networks: An integrated multi-layer framework. *Accident Analysis & Prevention*, 194, 107374.

Metropolitan and Urban Areas: Road infrastructures intervention strategies

Starting point: Analyzing crash data (e.g., in this case: 2015-2019 period)



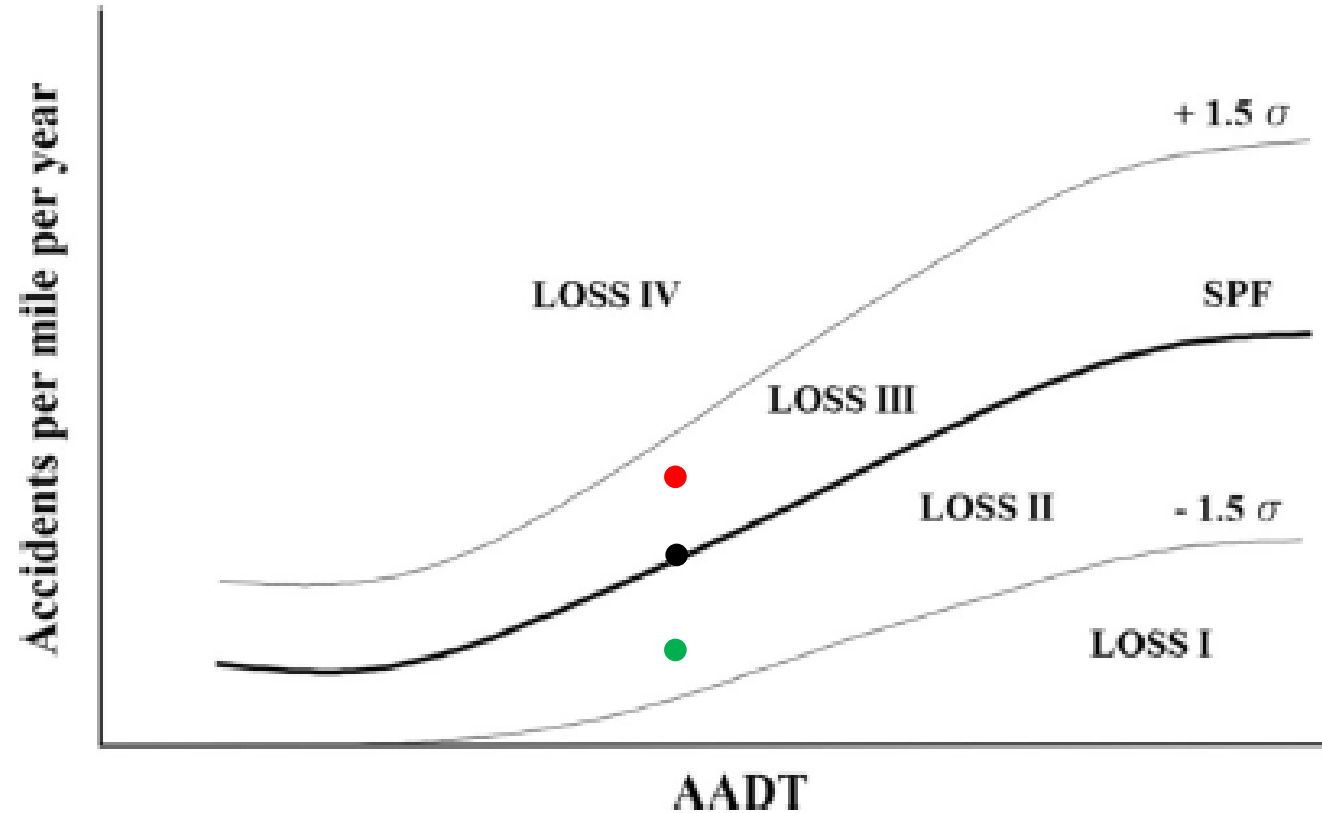
Crashes occurred on the primary/main road network (black lines with red stars representing intersections)



Crashes occurred on the secondary road network (black lines with red stars representing intersections)

Metropolitan and Urban Areas: Road infrastructures intervention strategies

Methodological framework

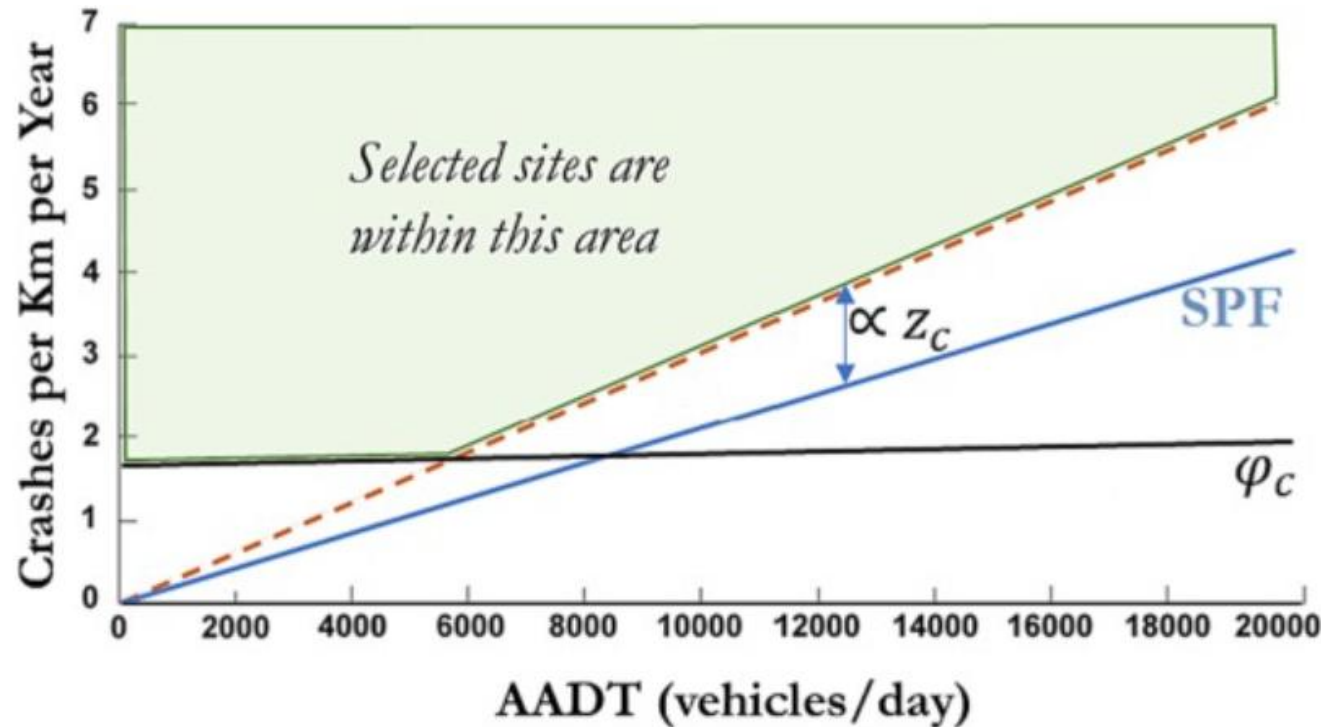


Intini, P., Berloco, N., Coropulis, S., & Ranieri, V. (2024). Optimal planning of safety improvements on road sites belonging to different categories within large networks: An integrated multi-layer framework. *Accident Analysis & Prevention*, 194, 107374.

Kononov, J., & Allery, B. (2003). Level of service of safety: Conceptual blueprint and analytical framework. *Transportation research record*, 1840(1), 57-66.

Metropolitan and Urban Areas: Road infrastructures intervention strategies

Methodological framework



SPF = Safety Performance Function for a given road category 'C' (e.g., a 2-lane rural road or a 4-legged intersection)

AADT = Annual Average Daily Traffic

φ_c = minimum threshold for intervention

α = distance from the mean SPF crash frequency for a given AADT value, depending on a given number of standard deviations (or a percentile)

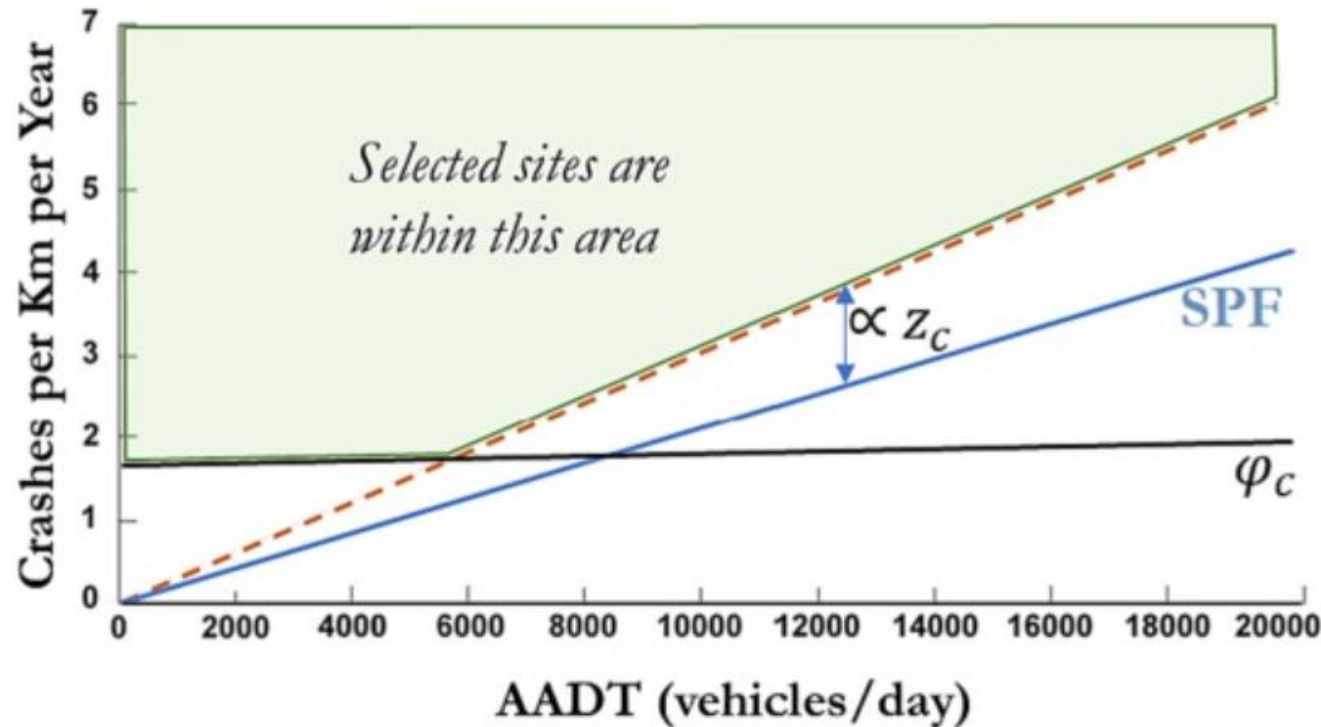
Intini, P., Berloco, N., Coropolis, S., & Ranieri, V. (2024). Optimal planning of safety improvements on road sites belonging to different categories within large networks: An integrated multi-layer framework. *Accident Analysis & Prevention*, 194, 107374.

Kononov, J., & Allery, B. (2003). Level of service of safety: Conceptual blueprint and analytical framework. *Transportation research record*, 1840(1), 57-66.



Metropolitan and Urban Areas: Road infrastructures intervention strategies

Methodological framework



In this case:

φ_c was set as the average crash frequency observed over all the sites belonging to a given road category

αz_c distance was set based on three different high percentiles of the distribution

- 90% (to highlight the high-priority urgent interventions)
- 80% (to highlight the medium-priority interventions)
- 70% (to highlight the low-priority interventions)

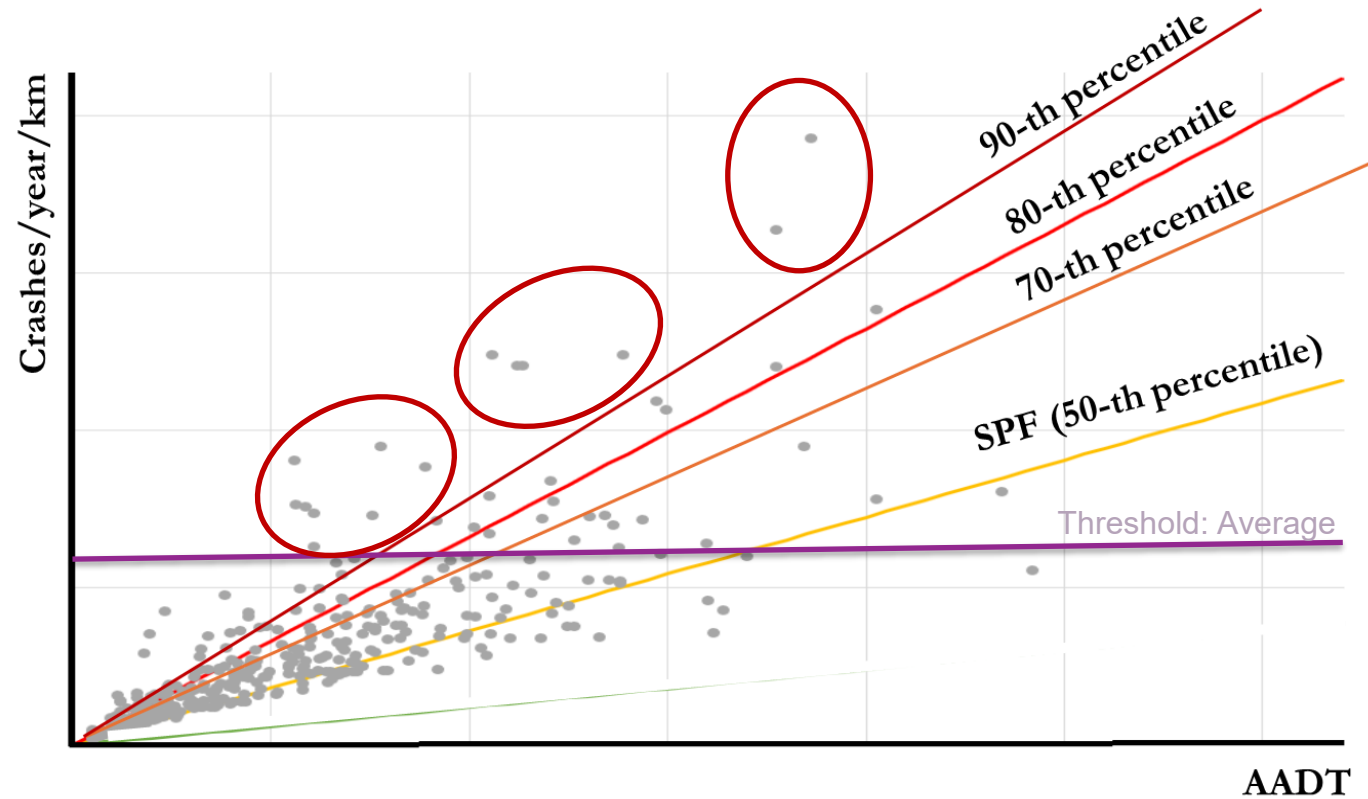
Intini, P., Berloco, N., Coropulis, S., & Ranieri, V. (2024). Optimal planning of safety improvements on road sites belonging to different categories within large networks: An integrated multi-layer framework. *Accident Analysis & Prevention*, 194, 107374.

Kononov, J., & Allery, B. (2003). Level of service of safety: Conceptual blueprint and analytical framework. *Transportation research record*, 1840(1), 57-66.



Metropolitan and Urban Areas: Road infrastructures intervention strategies

Methodological framework



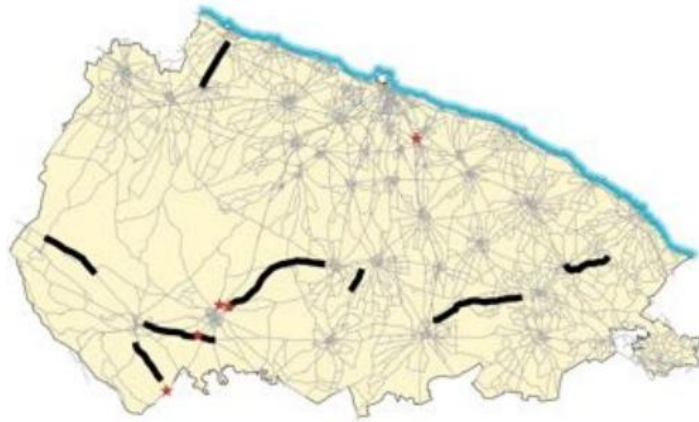
Example of identification of the high-priority road sites for a given category (red circles)

The procedure is repeated for each road category in the network.

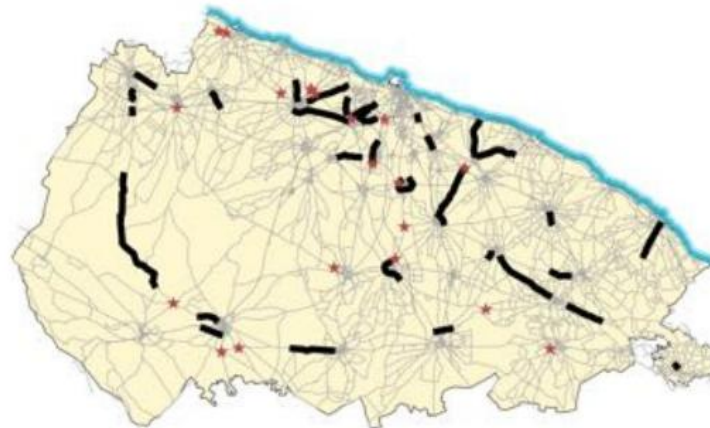
Intini, P., Berloco, N., Coropolis, S., & Ranieri, V. (2024). Optimal planning of safety improvements on road sites belonging to different categories within large networks: An integrated multi-layer framework. *Accident Analysis & Prevention*, 194, 107374.

Metropolitan and Urban Areas: Road infrastructures intervention strategies

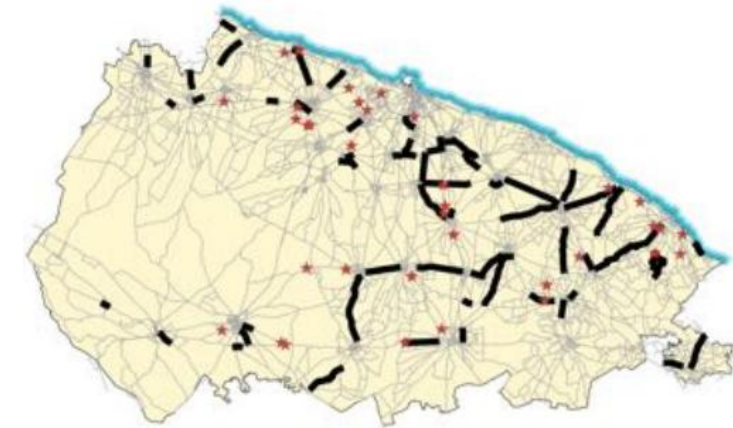
Results



Priority 1 - High



Priority 2 - Medium



Priority 3 - Low

È in corso di completamento (Marzo 2027) il **Progetto PRIN** (Progetto di Rilevante Interesse Nazionale finanziato dal MIUR) AISMoDiT a cui partecipa il Politecnico di Bari.

Tra i gli scopi del progetto vi è anche la messa a punto delle **metodologie per l'uso delle tecnologie digital twin per alimentare in modo rapido ed efficiente con veicoli attrezzati come quello in dotazione al Politecnico di Bari** (di cui vi parlerà l'ing. Prencipe) il data set informativo necessario a implementare le metodologie di prioritarizzazione esposte in precedenza

Grazie dell'attenzione!!!



Prof. ing. Vittorio Ranieri