



# Netværksanalyse af den danske cykelinfrastruktur

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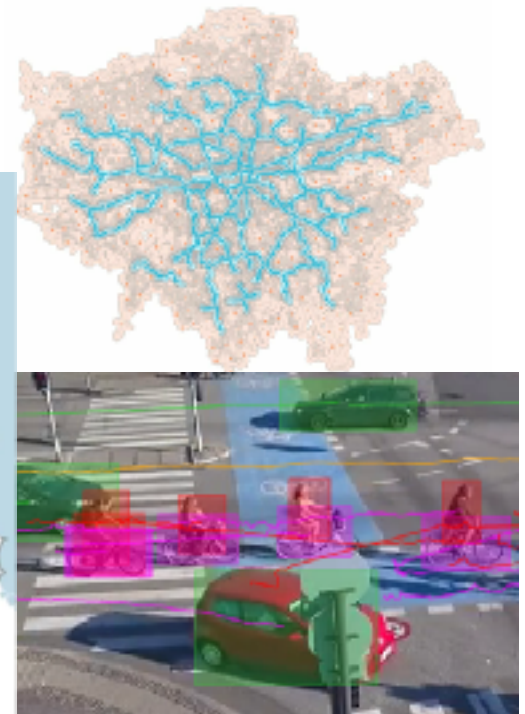
# We are NERDS

NEtwoRks, Data, and Society  
nerds.itu.dk

14 members, founded 2019

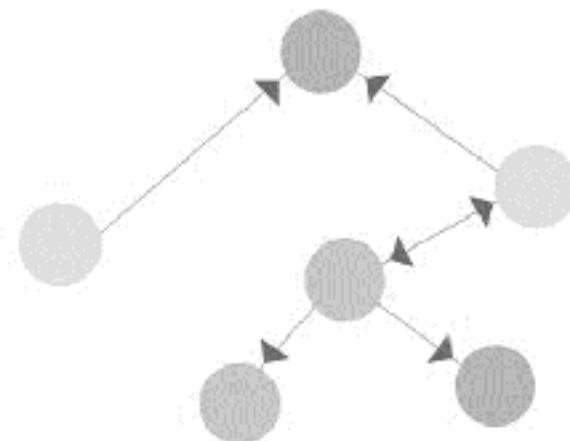
Network/Data science expertise from MIT, Harvard, ...

6 of us do cycling research



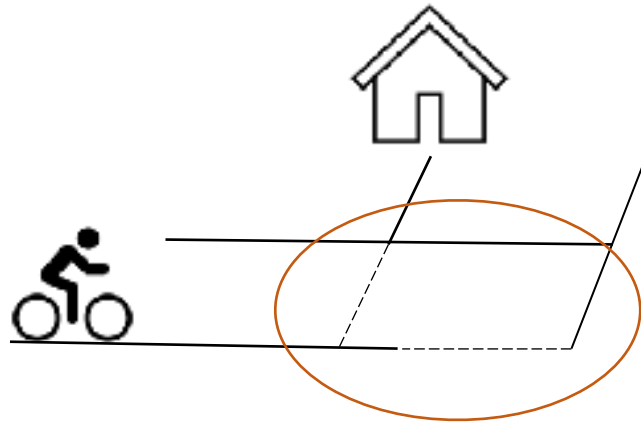
# Hvad?

- 3årigt forskningsprojekt
- Fokus på cykelinfrastruktur og cykelfremkommelighed
- Baseret på netværksteori og metoder
- Fokus på:
  - **Forbindelser** – kan du komme fra A til B på cykel?
  - **Bikeability**: Er cykelforbindelserne sikre og komfortable?
  - **Tilgængelighed**: Kan du cykle til dagligdags gøremål?
  - ...og afhænger tilgængeligheden af hvem du er?
  - Hvor er der brug for **forbedringer**?  
Og hvordan kan de **prioriteres**?



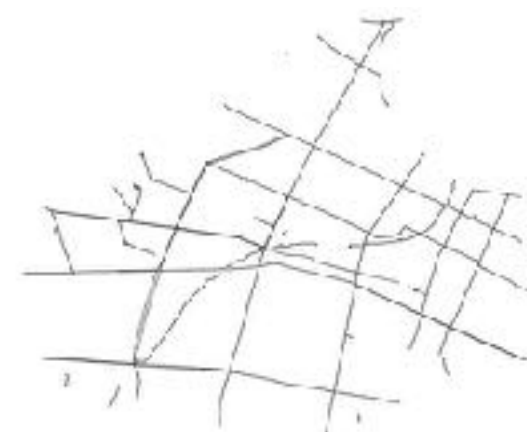
# Hvorfor?

- Mangler systematisk viden & overblik
- Km  $\neq$  kvalitet
- Fragmentarisk cykelinfrastruktur



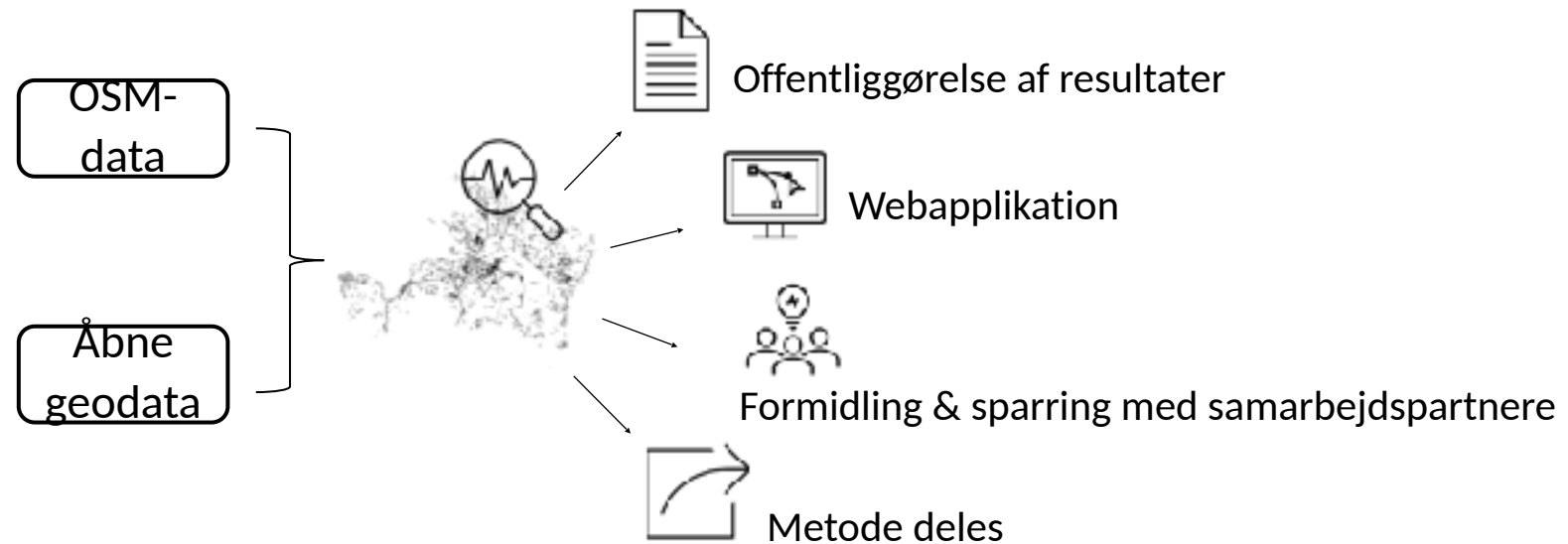
# Hvordan?

- Detaljeret kortlægning af cykelinfrastruktur
- Undersøge og kvantificere kvaliteten af netværket af dansk cykelinfrastruktur
- Kortlægge muligheden for at cykle til daglige aktiviteter
- Differentieret analyse, der tager højde for forskelle i krav til sikkerhed, tryghed og komfort



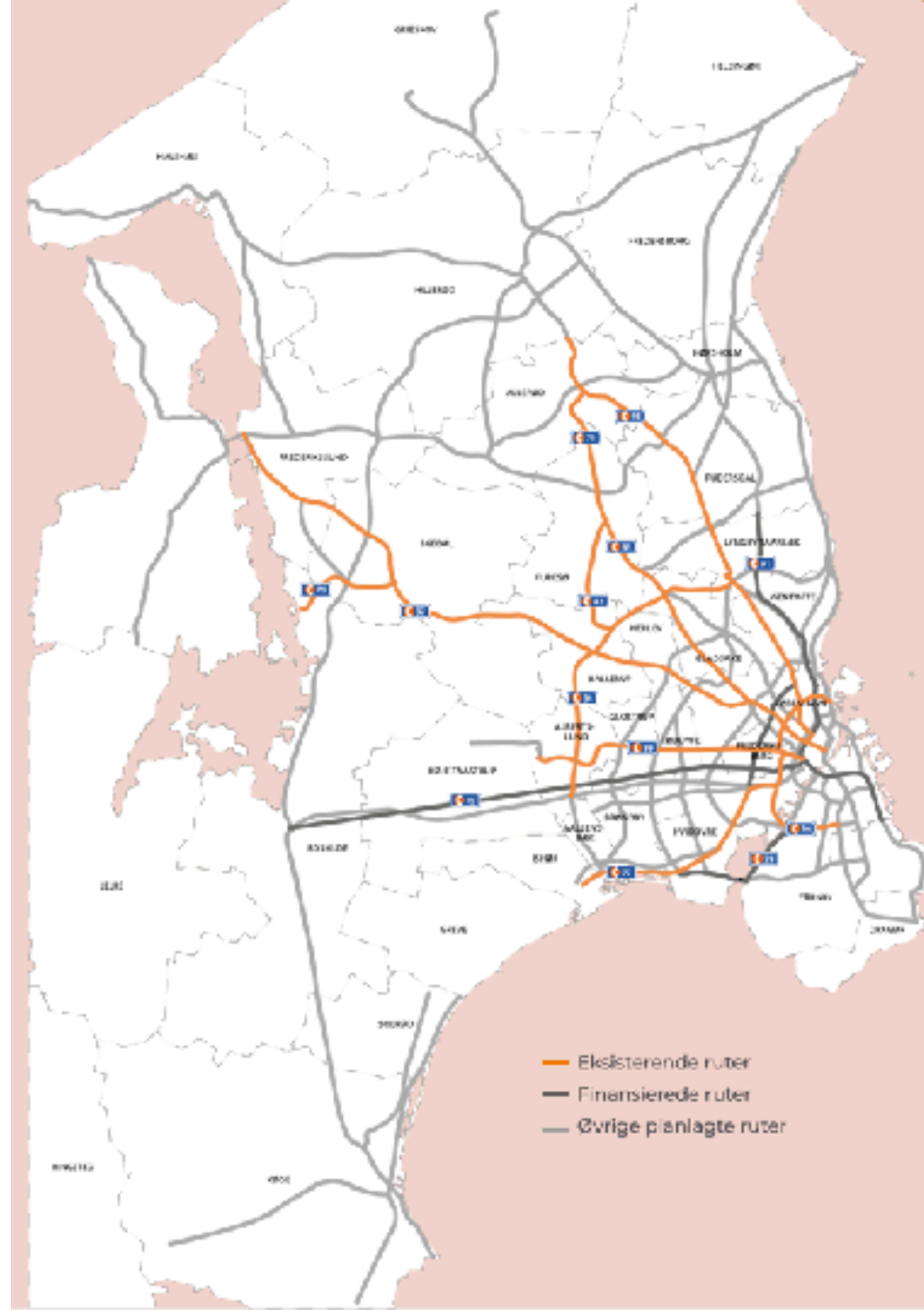
# Resultater

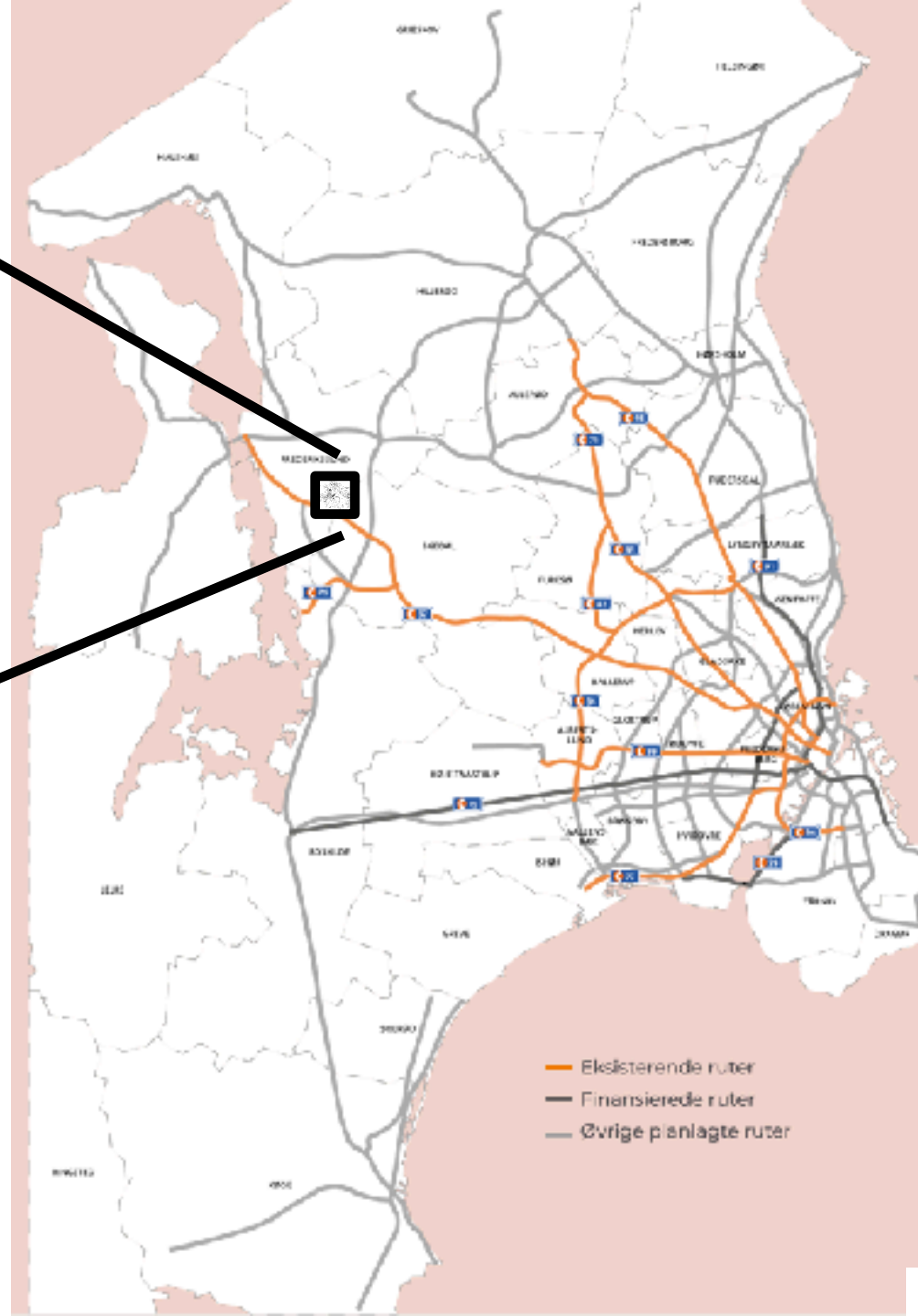
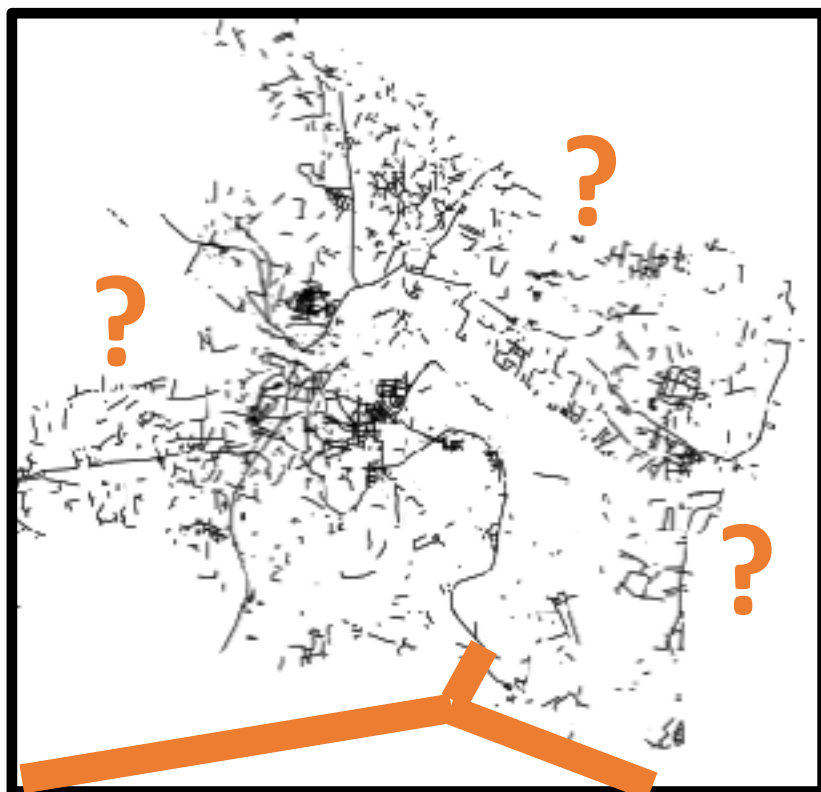
- Detaljeret, nuanceret beskrivelse af cykelinfrastruktur på tværs af kommunegrænser
- Kvantificering af netværkskvaliteten → grundlag for sammenligning og benchmarking
- Kortlægning af huller og mangler i cykelnetværk
- Metode til at identificere og prioritere behov for ny/forbedret cykelinfrastruktur





# Ideas for analysing the Visionsplan





Are the **Supercykelstier**  
well integrated locally?

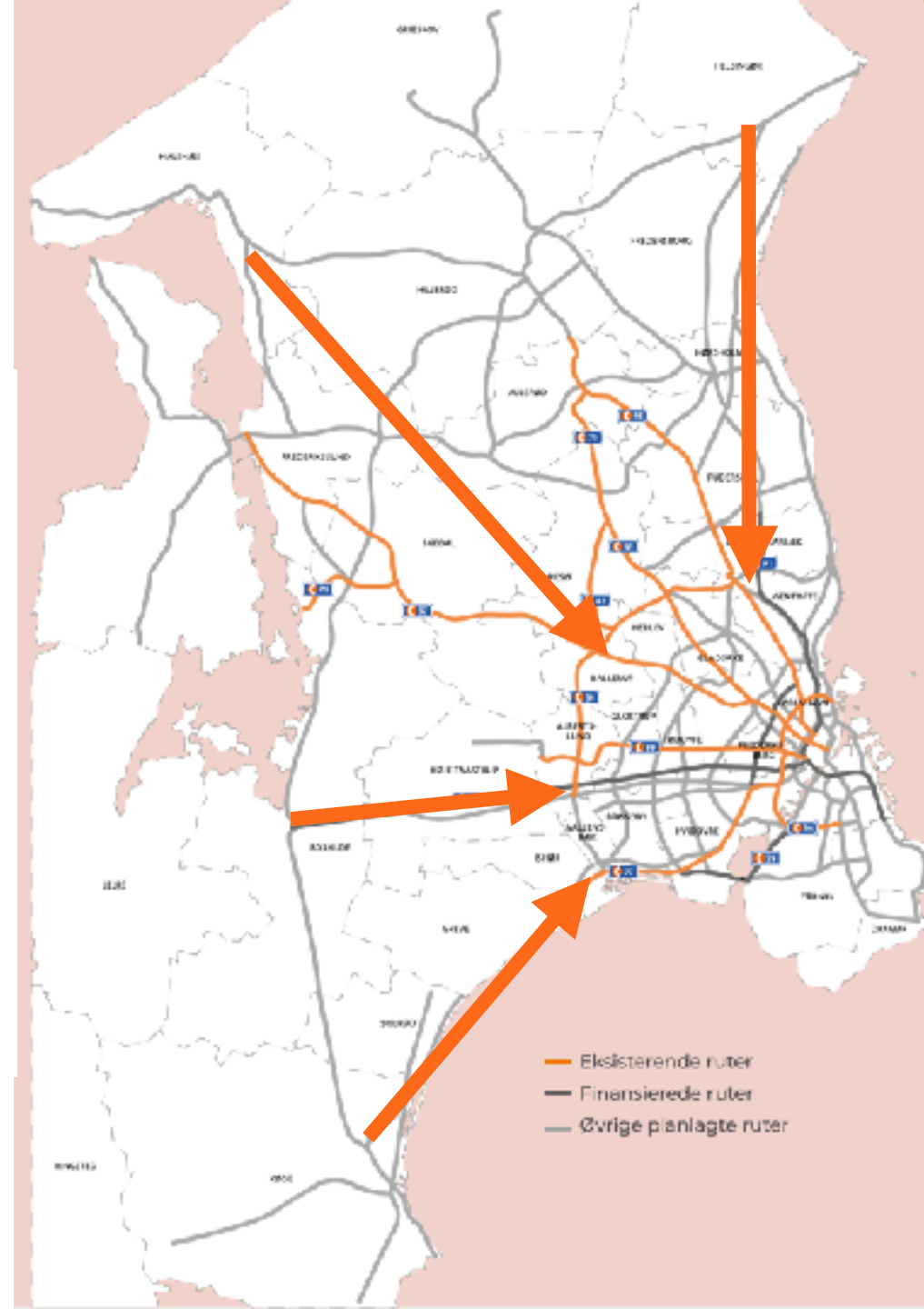
Develop both scales!





# Priorities?

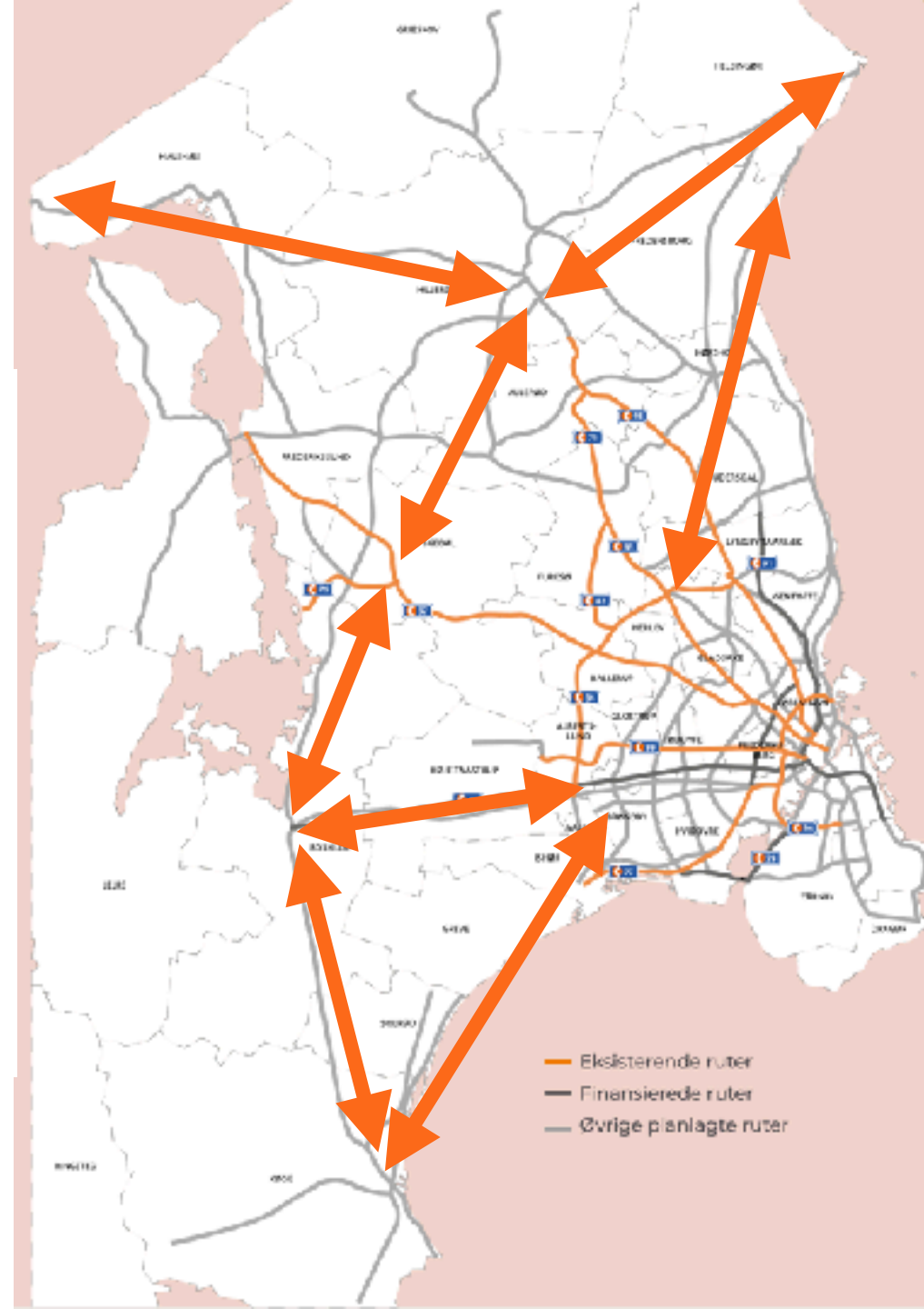
All fast to Copenhagen?



# Priorities?

All fast to Copenhagen?

Connect cities?



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All fast to Copenhagen?

Connect cities?

Integrate with re-creational network?



6.10.2021



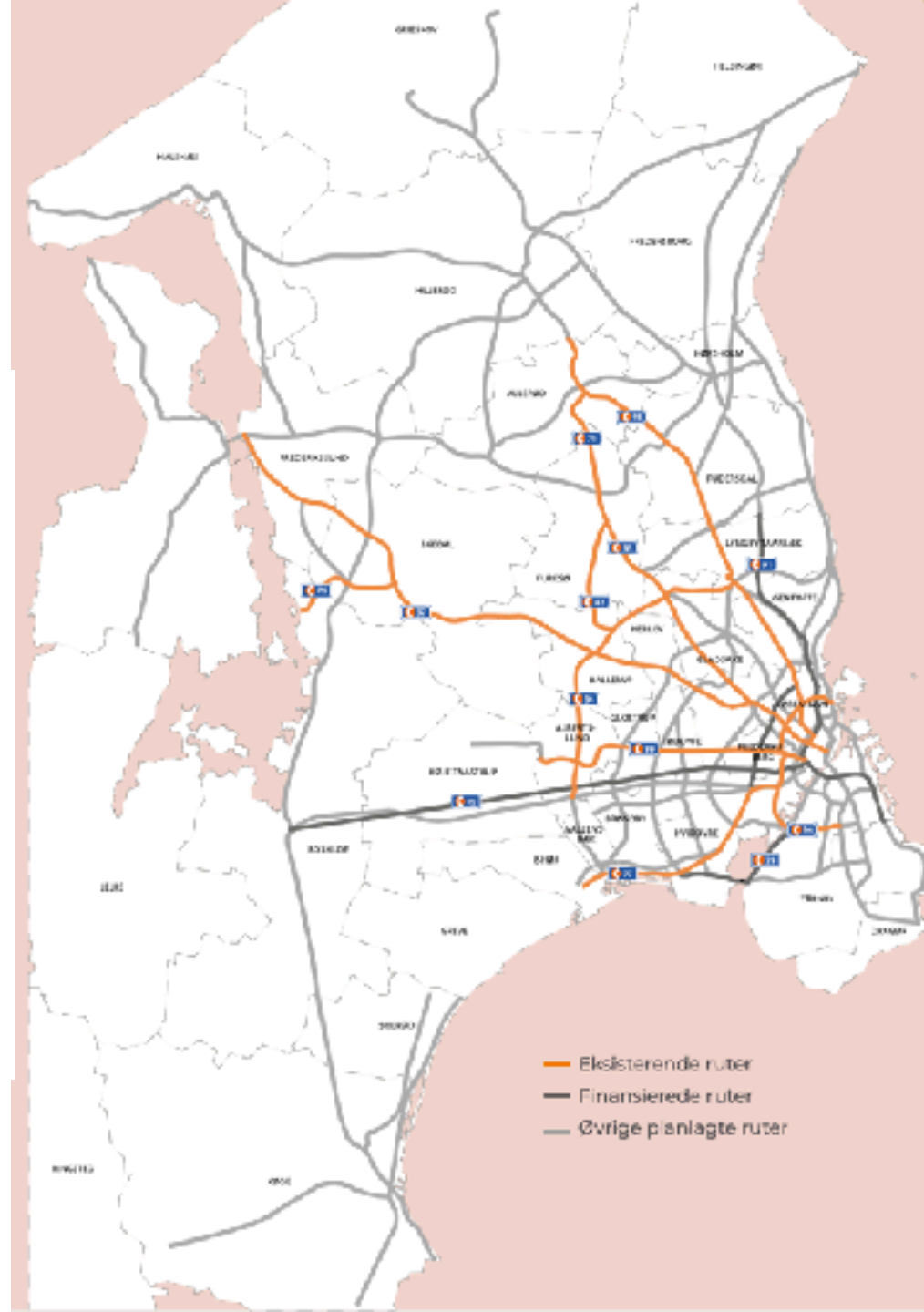
# Priorities?

All fast to Copenhagen?

Connect cities?

Integrate with re-creational network?

Modal shift car→bike? car→bike+**train**?



# Priorities?

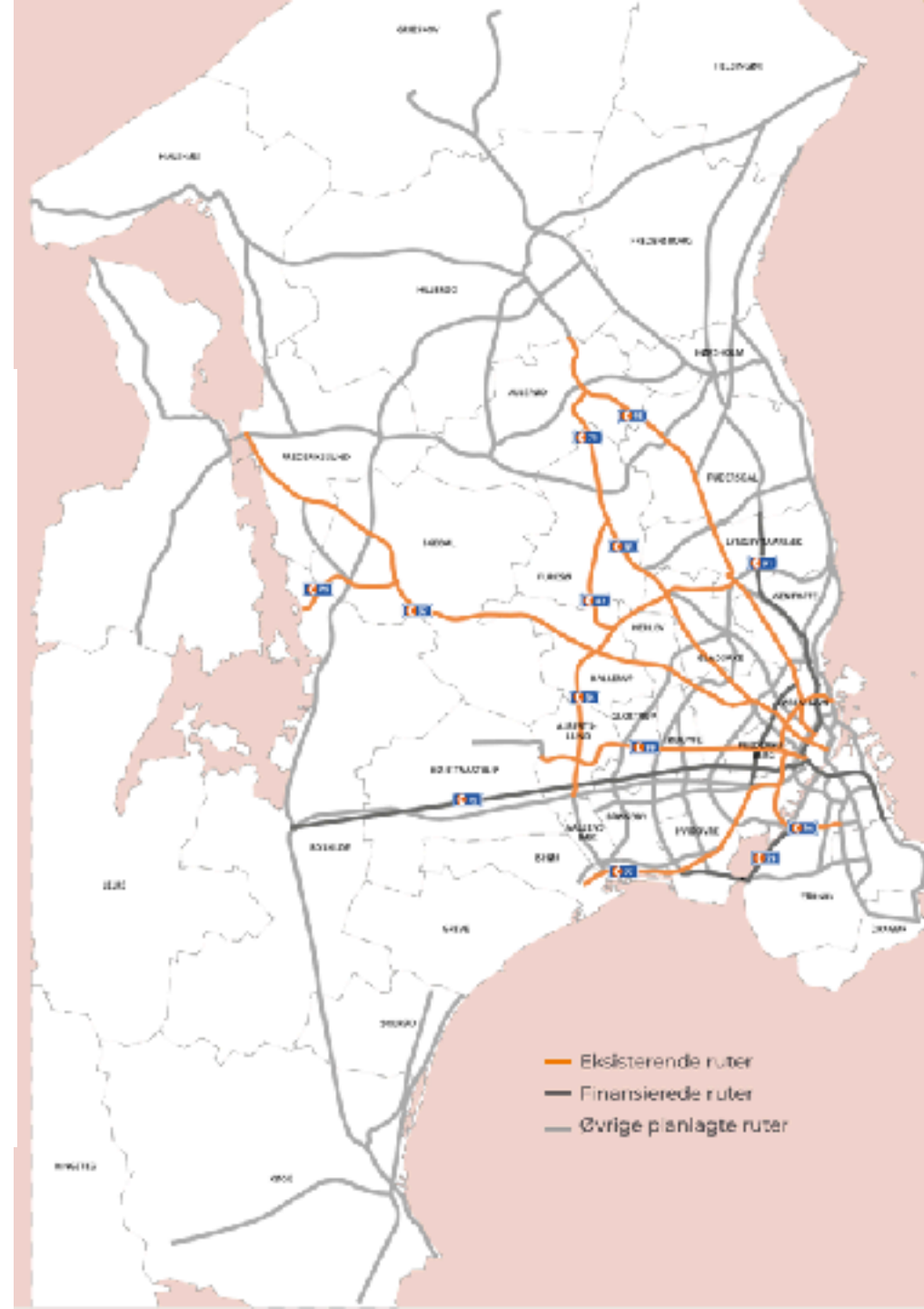
All fast to Copenhagen?

Connect cities?

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Modal shift car→bike? car→bike+**train**?

Do all municipalities share a common vision?

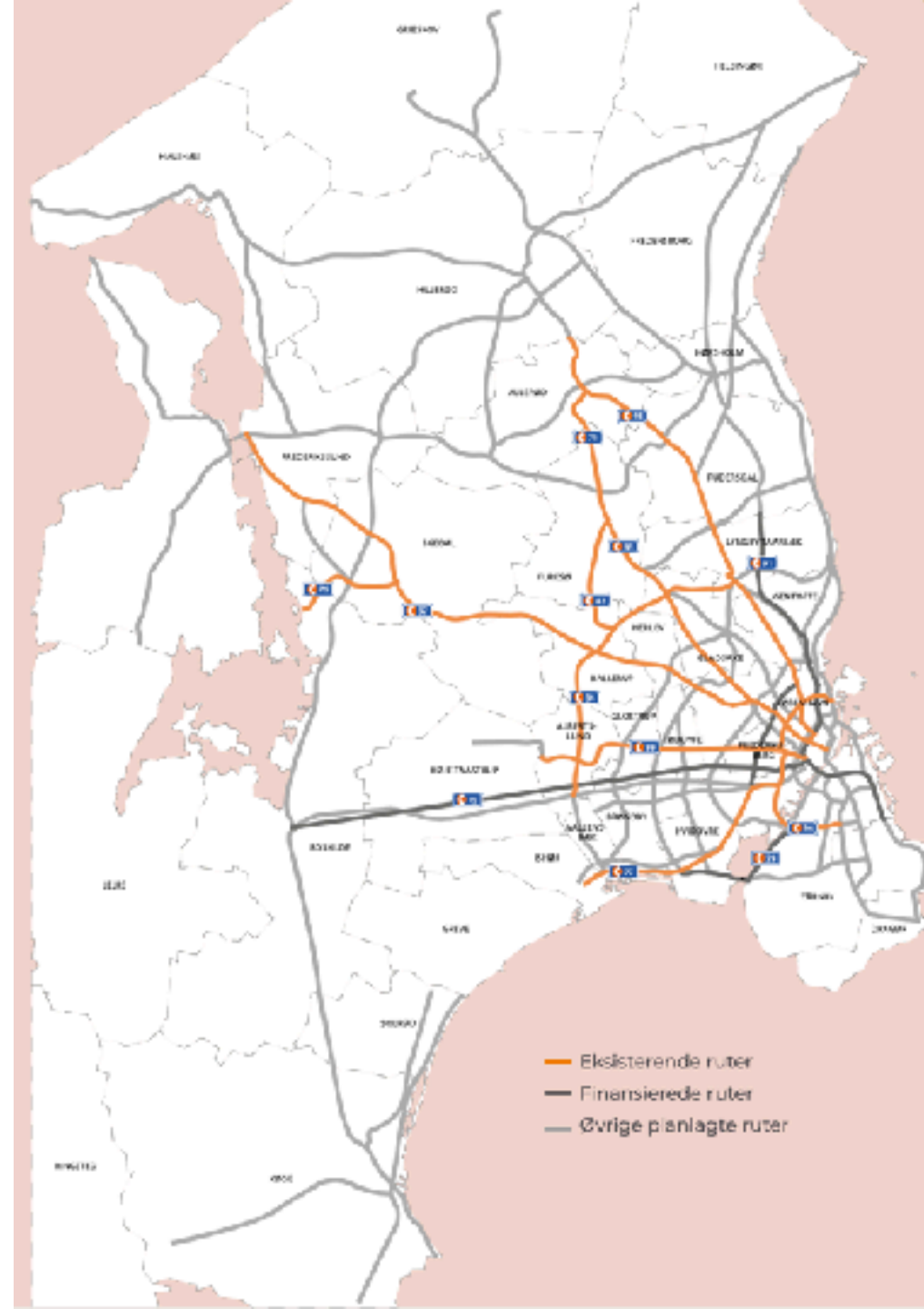




# Ideas for analysing the Visionsplan

1) Are the øvrige planlagte ruter optimal? Gaps?

## 2) How to prioritize links?



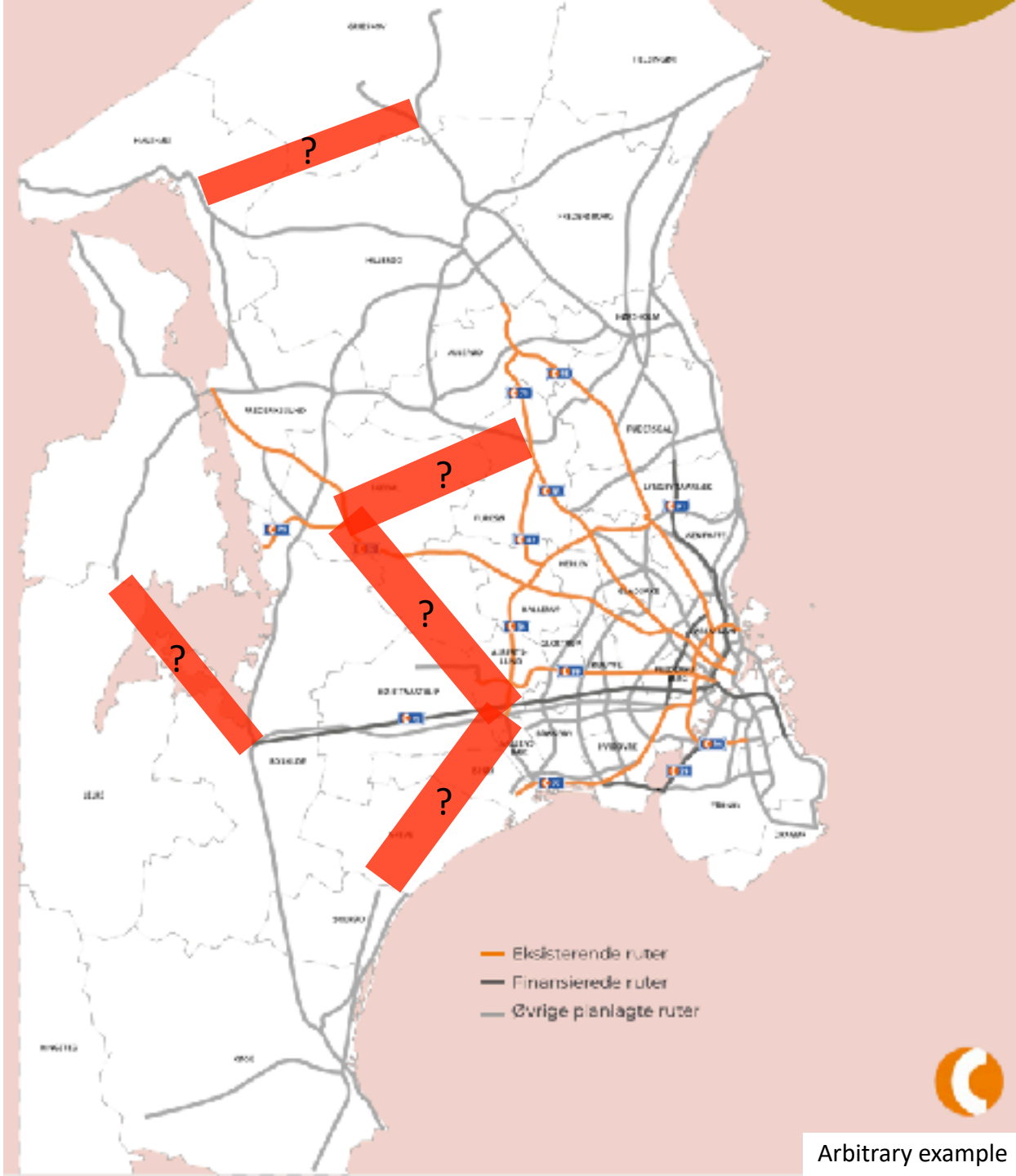


# 1) Find missing links

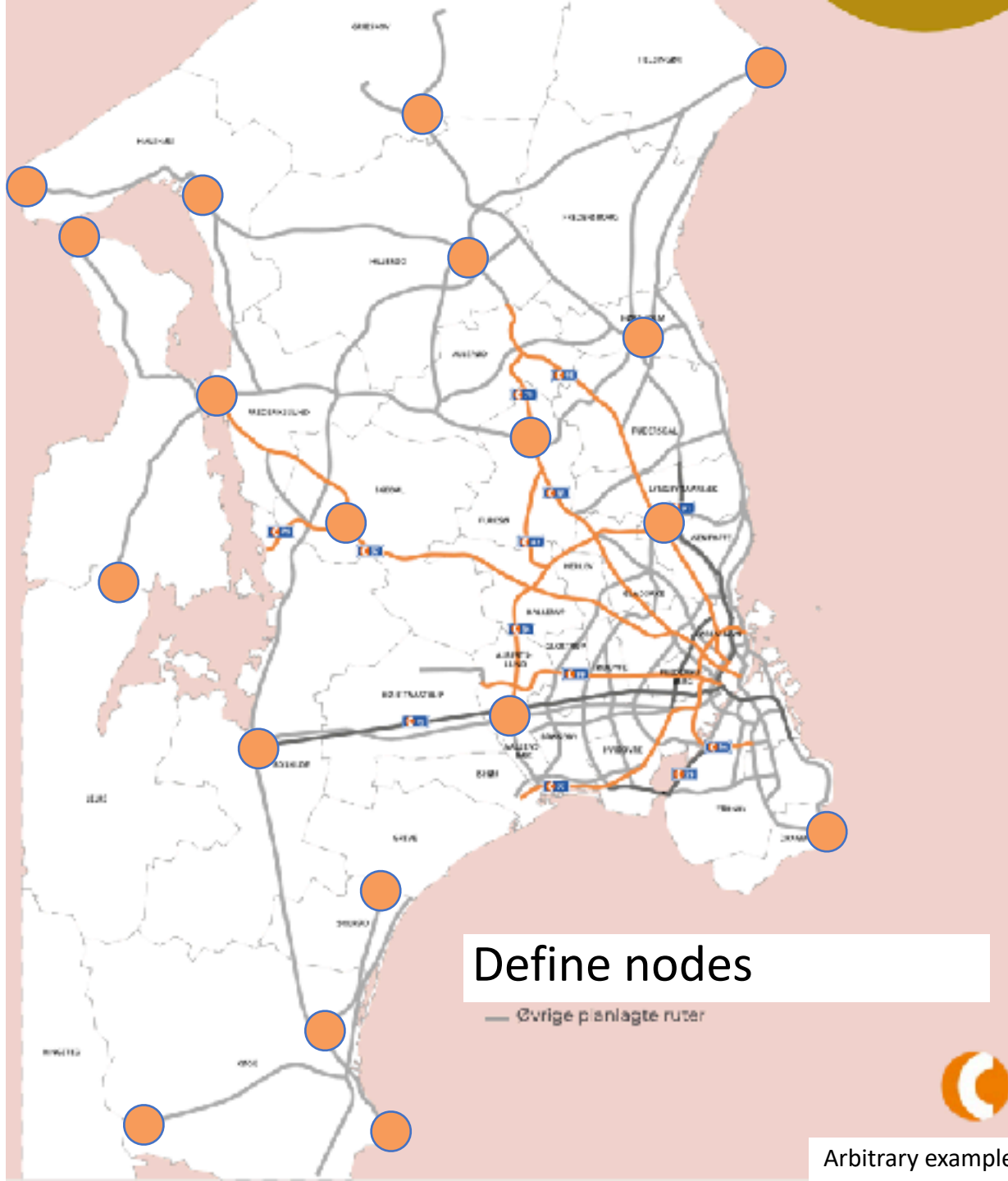


Minimize mixing with cars and investments  
per cycled km

Vybornova et al (2022)

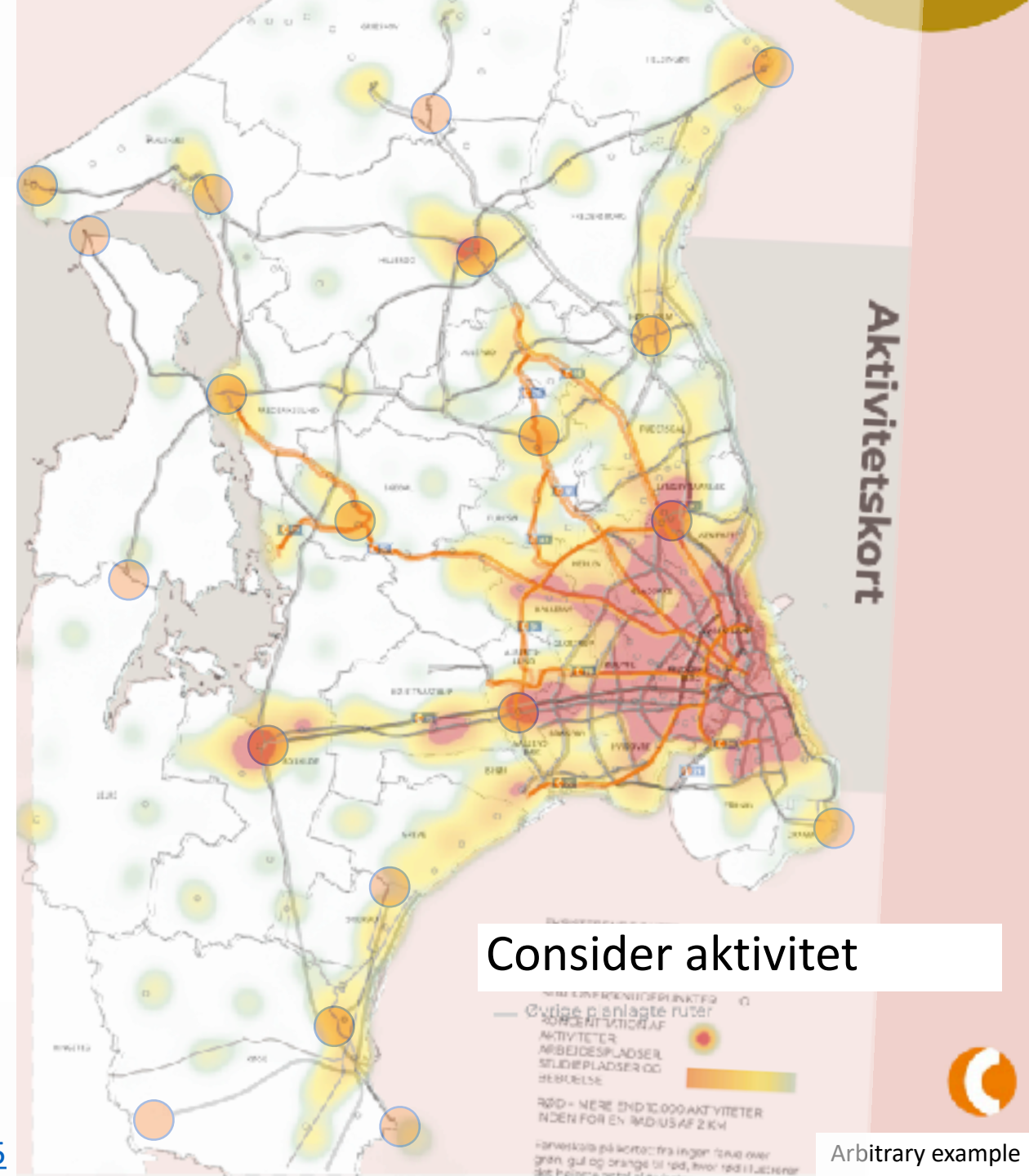


Arbitrary example



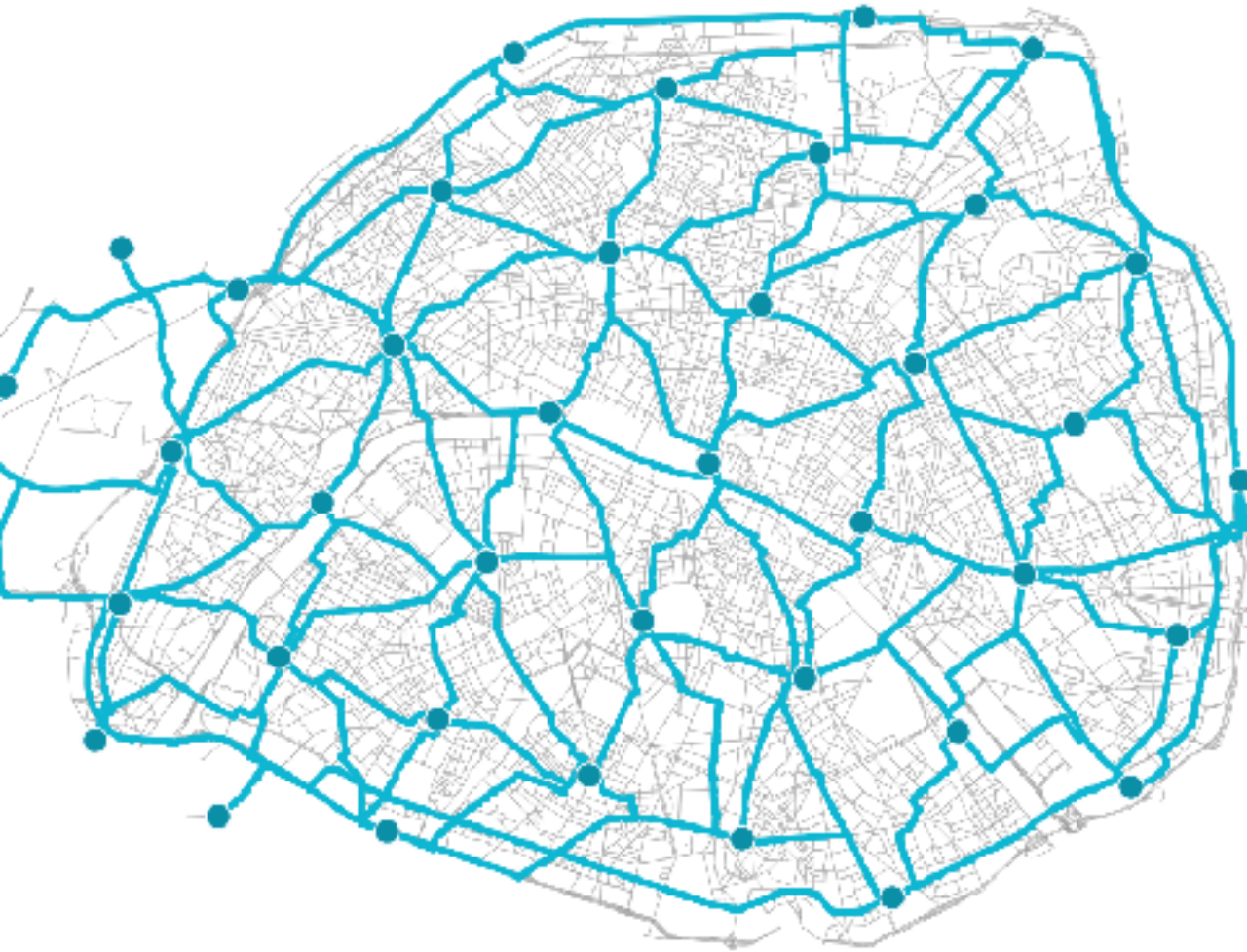


## 2) Node approach



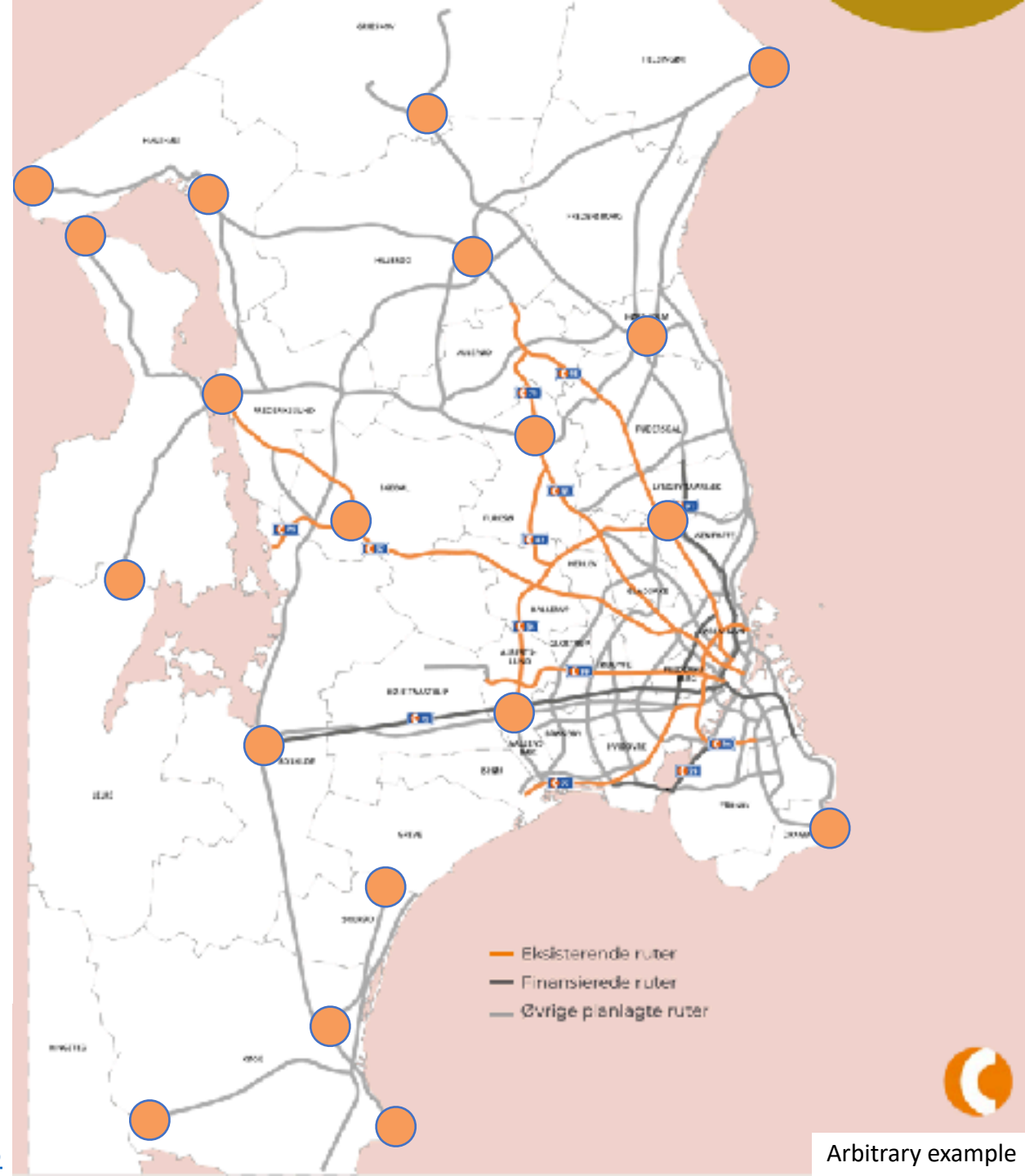
Consider aktivitet

## 2) Node approach



## Calculate your optimal full network

Szell et al (2021) <https://arxiv.org/abs/2107.02185>



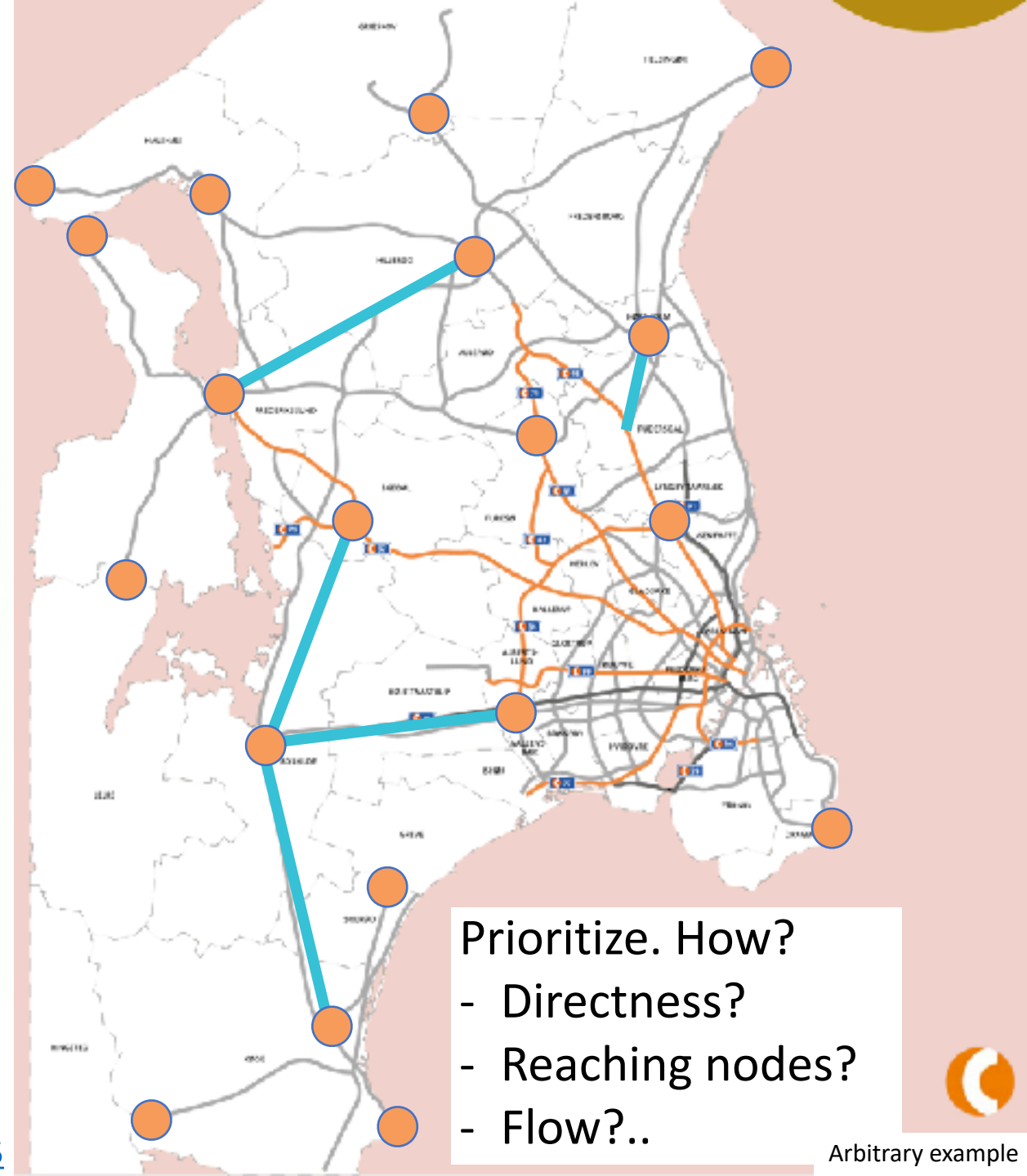
### Arbitrary example



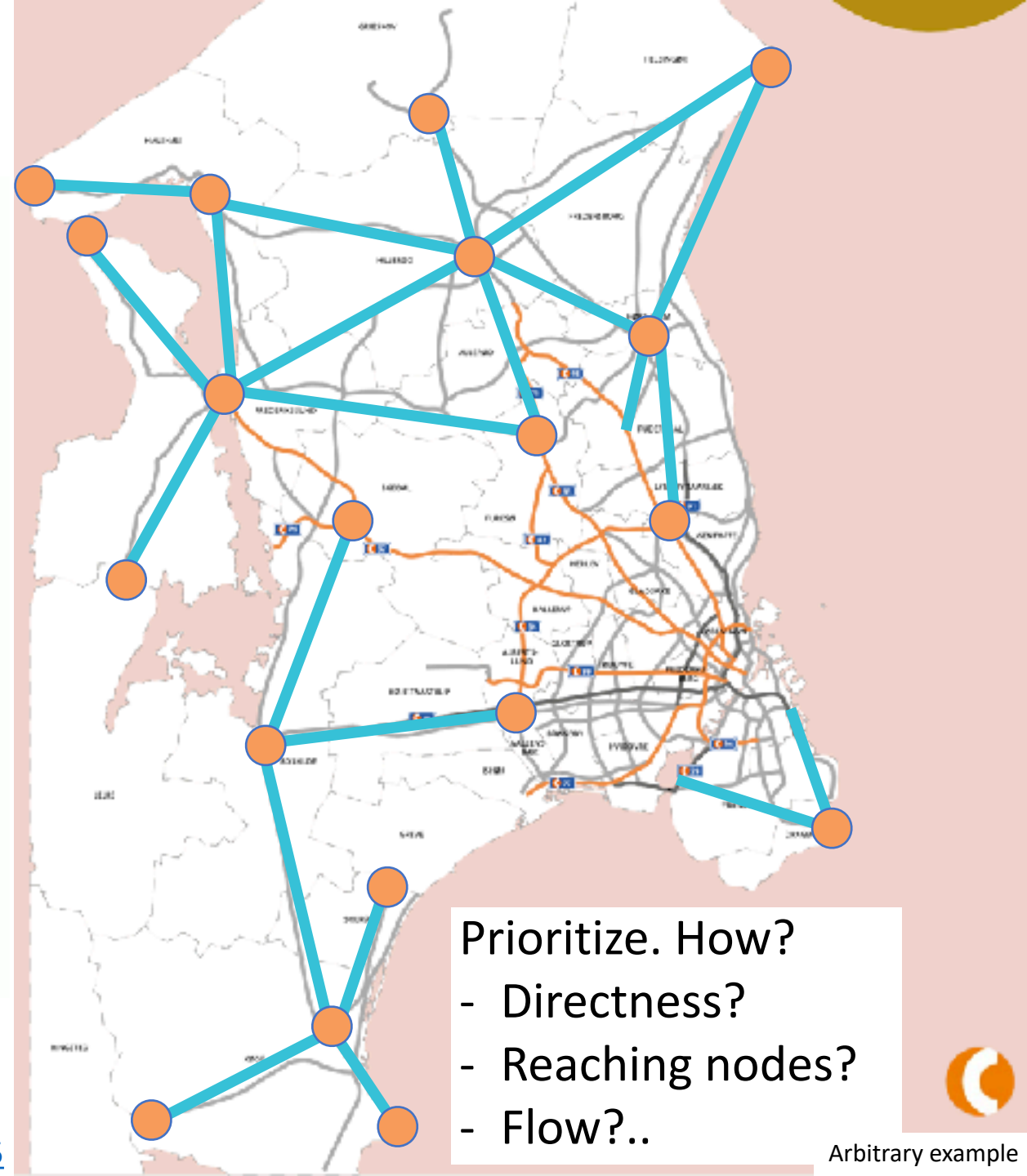
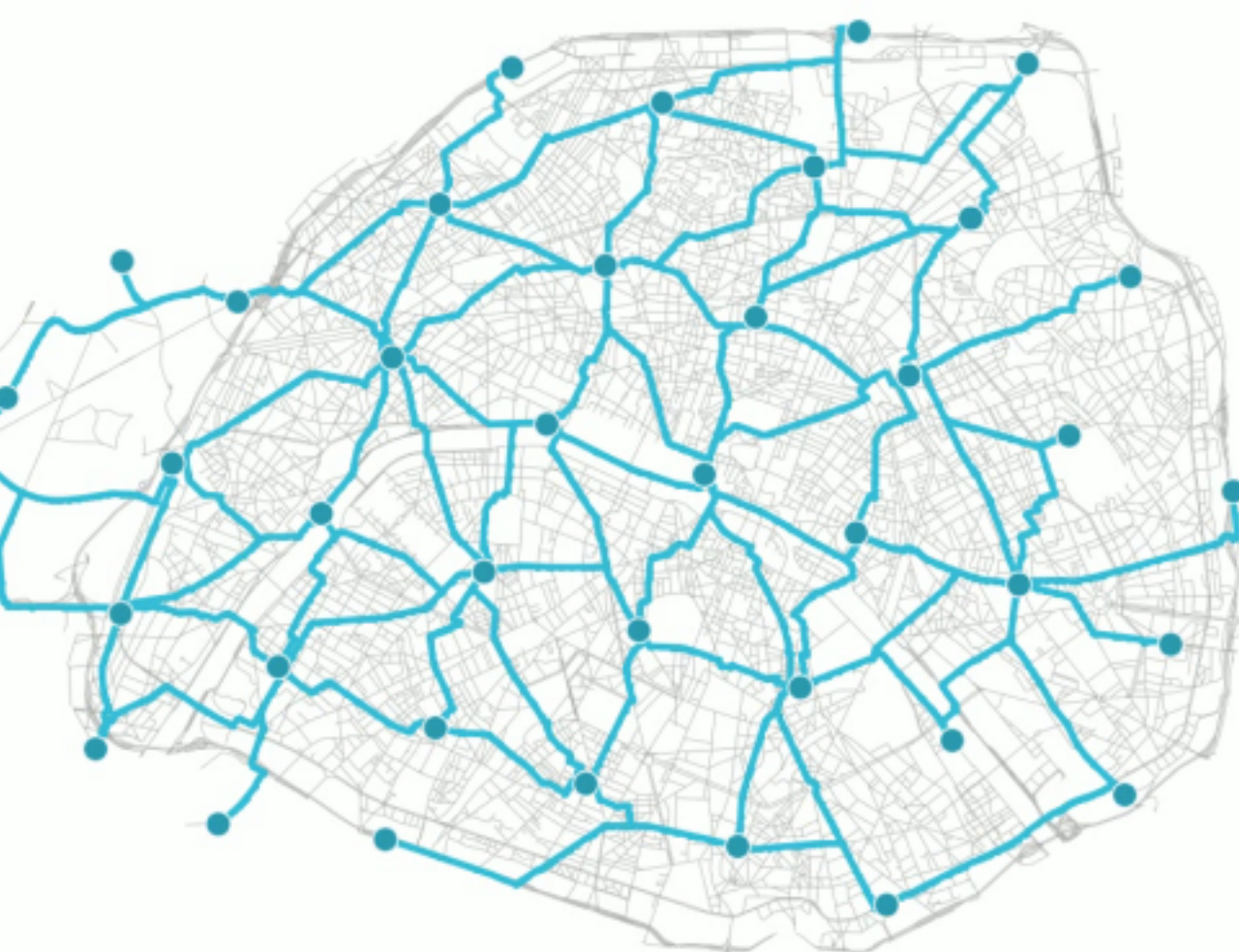
## 2) Node approach



Grow and prioritize [your metrics]



## 2) Node approach

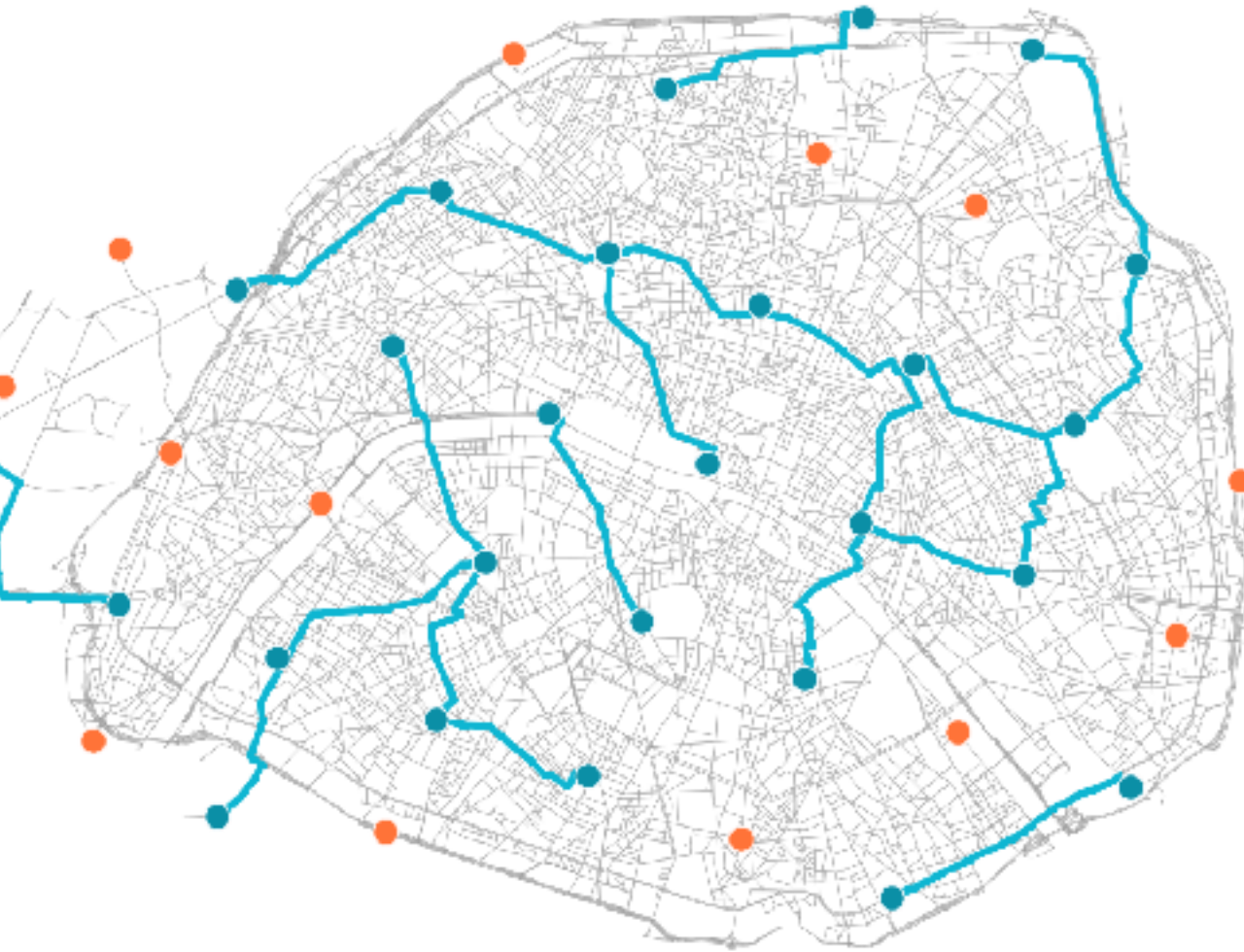


Prioritize. How?

- Directness?
- Reaching nodes?
- Flow?..

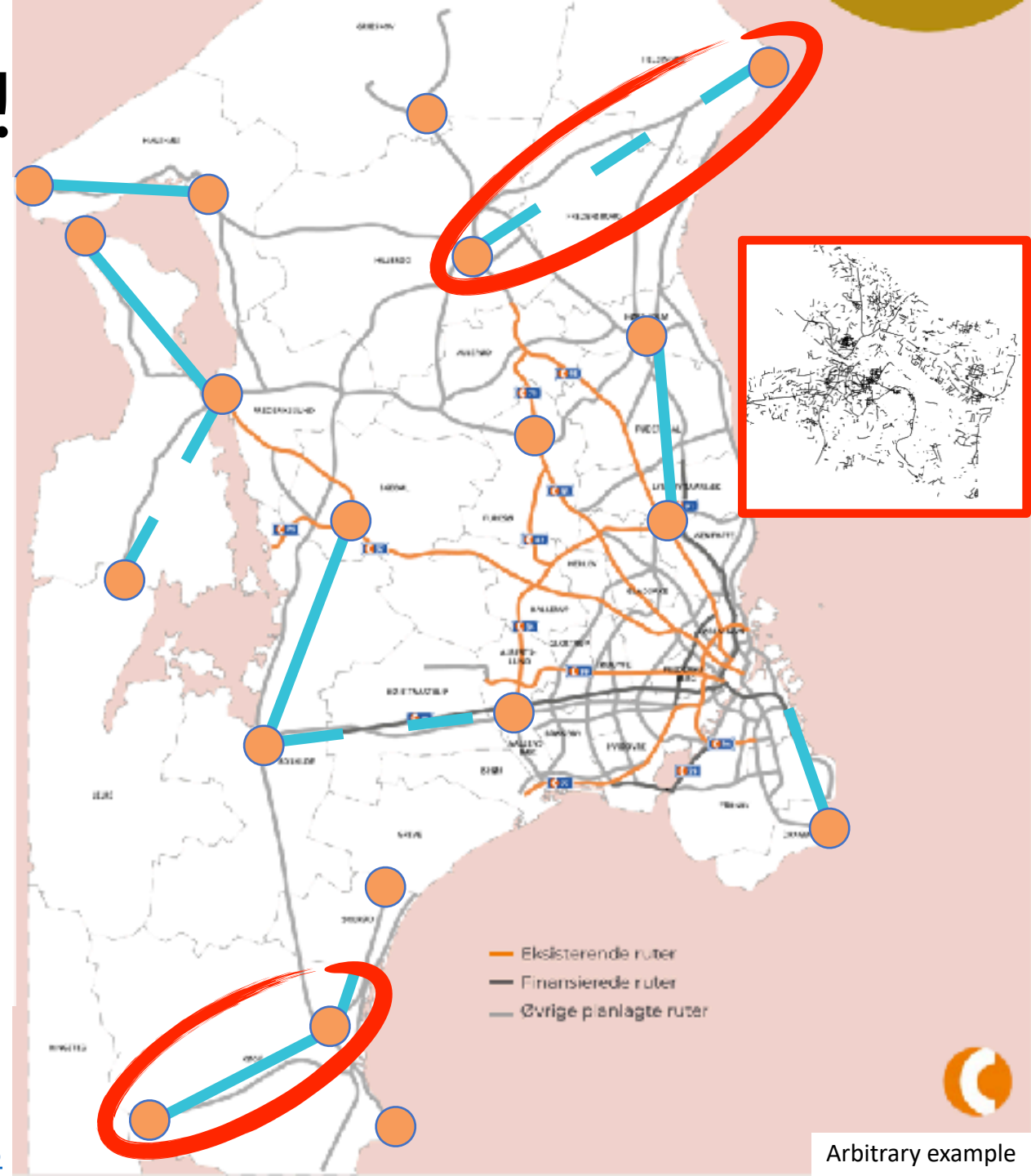


# Avoid the **WORST** strategy!



Random, piecewise growth

Szell et al (2021) <https://arxiv.org/abs/2107.02185>



Arbitrary example

# What is needed for success?

- Consistent, complete data + funding for cycling research

# What is needed for success?

- Consistent, complete **data + funding** for cycling research
- Municipalities have **common vision** and strategy
- Develop local AND regional scales
- Transdisciplinary stakeholder collaboration

[growbike.net](http://growbike.net) | [fixbike.net](http://fixbike.net)

Michael Szell, Ane Rahbek Vierø, Anastassia Vybornova