

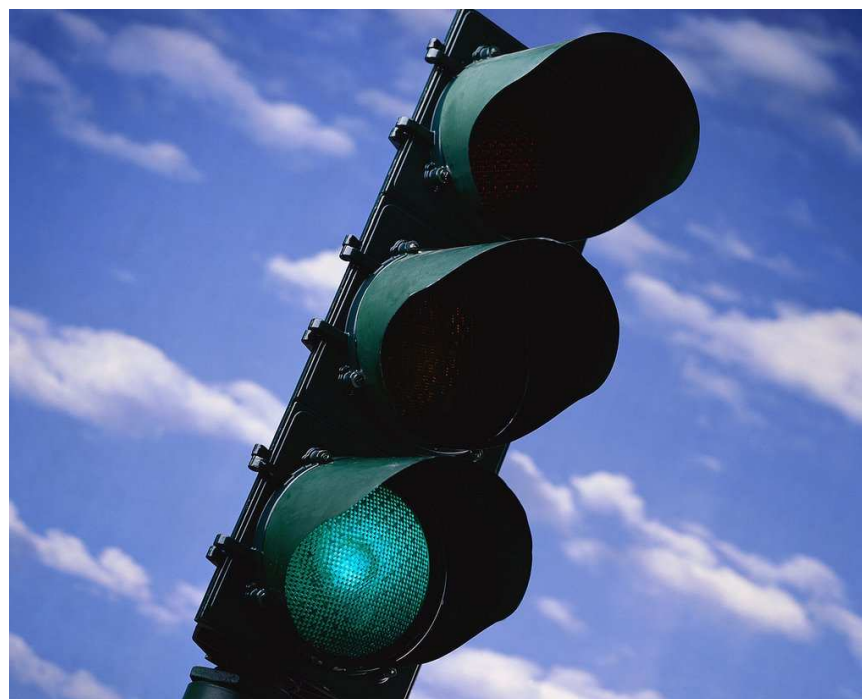
# The use of ITS for improving bus priority at traffic signals

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Trafikdage 2010  
Aalborg university

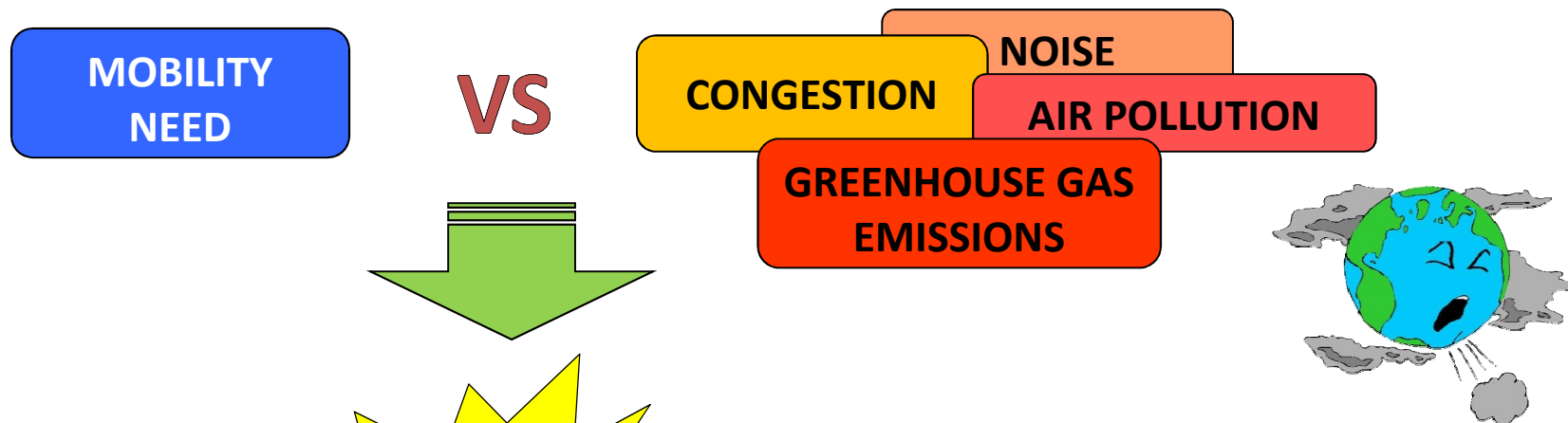
24<sup>th</sup> August 2010



# Outline

- Introduction
- What is bus priority?
- Non-adaptive bus priority
- Detector-based bus priority
- GPS-based bus priority
- The potential of ITS
- Evaluation of bus priority systems
- Results from international experiences
- Future perspectives
- Copenhagen?

# Introduction/1



*from private car  
to public transport*

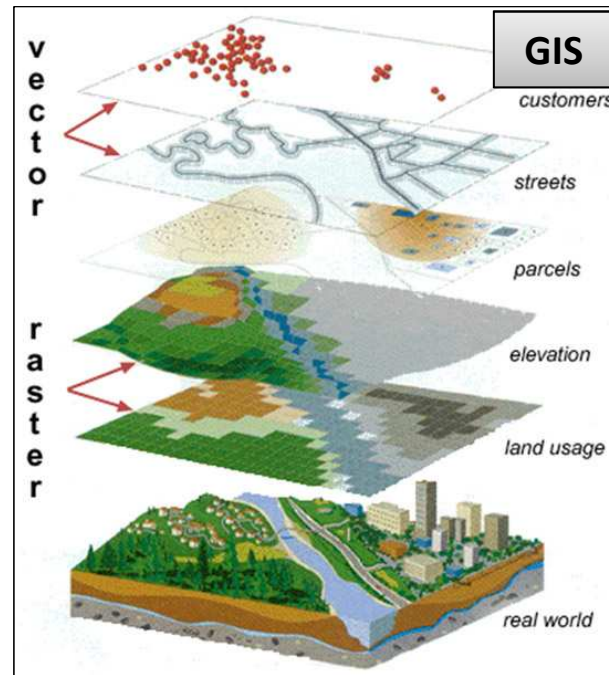
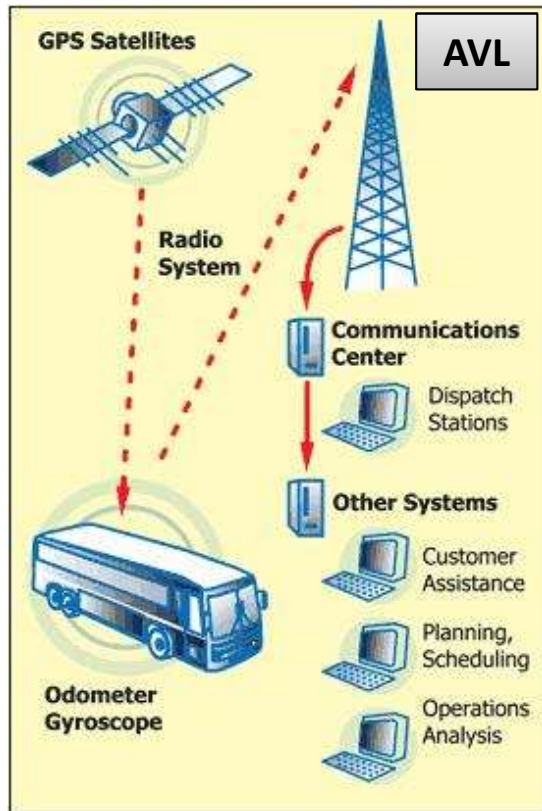


# Introduction/2

More **efficient** and **attractive** public transport:

**HOW?** →

What if we apply **Intelligent Transport Systems (ITS)** to public transport **???**



# What is bus priority?

Prioritize buses in the network

fixed,  
pre-determined

vehicle-  
actuated

**PASSIVE  
PRIORITY**

**VS**

**ACTIVE  
PRIORITY**

LINKS

**LINK-BASED**

**VS**

NODES

**JUNCTION-BASED**

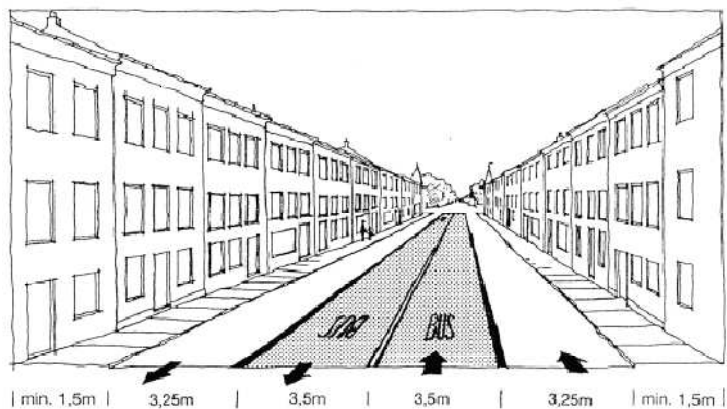
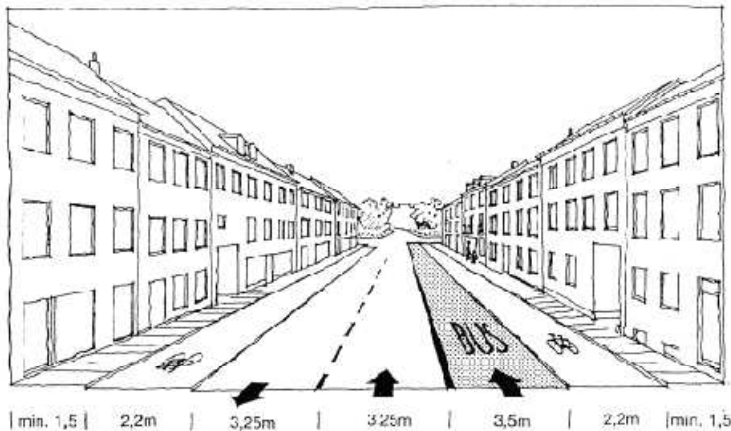
### 3 categories:

- Non-adaptive bus priority
- Detector-based bus priority
- GPS-based bus priority

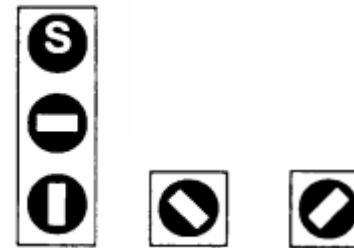


# Non-adaptive bus priority

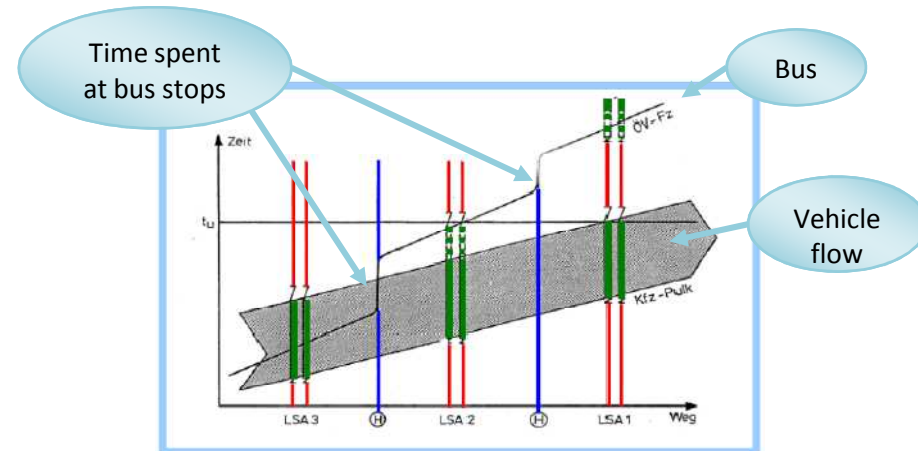
- Bus lanes



- Dedicated signals

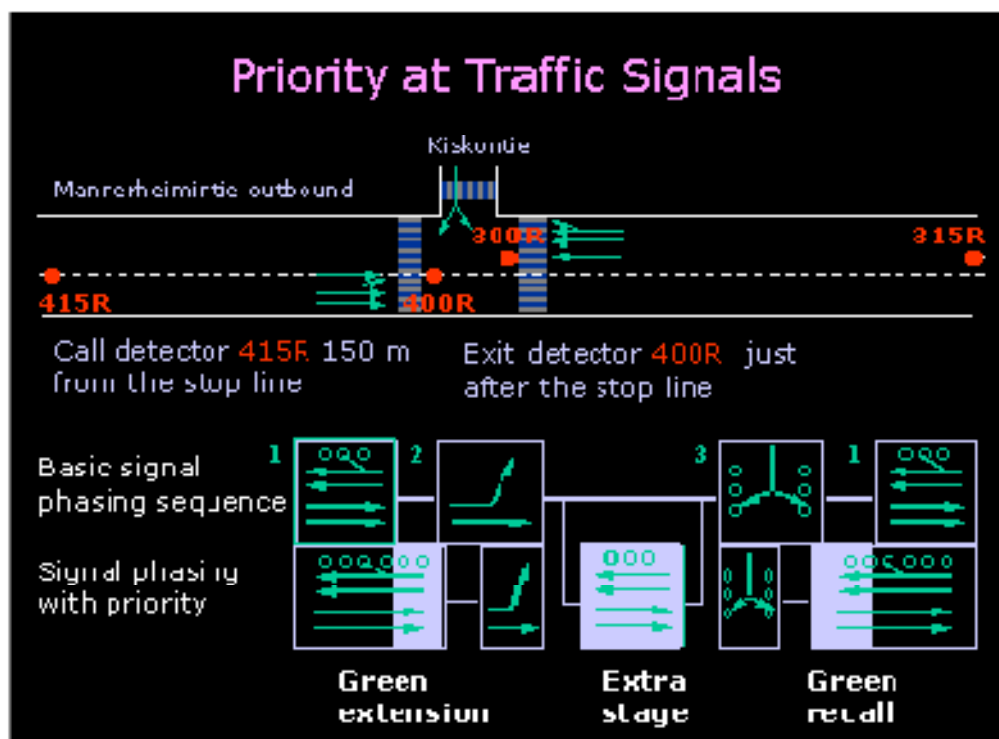


- Green waves

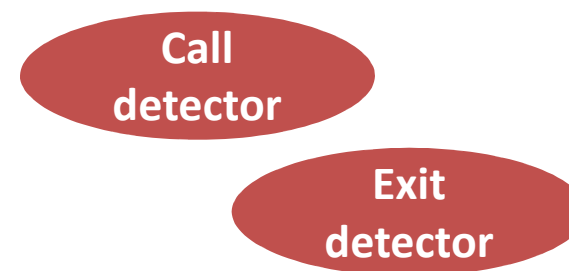


# Detector-based bus priority/1

## Selective Vehicle Detection (SVD)



(Sane, 1998)

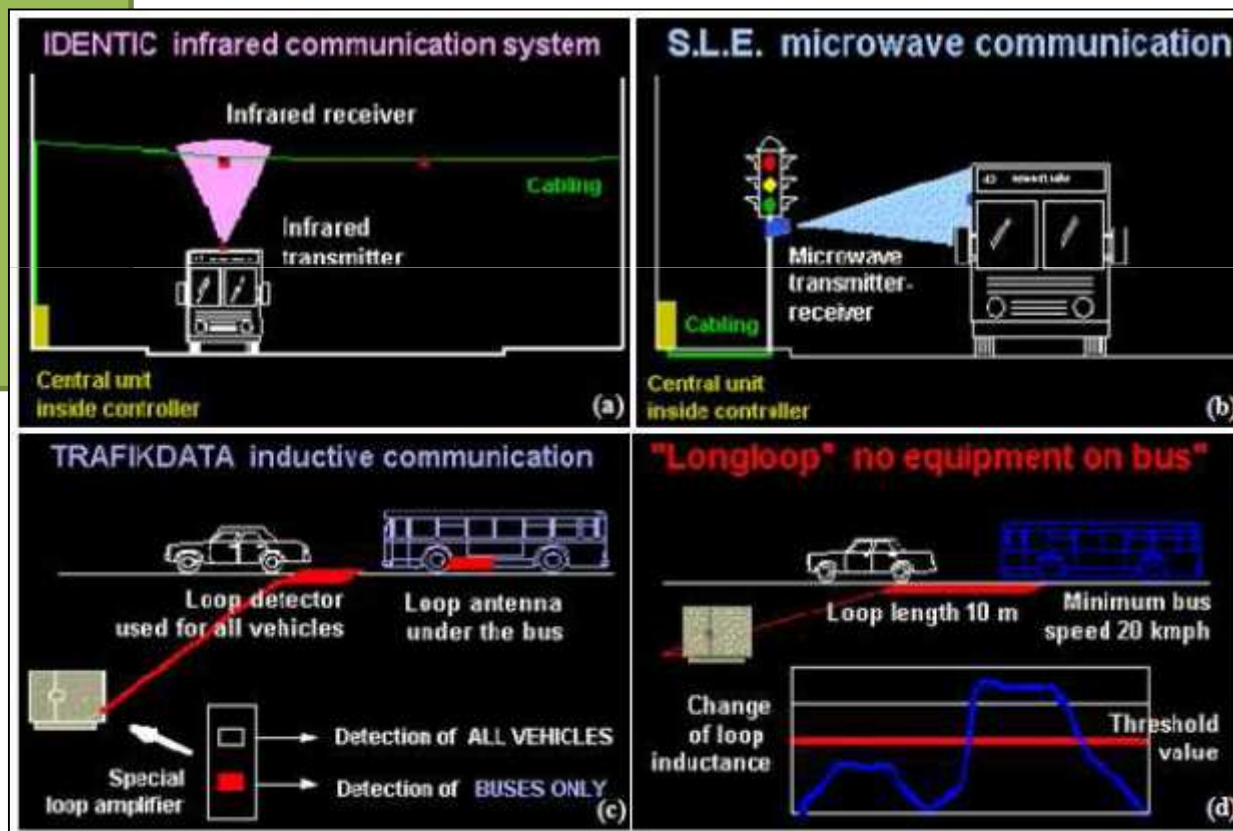


- Priority functions:**
- Green extension
  - Green recall
  - Extra stage

# Detector-based bus priority/2

## Detection technologies:

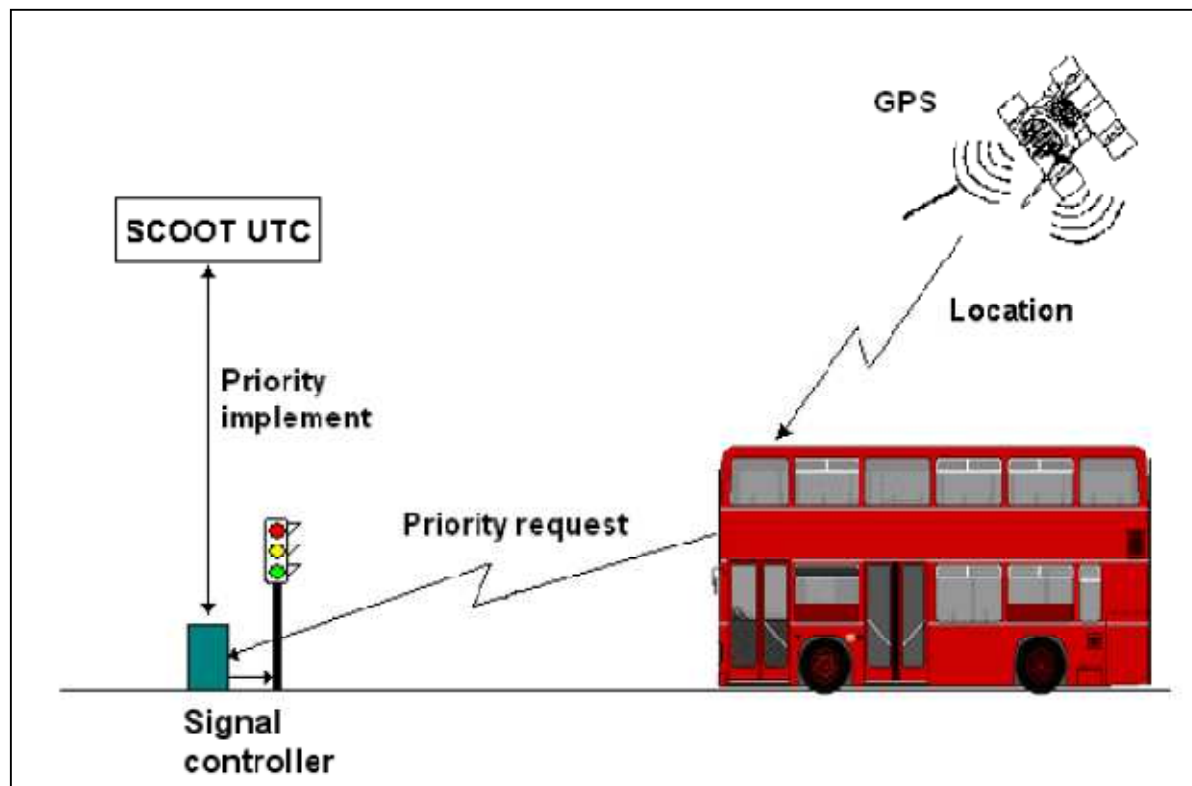
- Infrared
- Microwave
- Inductive loop
- Long-vehicle loop



(Långström and Sane, 1998)



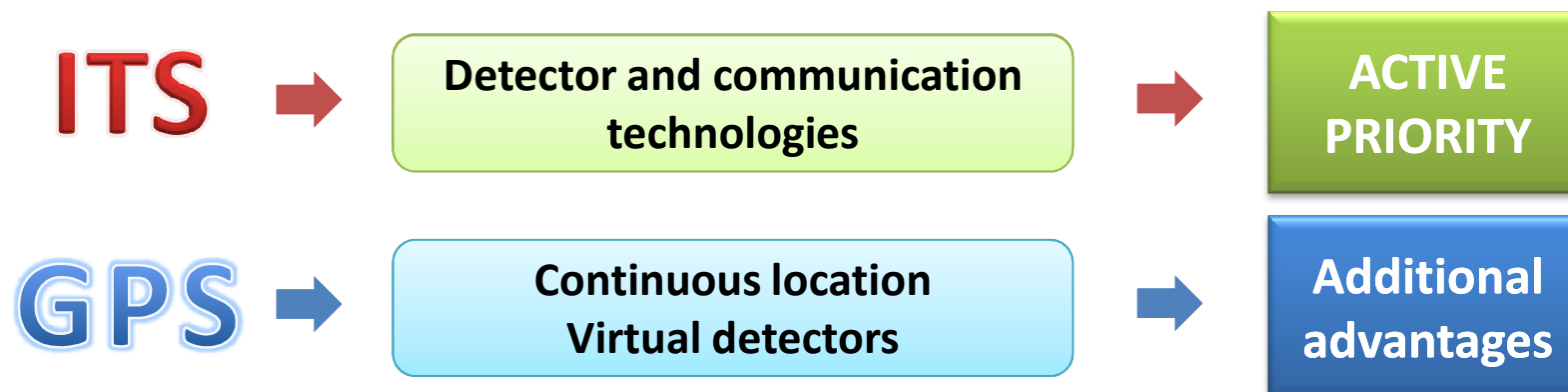
# GPS-based bus priority



- Buses equipped with GPS receivers
- **Continuous location**
- **Virtual detectors**
- Priority request sent via radio to the signal controller

(Hounsell et al., 2005)

# The potential of ITS



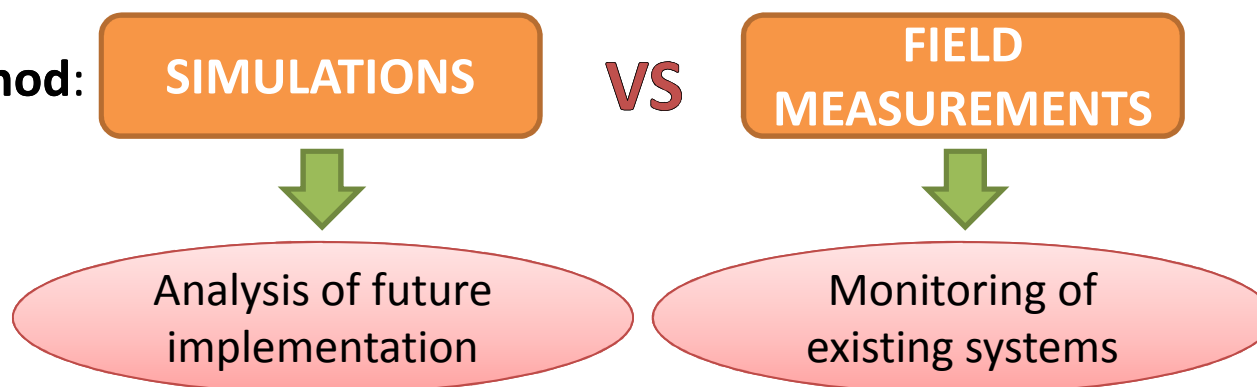
<i>Non-adaptive</i>		<i>Detector-based</i>		<i>GPS-based</i>	
Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages
Simple to implement	Need for road space	Minimum disruption to other traffic	High costs	Low costs	More complex
	Enforcement issues	No additional road space needed	Inflexibility for relocation	High flexibility	Positioning inaccuracy
	Disruption to other traffic	No enforcement problems	Obstacles can prevent detection	Integration with real-time information	Poor satellite coverage in some areas
				Differential priority	

# Evaluation of bus priority systems

- **Key Performance Indicators** → evaluate both **bus** and **other traffic** performance

<i>Punctuality and reliability</i>	<i>Environmental impact</i>	<i>Operational savings</i>	<i>Attractiveness of bus service</i>	<i>General traffic performance</i>
Travel time savings	Fuel consumption	Number of vehicles needed	Users' satisfaction	Travel time
Delay savings	Emissions		Change in bus patronage	Queue length
Headway between buses	Noise			Emissions, noise, fuel consumption

- **Evaluation method:**



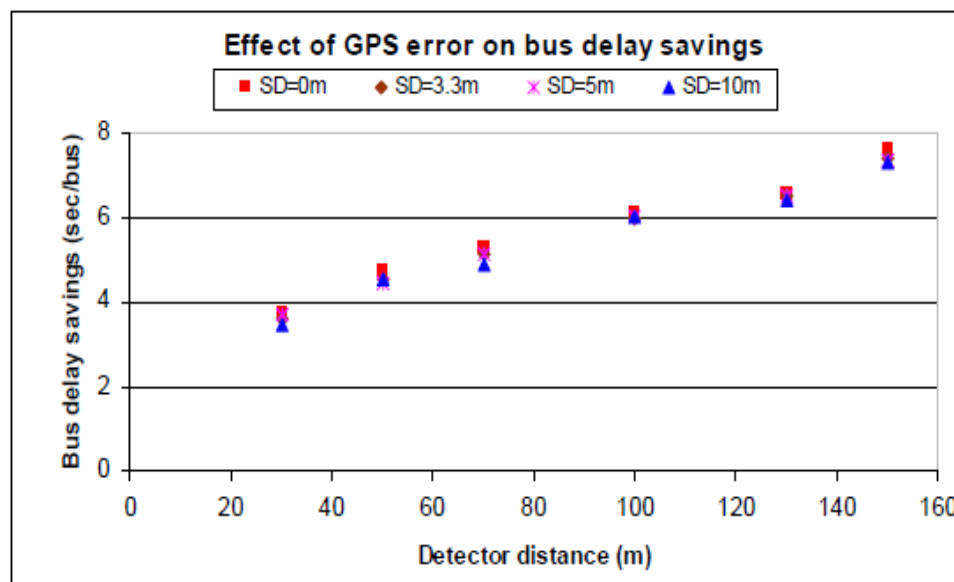
# Results from international experiences

- Significant differences in the benefits achieved from place to place
- Bus travel time savings around 5-10%
- Minimal effect on other traffic
- Importance of *how* bus priority is implemented

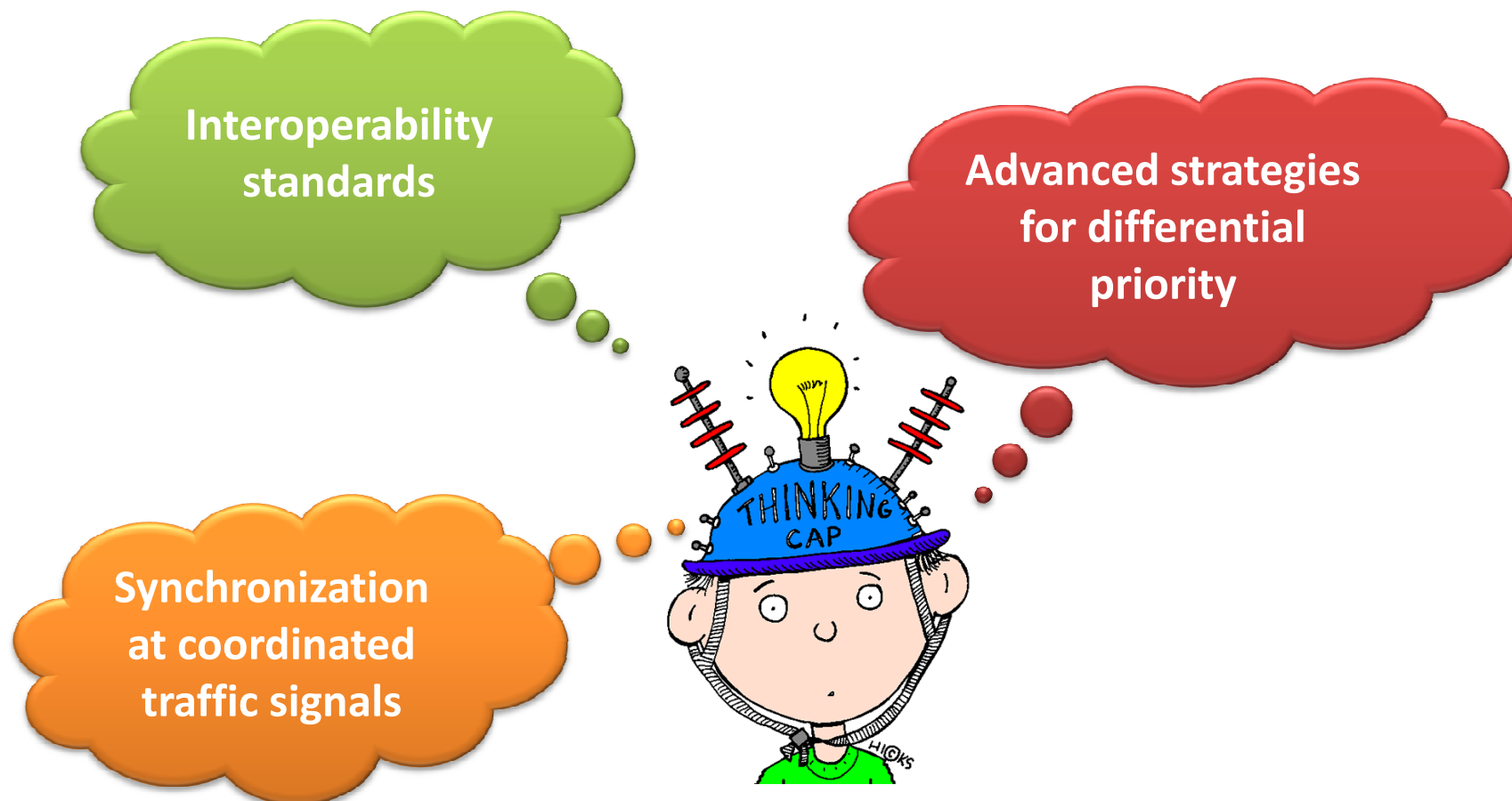


## DETECTOR LOCATION

(Hounsell et al., 2005)



# Future perspectives



# Copenhagen?

Currently considering to implement GPS-based bus priority in some parts of the network

**FLINTHOLM  
AREA**



M.Sc. Thesis:  
 “Estimation and evaluation of the effects of future implementation of GPS-based bus priority at traffic signals in Copenhagen”





**Thank you for your attention!**



**QUESTIONS?**



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