SafeCycle: e-safety applications for safe cycling in Europe

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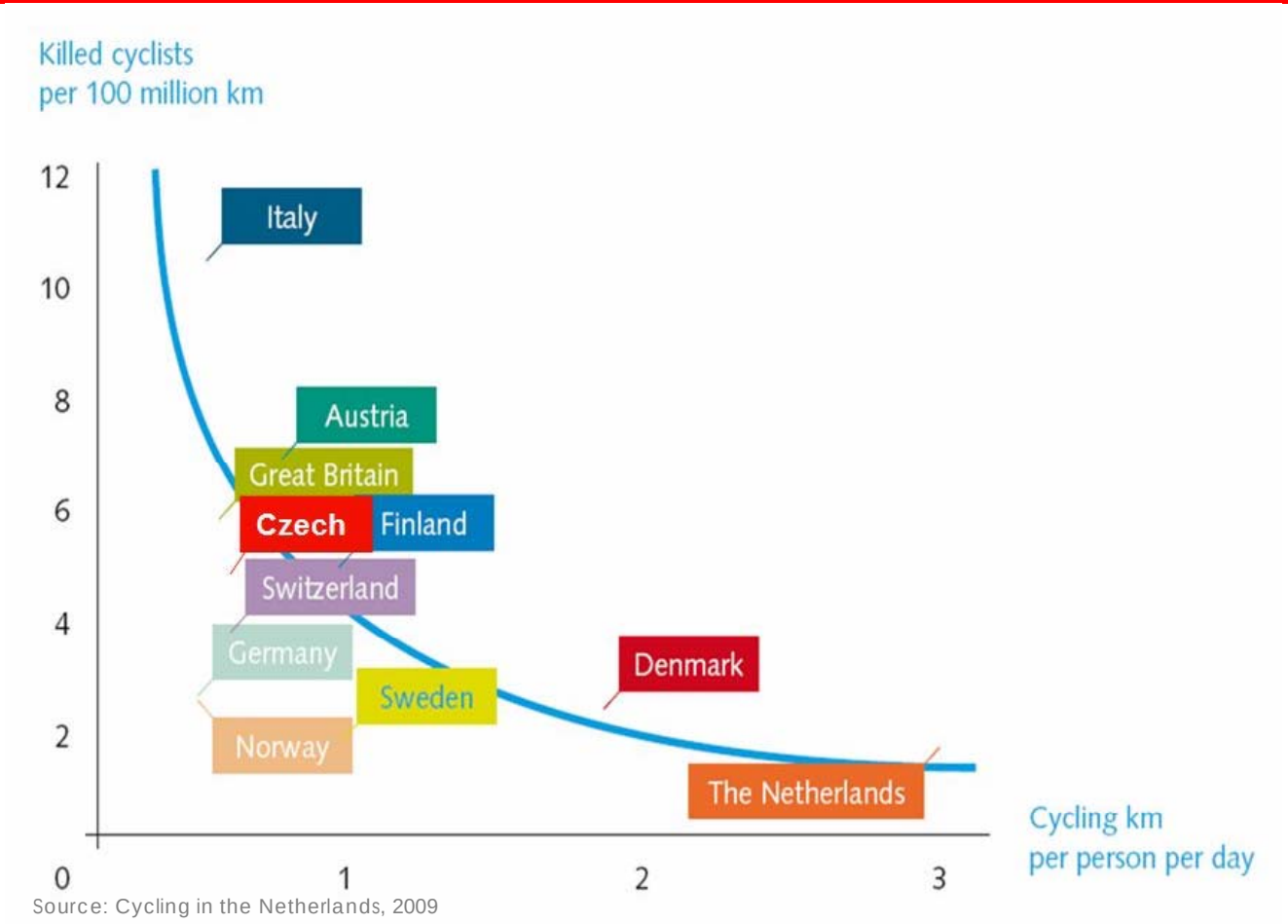
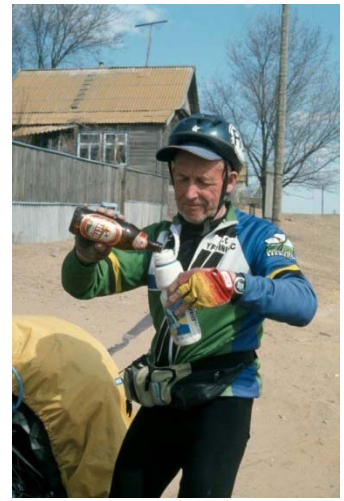
Cycling fatality rate



Source: Cycling in the Netherlands, 2009

Safer cycling with ICT?

- 7% of all accidents in the EU: cyclists
- **Motorized traffic**: speed & mass
- **Bicycle related accidents**



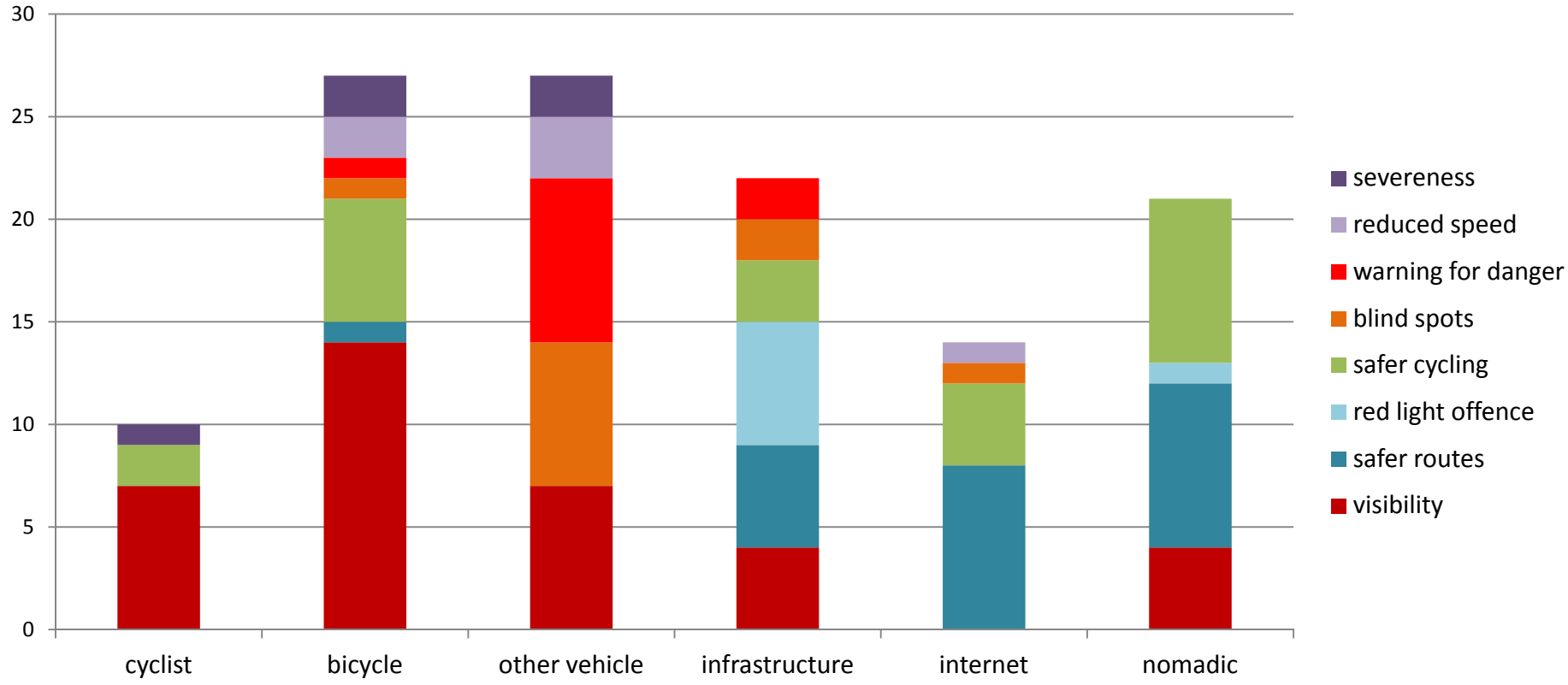
Cycle technique

Limited protection

Bad visibility

121 e-safety applications

… with different safety potentials



E-bike

Copenhagen Wheel
Prototype

E-bike wheel transforms a 'normal' bike into an electrical bike and allows use of measuring, tracking and communication devices .
Effect: information about safety, health, routes

Hindsight 35
Prototype

Screen on the handlebars provides information about situation behind the bicycle
Effect: knowledge about what is going on behind the bicycle without manoeuvres

Virtual bicycle lane

A cycle lane on your handlebars
Existing – patent has been applied for

Where a real bike lane is missing, a virtual bike lane is projected by the cyclist, thus creating his/her own virtual bike lane. It is expected that this will create more space around the cyclist when taken over by a motorized vehicle

Effect: increased visibility of the cyclist and the safety space needed around

Detection

Airbag as protection of cyclists
In development (TNO – APROSYS)

Airbag on the bonnet and windows protects the cyclist in case of an collision
Effect: reduced severity of injuries in case of collision

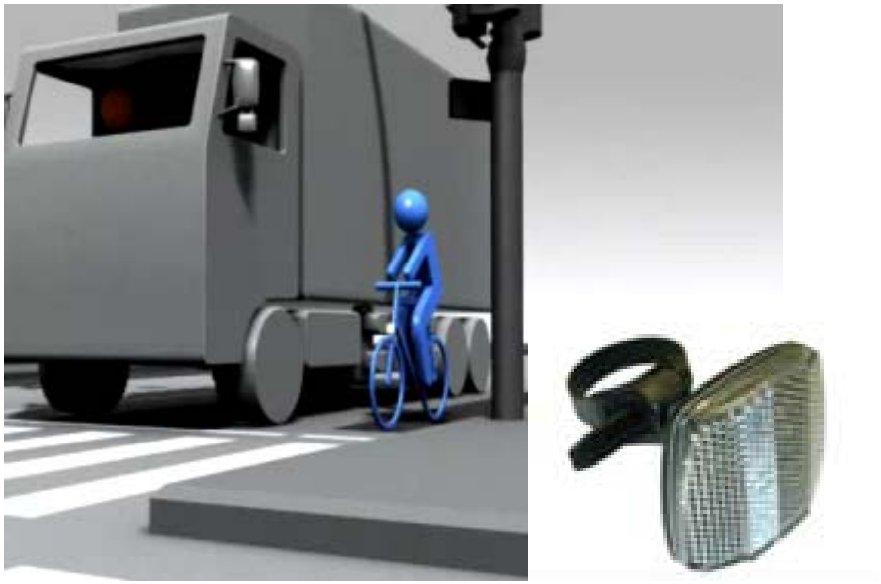
NextGenITS
In development

V2V en V2I communication allows detection of bicycles and to anticipate on them by adapting speed or braking
Effect: prevention of collisions with cyclists

Blind spot

Lexguard
Existing

Detection strips on the truck to warn for objects around the truck combined with warning signs inside the truck.
Effect: prevention of blind spot accidents



See-Mi
Existing (Copenhagen, London)

The bicycle sends a signal with a special reflector to a receiver at the intersection showing the presence of a cyclist.
Effect: prevention of blind spot accidents

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SAFECYCLE

Why analysing applications ?

- Are the apps suitable in all contexts ?
- Can they be implemented or used as such or do they need to be supported in some way ?
- What could be their positive or negative aspects ?
- What are the most promising apps that should be promoted ?
- What are the apps impacts on safety of cyclists ?

Analysis methodology

- Selecting the more relevant apps
  - Choosing those more representatives of various categories
- SWOT analysis
  - Assessing potential strengths, weaknesses, opportunities and threats
- Selecting the most promising apps for safety of cyclists
  - Comparison of opinions and selection of main apps
- Impact assessment and Cost-Benefit Analysis
  - Quantitative assessment of main apps

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SAFE CYCLE

From 30 to 11 applications

cyclist	Speed vest	Direction indicator	Copenhagen wheel	**HindSight**	Foldable handlebars
	Light Lane Bike	Self-powered laser	**Bike braking light**	Hokey spokes	Safety area
other vehicle	**Car airbag SaveCap**	ISA	Frontzicht	Night view	Veh audible system
	ISI	**Lexguard**	**Countdown traffic lights**	Traffic light for rain	**Traffic eye Zurich**
	LED-Mark	Photovoltaic panels	See-mi	Street view	Arrive Alive
	Opwegnaarschool.nl	**Routeplanner Gent**	Bike wise	**Citizens connect**	Bike stability

bicycle

Infrastructure

internet & nomadic

Impact assessment

- For each app a Cost-Benefit Analysis (CBA) is realised based on assumptions about:
  - costs for implementing the app
  - costs for maintaining the app
  - unit to be considered depending on the app (km of equipped roads, n. of traffic lights equipped, n. of vehicles equipped, ...)
  - type of accident (intersection, during night, frontal)
  - expected duration of the app
  - interest rate

CBA calculation

- CBA = Actualised Benefits / Actualised Costs
- Benefits = monetized reduction of n. of accidents, injured and victims
  - Social costs * Crash Reduction Factors * n. of accidents
  - Crash Reduction Factors are estimated from literature review (few data from FOTs or similar – use of values of systems with similar effect – assumed equal in all the countries considered)
- Costs = implementation plus maintenance costs
- Actualization factor = function of app duration and interest rate

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SAFE CYCLE

Light Lane Bike

CRF = -40% (victims) / -40% (injured) / -40% (accidents)

	Netherlands	Belgium	Italy	Czech Rep	EU
Accident	776	866	2,809	648	12,760
Injury	720	866	2,684	635	13,324
Fatality	24	15	75	20	418
Unit cost (€)	15	15	15	15	15
N. of bikes	16,000,000	5,500,000	27,000,000	5,200,000	224,000,000
Costs (mln €)	387	133	654	125	5,420
Benefits (mln €)	559	624	1,568	136	7,813
CBA	**1,44**	**4,69**	**2,40**	**1,09**	**1,44**

Synthesis of CBA results