



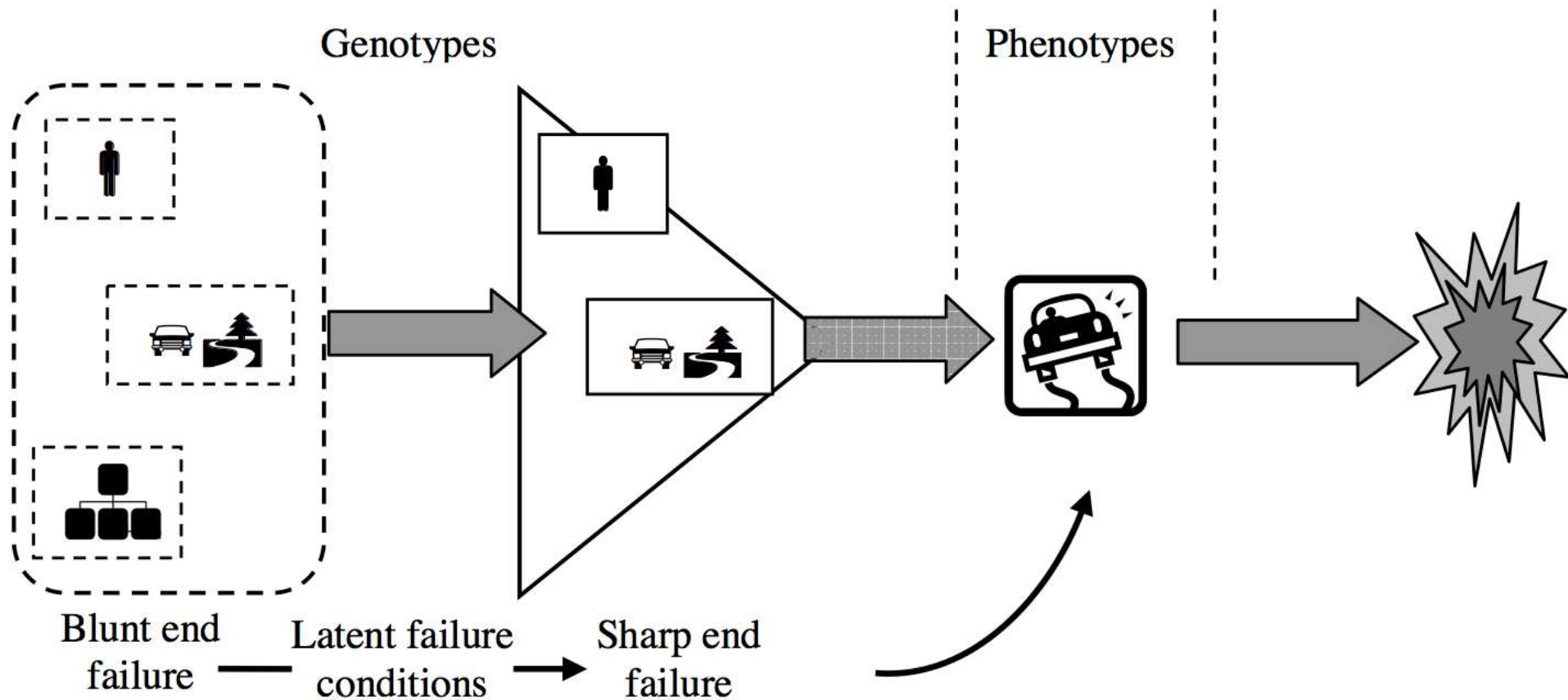
# Comparison of in-depth accident analysis data from three European countries using the Driving Reliability and Error Analysis Method

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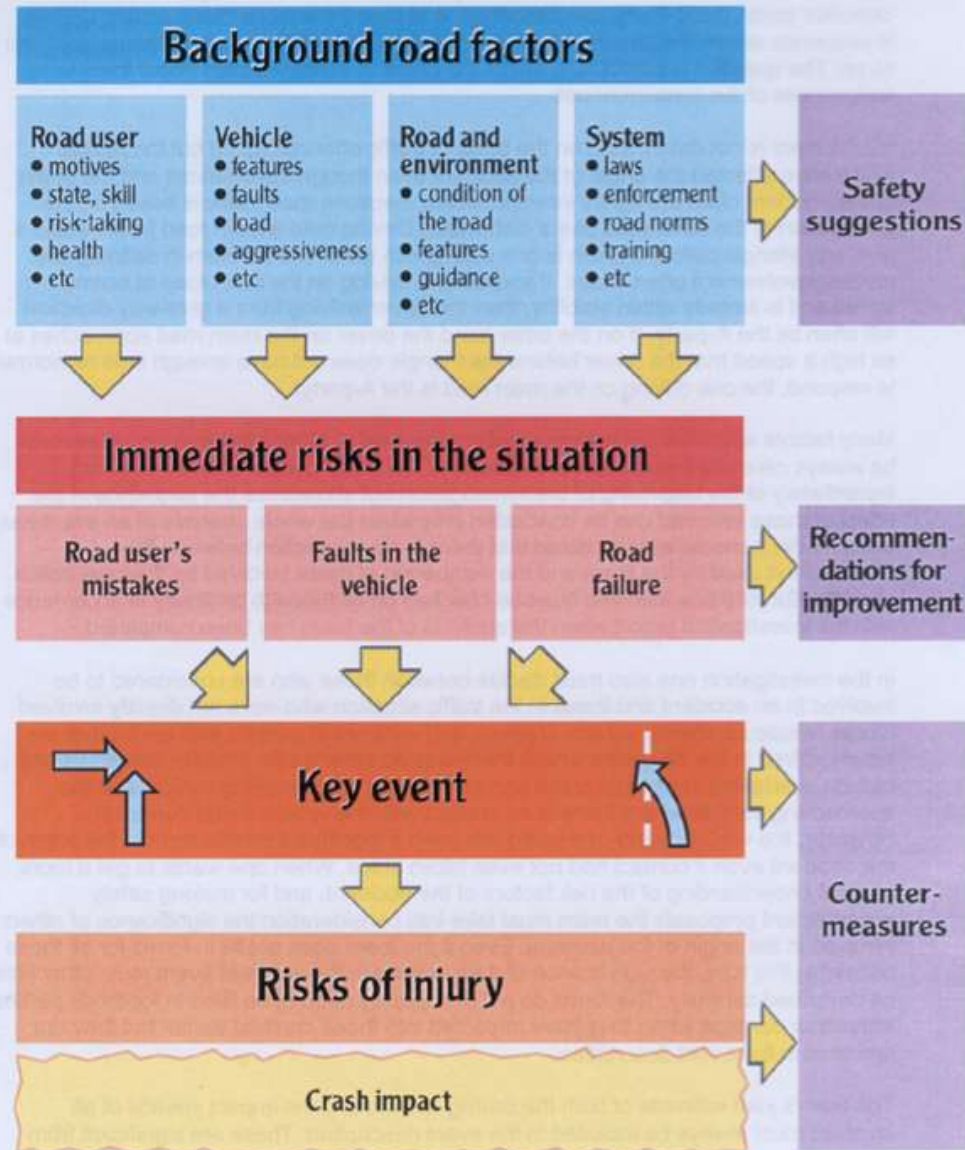


- Introduction
  - DREAM method
  - Case study: Single motorcycle crashes outside urban area, no intersection
    - British, French and Finnish data
- Results
- Conclusions
  - Advantages and limitations of DREAM
  - Could DREAM be used routinely in the Nordic countries?

## ■ An accident model



# RISK ACCUMULATION MODEL IN INVESTIGATION TEAM INVESTIGATIONS



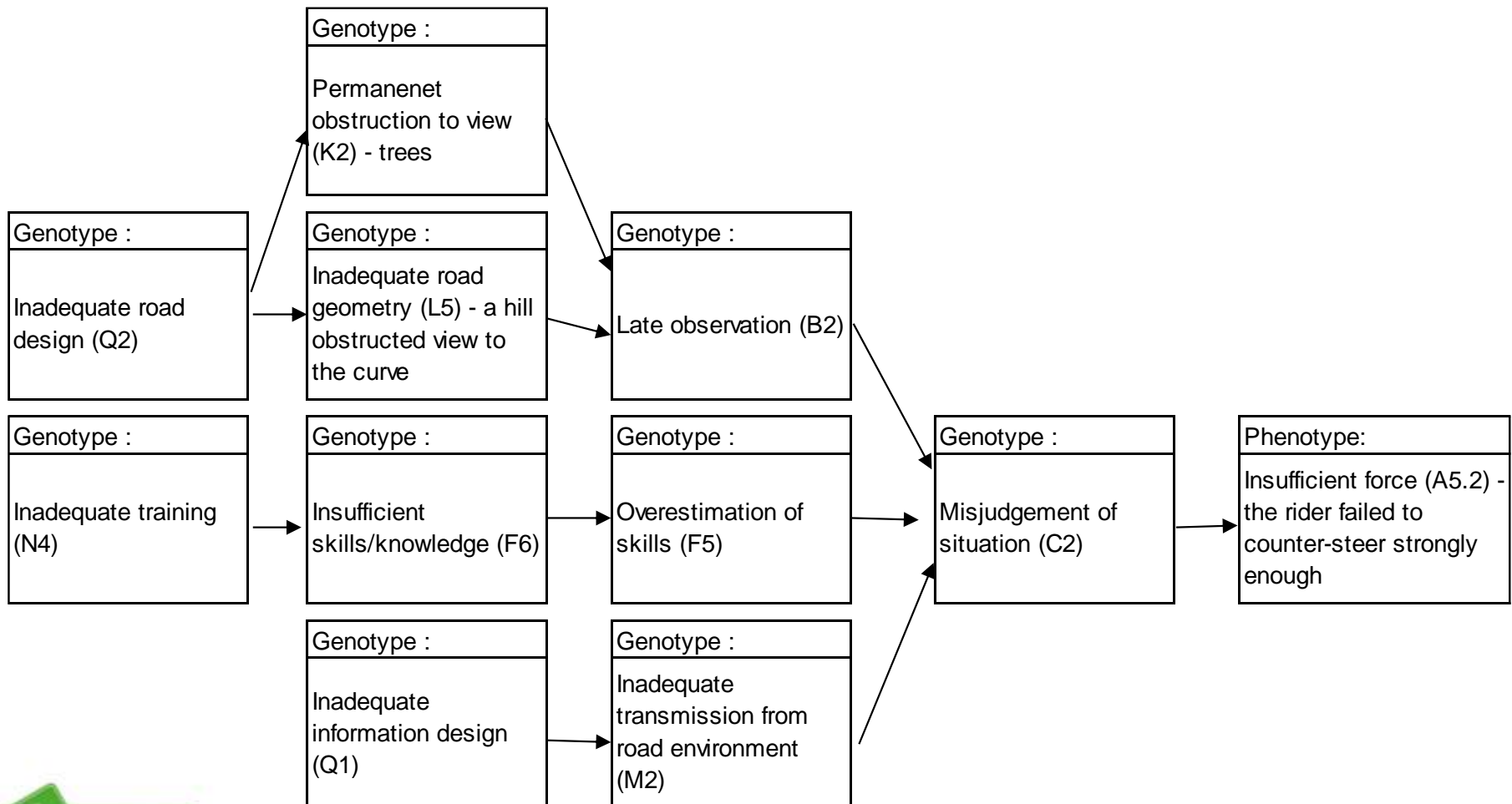
- A classification scheme
  - Phenotypes: the observable effects
  - Genotypes: the factors that may have contributed to phenotypes

Genotypes				A: Phenotypes
Driver	Vehicle	Traffic environment	Organisation	
B: Observation	G: Temporary HMI problems	J: Weather conditions	N: Organisation	Timing
C: Interpretation	H: permanent HMI problems	K: Obstruction of view due to object	O: Maintenance	Speed
D: Planning	I: Vehicle equipment failure	L: State of road	P: Vehicle design	Distance
E: Temporary personal factors		M: Communication	Q: Road design	Direction
F: Permanent personal factors				Force
				Object

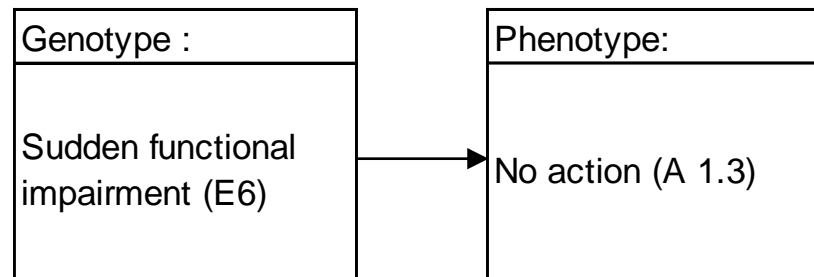
## PHENOTYPES (A)

ANTECEDENTS (CAUSES)	CONSEQUENTS (EFFECTS)		
GENERAL Genotypes	Definition of GENERAL Phenotypes	Definitions of SPECIFIC Phenotypes	Examples for SPECIFIC Phenotypes
<b>Misjudgement of time gaps (C1)</b>	<b>Timing (A1)</b> The timing for initiating an action.	<b>Too early action (A1.1)</b> The action is initiated too early, before the signal is given or the required conditions are established.	<i>Intersection accidents</i> Starting from a stand still the driver passes the traffic light too early – before it has turned green.  Starting from a stand still the driver passes the stop/give way sign too early - before the intersection is free.  Starting from a stand still the driver enters the intersection too early - before the intersection is free (this is regardless of whether or not it is the driver's right of way). <i>NB! If the driver has past a red traffic light or a stop/give way sign (see above) before entering the intersection the analysis should start by the traffic light/stop sign/give way sign.</i>
<b>Misjudgement of situation (C2)</b>			
<b>Fear (E1)</b>			
<b>Fatigue (E3)</b>			
<b>Under the influence of substances (E4)</b>			
<b>Sudden functional impairment (E6)</b>			
<b>Temporary access limitation (G4)</b>			
<b>Equipment failure (I1)</b>			
<b>Strong side wind (J2)</b>			

## A DREAM chart for each rider involved in a crash



# Sometimes all you can say is





## STATE OF THE ART



### MACRO ANALYSIS LEVEL

National databases issues  
UK, Greece, Finland, Italy, France

Scenario 1

Scenario 2

Scenario 3

Scenario ...

### MICRO ANALYSIS LEVEL

In-depth databases  
UK, Finland, France

Scenario 1

Scenario 2

Scenario 3

Scenario ...

M 1

M 2

M 3

M 4

M 1

M 2

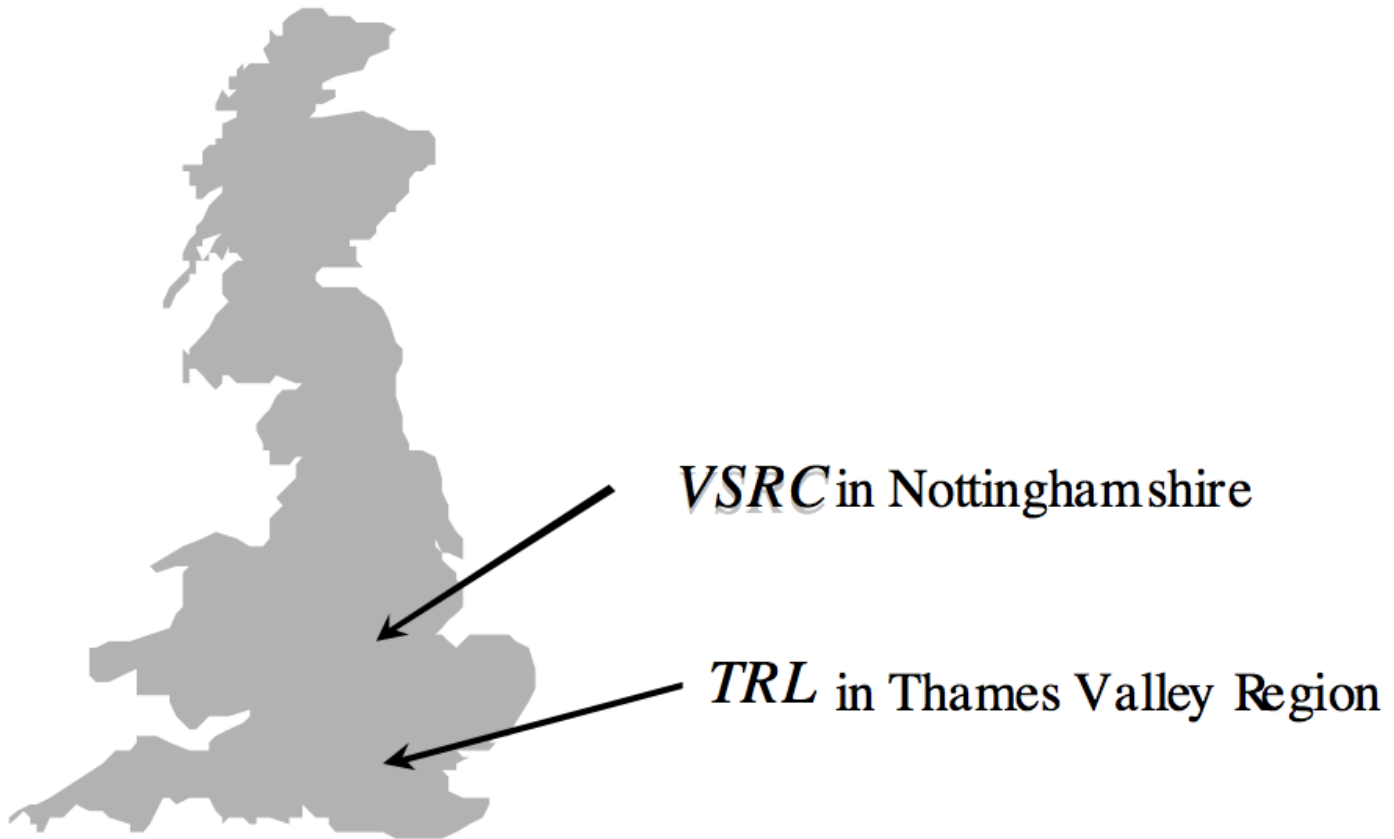
M 3

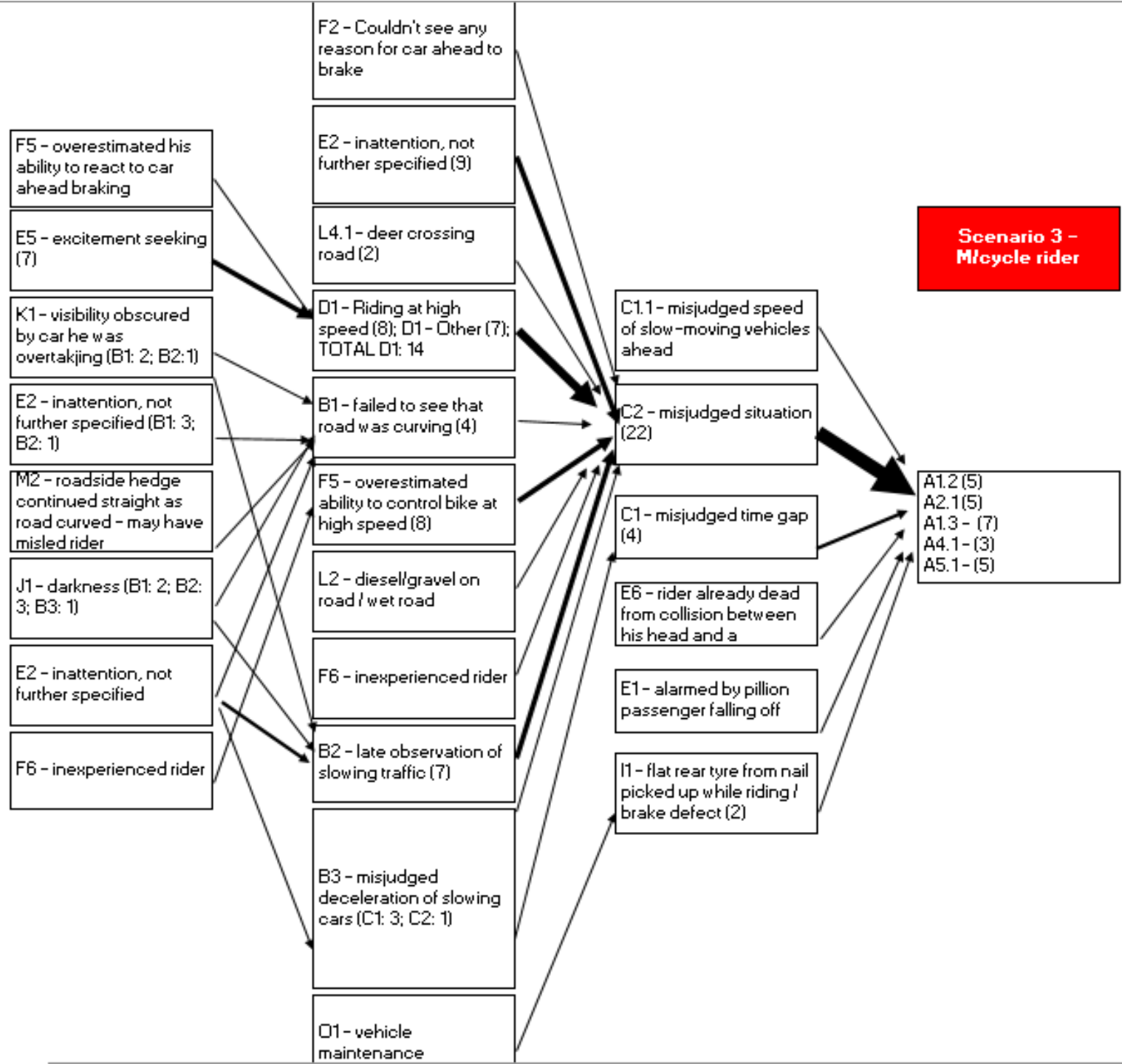
M 4

*M 1, 2, 3, 4= Model 1, 2, 3, 4*

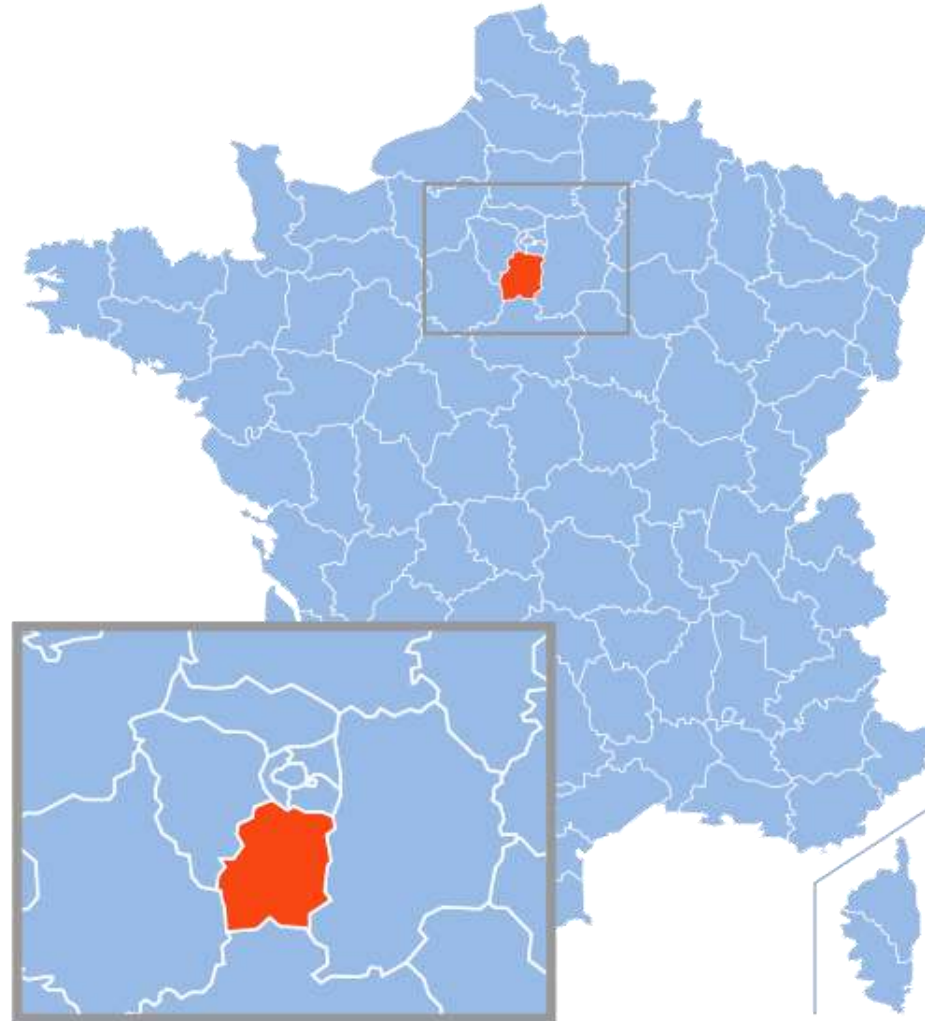


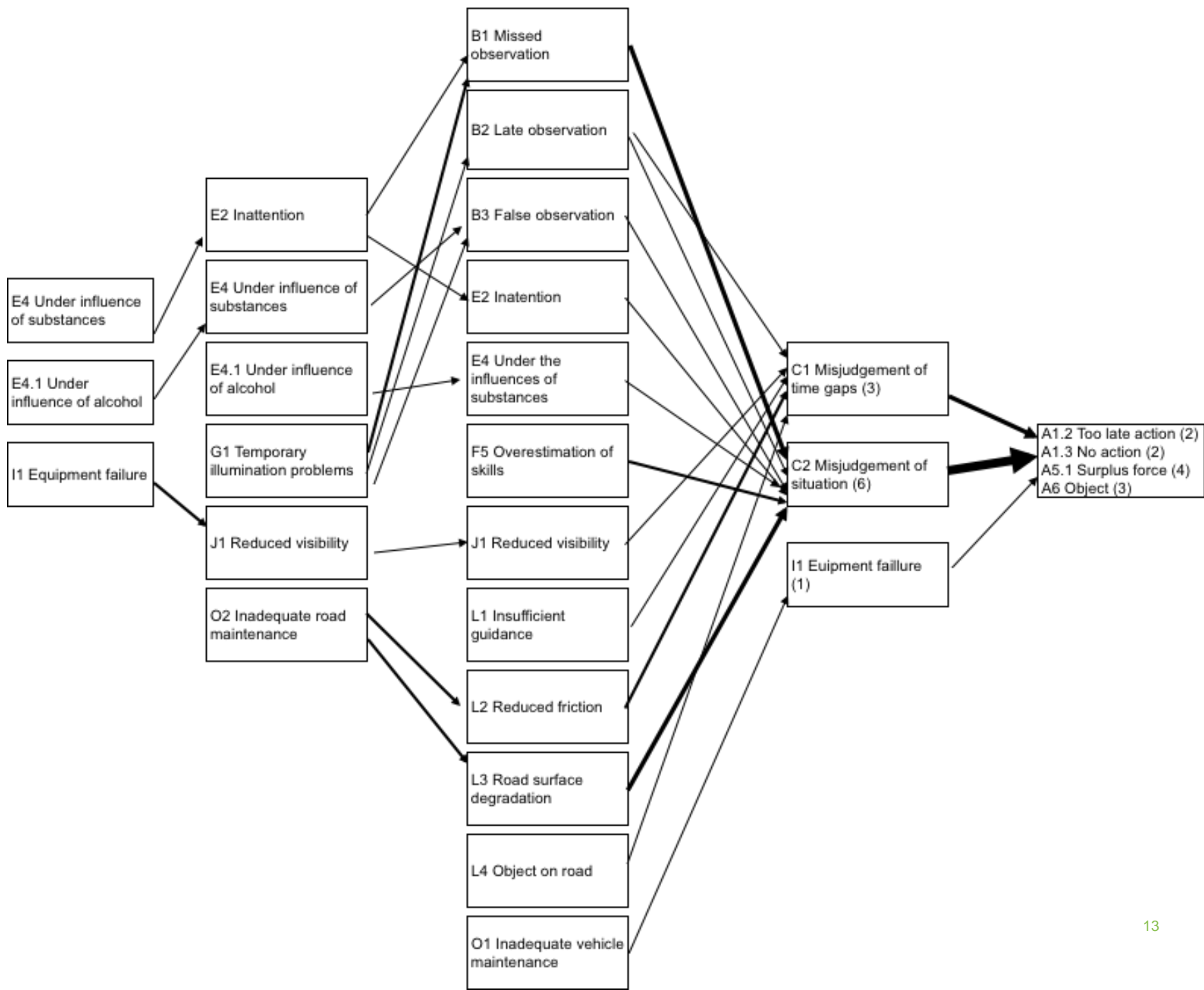
# UK data collection sites: 25 crashes





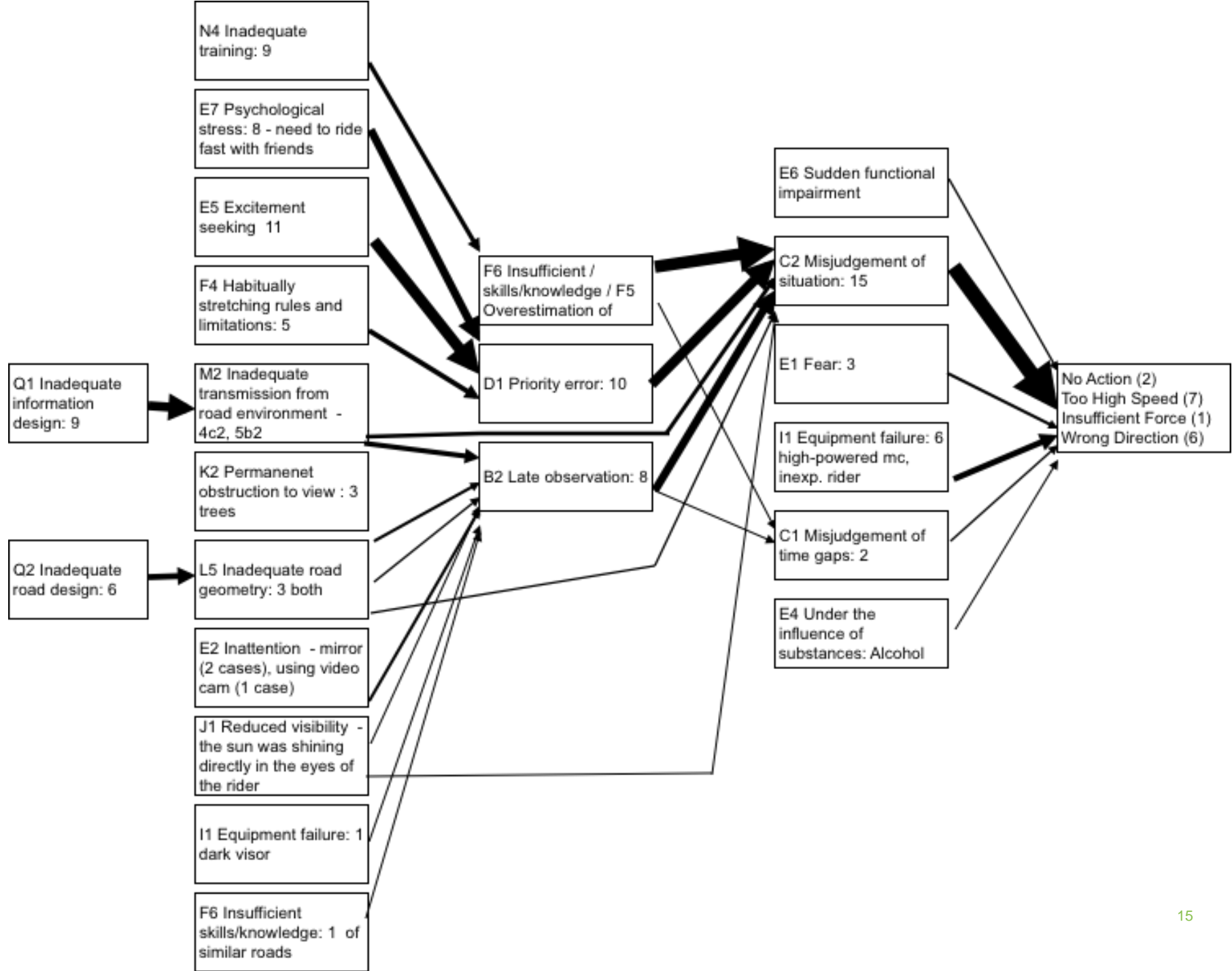
# French data: MAIDS & RIDER projects, 10 crashes





# Finnish data collection: 16 crashes

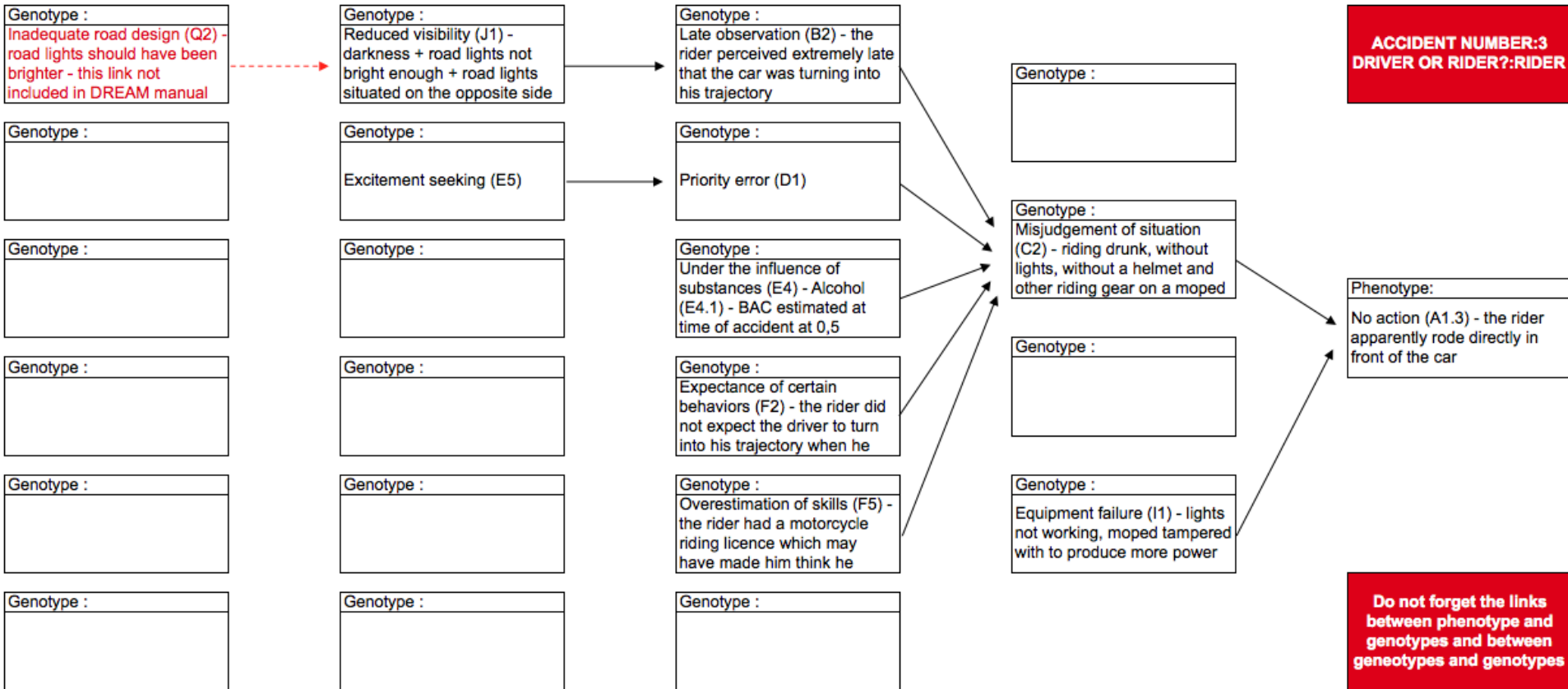




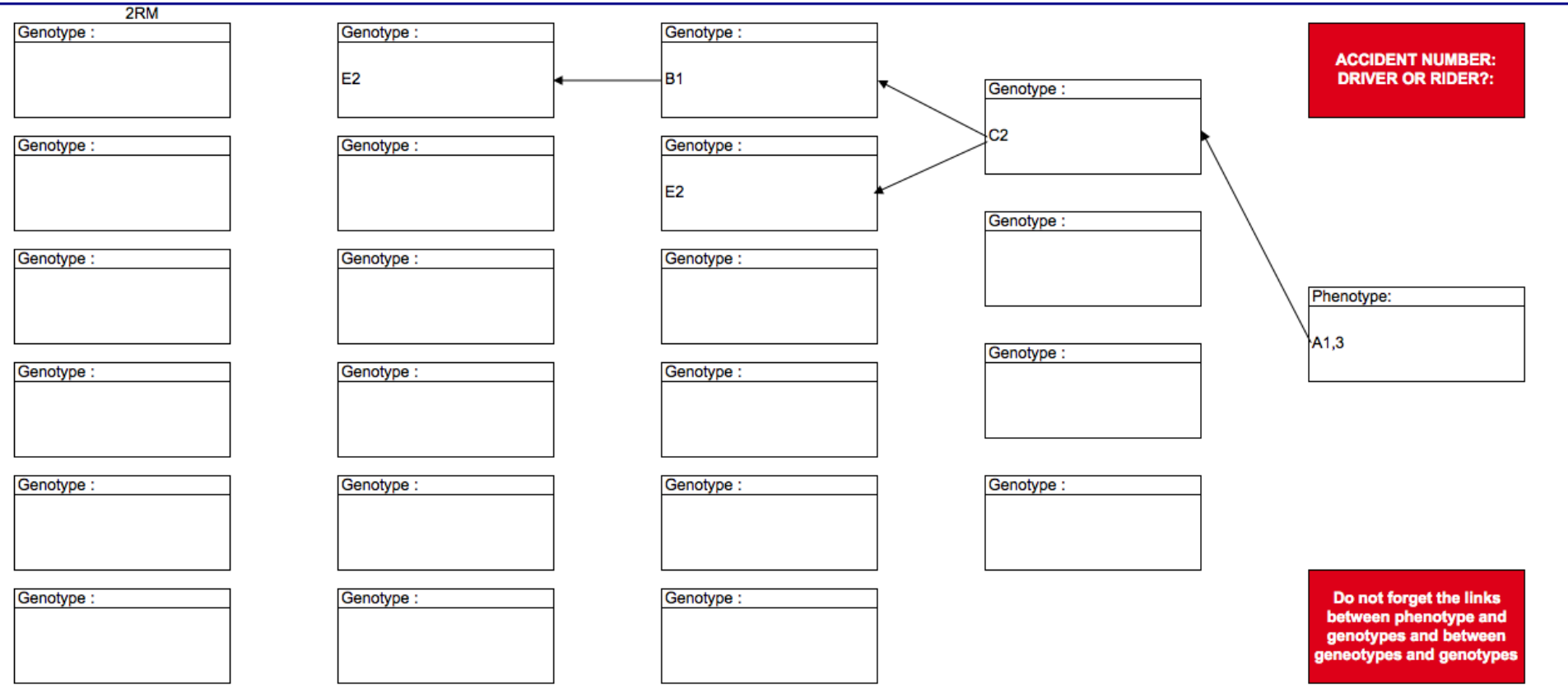
- Riding fast rather than safely, excitement seeking
- Overestimation of own skills

- Finland
  - High engine power
  - Riders compete / show off to one another
    - Riding in groups as a risk factor!
    - Inadequate information design
- France
  - Poor condition of the roads
- UK
  - Late observations by the riders

# Differences in practice: Finnish DREAM chart



# Differences in practice: French DREAM chart



- Different ways of using the method
- Different input data (differences between the in-depth investigation methods)
- Question arises: which differences are real, which ones arise through different ways of using the method?

- Personal opinion: using only DREAM genotype codes leaves essential information out
  - Good to complement the charts with more descriptive information

- Well-suited for identifying sharp-end factors
- DREAM is a visual method
  - Easy to see things at a glance
- Good tool for turning incommensurable information commensurable
  - Between countries
  - Within countries

- Blunt-end factors & injury risk factors receive less attention
- Aggregating results tedious & error-prone
  - Automatize DREAM!
- DREAM is a visual method
  - Add matrix representation: easier storage
- Factors not adapted to riders
- Differences in using the method
  - Amenable by better training of users

- Every fatal road accident investigated in
  - Finland, Sweden, Iceland
  - Denmark, Norway ?
- Similar methods, similar data
  - Driver, vehicle, infrastructure
  - Similar objective: Uncover causal factors, prevent similar accidents

- Is a harmonization of the Nordic methodologies for in-depth studies beneficial?
- If yes should an appendix based on DREAM be included in the in-depth databases?
- How does an optimal reporting system look like?
- Should also severe injury accidents be investigated in-depth?

# Thank you for your attention

[www.ltu.se/forskning](http://www.ltu.se/forskning) *publications*

[www.2besafe.eu](http://www.2besafe.eu)

- Routine since 1997 and is regulated in the government's instruction to the Transport administration
- Detailed investigation into each fatal road accident with the main objective to identify what caused the fatal injuries concerning

- What data is collected?
  - Road data based on: Site inspection, Transport administration systems, Police, Rescue services etc.
  - Vehicle data based on: Vehicle inspection, Police, car and vehicle register, manufactures description etc
  - Road user based on: Police report, autopsy report, driving license register etc.

## Methodology – Accident data for 9 scenarios



Scenario	PTW accident configuration	Number of in-depth accidents analysed per country			Total
		Finland	France	The United Kingdom	
1	Moped / Passenger car accident - Inside urban area - No intersection	0	13	2	15
2	Moped / Passenger car accident - Inside urban area - Intersection	3	36	10	49
3	Single motorcycle accident - Outside urban area - No intersection	16	10	25	51
4	Single motorcycle accident - Inside urban area - No intersection	4	26	16	46
5	Single motorcycle accident - Inside urban area - Intersection	0	19	17	36
6	Motorcycle / Passenger car accident - Outside urban area - No intersection	7	8	27	42
7	Motorcycle / Passenger car accident - Inside urban area - No intersection	0	31	10	41
8	Motorcycle / Passenger car accident - Inside urban area - Intersection	0	40	20	60
9	Motorcycle / Passenger car accident - Outside urban area - Intersection	3	18	30	51
	<b>TOTAL</b>	<b>33</b>	<b>201</b>	<b>157</b>	<b>391</b>

- A lack of in-depth accident data for several scenarios

# Driving Reliability and Error Analysis Method

- To classify and store information about factors contributing to accidents

*Warner, H., et al., (2008). Manual for DREAM 3.0, Driving Reliability and Error Analysis Method. Deliverable 5.6 of the european project SafetyNet*

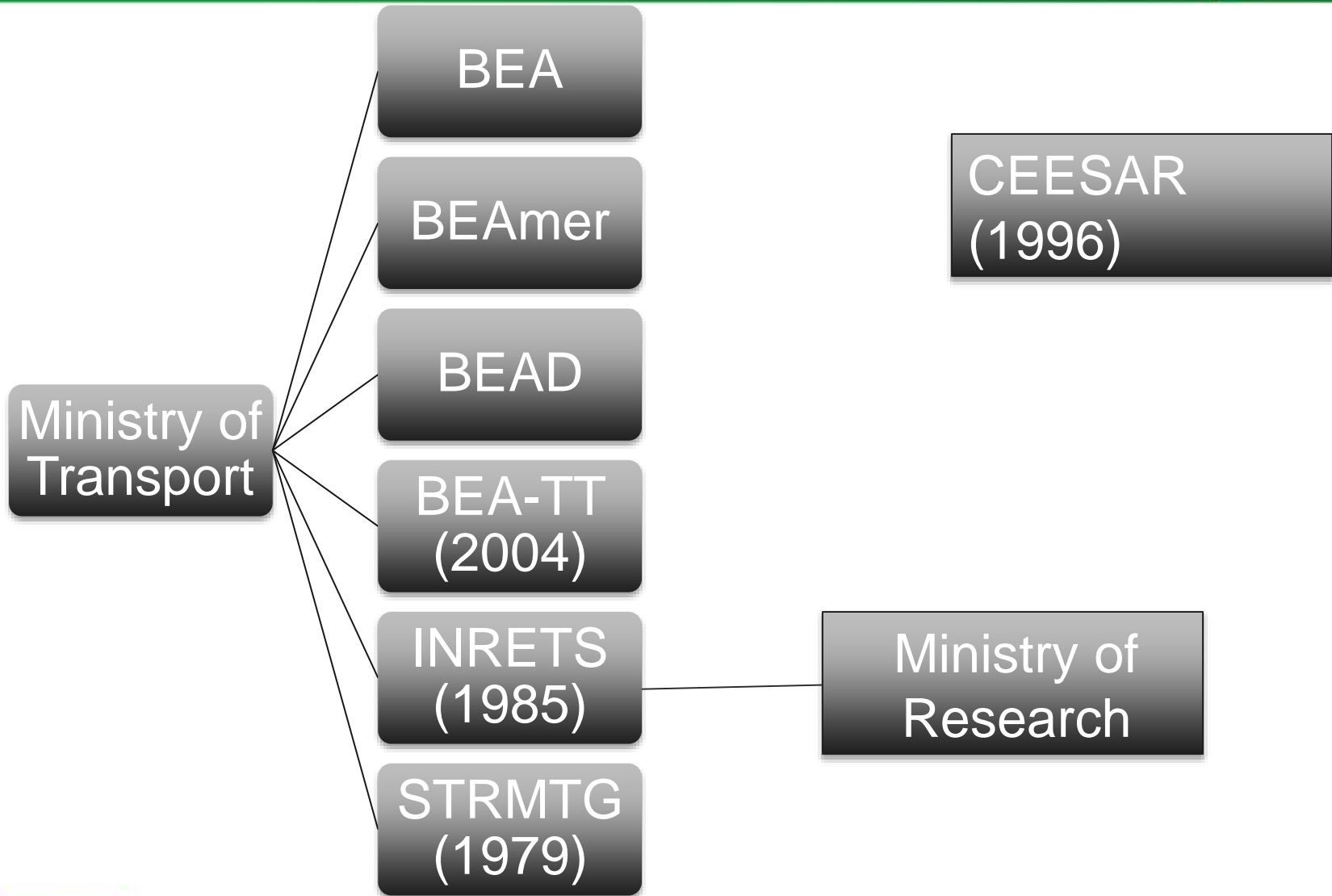
- DREAM is an adaptation of CREAM (Cognitive Reliability and Error Analysis Method)

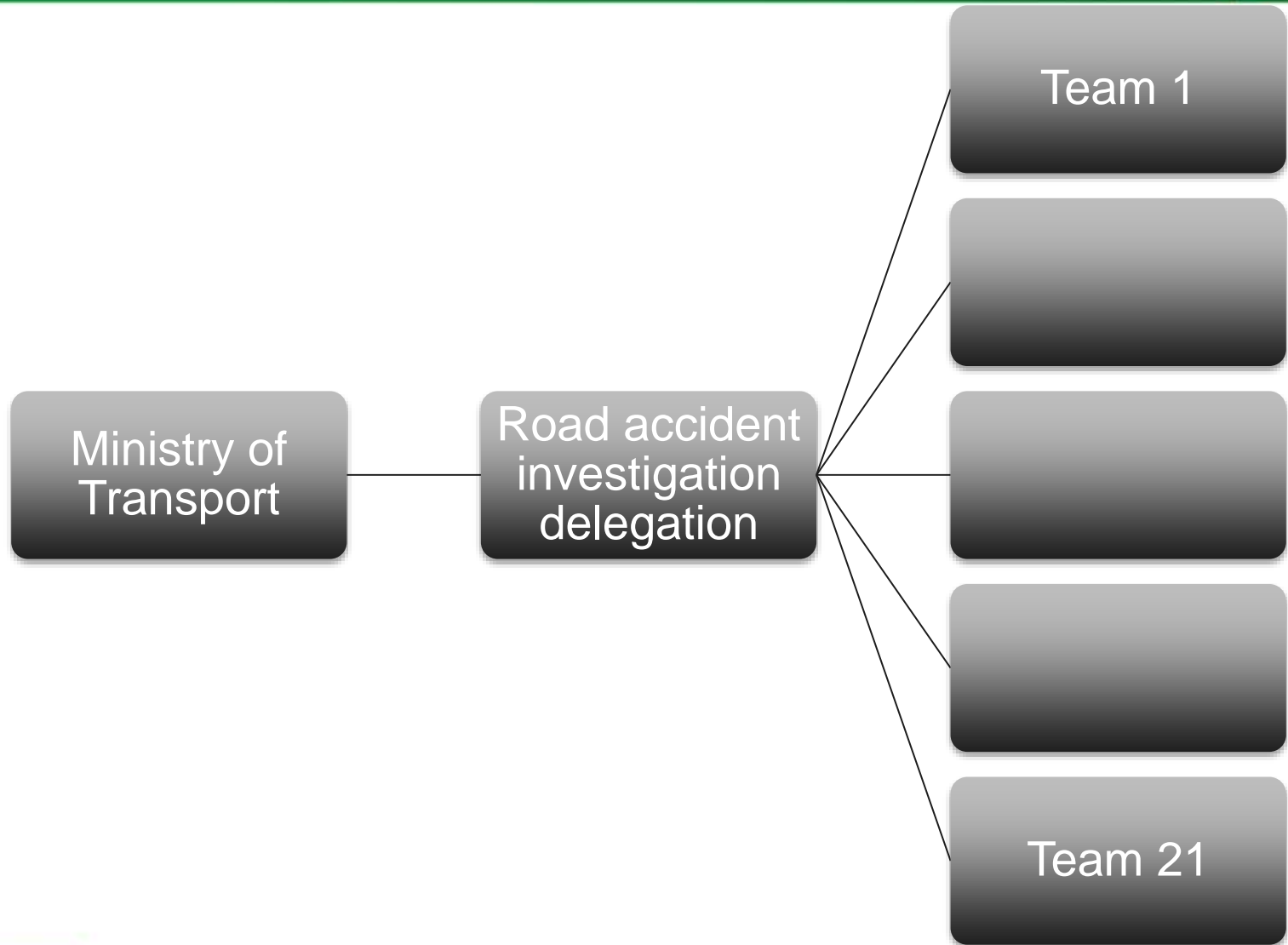
*Hollnagel, E., (1998). Cognitive Reliability and Error Analysis Method: CREAM. Oxford, UK: Elsevier Science Ltd.*

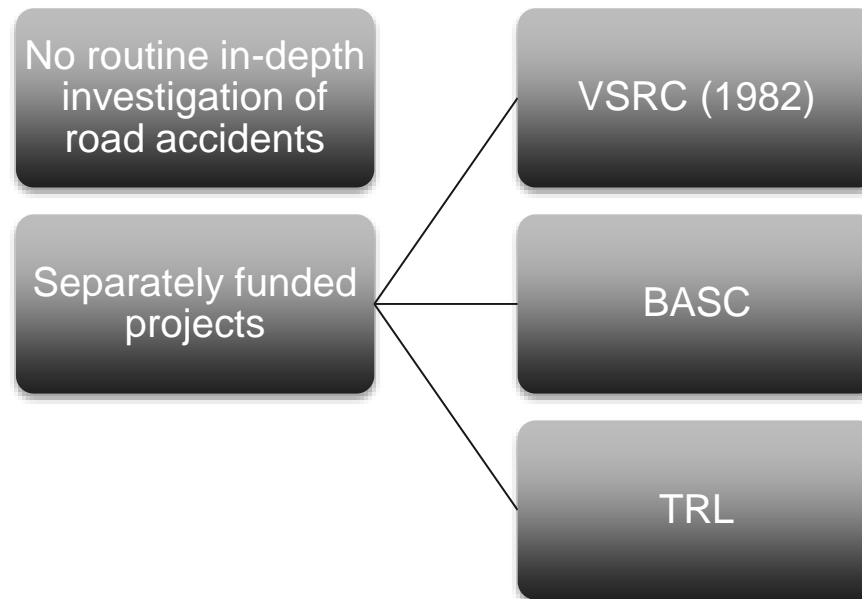
- Moped / passenger car, inside urban area, no intersection
  - Inattention
  - Late observation
  - Reduced visibility
- Moped / passenger car, inside urban area, at intersection
  - PTW with a right of way status: expect a certain behaviour from the passenger car driver
  - PTW without a right of way status: late observation, inattention, priority error, reduced visibility
- Lack of riding experience for the moped users

## 4 accident analysis models

- Description of the DriverVehicleEnvironment system
- Description of the evolution of the DVE system
- Determination of the Human Functional Failure (HFF)
- **Driving Reliability and Error Analysis Method DREAM**







# Pros and cons of the different systems



Country	Pros	Cons
Finland	<ul style="list-style-type: none"><li>• Comprehensive</li><li>• Breadth of information</li><li>• Cost-effective</li></ul>	<ul style="list-style-type: none"><li>• Routine</li><li>• Shallowness of information</li></ul>
France	<ul style="list-style-type: none"><li>• Depth of information (?): MA of INRETS focuses on specific accident types</li></ul>	<ul style="list-style-type: none"><li>• Non-comprehensive</li><li>• Expensive (BEA-TT)</li><li>• Complicated administration</li><li>• Focused on the Paris area</li></ul>
UK	<ul style="list-style-type: none"><li>• Depth of information</li><li>• VSRC: well-planned projects producing specific information</li><li>• BASC advanced knowledge of biomechanics</li></ul>	<ul style="list-style-type: none"><li>• Non-comprehensive</li><li>• Narrowness of information</li></ul>