

Change and Safety: Decision-Making from Data

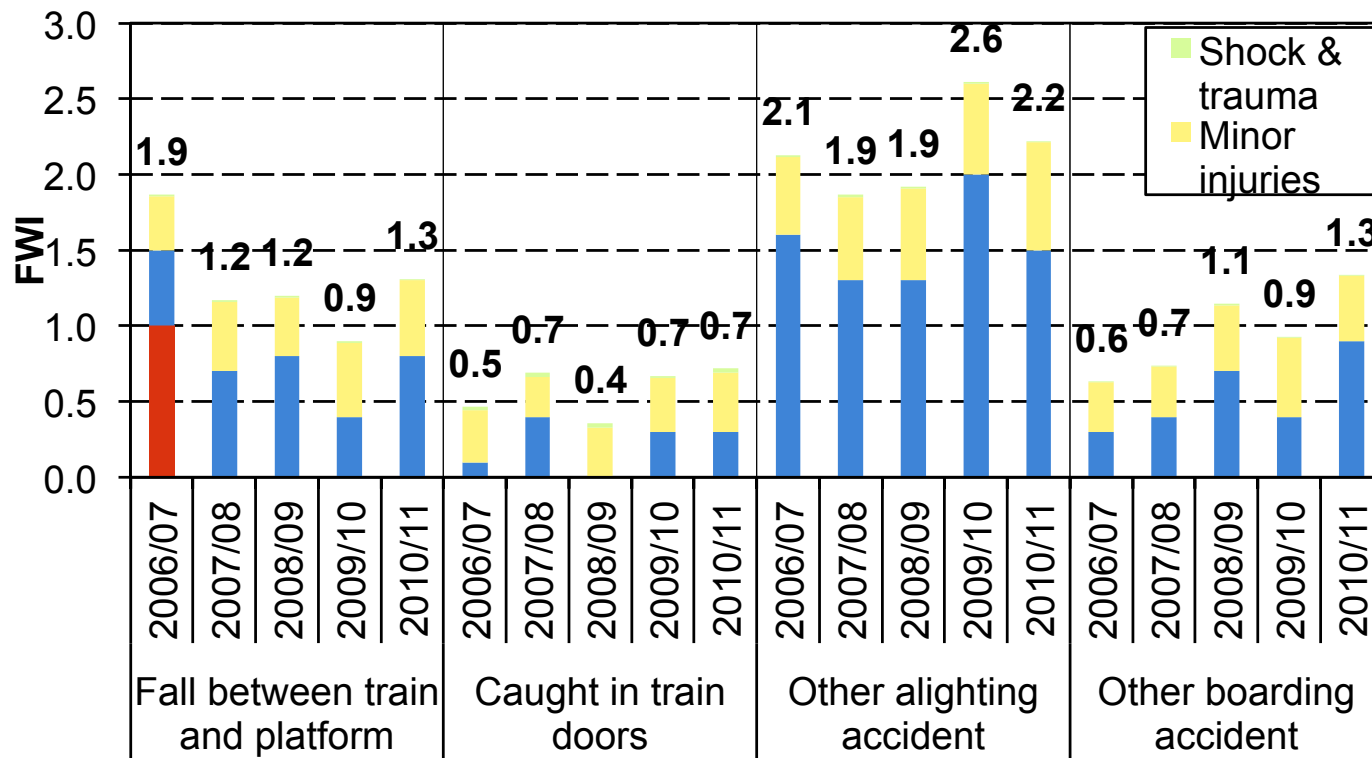
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- Incident data → risk estimate → decision: many applications
- Local prediction needed
- Local prediction possible with data and knowledge
- Bayesian network: example application

Boarding and Alighting Accidents

- Accidents to passengers getting on and off trains
- From 2011 Annual Safety Performance Report



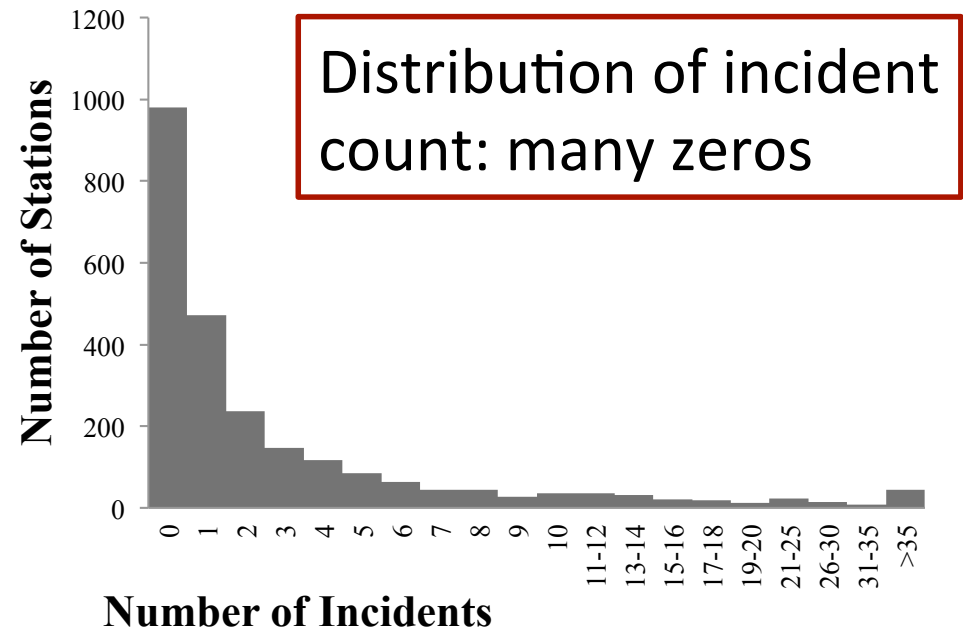
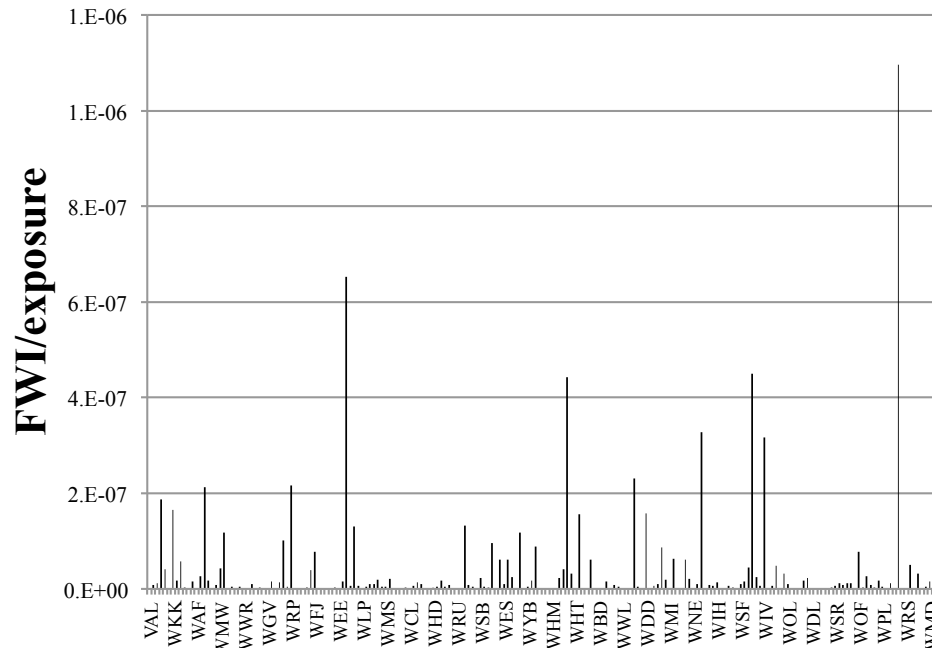
Decision Making is Local

- How to reduce Boarding / Alighting harm
 - Station staffing (local)
 - Station Design (local)
 - Train design (more global)
- Incident data – many examples
 - Safety: SPADs, broken rails, bridge strikes,
 - Reliability: signal failure, staff absence,



Just Data for Decision Making?

- Not enough data for local decision making directly



Normalised observed harm (FWI) – some stations: spikey

Model Concept: Data and Knowledge

- Knowledge: causal analysis of incidents

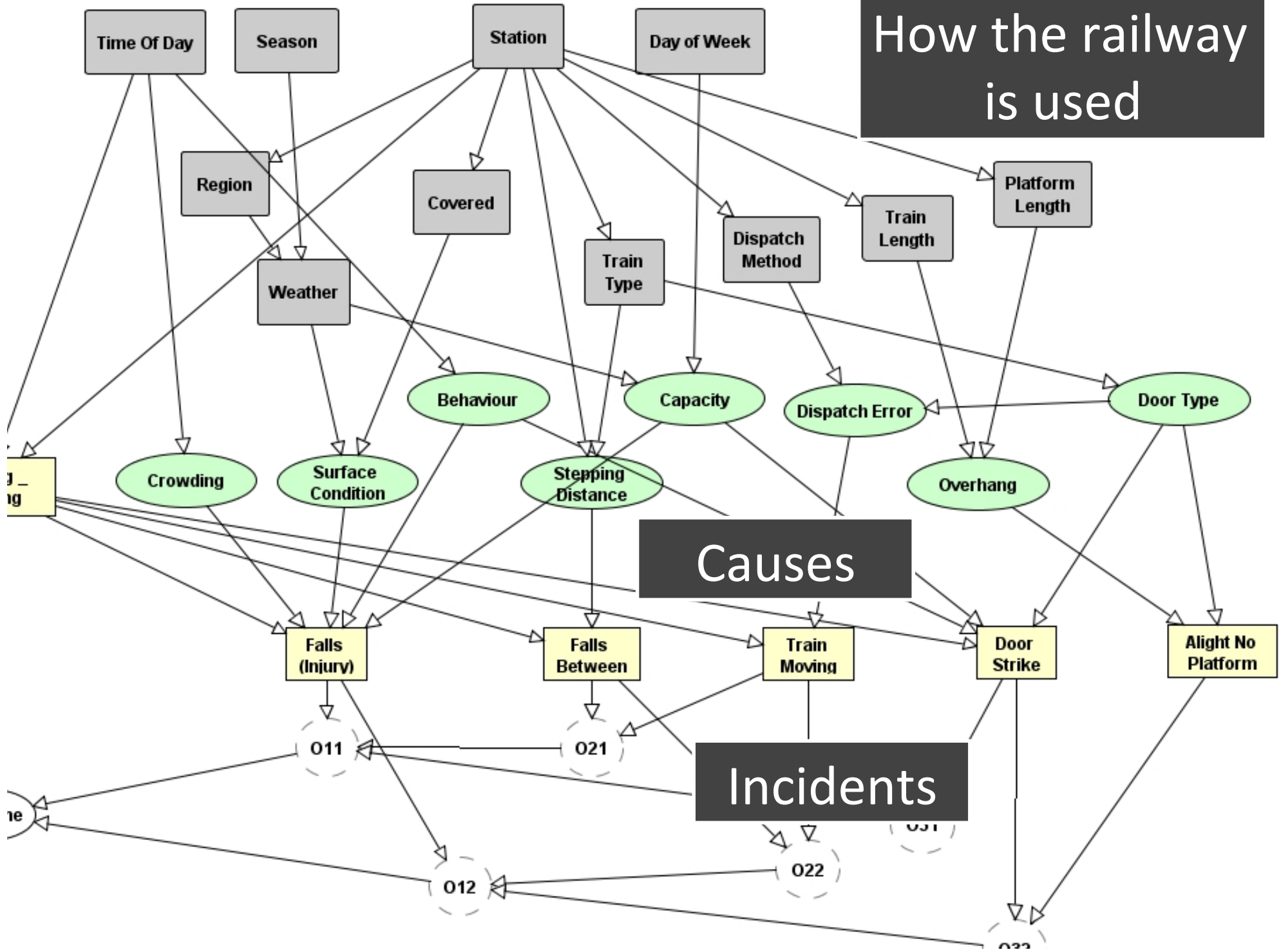


If ice is a cause of falls then we expect iciness to occur in incident reports more often than we expect from the prevalence of icy conditions

- ORR Station Usage
- TSDB
- DfT – Significant Steps Research
- DfT National Travel Survey
- SRM Normalisers
- MET Office
- APRS
- T763 dispatch data

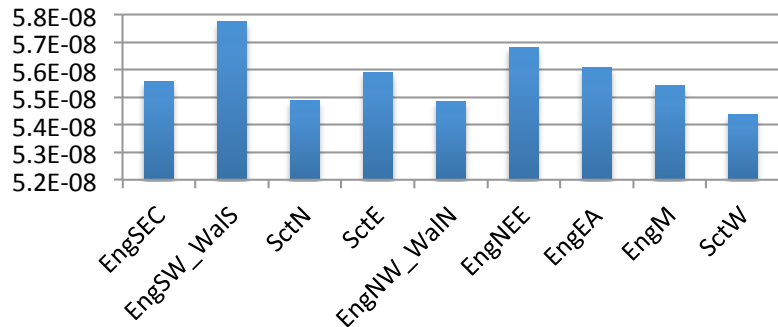
- Estimated effect of causes on incidents

How the railway is used



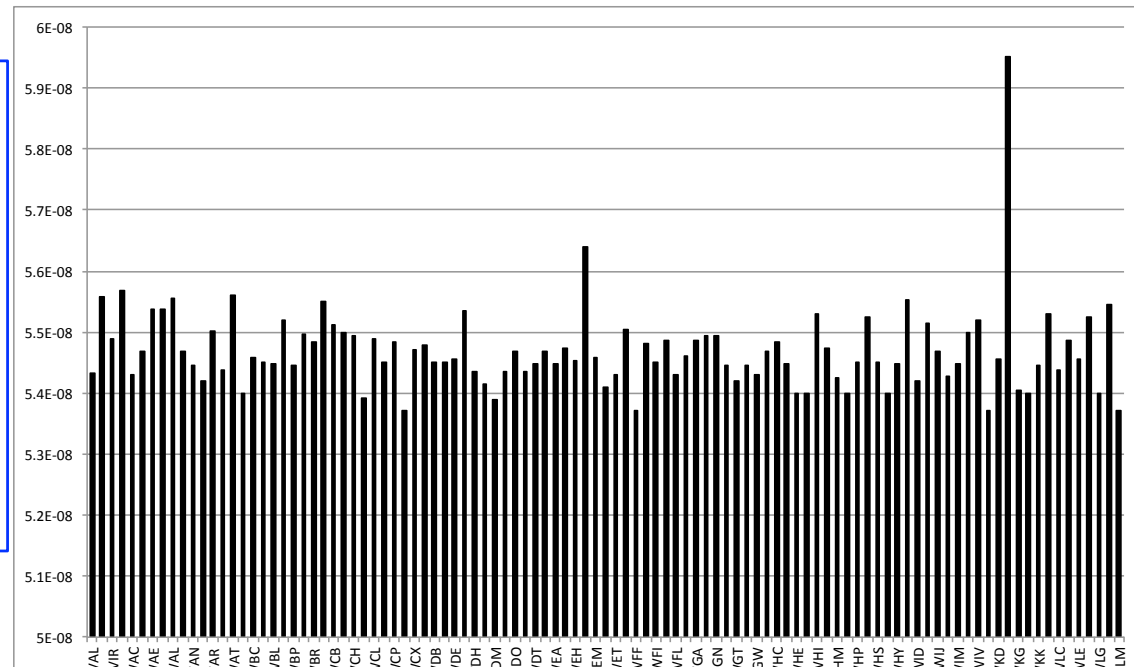
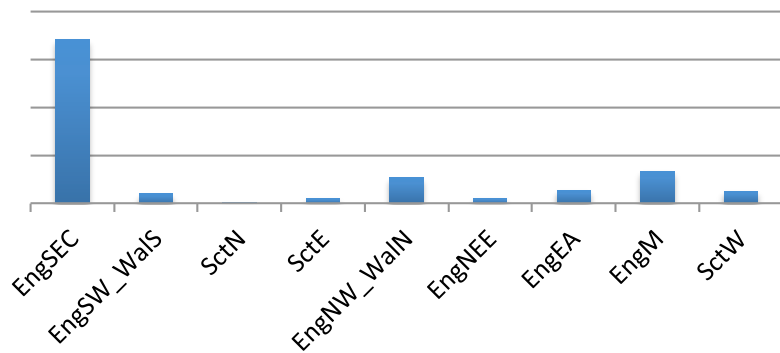
Model Queries

Individual FWI



- Profile: region, station, ...
- Distinguish individual and aggregate risk

Aggregate FWI (proportional)



Future Work

- Validation
 - Strength of different effect
 - Sensitivity to approximations
 - Consistency with data
- Other applications
- Tools to support model building

Thank You

Thanks to the Safety Knowledge and Planning and Safety Intelligence groups at RSSB for their generous collaboration



- Incident data → risk estimate → decision
- Local prediction
- Data and knowledge
- Bayesian network: example application