The Decision-Making Process Behind Weather-Related School Closings

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Problem Statement/Background

✓ In US and France, school closings or school transportation disruptions because of severe weather have great implications on public safety.

✓ How do local authorities deal with this problem?
✓ What lead time and information is most useful for decision-making process (close, dismiss, delay school)?
✓ **Hypothesis**: Appropriate decisions mostly depend on weather forecast quality.
Data and methods

✓ Data collection about school closings decisions from 2002 to 2005 for Anne Arundel County, MD, and The Gard department, France,

✓ Weather records from Meteo France and National Weather services for school closing dates for both locations,

✓ A comparison of weather intensity and school closing decisions,

✓ Interviews with the department governors and school superintendents,
The Gard department and school district, France

- Administrative area of 5853 km² confronted with heavy rains leading to flash floods

- One superintendent responsible for:
  - 126,000 students + 7,300 teachers
  - 712 schools

- Between 2002 and 2005:
  - 67 days of severe weather forecasted
  - 10 days of school disruptions
  - No false alarms (no school-related decisions issued without severe weather occurring)
  - 2 critical situations because of forecasts underestimating weather severity
The Gard Department crisis management concerning weather-related school disturbance

Environmental system

- Meteo France weather forecasts
- School transportation companies observations
- Hazard nature, timing, severity, areal extent (vigilance map)
- Disruptions and damages
- Local road services in-situ observations
- Civil security and police services in-situ observations
- Departmental authority headquarters
- School and school transportation cancellation
- Delayed school pick-up time
- Anticipate school pick-up time
- Crisis management team

Phone call, e-mail
- Schools managers
- School transportation managers
- City council
- Local radio, Toll-free number

Information type
- Incoming Information
- Outgoing Information
- department governor's decision

Environment permeable boundary
Environment impermeable boundary

Ruin, 2006
**French Weather services vigilance map**

**METEO FRANCE**
Valid from 4:00pm September 6th to 4:00pm September 7th

**Comments from Meteo**
De fortes précipitations orageuses concerneront jusqu'à mercredi après-midi Corse et le quart sud-est du pays jusqu'à l'est de Midi-Pyrénées. Sur le Gard et l'Hérault en vigilance rouge, ces pluies orageuses pourront être diluviennes.

**Advises from public authorities**

- Get informed and be careful before making a trip. Avoid secondary roads.
- If you live in flood prone zone, take all useful precautions.

**Warnings:**
- Stay home and avoid all trip.
- Do not walk or drive on a flooded road.
- Take all precautions to protect your goods and property from water even in area rarely prone to floods.

**Watches:**
Be very careful, some dangerous weather events are forecasted. Stay aware of weather evolution and follow advices given by public authorities.

**Violent winds**
**Heavy precipitations**
**Thunderstorm**
**Snow & ice**

**Carte n° 06092005_16_01**
Gardi Department, Role of weather information in the decision process

The later is the event forecast, the shorter is the time left to execute decisions, the greater are the transportation managers' responsibility and stress.
Gard Department overall assessment

- Good reliability of Meteo France forecasts
- Weather information = 75% of decision-making process inputs
- Strict organization and preparedness makes up for rare weather forecast failure
- Issuance time of daily forecast (6:00am and 4:00pm) isn’t so well adapted to school-related decision-making process

Decision-making process (1h) ➔ 1 h ➔ Transportation & school managers ➔ 1 to 2 h ➔ Decision execution
Anne Arundel County School District

✓ Includes Annapolis, Baltimore suburbs, and Washington suburbs
✓ Approximately 75,000 students
  ✓ 10,500 employees (including 8,000 teachers)
  ✓ Over 100 school buildings
✓ Closed 20 days in 2002-2005
  ✓ 18 due to snow and/or ice
  ✓ 2 due to hurricane
✓ Also six 2-hour delays (in 2 years)
Anne Arundel Cty. Decision Process

- Forecasts received twice a day
  - High quality – plan in advance
- Transportation manager stays in contact with Anne Arundel DPW
  - 8 transportation specialists throughout county
- Calls Assistant Superintendent at 4:50 AM
  - Decision must be made by 5:00 AM
  - Usually a closing, unless storm expected to lessen soon
Anne Arundel County Role of Weather Information

✓ Twice daily forecast
  ✓ Six hour forecast intervals
  ✓ Out to 48 hours
✓ Includes temperature, wind, precipitation, amount, start and stop times
✓ Lots of faith in forecast
  ✓ Sometimes wrong, it happens
  ✓ Non-weather closings are a bigger deal
  ✓ Lack of situational awareness
Influence of Weather on Closings

- Surprisingly little relationship
- Schools often used as shelters
- Plowing school parking lots is a low priority
- Generally 4” (10 cm) or more causes a school closing
Anne Arundel County Overall Assessment

- Very organized – “one pager”
- Weather information plays an important role
  - Adequate for needs
- End-users have realistic expectations of weather information
Conclusions

✓ Success is a result of very strict organization
✓ Decision-makers need reliable forecast at least 4 hours before expected decision execution
✓ At county and department levels decision-makers don’t need weather forecast to be spatially very precise (spatial precision leads to more complex decision and communication)
Thank you for your attention!
Any questions?