Diffusion of Emergency Warnings via Multi-Channel Communication Systems

-an empirical analysis-

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- Motivation and Research Questions

- Previous Research

- Empirical studies

- Conclusions

- In Germany: reduced coverage of the siren-based alerting infrastructure after the end of the cold war

- Increasing difficulties to cover the „last mile" when alerting the population in case of disasters

- Availability of electronic alerting channels (e-mail, SMS, pagers) in addition to sirens

→ Multi channel alerting systems emerge

→ But: how efficient can such systems be?

  → Do people notice alerts?

  → Do they act as instructed?

- Simulation-based approaches
  - USA
  - 1990-2000 (exclude „modern" communication channels)
- Practical tests with experimental systems (single channel)
  - Netherlands: Cell broadcasting, SMS (e.g. Jagtman 2010)
  - Australia: automated fixed-line telephone calls (2006)

- Gaps:
  - No multi-channel real world system for the general population analyzed
  - Existing studies do not cover Germany

- Alert process chain (modified from Jagtman 2010, United Nations 2006)
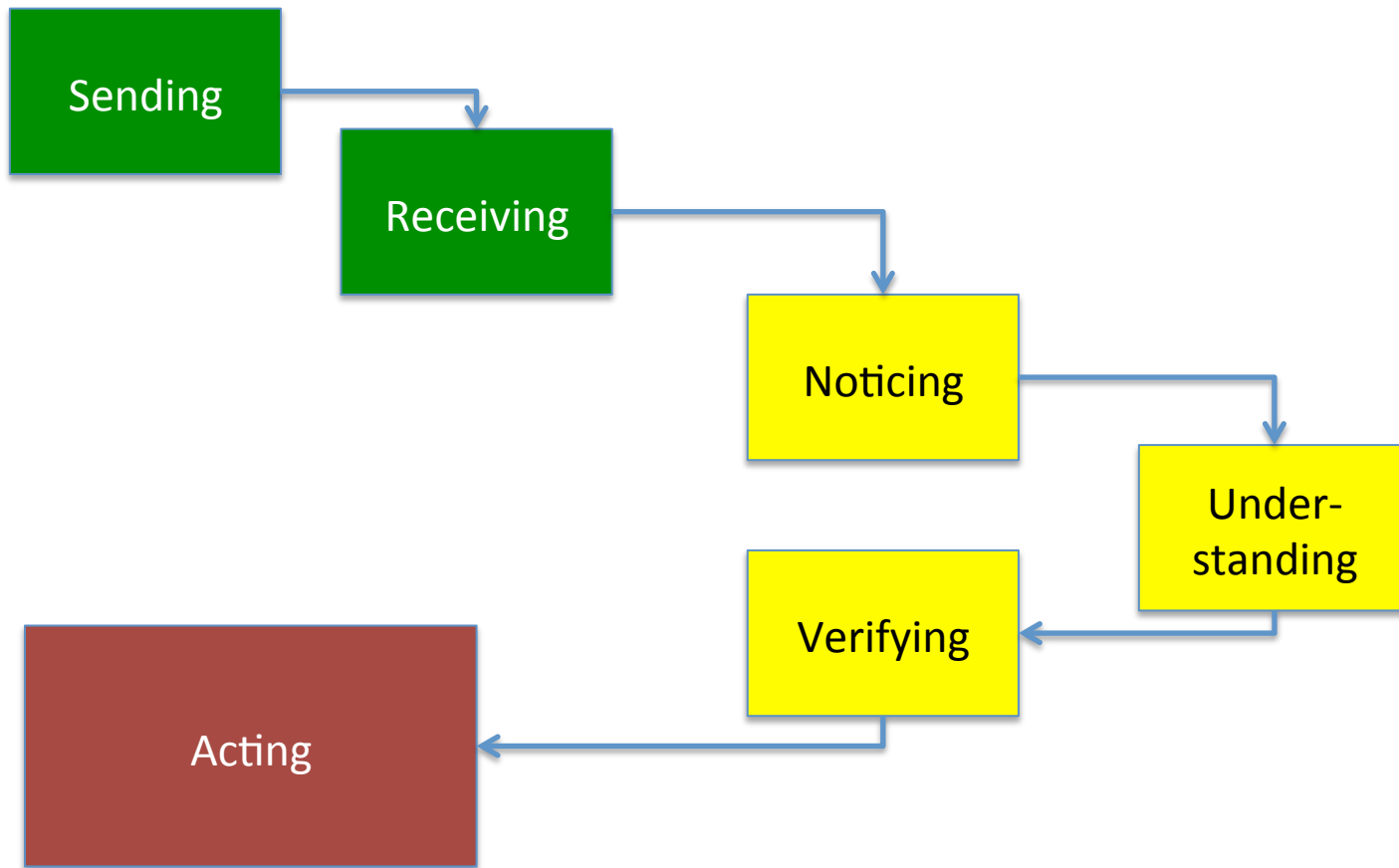
- Studies were conducted using the „KATWARN" alerting system
  - Alerting via SMS, E-Mail, pagers
  - Subscription based opt-in system (data protection laws!)
  - Role-based alerting (general public, first responders, etc.)
  - Composition of alert messages from text building blocks
  - Optional: free text messages
  - Operational in 5 German cities and 5 counties
  - February 2013: > 50,000 subscribers
  - Core technology also used in a weather-alert system with more than 500,000 subscribers

- Study conducted in Aurich county (rural coastal area in Northern Germany, close to the North Sea)

- 362 test users

  - Primarily first responders or multipliers (92%)

  - Almost all were registered for SMS alerts

  - 43 % additionally registered for e-mail-alerts

  - 2% were additionally alerted via pagers

  - Test alert was issued at a random point in time (within a time frame) by the regional emergency management authority

  - Immediate user-feedback required after noticing the alert

- The test alert

  (E-Mail version)

Aurich county
Advance warning for authorities:
Code RED serious drinking water incident

ZIP code: 26736

valid from: immediately
until: Monday, August 24th, 2009, 22:00 CET
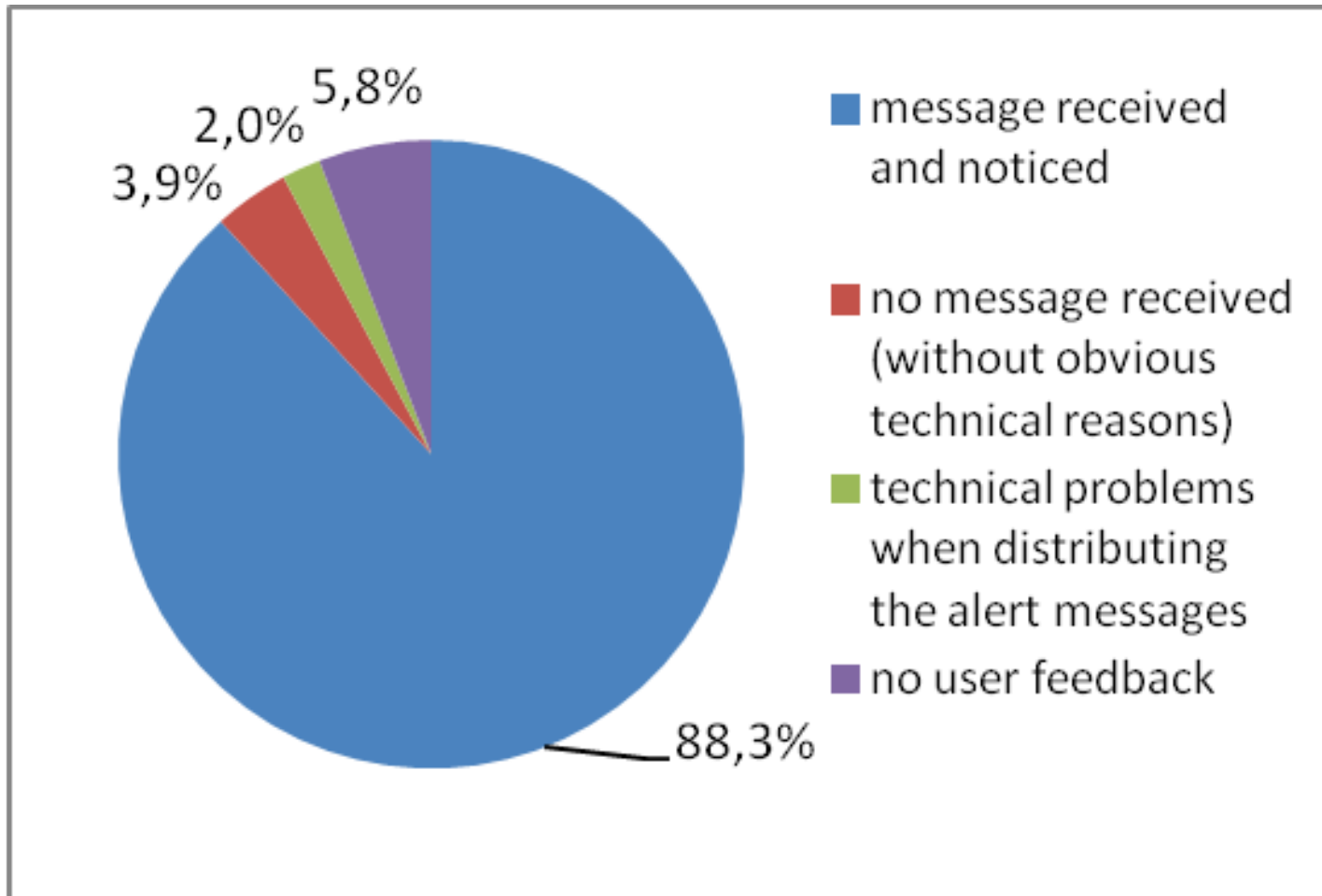editing date: August 24th, 2009, 14:09 CET

Advance warning code RED serious drinking water incident
Please contact the situation room. (Test alert)

Recommended protective measures:
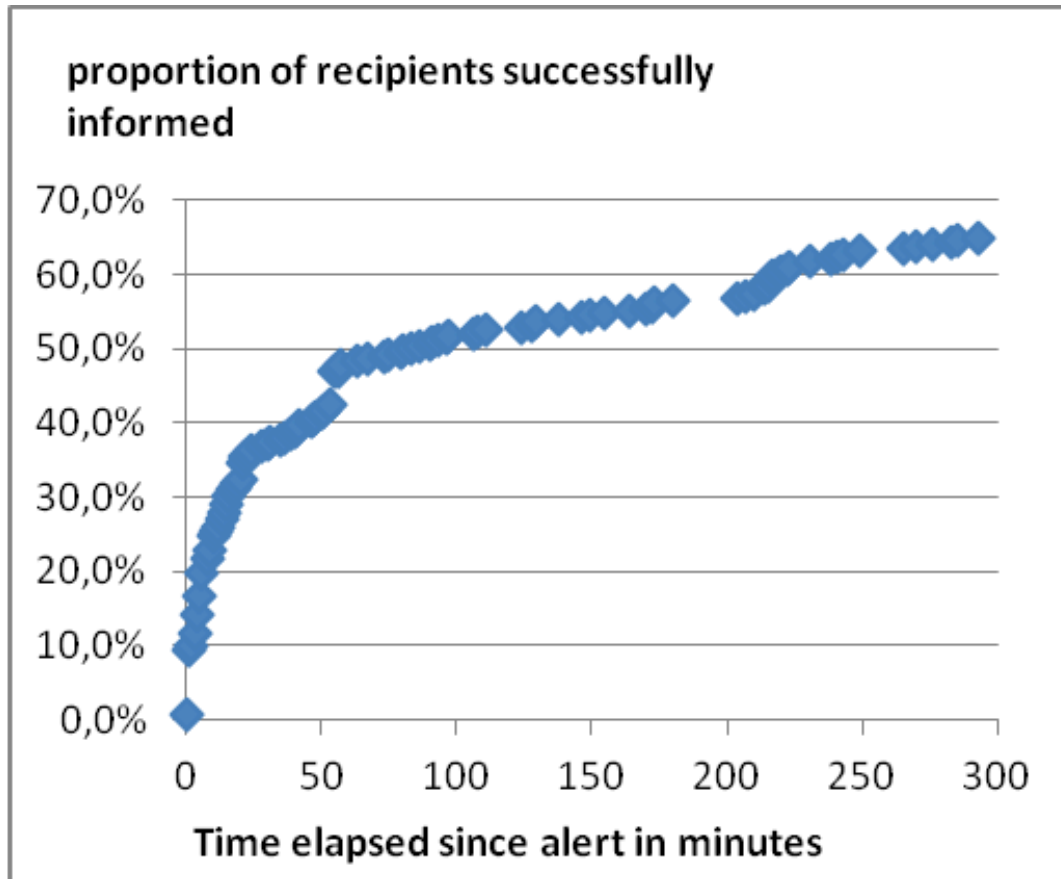Don't drink any tap water.

This message was sent by the emergency management agency of Aurich county.

For feedback and comments, please use info@katwarn-aurich.de

- Question one: How many test users did receive the alert?

Pie chart showing:
- 88,3% — message received and noticed
- 3,9% — no message received (without obvious technical reasons)
- 2,0% — technical problems when distributing the alert messages
- 5,8% — no user feedback

- Question two: When did recipients notice the alert? (alert sent at 14:09 CET)
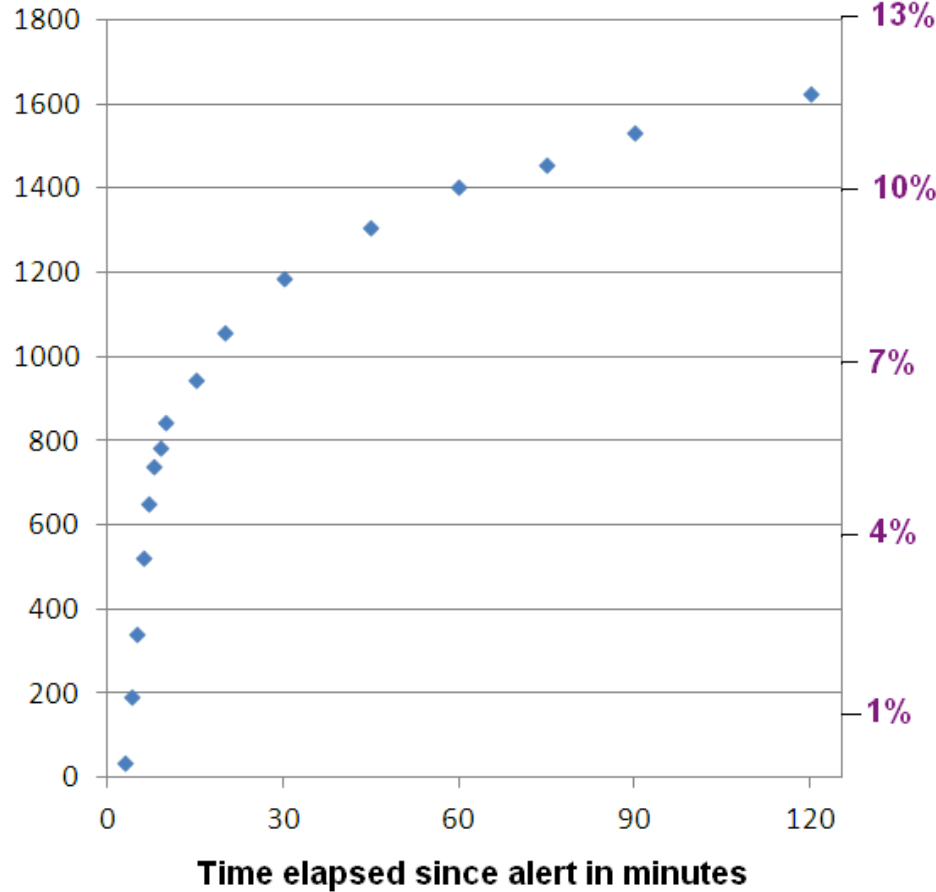
- Observations:

    - Inter-personal effects / multiplication, e.g.:

    - "I confirm that myself and 15 colleagues in the office received the alert

    - "Me and my wife received the alert"

    - No confirmations received over night (between 23:00 and about 6:00 hours)

    - Short-term alerting efficiency better than via TV and Radio (but slightly inferior to sirens)

    - Caveat: Results only valid for daytime alerts in rural areas!

- Procedure: a link to a web page with additional information on an alert was included in a routine test warning issued in Hamburg

- The alert was sent via SMS to all 13,950 registered users of the alerting system in Hamburg

- 16% of subscribers had additionally selected e-mail alerts

- After the alert, access patterns to the information page were analyzed (logfiles)

- Note: for legal (and trust) reasons, the alert had to be clearly labelled as a "test-alert" → lower incentive to search for information
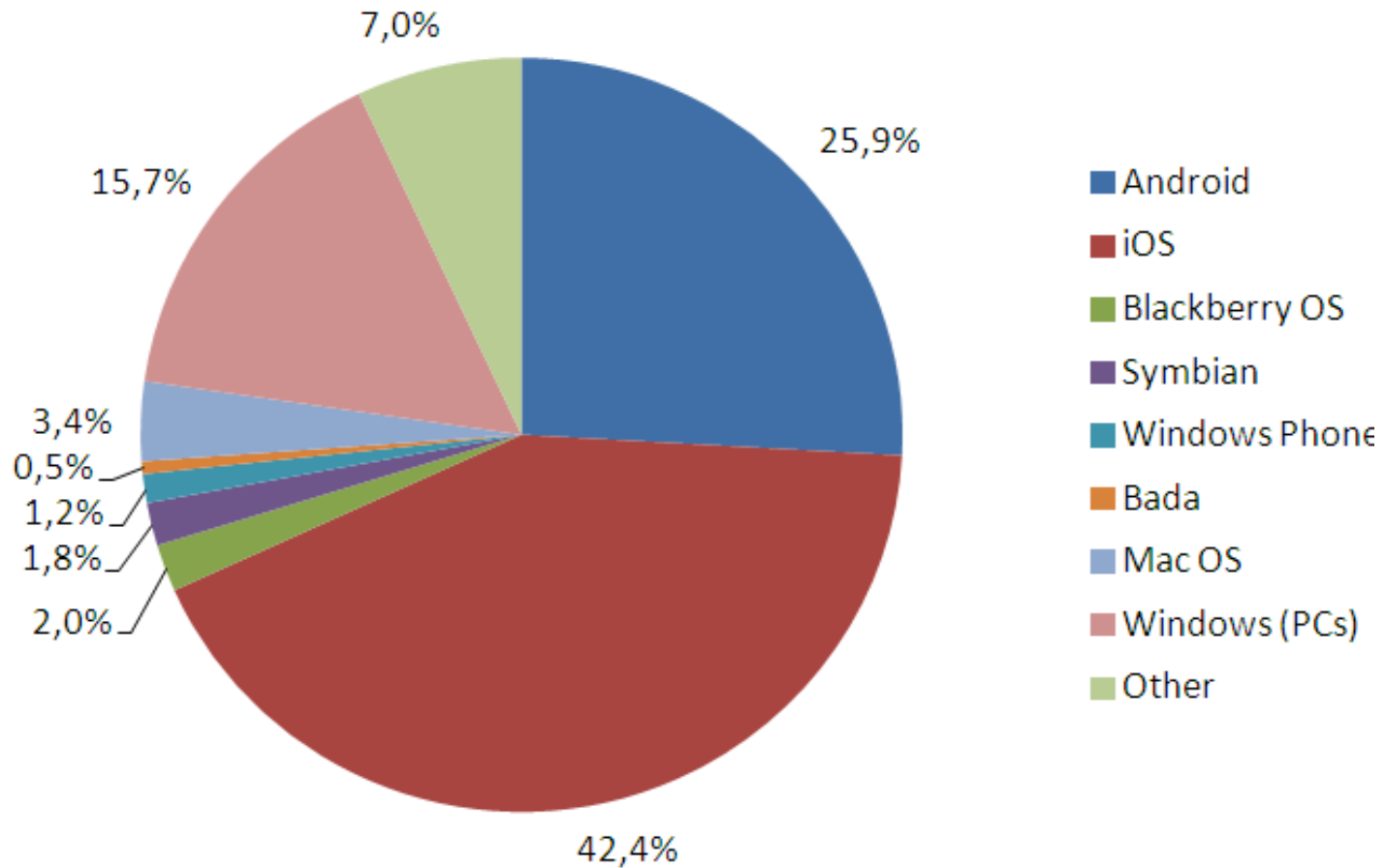
- Access pattern at the disaster-related website

Accesses to disaster-related website: absolute numbers

Percentage of alert recipients having accessed the website

Time elapsed since alert in minutes

- Operating systems of devices used by website visitors

- Observations:

  - The amount of people accessing additional information was rather limited, 17.4% within 24 hours

    - Test alert

    - Well-designed alert message text (confirmed in pre-test with 202 participants)

  - Most visitors used mobile devices (approx. 75%)

  - iOS users were over-represented

  - → Input for alert app design!

Thank you for your attention!