A network approach to households' role in electricity and ICT breakdowns

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Introduction

- Project funded by the Norwegian Research Council: **HOMERISK: Risk management strategies when households face collapsing electricity and digital infrastructure** (2014-2017). The project aims include:

  - Focusing on the *household* as the primary unit of analysis (and thus everyday life)
  - Study the *everyday social practices* in relation to preparedness for electricity and ICT breakdowns
  - Study the changes in *social and material networks* during a disaster
  - Comparing *the role of households* in national emergency management plans to their role in actual disasters

- SIFO's first project on risk/disasters thus we are interested in your tips regarding:
  - Relevant literature
  - Relevant journals
  - Other similar projects
  - Other research groups
  - …….

Outline of the presentation

- Utilizing elements from practice theory and actor-network theory (ANT) in disaster studies

- Presentation of one case study, a large fire in Norway causing breakdowns in the electricity and digital infrastructure

- Methodological considerations

- Preliminary findings

- Concluding remarks
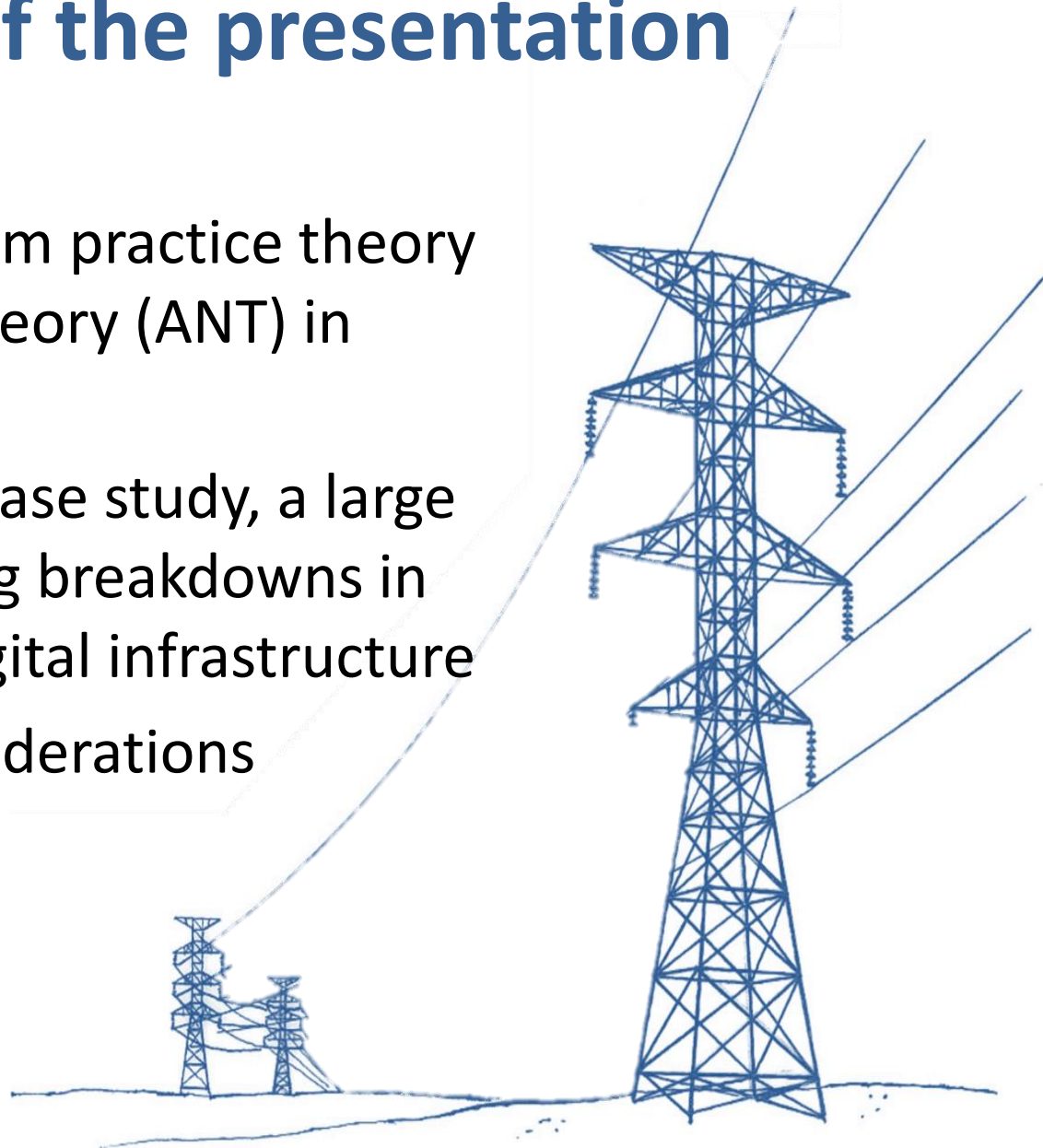
A SOCIAL PRACTICE perspective

- Households' everyday <u>doings</u> and <u>sayings</u>
- Analysing practices consisting of;
  - Know-how and embodied habits
  - Institutionalised knowledge and explicit rules
  - Engagements
  - Technologies
- How these practices are performed by households
- Which elements and practices becomes important during a electricity and digital infrastructure breakdown caused by a disaster?
- Can everyday life practices become a resource in a crisis situation?
- Preparedness practices of everyday life

Gram-Hanssen, K. (2011) Understanding change and continuity in residential energy consumption. *Journal of Consumer Culture.*

Inspiration from Actor-Network Theory (ANT)

- Includes the <u>material</u> as well as the social aspects of disaster and insists on symmetry between all types of actors (human and non-human)

- All actors are elements in cohesive <u>actor-networks </u>that can be analysed by following the different actors. Maintain networks during a disaster.

- When an element (e.g. the electricity and digital infrastructure) in a network collapses or loses its power, the network changes. <u>Immutable mobiles </u>are actors that can move between networks without losing their form, filling the role of the removed element (e.g. a diesel aggregate).

Case study: The Lærdal fire

Lærdal

is a small municipality located at the head of Sognefjorden, 260km from Oslo and 217km from Bergen, the two largest cities in Norway.

County: Sogn og Fjordane

Population: 2100

Size: 1 342 km²

The fire arose in Lærdalsøyri, a village with a population of 1147

Sequence of events

Listed buildings

Listed buildings burnt down

Øyragata

Løytnant Lem-vegen

Kyrkjegata

Øyramarki

Telenor's base station

Kyrkjeteigen

Where the fire started

Fire dep.

- On the evening of 18th January 2014, a fire arose in a residential dwelling in Lærdalsøyri. Due to strong wind and a dry season with little snow, it spread rapidly.

- 0 casualties, 393 dwellings (681 people) were evacuated.

- 41 buildings were destroyed in total: 17 dwellings, 24 other buildings (including 4 protected in the old town) such as garages, outhouses, commercial buildings.

Electricity and digital infrastructure

- Electricity outage:
  - 60-72 hours before full restoration
  - Use of aggregates in institutions and private households

- ICT outage:
  - 40 hours before restoration of 3G network with mobile base stations
  - Mobile coverage and internet was unstable for approx. one week

→ Electricity and ICT was available during the first few hours of the fire.

→ There was variations in access to electricity and ICT in different areas of Lærdal.

Methods

What roles have households played in actual crisis events, and what kinds of networks, relations and resources have they applied?

- Fieldwork in Lærdal consisting of:
  - Unstructured interviews with householders at home
    - Use of 'walk along' interviews (or 'show and tell' interviews)
    - Photographs of material elements
    - Questions on performativity
  - Stakeholder interviews with relevant actors in Lærdal
    - Municipality
    - Volunteer organisations
    - Commercial actors
  - Informal conversations and observation
  - Other data sources: media texts, official documents and reports

Data material (so far)

- **6** household interviews
  - Audio recordings (average length 1,5 hours)
  - 1 video recording
  - Approx. 20-30 photos from each household

- **5** stakeholder interviews (three municipality departments, one volunteer organisation, one shop owner)
  - Audio recordings

- Informal conversations and photos of the area

→ **Through the three methods above we have talked to approx. 30 informants so far. A final field trip will be conducted next month.**

- Media (videos, photos, articles), commissioned reports, local reports.

Households' resources

Fire

– <u>Social:</u> tight networks of neighbours and family (who lives where, who to contact etc.), flexible roles (formal and informal) which are known to the community

– <u>Human:</u> bodies (stamping feet, running, walking, talking), brains (local community and geographical knowledge), senses (smelling and seeing the fire, feeling the wind, observing other peoples actions)

– <u>Material:</u> e.g. fire extinguishers, buckets, hoses, shoes, clothes, ladders, farmers water wagons and other equipment, private cars for evacuation, river and sea water

Electricity outage

– <u>Social:</u> tight networks and thus knowledge of who needs assistance, who is at home, who can help, who has material resources that can be activated etc.

– <u>Human:</u> Previous experience with outages (hurricane Dagmar in 2011 in particular), skills (alternative heating, food preparation and storage, where to find material resources in the household and in the community)

– <u>Material:</u> e.g. head lamps, candles, wood stoves, kerosene burners, matches, batteries, barbeque grills, power aggregates
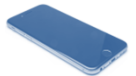
ICT outage

– <u>Social:</u> Relations (walking between households, talking in the streets and meeting places)

– <u>Human:</u> knowledge of ICT infrastructure (where to find mobile coverage), community knowledge (meeting places)

– <u>Material:</u> e.g. Cars for meeting to talk and finding mobile coverage, pen and paper, meeting places, radios, notebook with names and addresses

Examples of material resources

- *Diesel aggregates* restored electricity supply in households

- *Pen and paper* replaced internet connection for sending messages to households

- *Cars* replaced mobile phones within and between households extending the range of communication, were used to evacuate families, and to look for mobile coverage outside Lærdal.

Embodied knowledge and skills

- **Community knowledge**
  - Socially between people, volunteer organisations etc., and geographic through short distances

  "You know everybody, it's really special, I know everybody, the mayor, the nurses, the volunteers"

  - Knowledge of other peoples' everyday life (what they do, where they are, what roles they have)

- **Historic geographical knowledge**
  - Of wind through the valley, water from the river, mountains, tunnels, local electricity infrastructure (power lines, base stations)

  "It's this kind of wind from the east, it smashes through the mountains, changing direction all the time"

- **Household specific knowledge**
 - Knowing where material resources are (domesticated preparedness measures)

  "I have arranged all the headlights, now they're on the dresser in the hallway. Then we know where they are"

  - Knowledge of household members social networks

  "One of the firemen, he who got the call, his youngest son was in my daughters class, and so we got the message very quickly"

Multiple flexible roles of individuals

- People in the community exercised multiple and flexible roles during the event, and understood themselves and others within a role.

  - Families allocated different roles to different members

    - E.g. one parent was outside helping, the other coordinated the household from inside

  - Roles are different in different phases of the event

    - E.g. from assisting the community (formal role) to being evacuated from your home (informal role)

  - People acted coordinated without formal coordination

  - Examples of conflicting roles, especially between formal and informal roles, and between being affected and helping others

   - E.g. the house of the crisis team leader stood in danger of burning
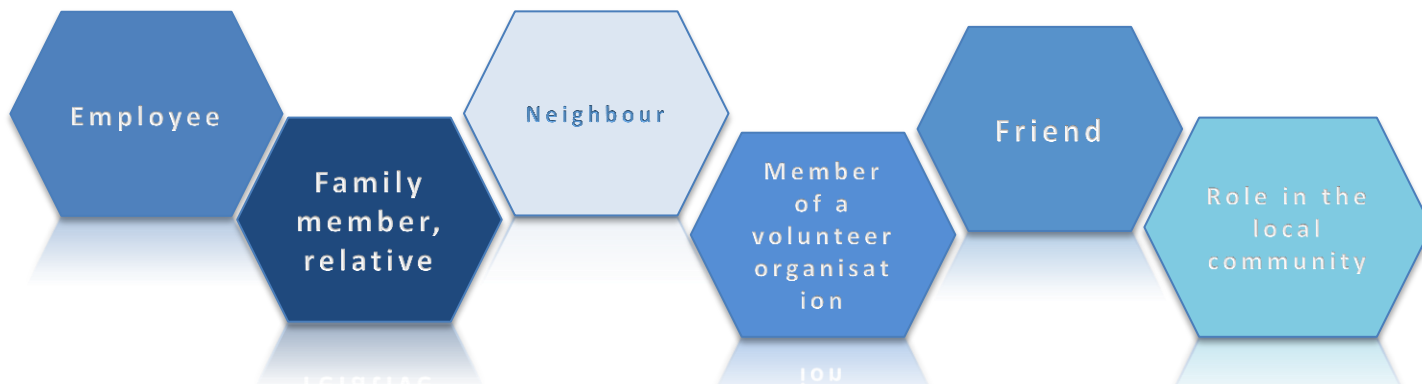
Households' barriers

What hindered households from activating resources during the event?

- Social
  - Conflicting roles
  - Being separated from other family members

- Human
  - Fear
  - Limited mobility
  - Exhaustion

- Material
  - Strong wind from the east, heavy smoke and loud noises
  - Cold both indoors and outdoors
  - Scarcely populated and isolated rural area
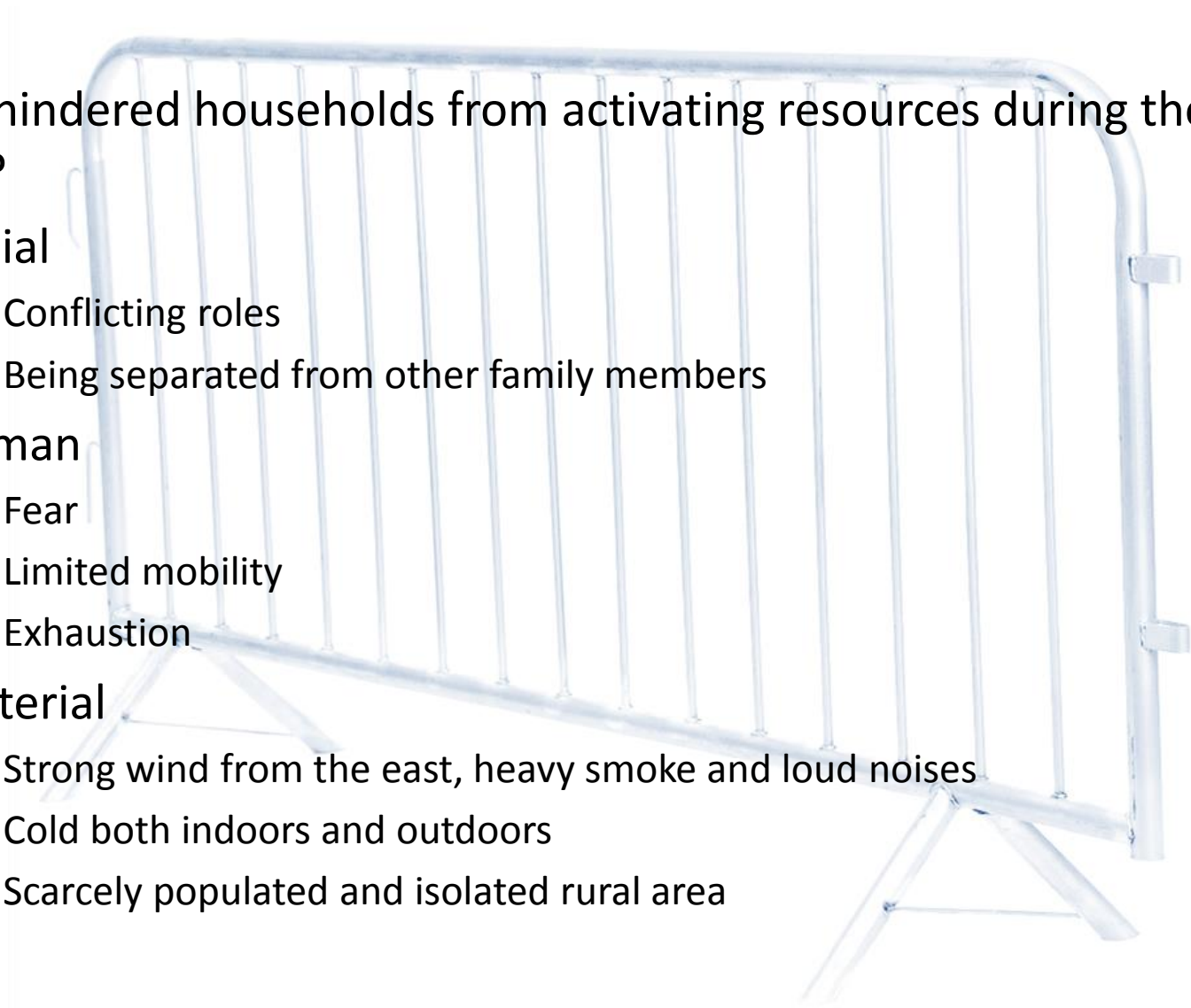
Concluding remarks 1

- Contextualising the el and ICT outage:
  - During and after a very dramatic fire
  - Infrastructure were down 2-3 days
  - The event occurred in an isolated valley with a tight local community
  - It happened on Saturday night when most people were home
  - It happened in a place with previous experience of outages

- Double meaning of *networks:*
  - As social connections between people (weak and strong ties)
  - As an analytical approach to study the value of material objects

Concluding remarks 2

- Households' role during outages is important due to strong social networks
  - *Strong horizontal relations* between households as citizens
  - *Strong vertical relations* between households and formal actors
→ What about other rural areas? And what are the differences between rural and urban areas?

- When an actant disappears (e.g. el.& ICT infrastructure) normal practices might not be possible to carry out, and networks must assemble in new ways by activating the available resources.

The next step in the project

- Study *everyday life preparedness measures* for outages in the electricity and digital infrastructure in *rural* and *urban* areas from a social practice perspective:

    - In what household practices is preparedness for electricity and ICT outages embedded?
    - How is preparedness performed in the everyday life of Norwegian households?

Thank you for your attention!

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Please visit our project website:
www.homerisk.wordpress.com