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Role multiplexity and home-grown resilience: A study of part-time firefighters in rural emergency management.

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ABSTRACT: We discuss the role of part-time firefighters as a resource for local emergency management in Norway. Informal social relations, the trust between practitioners and the social capital of the organization, has been recognized as a resource for emergency management, particularly as it contributes to improvisation and coordination between actors belonging to different professional groups. Likewise, social capital, the trust among citizens, has been identified as a resource for societal resilience in crises. We discuss a combination of these forms, how the social embeddedness of the emergency practitioners in the community and the multiplexity of roles is important for community resilience. These professionals know each other through several different social roles, and have resources beyond the formal capacities their position should suggest. Thus, role multiplexity and social networks provides a functional redundancy and is a resource for resilience in the management of incidents and emergencies. These abilities are hard to make visible in a work plan and challenging to include in exercises. Moreover, these abilities are affected by recent developments towards professionalization of and centralization.

1 INTRODUCTION

1.1 *Background of our study*

Based on studies of part-time firefighters we discuss how the combination of professional roles and embeddedness in the community of this group is a resource for community resilience. This is done through discussing how local knowledge, social capital and role multiplexity influences practice and decisions in emergencies.

Our paper supplements the literature on community resilience and emergency management by studying the role of a "hybrid" group. Their role as members of the community and their professional roles are both important parts of their capabilities in the prevention and management of emergencies.

We understand community resilience as the adaptive capacity of a community when faced with emergencies. Key elements of this are improvisation and redundancy (both in terms of resources and competence). This will be elaborated in the theory section.

What we describe here as role multiplexity is the fact that these professionals have different professional and social roles, that their "hat", or in the case of the firefighters, helmet, does not represent their only relevant role for the way they solve their tasks in emergencies.ⁱ Moreover, role multiplexity is an important contributing factor for the firefighters' local knowledge, a competency that is well-recognized in the emergency management community.

Thirdly, the notion of social capital is used to describe the networks of trust relations as a resource for coordination in emergencies.ⁱⁱ

These characteristics, we will argue, have proven to be important in the management of several emergencies in rural districts in Norway. Interestingly, they tend to elude description in formal documents, and thus risk being undermined by administrative reforms in the domain of societal safety and emergency preparedness, such as developments towards centralization and professionalization of the fire departments. Understanding and documenting the specific competence and community role of this group is important input to such processes.

1.2 *Part-time firefighters in Norway, ongoing changes*

Norway consists of more than 400 municipalities that range in population from 200 inhabitants to 650.000 (the capital, Oslo). The municipalities are highly diverse in terms of demographic profile, geography, size, organizational structure, and available resources. Equally diverse are the fire and rescue services, in terms of ownership, management, and organization. Some municipalities own and run their own fire and rescue services, while others collaborate with neighbouring municipalities either by having joint fire brigades or just in providing parts of the services. The fire departments and placement of fire stations are dimensioned after specific criteria for response times, leading to a relative high density of fire stations and shorter response times in most areas compared to other emergency services.

Whereas large fire brigades in cities and towns rely mostly on full time personnel, smaller fire brigades are largely dependent on personnel in different forms of part-time employment. For a large fraction of the

latter, their regular payment only covers mandatory training and a small reimbursement for being on call, plus additional pay for dispatches. This means that they typically have full employment in other trades. The composition of the fire and rescue services in Norway today are roughly 3500 full time firefighters, and around 8000 part-time firefighters. In principle, the competence demands for part-time firefighters are supposed to be equivalent with the basic requirement for full time personnel. However, in terms of technical skills and training, they tend to lag behind these demands, while full time personnel on the other hand train and rehearse their skills way beyond them. Recruitment, both for full time and part-time personnel, has often sought people with relevant technical skills from other trades, such as carpenters, electricians and people with military training. For part-time personnel, an additional requirement is often that they live close to the fire station, to be able to mobilize quickly. In rural districts, farmers often make up a significant portion of the crew.

1.3 *Societal safety and emergency preparedness*

In Norway, the municipality has a key responsibility in terms of risk management and emergency preparedness. In principle, the municipality "owns" the total risk picture within its borders, and should have updated all hazards risk and vulnerability analyses and emergency plans. The responsibility for this in small municipalities is usually given to an emergency management coordinator, typically an official in the technical department of the municipality that has this as a fraction of their position. In terms of operative resources, the Fire and Rescue Service (FRS) is a crucial first line of response, but the emergency plans also include other municipal personnel, as well as external actors (volunteers, industry, municipal technical department etc.)

1.4 *The fire & rescue service, the only remaining generalists in local emergency management?*

Societal safety as a term and policy area came about after the end of the cold war. Gradually, the resources available for emergency preparedness in the public sector in Norway in particular, and in Western Europe more generally, have been reduced since then. Moreover, as measures have been implemented to make the public sector more effective and goal oriented, through outsourcing and market based restructuring, generalist capabilities and functional redundancy have systematically been reduced. Other operative capacities in the public sector are trimmed (army, home guard, publicly owned technical services such as roads, energy, port authorities). Within this picture, the FRS is one of very few remaining generalists with a substantial redundancy. A result of this has, according to our informants in the FRS, informants from

other sectors and public reports (DSB, 2013; Øren et al, 2016) that the scope of tasks for the FRS is expanding.

In addition, in the rural areas, police services and emergency health services are generally sparse, so the FRS tend to be first on site for accidents and incidents of all sorts. This means that they sometimes must fill in for medical personnel or the police while waiting for ambulances and police patrols.

The FRS still put out fires, but increasingly they respond to other accidents (in particular traffic accidents) and other emergencies. Due to the reduced operative redundancy in the public sector generally they are becoming increasingly important as first responders to other forms of emergencies, such as landslides, floods and storms and search and rescue operations. For many areas, climate change leads to increases in flash floods and associated landslides as well as an increasing risk of forest fires.

Another important development for the FRS is the implementation of the joint communication network for emergency services in Norway called Nødnett (lit. "emergency net"). This means that all part-time firefighters have a communication radio at home, serving both as a call out terminal and as a communication tool in operations. Their training in using these is an important resource for the coordination in emergencies both for the FRS itself, but also as they may act as liaisons with other municipal professionals (Tilset et al., 2015). In some FRS, the firefighters are supposed to have the radio nearby at all times. These radios further integrate the FRS with other emergency services, as they may communicate in shared working groups with the police, health services and other relevant actors. The FRS are owned by the municipalities, but often, and to an increasing degree, they are parts of inter-municipal collaborative arrangements. It is an explicit national strategy to increase the size and professionalism of the FRS, and there are several ongoing changes in the sector. Understanding the unique role and competencies of the part-time fire fighters will be important to ensure that these changes are successful.

2 THEORY

2.1 *Resilience and robustness*

Resilience is employed here to describe how an organization, community or society absorbs shocks and 'bounces back' after a disturbance (Boin and van Eeten 2013). Resilience has become a central concept in the safety theory the last decades. One early contribution was Wildavsky's (1987) insistence that a "search for safety" should go beyond trying to mend known weaknesses, by including a creative exploration of ways to improve society's ability to sustain new challenges. Also, the descriptions and analyses

of High Reliability Organizations (LaPorte & Conso-
lini, 1991; Weick and Sutcliffe, 1995; see also Roe
and Schulman, 2008) stressed that designing robust
systems was only one step of the way to achieve high
reliability, stressing the need for redundancy, flexible
organizing and organizational mindfulness to be able
to cope with variability. The most prominent theory
on resilience within safety research is found in the
"resilience engineering" strand of research, where an
intense focus on the management and learning from
variability as a resource for safety has been a corner-
stone (Hollnagel et al, 2006).

Outside the safety literature, the concept of resili-
ence has also been important in studies on a societal
and community level (e.g. Boin and van Eeten 2013),
then often referring to the community or society's
ability to bounce back (or even forwards) when con-
fronted by major disasters. The literature on commu-
nity resilience is broad and diverse within several re-
search fields. (See e.g. Norris et al, 2008 for some
background.) In contrast, Resilience Engineering fo-
cuses heavily on the importance of resilience as a way
of avoiding accidents.

Based on a study of the response to the 9/11 terror,
Kendra and Wachtendorf (2003) identify some char-
acteristics of resilience. These are redundancy, re-
sourcefulness, effective communication, and the ca-
pacity to self-organize, undeterred by extremely
challenging circumstances. They point out that resili-
ence is essentially a set of attitudes concerning exp-
ediency of actions and the propensity to acquiring new
capabilities.

There is a big difference between a well laid out
plan and a plan that is well played out. The former
points to the ability to foresee and predict while the
latter refers to the ability to act when the situation
calls for the use of a plan. Plans cannot guarantee the
success of how emergencies are handled. They can
only provide the backbone of an emergency response.
A common example employed to explain resilience is
to compare hard wood to bamboo. The former is
strong and does not easily break when it encounters
strong winds. This is, of course, up to a certain thresh-
old. The robust hardwood tree will eventually break
if the wind blowing is at hurricane-strength. In com-
parison, the bamboo sways with the wind. It has the
ability to bounce back into place. This ability to
bounce back is what defines resilience. It is able to
adapt. A plan cannot be made for every single possi-
ble emergency situation in a community. It is the
ability to adapt the plan according to the situation as
it unfolds which will help a community to bounce
back after a disturbance (Boin and van Eeten 2013).

The part-time firefighters add flexibility in the
community response to local emergencies. There are
at least three aspects that contribute to this flexibility:
the firefighters' diverse backgrounds and experience
(providing a functional redundancy), their local
knowledge and proximity to the hazards and, that they

possess a rudimentary organizational structure and
means for communication and their social embed-
dedness in the community (easing swift coordination
with volunteers and other external resources). Inter-
estingly there is a good overlap between these char-
acteristics and those identified by Kendra and
Wachtendorf (2003). Though this is interesting, one
should also draw comparisons between such different
contexts with caution.

2.2 *Role multiplexity, social capital and community resilience*

Part-time firefighters have many ties in the commu-
nity. They are members of their local fire brigade.
They are parents of children attending the local
school, a colleague in the municipal organization or
electricians, plumber, factory workers or farmers.
They may also be members of the sports clubs, hunt-
ing groups, health professionals, janitors or a loyal
customer of the local grocery store. They have social
relations throughout the community and local
knowledge of threats and resources. The repeated in-
teraction and networks built in their local community,
over time, develops and strengthens their social capi-
tal. Social networks, reciprocity and interpersonal
trust are aspects that are critical to building social capi-
tal (Patterson et al., 2010). Social capital and net-
works among citizens are recognized to be critical to
disaster survival and recovery (Aldrich and Meyer
2015) on a societal level. Importantly, here we also
include the networks that go between the response or-
ganizations and the community, and that criss-cross
organizational boundaries in the community
(Almklov et al, 2017).

Local knowledge is an important element in disas-
ter management. For instance, it can help build resili-
ence to flooding in local communities by providing
local information on actual flood patterns, frequency,
and risk perceptions in the community (Ramsey, Ny-
tch et al. 2016).

While bureaucratic organizations are built around
uniplex roles, where the person is his role and that is
the only relevant feature (see Almklov et al, 2017;
Brøgger, 1993). In practice, however, we see, particu-
larly in small communities that there are spill-over
effects from other roles that the emergency profes-
sionals have in the community, and that these are of-
ten key both in terms of establishing trust relations
that go beyond the formal relations and also that the
multiplexity of roles provides the individual with a
functional redundancy, in terms of knowledge and ca-
pacities. In the empirical section, we will give some
brief examples of this.

3 METHODS AND DATA

This paper is based on an aggregate of data from several projects inspecting the roles of municipal emergency preparedness and the organization of the FRS in Norway: A study with scenario analyses for the future organization of the FR services in Norway (Fenstad et al, 2013), a study of different approaches for intersectoral collaboration between the fire departments and municipal services in prevention of deadly fires (Gjøsund et al 2016; Halvorsen et al, 2017), a study of the implementation of Nødnett in Norwegian municipalities (Tilset et al, 2014), a process analysis for a project to improve regional collaboration between large and small FR services in Western Norway (Gjøsund & Almklov, 2017), and a study of municipal emergency preparedness (Øren et al, 2016). All these projects have been based on interviews with firefighters and personnel that they interact with on a daily basis. While the scopes of these projects have been diverse, they have all contributed pieces to the puzzle regarding the role and qualities of part-time firefighters.

We have, for the purpose of writing this paper, conducted five directed interviews with key informants, two leaders and one firefighter at part time fire department and two with fire fighters in an urban fire department that has some part time personnel affiliated. We also conducted an observation study (with some informal discussions along the way) of a training session with a part-time FRS. During a one day visit (observation and interviews) in a regional dispatch central, our discussions included the capacities, call out procedures and response times of the part time FRS under their control, and also their typical assignments. In addition, we studied reports from a selection of recent emergencies in Norway.

4 EMPIRICAL EXAMPLES

In this section we give some examples from our data, supplemented with reports from recent emergencies, to illustrate how the role of municipal firefighters in contributing to community resilience can be characterized by the concepts of role multiplexity and social capital.

4.1 *Two illustrative examples*

One fire chief leading a fire brigade in two rural municipalities explicitly valued of the varied competencies of his crew. The long distances meant that his part-time firefighters had to mobilize for all sorts of accidents, and he had employed personnel that who's day jobs were in the medical sector, i.e. nurses, adding to their ability to respond to both medical emergencies and to take better care of elderly people in trouble. But also, other occupations had qualities he

valued. He told us about an accident on a farm where an old farmer had fallen and had to be rescued from a silo by the fire department and be evacuated by helicopter. When the helicopter and ambulance had left and the firefighters were demobilizing and consoling the old man's wife, they heard the cattle were in distress. They had not yet been milked. His crew, consisting of several farmers, would not leave the site before milking the cows, he said. Farmers just don't leave cows in distress! This example might seem little relevant, too trivial, for grand discussions of emergency management. However, it illustrates how their knowledge and professional values from other occupations spill over into their role as firefighters.

Another example from the same fire department illustrated the role of local knowledge and role multiplexity. An avalanche had hit a road, blocking the road and possibly covering some cars. While the police's operational leader, formally in charge of the rescue operations, was speeding to the site from the closest (yet distant) city, the fire department was first on site, starting a search and rescue on their own initiative. The leader of the first vehicle, realizing that they needed equipment to search under the snow, went to his other workplace, a skiing facility, to pick up search and rescue gear there. Thus, the firefighters had mobilized the necessary equipment before the other services even reached the site, again because of the knowledge and access to resources provided by the firefighters' day-jobs. It also illustrates the make-do attitude and improvisational skills they have to their job.

4.2 *The fires of 2013*

Some very prominent examples in the recent discussions of part-time firefighters and municipal emergency manager's improvisational skills in Norway are the fires in 2013. That winter had had a very rare weather situation, with a very dry winter with little snow in the normally humid coastal areas, leading to bushfires in winter, and a major fire in the wooden town of Lærdal. All these fires were testing to the local fire departments ability to mobilize, organize and execute an efficient response, and in the aftermath their effectiveness has been subject to debate (See Andresen, 2017, PWC, 2014).

Even before the fire in Lærdal started some of the firefighters had concerns to the fire risk due to the combination of strong eastern winds and dry weather. Thus, there was already an increased awareness before the fire started. This is underscored by the fact that the municipality on earlier occasions had implemented fire watches when this weather combination occurred, so this type of weather in was a risk recognized by the locals (Andresen, 2017).

When the firefighters mobilized, the response had a very improvised nature, seamlessly integrating volunteers (such as farmers with manure spreaders) in

the response. As many firefighters were municipal employees, they also had good knowledge of available resources, such as access to the waterworks (to get pumps started when the electricity failed) and equipment. When telecom-services and electricity was lost, coordination was done by improvised means. Evacuation was greatly helped by the firefighters' and volunteers' knowledge of where vulnerable people lived.

The response was improvised and organic. Representatives from the larger fire brigades that eventually assisted the firefighting, and the national fire authority (DSB), noted the lack of organization as a shortcoming, while the local community highlight the effectiveness in the improvised response. Both views have some support in the eventual investigations. The initial response was clearly effective, and several problems were solved in creative ways, but as the fire grew and as more and more resources arrived and needed to be coordinated (without effective means of communication as the Nødnett broke down), the coordination based on local knowledge and social networks became less efficient.

The response to the Lærdal fire clearly shows how part-time firefighters may act as an integrated part of a closely-knit community, and how their role multiplicity and social embeddedness in the community proved invaluable resources for their response. However, it also shows that this mode of organizing has shortcomings in terms of tactical leadership and coordination of resources when the control span grows.

Similarly, an external evaluation of the response to the bushfire in Flatanger the same winter pointed to a deficient plan compensated by good local knowledge and well-oiled collaboration machinery in the region. According to the investigation report, the crew exhibited their willingness to go beyond what was expected of them despite the notably harsh conditions. Some of the firefighters even lost their homes while extinguishing fire to save other people's homes (PWC 2014:51).

4.3 Responses to other emergencies

An ever more common type of emergency in Norway the last decades are seasonal floods and flash floods, and water induced landslides. (DSB, 2013; Fenstad et al, 2013) In particular flash floods and water induced landslides are commonly associated with climate change, as this leads to more intense precipitation.

In rural communities, the combination of part-time firefighters and volunteers (farmers and others with access to machinery) are the core first responders to such events. Again, the personal networks and role-multiplicity of firefighters and municipal employees, provide a combination of a rudimentary organization and access to resources beyond the standard gear possessed by the fire department. Moreover, floods and landslides are events that typically happen on locations that are known by the locals to be risky, so local

knowledge is important both in prevention and response. During floods, the local fire department usually assists in pumping out water that has flooded buildings. Knocking from door-to-door, firefighters also often perform the task of informing the locals of possible flooding in the area, and hazards posed by landslides. The FRS also clears out trees that may pose a risk to the public or impede traffic. Other examples of notable cases of the rural fire department's new challenges is the 2013 triple murder in on a regional bus in Årdal. There, the fire department, together with ambulance personnel, managed to keep the perpetrator under control while the police response was severely delayed. In September 2011, a train at Rørosbanen was derailed. The first emergency personnel to arrive on the scene was the local part-time FRS. They started the evacuation of injured passengers and cared for them until the paramedics arrived. They also cleared out an evacuation path and organized an assembly point where the evacuated passengers were registered before they were allowed to leave the area.

The cases here illustrate some of the variation and complexity of the tasks facing these fire and rescue workers. City firefighters face some of the same complexity, but they have more support from police and health services and other professionals and experts. This difference is also a source of the respect city firefighters have for part time crews. The demands for generalist competencies are higher for the part time crews. The part time personnel are sometimes (incorrectly) referred to as volunteer firefighters, but their response is based on a rudimentary organizational structure and basic training, and it is also better integrated with more professional responders than most volunteers. In a discussion of volunteers' response to the large storms in the southern US (Katrina and Harvey), Wachtendorf and Kendra (2017) stress the importance of such coordination for the efficiency of volunteer responses. Though the part time FRS are not volunteers in the strict sense of the word, the part time FRS can be regarded as a hybrid form of response, connecting the volunteer community and official response to events.

5 DISCUSSION

5.1 *Are part-time firefighters only part firefighters, or do they bring some unique resources to the table?*

Based on our studies in different fire departments in Norway, it is clear that the part-time firefighters are less skilled and have less training for advanced firefighting than their full-time counterparts. The part-time fire departments also have shortcomings on formal communication procedures and on the manage-

ment side, particularly when faced with larger incidents requiring coordination outside of their personal networks.

pronounced in the part-time corps. Their local knowledge (of terrain, threats, resources, people and buildings) and embeddedness in the social fabric of

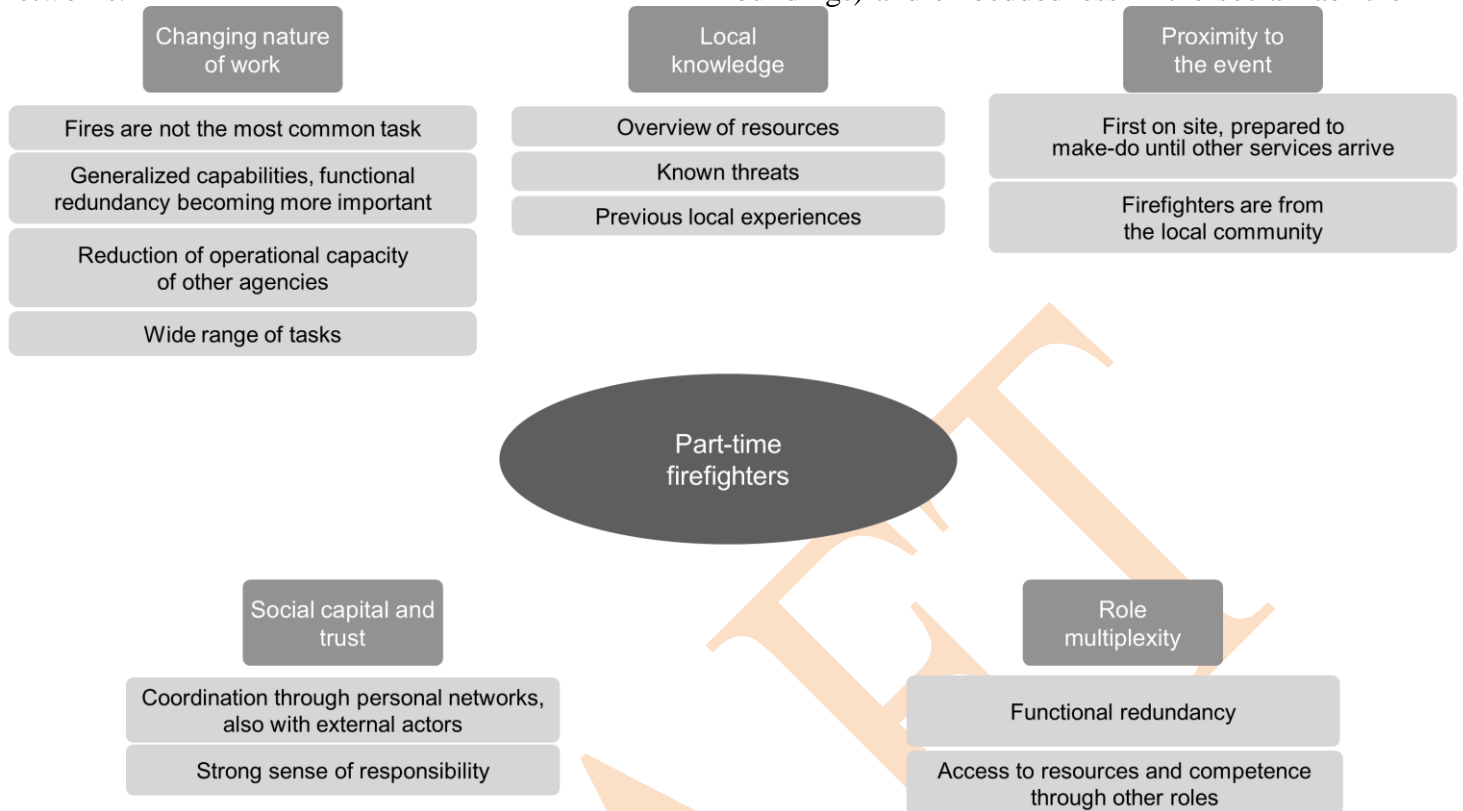


Figure 1: Summary of our description of the characteristics of the part time firefighters.

One should be very surprised if this was not the case that these firefighters lacked some skills, as they have highly limited time for courses and training. This is also noted in the national "Fire Study" (DSB, 2013). They also lack resources in terms of equipment, and several firefighters lack formal qualifications. Moreover, due to the low frequency of call outs, many of them struggle to gain practical experience with firefighting. There is no shortage of problems in these fire departments. Notorious underfunding has also led to some FRS operating antiquated vehicles. Still, when we talk with full time firefighters and other professionals in the emergency community, they generally have great respect for the part-time crews for their general skills and for their ability to solve their tasks. One city fireman described how impressed he was by a nearby part-time FRS near an accident-ridden highway, how they responded quickly to horrible accidents, and how they on their own initiative had started taking first aid courses as a response to the slow response of the ambulances in that area. Their high motivation, and sense of responsibility was generally recognized by several of our informants.

The part-time firefighters are seen, by full-time firefighters, as generalists with improvisation skills based on their additional occupations. Also, the full-time fire departments have traditionally strived for this quality, by actively recruiting people with a variety of professional backgrounds, but this is even more

the community is important for their ability to respond to emergencies, and their day job is sometimes an important resource.

As professional firefighters, they are inferior to the well drilled crews that practice every day, but they have other qualities that should not be underestimated, and that should be evaluated in the larger context of societal safety and community resilience, not only as actual fire fighting, which is only a minor part of their task portfolio.

5.2 Role multiplexity and part-time resilience

The fire-department in general, and the rural ones in particular, are organic parts of their communities. The qualities of the part-time firefighters that we have discussed here are important parts of what we have labeled community resilience. Their social relations in the community make them more effective than their fractions of positions may suggest, and they make up a critical part of the local communities' ability to withstand and respond to emergencies of a highly varied nature. We introduced two sociological explanations for this:

Role multiplexity: They have many hats, many forms of competence which give them a broad skillset, competence and access to resources when faced with novel situations. In particular professional roles such

as jobs in the municipality's technical services, farmers, carpenters or medical professions gives highly valued additional competencies.

Social capital: They have social networks, trust relations, that can be very useful for coordination in emergencies, and also for mobilizing equipment and resources. This also contributes to high motivation. Informants throughout the sector are clear that the economic incentives, the paycheck, is not the primary motivation for most of the firefighters. Rather, it is the sense of doing an important job for the community that is the main motivation for most.

6 CONCLUSION

One conclusion, not a very daring one, is that we (researchers and especially policy makers) need to know more about the specific role of these firefighters as Norway is about to restructure our fire departments. They might not be as competent as full-time fire fighters, but they are different and fill other roles and are organically involved in community preparedness and response. From a societal safety perspective, the part-time fire fighters are possibly the most cost-efficient operative emergency management resource in Norway.ⁱⁱⁱ

Beyond the discussion of firefighters in Norway, our paper emphasizes the importance of role multiplicity and social capital in the management of societal emergencies. Part time firefighters are not volunteers in the traditional sense but not fully professional actors either. For effective emergency management, they represent an important hybrid resource as they both possess rudimentary means in terms of coordination, communication (most importantly by being equipped with and trained to use radio communication terminals) and leadership while simultaneously being well engrained in the social fabric of the communities they serve.

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8 ENDNOTES

ⁱ The notion of role multiplexity is inspired by sociological theory on modernity and bureaucracy. Whereas one individual in a bureaucratic organization has one role only, and thus uniplex relations to the ones he interacts with, in small scale communities most people have several relations to each other. (Durkheim discussed in Brøgger (1993: 26ff), see also Almklov et al, 2017).

ⁱⁱ The individual sense of the term social capital is inextricably related to the works of Bourdieu (1986), viewing social capital as a source of power individuals possess and use to further

their interest. The collective view on social capital is particularly associated with Robert Putnam (1995), viewing it more as a property of a group, a community or a society. We are here referring to the latter, as a descriptor of how trust based networks are resources for collective action.

ⁱⁱⁱ We have not investigated the economics of this, but to illustrate: A fire chief we interviewed stated that he had a yearly budget of roughly 4 mill NOK (around 400.000 Euros) and could mobilize 80 part-time firemen.

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