

The effects of a fire on work arrangements in a knowledge intensive organisation

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Abstract: On the 21st of November 2007 there was a big fire in the building of Eastern Norway Research Institute (ENRI). For six weeks most of the employees had to work at remote locations. In this paper we look at the effects of the fire on working locations, advantages and disadvantages of telework, and effects on communication. All researchers increased their use of telework after the fire, but for the future they generally do not see a big increase in home work compared to the period before the fire. But they will use it more flexible according to needs. The advantages of telework is mainly to work undisturbed, but disadvantages are related mostly to practical activities. The researchers were able to keep in contact with their customers pretty well. Some of these results differ somewhat from previous research, but this is due to the "introduction" of telework through of a fire.

1. Introduction

1.1 The case organisation

Eastern Norway Research Institute (ENRI) was established in 1984 as a private autonomous non-profit foundation. The Institute has its main base two hours north of Oslo, in Lillehammer. In addition there is also an office established in Hamar. In Lillehammer ENRI is co-located with other research and educational institutions like Lillehammer University College. The Institute has presently a staff of 34, where 11 have a part time position besides working for regional Colleges or Universities in Norway and Sweden. The staff constitutes an interdisciplinary and inter-scientific community with the main emphasis within the social sciences. The Institute earns 90% of its income from contract research, both in a regional and a national market. ENRI has a dual role of being a national resource on some few selected areas, as well as a regional resource on a broader area of topics. Some of the areas of research are: welfare research, innovation studies, cultural studies, evaluations of public policy and measure, population studies, regional development, gender research and research related to schools and education.

1.2 The fire and the immediate effects

On the evening of the 21st of November 2007, there was a big fire in the main building of ENRI in Lillehammer. No people were hurt and the data-server and the electronic information was saved. But, almost all the paper material of the researchers and the administrative people, as well as the building itself, was heavily damaged. All furniture had to be re-purchased. Some of the most important paper material was however reconstructed. In figure one we can see an example of one of the cleanest offices after the fire. We have offices which are much worse than this.

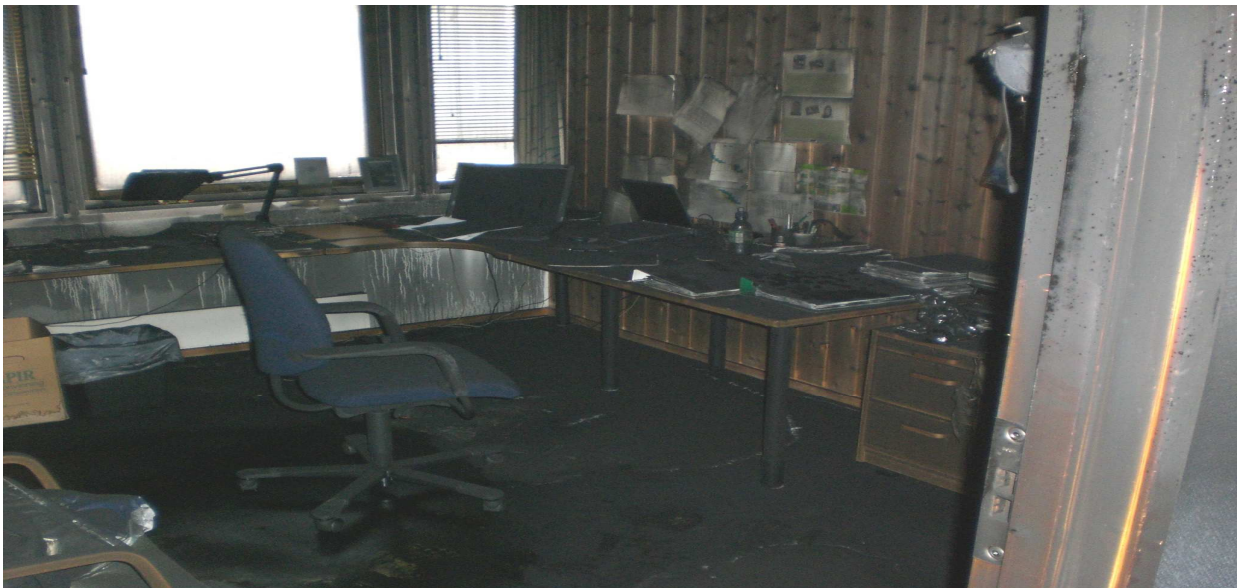


Figure 1: Example of a burnt office

For six weeks the only physical location of ENRI was a couple of rooms, called a service center, at the Lillehammer University College (LUC), which is located close to the burnt building. The administration of ENRI, consisting of only three people, were sitting in a separate small room, while the researchers shared an adjoining room. Only two to three weeks after the fire, researchers were able to work from home or other remote locations as they all received a new portable PC with remote access to the new data-server. In this way, ICT-solutions and remote work arrangements reduced the negative effects of the fire for the customers, for the ENRI itself and for the employees. A large number of decisions related to practical, technical and economic questions had to be decided after the fire. One of the most challenging one was related to the aspects of insurance. In this paper we will however limit our focus to analyses of the effects of changed working locations because of the fire. These changes must however been seen in relation to other effects, like the lack of routines or the lack of paper material etc. Some of the effects would probably have been different if remote working had been introduced in a planned way with a "normal" administrative infrastructure.

1.3 Research problem

The fire caused a temporarily relocation of researchers to home offices or other remote places, and there was a limited administration function. This new spatial working structure gave the idea to conduct a limited survey about the effects of the fire on working arrangements in the Lillehammer department of ENRI. This survey should be carried out before the researchers had settled in their new offices, which were in the middle of the city of Lillehammer, 5 km south of the previous building. The research questions were the following:

- what are the working locations of the employees in ENRI: before and after the fire. and also some forecasts about the future?
- what are the evaluation of positive and negative effects of working at home, and the assumed importance of a common office building?
- what are other effects of the fire, for example on the communication structures

2. Some relevant earlier research

2.1 Research on the introduction of telework

Most of the research on telework emphasize the need for telework to be carefully planned and implemented. As part of the implementation there is a lot of focus on the selection on tasks/jobs suitable for telework and personal characteristics of teleworkers. Tegnander (2000) is one of the authors who have summarized these questions and say that work tasks that are either: easy to measure, can be planned or have specific goals, or work where there is not a demand for frequent contact with manager or colleagues, have a potential for telework. Huws et al (1990) also add that tasks where there is a need for concentration and limited need for communication is well suited for telework. Related to personal characteristics, Tegnander (2000) says that work independence and experience in the organisation are the two most important characteristics and requirements. It is important for the teleworker to be active to collect information to compensate for the reduction of

informal communication and reduced tacit knowledge. We should also add that the literature also recommends that telework should be limited to only some days a week. Full time telework gained a lot of focus in the early phases of telework history, in the 1980s and 1990s, but during the last decade all experiences tell us that part time telework is the dominant alternative. Full-time telework is very marginal, and this is due to disadvantages related to isolation and lack of social contacts.

2.2 Research on advantages and disadvantages of telework

There are a lot of studies who mention the advantages and disadvantages of telework, especially related to working at home. At the Norwegian Web-site "www.fjernarbeid.net" (downloaded 19th of May 2008), the following arguments of home based telework are mentioned.

Table 1: Advantages and disadvantages of telework

Advantages	Disadvantages
More freedom and flexibility, for example to adapt to illness, birth or flexibility before retirement	Possibilities for isolation
Less commuting time	Difficult to separate work, leisure and family, for example disturbances from children
Better concentration	Increased telephone costs
Better work/life balance: better flexibility related to family and children	Reduced social environment and less access to knowledge exchange with colleagues
Increased effectiveness	Reduced opportunities for career development
Reduced costs	
More time at home and in the neighbourhood	

There are numerous other articles and books which discuss this topic. They mainly mention the same general arguments, like for example Gray et al, 1993, Bakke et al, 1998; Tegnander, 2000. But, regularly other words are used or they specify for example flexibility. In addition, some specific arguments are mentioned like new possibilities for disabled people, young parents and old people to work partly from home (Norwegian Research Council, 1997), or positive environmental effects, as mentioned in the earliest studies of telework (Nilles et al, 1976). Huws et al (1990) found out that teleworkers in general had a higher job satisfaction, because of advantages mentioned in the table above. Other disadvantages are for example mentioned by Bakke et al (1998) where they look at negative effects of aspects mentioned above, where limited informal contacts will reduce the quality of the work. Other studies looked at the effects of isolation on for example the motivation of the teleworkers.

Based on these arguments we will select the following advantages for telework in the survey: a) can work more undisturbed; b) more effective; c) improved work/life balance; d) reduced commuting time; e) positive environmental effects. Specified alternatives to describe disadvantages with telework are: a) difficult to separate between work and leisure; b) lack of motivation/too isolated; c) not enough access to professional material; d) no satisfactory access to administrative material and support; e) more difficult to get hold of managers and colleagues; f) communication is more complicated. We have added the aspect of administrative problems, because telework in ENRI was not planned and administrative procedures were "destroyed". This argument was particularly mentioned in the early phase of telework research, perhaps because at this time period during the 1990s ICT and communication systems were not as advanced as they are today.

A closely related question to the advantages and disadvantages of telework, is the question of the advantages of the office. In fact, there has not been too much research on this topic, and it seems that this phenomenon almost has been taken as given. During the last decade there have however been a discussion of the office, especially related to the question of physical design: traditional fixed office design compared to more open and flexible physical structure. Some central studies of this in the Nordic countries are made by Moberg (1997), Rapp & Rapp (2001), and Karlsen & Langseth (2003). Some common findings are that flexible and open office design is not always positive, but has an advantage in certain situations, for example in project/team work, situations characterized by large communication needs as when there are uncertainties and ambiguities because of changes in internal and external conditions. Besides advises for the physical design and recommendations for flexible physical structures, we can also read from these studies that some of the advantages of co-located offices are to avoid some of the disadvantages of telework and therefore the purposes of co-located offices are: to do practical administrative task, to have professional discussions and conversations with managers and colleagues, small talks and informal conversations with the same people, and to have some social arrangements like a wine lottery every Friday. The office provides an arena for access to other people, even these are busy and are out of the office several times a week, because of increased mobility. We therefore want to find out in our survey how employees in ENRI miss these qualities of the office.

2.3 Telework, communication and media choice

There are a large number of studies on communication and media use related to telework. One of the early academic studies is made by Lowry (1996), who indicates that the perceived total amount of communication is relatively unchanged in telework, but becomes more electronic and formalised. Face-to-face communication is reduced, but the total level of communication is maintained through compensatory activities by managers and employees. Even if there is agreement on the changing composition of media use from face-to-face to electronic, and towards more planned communication, there is disagreement on the effects on the total level. Most telework studies emphasize the importance of communication and the challenge to maintain communication at a distance. Even if there are several electronic communication media, geographical distance has generally shown to have a negative effect on the communication frequency. This finding goes back to a study by Allan and Fustfelt in 1975, who found that the number of contacts between colleagues decreases when the distance between workplaces increases. The number of contacts was reduced to almost zero when the distance was more than 30 meters. Because telework may reduce the communication volume, the telework-literature generally agrees that the teleworker himself as the manager have a responsibility to initiate communication through discussions and problem-solving in such distributed work arrangements. In this way the phenomenon of “out of sight, out of mind” can be reduced. In this study we will at how employees have changed their communication volume after the fire, differentiated by various media.

2.4 Our case compared to other telework studies

Our case in ENRI with the introduction of telework as a default or mandatory work arrangement for many employees, is different on some aspects from earlier research. This especially refers to the planned introduction of telework, and that telework should be limited to some people for a limited amount of the time. On the other hand, telework had

been allowed as an ordinary work arrangement for several year in ENRI, though limited to once a week. We can also notice that the characteristics of researchers and their independent jobs, both satisfy the general requirements mentioned in telework research and practical advise.

The use of telework by other types of accidents than fire, for example related to terrorism and natural disaster, was much debated after the events in New York and Washington DC on September 2001, as well as after earthquakes in San Francisco and Los Angeles in 1989 and 1994 (<http://jala.com/disasters.php>, downloaded 19th of May 2008). At this Web-site, the inventor of the telework/telecommuting concept, Jack Nilles, writes about the experiences of using "telecommuting by default" due to terrorism and natural disasters. He tells us that the electronic infrastructure is more easily repaired than the physical infrastructure of roads and buildings. Therefore there is a period of increased use of telework or what is called telecommuting. But, when the physical infrastructure in operating again, then the amount of telework is often reduced back almost to the initial level before the accident. Many possible explanations can be found in the telework literature: We have already mentioned disadvantages for the employees, and we find disadvantages also for the employers related to reduced managerial control, increased coordination and communication costs, negative effects on organisational commitment and culture etc (Tegnander, 2000). Our small case is not directly comparable with these large US examples, but we have not found examples of case studies on this topic. But, as the macro-studies, we have a focus on the level of telework before and immediately after the fire. In addition we also ask the respondent to make some assumptions about their future application of telework.

3. Methods used

3.1 General aspects

This study is carried out by two of the researchers who work for ENRI. Because we are close to the employees, we preferred to have a more anonymous form of data collection. A Web-based survey was sent to all the employees including the administration, two middle managers and the CEO of ENRI. The total population for this study is around 20 people. The questionnaire was sent out in the beginning of January 2008, just after the employees had moved into their new office locations. We gave them a response time of around 10 days. This showed to be satisfactory for such a small survey. The respondents are very motivated and they are used to conduct surveys themselves. A total number of 16 answered the questionnaire. We received "signals" that a couple in the administration found the questions more relevant for researchers, and they did not participate. The focus is therefore on the researchers in this study. Among this group the response rate is very good, and we can assume that around 90% of the employees in Lillehammer have answered the questionnaire. We will consider to follow up this survey by some selected interviews later, where also the administrative personnel might be included. Generally the questions had predetermined alternatives, and many of them also included possibilities for additional comments. Few respondents took this opportunity.

3.2 Topics and questions in the questionnaire

The questionnaire included 13 questions, and most of them are relevant for this study. Because we knew the respondents, and this is a small organisation, we did not want to include questions about the age and positions of the respondents. We however asked as our first two questions about gender (question one) and as the second question: how many years have you been working for ENRI. The next four questions are about the working locations:

- question three is about how much the employee has worked at home before the fire, on average. The alternatives are: a) 2 times a week or more, b) once a week, c) 1-2 times a month, d) varying dependent on needs, e) nothing
- question four is about how much the employee worked in the office building before the fire, on average. The response alternatives are: a) every day, b) 3-4 days a week; c) a couple of days a week; d) once a week or less.
- question five is about where the employee have been working after the fire. The alternatives are: a) the temporary headquarter/service center; b) other places at the Lillehammer University College; c) at home; d) other type of office (for example at the working location of the spouse); e) other locations
- question six is about how much time is spent at the home office after the fire compared to the period before the fire. The alternatives are: a) more time; b) the same amount of time, c) less time.

The next questions, seven and eight, are about the advantages (question six) and disadvantages (question seven) of working at home. The alternatives are already presented. For the advantages the respondents were asked to rank all the statements, where rank 1 is the most important and 5 is the least important. On the eight question, about the disadvantages of working at home, the ranking was somewhat different as respondents were asked to fill in as many relevant alternatives as they wanted. In question nine we have a question which should be seen together with the descriptive questions 3-6 about work locations. Here we ask about forecast from the respondents about their assumed future level of working at home. The alternatives are: a) at least twice a week; b) once a week; c) 1-2 times a month; d) varying dependent on needs; e) nothing. Question ten should be seen together with the questions on advantages and disadvantages of home work, and asked what the respondents missed mostly by not having a common office location after the fire. Respondents were asked to rank the three most relevant alternatives, among these: a) to do practical tasks (like copying); b) to have professional talks and discussions; c) more difficult access to the managers; d) more difficult access to colleagues; e) small talk and socializing with the colleagues; f) social events like the wine lottery and waffles every Friday. Question eleven is about changes in communication because of the fire. Six statements are presented, and the respondents should answer by either saying: a) agree; b) some agreement; c) neutral; d) some disagreement; e) disagree. The six statements are:

- I have less communication with my colleagues in ENRI face-to-face
- I have used the telephone more for contacts with my colleagues
- I have used more emails for contacts with my colleagues
- The total amount of communication has been reduced
- I have less contact with my customers/principals
- I have less contact with the managers in ENRI

Even if the fire has caused a lot of problems, there might also be some “positive effects” of the fire. Therefore, in the last and twelfth question, we asked this question, and proposed the following six statements. In the same way as in question eleven, respondents were asked to say: agree, some agreement, neutral, some disagreement or disagree to these statements:

- The employees are “closer” than before the fire
- We have got better PC-solutions
- We have a better physical location for ENRI
- I have “cleaned up” my office

We should add to the fourth statement, that books and written material were damaged by the fire, but not totally burned out. Books and written material were covered by dust and it smelt awfully. Some of the researchers chose to clean the books and make new paper copies of some of their documents. The damage varied from one office to another. And there was also different priorities by the researcher how they cleaned their offices. Some researchers only took out their most important books and documents, while some researchers went through their office rather thoroughly. But, for all researchers, a lot of material was left in the building. Especially during the first month after the fire, the smell was awful and the building was full of dust. People who went into the building had to wear special clothes and masks. The third statement about better physical locations is different from most of the other questions and statements: It refers to the office location in which employees moved into the same week as they received the questionnaire. The two last questions were about other comments (13) and about requirements for future localization for ENRI (14). We do not refer to these specific questions.

4. Results from the survey

As said before we had 16 respondents and many of these have been working in Eastern Norway Research Institute (ENRI) for several years. In the table below we see that 11 of these 16 respondents have been employed by ENRI for at least five years. We have one column for the actual number of respondents who have chosen the different alternatives. The right column gives the percentages on the alternatives.

Table 2: How long have the employees worked for ENRI

Number of years employed	Frequency	Percent
Less than 2 years	4	25
2-5 years	1	6
5-10 years	4	25
More than 10 years	7	44
Total	16	100

We see that a majority of the employees have a long experience from ENRI.

4.1 Working locations

4.1.1 Work at home before the fire

We first refer to the question of how much the employee, on average, had worked at home before the fire.

Table 3: Work at home before the fire

Alternative	Frequency	Percent
2 times a week or more	2	13
Once a week	5	31
1-2 times a month	7	44
Varying dependent on needs	2	13
Nothing	0	0
Total	16	101

We see that all respondents had worked at home, and that almost half of them (7 of 16) work at home at least once a week.

4.1.2 Work at the office building before the fire

Table 4: Work at the office before the fire

Alternative	Frequency	Percent
Every day	5	31
3-4 times a week	6	38
A couple of days every week	5	31
Once a week or less	0	0
Total	16	100

All respondents in general spend a couple of times or more each week at the office. The respondents are distributed on three of the three alternatives with the highest score. The rest of the week they spend at home, at customer premises or other locations.

4.1.3 Main work locations after the fire

On the fifth question asking about the main locations of the employees after the fire, respondents had the possibility to give several alternative answers. Therefore the total percentage in the table below amounts to 156%. In the table below we have referred the percentage of the respondents who have mentioned the alternatives. As an example we see that 73% of the respondents mention home as one of their main working locations after the fire, and this is the most preferred location.. One respondent did not answer this question, and the number of respondents are therefore 15.

Table 5: Main work locations after the fire

Alternative	Percent
At home	73
Temporary service center	47
Other place at Lillehammer University College	23
Other places	23
Total	156

It is interesting to note that more than half of the respondents, 9 of 15, had mentioned two main locations, this means 9 employees. 4 of them mentioned the Service Center as well as the home, 3 respondents mentioned other places at the University and home, while 2 people mentioned home and other places. Only 6 respondents mentioned only one place. This indicates that our respondents practice some kind of multi-locational telework, also called mobile telework.

4.1.4 Work at home: after and before the fire

The sixth question should compare the extent of working at home after the fire with the level of home working before the fire. As could be interpreted from table 1 and table 3, most of the employees work more at home after the fire than before. 13 of the 16 respondents said that they worked more at the home office after the fire, which means more than 80%. We know, as colleagues, that some of the employees had to work away from home because they had small children at home, workspace which is not satisfactory, or it might be that an employee also had to work at the temporary service center because of administrative duties or because of their ICT-needs. This indicates that almost everybody increased their work from home during this period, which lasted for around six weeks, including the Christmas period.

4.2 Advantages of working at home

Question 7 is about the advantages of working at home. We show the relative distribution of answers on the alternatives (percentages), with the frequencies in brackets.

Table 6: Advantages of home work

Argument	Very important	Important	Some importance	Minor importance	Not important	No of resp
Can work more undisturbed	38 (6)	25 (4)	13 (2)	19 (3)	6 (1)	16
More effective	6 (1)	27 (4)	47 (7)	13 (2)	6 (1)	15
Improved work/life balance	27 (4)	7 (1)	13 (2)	47 (7)	7 (1)	15
Reduced commuting time	25 (4)	31 (5)	13 (2)	19 (3)	13 (2)	16
Positive environmental effects.	25 (4)	6 (1)	31 (5)	19 (3)	19 (3)	16

We see that the alternative of working more undisturbed is regarded as very important, together with reduced commuting time. We did not ask about exact commuting time, but we know as colleagues that commuting time is moderate around Lillehammer, mostly less than half an hour. For half of the employees it is around 10-15 minutes. It is also interesting to see that half of the respondents see the argument of work/life balance of minor importance.

With reference to disadvantages of working at home, the alternative of "lack of support of administrative material" gained the largest number of votes (8), and oppositely the statements called: "problems to separate work and leisure (work-life balance) and access to

professional material were the two alternatives who received the lowest number of votes. The three remaining alternatives: 1) less motivating/isolated, 2) access to people and 3) more difficult communication, all got six votes. We see that votes are rather evenly distributed. One explanation of this was that respondents were allowed to give as many votes as they wished, and in total we received 34 votes from 15 respondents who answered this questions, which means more than two alternatives per respondent. At least we can conclude that there are combinations of reasons why the respondents hesitate to telework from the home.

4.4 Future level of work at home

Question 9 is about an assumed level for future work at home. We used the same alternatives as in the previous questions who asked about the level before and after the fire.

Table 7: Forecast of future level of work at home

Alternative	Frequency	Percent
2 times a week or more	1	6
Once a week	5	31
1-2 times a month	4	25
Varying dependent on needs	6	38
Nothing	0	0
Total	6	100

We see that no employee think that they will not work at home at all in the future. Almost all respondents are distributed on three alternatives, where the alternative of "need dependent use" has the highest score. The increase in this category and the reduction in votes for the alternative of 1-2 times a week, are two significant changes compared to figures from the time before the fire.

4.5 The benefits of a common office environment

Question 10 asked what the respondents missed mostly by not having a common co-located office location after the fire. The results are shown in the table below:

Table 8: Benefits of common office environments

Argument	I miss it strongly	I miss it to a certain degree	I do not miss it at all
To do practical tasks (like copying);	56	31	133
To have access to managers		73	23
To have professional talks and discussions;	13	69	19
More difficult access to colleagues	25	69	6
Small talk and socializing with the colleagues	25	75	
Social events like the wine lottery and waffles every Friday.	31	44	25

The highest scores are mostly on the alternative "in the middle" between the extremes, with one exception. The respondents miss the possibilities to do practical tasks. We can also see

that small talks and social events are important, and that access to managers is a minor problem.

4.6 Changes in communication

Question eleven is about changes in communication because of the fire. Six statements are presented, and the respondents should answer by either saying: a) agree; b) disagree or c) neutral. We show the results through percentages on every statements.

Table 9: Statements of changes in communication because of the fire

Statements	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	No of resp
Less communication with colleagues face-to-face	67	27	0	7	0	15
More use of telephone	50	38	0	0	0	16
More use of email	50	31	19	0	0	16
Total com. reduced	38	50	6	6	0	16
More effectiveness, because of less stress and disturbances	13	7	27	47	7	15
Less contacts with customers	0	0	66.7	6.7	26.7	16
More contact with the University College	27	27	27	0	20	15
Less contact with the management of ENRI	7	40	20	7	27	16

Communication face-to-face with colleagues has been significantly reduced, but it has been compensated to a certain degree by telephone and email. The total amount of communication has however been reduced. We see that many of the respondents have been able to maintain communication with the customers. As this communication is often by email or telephone on a daily or weekly basis, might explain this finding. Another result is that respondents do not think they have been more effective because of less disturbances, but two third of the respondents think they have maintained to keep in contact with the customers/principals. We should think that many of the employees should have had more contacts with the regional University College, but only half of them report this. On the question on contact level with the management of ENRI, there are variations in the results, and all response-alternatives are applied.

Even if the fire has caused a lot of problems, there might also be some “positive effects” of the fire for ENRI. Therefore, in question twelve we asked this question, and proposed six statements. Results are shown in the figure below, illustrated as percentages for each statement.

Table 10: Positive effects of the fire

Statements	Agree	Somewhat agree	Neutral	Somewhat disagree	Disagree	No of resp
Employees are more closer to each other than before	38	38	13	13	0	16
Our ICT-solutions are of better quality	27	33	20	20	0	15
The physical localisation of ENRI is better	38	38	13	13	0	16
I have "cleaned up" my office	25	19	31	6	19	16

It is interesting that all alternatives have positive results, even if the statement on ICT-solutions was formulated negatively. But 60% of the respondents thought that ICT-solutions became better after the fire, probably mostly because of the new portable PCs with remote access. It is therefore interesting to notice that the crisis in the organisation caused by the fire, also has brought the employees closer together, at least supported by two third of the employees. On this specific question we know that people from the administrative section, who probably have not answered the questionnaire, disagree on this statement. They felt to be alone and the effects on the administrative procedures were probably more significant than on the work of the researchers. But, we will not go into analyses of such functional differences in this study. The statements in this question are probably subjects to more interpretations than in some of the other questions, as for example what is meant by "cleaning up". Three respondents have disagreed on this statement, probably because they interpret the fire as not a good way of cleaning up. We should therefore be careful to draw conclusions of these figures, but there are some indications that even a crisis can have some positive effects.

5. Analyses

In this section we shortly compare our findings with other relevant studies. We should notice that in most of these other studies, telework have been introduced for other reasons than a fire, mostly in a planned way for a limited number of people for a limited amount of time. Then also the administrative procedures are in place to support this work arrangement. In ENRI, even if there was some telework before the fire, telework after the fire was not planned in detail. This was however the default way of working for most of the employees in Lillehammer. And because of the fire the administrative procedures were mostly destroyed, there was lack of papers, printers etc. But, after a couple of weeks, a temporary working situation was established with a data-server and portable PCs. This lasted for six week, when the employees moved to another office location. Just as this happened, we made this survey. Even if this case is different from planned introduction of telework, we should bear in mind that this case organisation consists of independent researchers, where 11 of 16 have been working in ENRI for more than 5 years, and they also have work tasks which is suitable for telework. These are therefore some positive conditions for telework, which made telework possible. The analysis is structured around the three research questions: working locations, advantages/disadvantages and effects.

5.1 What are the working locations of the employees in ENRI: before, after and future?

Results showed us that before the fire, 7 of 16, (this means around 44%) worked at home once a week or more. This is a relatively high percentage, as most studies on telework talk about much lower percentages for countries as a whole, like less 5-10 percent who has part time home work, and 10-20% practice mobile telework. But, we saw that after the fire, the percentage of home work has grown to 73%, and this is home work at a larger percentage of time than before the fire. Our third relevant question is about the assumed forecast for the future level of homework. As shown in the table below, figures are not much different compared to figures from before the fire.

Table 11: Comparisons of work at home before and after the fire

Alternative	Home work before fire	Future forecast for home work
2 times a week or more	2	1
Once a week	5	5
1-2 times a month	7	4
Varying dependent on needs	2	6
Nothing	0	0
Total	16	16

The overall picture is that there are more similarities than differences in the level of home work before the fire compared to the anticipated forecast in the future. There is no indication that there will be a significant increase in home work in the future, as the major change is that more employees prefer to answer "varying dependent on needs" rather than saying 1-2 times a month. But we notice a change towards a more flexible "view" on the use of telework. The quantitative effects of this is impossible to measure now. As we have no company data to compare with, we must compare with studies at "macro level" of natural disasters and terrorism, and these have reported publicly rather general findings saying that the level of telework went back to the initial level when the physical infrastructure was reestablished. This seems also to be true in our case. To give more reliable answers we should follow up to make statistics on the real use of home work, not only perceptions either after or before the real actions.

5.2 What are the evaluation of positive and negative effects of working at home, and the assumed importance of a common office building?

5.2.1 Advantages

In the literature the following seven arguments are often used to describe advantages of telework/working at home. In our study the alternative of working more undisturbed was regarded as the most important advantage, together with reduced commuting time. It was also interesting to see that half of the respondents see the argument of work/life balance of minor importance. We can therefore compare our finding with previous research in the table below, and state the arguments ranked according to the importance in our study.

Table 12: Work at the office before the fire

Advantages from general literature	Relevance in our study
Better concentration	Very important
Less commuting time, ecological impacts	Seen as important, even if commuting time is moderate. Ecological impact is seen as important by some respondents.
More time at home and in the neighbourhood	Some/minor importance
Better work/life balance: better flexibility related to family and children	Not very important
Increased effectiveness	Not very important
Reduced costs	Not mentioned, less relevance

5.2.2 Disadvantages

On this question the respondents were allowed to select as many alternatives as they want. The result of this is that half of the alternatives received six votes each. Only the disadvantage of "lack of support of administrative material" (8 votes) and "problems to separate work and leisure (work-life balance) and problems with access to professional material (both 5 votes) are different. It is interesting to see that administrative tasks is the major disadvantage and that the alternatives of "work-life" balance and communication seems to have less impacts in ENRI than in other research studies. Compared to previous research, this is different. Results are often the opposite. Administrative tasks seem then to be a minor challenge, especially when there are organisations with established routines and effective ICT-services. In ENRI, many of the administrative procedures were temporarily out of order when the survey was carried out. Why "work-life balance" is a minor problem in our case, we cannot explain. It might be that skilled and independent researchers in a medium sized Norwegian city, manage this better than the average employees? Related to communication, this might have something to do with the characteristics of this organisation. ENRI has more long term projects compared to more operating companies. Frequent day to day communication is not that common as for example in financial institutions, call centers or shopping centers.

5.2.3 The benefits of a common office environment

Question 10 about the benefits of having common co-located offices, could be seen as solutions to some of the disadvantages of telework. It is therefore interesting to notice that respondents missed mostly the possibilities to do practical tasks during the period without a satisfactory office building. This is almost the same argument as in the previous question, where "lack of administrative support" was the highest ranked disadvantage. But, the importance of the office is not only as an "advanced copy center". The office-building has several functions related to all kinds of discussion, knowledge transfer and social communication. The office building provides an arena with some unique characteristics which is hard to replace in a virtual way. On the other hand, we should know more concretely about how the office should function effectively when many employees travel a lot to participate in projects and external collaborations or prefer to sit at home regularly. Planning of common office arrangements, both professionally and socially, are critical to

maintain organisational commitment and culture. ENRI has some few events, like for example the weekly wine lottery with Norwegian waffles, which was appreciated by 75% of the employees.

5.3 What are other effects of the fire, for example on the communication structures

As said before, there are a large number of studies on communication and media use related to telework. Many of the studies conclude general and not surprising conclusions that communication in telework becomes more electronic and formalised. A large number of studies also claim that communication in total is unchanged, because of compensatory activities by teleworkers and/or managers. On this last aspect there are however disagreements. Relevant for this question is also answers from the question on disadvantages of telework, where communication is seen as a modest challenge or disadvantage. In our study, communication face-to-face with colleagues has been significantly reduced, but it has been compensated to a certain degree by telephone and email. The total amount of communication has however been reduced. We see however that many of the respondents have been able to maintain communication with the customers. As this communication is often by email or telephone on a daily or weekly basis, this might explain this finding. Another result is that respondents do not think they have been more effective because of less disturbances. On the question on contact level with the management of ENRI, there are variations in the results, and all response-alternatives are applied.

Even if the fire has caused a lot of problems, there have also be some “positive effects” of the fire for ENRI. It was interesting to notice that the crisis in the organisation caused by the fire, also has brought the employees closer together, at least supported by two third of the employees. On this specific question we know that people from the administrative section, who probably have not answered the questionnaire, disagree on this statement. They felt to be alone and the effects on the administrative procedures were probably more significant than on the work of the researchers. Other statements, which all gained some support from the respondents, were related to ICT-solutions, new office building and that "the office was cleaned up and paper could be thrown". The statements in this question are probably subjects to more interpretations than in some of the other questions, as for example what is meant by "cleaning up". Three respondents have disagreed on this last statement, probably because they interpret the fire as not a good way of cleaning up. We should therefore be careful to draw conclusions of these figures. But there are some indications that even a crisis can have some positive effects, like defeats and crisis can have positive effects for soccer teams or working teams when they loose a contract.

6. Conclusions

There are few studies where almost all employees work at a distance, the introduction is unplanned, and administrative routines are not optimal. But we know that telework has been a solution to many US employees in case of natural disasters and the crisis after the terrorist attack in NY and Washington DC six years ago. The extent of telework increased

significantly as a temporarily back-up solution to maintain basic operations until the physical infrastructures were rebuilt. We find the same pattern in our study, with a substantial growth in home work and other types of remote work after the fire, but forecasts from the employees indicate that they will return almost back to the "pre-fire level", though with a more flexible use of it, according to their "need". The advantages of working at home is seen primarily as allowing more "non-disturbing" working environments, while the mostly referred disadvantage is related to practical activities. Respondents miss both the co-located offices as an arena for knowledge exchange and social purposes. Some of the conclusions are the same as in other traditional telework studies, but some of them are also reflections that this is an unique "introduction" of telework. At least, telework provided possibilities in ENRI to maintain business and research and no major projects were delayed because of the fire. There is however a need to know more about how telework could be applied as part of an "emergency and security strategy" in organisations.

References

Bakke, J., Bergersen, E., Fossum, E., Julsrud, T., Opheim, H., Sakshaug, U. (1998) Håndbok i fjernarbeid (In English: Handbook in telework), Arbeidsmiljøforlaget, 1998

Gray, M. , Hodson, N. and Gordon, G. (1993) Teleworking explained, Chichester, John Wiley & Sons.

Huws, U., Korte W.B., Robinson S. (1990) Telework - Towards the Elusive Office, John Wiley & Sons Ltd, Chichester

Karlsen J. K. and Langseth, M. (2003) Hvor skal jeg sitte? Om a lykkes i det mobile arbeidslivet, Cappelen Akademisk Forlag (In English: Where do I sit? To succeed in the mobile working life)

Lowry, T. (1996) Alternative work arrangements: the effects of distance and media use on the supervisor-subordinate relationship, Ph.D. dissertation, University of Houston

Moberg, A. (1997) Proximity and distance, Studies of communication patterns in satellite offices and flexible offices, Linköping Studies in Science and Technology, Dissertation No 512, University of Linköping

Nilles, J., Carlsen Jr. F.R., Gray P., Haaneman, G. J. (1976) Telecommunication – Transportation tradeoff, New York: John Wiley and Sons

Rapp, B. and Rapp, B. (2001) Flexibla organisationslösningar, Telematik 2001, Published by Teldok and KFB (Kommunikationsforskningsberedningen), Stockholm)

Tegnander, E. (2000) Fjernarbeid: god kommunikasjon på tross av geografisk avstand, (In Norwegian), (Telework: good communication in wake of geographical distance, Master Thesis at The University College of Buskerud, Economics and Business Administration, Dept of Hønefoss)

Ørbeck, M. (2008) Erfaringer fra en krise. brann på arbeidsplassen, Foredrag på konferansen Sikker Info, Gjøvik 9. april 2008 (In English: Fire at the workplace, presentation at a National Conference on Information Security)

Internet-links:

www.fjernarbeid.net: Norwegian Web-site for telework, edited by Willy Bakkeli

www.jala.com/disasters.php: Web-site in the USA, edited by Jack Nilles