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- Master thesis -

Compare and discuss peoples use of risk concepts relative to the
contemporary science

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Abstract

This thesis reviews a set of examples regarding several everyday societal issues, whereas there is an attempt for describing related risk. The examples will highlight the everyday use of risk terms and concepts by people of authority, journalists, bureaucrats, politicians etc. The thesis will point out whether any terms and concepts to communicate specific risk are ignored or not. More specifically are they making scientific sense and is there a potential for improvement.

The thesis will also include examples from assessment made by risk expert group, so that it creates a structure for comparing the everyday examples to actual expert use of risk terms and concepts. More specifically it will discuss and compare similarities between everyday use of risk terms and concepts among politicians, bureaucrats, and journalists to the state-of-the-art risk science that we know of today.

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Chapter 1: Introduction

1.1 Background

Risk is described in some ways in the past, with different attempts from for example, mathematicians. Abraham de Moivre assigned risk to be an unfortunate event with a probability of the event taking place. Is this a good description of risk? What is risk really?

Politicians and bureaucrats use the word risk in many situations, as we may have observed through media throughout time in most situations where there is uncertainty about an outcome (consequences) of some activity (activities).

Many scientists in risk related work have established a groundwork for risk science, and they have given a description of what the science is, what it includes, how to use it and how to communicate risk. Interestingly, we are uncertain about how much knowledge people in general have knowledge about this science.

In a broad sense, the main motivation of this thesis is to gain knowledge about how everyday use of risk terms and concepts relate to the state-of-the-art science. If it however, does not relate to the contemporary science at all, is it because there is a lack of knowledge about terms and concepts in the communication, or is just purely not making scientific sense?

1.2 Objectives

The main objective of the thesis is to generate knowledge about how everyday use of the risk term compares to contemporary risk science.

More specifically the objectives are to

- Provide examples of how the risk term is used in real life among politicians, **bureaucrats, managers, journalists, ...**
- Establish a structure for interpreting and comparing these examples.
- Compare the examples to state-of-the-art risk science knowledge.
- Draw conclusions based on the above analysis.

1.3 Content/Structure of the thesis

Moving on from this point, this thesis will be organized in the following way:

- In chapter 2: The authors approach and method are described
- In chapter 3: Examples from newspapers, reports and articles are reviewed and discussed. A structure is established to make a desired comparison between everyday use and contemporary science. More specifically, we are aiming to design a structure to reach our purpose, establishing a structure for interpreting and comparing the examples provided to the state-of-the-art risk science.
- In chapter 4: Further discussion around the subject in hand will take place.
- In chapter 5: Conclusions are drawn from the discussion.
- In Appendix: A bases for discussion and conclusion is designed.

Chapter 2: Approach/Method

Approaching this thesis, we will investigate government papers whereas risk and relative terms in risk has been used to describe and manage risk by the government, directorate of health and Department of public health concerning the covid-19 pandemic. In that sense will direct our focus deeper into the global pandemic that occurred in December 2019, namely, the covid-19 virus, as risk terms and concepts have been used in several ways. Similarly, we will study examples concerning other areas where risk terms and concepts have been used by journalists, politicians, and bureaucrats.

Many statements have been used by politicians in Norway through time, for example considering, financial risk, technical safety, and hazards and vulnerability in several aspects. In Norway there are some “quite strict” rules and regulations during the global pandemic we are facing today to avoid the risk of spreading the virus too quickly and massively. In this thesis we will investigate how they have use statements and terms that includes risk scientific meaning to describe the risk of the novel corona virus.

Furthermore, we will focus our attention towards reports and analysis made by the FHI throughout the pandemic period. It is important to acknowledge that there might be reports and other paper that repeat the same ideas. Therefore, we will accurately only include the most fulfilling papers in our study in which not repeating the same ideas several times.

We will attempt to create a satisfactory variation by including other examples of risk terms and concepts usage in other areas. It is worthy of mention that risk terms and concepts is broadly used by people in many different bureaucratic positions, which in return will give us a wide range of alternatives to choose from. Of the variety of such examples we will include a few regarding issues around investments, bank savings, and finance. One example that seemingly have not appeared more often in the newspapers, is artificial intelligence, which is one of the examples we have included.

Chapter 3: Risk statements

An on-going task in this thesis is the essence of our discussion, which is everyday use of risk terms and concepts by bureaucrats, politicians and managers as mentioned earlier. Being able to do so, we will attempt to give examples by studying and analysing such events in government papers, reports from the Norwegian institution for health (FHI), the Norwegian directorate of health (Helsedirektoratet) and some newspaper articles as we proceed. Will provide specific examples as we move along around our subject of matter in this chapter.

Risk as known to experts and risk managers exist in nearly all areas. There are always going to be some risk to any possible event no matter how its nature behaves. It will therefore make sense to cover all areas. However, for the sake of simplicity we will focus mainly on Politicians (and or bureaucrats in Norway) as we are limited in terms of time.

More specifically we will study several papers and put forth examples from them not in a specific order. We will also attempt to give precise reasoning for the quoted statements we provide and explain their usage of risk terms and concepts.

3.1 Newspaper articles

1.

“There is a research paper from the Journal of Alzheimer Disease that shows that covid-19 can cause tendon damage with an increased risk of neurological diseases such as Alzheimer's and Parkinson's. Anne Hege Aamodt is chief physician at the Neurological Department at Oslo University Hospital, and chair of the Norwegian Neurological Association.

She confirms that this is something Norwegian neurologists are vigilant about, and that research is being considered both in Norway and abroad.

One in three experience neurological symptoms in the acute phase – and some appear to be prone to prolonged lingering ailments," Aamodt told VG.

–There are things that suggest that this virus can affect age-related diseases.”

(Simensen, H.M, 2020,)

Looking beyond the pandemic, this is regarded as a scientific reasoning to describe the long-term effects of the virus.

2.

The British virus variant presents a 2.6 times greater risk of being hospitalized, according to the Norwegian Institute of Public Health (FHI), reports NRK on Monday evening.

According to the channel, a new study by the FHI shows that the British variant far more often leads to serious illness.

"People infected with the British variant are associated with a 2.6 times higher risk of being admitted to hospital with covid-19 as the main reason for their admission," director Line Vold at FHI told the channel.

According to the study, the increase in the number of admissions occurs in all age groups – it also shows that the British variant causes serious illness in young people and adults under 40 years of age.

(Myrvang, S.E, 2020)

3.

Students at the Oslo MET university infected during the internship state: – Must be allowed to choose what risk we expose ourselves to. (Olsen, D.L, 2021)

4.

“The risk never becomes zero

The authorities should speak clearly that we do not come out of the pandemic without enduring risks, and that strict measures will not be able to stop it.”

(Schumacher, S., & Tanberg, A.M, 2021)

Despite whatever else there is to come, a risk will never become zero no matter the circumstances. Where the mention of enduring risk comes up is quite accurate, as it is somewhat intuitive that enduring risk is important to overcome a situation, such as the covid-19 outbreak.

5.

“The U.S. CDC considers pregnant women as the risk group for severe course of covid-19. Norwegian pregnant women are at lower risk, according to Norwegian health authorities - so far, no pregnant women have become seriously ill in this country.”

(Jonassen, T.H., & Hatlo, M., 2020)

6.

“Pregnant women with covid-19 have less fever and muscle pain but run a higher risk of severe disease and gestational complications, new research shows.” (Hansen, A., 2020)

Examples, 5 and 6 both highlight the issue of pregnant women that might get infected by the virus. They both implicate a certain severity of them having the disease while they are pregnant as they run a higher risk of several complications. At the time being no pregnant women that was infected got any severe disease in Norway. What is interesting is that the Norwegian health care authorities made this statement that pregnant Norwegian women run a lower risk than other pregnant women, which by all means is a poor risk perception, as risk cannot be based purely on historical data, which is an obvious statement in example 6.

7.

“Men's infected with both common flu and the coronavirus SARS-cov-2 run more than twice the risk of dying compared to people who have only covid-19, an analysis conducted by Public Heal England (PHE) shows.” (Hansen, A., 2020)

8.

“British scientists have studied a large group of people who have survived 20 commonly occurring cancers and compared them to an even larger group of people who have not been affected by cancer.

Based on the findings of this study in EClinicalMedicine, published by renowned The Lancet, the researchers believe that those who have survived cancer are likely to run a greater risk of severe covid-19 rates than those who have not had cancer.

A group of 108,215 cancer survivors and a control group of 523,541 cancer-free people are included in the study, which has examined whether healthy cancer patients run a greater risk of severe causes from common influenza disease, which appears to be largely transmitted to coronavirus disease.” (Hansen, A., 2020)

9.

“Previous stroke, cancer with proliferation and male sex are associated with an increased risk of dying after being diagnosed with covid-19. It shows a study conducted by researchers at the Norwegian Institute of Public Health (FHI), St. Olav's Hospital and the Cancer Registry.

- The greatest risk factor for death among SARS-CoV-2 test positive individuals was age. Male sex, previously detected stroke and cancer with remote proliferation were also associated with an elevated risk of death after proven covid-19, the article states.

It is titled "What does previous cardiovascular disease or cancer mean for risk of death after proven SARS-CoV-2?" was first published in the Journal of the Norwegian Medical Association on 29 December 2020.” (Fjeld, J., 2021)

10.

“Diabetes carries twice the risk of dying or becoming seriously ill if you become corona infected.

In particular, people with uncontrolled diabetes, multiple concomitant underlying diseases, or both, are vulnerable to covid-19, the researchers from the United States, Australia, China, and South Africa, among others.

This is evidenced by new research published in the medical journal *The Lancet*.” (Holm, M. L., 2020)

11.

“On Thursday, City Councilman Raymond Johansen stated that the contagion situation in Oslo municipality is at a tipping point. Health Minister Bent Høie tells *Dagbladet* that the risk in Oslo is now too high.

On Wednesday, 80 new cases of infection were registered in Oslo, while 69 new cases were registered the following day. This is significantly higher than the average infection figure last week, which was about 40 new cases per day.

-The level of infection in Oslo is too high, and the infection must be reduced. There is too high risk now that the infection spreads to nursing homes and hospitals, and has consequences for staffing in the health service, and that the infection spreads to the rest of the country," Health Minister Bent Høie told *Dagbladet*, continuing:

"Therefore, it is important that people now follow the clear rules and advice given by both national health authorities and the City Council in Oslo.” (Andresen, F., & Langsem, B., 2020)

12.

“The job is proving more risky than usual. Therefore, efforts must be made to minimise the risk, but it will not be risk-free.

Now the long-term effects after covid-19 are beginning to show - so-called "Long-Covid".

Although fewer people die from the disease, more reports show late-term injuries such as lung problems, chest pain, headaches, and joint pain.

Half describe exhaustion and permanent loss of quality of life. Health professionals are more prone to covid-19 infection than the general population. Now we see the first nurses in Norway who can't get back to work because of the late effects of covid-19 disease.

Late-night injuries are one of several reasons why we as a population need to take the infection control rules seriously. The late injuries are serious for you personally if you are affected, but the community must also protect health professionals and impactor health care capacity.” (Larsen, L. S., 2020)

13.

“In connection with the covid-19 pandemic, it was found that healthcare professionals had a significantly increased risk of SARS-CoV-2 infection compared to the general population, while a recently published study from the Mid-Norway did not find infection to staff from a non-isolated covid-19 patient. Norway In a series of three studies (a study based on registry data and questionnaire, an individual-level case control study and a case-control study at the system level) we will examine the risk of infection, as well as risk factors for and disease burden of covid-19 among employees in Norwegian health care. Data for descriptive and statistical analyses will be collected from the new preparedness register PreparedC19 for which the Norwegian Institute of Public Health is responsible for and from questionnaire surveys. The studies are important for quantification and understanding of the prevalence among employees in the health service, virus transmission patterns, relationships, causes and consequences of disease. This information will increase our knowledge and contribute to the implementation and adjustment of local and national infection control measures, thereby preventing future infections among employees in the health service and health service-associated spread of SARS-CoV-2. About the studies and issues This project is a series of three studies with differences in the study population and method designed to complement each other. Results from the individual studies are intended to be part of an overall project to shed light on various aspects of importance to employees in the health service in connection with the covid-19 pandemic. Issues: Improve the data quality of national messaging systems for better monitoring of pandemic among employees of the health service (ecological registry study) - Quantify the proportion of employees in the health service confirmed with covid-19 (ecological registry study) - Quantify the proportion of employees in the health service admitted due to covid-19 and/or registered with covid-19 as cause of death (ecological registry study) - Describe the clinical presentation of covid-19 among employees of the health service (ecological registry study) -Describe characteristics among employees of the health

service confirmed with covid-19 (ecological registry study, case-control study at individual level, case-control study at the system level) -Identify individual work-related risk factors for employees in the health service with covid-19 (case-control study at individual level) - Identify structural risk factors at institutional/health care level (case-control study at system level)". (Eriksen, H.-M., Molvik, M., Kacelnic, O., 2020)

Interestingly, the example above quotes a summary of an analysis made by a group of professional health care takers that focuses on risk(s) related to health care workers during the pandemic, on how they are always exposed during working hours. What is interesting is the preciseness of the risk term regarding how it increases when one is more exposed to the virus. If we simply compare this example to the next example, we will quickly observe some similarities. Namely, the risk of something being a magnitude if someone is more exposed to something. What remains is whether the word probability of its meaning would give the same outcome as the word risk, or not.

14.

"“The contagion is at a level where the risk of a new wave and new eruptions is too great," Bent Høie said at the government's press conference on the corona situation on Wednesday. There have never been as many cases of infection in Norway as in the first week of 2021, according to VG's overview. A total of 166,759 people tested - and at least 4,758 of them received positive test responses.” (Buggeland, S. A., Sfrintzeris, Y., Skjetne, O. L., & Myrvang, S. E., 2021)

In example 14 as in other examples the word risk is used as a risk of a new wave and new eruption of the virus. There is a probability that a new eruption might take place, but the risk of that happening would not affect if it happens, rather, the risk is coming with the eruption. We may observe from several example where the word risk of something happening would as easily be replaced with the probability of it happening, and the risk will follow as it happens.

15.

“The cause is great demand and reduced capacity on the second Easter Sunday. Rather, the municipality wishes that those at greatest risk of being infected can get an appointment for testing first.” (Myrvang, S. E., & Nave, O. B., 2021)

Those at greatest risk meaning those whom may be more vulnerable, the word vulnerable would ideally communicate the issue of the group more accurately, although for a specific group to be at risk makes sense when they are vulnerable as in health matters.

3.2 Various examples, Finance, economy, and artificial intelligence

1. "If you really want to reduce risk, you should just forget about the money.

How risk-averse are you really with your own savings? You should think carefully about that question before investing in a mutual fund." (Skagen Fondene, 2021)

2. "Støre points out that the authorities and many local communities have for many years lined up to ensure good and long-term framework conditions for Hydro's operations in Norway.

"This gives the company a special responsibility to secure its operations in Norway. We receive feedback from employees, elected representatives and elected representatives in the affected municipalities that the sale creates uncertainty in what is already a demanding time," says Støre." (Ghaderi & Hovland, 2021)

3. "Artificial intelligence at full speed into the business world: – Catastrophic consequences if one does not understand the technology.

Artificial intelligence is being used by an increasing number of industries, but experts at DNV GL warn against taking the technology too lightly." (DNV-GL, 2020)

4. "Commission: Corona crisis could cost \$330 billion:

The Corona Commission estimates the cost of the corona crisis and infection control measures at NOK 60,000 per capita for the period 2020-2023, but stresses that the estimates are uncertain." (Hovland, 2021)

5. "In its threat assessment for 2021, the Norwegian Police Security Service (PST) writes, among other things, that bankruptcies in the wake of COVID-19 can be a popular target for foreign interests.

"Negative economic consequences and possible business bankruptcies may give other states more opportunities to make strategic acquisitions in Norway," the threat assessment states.

They also highlight that such acquisitions can be used to increase a state actor's influence in areas of strategic value, and to access sensitive technology and information.” (Bach, 2021)

These examples slightly differ from other introduced examples from newspaper articles, as they include a set of other terms which describes risks related to those activities. Terms as threat, crisis, catastrophic consequences, risk-averse, etc. What remains is the question whether they communicate activity related risk better than previous examples.

What we have observed previously is the similarities in the use of risk terms and concepts that communicate the risk in about the same way, where it should not have been the case when the related activities are different to one another although they may be about the same subject. Contrary, present examples indicate that different terms give stronger meaning to activity related risk in a more specific way.

We have noticed in previous articles the use of the word risk, and just that word alone, is used to describe all the risk related aspects with for example the corona virus. Although it might make sense where we are familiar with the high uncertainties related to those events around the pandemic, we are able to see a remarkable difference when specific terms are used to communicate risk, such as in the examples above.

Example 3 above is a heading of an article concerning artificial intelligence. Seemingly, they describe the risk as catastrophic consequences if one does not understand the technology. This is an example that is genuinely important to point out, whereas they describe that artificial intelligence has catastrophic consequences, but it is not often we notice that there are articles about this issue. One would think that such harsh risk communication would concern an issue that should be more of worry for society, especially politicians and people of authority.

3.3 Covid-19 Epidemic: Knowledge, situation, forecast, risk and response in Norway after week 14 (2020)

This report is an annual situation description, that focuses on the ongoing pandemic. It includes knowledge about the covid-19 virus, and knowledge around the risks in several of its aspects. The report is written by the FHI and it is meant to give a general reasoning around the safety measures that took place at the time and also what safety measures should be considered in the future on the bases of how the pandemic has evolved amongst the Norwegian people.

The report gathers information about which age-group are the most vulnerable amongst the people. During the pandemic there has been quite some talk that the elders are the most vulnerable ones and that they should be somewhat shielded carefully during the pandemic as they have a more likelihood of dying from the disease than younger people.

A risk assessment has been done, in which there are several risk terms and concepts used in the report and we will therefore attempt to quote some of the statements (Translated from Norwegian):

1. “Generally we assess the risk for the people that stayed in these countries (meaning the countries most affected by infections of covid-19, such as Spain and Italy) has been infected with covid-19, is higher than for those that have stayed in Norway. The risk for developing a disease for some of them that stayed in other countries is therefore somewhat higher. A non-insignificant amount of them will be among the risk-groups; they are retirees living in hotter areas. A part of them will also have an underlying disease.” (Folkehelseinstituttet, 2020, p.27)

2.

“This group will contribute to increase the amount of sickness amongst people and more admissions in the Norwegian hospitals given the size of the group, potentially with increased share of infections and that they have a greater amount in the risk-group than rest of the people, but there is less likelihood that this group will increase the pressure on the health care all at the same time. The reason for this assessment is that even though the risk of being infected will be greater than it would be generally amongst the Norwegian people, it is not such that we can expect a great share of them to be infected almost at the same time and

therefore not developing a sickness at the same time. They also most likely live in several different areas in Norway, so that they would not increase the pressure towards the health care in one simple region.” (Folkehelseinstituttet, 2020, p.28)

The examples above are few, however, they reflect most of the use in the public paper by the Norwegian Institute of Public Health. Throughout the report, it is clear that risk terms and concepts are used several times, but in quite the same way in all of the situations.

Evidently, they have used the word risk several times in somehow different ways. There are also several times where they have used the word risk instead of the statistical word probability, most likely to increase the impact of the meaning. Generally, we may state that the risk of getting an infection is not the same as having the disease, rather there is a statistical likelihood of getting a disease and having it will contain risk.

What is interesting about this report stated from here is that it repeats itself in several parts as where they describe the risks around the covid-19 virus.

3.4 Socioeconomical assessment of infection control measures– covid-19, Report from an expert group on mission for the Norwegian directorate of health, April.7 2020

This assessment takes the socioeconomic aspects of infection control measures decided by the Norwegian authorities. It explains the impact the measures have on society and the general economy. Corollary, it explains the choice of strategy by the government in different scenarios.

We will quote some of the statements:

1. “The situation of the disease (meaning the covid-19) is greatly varying and can be: not noticeable infection, a cold, influenza-like disease, pneumonia, severe lung failure and death. Anyone can get a serious illness, but the risk of death by the disease can be over 1:10 amongst the elders, under 1:1000 amongst young adults, and under 1:10 000 amongst children.” (Ekspertgruppe for helsedirektoratet, 2020, p.3)

Clearly, the example above is an attempt to describe the magnitude of the risk of death from an illness by the virus. The number of deaths due to the Coronavirus in the coming month is not risk. It is an unknown quantity. To talk about risk, we also must include uncertainty –we do not know today what this number will be. (Aven & Boudier, 2020)

2. “Services and events with many-to-many contact will involve greater risk of spread of infection. Opening for such services will depend on the fact that there is room for this within the main strategy chosen (meaning a strategy to fight the pandemic). For such services and events, it should also be considered whether they can be opened in a customized way with low or no spread of infection, possibly adapted to opening in parts of the country where the level of infection is low. In particular, activities with more "medium" contagion effect, such as gyms, organised sports activities, and some dining facilities, can be affected.” (Ekspertgruppe for helsedirektoratet, 2020, p.7)

The probability of getting infected by the virus varies with situation, meaning how one is exposed to the virus (generally from people that are already infected). The example above describes a scenario of such that where one is not able to keep a distance to others one might be exposed to the virus and eventually infected. In other words, there is an increase of risk getting infected in such a situation based on the statement above. Social distancing has been

proven to control infection effectively as there will not be enough room for droplets of the virus reaching not infected people.

3. “Closed kindergartens and closed schools, especially for the smallest children, are measures with very large societal costs. These are also infection control measures that the organisations in the workplace highlight as very burdensome. At the same time, opening of kindergartens and schools can involve spread of infection, even if the children themselves become ill, and have very little risk of becoming seriously ill. If it is considered that there is room for some more spread of infection within the strategy chosen, kindergartens and schools for the smallest children will be high on the list of what should be opened. It may be possible to implement this in limited ways with less spread of infection, for example, that half of the children are in kindergarten/school every day. It will be possible to start by opening kindergartens and schools in areas with less spread of infection, where the situation is assessed on an ongoing basis based on the size of the epidemic in the different areas of the country.” (Ekspertgruppe for helsedirektoratet, 2020, p.7)

4. “Several petroleum extraction companies report lower activity. Equinor has decided that turnarounds planned this spring will now be postponed at Åsgard A, Åsgard B, Kristin, Troll C and Norne, as well as the onshore plant Melkøya. Turnarounds require more workers out on the platforms, so you have to place two and two in the cabins. The increased risk of infection is the reason for this activity being postponed, but cost-cutting can also be a motive.” (Ekspertgruppe for helsedirektoratet, 2020, p.10)

5. “In a study of the effect of increased unemployment in the United States during the financial crisis, Yagan (2019) finds that an increase in the unemployment rate of one percentage point in the period 2007-2009 resulted in a prolonged reduction in the employment rate of 0.0 3-0.4 percentage points.²⁰ In a study on Norwegian data, Raaum and Røed (2006) find that young people going into the labour market during a period of high unemployment will be at increased risk of being unemployed even as adults , with a one to two percentage point increase in unemployment as an adult.” (Ekspertgruppe for helsedirektoratet, 2020, p.25)

6. “Long-term closure of schools could have implications for whether pupils are given exams. As the completed exam may be a necessary qualification for further education or work, there is a risk that there are delays in the economy, where value creation is delayed with the time it takes until the exam can be completed. Also, if the exam is completed as planned, reduced learning during the intervention period may increase the risk of some not passing and thus not being able to complete their schooling. This will have significant consequences for the individual.” (Ekspertgruppe for helsedirektoratet, 2020, p.36)

7. “The absence of contact with adult persons outside their own family may also result in the risk that children in need of help from child welfare services will not be identified. Teachers, health professionals, coaches and friends' parents can be sources of concern to child welfare services, and such adult individuals are now given little opportunity to observe the children, as the offers are closed. This in turn can mean that children in need of help do not get it.” (Ekspertgruppe for helsedirektoratet, 2020, p.37)

To sum up the examples above, clearly, they describe different situations with some concepts and terms in risk. More specifically, they draw conclusions from a set of scenarios that describe what sort of measures of infection control we might need. It is therefore necessary to enlighten our focus in the direction of those different scenarios that decide what strategy society needs to abide by for an effective infection control. We will therefore give a brief overview around the four thought scenarios by the government (and experts that have done some research for the government, or the directorate of health, Norway) in appendix.

In appendix we may clearly observe each scenario of infection control and their economic and financial aspects. VSL grows rapidly when infection rate increases beyond a certain level, which evidently makes sense as increase in infected number will eventually lead to higher death rate.

We observe that the assessment communicates the importance of including all aspects around the pandemic when it boils down to deciding fulfilling and beneficial measures around the country for prevention of mass infections. All the scenarios described above are the ground work that had to be done for the experts to be able to further create a scientific based conclusion of what it would cost society throughout the time being when there were a need for decisions around safety measures.

Besides the scientific journals and reports we will include a series of relevant newspaper articles whereas politicians, bureaucrats and people of authority have used risk science expressions in their risk perceptions on different subjects. Mainly, our intention is to describe their use to make clear statements around our question in hand (What are the differences and similarities between the use of risk terms and concepts with the state-of-the-art science?). The examples include finance and economy and politics, whereas we will cover questions from politicians towards other politicians and bureaucrats that has made statements around a few subjects.

3.5 Government site, questions, and answers

Government politicians' examples:

As many have observed there was an incident in Gjerdrum county in Norway, whereas a landslide took place in the county. Politicians (the government) have since then been asked and answered a series of questions about constructions built on quick clay. Risk assessments have been done in the past, however, safety of the areas of quick clay is highly uncertain. A question was asked by a member of the parliament Une Bastholm to the Norwegian minister of petroleum and energy Tina Bru regarding this issue.

Une Bastholm (MDG):

“According to NVE (Norwegian Water resources and Energy Directorate), at least 110,000 people live in quick clay today, and the need for increased resources for mapping and measures against landslides and avalanche is great. What will the minister do to minimise the risk of landslides for these households, and to ensure that all 110,000 residents receive concrete information about avalanche risk, what risk assessments have been made, and what measures will be taken in the future?” (Kvikkleireproblemet, 2021)

Tina Bru:

“The quick clay avalanche in Gjerdrum is a very tragic event. We must do everything we can to prevent such incidents from happening again. There is quick clay in many places in Norway. Basically, such areas are not dangerous, and there are strict rules for development where there is quick clay. It is therefore important that we find the causes of the avalanche in Gjerdrum and draw the lessons that can be drawn. The Government will set up an external expert committee to investigate the causes of the avalanche in Gjerdrum and consider measures to strengthen the prevention of quick clay landslides throughout the country. This will also be important as a contribution to making other people living in quick clay areas feel safe.” (Kvikkleireproblemet, 2021)

“NVE assists municipalities in several ways to help reduce the risk of quick clay landslides in built-up areas. NVE assists with knowledge base on the risk of quick clay landslides, including in the form of professional gatherings, guidance, and mapping of hazard areas. NVE also participates in the municipalities' land-use planning with guidance, training, and statements on individual cases. As a state professional authority, NVE can object to plans that do not meet the requirements for safety in the event of a new development. In emergency

situations, the NVE assists, as we have seen in Gjerdrum, the municipality and the police with professional advice”. (Kvikkleireproblemet, 2021)

This is an example where the risk communication is quite satisfactory, for example where NVE is mentioned; NVE assists with knowledge base on the risk of quick clay landslides, including in the form of professional gatherings (meaning experts from desired backgrounds), guidance, and mapping of hazard areas. It makes especially sense where mapping of hazard areas is mentioned in the risk assessment discussion, which is desired as hazard areas must be identified to prevent quick clay landslides.

NVE is the trusted party in the quick clay areas in Norway, where they have given a lot of advices during emergency situations such as in the county of Gjerdrum. The use of ‘safe’ here is relatively technical as safety is not assured in quick clay areas, where the risk of landslides is largely uncertain.

Other politicians have raised a series of other questions regarding the same issue, but in different aspects, such as hospital buildings in quick clay background. In this setting there was a question asked to the minister of health and care services Bent Høie, by the socialist left party member Nicholas Wilkinson.

Nicholas Wilkinson (Socialist Left Party):

“Does the minister feel confident that the health trusts' planned hospital buildings – particularly the plans at Gaustad – uphold a precautionary principle regarding future climate change and extreme weather such as landslides and floods, avalanches, rockslides, and quick clay landslides?” (Kvikkleireskred, 2021)

Bent Høie (Minister of health and care services, Conservative party of Norway):

“My experience is that the regional health trusts are serious developers and in all major hospital developments extensive planning work is carried out with impact assessments prior to the start of construction. Planning of new hospital buildings follows the Planning and Building Act, which provides the overall framework for planning and construction. Planning pursuant to this Act coordinates state, regional and municipal tasks, and sets guidelines for land use, social development, and individual building measures.” (Kvikkleireskred, 2021)

“At Gaustad, geotechnical surveys have been carried out of both the relevant building plot and surrounding areas. Development of the new Rikshospitalet (Oslo University Hospital, Rikshospitalet) is located outside the avalanche-prone area. There is extensive evidence that area stability has been safeguarded and that continued safeguarding of stability is safeguarded in project execution. The following describes documentations and assessments.”
(Kvikkleireskred, 2021)

The minister of health and care services Bent Høie, makes a statement based on his experience, which is a personal statement to make, meaning weak scientific reasoning as it is clearly a risk perception. Surely, he shares statements from professionals at the southern and eastern Norwegian regional health authority. The difference of those to statements are the professionals do not share their experience subjectively, as we observe they are more in relation to objective scientific background.

The example above would without the statement from the health authorities be a quite poor risk communication and risk handling statements from a politician. Reasoning this statement is that the first and foremost answer is based on that single person’s point of view, or his experience, in other words a subjective statement.

Chapter 4: Discussion

In this thesis there are several examples from everyday life, as in, statements from journalists, politicians, and managers that have been reviewed and explained by the author. Ideally the target of this thesis is to compare the use of risk terms by those specific groups of society to the contemporary risk science. The author has observed from the examples reviewed in relation to the theory and literature available, that there is a need for establishment of certain conclusions so that risk as hole is not oversimplified and corollary not overestimated or overanalysed.

In general, it is observable that risk terms and concepts may be ignored when they are replaced with other terms (other terms from risk science), which in regard will increase the likelihood for stating a poor risk communication. Ideally, such an event may be troublesome as different risk aspects may be communicated in an inaccurate way, which in regard will in different situations lead to catastrophic (at least negative to some extent) consequences.

Moreover, we observe from the examples that there are differences in the usage of terms and concepts, which in regard makes the statements different from one another. However, throughout the analysis that has been done by the author it is clearly similarities between the statements. Our main task is to further discuss to what degree the examples relate to risk science, and secondly to what degree they relate to one another.

Furthermore, it is clear to the author that a need for better understanding exist among most of society when it comes to risk science and communication, most certainly during this pandemic. “The Coronavirus pandemic demonstrates the relevancy of the risk science in many ways, from risk understanding to risk assessment and communication, and risk handling. Risk is a key concept. Then, it is essential that there is a strong science supporting the analyses and management.” (Aven & Boudier, 2020)

4.1 Covid-19 related examples from newspapers

Throughout chapter 3.1 examples are presented by the author, where all of them stem from newspaper articles. The chapter mostly covers journalists use of risk terms and concepts, which indeed is one of our target group of people. Regarding those examples, it was foreseen to be important to include a larger number of examples so that we don't generalize all journalists use of risk terms and concepts by too few examples.

Concerning the previous statement, the word risk is used during the covid-19 pandemic in terms of risk-groups as in groups of people that are more vulnerable than other (normal) people as they may be facing more difficult complications during the illness they may receive from the virus. What we have yet to see among politicians, evidently observed from the examples in this thesis, is usage of the term vulnerability, as it would generally communicate the risk aspect of those groups of people that will most likely face more difficulties during the illness.

In chapter 3.1 example 1 it is stated that the neurological effects of enduring the virus on people that have survived long term diseases such as cancer may result in developing Alzheimer's disease. On a health and medical basis, it makes sense that they may be severely affected as they have their immune system compromised during treatment for their diseases. However, it does not scientifically make sense that they run a higher risk. Ideally the risk is the same as the event (enduring the virus) as the virus is behaving the same way with all people, the difference is that people have their own particular states of immune system that will fight the virus in different ways, and for some it will be harder to endure the virus based on their strength to fight it. In other words, the uncertainty about the possible outcome (consequences) will be different from one age group to another. This does not necessarily justify stating that the risk is higher as we have observed that young people with no underlying diseases have died because of the covid-19 virus, when at the same time people with several underlying diseases in those so-called "risk-groups" have survived the virus.

Going through the examples in chapter 3.1 it is intuitive that the word risk is majorly used in situations that could have been described with statistical likelihood or in some other situations with the term vulnerability. The probability of surviving the disease one may encounter of being infected with the virus variates from one age group to another and people with underlying long-term diseases compared to people with normal working immune system.

Examples 3 and 4 make somewhat sense as they use the term risk more accurately than most of the other examples. The first statement “should be allowed to choose what risk we expose ourselves to” relates more accurately to scientific use of the term, as the second statement “the risk never becomes zero” which is scientifically correct as risk never becomes zero.

Compared to the rest of the examples in chapter 3.1 examples 3 and 4 might be the two that make scientifically more sense than the other examples, even though we may observe that they highlight the level of uncertainty about the pandemic virus.

Furthermore, we observe from the examples in chapter 3.1 that there are many similarities between them, which in comparison to risk science are mostly inaccurate. The term vulnerability is mostly ignored and in most of the cases replaced with the word risk. Although risk is a key concept (Aven & Bouder, 2020), the word is somewhat misused throughout the examples where other terms and concept would have described the situation better.

4.2 Other newspaper examples concerning economy, finance and artificial intelligence

Looking up example 1 in chapter 3.2 there is a statement; “If you really want to reduce risk, you should just forget about the money. How risk-averse are you really with your own savings?” (Skagen Fondene, 2021). This statement clearly indicates the issue of being risk-averse in the case of savings. Risk-aversion is disliking or avoiding risk (SRA, 2018), which is the intuitive definition. What is important to highlight is that this example is quite accurate in the usage of the term risk-aversion. Consistently, we observe in chapter 3.2 that there are being used different concepts in each situation that describes the equivalent risk aspects in each event.

As in example 2 in the same chapter the newspaper indicates a statement from politician Jonas Garh Støre (Leader of the Norwegian Labour Party). It is pointed out that Hydro’s operations in Norway are being supported by the Norwegian government throughout their field operations, however the sales they are planning to make (or have to some degree already made) creates uncertainty in the sense that the buyer may change their frame-work in which it is uncertain what it will lead to. The statement is communicating the uncertainty of consequences of what new owner may bring forward in Hydro’s operations in the time being, regarded as a demanding time (meaning the pandemic). In the light of the overall definition of uncertainty, “For a person or a group of persons, not knowing the true value of a quantity or the future consequences of an activity” (SRA, 2018), the statement makes scientific sense as it describes the uncertainty of consequences with the event in hand (the planned sales of Hydro).

For the rest of the examples in chapter 3.2, artificial intelligence (example 3), corona commission crisis (example 4), threat assessment from the PST (example 5) are all describing consequences and uncertainty of the consequences. However, these examples are not describing the terms with clear evidence, and by that reason it is rather indistinct to clearly state whether they are scientifically correct or not.

4.3 Reports from Norwegian institute of public health and Norwegian directorate of health concerning the pandemic situation

The expert group that has highlighted the situation of the coronavirus have also used terms and concepts that originates from risk science in several ways. Certainly, it is thought that risk experts would most likely be more accurate in their descriptions. In chapter 3.4 example 1 in this thesis one will be able to observe that they have described the risk of death among three age groups starting with elders, young adults, and children. What is obvious is that this statement shows numbers similar to probability and percentage calculations, such as in statistical science. As we may observe, these calculations take base in historical data, as in death rate among all the age-groups among Norwegians (just an assumption as it is not specified in the report). It simply does not communicate “the risk of death” as scientifically accurately as they may have stated, even though it may be understood as such by most people. The problem with this is that it draws statements that relate to an intuitive risk perception on death rate among those age groups. Ideally, an expert conclusion should not specifically be a risk perception as it does not relate to scientific evidence in a broad sense.

In appendix, one may look up their descriptions of all the thought scenarios of the pandemic and their equivalent costs in the stated figures that represent tables with value of statistical life (VSL) in relation to number of infected people. This is more accurate on a scientific level as it communicates the costs it will burden society during the pandemic. In other word it creates a more scientific ground to make informed decisions in those different thought scenarios (with quantitative analysis).

Example 2 in chapter 3.4 indicates the reasoning for the measures considering many-to-many activities, such as organised sports activities, gyms, dining services and so on. They are stating the affect of those activities on number of infections, i.e. risk of spread of the virus related to these activities. Clearly, they state the effects of the measures made for these

activities to reduce the number of infected people, which scientifically makes sense as less gathering of people means less contagion as there will be less contact amongst people. The same measures abide for the example of the petroleum extractions in which they have postponed projects to reduce the number of infected workers in the field.

Examples 3, 5, 6, and 7, are all describing the consequences of the infection control measures. Closed kindergartens, schools and unemployment amongst their respective age groups have respective societal effects. As indicated from the report those statements are based on studies that they will have those consequences related to each part of society, which are regarded as strong background knowledge. Therefore, it is clear to the author that strong evidence is being presented in such a way that it makes scientifically sense for the expert group to describe the negative consequences of the chosen infection control measures during the time of high infections rate among people in Norway.

In contradiction, the subjective point of view of the author is that those statements are mostly regarded as intimidation propaganda as the knowledge of the behaviour of the virus at the time being (meaning in April 2020) was quite poor, although it has improved over time, it is still not a well-known virus. The author is willingly arguing that the lack of knowledge of the virus among health workers, doctors, nurses, and the rest of the health care system was crystal clear at the time, and until this day it is still clear that the level of scientific knowledge around its behaviour is considerably low. Therefore, most of the statements are generally regarded more political than scientific. However, we must not ignore that those statements are actually considering events (or activities), uncertainty, and consequences in most of their statements which obviously will be scientifically correct.

4.4 Government politicians' questions and answers examples discussion

From previous discussion, and the following discussion it is observable that the cautionary principle dominates most of the time when politicians, such as the minister of health and care services Bent Høie, makes statements about risks in different situation. Shifting focus from the covid-19 outbreak towards a different example, we observe that the quick clay landslides have caught much attention locally in Norway, especially in Gjerdrum county. Politicians at the time have been questioned regarding the risk around the issue.

Most of the time politicians, such as Tina Bru and Bent Høie, from the examples in chapter 4.5, highlight the attentions that has been given around the uncertainties with land masses built upon quick clay areas. Seemingly, this makes scientific sense as it is quite uncertain what may happen and when it may happen. When uncertainties are existing in an event as such the cautionary principle is the accurate choice, as stated by professor Aven; "It gives weight to the uncertainties. It has a role in notifying people and society in relation to protection against potential hazards and threats with serious consequences." (Aven, 2019)

Highlighting the risk of avalanches in quick clay areas, risk reduction is considered by both politicians in their statements, which in hand is the one thing desired by the Norwegian authorities, and presumably people in Norway that live in those areas. Risk is the potential of realisation of unwanted, negative consequences of an event (SRA, 2018), therefore it is scientifically relevant from both politicians Tina Bru, and Bent høie to make that specific statement around the subject of matter.

Generally, there is a potential for improvement around the use of risk terms and concepts. Observing their use through the last few years, it seems like, risk is just a word that is used when the intention of the user is to increase the impact of their statement. Additionally, the risk around subject areas is not communicated properly considering the lack of knowledge of the science, from which we observe that some terms and concepts may be ignored in different situations. However, based on qualitative definitions of risk, one of which is; Risk is the possibility of an unfortunate occurrence(SRA, 2018), the author finds it inconsistent to conclude that the statements are weak from the politicians mentioned in chapter 3.5, rather they are somewhat accurate, but they lack informative communication that is genuinely relating to strong background knowledge. One may argue that there exists a strong background knowledge amongst them, in that sense, it is not communicated properly.

Chapter 5: Conclusion

This thesis has illustrated and discussed several examples thoroughly and constructed a bases to draw some conclusions from. Ideally, it has attempted make an informed decision around whether people are familiar with risk management, risk science terms and concepts, and risk communication. With people the author has regarded the groups of people in society that are in important positions, which in regard makes them responsible to communicate risk properly to the rest of society. A definition of risk communication from the SRA Glossary is given in the appendix.

Observing the issues from the discussion it is obvious that a certain lack of knowledge exists among society, more specifically, among politicians, bureaucrats, and journalists. The reviews of examples have shown that the pre-cautionary principle is the dominating principle in general, as it is the most one referred to in most cases when decisions of measures are taking place. It is a valid principal and should be carried out in situations with large uncertainties. However, when the risk is communicated the data and information are somewhat inaccurate in some cases, although at times they make some certain scientific sense. Being inaccurate, is not intentionally stated by the author that they are wrong, rather they are unfulfilling and they lack evidences and parts of information in some situations, and therefore the author finds it satisfactory that the risk communication could be more informative than recent statements.

In Appendix the author has presented definitions of risk, events, uncertainty, and consequences from the SRA Glossary. As we have stated in the discussion a quite large numbers of the examples in this thesis may relate to those definitions, and in some of them they do relate. However, the author is consistent with the conclusion that the risk communication is not precise, and it will be hard for a lay person to understand the risk aspects of for example the covid-19 pandemic situation. The problem is that those statements are not described in such a way that it will make it for the lay-people intuition to understand. The author believes that those statements creates fear rather than understanding amongst people (meaning society as a whole).

5.1 Possible suggestions for the future

Going into the future the political system should include risk experts more often, so that in regard they may communicate risk more accurately, with fulfilling amount of data and not to only increase the impact of their statements by using the word risk alone, as it is what it seems like in some cases. The slight lack of knowledge shows that there is a need for improvement among those groups of people mentioned in this thesis, i.e. politicians, bureaucrats, journalists, managers etc. The author is majorly sure in stating that if the risk of any given situation is communicated properly, it will be easier for society to understand and abide by the measures decided by the authorities.

Furthermore, a focus should be directed towards what risk experts suggests may be of help during different situations, such as the covid-19 outbreak. Professors (such as Terje Aven, Frederic Boudier) of risk science (risk management) have highlighted how risk science may help during the covid-19 outbreak. Such articles and scientific papers should be allowed to make its way to politicians, managers, bureaucrats etc. This would ideally increase the strength of knowledge in decision making among them, and it would make at least some simplicity for more accurate risk communication. Additionally, it would give an understanding that it is important to obtain fulfilling data for sharing in the risk communication before stating the risk we may be facing in a situation such as the covid-19 pandemic that is discussed largely in this thesis.

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Appendix A: The four thought scenarios of the covid-19 infection control strategies

There are four scenarios presented in the paper (*Socioeconomical assessment of infection control measures– covid-19, Report from an expert group on mission for the Norwegian directorate of health, April.7 2020*), turn-down, turn-down-and-hold, brake, and without costly measures are used to estimate number of hospitalized patients that will occur over time by the pandemic. What we are interested in is the reproduction number. The reproduction number R is the number that describes the reproduction of the virus among society. Each scenario has an individual reproduction number, namely, it depends on the level of infection control measures. The reproduction number means the number of infected by one patient that has been infected with the virus. Ideally, R should be below one.

Turn-down

First scenario we are looking into is certainly the turn-down scenario. The scenario describes the willingness of turning down the number of infected by the virus, namely, holding the R number low which is the main target.

Scenario Turn-down with target $R = 0.9$. This could be a scenario where current measures continue from April 14.2020 for three more months, and then move to less burdensome measures, opening kindergartens and schools, opening up some wellness facilities (hairdressers, gyms, etc.) and partially allowing some activity in the hotel and restaurant industry. (Ekspertgruppe for helsedirektoratet, 2020)

Turn-down-and-hold

Scenario Turn-down-and-hold with target $R = 0.9$. This could be a scenario where current measures continue for example for another six months, and then move into somewhat less burdensome measures, opening kindergartens and schools and opening some other offers (less than in the first scenario). (Ekspertgruppe for helsedirektoratet, 2020)

Brake

Scenario Brake with target $R = 1.3$. This could be a scenario where the measures with the greatest burden of action end four months after April 14. On 14 August, kindergartens, schools, and several offers will be opened, while the ban on large events and some other measures is maintained. (Ekspertgruppe for helsedirektoratet, 2020)

Without costly measures

Without costly infectious measures, $R = 2.4$. We observe from this scenario that without any costly measures we are looking into a greater R , which eventually will lead to a greater loss of lives. Value of a statistical life is estimated 35 million NOK, which is presented in figure 2 below. (Ekspertgruppe for helsedirektoratet, 2020)

The scenarios represented above include a set of measures except the last, without costly measures. However, this scenario includes high uncertainty around the fact that the capacity of the health care services will be affected majorly. On the other hand, there is great uncertainty on all scenarios as there will be great consequences in other areas of society. (Ekspertgruppe for helsedirektoratet, 2020)

The choice of strategy is demanding due to great uncertainty about the course of the epidemic and about the effects of infection control measures. Effective infection control measures are needed to prevent the epidemic from getting out of control with a large loss of human life. At the same time, several of the infection control measures involve large societal costs, both economic and other societal adverse effects, which must also be considered. These costs affect the entire population, and the vulnerable in particular. Several consequences are long-term and will increase with the length of the infection control measures.

	Pasienter	Intensivpasienter	Kostnadsanslag (millioner kroner)
Slå-ned	1 900	547	631
Slå-ned-og-hold	1 260	329	383
Brems	74 800	21 600	24 955
Uten kostbare tiltak	155 000	44 700	51 643

Figure 1: The different strategies of battling the corona virus. Slå-ned is turn-down, slå-ned-og-hold is turn-down-and-hold, brems is brake, uten kostbare tiltak is without costly measures. Whereas, pasienter is patients, intensivpasienter is intensive care unit patients, kostnadsanslag is cost estimates. (Ekspertgruppe for helsedirektoratet, 2020)

	Antall tapte statistiske liv*	Verdi på antall tapte statistiske liv, milliarder kroner	Antall tapte statistiske leveår*	Verdi på antall tapte statistiske leveår, milliarder kroner
Scenario A: Slå-ned	317	11	2219	3
Scenario B: Slå-ned-og-hold-nede	199	7	1393	2
Scenario C: Brems	12 400	430	86 800	122
Scenario D: uten kostbare smitteverntiltak	47 600	1649	333 200	466

Figure 2: The different scenarios with estimated value of loss of lives. There also VSL (Value of a statistical life) included in the calculations for the four scenarios. (Ekspertgruppe for helsedirektoratet, 2020)

In figure2 above there are some calculations made based on value of a statistical life in each scenario. We observe that the VSL increases rapidly with the increase in loss of lives as we move along to a scenario from another scenario where the number of loss of statistical lives increases. What is important to notice is that these calculations have been made by an expert group in a socioeconomic assessment. For that reason, one is to observe that the terms and concepts they have been using throughout the assessment, as well as the VSL calculations, are quite accurate as they are based on scientific background. Corollary, they highlight the increase of the outbreak and that it will bring more death with it, and therefore it will increase the value of a statistical life (as many people will die, more death is equivalent to more loss) which in advance implicates accurate risk communication. It is important to highlight these aspects mentioned to be able to communicate risk as accurate as possible.

Appendix B: Definitions of risk and uncertainty from SRA Glossary

We consider a future activity [interpreted in a wide sense to also cover, for example, natural phenomena], for example the operation of a system, and define risk in relation to the consequences (effects, implications) of this activity with respect to something that humans value. The consequences are often seen in relation to some reference values (planned values, objectives, etc.), and the focus is often on negative, undesirable consequences. There is always at least one outcome that is considered as negative or undesirable. (SRA, 2018)

Overall qualitative definitions (of risk):

1. Risk is the possibility of an unfortunate occurrence. (SRA, 2018)
2. Risk is the potential for realization of unwanted, negative consequences of an event. (SRA, 2018)
3. Risk is exposure to a proposition (e.g., the occurrence of a loss) of which one is uncertain. (SRA, 2018)
4. Risk is the consequences of the activity and associated uncertainties. (SRA, 2018)
5. Risk is uncertainty about and severity of the consequences of an activity with respect to something that human's value. (SRA, 2018)
6. Risk is the occurrences of some specified consequences of the activity and associated uncertainties. (SRA, 2018)
7. Risk is the deviation from a reference value and associated uncertainties. (SRA, 2018)

RISK COMMUNICATION

Exchange or sharing of risk-related data, information, and knowledge between and among different target groups (such as regulators, stakeholders, consumers, media, general public). (SRA, 2018)

VULNERABILITY

Overall qualitative definitions:

- The degree to which a system is affected by a risk source or agent. (SRA, 2018)
- The degree to which a system can withstand specific loads. (SRA, 2018)

- Vulnerability is risk conditional on the occurrence of a risk source/agent. (SRA, 2018)

UNCERTAINTY

Overall qualitative definitions:

- For a person or a group of persons, not knowing the true value of a quantity or the future consequences of an activity. (SRA, 2018)
- Imperfect or incomplete information/knowledge about a hypothesis, a quantity, or the occurrence of an event. (SRA, 2018)

Event

- the occurrence or change of a particular set of circumstances such as a system failure, an earthquake, an explosion, or an outbreak of a pandemic. (SRA, 2018)
- a specified change of the states of the world/affairs. (SRA, 2018)

Consequences

The effects of the activity with respect to the values defined (such as human life and health, environment and economic assets), covering the totality of states, events, barriers, and outcomes. The consequences are often seen in relation to some reference values (planned values, objectives, etc.), and the focus is often on negative, undesirable consequences. (SRA, 2018)