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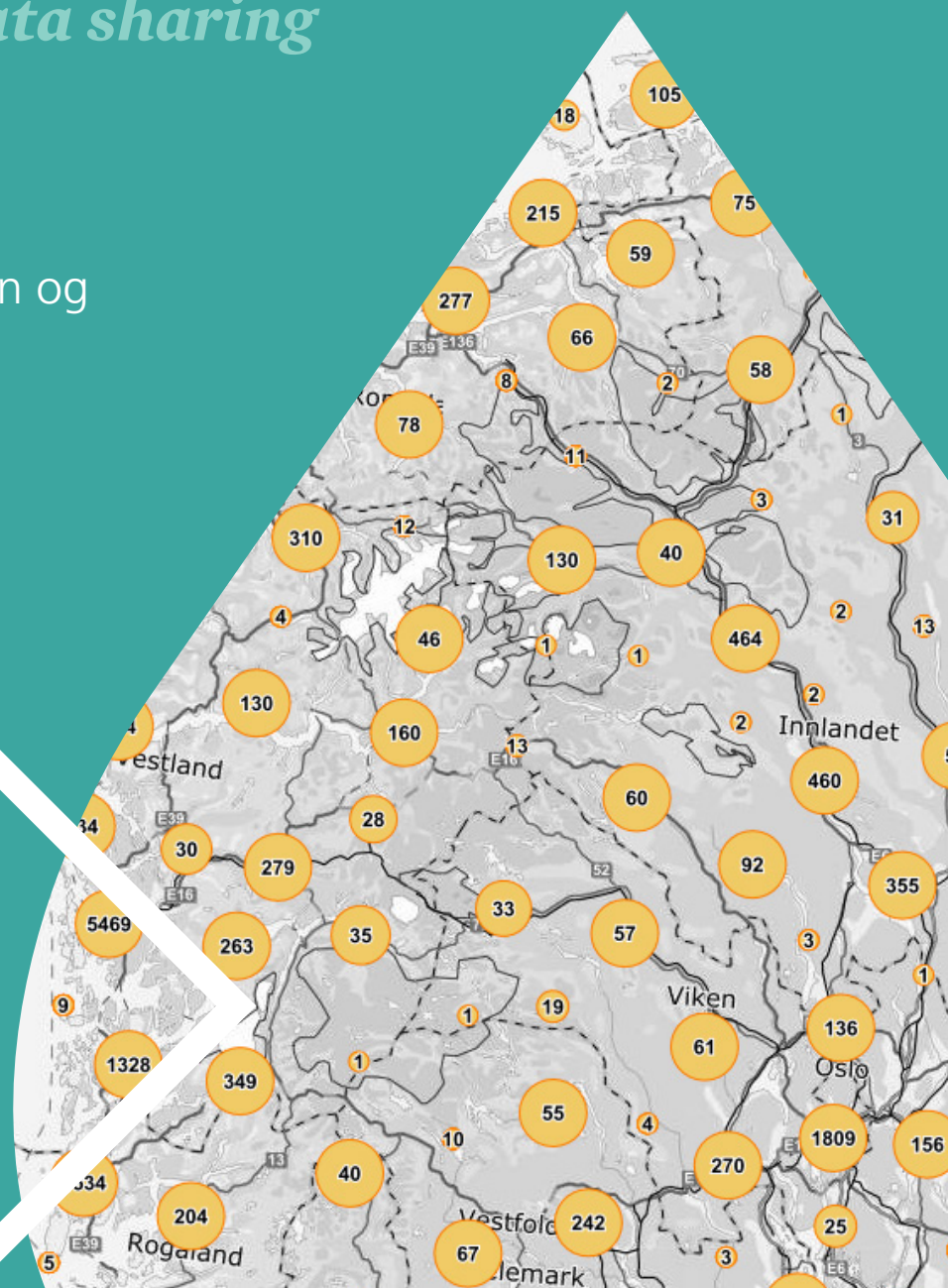
**KLIMA
2050**

Nr. 34 – 2022

INSURANCE LOSS DATA FOR IMPROVED CLIMATE CHANGE ADAPTATION

*Conditions for data sharing
and utilization*

Maria Kollberg Thomassen og
Åshild Lappegard Hauge





KLIMA 2050

Klima 2050 Report No 34

Maria Kollberg Thomassen (SINTEF Community) og Åshild Lappegard Hauge (Høgskolen i Innlandet)

**Insurance loss data for improved climate change adaptation
Conditions for data sharing and utilization**

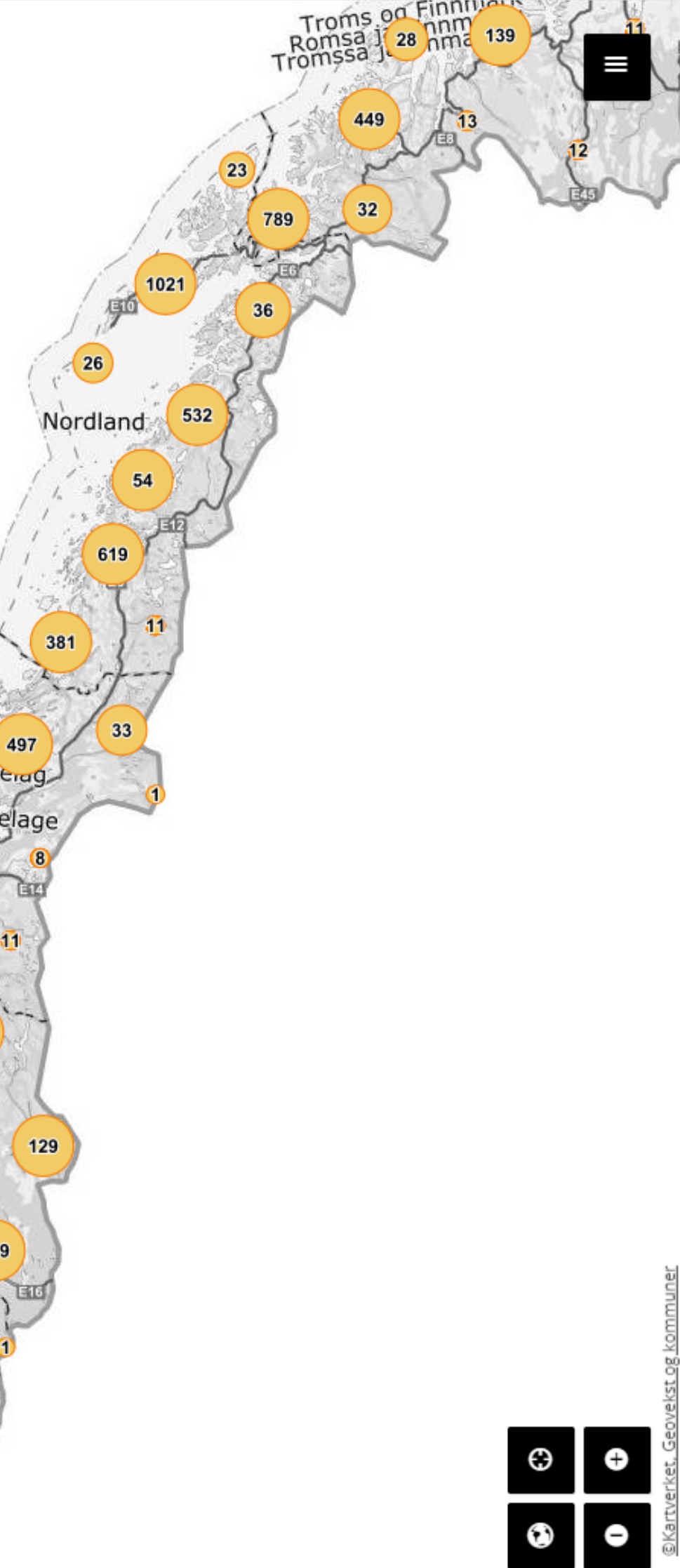
Keywords: Climate services, Usability gap, Data quality, Data governance, Legal and regulatory frameworks, Municipal risk and vulnerability assessment

ISBN: 978-82-536-1759-6 (pdf)

Illustration front cover and page 3: Views of the Knowledge Bank, <https://www.dsb.no/kunnskapsbanken>

Publisher: SINTEF Community, Høgskoleringen 7 b, PO Box 4760 Sluppen, N-7465 Trondheim

www.klima2050.no



Temalag

ALLE TEMALAG

SORTER TEMALAG

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 - Jordskjelv
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- Forebygging
- Beredskap
- Befolkning og bebygde områder
- Samfunnsfunksjoner
- Verdier kultur og natur



Preface

This report presents the results of a study addressing critical conditions for sharing insurance loss data and their utilization with the aim to improve work with climate change adaptation in Norwegian municipalities.

'Klima 2050 - Risk reduction through climate adaptation of buildings and infrastructure' is a Centre for Research-based Innovation (SFI) financed by the Research Council of Norway and its consortium partners. SFI status enables long-term research in close collaboration with the private and public sectors, as well as with other research partners with the aim of consolidating Norway's innovation capabilities and competitiveness in the field of climate adaptation. The composition of the consortium is vital in enabling the reduction of societal risks associated with climate change.

The aim of the *Klima 2050* Centre is to strengthen companies' innovation capacity by focusing on long-term research. It should also facilitate close cooperation between companies performing R&D activities and prominent research groups. Emphasis is placed on the development of moisture-resilient buildings, stormwater management, blue-green solutions, measures for the prevention of water-triggered landslides, socio-economic incentives and decision-making processes. Both extreme weather and gradual changes in climate are addressed.

SINTEF is the host institution for the SFI *Klima 2050*, and the Centre is administered jointly with NTNU. Other research partners are the BI Norwegian Business School, the Norwegian Geotechnical Institute (NGI) and the Norwegian Meteorological Institute (MET).

The Centre's business partners represent important segments within the Norwegian building industry, including consultants, building contractors and the producers of construction materials and technology, and comprise Skanska Norway, Multiconsult AS, Mesterhus, Norgeshus AS, Leca Norge AS, Isola AS and Skjæveland Gruppen AS. The Centre also incorporates key public sector builders and property developers such as *Statsbygg*, *Statens vegvesen*, *Jernbanedirektoratet* and Avinor AS. Other key actors include Trondheim Municipality, the Norwegian Water Resources and Energy Directorate (NVE), and Finance Norway.

Trondheim, May 2022

Berit Time

Klima 2050 Centre Director, SINTEF Community

Summary

Background

Climate change has led to an increased risk of damage to buildings and infrastructure. Norwegian municipalities have intensified their efforts to address climate change adaptation and the prevention of climate-related damage due to natural hazards. The Norwegian Directorate for Civil Protection (DSB) has developed a so-called 'Knowledge Bank', which is a Norwegian web-based data platform containing information about risk and vulnerability related to natural events. The Knowledge Bank serves to compile civil protection data and makes these available to municipalities, providing them with an improved overview and knowledge about undesirable events and natural disasters as a basis for cost-benefit analysis, risk and vulnerability assessments. The platform also includes data related to natural and weather-related damage derived from insurance companies.

Previous research related to insurance data and the Knowledge Bank carried out at the *Klima 2050* Centre has addressed attitudes to data sharing among insurance companies, the value of insurance data, and the potential to use these data to predict events. It has also addressed the municipalities' initial perceptions and experiences. Expectations linked to a new system for sharing insurance loss data in the Knowledge Bank are high, but several issues still need to be resolved before the system can be fully exploited. There is need to improve the understanding of key factors related primarily to data sharing and quality, as well as the relevant regulatory frameworks. This will enable insurance data to become available via the Knowledge Bank so that they can be utilized by municipalities in a way that will benefit wider society.

This report presents the results of a study that addresses the critical factors required for the establishment of a new system allowing insurance companies to share insurance loss data with municipalities, using the Knowledge Bank platform.

Method

In this study, we have included the perspectives of the key organizations, the DSB and Finance Norway, because both are playing key roles in the development and establishment of the insurance data system incorporated in the Knowledge Bank. Data have been collected mainly from interviews with key informants working in these organisations. The informants were selected on the basis of their experience with the development and implementation of the Knowledge Bank, and their insights into prevailing conditions. Primary data have been combined with data gathered from public sources and documentation provided by key informants. Draft summaries of data collected from the interviews, as well as a draft version of the report, were sent to the informants for their feedback and quality assurance.

Results

The new insurance data system is based on a new legal foundation rooted in the Norwegian Civil Protection Act, which came into force on 1 May 2021, and the proposal of a new statutory regulation governing the Knowledge Bank, which is expected to come into force during 2022.

Insurance loss data that are currently available in the Knowledge Bank include historical data of damage that is registered during the period 2013 to 2018. These data have several quality deficiencies and have been used for testing purposes. The proposed Knowledge Bank regulation, currently in preparation, include requirements related to data concerning new damage events that occur from and including the date of the proposed regulation's enactment. It is expected that a continuous supply of standardized data from the insurance companies will start by the date of enactment of the proposed regulation.

This study highlights several important conditions governing the new insurance data sharing system. Conditions related to the legal authorisation for data sharing include the authority of the DSB to process data, the withdrawal of the duty of confidentiality incumbent on the

insurance companies, and a clear purpose and common willingness among the involved parties to work to benefit wider society. Moreover, Finance Norway's statistics on natural damage and weather-related water damage, the standardisation of data registration by insurance companies, and access to updated information on the part of the DSB are important for the establishment of adequate reporting procedures and the transfer of data to the Knowledge Bank. Furthermore, there are additional factors influencing the availability of data to the Knowledge Bank, including data quality assurance carried out by Finance Norway and the DSB, the map visualization of address level information, the protection of personal data, the DSB's experience of testing the historical data set, as well as the combination of historical and new data.

This study shows that the legal foundation has been critical. It will be crucial to see how the proposed regulation will be adopted in practice and, in particular, how procedures within the insurance companies for reporting and registering data are practised. Results indicate that it may take some time before the new procedures are in place in the companies, and for the data to meet the quality requirements set out in the proposed regulation. This underlines the importance, in terms of the expectations of users and other stakeholders, of adopting a long-term strategy by which data will be improved over time.

This study further emphasizes the importance of data quality for users, especially in view of the inherent weaknesses of historical data. Despite quality deficiencies, older data can be valuable to users. The mixing of higher quality new data with historical data containing weaknesses may challenge users' abilities to estimate data reliability. We thus propose to raise awareness among users of the importance of differentiating between different levels of data reliability, while at the same time improving historical data so that they meet the new requirements. The new system still requires further testing, and it will be important to learn and share experiences of current systematic procedures related to progress monitoring and the communication of status updates.

Further research

More research is required if we are to improve our understanding of how to safeguard data quality in data sharing systems and of how users can utilize shared data. Studies are proposed that address how quality can be improved, including the development and testing of new measures and systems, with the involvement of several organisations. We also propose studies that will provide better insights into how the municipalities can use the data to provide added value. For example, showcases can be used to assist the dissemination of knowledge about the potential value of the data and their limitations. Process models demonstrating how to utilize insurance loss data in municipal planning can also be developed and tested. More research is also needed into users' perspectives. New investigations of use and the perceptions of various user groups are proposed that may contribute with further detailed insights that can add value to the further development of the insurance data system.

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1 Introduction

1.1 Background

Climate change is resulting in an increased risk of damage to buildings and infrastructure and a corresponding increase in insurance costs. According to Finance Norway (2021), insurers have paid out compensation amounting to approximately NOK 30 billion for building, home and forestry damage caused by weather or other natural events during the past ten years (2011-2020). The majority of this compensation is related to water damage in densely populated areas.

In 2010, as part of an official Norwegian report addressing climate change adaptation (NOU 2010:10)¹, the committee recommended that a public database should be established as a basis for research using aggregate, anonymised data related to climate-related damage derived from insurance companies and the Norwegian Natural Perils Pool. Data from the insurance companies related to weather-related and other natural causes of damage have been acknowledged as useful to Norwegian municipalities in their work to prevent climate-related natural hazards (NOU 2015:16)². Pilot tests carried out in various municipalities have shown that insurance loss data are useful in informing and supporting preventive measures (Brevik et al., 2014). These tests have also revealed data quality issues, related especially to the timing and location of damage events.

The Norwegian Directorate for Civil Protection (DSB) has developed a national data platform called the ‘Knowledge Bank’³, which serves to compile civil protection data and make them available to municipalities. Figure 1 displays a series of screenshots taken from the platform.

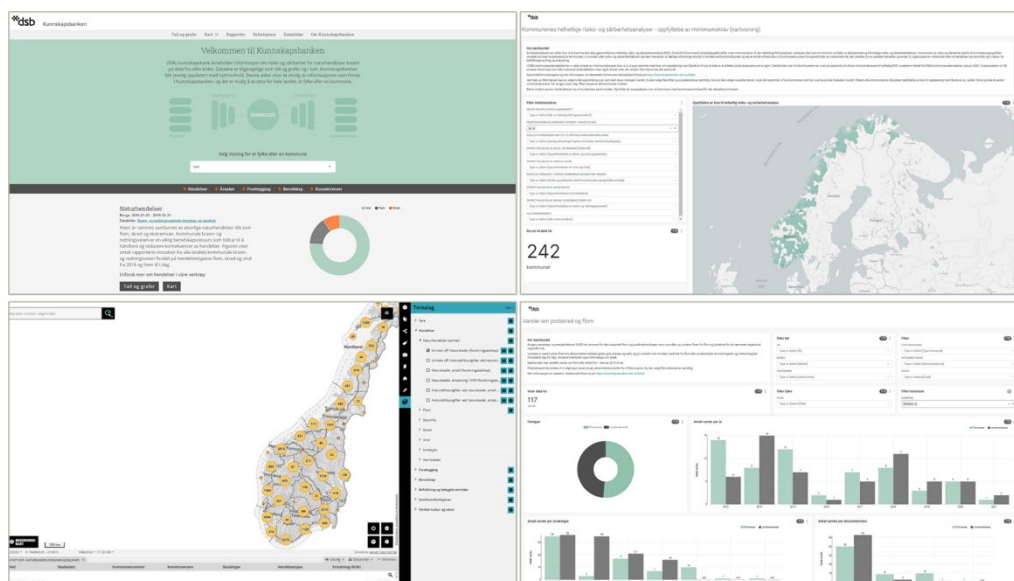


Figure 1. Examples of views of the Knowledge Bank

The Knowledge Bank platform aims to assist municipalities in their work to prevent damage caused by natural events, and to consolidate their work to safeguard societal safety, enhance disaster prevention, and reduce losses. It also offers improved knowledge of undesirable events and disasters as a basis for cost-benefit analysis and risk and vulnerability

¹https://www.regjeringen.no/contentassets/00f70698362f4f889cbe30c75bca4a48/pdfs/nou201020100010000en_pdfs.pdf

²<https://www.regjeringen.no/contentassets/e6db8ef3623e4b41bcb81fb23393092b/no/pdfs/nou201520150016000dddpdfs.pdf>

³ <https://www.dsb.no/kunnskapsbanken>

assessments. It gathers information from several sources, including the Norwegian Water Resources and Energy Directorate, the Norwegian Public Roads Administration, the Norwegian Agriculture Agency and the Norwegian Centre for Climate Services. Finance Norway also provides insurance loss data from insurance companies. The first version of the Knowledge Bank was opened for public use in 2020.

1.2 Purpose and scope

The purpose of this study is to identify the main conditions required for the establishment of a new system, incorporated in the Knowledge Bank platform, for the sharing of loss data held by insurance companies that can be used by Norwegian municipalities.

There exist many digital tools and guidelines in the field of climate change adaptation, and there is a need to develop new knowledge as to how new digital systems can assist in improving climate change adaptation in municipal planning. Barriers to data sharing and data quality are also important. Previous research carried out in the *Klima 2050* Centre that is related to the Knowledge Bank platform has focused on attitudes to data sharing within the insurance companies, the value of insurance data, the opportunities to use these data to predict events, and the municipalities' perceptions of, and experience with, their early use of the Knowledge Bank.

It is assumed in this study that insurance loss data will help municipalities in their risk assessment and mitigation activities related to climate change. It is greatly anticipated that the municipalities will use the data extensively in their planning processes, and that the data will contribute to improved decision-making, risk and vulnerability assessments, and offer benefits to wider society.

In spite of the clear potential of such data sharing system for the municipalities, there still remain several issues that have to be resolved. Previous research carried out at the *Klima 2050* Centre has demonstrated that there is a need to continue to investigate the basic factors that may contribute to better utilization by the municipalities of these data in their work to address climate change adaptation. This includes factors influencing the quality of insurance data. A recent user evaluation study has revealed major issues related to data quality that are expected to determine the actual utilization of these data by the municipalities. Despite the fact that issues pertaining to data quality were addressed at an early stage, and taken into account during the development of the Knowledge Bank, further resolution is required before municipalities can exploit the full potential of these data.

Several factors are considered to be critical to the quality of shared insurance loss data in the Knowledge Bank platform;

- Methods, formats and standards for data collection, registration and storage by insurance company assessors and companies
- Methods and procedures for data transfer, processing and analysis including for example aggregation, georeferencing and combination of various data sets
- Means and procedures for data access, presentation and interpretation
- User interfaces, user experience, visualization in maps, and restrictions due to personal privacy considerations
- Legislative and regulatory mechanisms
- Roles and responsibilities of relevant stakeholders

This study seeks to further investigate the major factors that influence how insurance data can be made available in the Knowledge Bank prior to their subsequent use as a means of adding value to wider society. The main focus of the study is directed on the views of representatives from the DSB and Finance Norway, since these organisations are playing key roles in the development and establishment of the new system incorporated the Knowledge Bank platform.

1.3 Previous research carried out at the *Klima 2050* Centre

Several research activities projects related to insurance loss data have been carried out at the *Klima 2050* Centre.

The value of utilization of insurance loss data in Norwegian municipalities. This investigation of the utility value of loss data for Norwegian municipalities (Hauge et al., 2020) shows that loss data on asset level can enhance a municipality's understanding of current and future climate risk, and thereby improve the effect and quality of the measures it adopts to prevent and adapt to climate change risk. As regards data quality, it is essential to know the precise timing and location of damage occurrence. It is critical in this context that insurance companies are willing to share loss data with the municipalities that are working with climate risk mitigation.

The application of insurance data in surface water flood event analysis. This literature review by Gradeci et al. (2019) shows that models used to identify the relationships between insurance data and explaining variables may provide insights into the occurrence of surface water flood events. The study stresses the importance of the relationships between damage events and explaining variables, and identifies several issues including the lack of a consistent classification system for damage claims, the availability of data held by insurance companies, and data quality. Data variability issues with respect to temporal and spatial uncertainty are also critical. Reliability may be limited if data are scarce, missing or associated with high levels of uncertainty. Policies that regulate and digitize the claims process can better facilitate more accurate inputs.

Attitudes to data sharing among Norwegian insurance companies. A study of the attitudes of insurance companies to data sharing revealed the existence of a great willingness to share loss data with municipalities and governmental agencies working with risk prevention and climate adaptation (Hauge et al., 2018; Hauge et al., 2020). However, due to personal privacy protection (access to addresses, etc.), it was concluded that only data at aggregate level should be made publicly accessible and that the public authorities should be seeking ways of resolving data access and privacy issues. Since these data are considered commercially sensitive, access must be restricted to qualified public sector entities. Moreover, the responsibility for data sharing by the companies should be mandatory and regulated. Digital systems for the registration of loss data by the companies were considered adequate for data sharing and transfer.

User evaluation of the Knowledge Bank in Norwegian municipalities. A user evaluation study of the Knowledge Bank was carried out in 2021 among Norwegian municipalities that had started to test the platform (Hauge & Thomassen, 2021; Jevne, 2021). The municipalities had great expectations and were eager to begin utilizing the insurance loss data. The study revealed that although the data had been made available, there remained several problematic issues related primarily to data quality. The main problems were an overall lack of data and inadequate details regarding when and where events had occurred. The municipalities were looking for data at aggregate level, as well as access to more detailed data regarding the specific locations and causes of damage events. Access to detailed data, most notably georeferencing that may in part help to link damage-related data to specific addresses, was restricted and based on the specific needs of individual employees. There was a need to have direct access to, and to download, raw data, and to better understand the information available in the Knowledge Bank platform. The data provided insufficient insight into the causes of damage events and why they had occurred. Moreover, they failed to distinguish between relevant and non-relevant causes, such as the difference between an overload in the stormwater network and the breakdown of a dishwasher. In order to interpret the data, the municipalities need additional information such as building types, building standards and insurance payment schemes, including historical data that enables them to observe development over time and patterns in time series. Moreover, data quality in the solution currently relies on how the loss assessor registers the damage caused, and how much time and effort is needed for an appropriate assessment of damage.

1.4 Theoretical considerations

This study has its starting point in the climate services literature. A climate service is defined as the provision of climate information in order to assist decision-making (Hewitt et al., 2012). The European Commission has adopted a broader definition, by which climate services refer to "*the transformation of climate-related data — together with other relevant information — into customised products such as projections, forecasts, information, trends, economic analysis, assessments (including technology assessment), counselling on best practices, development and evaluation of solutions and any other service in relation to climate that may be of use for the society at large*" (European Commission et al., 2015).

The aim of climate services is to provide timely and tailored climate-related knowledge and information that people and organizations can use to reduce climate-related losses and enhance benefits, including the protection of lives, livelihoods, and property (Vaughan & Dessai, 2014). The Global Framework for Climate Services (GFCS), which aims to strengthen and coordinate initiatives and develop new infrastructure designed to meet society's climate-related challenges, includes a user interface platform, an information system, observations, monitoring and research, as well as modelling and prediction (Hewitt et al., 2012). In Europe, a joint roadmap has been launched for the development of a market for climate services and the establishment of a climate services system, the Copernicus Climate Change Service⁴ (European Commission et al., 2015).

Despite growing awareness, knowledge about the performance of climate services and the extent to which they live up to their promise remains limited (Vaughan & Dessai, 2014). A major challenge presented by the rapidly growing volumes of climate data is ensuring that these data, and the results that depend on them, are useful and comprehensible to a broad, interdisciplinary audience (Overpeck et al., 2011). The usability gap, which refers to the gap between what is understood as useful information by scientists (knowledge production) and what users recognize as applicable in decision-making (knowledge use), can be used to explain why useful information nevertheless remains unused (Lemos et al., 2012).

There remain several key challenges related to information and its users, such as a low quality of climate services that fails to meet user requirements, inefficient communication between providers and users, and the inadequate availability and quality of climate data (Hewitt et al., 2012). According to Hewitt et al. (2012), climate services must offer credible information and effective access, involve engaged users and providers, and meet their users' needs. Other authors raise the possibility that some of the factors influencing usability may include validity (e.g. that information is correct and trustworthy), readability (e.g. clear presentation of information), and interactivity (e.g. possibilities to modify information or visual appearance) (Raaphorst et al., 2020). There is a need for more research directed at seeking to improve the links between climate information and its users, in particular in relation to communication and the mapping of information needs, which will help to improve data usability (Vaughan et al., 2016).

In order to better understand how climate services can live up to their expectations, Vaughan and Dessai (2014) propose a framework for performance evaluation. The framework consists of four design elements;

- a problem identification and decision-making context
- the characteristics, tailoring and dissemination of climate-related information
- the governance and structure of the service, including the development process, and
- its socio-economic value.

Climate services are typically based on web-based or digital climate information portals or platforms, designed to facilitate access to climate-related data (Swart et al., 2017). Although such portals are developed to take user requirements into account, it is rare for the

⁴ <https://climate.copernicus.eu/>

effectiveness of user engagement or the usefulness of the portals to be evaluated (Swart et al., 2017). It is important to consider user diversity and to conduct systematic analyses of who the users are, their objectives, interests and skills, and how they are best engaged (Swart et al., 2017).

As regards climate information, it is important to understand the characteristics of the information, and to tailor it to meet users' needs, both in terms of accessibility and its perceived relevance (Vaughan & Dessai, 2014). Data quality aspects are key to an understanding of the usefulness of climate information in specific decision-making settings (Vaughan & Dessai, 2014). It is not sufficient simply to make the information relevant and tailored to users' needs. It is also important to establish relationships with users in order to provide them with the confidence not only to accept the advice offered by climate services, but also to deal with any uncertainties they may encounter in connection with the challenges they face (Brasseur & Gallardo, 2016). It is important that users trust the data offered by climate information portals. Responsibility for data quality most commonly rests with the data owners, who have access to the original sources, and not necessarily with the portal developers (Swart et al., 2017). If data of questionable quality are to be made available, users should be notified of their reliability (Swart et al., 2017).

Another aspect of the use of climate services concerns the sharing of data between organisations as part of so-called data or platform ecosystems. Critical data governance factors influencing such ecosystems include the definition of data ownership, access definition, definition criteria, an estimation of contribution, data use cases, conformance, monitoring and data provenance (Lee et al., 2017). There is a general lack of research into data governance in inter-organizational relationships (Abraham et al., 2019). The growing interest for datacentric and inter-organizational collaborations, involving data ecosystems in which autonomous and interacting actors consume, produce and provide data and other related resources, has generated a need to improve our understanding of the governance of such systems (Lis & Otto, 2021).

The research literature has identified studies of data governance in domains such as big data, artificial intelligence (AI) and healthcare (Janssen et al., 2020; Tallon, 2013; van den Broek & van Veenstra, 2018). However, on the basis of searches carried out in 'Google Scholar', research addressing governance in relation to climate-related data seems to be lacking.

2 Methodology

2.1 Data collection

This study is based mainly on data collected from interviews. These were carried out using a semi-structured approach with the assistance of an interview guide (see the Appendix – Interview guide). The principal contact persons in the relevant organizations selected suitable interview informants on the basis of their experience with the development and implementation of the Knowledge Bank, and their insights into the factors relevant to this study. A list of the informants is shown in Table 1.

Due to the Covid-19 pandemic, all interviews were carried out in Norwegian via online video meetings. The interviews with DSB personnel were carried out during three individual meetings, while those with Finance Norway personnel were carried out as part of a single group interview. The interviews were conducted in early December 2021 and lasted for about 45 minutes. Two researchers participated in the interviews, asking questions and taking draft notes in Norwegian. Transcription of the data was finalized shortly after each interview.

Table 1. List of informants

Organization	No. of informants	Type of interview	Duration	Aspects discussed
DSB	3	Individual interview	3 interviews (each 45 minutes)	Legislation and regulations Data quality requirements, users and data providers Data transfer, handling, analysis, visualization Technological solution incl. maps and GIS The Knowledge Bank platform
Finance Norway	3	Group interview	1 interview (45 minutes)	Overall political objectives Insurance data and data flows from insurance companies Data transfer systems Data quality requirements, data providers

The primary data were combined with data gathered from publicly available sources and other documents provided by key informants. These included the draft of the new regulation proposal, the Knowledge Bank website, descriptions of data available in the Knowledge Bank, the new Norwegian Civil Protection Act, legislative consultation documents related to the new regulation and amendments to the Act, and a plan for the Knowledge Bank project.

2.2 Data analysis

Documented data from the interviews were summarized thematically across the different data sources, and the presentation of findings was based on an English summary of the data. The content in the data is used to define the themes. The main themes include descriptions of the new system for the sharing of insurance data in the Knowledge Bank, and the conditions required to achieve the new system. Several sub-themes were also defined, for which their descriptions are based on data collated from the organizations and other information sources. In this way, the presentation of findings makes no distinction between the various data sources.

In order to provide a description of the new system, data from the interviews were collated with relevant publicly available data related to the existing Knowledge Bank. The draft version of the new Knowledge Bank regulation provided in-depth insights into its content.

2.3 Ethical considerations

Prior to the interviews, informants received an invitation containing relevant information. The data collected contained no personal information and all informants were anonymised in the written notes and interview summaries.

Draft summaries of the interview data were sent to the informants for feedback, quality assurance and approval. A draft version of the report was also sent to the principal contact persons in the relevant organizations for comments and other feedback.

3 The new insurance loss data sharing system

This chapter describes the new data sharing system, facilitated by the Knowledge Bank, that enables Norwegian municipalities and other users in the public sector to access insurance loss data provided by private insurance companies.

The new insurance loss data sharing system involves several organizations and subsystems, see Figure 2.

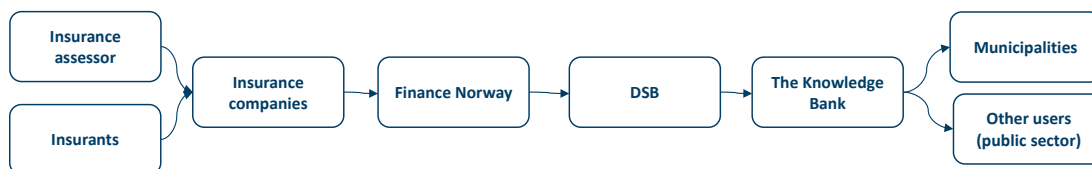


Figure 2. Overview of the flow of insurance loss data from the reporting of damage events to the end users.

The main platform is the DSB Knowledge Bank, via which shared data are made available to users. Finance Norway has developed a technical system for the collection of data held by the insurance companies, and subsequent sharing of the data with the DSB. The insurance companies record damage events in their internal systems. The reporting of damage and compensation amounts to the insurance companies is made mainly by insurance assessors and insurance holders.

3.1 The legal framework

The system that enables sharing of data in the Knowledge Bank is based on a legal framework that regulates the roles and responsibilities of the involved actors (Figure 3).

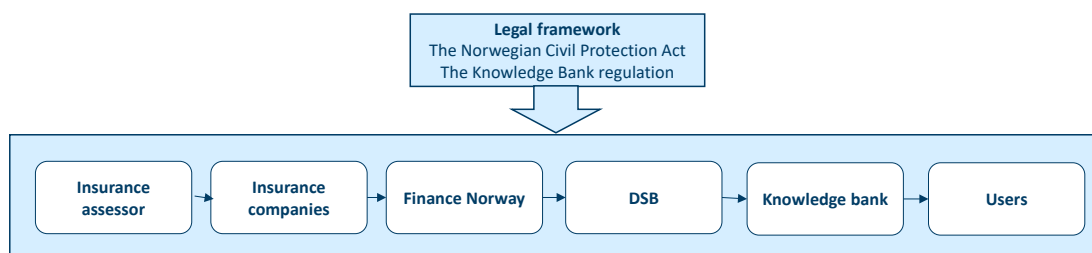


Figure 3. Overview of the legal framework and involved actors

The key components of this legal framework include the Norwegian Civil Protection Act (Act) and the statutory regulation governing the Knowledge Bank. The framework regulates the following legal issues related to the sharing of data;

- In order to meet GDPR requirements, the DSB has statutory authority to process personal data for the specific purpose
- In order to meet confidentiality requirements, the DSB establishes access control to the Knowledge Bank, so that only users with specific needs are given access to personal data
- In order to meet specific sharing requirements, aspects such as information, data formats, access entitlements, data processing and so on, are assigned specific definitions

3.1.1 The Norwegian Civil Protection Act

According to the Act, the DSB has the legal authority to process, with additional permission to collect, collate and share, data as and when necessary in order to prevent and reduce the impact of unwanted events, and to support the municipalities with their risk and vulnerability assessments. The role of the DSB includes the receipt and structuring of insurance loss data,

the facilitation of data access, as well as determining exactly what data the insurance companies should release.

A new chapter is being appended to the Act (Lovdata.no, Chapter 5A, Section 15a: <https://lovdata.no/lov/2010-06-25-45/§15a>) that sets out the foundation for the DSB's data processing authority. Public authorities generally require such legal authority in order to share data. The Act also includes a regulation authority, which states that the DSB is able to specify the conditions for data collection, data availability and other processing activities as part of an additional statutory regulation.

The DSB's legal authority further extends to the collection and collation of personal information with other data, and as such includes both the collection and sharing of data. The DSB also has the authority to collect data from multiple sources, including from the municipalities. This enables the municipalities to upload data to the Knowledge Bank.

3.1.2 The proposed Knowledge Bank regulation

The DSB has drafted a proposal for a new statutory regulation governing the activities of the Knowledge Bank. The proposal is yet to be approved by the Norwegian Ministry of Justice and Public Security. The proposal states that insurance companies that are members of the Norwegian Natural Perils Pool are required to release information about natural and water-related damage events to the DSB.

In order to ensure data compatibility, the proposal provides definitions of both the data and data formats that the insurance companies should release. The data will include the addresses and geographical coordinates of properties that have been impacted by weather-related water and other natural damage events, together with information about the cause of the damage to property, the timing of the event, and the compensation amounts paid out by the insurance companies. The following damage events are included;

- natural damage events
- water damage related to natural damage events, and
- loss of use insurance related to natural and/or water-related damage caused by natural damage events.

The proposal also requires that the insurance companies release their data to a joint data processing entity, and the companies have subsequently agreed that Finance Norway should assume this role. The following entities will also be granted access to the data via the Knowledge Bank and will have permission to process personal data;

- the Norwegian municipalities
- the local government authority in Longyearbyen (Svalbard)
- state administrators
- the Governor of Svalbard
- the Norwegian county authorities
- the Norwegian Water Resources and Energy Directorate (NVE)

In order to get access to the personal data, which have restricted access, employees who work at these entities and meet specific job-related requirements, can apply for access.

3.1.3 Involved actors

A list of the actors involved, as defined in the Act and proposed regulation, together with their roles, rights and responsibilities, is shown in Table 2.

Table 2. List of involved actors, with their roles, rights and responsibilities

Role	Actor	Responsibilities/rights	Reference
Data processing authority	DSB	To collect, analyse, evaluate and collate personal data To require information from the insurance companies To make information available to other public authorities To specify details in the statutory regulation	Civ. Prot. Act (Chapter 5A, Section 15a)
		To collect personal data from the insurance companies To collate data from multiple sources To analyse and process personal data in the Knowledge Bank	Proposal for the Knowledge Bank regulation (Chapter 2, Section 3)
Data provider	Insurance companies, members of the Norwegian Natural Perils Pool	To release personal data and other information on natural and water-related damage events To meet specified information and format requirements	Proposal for the Knowledge Bank regulation (Chapter 3, Sections 4 and 5)
Insurance companies' data processing authority	Finance Norway	To conduct data processing on behalf of the insurance companies To collect data from the insurance companies To release data to the DSB	Proposal for the Knowledge Bank regulation (Chapter 3, Section 6)
Users	Municipalities, Local government in Longyearbyen, State administrators, Governor of Svalbard, County authorities, NVE	To access personal data from, and process data in the Knowledge Bank	Proposal for the Knowledge Bank regulation (Chapter 4, Section 7)

3.2 The development process

A major driver for the development of a new insurance loss data sharing system has been the overall need experienced by the Norwegian municipalities to further develop their risk and vulnerability assessments by taking climate-related risks into account in damage prevention. The system is based on an overall agreement that greater knowledge and better access to damage event statistics will result in improved damage prevention measures. With this specific purpose in mind, the insurance companies agreed to share their data, and the public authorities agreed to make the necessary legal arrangements to enable sharing to take place.

The data sharing system is the result of a multiparty collaboration over several years, involving a shared interest to obtain more knowledge at local level of climate-related risks associated with weather-related water and other natural damage events. The Norwegian municipalities require more knowledge about these risks in order to be able better to exercise their responsibilities linked to implementing preventive measures. The DSB has based its development of the Knowledge Bank on the actual needs of users, and the legal framework has been adjusted to meet these needs.

3.2.1 Timeline and milestones

An overview of the timeline and milestones involved in the development process is shown in Figure 4. The green and blue boxes represent completed activities, and planned, but as yet not completed activities, respectively.

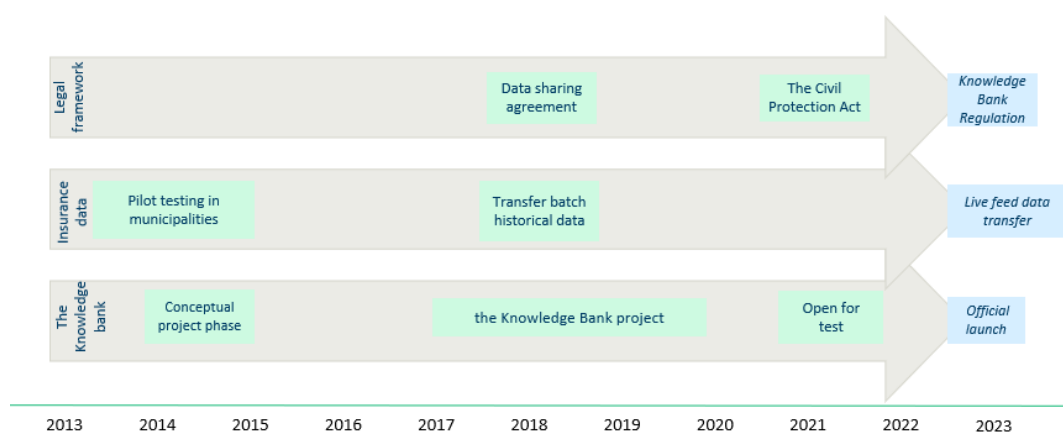


Figure 4. Overview of timeline with milestones

A pilot project was initiated in 2013, as part of which the municipalities were given access to data held by the insurance companies for testing, which was carried out in the period 2013 to 2014. In 2018, a temporary sharing system was established where Finance Norway shared data from the period 2013 to 2018 with the DSB, and these data were made available in the Knowledge Bank. Formal agreements were drawn up to ensure the legality of this data sharing. Pending the new Act, a data processing agreement was established with Finance Norway to guarantee the DSB's access to damage events data held by the insurance companies. This agreement was appended to the existing joint collaboration agreement between Finance Norway and the DSB, dated 5 February 2018.

The Knowledge Bank project, aiming to provide a technical platform, was initiated in 2017, with a project period extending from 2017 to 2020. The Knowledge Bank was made available online for testing by the municipalities in 2020, containing insurance loss data for the period 1 January 2013 to 30 November 2018. The official launch of the Knowledge Bank has been postponed and is planned to take place during 2022.

Amendments to the Norwegian Civil Protection Act (Chapter 5A, Section 15a) that stipulate the data processing authority held by the DSB came into force on 1 May 2021. The proposition for amendments to the Act (Prop. 136 L (2019–2020))⁵ was approved on 19 June 2020⁶, and the suggested amendments were approved by the Norwegian Parliament on 18 February 2021⁷. The proposal for a new statutory regulation governing the activities of the Knowledge Bank, drafted by the DSB, was sent for public consultation on 18 June 2021, with a response deadline of 1 October⁸. All the responses submitted were positive, with only a few minor comments.

⁵https://www.regjeringen.no/contentassets/93fc65582f6e4f679af1e5b8c5f77ac0/no/pdfs/prp20192020_0136000dddpdfs.pdf

⁶ <https://www.regjeringen.no/no/dokumentarkiv/regjeringen-solberg/aktuelt-regjeringen-solberg/jd/pressemeldinger/2020/kunnskapsbank-skjal-bidra-til-forebygging-og-reduuerte-skader-ved-naturhendelser/id2714976/>

⁷ <https://lovdata.no/static/LOVVED/lovved-202021-069.pdf>

⁸ <https://hoering.dsb.no/Hoering/v2/1849>

A major milestone was the confirmation, on 1 May 2021, of the legal authority of the DSB to collect, process and share personal data, as set out in the Civil Protection Act. The proposed Knowledge Bank regulation is still in the process of completion. However, on the basis of the consultation responses, it is expected to be approved and come into force during 2022.

In order to share a single batch of insurance loss data from the period 1 January 2013 to 30 November 2018, which is included in the current Knowledge Bank system, a comprehensive set of interim agreements were established pending the enactment of a new permanent legal framework. These included a data processing agreement between Finance Norway and the insurance companies, under which the DSB acted as a sub-supplier to Finance Norway. Each insurance company was responsible for the processing of its own personal data. Finance Norway served in the role of joint data processor, responsible for the collection and forwarding of data to the DSB. The DSB served as a data processing supplier to Finance Norway.

In the past, the DSB has relied on instructions from the insurance companies and Finance Norway regarding data handling. A major issue here is that the companies do not have the authority to collate personal data held by other companies. They are not authorised to instruct the DSB in connection with such processes. The DSB has thus not been entitled to collate data held in the Knowledge Bank. However, the new legal framework will replace these interim agreements and give the DSB the right to collect and collate data.

3.2.2 Status at the end of 2021

The legal authority stipulated in the Civil Protection Act regarding data sharing has been approved and is now in force. The regulation proposed by the DSB, including the requirement related to data and data formats, has been submitted to the Ministry of Justice and Public Security for approval.

As of December 2021, the proposed regulation is still under completion, and it is not certain to what extent the final version will resemble the current draft. It is expected that a few minor amendments will be made prior to approval of the final version. Moreover, in order to apply in Svalbard, the Civil Protection Act and the new regulation must be specifically stipulated in a Royal Decree. It is expected that the proposed regulation will come into force during 2022 and, as such, the requirements that the insurance companies should release data will not come into force until after the date of enactment of the regulation.

It is expected that the DSB will be granted access to the new data as soon as the new regulation has come into force. It does not seem to be possible to obtain access before this date. The DSB will be granted permission to access data associated with damage events that occurred only after the date of enactment of the regulation. Data will be transferred in monthly batches.

A technical platform is being established by Finance Norway that will be ready when the data sharing requirements stipulated in the new regulation come into force. Finance Norway is currently in dialogue with the insurance companies in connection with preparation of their datasets, and is preparing systems to facilitate data transfer from the companies and subsequent processing prior to their onward transfer to the DSB. A period of testing of the new technical platform is planned to start in early 2022.

The insurance data currently available in the Knowledge Bank includes test data from the period 2013 to 2018. These data will be supplemented with the new data, which will comply with the requirements set out in the new regulation.

4 Conditions for data sharing and utilization

This chapter presents the main conditions that must be in place for the establishment of the new insurance loss data sharing system that will be facilitated by the Knowledge Bank with the aim of enabling data to be utilized by the municipalities. An overview of the conditions is shown in Figure 5.

The conditions are divided into three groups:

- Legal authorisation for data sharing
- Reporting and transfer of data to the Knowledge Bank
- Data availability in the Knowledge Bank

Legal authority for data sharing	Reporting and transfer of data to the Knowledge Bank	Making data available in the Knowledge Bank
<ul style="list-style-type: none"> • DSB's legal authority to process data • Withdrawal of the insurance companies' duty of confidentiality • A clear purpose and joint willingness to contribute to society 	<ul style="list-style-type: none"> • Finance Norway's statistics of natural and water damages • Standardisation of the insurance companies' registration of data • DSB's access to up-to-date information 	<ul style="list-style-type: none"> • Data quality assurance by Finance Norway and DSB • Map visualization of address level information • Protection of personal information • DSB's experience from testing of the historical data set • Combination of historical and new data

Figure 5. Conditions for the establishment of the new insurance loss data sharing system.

4.1 Legal authorisation for data sharing

4.1.1 The DSB's legal authority to process data

It has been necessary to establish a legal framework to facilitate the data sharing system. The following components of this framework have resolved a number of major legal issues related to the role of the DSB;

- The establishment of appropriate terms and conditions in law that enable the DSB to assume authority to process personal data in the Knowledge Bank. This is stipulated in the new Act and the proposed regulation.
- The revocation of the insurance companies' duty of confidentiality
- Access by the DSB to information held by the insurance companies

It is important that the DSB is formally assigned data processing authority and that it can stipulate requirements to Finance Norway. It is the DSB that determines the purpose of use and the processing of personal data in the Knowledge Bank, pursuant to Section 15a of the Civil Protection Act.

The new legal framework grants the DSB the authority to collect, process and publish the data. The DSB does not own the data, but is simply granted the authority to process them. This includes the facilitation of user access to the data and the stipulation of requirements to the insurance companies regarding data content and formats. The insurance companies remain owners of their data, but it will be mandatory for them to release these to the Knowledge Bank. Finance Norway is selected as the joint data processing entity on behalf of the insurance companies and will ensure that the data are released to the Knowledge Bank.

This legal stipulation of authority reduces the risk that some companies may decide to stop releasing data to the DSB. The new regulation replaces all previous agreements, and guarantees in law a stable and long-term solution, which is regarded as essential. The

aforementioned interim legal agreements between the insurance companies, the DSB and Finance Norway, failed to regulate fully the necessary data handling practices related to the Knowledge Bank, not least because these agreements could have been subject to termination at short notice.

It is critical to the integrity of the new system that the DSB continues to assume its responsibility as a professional data processor, since this will engender a high level of trust among the insurance companies and private insureds. For example, data must not be accessible to parties other than the user groups defined in the proposed regulation. The DSB is accustomed to this type of role and has the appropriate mechanisms in place to ensure reliable data processing for as long as the Knowledge Bank exists.

The proposed regulation includes a requirement that information should be made available to the DSB via a common application programming interface (API). Finance Norway is currently setting up a system that will allow the companies to upload information relating to new damage events, as well as amendments to existing event data. The DSB will have access to these data via an API. Since the data are expected to be supplied in a predefined format, additional manual processing will not be necessary. Data quality is taken into account in the proposed regulation in the form of detailed specifications of which information should be delivered to the DSB and in which format.

In the future, there may be a need to collect more information from the insurance companies. Currently, the DSB has the necessary legal authority for general data collection, although new regulations will be required to extend this authority for additional types of data. Compared to enacting amendments to legislative Acts, which may take several years, making changes to existing regulations is an undemanding process that normally takes about one year. The DSB currently administers a total of four Acts and 60 regulations. The regulations are regularly under review and the DSB reports annually on the priorities of any amendments.

4.1.2 Revocation of the insurance companies' duty of confidentiality

Another major legal barrier to data sharing has been the issue of the confidentiality of personal data held by the insurance companies regarding the recipients and amounts of compensation payments. Stringent GDPR legislation would normally prevent the DSB from processing these personal data without the aforementioned authorisation in law. On 1 April 2019, the duty of confidentiality incumbent on the insurance companies regarding the sharing of insurance loss data, including compensation payment amounts and recipients' addresses, was revoked temporarily in order to facilitate the transfer of insurance loss data from 2013-2018. Approval for this revocation was provided by the Financial Supervisory Authority of Norway (*Finanstilsynet*), and facilitated the sharing of data with the DSB, the municipalities, county governors and the NVE. This duty of confidentiality will be revoked permanently by the proposed regulation.

As a public authority, the DSB requires specific legal authority to process personal data and instruct the insurance companies to release information. GDPR legislation differentiates between private actors and the public authorities. As such, Finance Norway is able to collate personal data on the basis of the legal authority inherent in the GDPR, while public authorities such as the DSB require specific legal authority to do so.

The duty of confidentiality will still remain important. The insurance companies continue to improve and utilize the data they hold as a basis for enhancing their products and pricing according to risk. In order to protect the companies' business operations, these data must not be made available to competitors via the Knowledge Bank. Large insurance companies with long historical data series are better qualified accurately to price their insurance rates compared with smaller companies that typically lack such historical data.

4.1.3 A clear purpose and joint willingness to benefit society

Throughout the process, there has been broad agreement on the purpose of data sharing, and this has facilitated the legal changes and DSB's dialogue with the Ministry of Justice and Public Security.

There will be no financial transactions between the DSB and Finance Norway. Nor will these organisations receive any form of compensation for registering the data. This aspect has been an important part of the solution. The incentive for the insurance companies is to benefit wider society. However, the registration and sharing of data will incur costs to the companies because they will be required both to set up an API and to pay Finance Norway for joint data processing services. The proposed regulation states that the companies must seek an appropriate cost sharing mechanism for these services. It has since been decided that any costs incurred will be covered jointly by the insurance companies and Finance Norway.

Despite the costs, the insurance companies are incentivised to share their data because they believe that the system will contribute to fewer and less expensive claims settlements in the future. The municipalities will utilize the data for risk assessment and other planning activities. The companies will benefit from that fact that insureds can take the necessary preventive measures to avoid having to make large claims. The system is expected to promote greater knowledge within the municipalities of weather-related water and other natural damage events, combined with a greater focus on better preparation and prevention under harsher climatic conditions. This will lead to an overall reduction in damage claims.

A vision of potential societal benefit is key for the insurance companies. Insureds have to take action to prevent damage events, but if unwanted events occur that lead to damage claims, their losses will be covered, provided that the event is sudden and unforeseen. Sharing data via the Knowledge Bank is important because it strengthens the contract, entered into by the companies, insureds and wider society. This underpins the entire insurance industry and ensures that insurance schemes work as intended.

A key factor is that the insurance companies exhibit a real willingness to prioritize data sharing. This requires a focus on enforcing sanctions on those companies that do not release their data. It will also be important to demonstrate that the data are being used and the value of this utilization. Finance Norway is especially interested in demonstrating the benefits accruing to wider society of the shared data, not least to enable the companies to understand that their data are generating value. The system requires not only that the companies have to release their data, but that the data also add value to wider society. The data must be used to enable real damage prevention actions, and it is important to demonstrate that damage is avoided as a result of access to the data.

4.2 Reporting and transfer of data to the Knowledge Bank

4.2.1 Finance Norway's statistics of natural and water-related damage events

Finance Norway has been generating statistics on damage events linked to insurance loss for long time. These statistics, that include data related to natural damage events (the Norwegian Natural Perils Pool from 1980) and several categories of water-related damage events, are openly available on its website. Statistics related to natural damage events have been generated since 1980, and the sources and causes of fire-related damage have been reported since 1985. The work to extend the recording of statistics on water-related damage events started in 2005, and these have been complete since 2008. Finance Norway collects relevant data related to damage events on a quarterly basis, and presents these in various statistical reports (VASK, for water-related damage events, and NASK, for other natural damage events). The statistics are presented in aggregate form for each Norwegian municipality, but do not include information about the locations or addresses where damage has occurred.

A prerequisite for the present data sharing system is the option to distinguish in the data between different types of water-related damage events, so that only data including damage

resulting from weather-related causes are included in the statistics. An important aspect of the pilot test project carried out in 2011, was to evaluate the usefulness of data including causes and consequences of damage events provided by Finance Norway. This information is expected to contribute towards giving higher priority to prevention action within the municipalities. Another important aspect of the pilot was to collect local damage-related data, such as specific addresses.

4.2.2 Standardisation of the insurance companies' registration of data

An important prerequisite for the new system is the proper generation and registration of data. Currently, for example, a loss assessor or individual insurant registers a claim via a website or professional company-specific system. It is important that they understand the value of the data, not simply as information that they are required to submit, but also as data that will be used by others and which will add value and be of benefit to wider society. Such understanding may boost an assessor's incentive to enter good data into the system.

It is not expected that the insurance companies will have established a fully operational registration mechanism by the date on which the proposed regulation comes into force. However, it is expected that they will continue to develop such systems as time progresses. It is possible that the companies' performance scorecards require adjustment, and that employees should be appraised according to parameters that are relevant to the data sharing system. For instance, they could be evaluated not only on the basis of the rapid payment of damage, but also on their skills in registering adequate information regarding the claim.

Details regarding how information entered into the data sharing solution are being used have yet to be communicated universally to those responsible for data entry. In general, information about the importance of correct data entry and its benefits has only been communicated at aggregate level. It is expected that the importance of the data is well known only among employees working in certain parts of the claims settlement process, in situations involving large claims cases and in companies where relevant codes are applied as part of their internal systems. It is often the case that private clients and employees responsible for claims settlements are concerned primarily with the quick and efficient processing of cases, leading to the prompt payment of compensation.

Insurance companies' privacy policies will entail that they will have to inform insurance policy holders that their personal data, including the addresses and geographical coordinates of damaged property, will be shared and processed in the Knowledge Bank.

The new procedures and systems may present a challenge to the insurance companies. It is thus important to ensure that the registration and entry of data into the new system is not perceived as cumbersome. It is expected that there will be variations related to the size of the companies, how much resources are dedicated. The companies are expected to prioritize meeting the new requirements, and it will be critical for them to obtain correct and detailed information on the nature of the damage and the geographical coordinates.

Currently, each insurance company has its own systems dedicated to the registration of damage-related data. These differences, and the use of different codes, will present a challenge to the new system. Finance Norway thus has an important role, acting as a link between the DSB and the insurance companies, in attempting to achieve uniform and standardised reporting. The present coding system, especially in relation to water-related claims, has room for improvement because the codes currently applied by the insurance companies can be difficult for users to understand. Finance Norway may be able to help by instructing the companies to register claims using adjusted forms of coding. However, it is important to ensure that any new requirements do not entail extensive additional work for the companies.

4.2.3 DSB's access to updated information

The timing of data transfer will be key, and a continuous and even flow of insurance data to the DSB will be a requirement. However, although this is the long-term aim, it is not certain that it will be possible on start-up of the system to achieve such data flows. Ideally, data should be transferred automatically to the Knowledge Bank (for example, every night) as soon as claims are registered by the insurance companies. Both the current solution and the proposed regulation entail that the companies will be submitting data to Finance Norway at least once a month. It is expected that such submissions will for the most part be carried out automatically, but that this may depend on the size of the company. Smaller insurance companies are expected to submit the details of fewer damage claims than larger companies, and many of the smallest companies will be expected to employ manual processes, especially if they are not processing claims of the relevant type every month.

The DSB wants the data transferred as soon as it is registered and a compensation amount estimated. While the claim is being processed, the data can be adjusted as more information is generated. Compensation amounts may also be subject to adjustment. The municipalities will be able to access information about ongoing insurance cases. The timing of the claim is very important, but the data should also include the progress status of the claim assessment. It is important that the municipalities have access to the data as quickly as possible, rather than waiting for the assessment to be completed, which may take as long as one to two years.

4.3 Making data available in the Knowledge Bank

4.3.1 Data quality assurance by Finance Norway and the DSB

Data submitted by the insurance companies have to be cleaned before they can be downloaded to the DSB. Finance Norway collates the data and removes information about the name of the company that delivers them. It also appends time details to the data that show when they have been uploaded or refreshed. The DSB requires the latest version of the uploaded data at all times.

The DSB has to recode the data according to the type of natural damage event involved. Currently, this transcoding is the only processing that the DSB carries out as part of the new system. However, additional processing may be needed depending on the completeness of the data submitted.

In order to achieve a holistic visualisation and assessment of data related to natural damage events derived from multiple sources, the types of events used by the data owner have to be translated into specific event types defined within in the Knowledge Bank framework. For example, the term 'storm' is used for all storm-related events, even though the various data sources may initially have used other terms. This is simply an enrichment of the data, providing additional information that does not change its original nature. This process allows the DSB to visualize insurance data together with other data. Any data recoding will occur automatically by adding a new column to the data.

It has been necessary to process the aforementioned historical data set from the period 2013–2018. Among other things, these data have been generalized across the municipalities. The biggest challenge related to this historical data is that a single damage event may have been registered at several locations. An event occurring at a policy holder's summer house may have been registered both at his or her residential address as well as at the actual address of the summer house. In order to obtain a correct overview in the Knowledge Bank of the amounts of compensation paid out in each municipality, the DSB has created a script that ensures that each damage event is counted only once, and only in the municipality where the event occurred. The DSB has employed consultants to append geographical locations based on address fields that were previously missing in the historical dataset.

In order to assure the quality of the data submitted to the Knowledge Bank, Finance Norway will assemble datasets held by the insurance companies and make sure that these

assemblages are complete before they are transferred to the DSB. Finance Norway will check that all fields have been filled in, including the geographical coordinates of the damage events. During the first phase of system development, Finance Norway will only check as to whether the fields are filled in. No checks will be made of the accuracy of the coordinates or addresses. It will be possible to add further quality assurance rules in a later phase.

The DSB is not expected to check the quality of the data it receives. However, in order to create ‘dashboards’ and statistics in the Knowledge Bank, it will probably run checks for missing data and data defects. It will be important for the DSB to check to see if there are multiple registrations of the same insurance claim, i.e. whether a claim has been reported several times due to updated information, such as adjusted amounts. This will be done automatically by setting up a unique identification for each claim, along with a timestamp to ensure that the dataset contains the most updated version.

It is also important to run automatic checks for visualization of the data in the map services modules of the Knowledge Bank, not least to ensure that the correct coordinates within Norway have been recorded. The data must also be checked to ensure that they are sorted under the correct damage categories.

4.3.2 Map visualization of address level information

Georeferenced data must be linked to damage events in order to create the Knowledge Bank’s map services. The map services openly available to all users include data that have been generalized or aggregated according to municipality. Visualization is facilitated according to defined topics and categories.

It is important to provide users with access to specific addresses registered in the Knowledge Bank. Knowledge about the exact location of a damage event is useful to the municipalities. Municipalities already have access to data at address level included in the old dataset in the Knowledge Bank. Four map services have been created in the Knowledge Bank for all damage events at address level. These are accessible to users using a login function, but are not publicly available. The DSB will be able to upload the raw data into a map from which the municipalities can retrieve the information and subsequently download a file containing all claims information linked to a given area or municipality. It is expected that both internal and external users will be seeking more and better opportunities to investigate data in map form, and a new map solution in the Knowledge Bank may be relevant in the longer term.

It is important that the data are visualized in the Knowledge Bank, and that they are relevant to users. Map functionality is important since this facilitates data investigation. It must be intuitively simple and as user-friendly as possible.

Municipalities can export the datasets and obtain alternative file types in geographical formats that enable them to use the data in their own internal systems. Many municipalities have such systems, and it is beneficial for them to collect data from several sources and aggregate them in a single system. However, privacy limitations place constraints on how municipalities can process the data. The map solution in the Knowledge Bank enables the municipalities to upload information and add files in several formats.

All insurance claims can be visualised in map form in the Knowledge Bank as part of various map service options. Information held in aggregate form is open information, but that presented at address level is protected and available only to certain users using a login function. The map solution includes several datasets, including natural damage events and related disruptions as well as water damage events and related disruptions. Property information can be retrieved for each event. It is also possible to filter functionality according to categories in a table format, and it is planned to improve the map solution to include filtering.

The new data that will be available from 2022 will not affect the functionality of the current Knowledge Bank map system. However, the data will now be subject to regular updates, and geo-location is expected to be more precise because the insurance companies will be under obligation to report coordinates.

There are several limitations inherent in the current Knowledge Bank map system (called Adaptive and developed by Asplan Viak). It is expected that new filter functionality to expand map-based data investigation, as well as the current filter functionality in table form, will be further developed in 2022. There are major opportunities to develop greater levels of analytical functionality that can display insurance loss data together with other data. However, such opportunities are limited in the current Knowledge Bank map system and the DSB is considering replacing it at some time in the future.

There are also major opportunities associated with technical solutions and data processing. The DSB's current technical platform works very well, but technological development is rapid and it may consider redesigning the Knowledge Bank in order to facilitate more efficient operation and maintenance. The DSB is seeking to develop a new map system that in the long-term will enable the combination of several data types.

4.3.3 Protection of personal data

In order to view personal data, users employ a login function that enables access to maps in the Knowledge Bank system. Municipal employees working in public safety and the County Governor's office have such access. The login function means that these data are not openly available. Still, the data are available to some users in connection with risk and vulnerability assessments in their areas.

In order to log in to the Knowledge Bank, employees must be employed in given organisations and meet a set of specific job-related requirements⁹;

- Employed in a municipality and carrying out tasks included as part of the municipality's responsibility to prepare risk and vulnerability assessments (this is related to meeting the requirements set out in Section 14 of the Civil Protection Act and Sections 3-1h and 4-3 of the Planning and Building Act), or
- Employed at the County Governor's office and carrying out tasks included as part of the Governor's responsibility to prepare risk and vulnerability assessments, exercise his/her authority to supervise, or object to, municipal plans (this is related to meeting the requirements set out in Section 3-2 of the Planning and Building Act and/or Chapter V of the County Governor's Community Safety Instructions), or
- Employed in a public agency and carrying out tasks linked to the agency in question's authority to raise objections (as set out in Section 5-4 of the Planning and Building Act), or
- Employed in a public agency and carrying out tasks related to the assessment of measures that can help reduce the community asset loss resulting from natural events.

In addition to this categorization, it will also be necessary to define the access to information related to specific areas in more detail. Such measures will be area-specific and sorted into various geographical levels. For example, it may be the case that employees in a given County Governor's office will only have access to data at address level for their own county.

4.3.4 The DSB's experience from testing of the historical data set

The Knowledge Bank currently contains historical information that has been transferred as a single data batch related to the period 2013 to 2018. These data had to be processed to resolve a number of deficiencies, including the absence of location coordinates. The DSB

⁹ <https://kunnskapsbanken.dsb.no/om>

has used address information to update and supplement the data using Google geocoding. Only two of the ten insurance companies from which the DSB received data had provided coordinates. The historical dataset contains information related to between 450,000 and 500,000 insurance claims.

An issue with the old dataset from 2013 to 2018 is that several items of specific information are missing. For example, only very few of the claims related to water damage events provided information about the cause and the location of the damage. Other claims failed to identify the date and location (municipality) of the event.

This ‘temporary dataset’ also includes several major quality weaknesses (specified in the ‘product sheet’ called ‘Natural and water damage from insurance companies’¹⁰). Since the insurance companies that have provided data employ different systems for claims registration, the quality and format of the information varies somewhat in terms of the types of information reported and the categories used. For example, only seven of the 11 datasets contain information about the source and cause of water damage events. The following weaknesses are also identified;

- Date of damage. This information is missing for 1,216 of the reported damage events.
- Municipality. Information about the municipality where damage occurred is missing for 66,609 of the reported damage events.
- Type of damage. This information is missing for 1,216 of the reported damage events. These records are not included because it is not possible to identify the type of damage involved.
- Amount of compensation. This number relates to the amount that a customer has received, minus the excess. For 114,931 of the reported damage events, information about the amount of compensation (59,206) or amounts displaying a negative value (55,725) is missing. These records are also not included in the Knowledge Bank.
- Geographical location. The Knowledge Bank has used Google's geocoding to determine the location coordinates of a damage event where this is not stated. Only two of the insurance companies provided such data, but not necessarily for all events. Three companies provided coordinates, in ‘gpsx’ and ‘gspy’ formats, but without specifying the UTM (Universal Transverse Mercator) zone. It is thus not possible to use these data, making the location information uncertain.

The transfer of this historical dataset was important, if only to obtain an appreciation of what the companies were able to deliver. The dataset revealed major differences in the quality of data produced by the various insurance companies. For example, precise GPS coordinates for damage events were often missing, and not all water damage events were linked to weather conditions. For this reason, some companies may have to introduce new damage event codes in their systems. The proposed regulation, which is expected to come into force in 2022, will ensure that the companies will deliver data with more uniform quality, although it cannot be expected that they will be able to deliver such quality for historical data registered before the date of the proposed regulation's enactment.

It is also expected that there will be a data gap between that information provided for the period 2013 to 2018, and the new data that will be delivered starting on the date of enactment of the proposed regulation. The new legal framework will allow data sharing processes to fill the gap, involving claims registered in the period 2018 to 2022. However, this arrangement will be voluntary on the part of the insurance companies. It is currently expected that not all companies will be able to deliver their data for this time period, but that the largest companies will be able to share these historical data.

¹⁰ <https://kunnskapsbanken.dsb.no/filer/185/Natur--og-vannskader-fra-forsikringsselskap-.pdf>

4.3.5 The combination of historical and new data

It is important that the insurance companies are given the time to develop their data quality procedures. It cannot be expected that the highest quality will be achieved immediately the system is up and running. It is likely that system development and refinement enabling optimal insurance loss data in the Knowledge Bank may take several more years.

It is still expected that the data received by the DSB after enactment of the proposed regulation will meet the legal requirements. However, the DSB is well aware that the insurance companies will encounter challenges in terms of changing their procedures. In order to comply with the regulation, they must deliver their data in compliance with format requirements. Some uncertainty is anticipated with regard to data quality in the start-up phase, during which time new procedures will be refined, but such issues are expected to be resolved in due course.

In order to ensure data quality, control mechanisms must be introduced to ensure that information transferred to the DSB is correctly reported and in compliance with requirements. Such mechanisms must also make sure that insurance assessors enter the correct geographical coordinates.

It is expected that the DSB will obtain access to historical data for the ‘gap’ period 2018 to 2022. Since it cannot require that these data will be in the new format required by the proposed regulation, it is anticipated that quality will probably be similar to that of the 2013-2018 dataset. The DSB will have to process these data in the same way as for the older dataset. The DSB will thus have to find out how to inform users about quality variations in the data, that there is a data ‘gap’, that historical data may be of less than optimal quality, and that data entered after the date of enactment of the proposed regulation will be of better quality. The DSB expects to encounter challenges in connection with this data integration process, not least because different datasets with varying quality will most likely have to be administered separately.

An important issue related to data quality is that new datasets, starting in 2022, are complete, including adequate detail regarding geographical coordinates. The data required are the address of location of the damage event, not the residential address of the insurance holder. It is also important to state whether the damage event is water-related or some other form of natural event, including source and cause. In terms of disruptions, it is important to report whether these are linked to water related-damage or another form of natural event, since this will provide a complete picture of the event and help to ensure that the correct compensation amount is paid out.

It is expected that improvements in data quality will be prioritised once data transfer has begun, since it will then be possible to measure the levels of information inadequacy contained in the cases registered and thereafter compare and benchmark data quality across the various companies.

5 Concluding remarks

5.1 Research contributions

This study is contributing to existing literature dealing with information-related issues of climate services by providing detailed insights into a Norwegian system for the sharing of insurance loss data in a nationwide web-based platform, the Knowledge Bank. Our findings support previous research that stresses the importance of data quality, accuracy, usefulness, reliability, legibility and comprehensibility to users, relevance and accessibility (Hewitt et al., 2012; Overpeck et al., 2011; Raaphorst et al., 2020; Swart et al., 2017; Vaughan & Dessai, 2014).

The study further seeks to contribute to the knowledge gap by improving the links between information and users, i.e. the usability of climate-related information (Vaughan et al., 2016). Detailed insights are provided into some of the features of climate services, and in particular in connection with information characteristics, structure and governance (Vaughan & Dessai, 2014). Our findings related to the legal framework that is required in order to put in place a permanent data sharing solution, demonstrate the importance of trust and of linking responsibility for data quality with data ownership by assigning responsibility to the original sources (Swart et al., 2017). Regarding data differentiation (in this case making the distinction between historical and new data that are to be supplied by insurance companies), our findings have illustrated the importance of explaining data reliability to users in situations where data quality may be questionable (Swart et al., 2017). By presenting the conditions required for sharing climate-related data between organizations in climate services contexts, this study has also added to the literature on data governance and inter-organizational relationships (Abraham et al., 2019; Lee et al., 2017; Lis & Otto, 2021).

5.2 Implications for practice

The legal foundation described in this study has been critical to the new data sharing solution. Elements of it are already in place and the new proposed regulation is expected to be in force in 2022. Several challenges have to be addressed in the further work needed to develop the Knowledge Bank platform and improve data utilization in the municipalities.

A crucial aspect in this context is how the proposed regulation will be adopted in practice in terms of data reporting and registration procedures within the insurance companies. While the companies will be obliged to meet the requirements set out in the proposed regulation, it is also expected that it will take time before the new procedures are in place and before Finance Norway and the DSB can expect to receive data in the desired format from all the companies.

Another potential challenge is that both Finance Norway and the DSB will be required to make a major effort in terms of processing the data they receive from the companies, as well as quality assurance. Even though it is expected that such issues will be resolved in the initial phase, there is a risk that major additional resources may be required to ensure that the data actually meet the new quality requirements.

The data ‘gap’ caused by quality deficiencies in historical data available in the Knowledge Bank must also be addressed. The way historical and new data series are combined is key to data utilization. Users must be able to differentiate between the quality inherent in the old and new data, since this may help them to evaluate the reliability of data derived from different time series. Despite their quality deficiencies, the historical data can be valuable to users. However, data deficiencies may entail limitations on the utilization of the older data. The processes to combine data series could thus be equipped with a tagging system that facilitates differentiation in terms of data reliability.

In order to further improve and complete the dataset, efforts can be made to close the ‘gap’ caused by the current absence of data for the period 2018 to 2022. If these data are reported and registered in the insurance companies, they can also be transferred to the Knowledge

Bank. The DSB and Finance Norway must enter into dialogue with the companies to discuss how these data can be improved with the aim of meeting the new requirements. By highlighting the value to society of sharing a complete data series for the period 2013 to 2022, the companies may be incentivised to improve data quality and transfer these data.

If these challenges are resolved, insurance loss data currently held in the Knowledge Bank will be updated and improved on a regular basis over time. The proposed regulation is expected to come into force by 2022, thus ensuring that data related to new damage events will meet the new requirements. Users must expect that it may be several years before all data held in the Knowledge Bank meet the new requirements. They must also be prepared for the fact that the dataset will contain historical data of deficient quality and that there will be variations in data quality between time series. Many users currently have high expectations of the new system, but it is important that these are better aligned with current reality. A complete Knowledge Bank solution is a long-term project, and data will continually be improved over time.

The process of insurance loss data sharing has been in progress for several years, involving the establishment of a legal framework and a technical system, and it is important to maintain a long-term perspective. It may take several years before the data set available in the Knowledge Bank meets the desired data and format requirements.

The new data sharing solution still requires further testing, and it is important to learn from, and share, any lessons obtained during this process. It may help to introduce systematic processes for progress follow-up, experience sharing and status reporting across the organizations involved. There are several uncertainties related to how damage-related data will be registered and transferred by continuous live feed, as well as issues associated with data follow-up in the initial phase. It will take time before the new mechanisms work efficiently. In terms of development and testing, it is important to take the utilization of data by the municipalities into account.

5.3 Suggested further research

Based on the findings of this study, we have some suggestions for further research into how data quality can be assured in data sharing solutions, and how users can utilize shared data.

Data quality issues were raised in a previous study of the pilot project (Aall et al., 2017) and as part of a user evaluation study (Hauge & Thomassen, 2021). These issues are still considered to be critical in terms of the desired levels of data utilization in the municipalities. More knowledge is needed on how data quality can be further improved, and this can be achieved by involving several organisations in the development and testing of new initiatives and solutions.

We also need further insights into how the municipalities might use these data to add value. One idea is to develop showcases that may help to disseminate knowledge about the potential value of the data and their limitations. It may also be possible to develop and test process models for the utilization of insurance loss data in municipal planning, as well as models for evaluating the value of these data to wider society.

On the basis of a previous user evaluation of the Knowledge Bank (Hauge & Thomassen, 2021), we believe that further research is needed from a user perspective, focusing on insurance loss data. When the new data becomes available in the Knowledge Bank, it will be possible to initiate investigations of the perceptions of, and use of the system by, various user groups. These will contribute to further insights that may add value to future development processes.

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Appendix – Interview guide

Interviews conducted with the DSB and Finance Norway in December 2021.

Introduction

- Presentation of the study and of the *Klima2050* Centre
- Background and scope

About the new solution

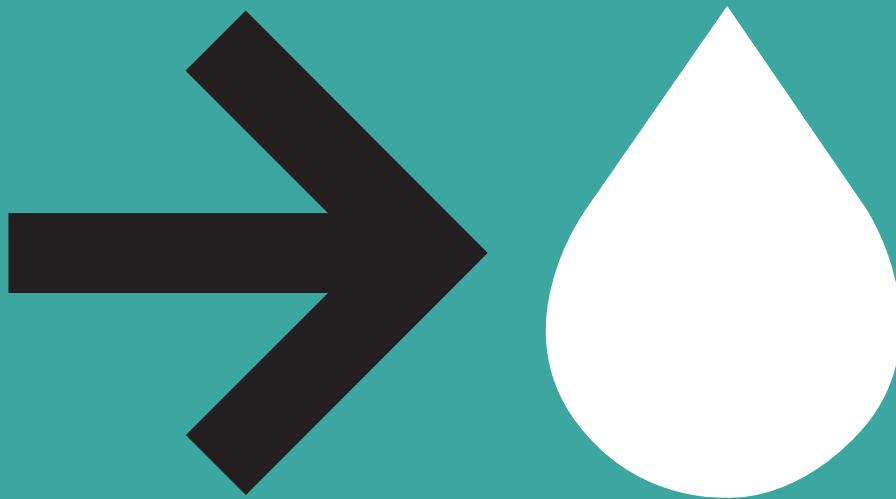
- How have you been involved in the work with the Knowledge Bank platform and the processing of insurance loss data?
- Give a brief status of the work with the new system
 - Describe the role of your organization
- Describe how the new data will be transferred, and the requirements for further analysis and refinement of the data prior to publication.
 - Who owns the insurance data?
 - Describe the scope of the data that will be transferred from the companies. Are there any limitations regarding time periods?
- Explain the different time series of historical data
 - How were historical data already available in the Knowledge Bank transferred and refined?
 - Explain the differences between the new data currently to be delivered and historical data available today
 - How are missing periods of data handled?

Factors influencing the new system

- Important political prerequisites for data sharing?
- Key technological factors?
- What is needed to ensure that the companies release their data?
- How are the additional costs to the companies being handled?
- What are the challenges and key factors related to
 - the collection of data from the companies
 - the collation and refinement of the data
 - data transfer
- How will the quality of the data held by the insurance companies be assured, and how will transfer of the data to the Knowledge Bank be guaranteed?
- Important factors related to adequate data quality.
 - How will the quality of historical data be assured/managed?
 - How will you ensure that the data will be used as expected?
 - How important is the registration of insurance claims information? How is information registered and who is involved?
 - Are those employees involved in claims assessment in the insurance companies familiar with how the data will be used? Are they aware of what is needed to make the new system work?

Further work

- What is needed to ensure
 - that the system will work as planned?
 - good data quality?



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SKJÆVELAND
GRUPPEN

NORGESHUS

Leca

isola

Public sector



Statens vegvesen



Noregs
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energidirektorat

AVINOR



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direktoratet



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