Inter-agency collaboration - how does it result in an improvement in the quality of child welfare statistics?

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Abstract

Statistics Norway (SSB) has constructed a novel data design for the compilation and storage of child welfare statistics through a system known as DigiBarnevern (DBV). This innovative system enhances the frequency of data flow pertaining to child welfare services by leveraging cloud computing infrastructure, specifically Google Cloud.

Collaborative efforts between SSB and The Norwegian Directorate for Children, Youth and Family Affairs (Bufdir) have driven the development of the advanced data reporting and storing. This paper aims to present SSB's experiences in inter-agency collaboration particularly regarding the professional input to the acquisition of data for statistical purposes. The most important aspect regarding the quality of data from this new reporting system is the continuous reporting that includes validation response in real time as well as the follow up of mistakes that the municipalities are reporting. Understanding the new reporting system and getting control of their own statistics have been important for the child welfare services.

Furthermore, this study will delve into broader aspects of the DBV project, encompassing both its limitations and accomplishments. The exploration of SSB's role as an information technology (IT) system supplier for an administrative authority (Bufdir) and, indirectly, for municipalities will be a focal point. Additionally, the paper will examine the experiences related to managing security, legal considerations, and confidentiality issues within the DBV framework.

In 2024 the official statistics will encompass data from both the old and the newly developed reporting system. SSB acquires data from many other municipal services, not only from the child welfare services. The paper will therefore highlight the possible adaptability of the DBV project's products for application in other municipal services.

Keywords: child welfare statistics, cloud computing, collaborative efforts, pilot to production, data quality

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1. Inter-agency collaboration

Since 2021, SSB and Bufdir have collaborated on establishing a new reporting solution, as well as a child welfare register with data from municipal child welfare services (BVR). Bufdir is a state directorate under the jurisdiction of the Ministry of Children and Family Affairs (BFD) and primarily deals with statistics based on the collection of child welfare data from municipal child welfare services provided by SSB. Municipal system suppliers contain information about various aspects of cases in the child welfare service, as illustrated in Figure 1.

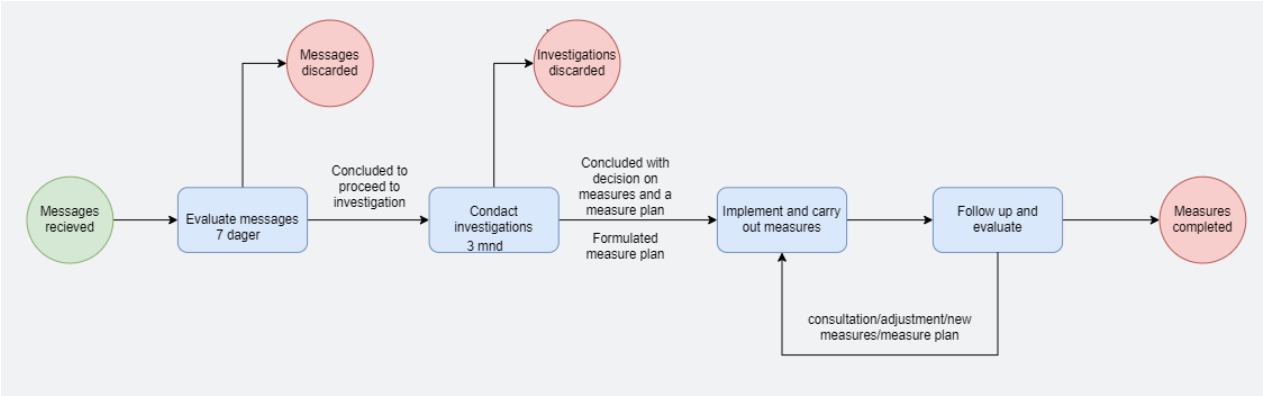


Figure 1: the procedural flow within the municipal child welfare service

As a result of the quality work between SSB, Bufdir, municipalities, and system suppliers, Bufdir and SSB approved all 80 municipalities that had transitioned to new systems for automatic reporting to BVR from the statistical year 2023 in February 2024. Data from BVR, along with KOSTRA (information on most municipal and county municipal activities –the old reporting solution), formed the basis for the publication of child welfare statistics on March 15, 2024: Child welfare -SSB.

1.1 Key Frameworks for Collaboration

The collaboration between SSB and Bufdir was initially established through a memorandum of understanding, which outlined the main points and premises for further negotiations/clarity. The memorandum of understanding was signed by the directors of SSB and Bufdir in 2021. Subsequently, the agencies entered into a so-called Standard Agreement for Research and Report Assignments (R&D Agreement), where one premise was to use AGILE methodology in the project. The main principle of AGILE is to focus on interpersonal interaction (creating psychological safety and trust) rather than traditional tools, control, and process management. Presenting results from the solutions developed/tested continuously, and receiving quick feedback along the way, enabled us to arrive at good solutions that addressed multiple needs more rapidly (and smoothly). The significance of close, trusting, and open collaboration proved to be fundamentally important in the project. The experience also emphasized the importance

of ongoing prioritization, as well as starting with the most important tasks first, and in DBV, we have largely accomplished the planned tasks.

1.2 Old Reporting Solution (KOSTRA and Semi-Annual Reporting)

SSB has been collecting child welfare data on an annual basis (KOSTRA). Data reporting occurs at the individual level for one statistical year at a time, making the process of compiling data across years difficult and time consuming. The potential of the hierarchical structure of child welfare cases and the interdependence between different pieces of information within the case are not fully utilized in the current data structure. Continuous data compilation is required to understand the entirety of a child welfare case across information elements and statistical years. A new data model that preserved the original data structure of a child welfare case and focused on the child, regardless of where in the country they received assistance from child welfare, had the potential to facilitate a comprehensive time series analysis of child welfare data. The semi-annual report (previously received by Bufdir from county governors) was conducted at the municipal level and relied on the correct interpretation of the sizes Bufdir requested, as well as on the system making the correct extraction. This also potentially led to different interpretations of the reporting between municipalities, as well as requiring resource-intensive efforts to ensure data quality. Therefore, modernizing the existing reporting system was necessary to meet an ever-increasing reporting demand for more and better data on a more frequent basis, where the requirement was easier access to more detailed and comprehensive information in one place. During the quality assurance process, we found that municipalities largely did not relate to the key figures in SSB's statistics and used other terms and sizes in their daily work, which are often more detailed and directed towards internal goals. Through more frequent reporting, municipalities must address data quality on a daily basis.

1.3 User Needs Influencing Data Quality

The project devoted considerable time to clarifying user needs to establish a clear goal. It is primarily necessary to focus on the user needs of the main users of child welfare data: Bufdir, municipalities, system suppliers, analysts, researchers, and SSB. User needs framed choices including the technical solution, the content of BVR, data structure, data quality, security, and accessibility. Among the user needs, those influencing data quality to a greater extent are worth mentioning:

- Ensuring and improving the quality of current statistical publications at SSB and Bufdir.
- More frequent reporting from municipalities to ensure that decision-makers in the state and municipalities have an updated knowledge base.
- Monitoring the development with time series in the field of child welfare over a long

period for analysis and statistical purposes.

- Maximizing automatic reporting to streamline reporting for municipalities.
- Flexible technical solution capable of handling changes in reporting.
- Validation rules that detect and provide feedback to municipalities about logical errors in reporting, enabling municipalities to deliver data with good quality.
- Microdata delivery to Bufdir for individual analyses and statistical purposes.
- Delivery of compiled data for statistical purposes.

1.4 User Needs Addressed

The project addressed the assignment with multiple deliveries that cater to all user needs specified in the memorandum of understanding. A technical solution for a new Child Welfare Register (BVR) in the cloud was developed to meet the need for a secure solution for automatic reporting. Figure 2 provides an overview of the technical solutions built in DBV.

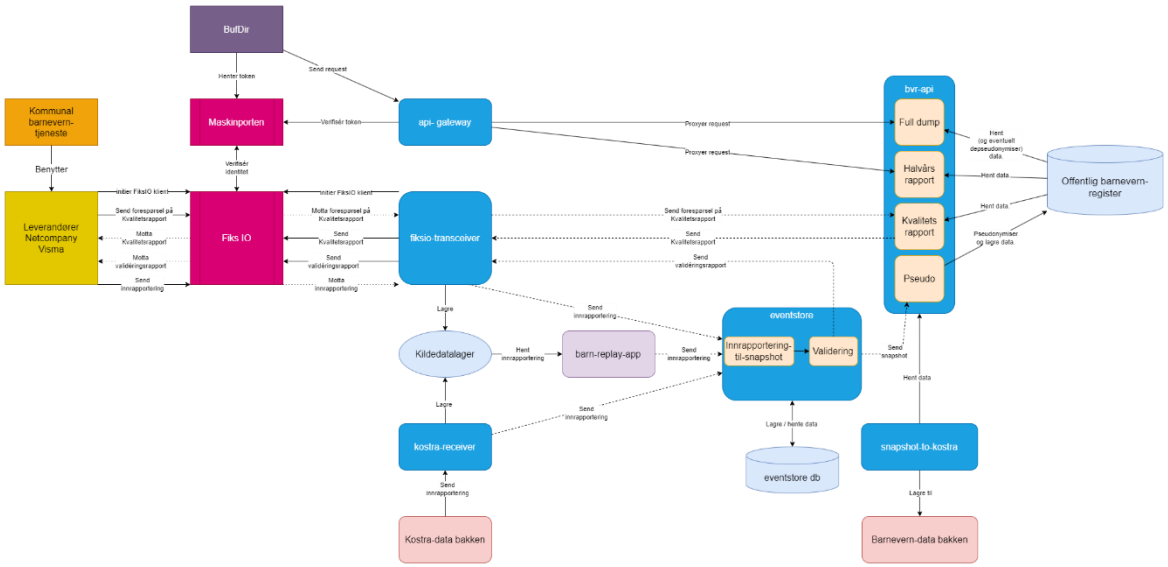


Figure 2: illustration of the datasources and dataflow in DBV

1. The technical solution is designed for continuous daily reporting, enhancing the timeliness of available data and ensuring seamless time series.
2. The chosen data model enables, among other things, the tracking of children/youths' progress in child welfare services regardless of the responsible municipality.
3. The solution ensures a data foundation for deliveries to users with a need for microdata/table assignments in the field of child welfare for use in statistics, analysis, and decision-making.
4. Data quality is ensured through an automatic system for feedback based on a validation regime. The current validation rules are continued and adapted to the new technical solution, as well as expanded for new information to BVR.

5. The solution provides real-time automated feedback on validation errors to municipal child welfare services upon submission at the case level.
6. The solution ensures automated (via API access) statistical delivery to Bufdir for publication in the "semi-annual report" through flexible extraction of aggregated figures from BVR prepared according to Bufdir specifications.
7. The solution ensures Bufdir access to pseudonymized personal data from BVR for analysis purposes as needed.
8. A management and further development system has been developed, facilitating the ability to change reporting requirements in line with new or altered data needs, and providing strong anchoring and understanding of the changes.

The Child Welfare Register (BVR) itself is a separate delivery primarily intended to satisfy reporting needs. BVR currently contains information on activity in the child welfare service directed towards the child. In addition to the same content as the old reporting solution to SSB (KOSTRA reporting), information used in semi-annual reporting (reporting from the County Governor) to Bufdir is included. This means that DBV has managed to integrate the reporting solutions of SSB and Bufdir. All changes in data come from the child welfare service in the form of updates in the system and automatic transfer of these to BVR. BVR thus has a "mirror image" of the content in the systems of municipal child welfare services. BVR uses Google's database solution for data storage – BigQuery. Child welfare data in BVR is event-based personal data with a hierarchical structure, where all information about the child from a specific child welfare service is collected in one case, with timestamps for all events, and reference to how various parts of the case are related to each other if the relationship exists in the systems. It is also designed so that information can be collected for the same child across child welfare services over a period, allowing for tracking the entire course of the child's involvement in the child welfare system regardless of how many times the child has moved over the years. In this way, the data model facilitates storage of data on the case or the child, enabling easy access to a comprehensive overview of all events in the child welfare case over a period.

It was discovered that there was a need for multiple deliveries during the actual work on data quality in the pilot process. Therefore, separate deliveries were developed for pilot purposes that create and transfer reports for the status of migration, data quality, and correct content in reported data per municipality for SSB, Bufdir, and system suppliers/municipalities.

1.5 Tight collaboration on data quality

Data quality in the new Child Welfare Register (BVR) was central during the pilot phase of the project. The quality objectives identified in the project were:

1. Migration requirements: municipalities are able to report complete data according to reporting requirements to BVR.
2. Validation requirements: reported data contains a low proportion of critical errors that impede reporting.
3. Key figures: key figures generated based on data in the Child Welfare Register should correspond to reality.
4. System requirements: the new systems should meet technical requirements for continuous machine-to-machine reporting.

Collaboration with Bufdir and joint efforts in closely monitoring technical system requirements, migration, and validation errors towards both system suppliers and municipalities have been crucial for the data quality in BVR. In 2024, efforts continue to ensure the quality of other municipalities for transition to automatic reporting. The quality collaboration with municipalities has laid a solid foundation for a shared understanding of what good data quality entails and its significance. Reporting needs for both agencies have been well established in municipalities, and the parties have come to a consensus on the path for approval of reporting from new systems in a pilot process. Figure 3 illustrates the data flow and mechanisms for control and collaboration (**see appendix**).

1.5.1 Migration testing

Migrating testing has been necessary to ensure the correct transfer of necessary data from old to new systems. SSB compares the number of cases reported to SSB in the previous KOSTRA reporting with the number of cases reported from the new system. It is expected that the numbers match, but in practice, the test detects discrepancies often due to child welfare services cleaning up their cases. Through migration testing, a migration report is generated, providing an overview of cases that have not been migrated. This report is made available to system suppliers, who then relay it to child welfare services. Child welfare services must be able to explain why cases have not been migrated from the old to the new system for approval. Experience shows that missing migration is often due to cases being closed after reporting to SSB but before migration to the new system.

1.5.2. Validation Testing

Validation testing tests the logic in the data and builds on what was previously used in SSB's control program for KOSTRA reporting (old reporting) and is also expanded to include new information now collected in BVR. The validation test returns to the system supplier an overview of errors in the submitted data. The overview provides feedback on three different levels: a) critical errors, b) warnings, and c) information. Critical errors must be corrected, as data with this type of error is not registered in the register. After child welfare services have

corrected these errors, they are resubmitted and registered in BVR.

1.5.3. Statistical Testing

SSB and Bufdir compare their respective key figures from previous reports with figures based on data delivered to BVR. Child welfare services often have a relationship with the key figures from KOSTRA and semi-annual reporting. The statistical test is an important test to ensure that the data in the system reflects real conditions in child welfare services. Child welfare services are responsible for ensuring that the figures provide an accurate picture of the activity of the child welfare service. Therefore, municipalities were encouraged to provide feedback to Bufdir/SSB if the figures turn out to be incorrect. If SSB or Bufdir reveal major discrepancies in the historical development, child welfare services are contacted for clarification and potential correction in reporting. Through close monitoring of key figures with municipalities, the DBV project has ensured a common understanding of the concepts and how statistical figures in key indicators are aggregated, as well as their significance. Municipalities have actively participated in reconciling the figures and have received assistance from system suppliers in finding the key figures in their own systems. To hold municipalities accountable, there was a requirement for written approval of the key figures for the municipality to be approved for automatic reporting to the child welfare register.

1.5.4. System Requirements

For the municipality to be able to send data to the production system of the child welfare register, the new system must meet certain technical requirements for continuous machine-to-machine reporting and receipt of feedback, as well as for the content of the reporting necessary to ensure reporting needs. The system must, among other things:

- be configured for automatic submission of data from machine-to-machine.
- be capable of sending all reportable data according to XSD, which specifies the information to be sent, the format of this, the structure the data should have, and contains information about the connections in the data.
- be able to migrate necessary data to the new system if available. Migrated data from new systems must have a reference to IDs in old systems, so that SSB/Bufdir can ensure the migration process and, not least, compile new information based on the already existing case.
- send all necessary data for a municipality for a certain period.
- send subsequent changes in existing cases, as well as new cases continuously once a day.

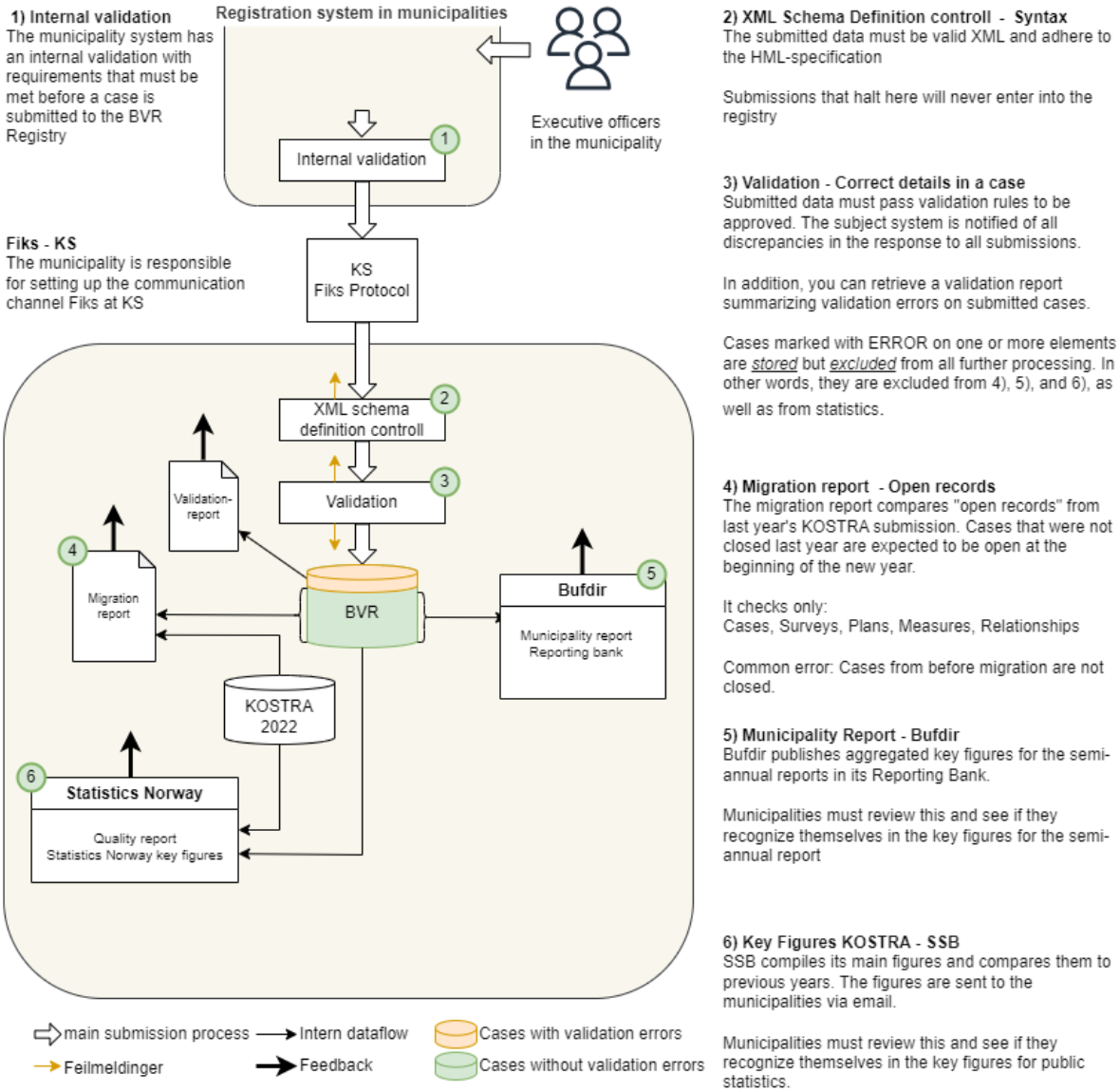
2 Concluding remarks

Cloud services enable rapid and reliable data transfer between a large number of

municipalities and a centralized statistical authority. Access to a wide range of services supporting efficient data collection, storage, and availability, combined with machine-to-machine reporting, offers a flexible and scalable infrastructure for handling large volumes of data over the internet securely. The new technical solution has facilitated closer collaboration on data quality between two government bodies (Bufdir and SSB). The solution has provided mechanisms for flexible further development of the child welfare register across government agencies and in collaboration with system suppliers and municipalities. The solution enables municipalities, Bufdir, and SSB to utilize their resources in a more cost-effective and dynamic manner than previous data collection methods. As a result of the work on approving data quality for municipalities that have transitioned from the pilot phase to being approved for automatic reporting, SSB has further automated the feedback process to municipalities. This streamlining has led to the use of several new technical solutions and the possibility of streamlining communication with municipalities in current statistics production for municipalities using old system solutions. The experience gained from the development work and the results achieved can be utilized in statistics production in other areas within SSB. The premise for SSB taking on the role of developer of new technology for data collection, storage, and sharing was the potential for reuse in statistics production. SSB is in a process of change and is working on transitioning to cloud-based statistics production, where more and more opportunities for reuse of the solution and the project's experiences are emerging.

Appendix:

Figure 3: illustrates the data flow and mechanisms for control and collaboration



Registration system in municipalities - electronic system developed for registration and processing of data within a field of experience, here child welfare services

KS - The Norwegian Association of Local and Regional Authorities

Fiks Protocol is a service group, where among others, Fiks IO is the service responsible for asynchronous machine-to-machine message exchange. In addition to message exchange via Fiks IO, Fiks Protocol validates that only valid message types are sent for the various protocols (e.g., Fiks Archive or Fiks Plan). Furthermore, it ensures that messages are only sent between sender and recipient systems that are pre-approved by system administrators.

Fiks IO is a channel for secure machine-to-machine integration. This channel can be used to build processes across systems and organizations, for example, when a subject system needs to archive a document in an archive system or inquire about information stored in another system.