

# BI and Automation Projects

## TABLE OF CONTENTS

Prerequisites .....	2
Data warehouse .....	2
BI: HSE Report, ferry companies .....	4
BI: Fuel Consumption Report, ferry.....	7
BI: Traffic reports and passenger statistics .....	10
BI: Electrical buses. Battery capacity and calculation of optimal speed .....	12
BI: Accounting reports.....	13
Process automation: e-invoicing (EHF) .....	14
Process automation: Ticketing reports (Azure App Service + Azure SQL).....	17
Process automation: Ticketing reports (Desktop + MS SQL).....	20
Process automation: Reconciliation of group balances, ACCESS + VBA.....	24
Process automation: Accounting input, Excel + VBA .....	28
RPA: PROject examples.....	31
RPA: SOME OBSERVATIONS .....	33
level of competence: SQL.....	34
level of competence: C#, ASP.NET Core.....	35
level of competence: DWH and ETL Tools (SSIS, APACHE Airflow) .....	36
level of competence: Python .....	37
level of competence: STATISTICS .....	38
level of competence: power bi and dax .....	38
level of competence: RPA .....	38
level of competence: VBA .....	39
level of competence: HTML, CSS.....	39
level of competence: javascript .....	40

## PREREQUISITES

Actual numbers, metrics, and dates in this document are confidential and have been changed for the purpose of demonstration. Reports and reports design and structure, eventual company names, task descriptions etc. are actual.

## DATA WAREHOUSE

### Objective

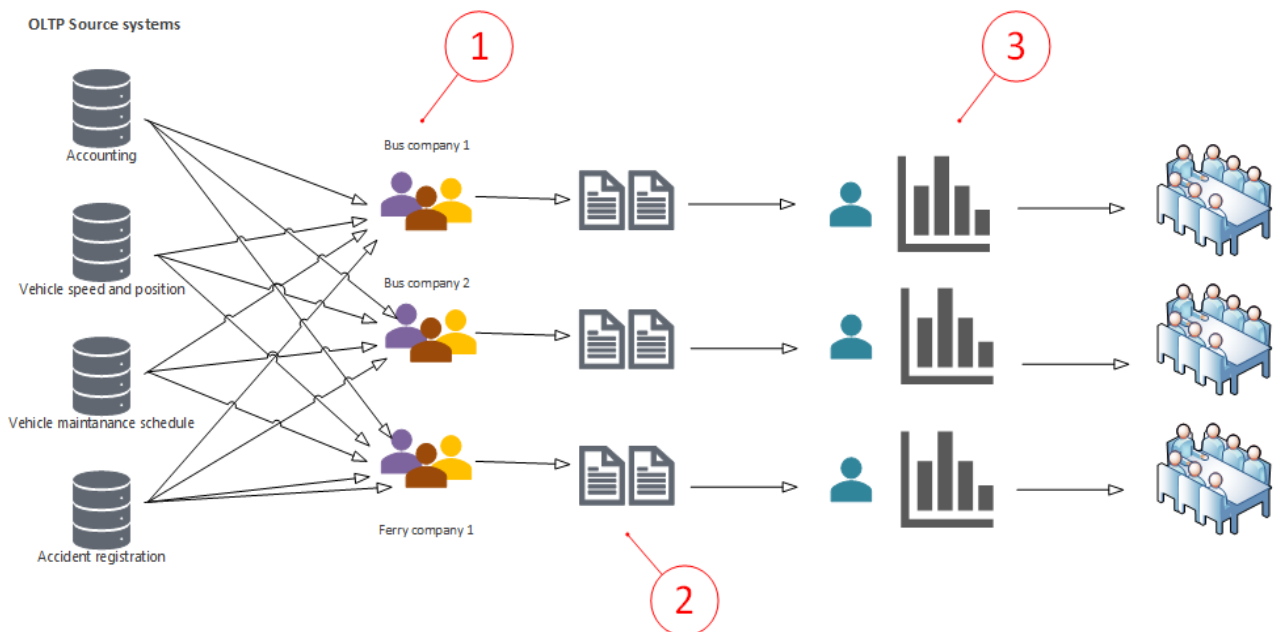
Unified data storage and source of information for all kinds of analytical reports across the holding. One solution for both ferry and bus subsidiaries (dimension types, metrics and reporting requirements coincide almost completely)

### Challenges

- Dimensions (ships, vehicles, departments, ferry, and bus lines) have different codification in different OLTP source systems.
- Complex dimension dependencies across the holding (for example 30% of costs that belong to dimension 200, must be also accounted for in dimension 300 etc.)

### Original reporting process

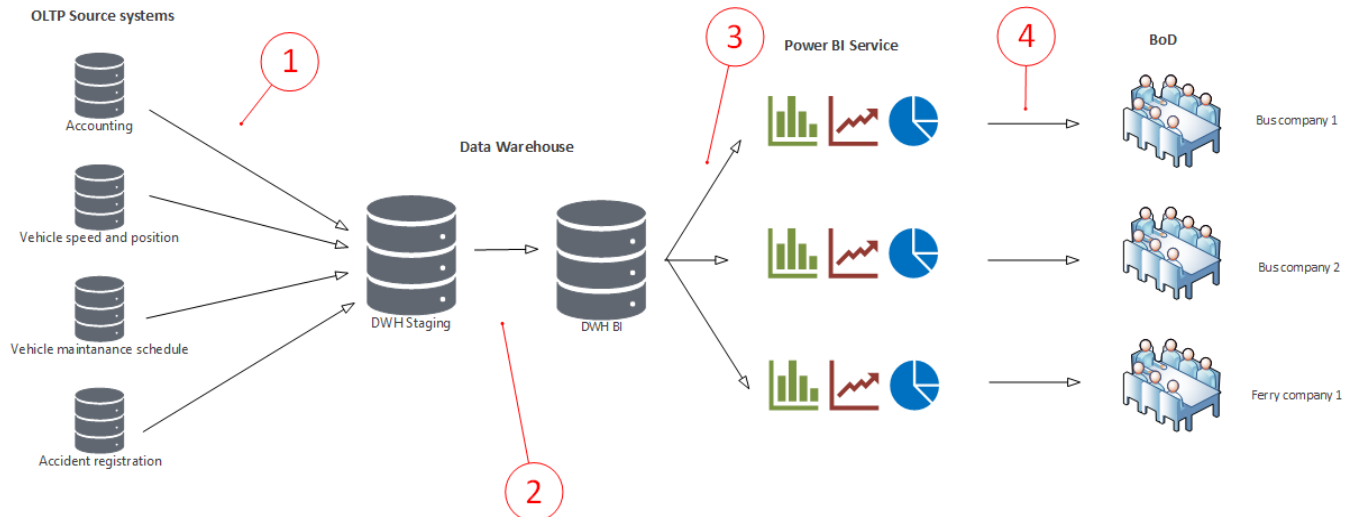
- Isolated reporting routines where subsidiaries used their own tools, established dataflow routines and reporting standards.
- Large volumes of manual work involved.
- Reports are updated monthly, and updates are available not earlier than on the 10<sup>th</sup> of the next month (the process can take up to 10 days to complete)



1. Raw data had to be extracted from isolated OLTP source systems (manually, copy / paste)
2. The data was then grouped and transformed manually and saved as Excel / Word files
3. Persons responsible for reporting, used the files to prepare final reports (Excel, Power Point). The final reports were then presented to the Board

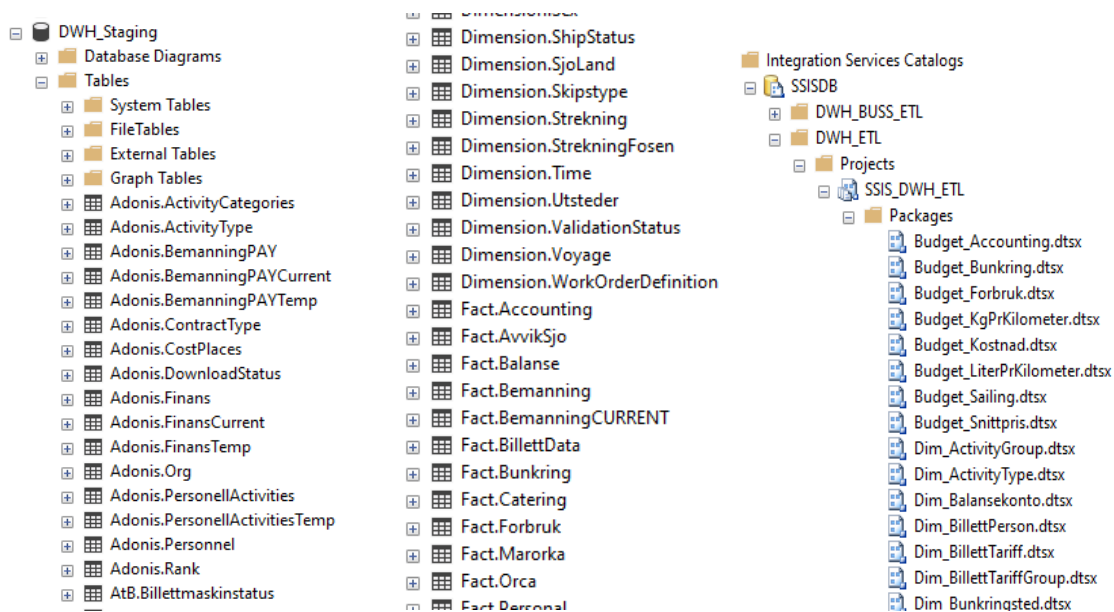
## Optimized reporting process

- Unified reporting process with common rules and metrics.
- Fully automated dataflows and report updates (zero manual work)
- Reports are updated daily / hourly, the process is fully automated



1. Raw data is partially transformed and transferred to Staging DWH (on-premises MS SQL Server), using automated ETL / ELT tools (SSIS packages scheduled as SQL Server Agent jobs)
2. The same ETL tools transform the data further and update both fact and dimensions tables in DWH BI
3. Power BI Service reports are updated automatically through Power BI Gateway (daily, hourly)
4. Members of the Board have instant, direct access to the updated Power BI reports through their desktops, laptops, and mobile devices

## DWH: screenshots



## BI: HSE REPORT, FERRY COMPANIES

### Objective

HSE (Health, Safety and Environment) report is of crucial importance to a ferry company in Norway. A company that fails to report right or fails to report on time, can get its license revoked. Objective was to unify and automate the reporting process and to make it fast, predictable, and error-free across the holding.

### Challenges

- OLTP source systems operate using different technical backgrounds with different update frequencies and data formats.
- Controlling indicators must be calculated using non-linear or non-straightforward calculation algorithms.
- Each subsidiary follows its own reporting routines and sometimes accident classification could vary from company to company.

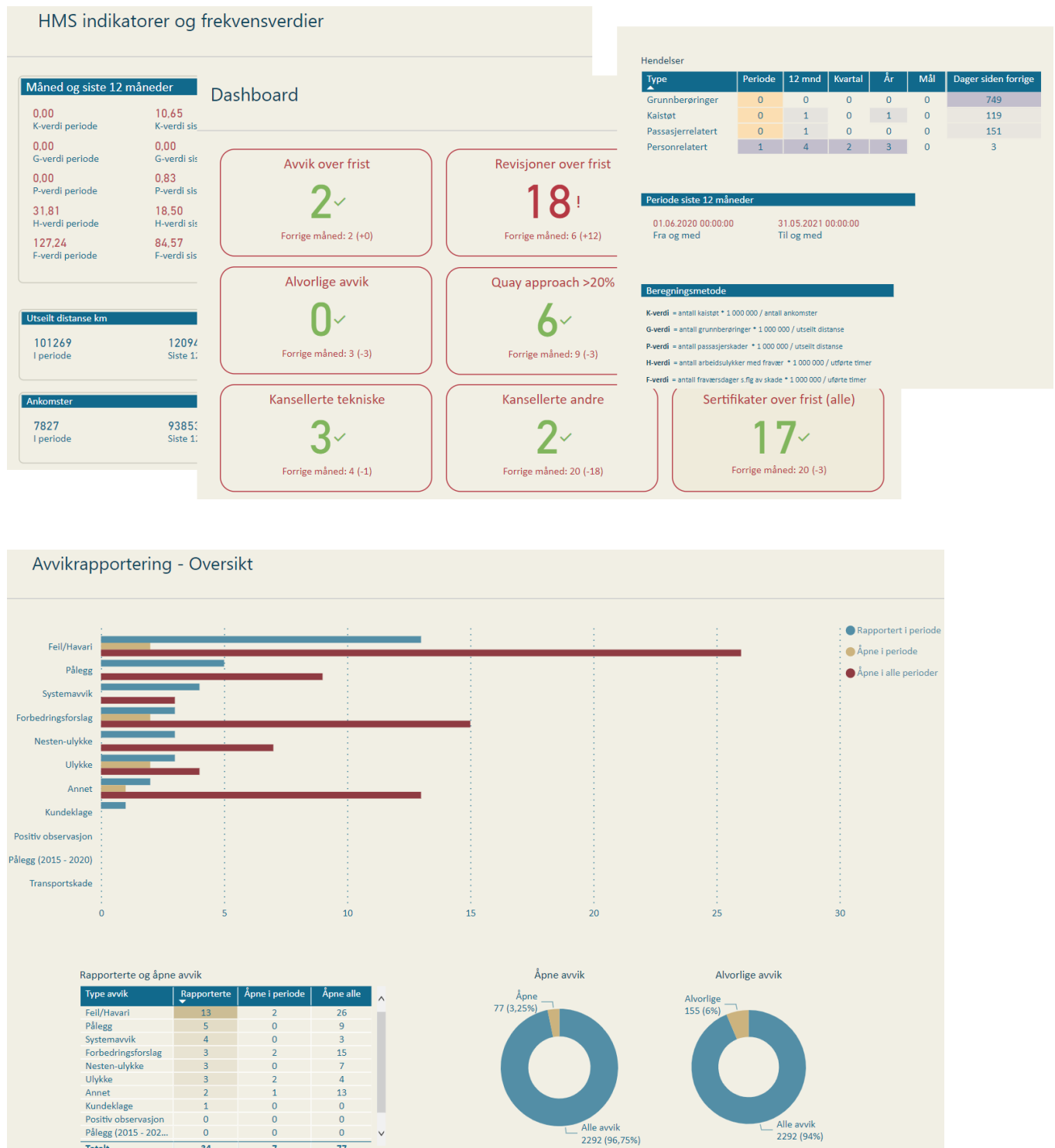
### Original reporting process

- Raw data had to be extracted from isolated OLTP source systems (manually, copy / paste)
- The data was then grouped and transformed manually and saved as Excel / Word files
- Persons responsible for reporting, used the files to prepare the final report (Word file).
- The final report was then sent in separate e-mails to both controlling authorities and ferryboat's crews.
- Once-a-month update.

### Optimized reporting process

- Raw data is gathered and transferred from OLTP systems to DWH automatically
- DWH supplies the transformed data and precalculated metrics to Power BI Service reports through automated updates (Power BI Gateway).
- Direct access to Power BI Service HSE report is granted to both crews and authorities
- Regular, automated daily updates.
- Approximately 50 hours of manual work per month have been eliminated

## HSE report: screenshots



#### Utseilt distanse km

101269	12094
I periode	Siste 1:

#### Ankomster

7827	9385
I periode	Siste 1:

Type avvik	Rapporterte	Åpne i periode	Åpne alle
Feil/Havari	13	2	26
Pålegg	5	0	9
Systemavvik	4	0	3
Forbedringsforslag	3	2	15
Nesten-ulykke	3	0	7
Ulykke	3	2	4
Annet	2	1	13
Kundeklage	1	0	0
Positiv observasjon	0	0	0
Pålegg (2015 - 2020)	0	0	0
Transportskade	0	0	0
<b>Totalt</b>	<b>34</b>	<b>7</b>	<b>77</b>

#### Åpne avvik

Åpne: 77 (3,25%)

Alle avvik: 2292 (96,75%)

#### Alvorlige avvik

Alvorlige: 155 (6%)

Alle avvik: 2292 (94%)

## HSE report: screenshots

## Premaster vedlikehold

Vedlikehold over frist (periodebasert)\*

Fartøy	Beskrivelse	Regelmessighet	Kritikalitet	Forfall	Sist utført	Dager over frist
AC Engager	Årlig kontroll av magnetkompass	Y	Ikke Kritisk	31.03.2021	20.06.2019	61
AC Engager	Sjekk spillendemorør ved funksjons test	M	Ikke Kritisk	14.04.2021	14.03.2021	47
AC Engager	Sjekk ekspansjons tank til AC anlegg	W	Ikke Kritisk	15.04.2021	08.04.2021	46
AC Engager	Vernemåte	M	Ikke Kritisk	18.04.2021	18.10.2020	43
AC Engager	Kontroll av avfallshåndtering	M	Ikke Kritisk	22.04.2021	22.03.2021	39

Antall forfalte

27✓

Forrige måned: 203 (-176)

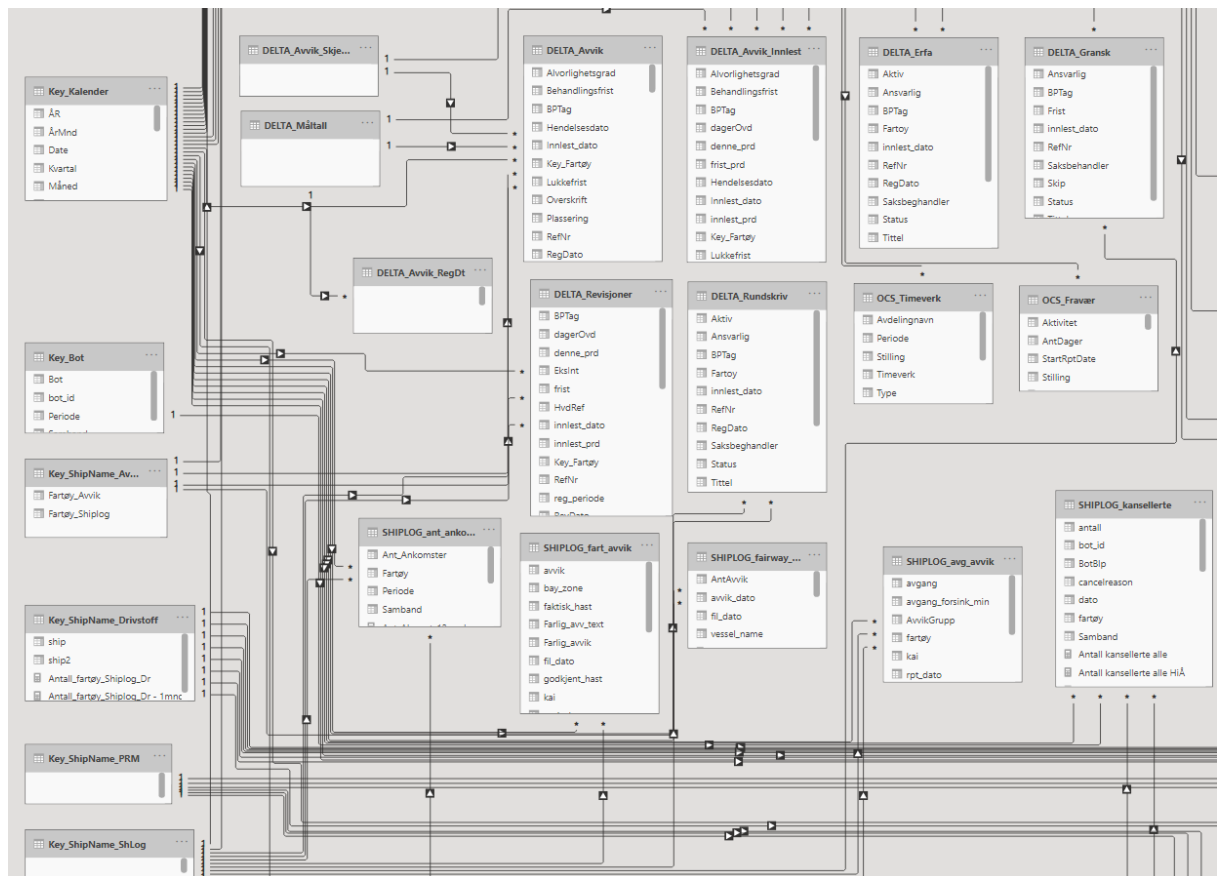
Snitt dager over frist

27✓

Forrige måned: 224 (-197)

Vedlikehold over frist (timebasert)

Fartøj	Beskrivelse	Regelmæssighed	Kritikalitet	Forfall timer	Faktiske timer	Forfall
IMO 770916	Skift brennolje fin filter *	M	Ikke Kritisk	2793	2985	NA



## BI: FUEL CONSUMPTION REPORT, FERRY

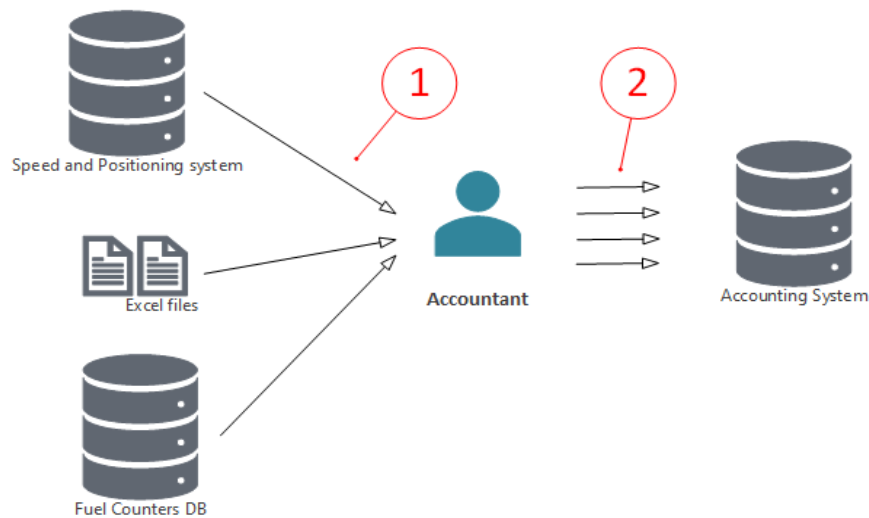
### Objective

Unified reporting format across the holding. Faster updates and elimination of manual inputs into the accounting system.

### Challenges

- Not all the ferries have been equipped with automated fuel counters.
- Crews used different ways to register fueling information (some of them used Speed and Positioning system, while other used Excel-based reports etc.).

### Original reporting process

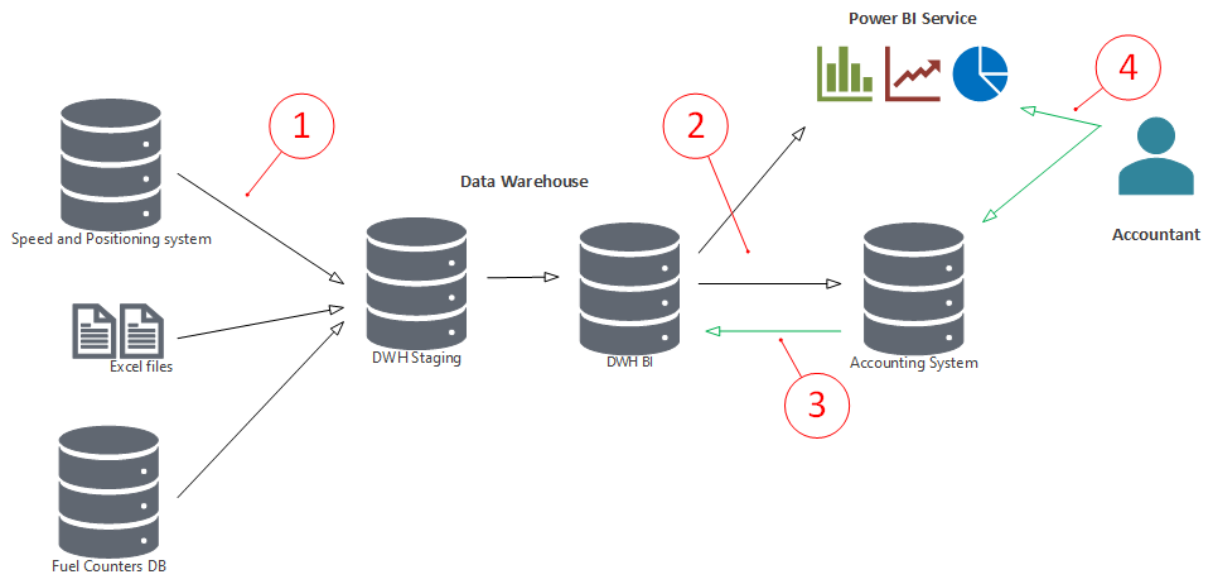


- Fuel reports are copied from a corresponding source system manually
- An accountant registers the reports in the accounting system manually (one report per subsidiary)

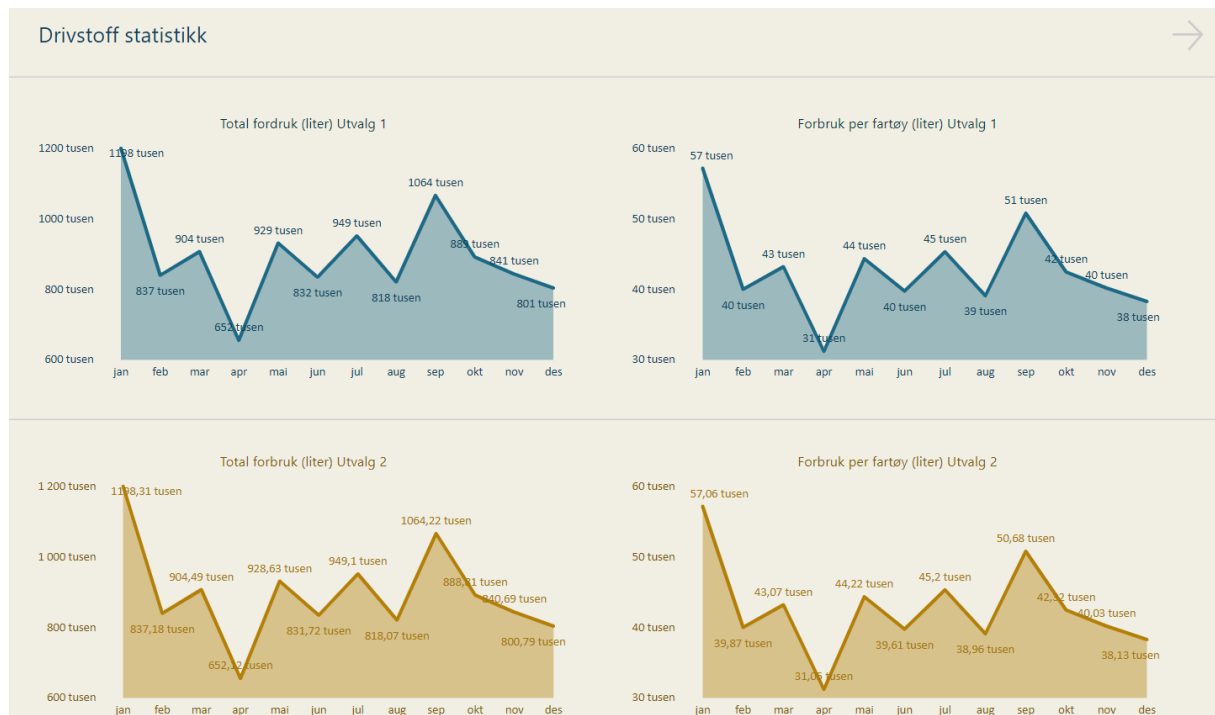
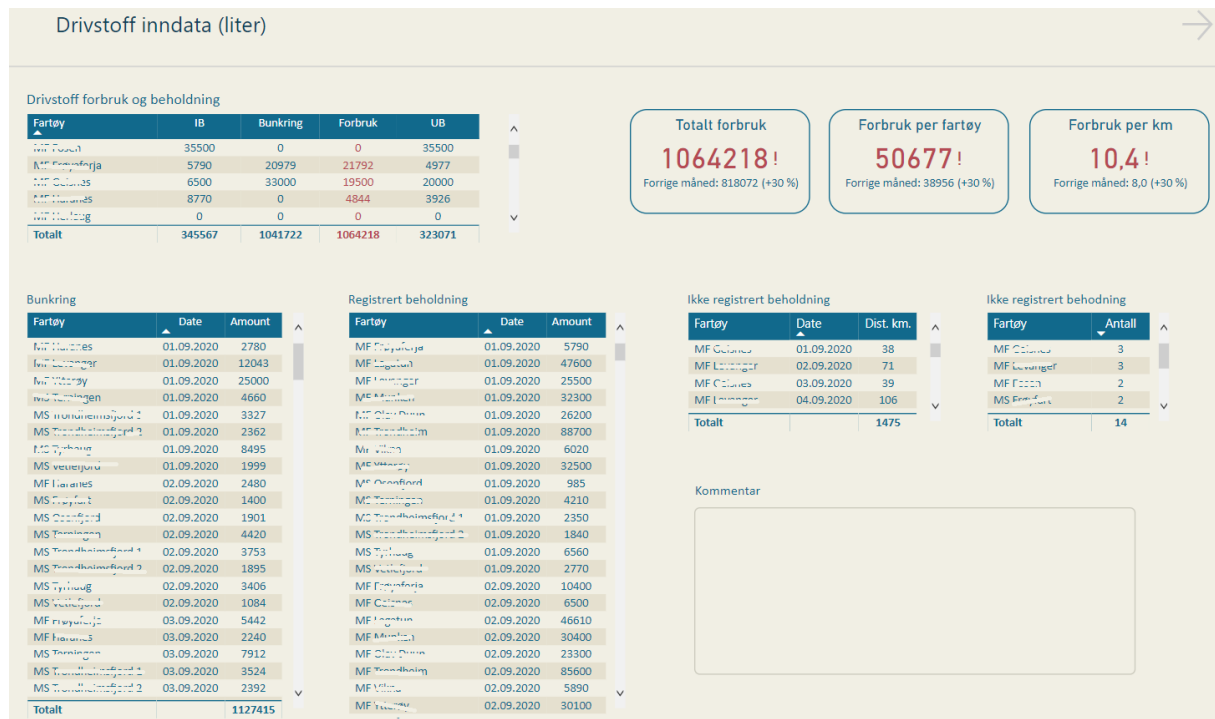


## Optimized reporting process

1. Fueling data is read into DWH, using API and in-house ETL process (SSIS)
2. An RPA process reads fueling reports from DWH and registers these reports in the accounting system automatically
3. The same RPA process marks fueling reports as registered in DWH to avoid double registrations in the accounting system. The fueling reports remain available in DWH and can be used further for analytical purposes.
4. The accountant's role is just to control if reports has been read and registered correctly. Accountants use Power BI Service to control the registrations.
5. The updated reporting routine eliminated almost 100% of manual input in the accounting system.



## Fuel consumption report: screenshots



# BI: TRAFFIC REPORTS AND PASSENGER STATISTICS

## Objective

To automate reporting process to AtB. AtB is one of the biggest transportation companies in Norway. All the companies that use AtB own ferry and bus lines as subcontractors, must report in accordance with predefined rules and procedures.

## Challenges

Source data from different ticketing systems had to be read into a unified fact and dimension tables in DWH.

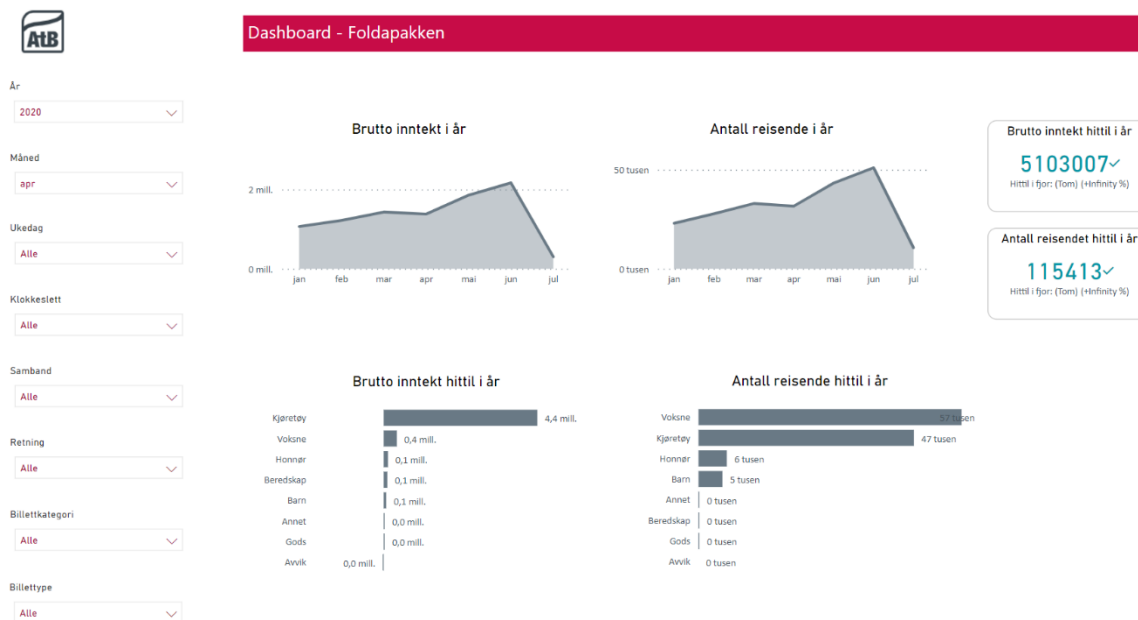
## Original reporting process

- Raw data had to be extracted from different ticketing systems manually.
- Some of the ticketing system owners did not wish to grant direct access to the back-system / raw data depositories
- Once-a-month update

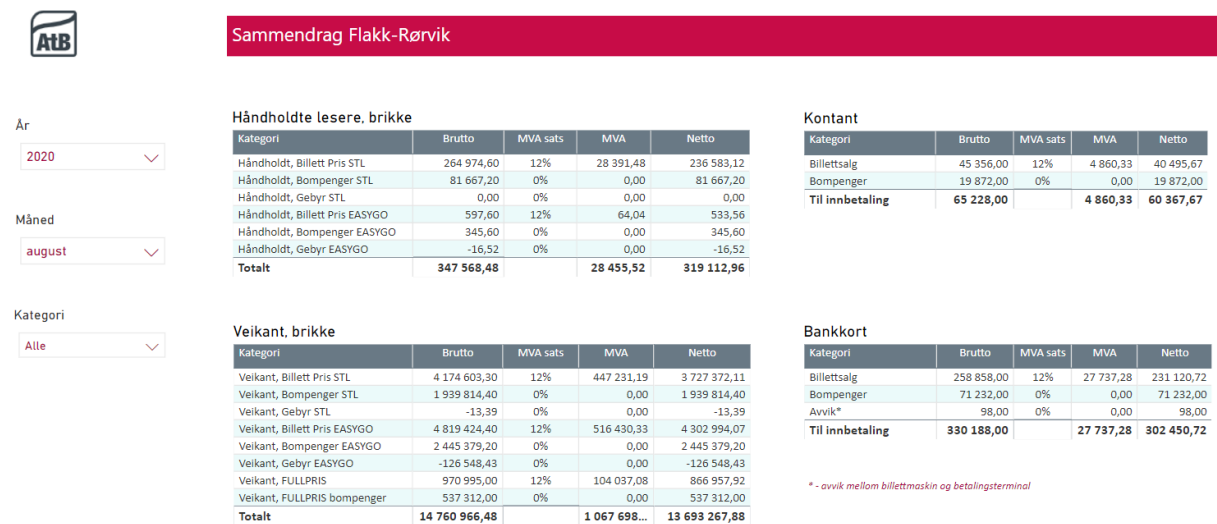
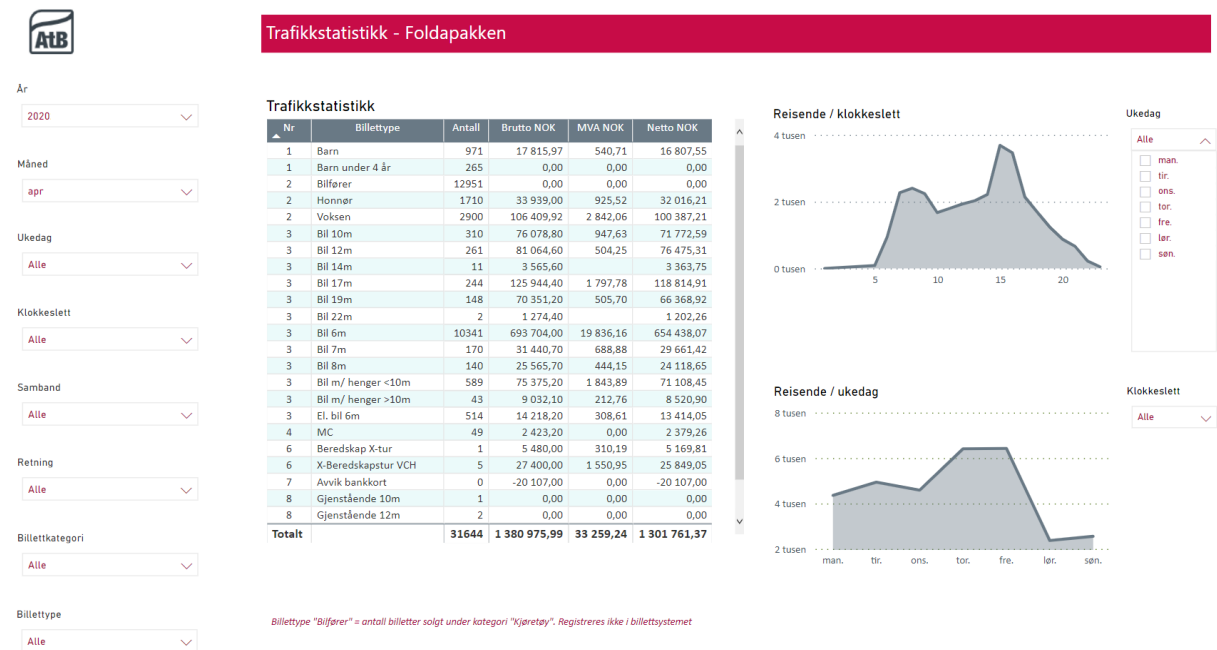
## Optimized reporting process

- Export of source data (sales transactions) to DWH have been automated using both SSIS packages and RPA processes (where direct access to the ticketing systems database was not possible)
- Reporting is now made through Power BI Service, where reports are shared with AtB officials.
- The ETL and update processes are fully automated.
- Reports are updated daily.

## Traffic reports and passenger statistics: screenshots



## Traffic reports and passenger statistics: screenshots

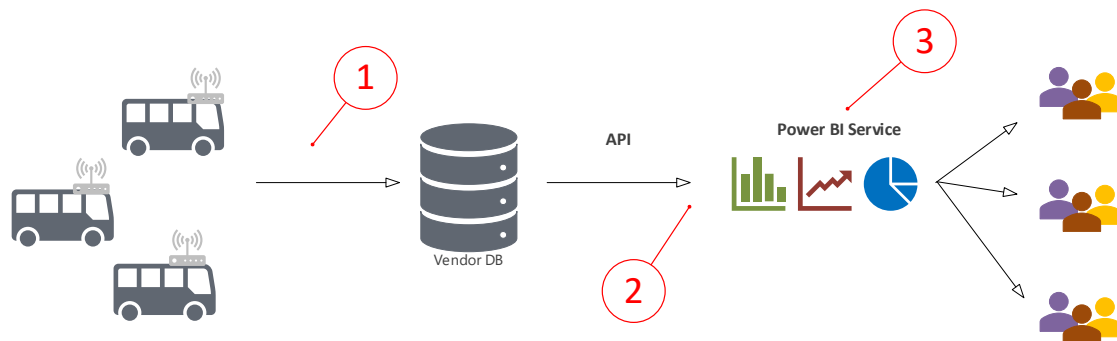


# BI: ELECTRICAL BUSES. BATTERY CAPACITY AND CALCULATION OF OPTIMAL SPEED

## Objective

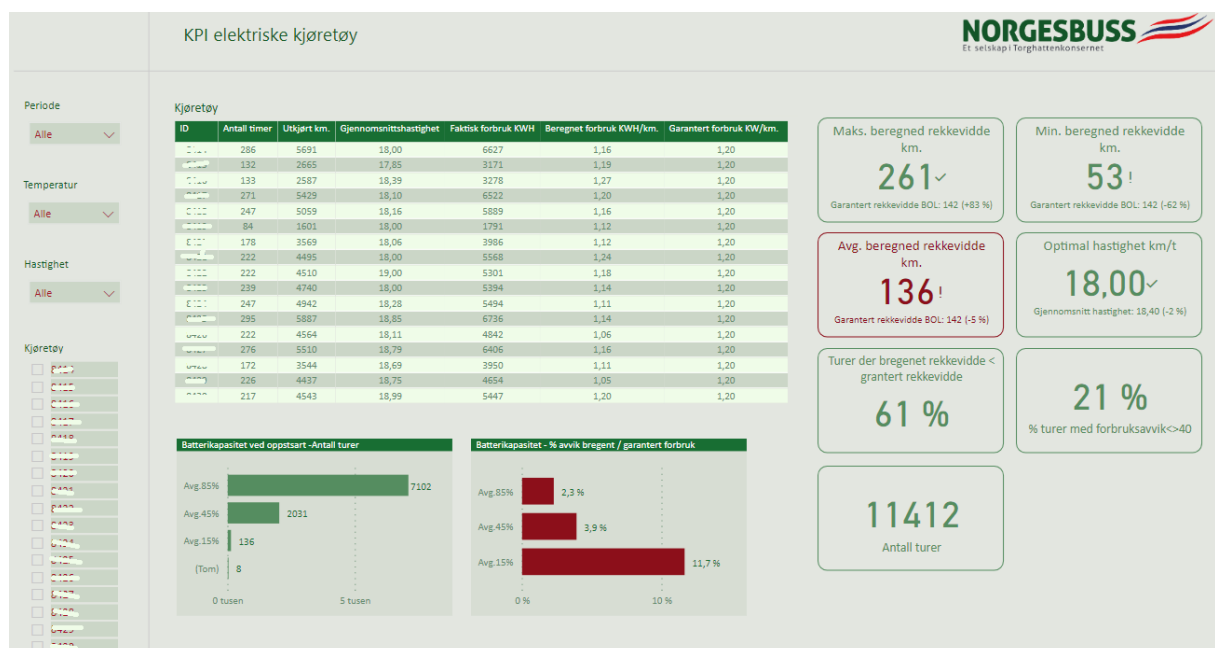
Finding of actual battery capacity for each vehicle and its dependence on the outer temperature.  
Calculation of optimal driving patterns under given weather conditions. Comparison of the actual metrics with those declared by the vendor.

## Reporting process

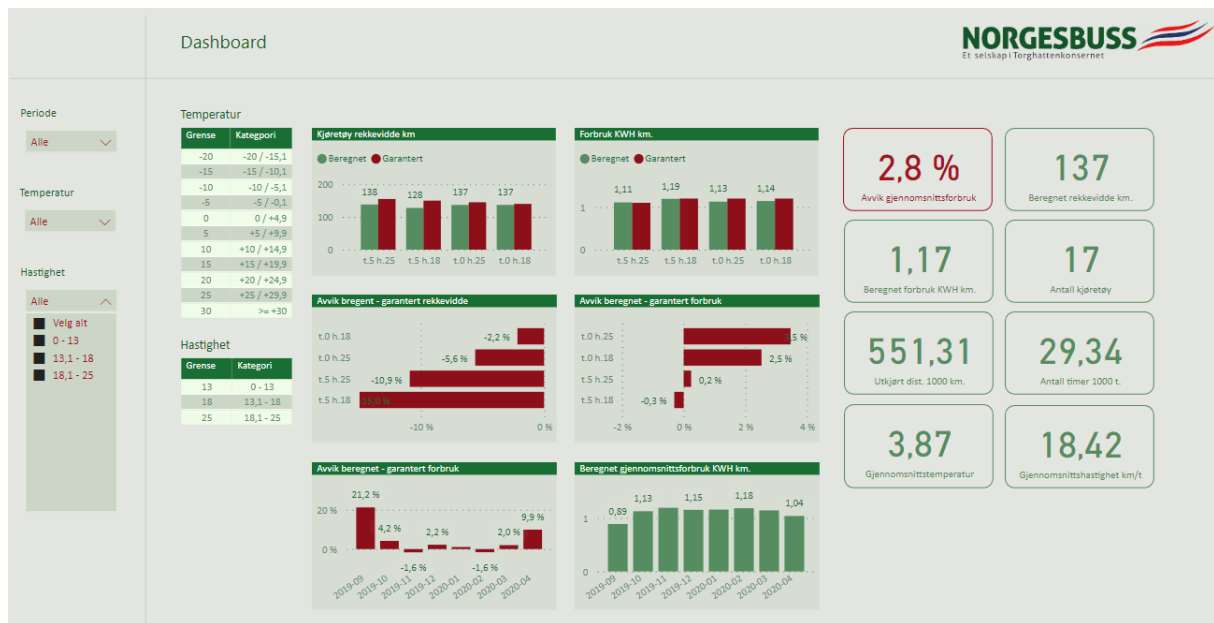


1. Vehicles communicate regularly with dedicated database to transfer the data (speed, temperature, battery charge etc.)
2. Power BI Service report is updated automatically using vendor's API.
3. Reports are available to end users (management, bus drivers etc.)

## Battery capacity and calculation of optimal speed: screenshots



## Battery capacity and calculation of optimal speed: screenshots



## BI: ACCOUNTING REPORTS

### Objective

To extend the capacity of the accounting systems reporting module and to grant access to the accounting reports to extern users without granting full access to the accounting system. To provide a better and more clear graphical presentation of accounting metrics.

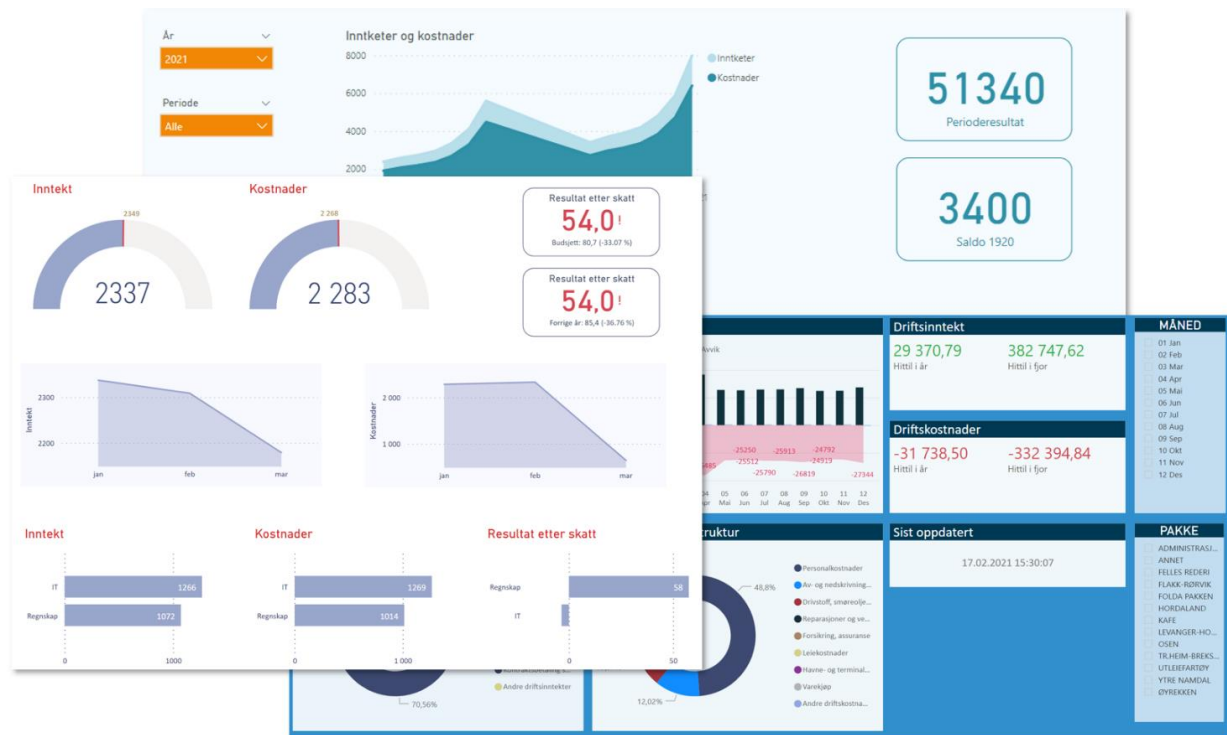
### Original reporting process

Subsidiaries used accounting system's original reporting module that was quite professional and technically advanced. However, it was difficult for a user without any technical background to develop a customized report. The original module was also lacking those reach graphical facilities that are available in Power BI.

### Optimized reporting process

Power BI Accounting reports were developed as an operative tool, that apart from other operative information, contains annual and quarterly reports. This reporting tool was devised rather as an extension to an OLTP system than a stand-alone analytical tool. Reports read raw data directly from accounting system using direct SQL queries and can be updated on demand by users themselves through Power BI API and Gateway.

## Accounting reports: screenshots



## PROCESS AUTOMATION: E-INVOICING (EHF)

### Objective

To automate invoicing process across the holding and to improve control and traceability of both outgoing and incoming invoices.

### E-invoicing

E-invoices are transferred automatically from issuing to receiving company in form of specially formatted XML-files. These files are automatically authorized in specialized clearing centers and clearing centers issue transfer reports that show the fact of approval or denial of e-invoices. These reports are sent to the issuer and this, among other things, ensures full traceability of the invoicing process.

E-invoicing eliminates many of manual processes and much of paperwork. In addition, state-run organizations in Norway send and receive invoices only electronically.

The diagram illustrates the E-invoice process flow:

- Issuing company** (represented by a person at a desk) sends an **E-invoice** (represented by a document icon with a globe) to the **Clearing Center** (represented by a database cylinder).
- The **Clearing Center** sends the **E-invoice** to the **Receiving company** (represented by a person at a desk).
- The **Clearing Center** also sends a **Transfer report** (represented by a document icon with a globe) back to the **Issuing company**.

Information about outgoing and incoming e-invoices across the holding:

Faktura Nr.	Faktura dato	Mottaker	Leverandør	Beløp	Type	Mottatt fra NETS	Sendt til Eye-Share	Fil navn
10262	31.12.2020	Torghatten Mund AS	Dinco AS	19 245,63	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...
455884	30.12.2020	Fossum Norge SpA AS	Eing Hansen Raskeland Troms	1 002,92	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
455886	30.12.2020	Fossum Norge SpA AS	Eing Hansen Raskeland Troms	1 212,72	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
455885	30.12.2020	Fossum Norge SpA AS	Eing Hansen Raskeland Troms	3 108,08	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
8211014	31.12.2020	Geddebu AS	Tecum Ventilation Sør AS	3 632,00	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
1011633	31.12.2020	Torg-Hatten Mund AS	Lukemur AS	208,75	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...
1011635	31.12.2020	Torg-Hatten Mund AS	Lukemur AS	1 417,50	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...
1011610	31.12.2020	Torg-Hatten Mund AS	Lukemur AS	2 243,75	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...
1011634	31.12.2020	Torg-Hatten Mund AS	Lukemur AS	202,50	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...
2020-541610	28.12.2020	Penta Form AS Leidsansatte	Rosenløkken AS	28 980,00	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
5238	31.12.2020	Penta Form AS	Rosenløkken HANDELING	450,00	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
2020-541609	28.12.2020	Penta Form AS Leidsansatte	Rosenløkken AS	3 325,00	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
40764	31.12.2020	Kjøtt og Fiskehandel AS	CDO Trollden AS	342,75	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
85914	31.12.2020	Trondheim Skolekantine AS	Horsengrensen Pappir Papirhus	1 077,56	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
21790	31.12.2020	Torg-Hatten Mund AS	Finke Mekaniserings Bedrift AS	4 641,40	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...
20321	31.12.2020	Torg-Hatten Mund AS	Finke Mekaniserings Bedrift AS	50 650,00	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
801502320	30.12.2020	Trysilbyggingsselskapet AS	Vikner AS	915,00	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
8210980	30.12.2020	Geddebu AS	Tecum Ventilasjon Sør AS	8 815,00	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
210000049	04.01.2021	Torg-Hatten Mund AS	Tulle SA	3 704,25	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...
85186	15.11.2020	Trysilbyggingsselskapet AS	Strömbergsgårdens Betong og Byggeteknikk AS	3 689,24	Faktura	31.12.2020	31.12.2020	pTORASA.PRODEFAKTB2B_OUT_20201231T070500...
AS64016082	30.12.2020	Torg-Hatten Mund AS	Aldreid AS	35 101,08	Faktura	31.12.2020	31.12.2020	pTORGHA.PRODEFAKTB2B_OUT_20201231T070500...



**TORGHATTEN**  
SERVICESENTER

---

**År**

2020 ▼

---

**Måned**

Alle ▼

---

**Leverandør**

Alle ▼

---

**Mottaker**

Alle ▼

---

**Faktura nummer**

Alle ▼

---

**Faktura dato**

Alle ▼

---

**Faktura total**

Alle ▼

### Utgående EHF filer (Godkjønte)

Faktura nr.	Faktura dato	Leverandør	Mottaker	Faktura total	Tilbakemelding fra NETS
84864	31.12.2020	Fosen Havnemøbler AS	Burud AS	2 335 463,37	Videresendt til mottaker
84903	31.12.2020	Fosen Havnemøbler AS	Aldre og vudu3	2 583 750,00	Videresendt til mottaker
103703	31.12.2020	Torgatten Servicecenter AS	Hogstadius AS	24 758,75	Videresendt til mottaker
103727	31.12.2020	Torghatten Servicecenter AS	Hogstadius AS	1 937,50	Videresendt til mottaker
107793	31.12.2020	Pindsetorvet Hyppeløsning AS	Gross Gruppen AS	7 071,89	Videresendt til mottaker
107837	31.12.2020	Pindsetorvet Hyppeløsning AS	Aldre og vudu3	795 000,00	Videresendt til mottaker
108345	31.12.2020	Siv Hjeltnes Interiør AS	Nysæte AS	3 666,00	Videresendt til mottaker
108346	31.12.2020	Siv Hjeltnes Interiør AS	Mofas AS	5 500,00	Videresendt til mottaker
108347	31.12.2020	Siv Hjeltnes Interiør AS	Geop R. Gullhus	1 526,25	Videresendt til mottaker
108350	31.12.2020	Siv Hjeltnes Interiør AS	Hjelpeland Ennerebank	11 445,00	Videresendt til mottaker

### Utgående EHF filer (Avviste)

Faktura nr.	Faktura dato	Leverandør	Mottaker	Faktura total	Tilbakemelding fra NETS
133961	31.12.2020	Torgatten Servicecenter AS	Winst AS	21 552,28	Receiver not found, invoice rejected since sender chosen no-print option
369865	31.12.2020	IIS Bil og Uteraketter AS	Ople AS	1 537,50	Receiver not found, invoice rejected since sender chosen no-print option
369902	31.12.2020	TTS Bil og Uteraketter AS	Ople AS	1 724,25	Receiver not found, invoice rejected since sender chosen no-print option
176342	29.12.2020	Torsdalen AS	Dette Gruppen og Løgren AS	4 125,00	Receiver not found, invoice rejected since sender chosen no-print option
324236	16.12.2020	Fosen Vedtvedt AS	MTS Transport AS	10 835,28	Schematron validation error: CEN-EN16931-UBLxsl[BR-27]-The item net price (BT-146) shall NOT be ...
133906	30.11.2020	Torgatten Servicecenter AS	Winst AS	33 799,92	Receiver not found, invoice rejected since sender chosen no-print option
20668	06.11.2020	Fosen Vedtvedt AS	FINEVIA KPMR & TØNNEBOEDT ...	6 515,13	Schematron validation error: PEPOL-EN16931-UBLxsl[PEPPOL-EN16931-R120]Invoice line net amo...
133812	31.10.2020	Torgatten Servicecenter AS	Moss Møbler AS	11 059,96	Receiver not found, invoice rejected since sender chosen no-print option
84674	07.10.2020	Fosen Havnemøbler AS	Fraen Kommune	1 190,00	Receiver not found, invoice rejected since sender chosen no-print option
175929	30.09.2020	Torsdalen AS	T... .. Kommune	5 342,40	Receiver not found, invoice rejected since sender chosen no-print option

### Faktureres ikke med EHF

Konsern selskap nr.	Reskontro	Kunde	Faktureringsprofil
1	11704	CIC Hjeltnes AS	Faktura som PDF til epost
1	11704	CIC Hjeltnes Service AS	Faktura som PDF til epost
1	11704	Eco Skriver AS	Faktura som PDF til epost
1	11704	Elvegrus	Faktura som PDF til epost
1	11704	Moss Bil AS	Faktura som PDF til epost
1	11704	Nordland Truss	Faktura som PDF til epost
1	11704	Thorn Truss AS	Faktura som PDF til epost
1	11759	Rippen Bedding AS	Papirutskrift vanlig ordre

Utgående EHF

jan feb mar apr mai jun jul aug sep okt nov des

**Klikk for å sjekke EHF brukere i ELMA Registrert**

Utgående EHF filer: N\data\certificates\sendingprocess\sendmessage "Send"

Anskaffelsesprosessen      Avtaler og regelverk      Innkjøpsledelse      Samfunnsansvar      Innovasjon

Kilde: Digitaliseringsdirektoratet

Her kan du søke i virksomheter som er registrert som mottakere av EHF faktura i ELMA-registeret.

Publisert: 10. apr 2014, Sist endret: 26. mar 2021

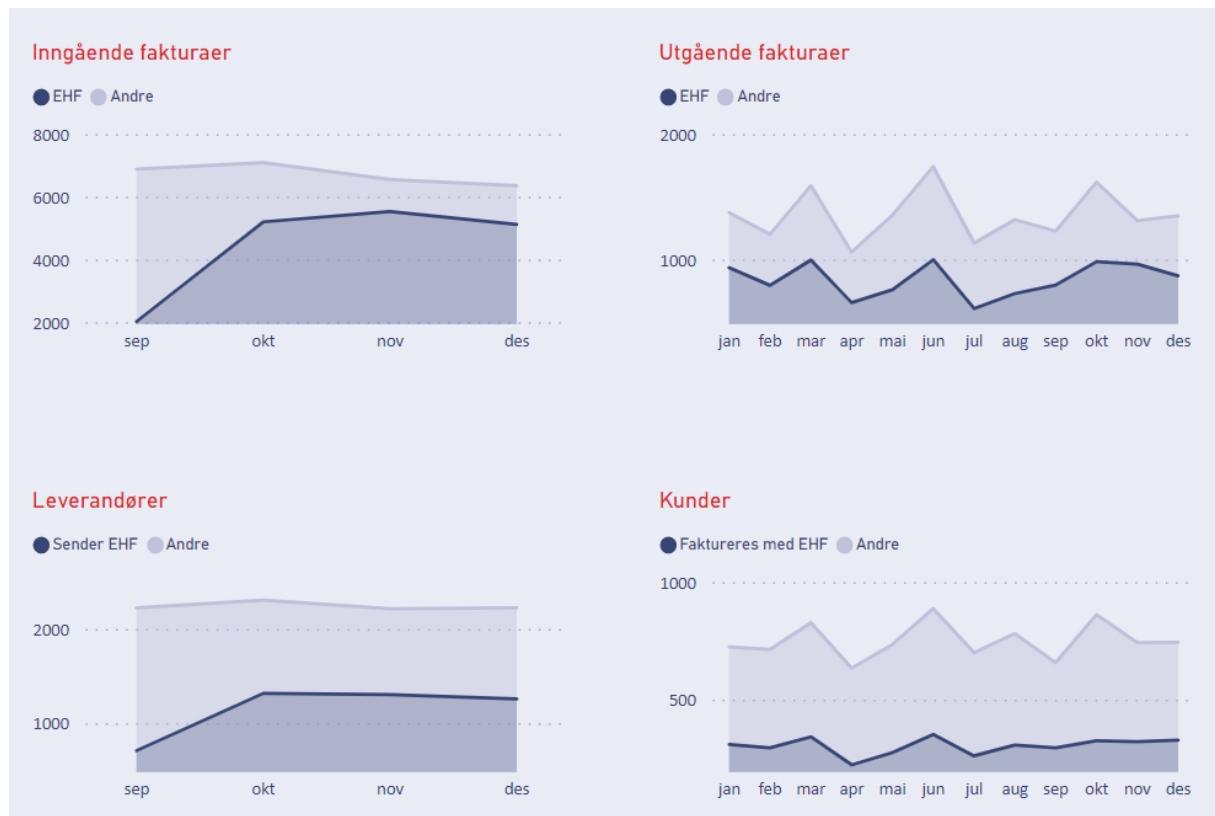
## Hva er ELMA

## Hente ut alle dataene via Datahotellet

## Hvordan bli registrert som mottaker i ELMA eller bytte økonomisystem/aksesspunkt

 Klikk for å sjekke EHF brukere i ELMA Registeret

The report shows the number of e-invoices that are being sent and received across the holding, in relation to the number of paper invoices and invoices sent through email:



## PROCESS AUTOMATION: TICKETING REPORTS (AZURE APP SERVICE + AZURE SQL)

### Objective

Ferry crews must report ticket sales daily. The reporting process involved a great deal of paperwork and much of manual input. Crews had to fill out paper reporting schemes and send them to the central office.

Accountants in the office had to register reports in the accounting system manually. An average ferry company could generate as many as 30 000 sales transactions per month. The holding owns 5 ferry companies which use 3 different types of ticketing systems.

The goal was to eliminate 100% of paperwork and 90% of manual work.

### Optimized reporting process

Tools: Azure App Service (ASP.NET Core), Azure SQL, RPA (Blue Prism). Manual reporting and accounting process has been fully eliminated. Sales reports are being exported automatically from the ticketing system to a dedicated OLTP database (Azure SQL). Sales transactions are then mapped with corresponding account numbers and exported automatically to the accounting system. The process can be controlled by both crews and accountants through a dedicated web application.

It is still possible to register ticket sales manually for example in case of communication failure in the ticketing system (a sale transaction has been registered in the ticket-machine but has not been transferred to the dedicated back system)

### Ticketing reports: screenshots

A screenshot of a web browser showing the 'BILLETTOPPGJØR FNS' registration form. The browser's address bar shows 'azurewebsites.net' with a red box highlighting the domain. The form has a teal header with the text 'BILLETTOPPGJØR FNS'. Below the header, there are two input fields: 'Debitornummer' and 'Email adresse'. Below the email field, there is a small text label 'Email du var registrert med som bruker.' and a yellow button labeled 'Billettoppgjør'.

A screenshot of the 'BILLETTOPPGJØR FNS' report page. The page has a teal header with the text 'BILLETTOPPGJØR FNS'. Below the header, there is a section titled 'Ukjent Ukjent' with the email 'ukjent@ukjent.no'. To the right of this section, there are filters for 'Operator:' (40703), 'Uke:' (26), and 'År:' (2021), followed by a red 'Søk' button. Further right, there are links for 'Last ned Excel', 'Manuell skift input', 'Alle skift per uke', and 'Operatorliste'. Below this, there is a table with 12 columns: 'Dato', 'Skift Nr.', 'Total FARA NOK', 'Voucher NOK', 'Total Bank NOK', 'Korrigerings NOK', 'Utbetale til FNS NOK', 'Innkastnr. kontant', 'Dato innbet / safe', 'Kommentar', 'Fartøy', and an empty column. The table contains 8 rows of data, including a 'Total:' row at the bottom. The 'Fartøy' column contains 'MS Frøyfart' for the last three rows. The last column contains buttons: 'Åpent' for the first four rows and 'Eksportert' for the last three rows.

Dato	Skift Nr.	Total FARA NOK	Voucher NOK	Total Bank NOK	Korrigerings NOK	Utbetale til FNS NOK	Innkastnr. kontant	Dato innbet / safe	Kommentar	Fartøy	
04.07.2021	1188	7328.00	0.00			7328.00					Åpent
03.07.2021	1187	8757.00	0.00			8757.00					Åpent
02.07.2021	1186	9522.00	0.00			9522.00					Åpent
01.07.2021	1185	2199.00	0.00			2199.00					Åpent
30.06.2021	1184	3594.00		3594.00		0.00				MS Frøyfart	Eksportert
29.06.2021	1183	1184.00		1184.00		0.00				MS Frøyfart	Eksportert
28.06.2021	1182	3633.00		3633.00		0.00				MS Frøyfart	Eksportert
Total:		36217.00	0.00	8411.00	0	27806.00					

## Ticketing reports: screenshots

BILLETTOPPGJØR FNS

Alle operatører Uke: 26 År: 2021 Søk Last ned Excel Ukerapport per operator

Uke rapport

Operator	Dato	Skift Nr.	Total FARA NOK	Voucher NOK	Total Bank NOK	Korrigerig NOK	Utbetale til FNS NOK	Innkastnr. kontant	Dato innbet / safe	Kommentar	
40703	04.07.2021	1188	7328.00	0.00			7328.00				Åpent
40743	04.07.2021	688	1240.00	0.00			1240.00				Åpent
40715	04.07.2021	11	17527.00	0.00			17527.00				Åpent
177006	04.07.2021	255	1180.00		1180.00		0.00				Eksportert
177004	04.07.2021	178	310.00	0.00			310.00				Åpent
40703	03.07.2021	1187	8757.00	0.00			8757.00				Åpent
40715	03.07.2021	10	8515.00	0.00			8515.00				Åpent
177004	03.07.2021	177	424.00	0.00			424.00				Åpent
40743	03.07.2021	687	1091.00	0.00			1091.00				Åpent

```

namespace FNS_SalesRapport
{
    2 references
    public class Startup
    {
        private IConfiguration config = null;

        0 references
        public Startup(IConfiguration config)
        {
            this.config = config;
        }

        0 references
        public void ConfigureServices(IServiceCollection services)
        {
            services.AddControllersWithViews();
            services.AddDbContext<SalgRptDbContext>(options => options.UseSqlServer(this.config.GetConnectionString("FNS_SalgConnection")));
            services.AddSingleton<DataProtectionPurposeStrings>();
        }

        0 references
        public void Configure(IApplicationBuilder app, IWebHostEnvironment env)
        {
            if (env.IsDevelopment())
            {
                app.UseDeveloperExceptionPage();
            }

            //app.UseExceptionHandler("/Error");
            //app.UseDeveloperExceptionPage();
            app.UseStatusCodePages();
            app.UseStaticFiles();

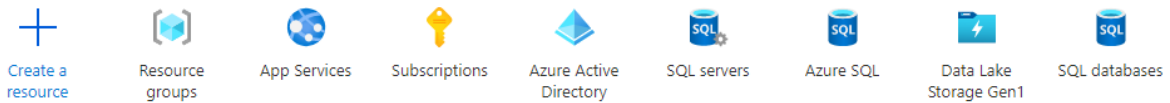
            app.UseRouting();
        }
    }
}

```







- FNS\_SalesRapport
  - Connected Services
  - Dependencies
  - Properties
  - wwwroot
  - Controllers
    - HomeController.cs
  - Models
    - BankRapport.cs
    - Operator.cs
    - SaleRapport.cs
    - SaleRapport\_Table.cs
    - SalgRptDbContext.cs
    - SambName.cs
    - SkipName.cs
    - TestID.cs
  - Security
  - Views
    - Home
      - Admin.cshtml
      - Edit.cshtml
      - Index.cshtml
      - LogIn.cshtml
      - ManueltSkift.cshtml
      - OperatorEndring.csh
      - OperatorListe.cshtml
      - UkeRapporter.cshtml
    - Shared
      - \_ViewImports.cshtml
      - \_ViewStart.cshtml
  - appsettings.json

## Ticketing reports: screenshots

### Azure services



### Recent resources

Name	Type	Last Viewed
 TSS_Dev	Resource group	a month ago
 Torghatten Azure Enterprise	Subscription	a month ago
 FNSSalesRapport20201120150227	App Service plan	a month ago
 FNSSalesRapport	App Service	a month ago
 FNS_SalesRapport_db	SQL database	4 months ago
 KESalesRapport202110120150227	App Service	5 months ago

## PROCESS AUTOMATION: TICKETING REPORTS (DESKTOP + MS SQL)

### Objective

Bus drivers must report ticket sales daily. The reporting process involved a great deal of paperwork and a lot of manual input. The drivers had to fill out paper reporting schemes and send them to the central office. Accountants in the office had to register reports in the accounting system manually.

The goal was to eliminate 100% of paperwork and 90% of manual work.

### Optimized reporting process

Tools: Desktop App (C#), MS SQL, RPA (Blue Prism). Manual reporting and accounting process has been fully eliminated. Sales reports are being exported automatically from the ticketing system to a dedicated OLTP database (MS SQL). Sales transactions are then mapped with corresponding account numbers and exported automatically to the accounting system. The process can be controlled by accountants through a dedicated desktop application.

It is still possible to register ticket sales manually for example in case of communication failure in the ticketing system (a sale transaction has been registered in the ticket-machine but has not been transferred to the dedicated back system)

## Ticketing reports: screenshots



Filter

Selskap: 964 Operator: Med skift > 0 Periode: 202105 Avdeling: Tromsø [Søk](#)

Status 964-202105

Avsluttet: JA Eksportert: JA Fakturagrunnlag gods: JA [Periodeevaluering](#)

Sjåføroppgjør Rekvvisjoner Gods Åpne poster

Dobbelklikk rad for å redigere skiftet Selskap: 964 Periode: 202105 Operator: — [Null skift](#) Database oppdatert: 06.07.2021 [Last ned Excel](#)

ID Skift nr og Dato	Kontant FR	Voucher FR	Bank Krt FR	Modif. FR	TOTAL FARA	Kontant OP	Kontant Dato	Voucher OP	Bank Krt OP	TOTAL OPPG	Avvik	Kommentar
9641006 451 02.05.2021	0	0	135	0	135	0		0	135	135	0	
9641006 453 06.05.2021	0	0	1530	0	1530	0		0	1530	1530	0	
9641006 454 06.05.2021	0	0	30	0	30	0		0	30	30	0	
9641006 455 07.05.2021	0	0	855	0	855	0		0	855	855	0	
9641006 456 10.05.2021	0	0	585	0	585	0		0	585	585	0	
9641006 461 11.05.2021	0	0	45	0	45	0		0	45	45	0	
9641006 463 12.05.2021	0	0	1040	0	1040	0		0	1040	1040	0	
9641006 466 21.05.2021	0	0	195	0	195	0		0	195	195	0	
9641006 468 22.05.2021	0	0	135	0	135	0		0	135	135	0	
9641006 469 24.05.2021	0	0	495	0	495	0		0	495	495	0	
9641006 472 25.05.2021	0	0	855	0	855	0		0	855	855	0	
9641006 473 26.05.2021	0	6050	0	0	6050	0		6050	0	6050	0	
<b>Total ID 9641006</b>	<b>0</b>	<b>6050</b>	<b>5900</b>	<b>0</b>	<b>11950</b>	<b>0</b>		<b>6050</b>	<b>5900</b>	<b>11950</b>	<b>0</b>	
9641007 337 03.05.2021	0	0	210	0	210	0		0	210	210	0	
9641007 338 04.05.2021	0	0	255	0	255	0		0	255	255	0	
9641007 339 05.05.2021	0	0	315	0	315	0		0	315	315	0	
9641007 340 05.05.2021	0	0	720	0	720	0		0	720	720	0	
9641007 341 10.05.2021	0	0	630	0	630	0		0	630	630	0	
9641007 342 11.05.2021	0	0	300	0	300	0		0	300	300	0	
9641007 343 12.05.2021	0	0	1494	0	1494	0		0	1494	1494	0	
9641007 344 18.05.2021	0	0	180	0	180	0		0	180	180	0	
9641007 345 19.05.2021	0	0	225	0	225	0		0	225	225	0	
9641007 346 19.05.2021	0	0	90	0	90	0		0	90	90	0	
9641007 347 19.05.2021	0	0	540	0	540	0		0	540	540	0	
9641007 348 25.05.2021	0	0	1080	0	1080	0		0	1080	1080	0	
9641007 349 26.05.2021	0	0	405	0	405	0		0	405	405	0	
9641007 350 26.05.2021	0	0	1435	0	1435	0		0	1435	1435	0	
<b>TOTAL PERIODE:</b>	<b>135</b>	<b>19860</b>	<b>194434</b>	<b>-135</b>	<b>214294</b>	<b>0</b>		<b>19860</b>	<b>194434</b>	<b>214294</b>	<b>0</b>	

## Ticketing reports: screenshots

Filtre  
 Selskap: 964 Operator: Med skift > 0 Periode: 202105 Avdeling: Tromsø **Søk**

Status 964-202105  
 Avsluttet: JA Eksportert: JA Fakturagrunnlag gods: JA **Periodeavslutning**

Sjåføroppgjør | **Rekvisisjoner** | Gods | Åpne poster

Registrerte rekvisisjoner 964-202105 **Last ned Excel**

OPERATOR	SKIFT	ANTALL	BLP FR	BLP OP	AVVIK
9641006	473	3	6050	6050	0
9641020	753	1	3000	3000	0
9641053	317	2	1740	1740	0
9641060	469	1	570	570	0
9641060	471	2	1080	1080	0
9641060	472	1	450	450	0
9641060	473	1	450	450	0
9641061	676	1	810	810	0
9641079	395	1	1080	1080	0
9641109	206	2	4000	4000	0
9641138	43	1	630	630	0

Innleverte rekvisisjoner 964-202105 **Last ned Excel**

OPERATOR	DATO	ANTALL	BLP	KATEGORI
9641006	26.05.2021	1	6050	Billett
9641020	26.05.2021	1	3000	Billett
9641053	06.05.2021	2	1740	Billett
9641060	03.05.2021	1	570	Billett
9641060	05.05.2021	2	1080	Billett
9641060	06.05.2021	1	450	Billett
9641060	06.05.2021	1	450	Billett
9641061	20.05.2021	1	810	Billett
9641079	04.05.2021	1	1080	Billett
9641109	11.05.2021	1	4000	Billett
9641138	03.05.2021	1	630	Billett

Kontroll **OK**

KILDE	BLP
Registrert	19860
Innlevert	19860
Avvik	0

THB\_driftsrapporter

Database Diagrams

Tables

System Tables

FileTables

External Tables

dbo.DImTBL

dbo.FactTBL

dbo.tblAvdeling

dbo.tblAvregning

dbo.tblBetaTerminal

dbo.tblBlockKntnl

dbo.tblBrukerStedID

dbo.tblEMV

dbo.tblFara

dbo.tblGodsFara

dbo.tblGodsModif

dbo.tblHovedSelskap

dbo.tblNrDKT

dbo.tblOperator

dbo.tblOperatorRPA

dbo.tblOppgPapir

dbo.tblPayEx

dbo.tblPeriodeAvslut

dbo.tblRekvisisjonManuell

dbo.tblRute

dbo.tblTeller

dbo.tblTellerBrukerSted

dbo.tblAapnePost

Views

External Resources

Synonyms

Programmability

Service Broker

## Ticketing reports: screenshots

```
1 reference
private void comboOperIdOgPeriodePopulate(ComboBox cmbID, ComboBox cmbPrd, int ruteId, Label lblAvd)
{
    if (ruteId == 0)
    {
        return;
    }

    string sqlStrRuteID = "select operid from tblfara where ruteid = " + ruteId + " group by operid order by 1";
    string sqlStrPrd = "select prd from vFara_PapirOppg where prd is not null and rutenr = " + ruteId + " group by prd order by 1 desc";
    string sqlStrAvd = "select rtrim(avdeling) as avdeling from tblrute where ruteID = " + ruteId;

    DataTable dt = new DataTable();

    //operator
    dt = ConstParam.SQLtoDt(sqlStrRuteID, ConstParam.ConnStringMdb, "t1");
    cmbID.Items.Clear();

    if (dt.Rows.Count > 0)
    {
        cmbID.Items.Add("Med skift > 0");
        cmbID.Items.Add("Med alle skift");
        cmbID.Items.Add("Kun med avvik");
        cmbID.Items.Add("Kun med voucher > 0");
        cmbID.Items.Add("Kun med kontant > 0");

        foreach (DataRow r in dt.Rows)
        {
            cmbID.Items.Add(r[0].ToString());
        }

        cmbID.SelectedIndex = 0;
        dt.Rows.Clear();
        dt.Columns.Clear();
    }

    //periode
    dt = ConstParam.SQLtoDt(sqlStrPrd, ConstParam.ConnStringMdb, "t1");
    cmbPrd.Items.Clear();

    if (dt.Rows.Count > 0)
    {
        foreach (DataRow r in dt.Rows)
        {
            cmbPrd.Items.Add(r[0].ToString());
        }

        cmbPrd.SelectedIndex = 0;
        dt.Rows.Clear();
        dt.Columns.Clear();
    }
}
```



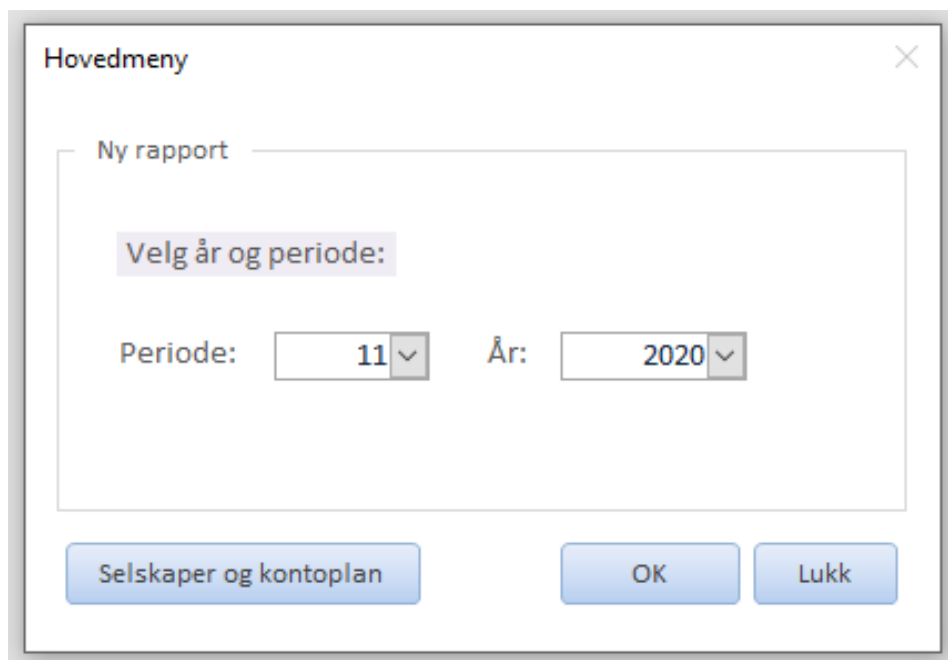
## PROCESS AUTOMATION: RECONCILIATION OF GROUP BALANCES, ACCESS + VBA

### Description

Reconciliation of group accounts has been made manually and involved reconciliation of internal revenues and costs inside the holding and elimination of those posts from the consolidated report. The main challenge in the process was to extract internal posts from the accounts that initially was not set up as group internal accounts in the charts of accounts.

The application that has been developed, had its own version of group account numbers, and could automatically query all the necessary posts from the accounting system. The reconciliation process has been considerably simplified and took now several hours to complete (the process took approximately 1 week per month before optimization)

### Reconciliation of group accounts: screenshots



The screenshot shows a window titled "Hovedmeny" with a close button (X) in the top right corner. Inside the window, there is a section labeled "Ny rapport" with a light blue border. Below this, there is a label "Velg år og periode:". Underneath, there are two dropdown menus: "Periode:" with the value "11" and "År:" with the value "2020". At the bottom of the window, there are three buttons: "Selskaper og kontoplan", "OK", and "Lukk".

## Reconciliation of group accounts: screenshots

### Konsernmellomværende



Periode: 11 2020

Dobbelklikk tilsvarende selskapsnavn:

Nr	Selskapsnavn	Eget regnskap	Motst. regnskap	Differanse
1	Torghatten ASA	2110000007	940005	-111000002
2	Torghatten Trafikkselskap AS	-15000005	-15000000	-0000004
5	Torghatten Buss AS	1000001	000000	000000
6	TTS Bil og Dekksenter AS	2060078	100004	150000
8	Sør-Helgeland Vaktselskap As	220009	200001	000008
11	Sørlandsruta AS	1000005	100000	100000
13	T-FINANS AS	20000000	000000002	000000009
15	Partsrederiet Kystekspresen Al	-10000000	1000000045	100000006
17	Bastø Fosen AS	-85000000	00000000	-85000000
20	Torghatten Servicesenter AS	0000001	1000003	0000002
25	Fosen Verkstedservice AS	150000	-30000	000000
55	Tromsø Busscharter AS	200000	000000	000000
75	FosenNamsos Sjø AS	-0000000	0000000	0000000
100	TrønderBilene as	-25000000	0000000	00000000
500	Torghatten Nord AS	1000000072	000000006	100000006

Hoved meny

Oppfrisk

Lage XLS rapport

Sammendrag Kunde - Leverandør Kortsiktige Langsiktige

Periode: 11 2020

Hoved selskap:

**Torghatten Trafikkselskap AS**

Motstående selskap:

**Torghatten ASA**

Samlet balanse:

Kunde kontoer 000000  
Leverandør kontoer 1000000

Samlet balanse:

Leverandør kontoer 000000  
Kunde kontoer 2000000

Differanse:

Kunde - Leverandør 100000  
Leverandør - Kunde 0

Kortsiktig gjeld 0  
Kortsiktig fordring 0

Kortsiktig fordring 0  
Kortsiktig gjeld 0

Krt. gjeld - Krt. fordr. 0  
Krt. fordr. - Krt. gjeld 0

Langsiktig gjeld 0  
Langsiktig fordring 20000000

Langsiktig fordring 0  
Langsiktig gjeld -20000000

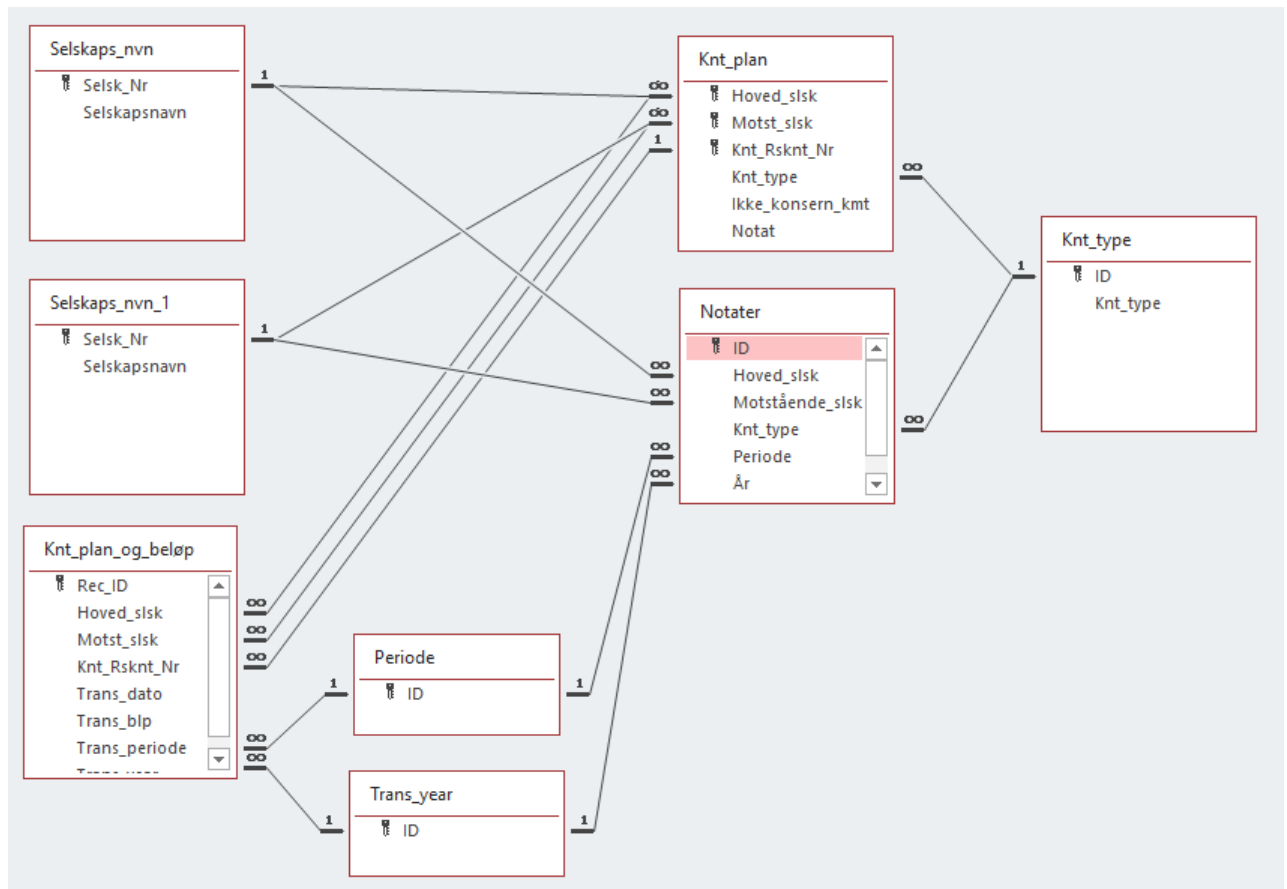
Lng. gjeld - Lng.fordr. 0  
Lng.fordr. - Lng. gjeld 0

TOTAL DIFF: 100000

<< Alle motst.

Oppfrisk

## Reconciliation of group accounts: screenshots



### Andre skjerm

- Hoved\_and\_Motst
- Hoved\_vs\_Motst
- Motst\_vs\_Hoved
- Sum\_Hoved\_and\_Motst
- Hoved\_and\_Motst-delskjema
- Selskap\_MVM

### Tredje skjerm KUNDE-LEVER

- Hvd\_vs\_Mts\_kunde1
- Hvd\_vs\_Mts\_lev2
- Mts\_vs\_Hvd\_kunde2
- Mts\_vs\_Hvd\_lev1
- Hoved\_Kunde\_vs\_Mot\_lev
- Hvd\_vs\_Mts\_kunde1-delskjema
- Hvd\_vs\_Mts\_lev2-delskjema
- Mts\_vs\_Hvd\_kunde2-delskjema1
- Mts\_vs\_Hvd\_lev1-delskjema

### Tabeller

- Knt\_plan
- Knt\_plan\_og\_beløp
- Knt\_type
- Notater
- Periode
- Selskaps\_nvn
- Trans\_year

### Første skjerm

- Hoved\_periode\_først
- Hoved\_sls\_total
- MAIN\_QUERY
- Most\_periode\_først
- Motst\_sls\_total
- MAIN\_QUERY-delskjema
- Total\_MVM

### HOVEDMENY

- Alle\_selskaper
- Felles\_kontoplan
- Alle\_konsernselskaper
- Alle\_selskaper-delskjema
- Felles\_kontoplan-delskjema1
- Kontoplan
- Ny rapport
- Selskaper og kontoer
- SlsMVM1\_Velg\_Oppfrisk
- Total\_Velg\_Oppfrisk
- Velg\_Oppfrisk

## Reconciliation of group accounts: screenshots

```
Sub InfoEasy()

Dim Prd As Integer ' rapportens periode
Dim Year As Long ' rapportens år

Dim Snnv_H_Knt(500, 10000) ' Konserninterne hovedkonti
Dim Snnv_R_Knt(500, 10000) ' Konserninterne reskontroer
Dim Snnv_H_Mnnv(500, 10000) ' konsernselskapsnavn og motstående selskapsnavn / hovedkonti
Dim Snnv_R_Mnnv(500, 10000) ' konsernselskapsnavn og motstående selskapsnavn / reskontroer
Dim i As Integer ' første matriseelement (500)
Dim a As Integer ' andre matrise element (10000)hovedkonto
'Dim b As Integer ' andre matrise element (10000)reskontro
Dim AntSls As Integer ' antall unike selskaper

Dim db As DAO.Database
Dim Rst As Recordset
Dim SqlStr As String ' sql string i Access
Dim y As Integer ' løkketeller

Prd = Forms![Total_Velg_Oppfrisk].Etikett19.Caption
Year = Forms![Total_Velg_Oppfrisk].Etikett20.Caption

'| ta med alle selskapsnavn
Set db = CurrentDb()

Set Rst = CurrentDb.OpenRecordset("SELECT Selskaps_nvn.Selsk_Nr " & _
"FROM Selskaps_nvn " & _
"ORDER BY Selskaps_nvn.Selsk_Nr;")

With Rst
Do While Not .EOF
Snnv_H_Knt(i, a) = ![Selsk_Nr] ' selskapsnummer / hovedkonti
Snnv_R_Knt(i, a) = ![Selsk_Nr] ' selskapsnummer / reskontroer
i = i + 1
.MoveNext
Loop
End With
AntSls = i ' tilordner antall selskaper
i = 0

'*****H O V E D*****
For y = 0 To AntSls - 1 ' begynner å ta med alle tilsvarende HOVED kontonummre

a = 0
```

## PROCESS AUTOMATION: ACCOUNTING INPUT, EXCEL + VBA

### Description

This VBA-driven Excel model takes a csv file with accounting posts as an input, reworks the posts, maps them with corresponding accounting dimensions and produces an output in a form of a specifically structured text file (DKT-formatted file) that can be exported automatically to the accounting system (InfoEasy). The model helps to avoid hours of manual work in case when accountants must regularly register incoming external documents with hundreds or even thousands of typical accounting posts.

### Accounting input: screenshots

Kildefil:	C:\Tools\Kildefiler\5 Torghatten Buss AS\LeaseWeb bilagregistrering\Kildefil tekst\
Kildefil arkiv:	C:\Tools\Kildefiler\5 Torghatten Buss AS\LeaseWeb bilagregistrering\Kildefil tekst\Arkiv\
DKT fil:	Arkiv\DKT\

Neste bilagsnummer:	96824
Neste DKT filnummer:	86
Periode:	
År:	
Faktura nummer:	
KID:	

Fil Import

DKT Eksport

Filimport

Inndata

Bilagsnummer

96824

Periode

Fakturanummer

05-2021

KID

06-2021

07-2021

08-2021

09-2021

10-2021

Ok

## Accounting input: screenshots

## Leasing DNB Torgatten Buss AS

[illegible]

### Konto mapping \*

Kode	Navn	Konto
102	Utkjøp	0
104	Forsk. leie	6012
105	Utkjøp	0
109	Kilometeravregning	0
125	Avgiftskrav	0
215	Miljøgebyr	0
235	Park.bot	0
240	Overlast	0
245	Årsavgift	7508
246	Bomp.bøter	0
250	Km.avg.	0
252	Vektavgift	7508
254	Overkjørt km	0
255	Refusjon bot	0
256	Bot piggdekk	0
270	Månedlig leie	6012
271	Månedlig leie	6012
272	Merverdiavgift	2710
293	Øresavrunding	2999
299	Pantepate	2155

## Accounting input: screenshots

```
Public Sub filExport_Excel() '!! textfil eksport til Excel model

Dim filSti As String 'filsti og filnavn
Dim filStiArkiv As String 'filsti arkiv
Dim filNavn As String 'filnavn
Dim filNum As Integer
Dim txtLinje As String
Dim fso As New FileSystemObject
Dim bilagPost() As String
Dim bilagTotal As Double
Dim radNr As Integer 'radnummer excel ark

filSti = Range("M3")
filStiArkiv = Range("M4")
filNavn = Dir(filSti)
radNr = 4

If filNavn <> "" Then ' hvis det finnes noe som skal eksporteres

    Range("A4:I617").Select
    Selection.ClearContents
    Range("A4").Select

End If

While filNavn <> "" ' hver fil i filsti

    ' hvis filen er txt
    If InStr(1, filNavn, ".txt", vbTextCompare) > 1 Then

        'Åpne filen
        FileNum = FreeFile()
        Open filSti & filNavn For Input As #FileNum
        bilagTotal = 0
```

# RPA: PROJECT EXAMPLES

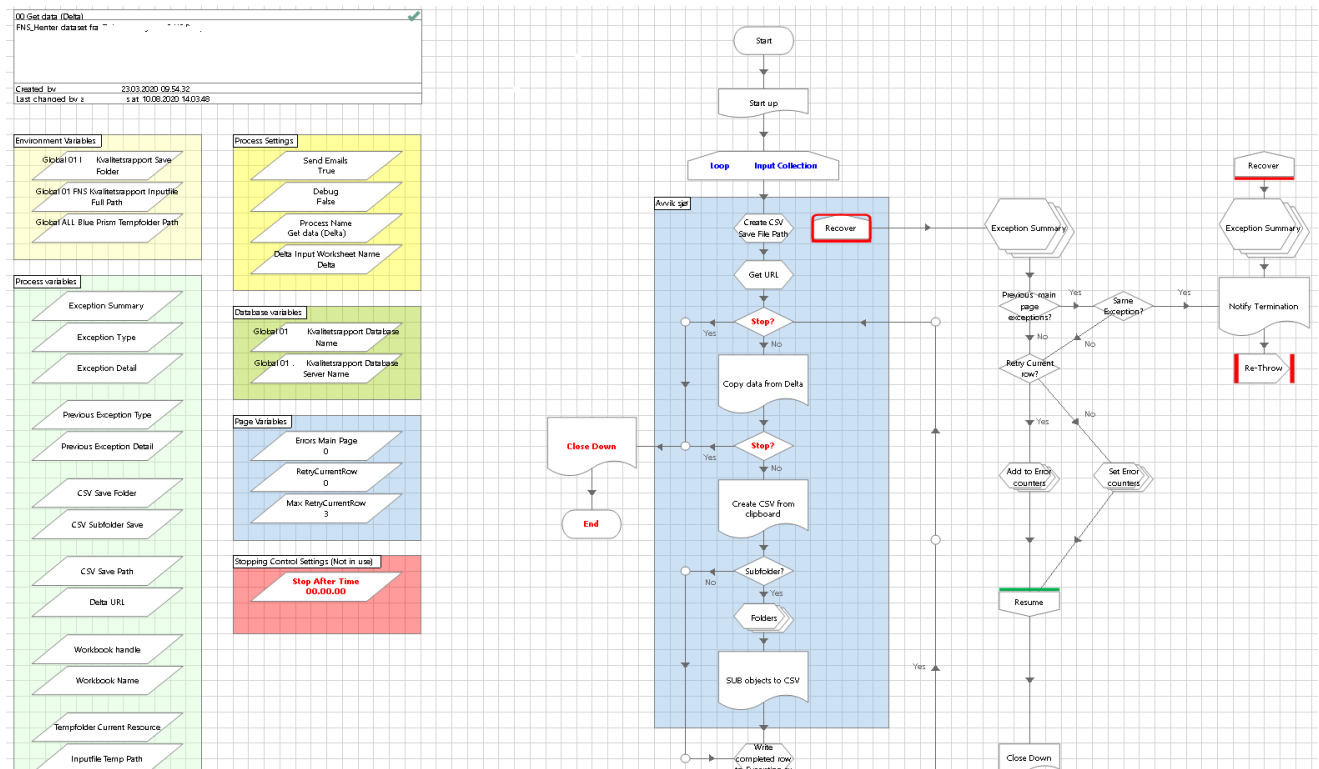
## Objective

The holding uses Blue Prism as RPA tool (public information). The tool is used rather intensively to perform the following tasks:

- Read table-formed reports from internal and external web-based applications and transfer the data to a dedicated database
- Write input into the accounting system (new subaccount numbers, new posts, invoices, and accounting dimensions)
- Read voluminous and structured Excel reports, rework the data into accounting posts and register the posts in the accounting system
- To initiate a script or a pre-programmed event in a user application when it is not possible to automate this in some other way

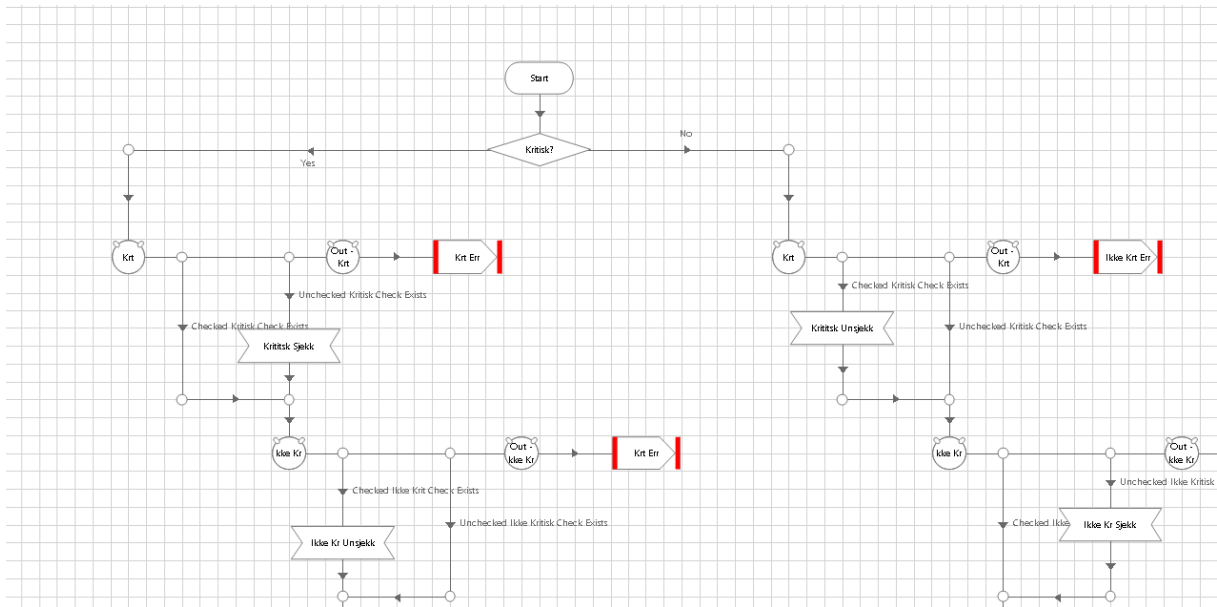
There are more than 10 major RPA processes in use with two RPA licenses across the holding.

## RPA: screenshots





## RPA: screenshots



Kunde Nummer: 09564

Leverandør

Næringsopplysninger Regnskap

Navn: Fødselsnummer: Org.nummer:

Adresse: Postboks: Land: Telefon: Telefax: Mobiltelefon: E-post-adresse:

Ny kunde eller leverandør

Ny Kunde: 09564

Ny Leverandør: 09564

Valutakode: NOK

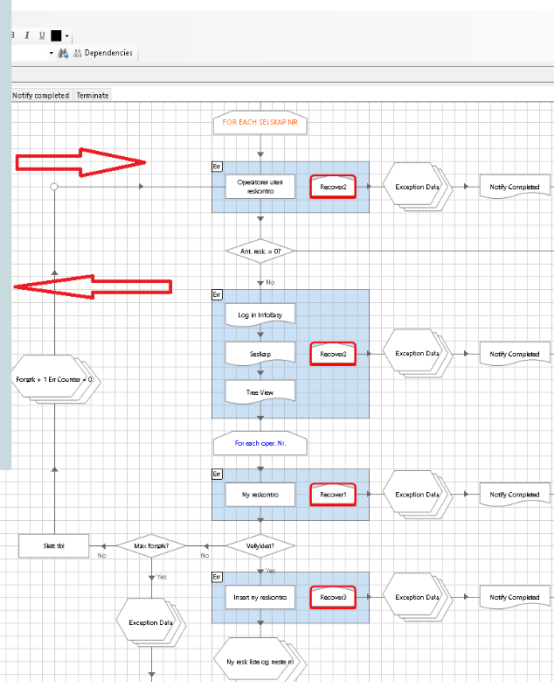
Salgs vedtelling: 1 - Standard

Formål med lagring: Ikke angitt

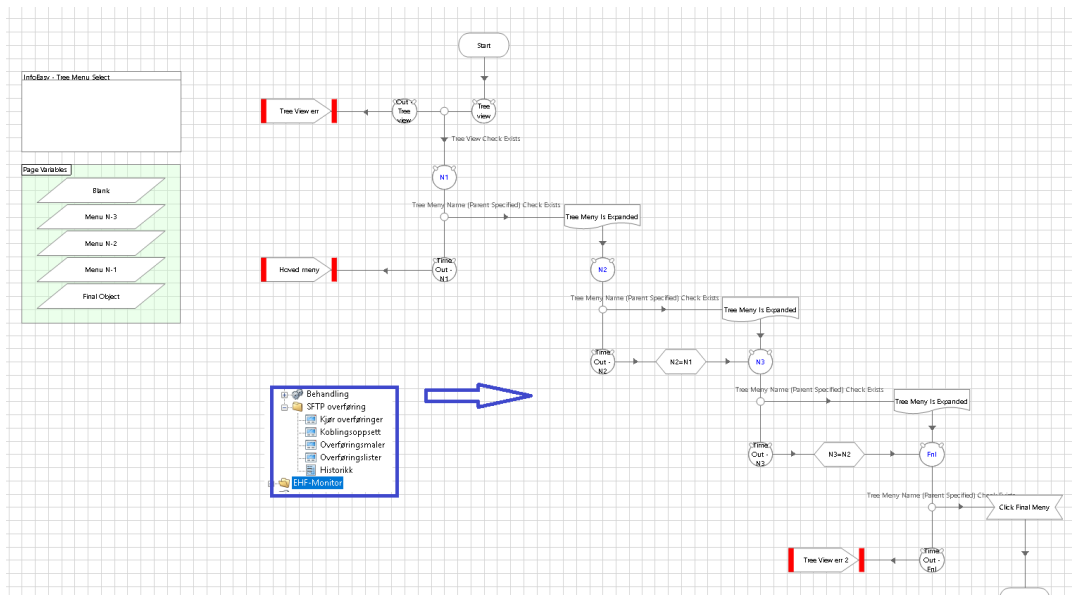
Sant/sikke til bruk: Ikke angitt

Type: ☒ Privat ☐ Nærings

Trykk opp...



## RPA: screenshots



## RPA: SOME OBSERVATIONS

- RPA is a brilliant technology which sometimes can be “the one and only” way to extract or export data automatically. It is quite reliable (if used properly), relatively cheap and as a rule has a short payback period (9-12 month).
- RPA tool, on the other hand, is not a “silver bullet” or “one-size-fits-all” solution. It seems that for example Blue Prism works perfectly well with applications where user interface was made using Microsoft products (C#) and can sometimes function unpredictably in an application where UI programming language is Java. Not all UI elements can be identified and not always. Even when all of them can be “found” by an RPA tool, it is not a 100% guaranty that the application itself can “tolerate” this (however this situation can be “cured” quite effectively by use of an integrated C# or VB.Net scripts inside of the RPA process)
- Best if an automation project does not rely completely and solely on the use of an RPA tool alone. A combination of different tools can be a more effective solution (for example a combination of SSIS packages and RPA tools)
- Despite some instructions that recommend not to use “pure” scripts (VB.NET, C#) inside of an RPA processes, are such scripts extremely helpful in some complex situation. In general, it can be said that an RPA developer should have at least basic understanding of programing concepts and patterns (such as for example reusability of code). Otherwise, it is highly likely that both RPA processes and the development process itself can at least become unmanageable after the number of developed objects and processes reaches not more then 10-15 pieces (which is not many, especially in a large company or holding)

## LEVEL OF COMPETENCE: SQL

### What I know and what I can

- All basic and some advanced CRUD operations
- Nested queries, unions, virtual tables
- Conditional operators (CASE WHEN etc.) and looping through a record set (virtual table)
- Ordering and grouping inclusive ROLLUP etc.
- Windows functions, all data types, use of variables etc.

```
-- ERFA ERFA ERFA ERFA
with alv_grad as
(
select  fv.fkObject
,dl.DisplayText
,lf.fkSelectionList
from delta_Lang dl
left join delta_SelectionListLeaf lf on dl.pkLang = lf.fkLang_Display
left join delta_FieldValue fv on lf.pkSelectionListLeaf = fv.fkSelectionListLeaf
where lf.fkSelectionList = 17
),
hend_type as
(
select  fv.fkObject
,dl.DisplayText
,lf.fkSelectionList
from delta_Lang dl
left join delta_SelectionListLeaf lf on dl.pkLang = lf.fkLang_Display
left join delta_FieldValue fv on lf.pkSelectionListLeaf = fv.fkSelectionListLeaf
where lf.fkSelectionList = 10
),
skjema_type as
(
select df.pkForm
,ot.SystemName
from delta_Form df
left join delta_ObjectType ot on df.fkObjectType = ot.pkObjectType
)
select convert(varchar,do.pkObject) + '_' + convert(varchar,GETDATE(),112) as RecID
```

```
declare @periode as int
set @periode = 201902

--avviste brikker
select Registered, PANID as [Brikke nr.], 'Billett pris' as ChargeType,
case when Debit_Credit = 'D' then ChargedGrossAmount else ChargedGrossAmount*-1 end as [Brutto pris],
case when Debit_Credit = 'D' then ChargedAmountVATRate else ChargedAmountVATRate*-1 end as [MAV sats],
case when Debit_Credit = 'D' then ChargedAmountVAT else ChargedAmountVAT*-1 end as [MVA blp],
case when Debit_Credit = 'D' then ChargedNetAmount else ChargedNetAmount*-1 end as [Netto pris],
case when Debit_Credit = 'D' then OBUIssuerFee else OBUIssuerFee*-1 end as Gebyr,
Debit_Credit, InformationCode, STLPostingDate,
case when DeviceType = 1 then 'Veikant' else 'Håndholdt' end as [Billett. utstyr],
STLTicketVersionNo, TicketCodeCharged, ChargedType, DeviceID, (RecID + 'Billettpris') as RecID
from FR_brikke_transer
where datepart(year, Registered) * 100 + datepart(month, Registered) = @periode
and rtrim(ChargedType) = 'NOTACCEPTED'
and InformationCode not in (0,100)
union all
```

# LEVEL OF COMPETENCE: C#, ASP.NET CORE

## What I know and what I can

- All the basic programming concepts
- Classes, interfaces, delegates, and events
- MVC model
- LINQ
- Entity Framework and database programming

```
//[ResponseCache(Location = ResponseCacheLocation.None, NoStore = true)]
0 references
public async Task<ActionResult> Index(string searchStringW, string searchStringY, string operID)//liste med alle skiftnumre
{
    ///this is regular operator
    //ViewBag.IsAdmin = 0;
    DateTime dtNow = DateTime.Now;
    int yrNow = dtNow.Year;

    //dropdown ukenumre + år
    List<SelectListItem> weeks = new List<SelectListItem>();
    List<SelectListItem> years = new List<SelectListItem>();
    string d_operID = protector.Unprotect(operID);

    foreach (var week in (db.vSaleRapports.AsEnumerable().Where(i => i.OperatorID == int.Parse(d_operID)).OrderByDescending(n => n.Aar*100 + n.UkeNr).Select(n => n.UkeNr).Distinct()))
    {
        if (!string.IsNullOrEmpty(week.ToString()))
        {
            weeks.Add(new SelectListItem { Value = week.ToString(), Text = week.ToString() });
        }
    }

    foreach (var yr in (db.vSaleRapports.AsEnumerable().Where(i => i.OperatorID == int.Parse(d_operID)).OrderByDescending(n => n.Aar).Select(n => n.Aar).Distinct()))
    {
        if (!string.IsNullOrEmpty(yr.ToString()))
        {
            years.Add(new SelectListItem { Value = yr.ToString(), Text = yr.ToString() });
        }
    }

    ViewBag.EncrOperId = operID;
    ViewBag.UkeNumre = weeks;
    ViewBag.AarNr = years;
    ViewBag.OperatorID = d_operID;
    ViewBag.ActUkeNr = searchStringW;
    ViewBag.EOperID = operID;
}
```

```
5 references
public class SalgRptDbContext : DbContext
{
    0 references
    public SalgRptDbContext (DbContextOptions<SalgRptDbContext> options) : base(options) { }

    18 references
    public DbSet<SaleRapport> vSaleRapports { get; set; }

    6 references
    public DbSet<BankRapport> VERIFONE_bankkort { get; set; }

    3 references
    public DbSet<SaleRapport_Table> SaleRapports { get; set; }

    2 references
    public DbSet<SkipName> SkipNvn { get; set; }

    2 references
    public DbSet<SambName> SambNvn { get; set; }

    0 references
    public DbSet<TestID> TestID { get; set; }

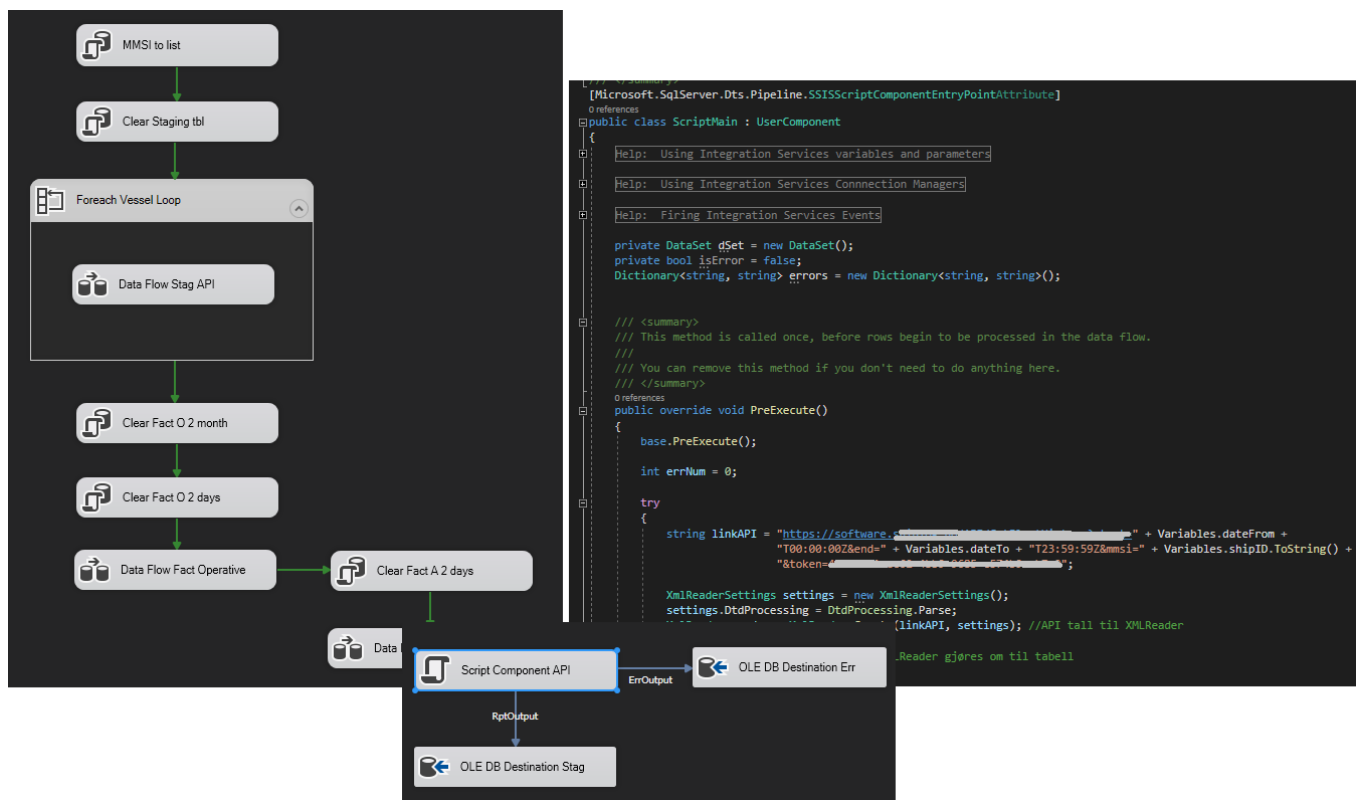
    15 references
    public DbSet<Operator> Primitve_LogIn { get; set; }

    //kyes
    0 references
    protected override void OnModelCreating(ModelBuilder modelBuilder)
    {
        modelBuilder.Entity<SaleRapport>().HasNoKey();
        modelBuilder.Entity<BankRapport>().HasKey(k => new { k.BAX, k.Avstem_nr, k.Avstem_dato});
        modelBuilder.Entity<SaleRapport_Table>().HasKey(k => new { k.OperatorID, k.SkiftNr, k.Skift_Dato });
    }
}
```

## LEVEL OF COMPETENCE: DWH AND ETL TOOLS (SSIS, APACHE AIRFLOW)

### What I know and what I can

- SSIS: advanced level inclusive scripting modules (C#) and migrating of packages to Azure Data Factory
- Apache Airflow – basic experience with DAG scripting
- Sound understanding of DWH theory and dimensional modeling techniques (Kimball)



## LEVEL OF COMPETENCE: PYTHON

### What I know and what I can

- DAG scripting
- All the basics related to variables, lists, dictionaries etc.
- Functions and classes
- Files and exceptions
- I/O, loops, conditions, and basic programming concepts

```
import requests
import json
import os
from file_directories import file_path
import sys
import yaml

#download config. fil / загрузка конфигурационного файла
def load_config(config_path):
    with open(config_path, mode="r") as yaml_file:
        config = yaml.safe_load(yaml_file)
        return config

def app(config):

    dates = ["2021-01-03", "2021-01-04", "2021-01-05", "2021-01-06"]
    create_dir = file_path()
    con = config["app"]

    #download API token / загрузка API-токена
    try:
        url = con["url_auth"]
        headers = {"content-type": con["content_type"]}
        data = {"username": con["username"], "password": con["password"]}
        r = requests.post(url, data=json.dumps(data), headers=headers)
        token = f"JWT {r.json()['access_token']}"
    except Exception:
```

## LEVEL OF COMPETENCE: STATISTICS

### What I know and what I can

- Basic concepts
- Averages, means and medians
- Central limit theorem, distributions, deviations, confidence intervals etc.
- Some advanced topics

## LEVEL OF COMPETENCE: POWER BI AND DAX

### What I know and what I can

- Power BI desktop, Power BI Service inclusive Gateway and Power BI API
- Integration of Power Apps into Power BI reports
- All the basic DAX operators and concepts, DAX is used mainly to make measurements in Power BI

## LEVEL OF COMPETENCE: RPA

### What I know and what I can

Blue Prism, UiPath, certified developer and solution architect



## LEVEL OF COMPETENCE: VBA

### What I know and what I can

- Excel + VBA, advanced level
- Access + VBA, advanced level

## LEVEL OF COMPETENCE: HTML, CSS

### What I know and what I can

All the basics that allow:

- to develop a web page with all standard UI elements
- to format web pages as necessary

```
ViewData["Title"] = "Edit";

<br />
<form class="form-inline">
  <br />
  <div class="form-group">
    <h3 style="margin-left: 7px;"> @ViewBag.OperNvn </h3>
    <h3>
      <label style="margin-left: 13px;" class="badge badge-secondary">@Model.OperatorID</label>
    </h3>
  </div>
</form>
<br />

<form class="form-inline">
  <div class="form-group">
    <h6 class="text-muted" style="margin-left: 8px;">Skift nummer:</h6>
    <h6 style="margin-left: 5px; color:#803E51">@Model.SkiftNr</h6>
    <h6 class="text-muted" style="margin-left: 25px;">Skift dato:</h6>
    <h6 style="margin-left: 7px; color:#803E51">@Model.Skift_Dato.ToString("dd.MM.yyyy")</h6>
    <h6 class="text-muted" style="margin-left: 25px;">Skift total NOK:</h6>
    <h6 style="margin-left: 7px; color:#803E51">@Model.Skift.Total</h6>
    <h6 class="text-muted" style="margin-left: 25px;">Voucher:</h6>
    <h6 style="margin-left: 7px; color: #803E51">@Model.Voucher</h6>
    <h6 class="text-muted" style="margin-left: 25px;">Bilagsnummer:</h6>
    <h6 style="margin-left: 7px; color: #803E51">@Model.BilagNr</h6>
    <h6 class="text-muted" style="margin-left: 25px;">Registrert av:</h6>
    <h6 style="margin-left: 7px; color: #803E51">@Model.registrertav</h6>
  </div>
</form>
<br />

if (Model.Skift_Eksportert == 1)
{
  <div class="form-row">
    <div class="form-group">
      <small class="form-text text-muted" style="margin-left: 13px;">Fartøy</small>
      <select class="custom-select my-1 mr-sm-2" id="ShipName" disabled style="width: 300px; height: 40px; margin-left: 14px;"><option selected>@Model.SkipNvn</option></select>
    </div>
    <div class="form-group">
      <small class="form-text text-muted" style="margin-left: 7px;">Samband</small>
      <select class="custom-select my-1 mr-sm-2" id="SambName" disabled style="width: 412px; height: 40px; margin-left: 7px;"><option selected>@Model.Samband</option></select>
    </div>
  </div>
<br />
}
```



## LEVEL OF COMPETENCE: JAVASCRIPT

### What I know and what I can

- Work with and iterate through UI elements on a web page
- Real-time content control and value extraction
- All the general basics

```
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js"></script>

<script>
//Dropdown avstem. total
$(function () {
    $('#AvstDt').change(function () {
        var dt = $('#AvstDt').val();
        //alert(dt);
        $.getJSON('/Home/BAXAmountList/?dt=' + dt,
            function (data) {

                var $states = $('#AvstTot');
                var $statesB = $('#AvstBAX');
                var $statesA = $('#AvstNr');

                $states.empty();
                $statesB.empty();
                $statesA.empty();

                var skiftTot = $('#SkiftTot').val()
                var korTot = $('#inputKor').val()

                var selValg = $('#AvstDt option:selected').text()

                if (selValg != "Velg dato--") {
                    $states.append($("<option>").text("Velg beløp--").val("Velg beløp--"));
                }

                document.getElementById("betFNS").innerHTML = (Number(skiftTot.replace(",", ".")) + Number(korTot.replace(",", "."))).toFixed(2);

                $.each(data, function (i, BAXAmounts) {
                    //alert("Hello: " + BAXNumbers.Text + " " + BAXNumbers.Value);
                    $states.append($("<option>").text(BAXAmounts.Text).val(BAXAmounts.Value));
                });
            });
    });
});
```