**NSG - Proof-of-Concepts for Roadmap Appendix**

**Purpose**

The present document provides an easy-to-access overview of the many ways that the exchange of real-time financial business data may benefit SMEs and enrich the future ecosystem of digital services that NSG envisions.

Decision-makers may use the Proof-of-Concepts (*PoCs*) described in this document as concrete examples of the value of NSG, explained in practical terms through the described use cases.

This document textually demonstrates the current state of the Proof-of-Concepts that NSG (in Work Package #4) has worked on, and lists a set of solution descriptions which have been considered, but not prototyped, tested or developed. The document provides an overview and in some cases also references to other NSG documents, such as Capabilities, Architecture, etc.

Disclaimer:

The real-life **examples** mentioned in the following should not be seen as endorsements of specific service providers, but rather show the feasibility and document the existing implementations of some of the described Proof-of-concepts.

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**Concept #1**

1. Credit assessment with real-time data

*The concept in a nutshell:*

The business systems used by SMEs should be capable of providing consent-based access to structured data for credit institutions and business partners, with a high level of details pertaining to each transaction (e.g. shipped orders, unpaid invoices, payment due dates). Access to details about all transactions would enable quicker credit cycles, more competitive rates and terms, and minimize paperwork related to credit assessments for both SMEs and credit institutions

To perform accurate credit assessments, banks and credit institutions want updated and trustworthy data on the customers applying for credit. This demand is twofold: A need for updated real-time financial data (to check current developments in a client-company’s finances), as well as a need to supplement the aggregated figures of annual financial statements with reports on recent periods, including more detailed data for greater accuracy. There could also be a need to construct an overview corresponding to an annual statement where none exists (in the case of newly started companies).

Credit institutions often supplement the publicly available annual financial statements with assorted business intelligence from 3rd party information brokers. For many kinds of small enterprises, there might not be public financial statements, or the data found in registries may lack sufficient detail and historical reach to facilitate credit assessment. Start-ups which have only begun growing thus face a demand to provide many figures for credit institutions (e.g. order backlogs, profits and loss for the latest periods, estimates of cost, and forecast).

Without readily available structured data, loan-giving processes may drag out and require much manual case-handling. However, SMEs often need liquidity quickly in order to grow. Time-to market is essential: Getting a new client or bidding for public tenders means that the SME needs to gear up, get more man-power, ensure the stocks are well-supplied, etc.

**NSG can improve the conditions for SMEs seeking credit by**

providing a specification of APIs that business systems must maintain, enabling creditors access to detailed financial data at the level of transaction, in a continuously updated flow or on demand, and in a structured format which is common to all customers no matter the business system used (see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

The assumptions of this concept

* a system for managing consent and the duration of the creditor’s access to relevant financial data (see the document on [national building blocks of roles and mandates](https://docs.google.com/document/d/1ueVnJcGu5DGJ3_WBkg8eYoxb_m6nNHh3KsKepnEJu2g/edit))
* data must be valid, accurate, and any tampering must be traceable
* SMEs must accept algorithm-based monitoring of their transactions in certain situations to get credit

**Concept #2**

2. Know-Your-Customer (KYC) network analysis for risk assessments

*The concept in a nutshell*

With access to detailed transactional data from the bookkeeping of a SME, it is possible to set up models for rating the network risk profile of that SME. With such a model, banks and credit institutions may assess how dependent an SME applying for credit is upon individual trading partners, or how likely they are to default because of the networked risk of relying on few clients. Furthermore, anti-money laundering processes may be automated.

In many cases, SMEs depend on selling products or services to a limited range of customers. Similarly, in some cases a SME depends on one or few suppliers to stay in business. In such scenarios, if the SME wants access to credit, the credit institution must incorporate an Know-Your-Customer (KYC) assessment of the network risks of the SME to accurately predict the customer/supplier dependencies of the client-company

The demand for KYC assessments is also great in relation to credit given to SMEs with much foreign trading, because of EU anti-money laundering directives. To ensure due diligence, banks are obliged to keep an eye on the transactions. By continuously tapping into the transactional patterns of such SMEs and developing models for monitoring the trade, the credit institutions may better direct their transparency procedures towards certain kinds of transaction as it happens, rather than imposing large restrictions on all credit applicants, and instead minimize the demands for SME documenting and reporting their trade.

**NSG can enable KYC network analysis for risk assessments by**

providing a specification of APIs that business systems must maintain, enabling creditors easy access to detailed financial data at the level of transaction, in a continuously updated flow or on demand, and in a structured format which is common to all customers no matter the business system used (see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

The assumptions of this concept

* a system for managing consent and the duration of the bank’s access to relevant financial data (see the document on [national building blocks of roles and mandates](https://docs.google.com/document/d/1ueVnJcGu5DGJ3_WBkg8eYoxb_m6nNHh3KsKepnEJu2g/edit))
* data must be valid, accurate, and any tampering must be traceable
* SMEs must accept algorithm-based monitoring of their transactions in certain situations to get credit, ie. if they work in high-risk sectors or with foreign trade partners that merits due diligence measures

**Examples** of the KYC/due diligence from NSG’s [Nordic Sandbox Challenge found here](https://challenges.dk/da/ide/indsend-ide-123) / *risika.dk* and *enin* - <https://challenges.dk/da/ide/indsend-ide-126>

**Concept #3**

3. Factoring and invoice-based loan types

*The concept in a nutshell*

With direct access to any business system’s invoicing data, a credit institution can evaluate all outstanding/unpaid invoices and offer credit to a SME accordingly. The same access may be used as basis for credit types which are based on single invoices, or for factoring (in which an invoice debt is instantly partly paid by a third party, shifting or filling a liquidity gap for a SME)

Short-term liquidity is often a problem for SMEs. Often, receiving a large order from a customer also means gearing up and investing before the ordered product or service can be delivered. This is a typical use-case for invoice-based loans, or invoice-buying (a practice called *factoring*): Fixing the cash flow in the short term.

Factoring and invoice-based loans exist today, but the developers of platforms providing liquidity in this way struggle with getting the right (transaction-level) data in the right way. They may need a different set of integrations for each bookkeeping system used by the SMEs seeking credit, as well as different transformation modules for reading “traditional” paper or PDF invoices. All of this drives up the cost for offering such services.

**NSG can enable easier access to invoice-based loan types by**

providing a specification of APIs that business systems must maintain, so that banks and third-party providers can easily get detailed financial data at the level of transaction, in a continuously updated flow, and in a structured format which is common to all customers no matter the business system used (see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

The assumptions of this concept

* a system for managing consent and the duration of the bank’s access to relevant financial data (see the document on [national building blocks of roles and mandates](https://docs.google.com/document/d/1ueVnJcGu5DGJ3_WBkg8eYoxb_m6nNHh3KsKepnEJu2g/edit))
* data must be valid, accurate, and any tampering must be traceable
* SMEs must accept algorithm-based monitoring of their transactions in certain situations to get credit

**Examples** of existing solutions, in which credit is given based on unpaid invoices

Buffer - <https://www.spv.no/bedrift/laane-og-finansiere/buffer> )

Tradeshift - <https://tradeshift.com/supply-chain-finance>

MoneyFlow - <https://moneyflow.io/>

**Concept #4**

4. Automated Account Posting

*The concept in a nutshell*

SMEs and entrepreneurs have little love for day-to-day handling and bookkeeping of invoices and receipts. Such processes can be automated to a high degree, with the adoption of digital transaction documents and smart business systems.With automation in place, the SMEs are less dependent on manually updating the books in order to get an updated view of their finances.

Most established business systems and many start-ups are beginning to deploy machine learning and artificial intelligence to simplify the bookkeeping processes of SMEs. The current state of the art of this technology revolves around scanned images of receipts and invoices. The next step of the future, however, exchanges paper-based transaction documents with well-structured digital documents and deploys algorithms that not only read and digitize documents, but also harvest the data from various fields and post the data to the relevant accounts.

With such algorithms, plus some process for handling exceptional documents and an initial customization of the company’s specific accounting rules, SMEs may gain access to near real-time accounting. The benefits of real-time accounting for SMEs are many, including better overview of VAT debt and liquidity gaps, less time spent on manual paperwork, zero time wasted on scanning receipts, and better grounds for any informed decisions.

In the future, as automation of accounting processes is disseminated and adopted, standardization work in the area of charts of accounts becomes more important and valuable. Once transactions are allocated to a machine-readable core chart of accounts (complying with standardized semantics), larger portions of common reporting obligations to authorities can take place automatically. At the same time, automatically updated accounting entries also enable applications running in near real-time that can provide an accurate view of finances to the SME. While auditors and accountants are still needed in this scenario, less preparation and manual checking of receipts and invoices will be needed.

**NSG can enable the increasing automation of account posting and aggregation of reports by**

recommending a common semantic model for representing transactions and account structures, and based on this model maintain a mapping between national implementations of chart of accounts (see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

**Examples** of automated account posting

Fabric.ai - <https://fabricai.fi/>   
OrangeBooks - <https://orangebooks.co/how-it-works>

**Concept #5**

5. Automatic VAT in domestic and cross-border trading

*The concept in a nutshell*

VAT is a transaction-based tax, so every single incoming and outgoing invoice in principle requires the SME to decide correct VAT treatment for each single line on the invoice. This means considerable administrative burden for SMEs, especially when trading cross-border. The accounting and reporting for cross-border trades makes VAT handling more complex. As first steps, the burdens found in domestic transactions could be reduced with rule-based, automated calculation of VAT, based on the use of structured invoices both by seller and by purchaser. To reduce the burdens caused by cross-border transactions, more work and clarifications are required.

The Nordic countries each have complex VAT legislation and many Nordic SMEs are uncertain about the correct reporting of VAT when trading cross-borders. In principle, however, the structured data from eInvoices could help SMEs comply with the most common VAT schemes, both domestic and international.

**The NSG PoC on VAT**

The VAT PoC described a model automated treatment of VAT based on structured eInvoice data. The Proof of Concept was tested with the database and data developed for the NSG Reference Implementation. In this test environment, a full year’s worth of synthetic (but realistic) eInvoices for a Danish catering company was stored. The dataset of invoices comprised both domestic transactions and transactions with companies in the Nordic countries.

The test comprised three parts. First, all the domestic transactions were tested against national VAT filing requirements. Second, cross-border transactions were tested against the VAT filing requirements. Third, certain improvements to tax category codes were added to the data set, and with these amendments, the appropriate tax rate for cross-border transactions were tested again against VAT filing requirements.

**Findings of the PoC**

Even though the tested company was a fictive company and the variation of the synthetic invoices was rather limited, the main result is that in domestic transactions, the current semantic model of the eInvoices could considerably lift the administrative burden of deciding the correct VAT rate. Considering SMEs, most of the domestic transactions are labelled with the domestic VAT standard rate, and the purchaser has a right to deduct the input VAT. This means much of the manual case-handling currently required in the VAT handling process could be skipped by SMEs using eInvoices. Special VAT schemes, like the marginal VAT schemes, exemptions, and restrictions on input deductions, currently require manual case-handling. Also, certain invoice requirements (exemptions and marginal schemes) cannot be technically fulfilled because of the eInvoice data structure. In order to avoid manual case-handling in these situations and to fulfil the invoice requirements, certain changes to the semantic model are required.

NSG could enable a greater degree of automated VAT handling in cross-border trading by pushing for revisions in the eInvoice data structure of the Peppol BIS 3 format, which is the recommended common format at the time of writing. The revisions must support VAT-compliance by design, and so many actors must join forces and agreed upon the common ground to push forward requirements concerning cross-border trading situations, where SMEs and authorities today face some case-handling and reporting challenges. We do not need to have a perfect model, but we must have a roadmap to improve semantic models into the direction that serve actual business needs.

**Concept #6**

6. Digital Business Assistants

*The concept in a nutshell*

With high-quality real-time data, many tasks and business processes do not need to be handled manually on a daily basis by SMEs. Instead, digital assistants with pre-defined roles and duties can monitor real-time data streams and only notify the SME when manual intervention is needed for decisions or handling exceptional situations. The rule-based routine work related to financial data, which today may be handled by secretaries, accountants or even close relatives of the company owner, can be automated and set up to be handled by a programmable, event-sensitive and schedule-based digital assistant.

Digital business assistants can perform basic account posting the moment an invoice reaches the SME’s business system. This is done via customized rules. When invoices are received which do not fit into the rules set up, the assistant notifies the SME and asks how the document should be handled.

Short examples of other basic assistant functionalities include 1) automated inventory handling, where the digital assistant takes care of replenishing the warehouse and orders new supplies when running low, and 2) a price tracker assistant that notifies the SME when competitors advertise prices below pre-defined thresholds, giving the SME the chance to respond to market changes.

**NSG can enable digital business assistant applications tailormade for SMEs by**

providing a specification of APIs that business systems must maintain, so that third-party IT service providers can retrieve information directly from the SMEs business system, in a structured format which is common to all SMEs no matter the business system used, and build smart solutions on top of that data (see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

**Concept #7**

7. Real-time Analytics Dashboard

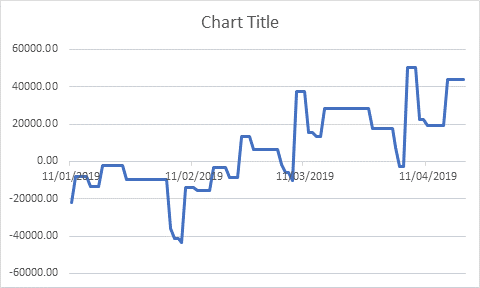
*The concept in a nutshell*

SMEs often lack a real-time view of their finances, because business transaction documents sent on paper or pdf are not uploaded into the bookkeeping system on time (if a system is used at all). This sometimes leads to liquidity crisis for the SME who have not prepared for the unforeseen expenses, and that might in turn lead to unpaid debt and unnecessary bankruptcies.

If all business documents were digitalized, the structured data found in the documents could be handled in real-time and allow companies to be in control of their finances at all times. Just by having the invoice data available in a standardized structured format, a simple system can be used to predict the change in cash flow for any given date in the future. Such a system, visualized in the form of a dashboard, could help SMEs understand their liquidity needs and help them avoid defaults or even bankruptcies.

**Realization** **of the PoC**

A free database tool (called BaseX) which allows you to query data from XML documents was used to load the synthetic data created in the NSG project and stored in the NSG [reference implementation](https://github.com/nordicsmartgovernment/nordicsmartgovernment). The PoC was repeated for the data represented in XBRL GL (business transactions) and as UBL-formatted purchase and sales invoices directly. In the PoC, we did not include payments for salaries or calculation of VAT debt/receivables. A simple query was created which calculates the daily sum of receivables minus the payables for any given days in the future. The result was then saved as a CSV file, and then a graph was created from the data using basic functionalities in Excel (see sample below).



**NSG can enable real-time overview for SMEs by pushing for adoption of eInvoices B2B.**

**Concept #8**

8. Automated inventory and eOrder management

*The concept in a nutshell*

Tedious counting of items in the warehouse and unnecessary updating of databases and file exports could be made obsolete. Instead, the moment a company receives an invoice and confirms that the goods have been received, the inventory management system should automatically be updated. Likewise, when an order has been successfully placed, the inventory should also instantly update the current stock.

**Example** - **pitch from the** [***Digitalism Challenge***](https://www.aalto.fi/en/news/the-topical-theme-of-the-5th-digitalism-challenge-course-is-nordic-smart-government) **in Helsinki, October 2019**

In the Digitalism Challenge 2019, hosted by the Finnish NSG Team and Aalto University, the runner-up team called Team Quantum presented a cloud-based solution for reporting and stock management in organic farming. The proposed solution, dubbed “*The Corganic Ecosystem – a cloud-based solution for reporting and stock management in organic farming”*, exemplifies the potentials of automated inventory:

*The solution:*

*o an application that fills the needs of farmers and regulating authorities*

*o a shared database that records transactions in the organic farming sector*

*o a shared between farmers, authorities and other related organizations*

*o data is extracted and imported automatically*

*o the main source of data are eInvoices, but*

*o the application allows the user to scan barcodes or QR codes on the products, too*

*o the solution makes manual reporting obsolete by introducing real-time supervision*

*Key benefits:*

*o easy stock management*

*automatically computed from the transaction data in the database*

*the farmer can check current stock quantity from the mobile version of the software*

*the farmer can also update the stock in the mobile app*

*o automated reporting*

*authorities have their own software to access the data in the database*

*continuous supervision of the ecosystem*

*automated real-time VAT-reporting*

*daily task list: list of all the reporting duties the farmer must do manually*

*o predictive analytics for better business decisions*

*based on aggregated data from all participants in the ecosystem*

*current trends in the industry*

*tailored recommendations*

**Concept #9**

9. Extracting information on consumption and costs of goods   
for internal or external purposes

*The concept in a nutshell*

Instead of storing information in separate systems to meet requirements for inventory management of specific products, the SME may generate a report directly from bookkeeping data with a specific view of the product information. The bookkeeping data is accessed via an API, which may be accessed by an external party based on consent from the SME. The report can serve both internal and external purposes. Examples include keeping track of consumed fertilizers, or documenting the use of pesticides or building materials in construction. With the right data obtained directly and continuously from the source (the bookkeeping), the life of the SME is simplified, and human errors of interpretation and typing are greatly reduced.

Businesses of all sizes, including the SMEs, need to monitor consumption of various goods, and many must also document their use of certain goods for the authorities. Today, many businesses use separate systems to monitor goods and manage the warehouse on the one hand, and to create internal and external reports on the other. Given the current political interest in sustainability, circular economy, and transparent supply chains, it is likely that requirements for reports with environmental data (such as carbon emissions or waste) is likely to increase dramatically.

## **Examples of documentation needs**

* Keep track of consumption of fertilizers and fertilizers in stock
* Keep track of consumption of medicine applied for animals
* Keep track of consumption and stock of pesticides
* Documentation of materials applied in constructions

The concept requires information in the invoice lines with product codes and/or machine readable descriptions.

**Example - pitch from the** [***Digitalism Challenge***](https://www.aalto.fi/en/news/the-topical-theme-of-the-5th-digitalism-challenge-course-is-nordic-smart-government) **in Helsinki, October 2019**

Team T pitched FarM, a mobile app with the slogan “We handle the smart, you handle the farm”. The core data of the app was a combination of real-time bookkeeping data from eInvoices and eReceipts (continuously updated in a business system database) plus data from a centralized real-time stock/warehouse management database.

On the financial side, the functionality of the app would allow farmers to do real-time profitability calculations and automate VAT calculations. On the production side, the app would constantly update stock levels during farming activities, and record data on animal and field profiles. The app would thus provide a link between the supplies bought and used in the production (e.g. fertilizer or fodder) and the production output (e.g. harvested crops or livestock). Thus, the FarML app would enable farmers to add information about traceability to each product’s invoice row. Traceability of goods used in farming is important and there are various governmental demands for reports to the agricultural and environmental authorities, detailing each animal group’s and field’s data.

Later releases for FarML would include support for sensors in greenhouses or milking machines linked to the app, as well as speech recognition that allows farmers to input data with voice commands (e.g. update data straight to the system, or search information from the connected databases) while doing farm tasks.

**Like concept #7, both concept #8 and concept #9 will be enabled if SMEs adopt eInvoices and eReceipts.**

**Concept #10**

10. Benchmarking and Real-time Insights

*The concept in a nutshell*

It is time-consuming to get an adequate overview of the economic situation, as most of the calculations are done using excel and manually collected data. Without updated data, SMEs cannot make informed decisions, and service providers of SMEs (such as industry benchmark services or accountants) cannot assess the SME’s current situation correctly and help accordingly. With real-time data, however, SMEs may benchmark their current financial situation and their products and services against similar companies.

With updated understanding of the current financial situation, the SME can plan ahead and make informed decisions. One aspect of making informed decisions is understanding the market, and being able to assess and compare with other relevant actors in the market. Another aspect of informed decision-making is having the right help at the right time. Even the best advisors and accountants may not be able to provide accurate financial advice, if they are working with outdated data.

Which changes must be implemented to reach this vision:

* SMEs must share data with their trusted service providers
* Service providers gain access to standardized transaction data from business systems
* Standard data representation for business transaction/accounting data is used
* Service providers (i.e. Insurance companies) will have to digitise and automate new areas of their core business

**NSG can enable real-time benchmarking applications for SMEs by**

providing a specification of APIs that business systems must maintain, so that third-party IT service providers can retrieve information directly from the SMEs business system, in a structured format which is common to all SMEs no matter the business system used, and build smart solutions on top of that data (see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

**Concept # 11**

11. Portability by Design

*The concept in a nutshell*

With standard interfaces that consist of standard data representation for business transaction data together with standard APIs, we can achieve interoperability between business systems by design. Businesses could choose the best fitting systems based on their own needs and use them seamlessly together. Businesses will also be able to switch from one business system to another more easily once data can be easily exported and imported in a standard format. For the system developers, there would be no maintenance or development of custom interfaces when more resources are free to be spent on productive functionalities.

Today, a lack of standard interfaces between business systems has led to a heap of customized interfaces to be maintained for system vendors that are paid by the business users in the end. Building and maintaining customized interfaces is also an extra cost for the businesses to be paid that often presents an obstacle big enough to hinder the usage of business systems that could greatly benefit the business.

**Realization of the PoC**

A reference implementation of the standard APIs together with synthetic business transaction data was produced in the NSG project. The standard APIs support two standards to present business transaction data: XBRL GL and SAF-T. [The reference implementation of NSG](https://github.com/nordicsmartgovernment/nordicsmartgovernment/tree/develop/src/main/resources/openAPI) natively supports XBRL GL as a data format simulating a business system, whereas the (real) Norwegian accounting system provider AccountFlow natively supports SAF-T.

In the PoC, the standard APIs were used to simulate the integration and changing of accounting systems by

* requesting the business transaction data from the reference implementation in SAF-T and loading it to the AccountFlow system (simulating the process of changing the accounting system)
* requesting the business transaction data (dummy data) from the AccountFlow system in XBRL GL and loading it to the reference implementation

**Concept #12**

12. Direct extraction of business data for statistical surveys

*The concept in a nutshell*

Instead of filling out burdensome surveys and questionnaires from national statistical agencies, a SME may use a microservice that generates a report directly from bookkeeping data, ready to be retrieved by the statistical agency. The statistical agency thus simplifies the life of sampled SMEs and gets the right data directly from the source, removing human errors of interpretation and typing

SMEs of various sectors must report to statistical agencies for a range of (random-sample) surveys. Much of the data requested by such authorities is created via the business processes of buying and selling, and can thus be calculated and reported with .

As a minimal test case, the Swedish Statistical Agency SCB has tested out how the reporting of net sales can be retrieved directly from a SME’s business system and used by the Swedish Statistical agency for use in an actual business survey. This PoC used the NSG reference implementation to simulate a real-time reporting of business statistics. This means that the reporting of net sales could be continuously updated and retrieved, resulting in a perfect data series for statistical use.

The perspectives of this PoC goes further: The method used could be used for testing out other simulations of real-time reporting apart from net sales. Adjacent use cases for government authorities include EU-Intrastat reporting, early-warning systems, fraud detection, and more.

The method, briefly described:

The Swedish Statistic “Net revenue”-taxonomy has been mapped to the reference implementation’s account mapping document. Based on the mapping information, a machine readable version of this mapping was produced, and a small service to generate the XBRL-instance documents containing net sales information based on the transaction level data was developed.

**NSG can lift the burden of statistical surveys on SMEs by**

providing a specification of APIs that business systems must maintain, so that statistical agencies can retrieve information directly from the SMEs business system, in a structured format which is common to all SMEs no matter the business system used (see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

**Concept #13**

13. A common language for auditing

*The concept in a nutshell*

Tax administrations and different audit service companies perform audits with proprietary data formats, acquiring data from the audited companies in costly and laboursome processes. By using a common format and a common reporting language for extracting the audit data, both tax auditors and private auditors can save time, increase data quality, enable automation of processes, and avoid countless custom integrations.

Business system integration is difficult today and costly, and there is a strong lock-in effect as companies can’t change system without significant cost. Most of the time spent for auditing is spent acquiring and molding the data to fit the process needs.

**Realization of PoC in Finland:** During the winter 2018-2019, The Finnish Tax administration, KPMG, and Fennoa (accounting software company) explored and proved the usability of XBRL-GL as a data format to be used as basis for auditing and tax auditing. An actual company (with revenue around 7 million euros), using the Fennoa accounting system, agreed to let their accounting entries be extracted in XBRL-GL format and forwarded this to Tax administration and KPMG for auditing.(see [the NSG Capability Documentation](https://docs.google.com/document/d/1v5iHELL30p5A41vbjFJY7HvaT5g6OTDS5LH2Lp_vXSQ/edit#heading=h.mbz3iob70eds))

## **Results**

* XBRL GL may be used in audit data collection
* Using XBRL GL was considered to be relatively easy
* User should get familiar with the XBRL GL data content descriptions
* Cost of usage are not significantly higher in comparison to creating other interfaces and they are non-recurring
* Standard chart of accounts would improve the data usability and understandability even further

**Benefits of a common auditing language**

* Enables automation in auditing processes for several actors at once
* Enables machine learning and the usage of AI in both the data molding and auditing processes
* Standard data structures decrease costs, and increase the data quality and interoperability

**Other experiences - Norwegian and Swedish standard auditing formats:**

In 2020, the OECD-developed format SAF-T is implemented in Norwegian business systems and made mandatory for larger companies. This legislation requires the business systems to provide transfer of transaction information into a standard audit file. In Sweden, a format called SIE has been developed and maintained for similar purposes.