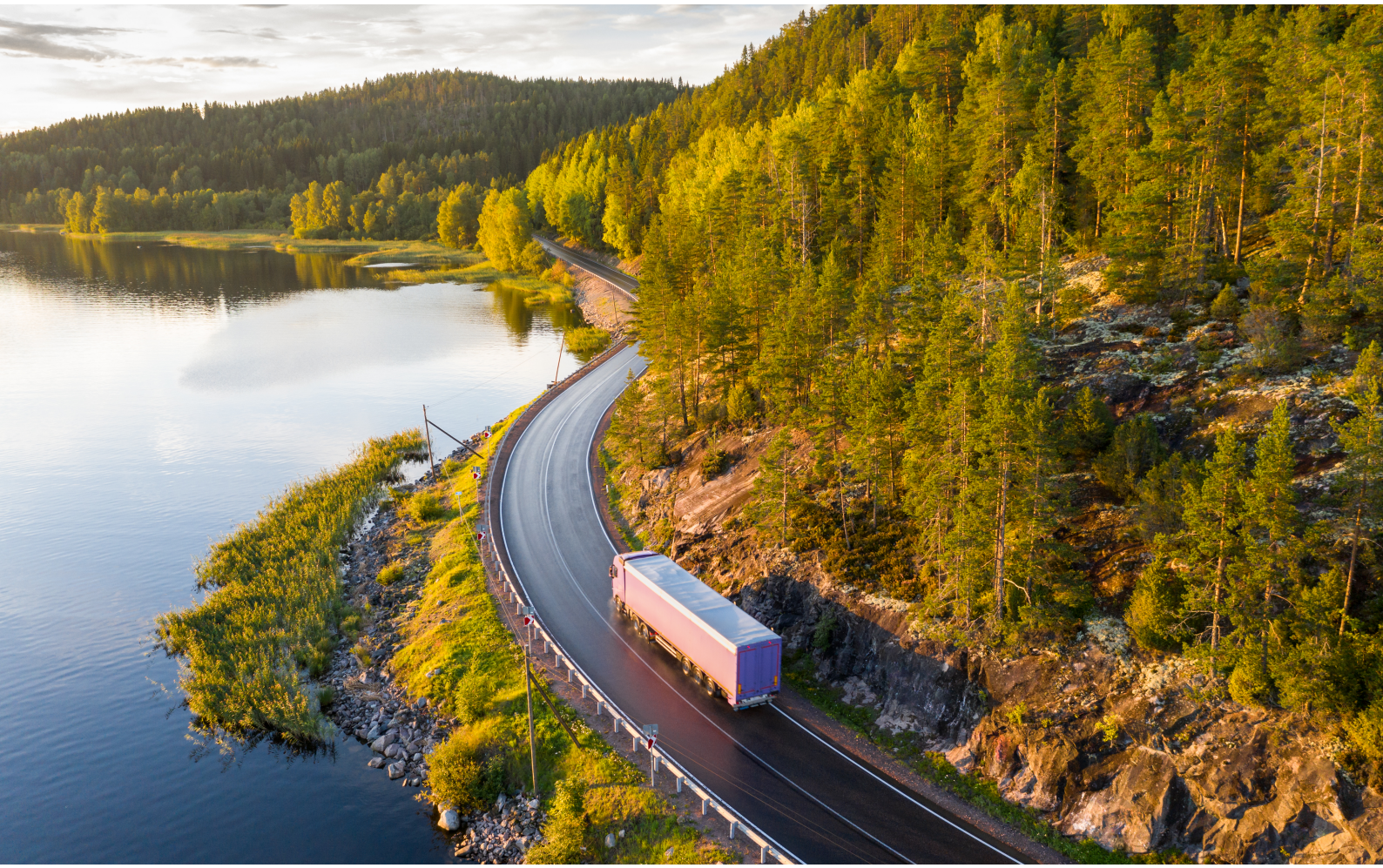
Smart Freight Centre

SFC Exchange Network

Stable Release 1.0 Report

April 2024



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About Smart Freight Centre

Smart Freight Centre is an international non-profit organization focused on reducing greenhouse gas emissions from freight transportation. Smart Freight Centre's vision is an efficient and zero emission global logistics sector. Smart Freight Centre's mission is to collaborate with the organization's global partners to quantify impacts, identify solutions, and propagate logistics decarbonization strategies. Smart Freight Centre's goal is to guide the global logistics industry in tracking and reducing the industry's greenhouse gas emissions by one billion tonnes by 2030 and to reach zero emissions by 2050 or earlier, consistent with a 1.5°C future.

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Executive Summary

The SFC Exchange Network is a sociotechnical project creating and proving the feasibility of a decentralized data exchange for capturing logistics GHG emissions. Transparency over GHG emissions is fundamental to the decarbonization of logistics, as it informs business decisions and can optimize logistics operations. This requires access to reliable data from supply chain operations. Data is both an opportunity and a necessity to extract information and operationalize into valuable insights that will be key towards full emissions transparency. Specifically, within the logistics industry, there are known structural challenges from data gaps, lack of interoperability between various IT systems and reluctancy to share data often considered as business sensitive.

The SFC Exchange Network aims to address these issues by supporting organizations progress towards acquiring reliable data and facilitate a peer-to-peer exchange. It is a succession project following previous SFC led projects, Data Access project and the End-to-End Guidance, based on the need of organizations to access reliable data whilst promoting data sharing collaboration efforts. It also integrates the data model proposed within the iLEAP project. The vision of SFC Exchange Network is to create full emissions transparency and catalyze decarbonization within transport chains based on decentralized principles.

Decentralized data exchanges are based on the concept of dataspaces in which secure, open and seamless data sharing is enabled. This allows for an efficient yet sovereign way to share data as the dataspace stakeholders govern the ecosystem in which they co-create and abide by. Such an ecosystem benefits from varied representation of logistics actors as it relies heavily on collaboration and accordance to demarcate the 'playbook' of how the data exchange is done.

The SFC Exchange Network project began in late 2022. Since then, the project has undergone two phases, Proof-of-Concept (PoC) and Stable Release v 1.0. The PoC covered governance, technology, and assurance workstreams for the SFC Exchange Network. The workstreams are crucial in which the sociotechnical nature of the project is fortified.

After the PoC phase, an interim phase of Stable Release v 1.0 kicked off with focus on technology improvements to demonstrate the feasibility of the technology at scale. These improvements would be the cornerstone of a scalable and a stable solution. The Stable Release v 1.0 phase concluded with a testing period in February 2024 with a larger scope. This report delves into Stable Release v 1.0 technology improvements and outlines key takeaways.

In November 2023, Smart Freight Centre made an announcement in which the SFC Exchange Network is transitioning to a purpose driven organization in order to scale the project with the required expertise and resources. The dedicated organization will become a for-profit for-good venture with the necessary know-how to establish a long-term vision.

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1 Introduction

1.1 Background

The Smart Freight Centre has been involved in data and digitalization related projects since 2019. The Data Access project and the End-to-End guidance are a couple of exemplary projects which defined the importance of a standardized data model and the parameters required to ease the interoperability between different IT systems. The projects were vital preliminary work to set the stage for the SFC Exchange Network to flourish by means of participatory pilots.

The SFC Exchange Network is a project dedicated to proving the feasibility of decentralized data exchange. The objective is to reduce logistics data gaps by promoting standardized semantics, improve interoperability between siloed IT systems and boost trust and commitment between stakeholders. Accessing reliable data goes in tandem with the state of digitalization of an organization both internally and externally. This means without the refinement of either, a desirable outcome will not be easily achieved. Hence data and digitalization are in conjunction with one another.

The SFC Exchange Network officially kicked-off in October 2022. The initial launch period defined the scope of decentralized peer-to-peer exchange. From this focal point, the project kicked-off its PoC phase from February 2023 to June 2023. The deliverables included multiple participatory workshops, exploratory research on requirements and a technical prototype. The technical prototype was fundamental to demonstrate the feasibility of peer-to-peer exchange, willingness to share data and technical implementation. The SFC Exchange Network is the first Smart Freight Centre project with a product deliverable being a technical prototype as an output.

1.2 Stable Release v 1.0

Following the success of the PoC, an interim phase of Stable Release v 1.0 began. This phase was marked by an improved technical first iteration that is stable and scalable. The initial work of the interim phase was to formulate the PoC feedback into improvements with a strong strategic direction. This required the interim phase to be divided into two parts: PoC evaluation and scaling preparations.

The first part, PoC evaluation, was to dissect collected feedback from the participants. This dictated the focus of PoC evaluation to be the grounding work consisting of brainstorm discussions, revision sessions, and planning. Taking in the feedback as the core guide, it was important to translate the input into a working vision and match it to the capacity of operating teams—SFC and Think-it. Think-it is an instrumental technology partner and led the IT development. The vision and the capacity were dually integrated so that the most viable project approach was taken.

Based on the outcomes of the primary part, PoC evaluation, it was evident to strategize on the technology improvements for Stable Release v 1.0 and demonstrate its feasibility. In parallel, a governance structure was proposed and discussed extensively to set up an organization ready to scale. The subject of assurance was decided to be deprioritized within this phase.

Hence, the second part of the interim phase of Stable Release v 1.0 was the scaling preparations. This also explains the title Stable Release v 1.0, as stability and scalability of the technology is instrumental in the project readiness and competitiveness. The scaling preparations concentrated on technology development and extensive documentation creation to support the overall comprehensibility of the project as well as to empower participants take ownership in the process. Therefore, the goal of the phase was to improve the technology to ensure a Stable Release v 1.0 is ready and set out a governance structure that is ready for scaling.

2 Technology

The improvements in the technology include key work around improving the data model, enhancing the technical features and functionalities, and streamlining the onboarding and deployment experience. Firstly, it was evident to improve the data model according to the collected feedback from PoC. The data semantics model utilized during the PoC consisted of 13 data variables. For Stable Release v 1.0, the data model was expanded to 32 data variables. The increased number of data variables reflected use case 1 of improving accuracy of reported emissions. Using the data model allowed participants to organize and structure their data in accordance with standardized semantics model which is based on the GLEC Framework and the iLEAP project. This improvement also came with a change in the data grouping requirement. During the PoC, the data shared by 'data providers' was grouped by shipments whilst in Stable Release v 1.0—it is grouped by month. This allows for multiple shipments to be shared based on a chosen month and enables higher amounts of data to be exchanged. The exchange of data on a monthly basis is also closer to operational reality.

Furthermore, data model compliance and validation rules were embedded within the technology. The technical prototype's API enforces these rules linking the enhancement of technical features and functionalities. For example, the content of data shared would need to adhere to data model validation rules and if it did not follow—there would be error messages stating the rows of data that needed to be corrected. This immediately pointed to the very rows easing the overall data exchange process and enforcing data quality. The API was further worked upon which made up most of the developments for the technical features and functionalities. The improved API is apparent from the capability of handling and sharing higher volume of data. During the PoC participants were able to share less than 10 lines of data whereas in Stable Release v 1.0—participants were able to share 40,000 lines of data, which was capped but could have been scaled further.

The final area of focus for the technological improvement was the streamlined onboarding and deployment experience to the SFC Exchange Network. Although this is not a purely technical work, the creation and design of documentation was essential in fostering a project that is scalable and stable. Learning from the PoC, to set-up participants for success is to ensure a smooth onboarding process. Therefore, Stable Release v1.0 offered an extensive onboarding package with numerous documents with the goal to ensure participants have a good grasp of the project and completed all necessary preliminary steps. This also allowed the participants to identify the required resources with the right profiles as active engagement and efforts are necessary to carry out the project successfully. Helping participants find the right team was a particular focus of the onboarding package which stemmed from the PoC phase. As much efforts and flexibility the operating teams of the project offered, it would not amount to the involvement and engagement from the participants. Additionally technical documents, specifically helpful for the testing period, was provided with the intention for it to be more simplified and digestible.

In addition to the documents, numerous workshops took place to gauge participants' understanding on the project as well as co-shape to progress together. For instance, the use case workshop was conducted to inform participants about use case 1 on improving accuracy of reported emissions and determine associated key performance indicators together. Use cases are important to the objective of SFC Exchange Network as they are participant driven and capture the value proposition of the project to address realistic problems within the industry. Simultaneously, the key performance indicators are targets which measure the extent of the attainment.

3 Testing and Deployment

The aim of Stable Release v 1.0 testing was to prove that the technology is scalable, easy to deploy and fulfills key objectives of the project. The testing period was the second time the technology was tested and validated since the inception of SFC Exchange Network. The testing would assess the resiliency of the system and its updated technical features amongst four testing goals: assess functionality; assess reliability; prove business value and gather feedback. The goals were crafted with the notion that feedback loop is instrumental in inspecting and evaluating the technology. Thus, participants were encouraged to complete the testing autonomously to enable the participants to "own" the technology and simulate a potential scenario in which the technology can be adopted and integrated within their IT systems.

3.1 Infrastructure choices

In terms of infrastructure choices, participants could choose between deploying on SFC infrastructure as a managed service or in their own cloud environment. The first option of SFC infrastructure can be considered as Software as a Service (SaaS) in which the deployment is handled fully by Think-it thereby providing automatic configuration and ease. The second option of deployment on own environment is cloud agnostic meaning the technology can run on any cloud infrastructure—in this case the deployment takes place on participants' own infrastructure. This offers flexibility and customization for participants. There was a step-by-step *Deployment Guide* provided to facilitate participants to self-deploy and truly utilize the technology for its intended purpose of sovereignty, scalability, and stability.

3.2 Results

There were six companies partaking in the project as participants resulting in four pairs. One participating company, in the role of a 'data consumer' was paired with two of its carriers. Another participant acted both as a 'data provider' and 'data consumer' exchanging data by themselves across potential business units. The data exchange between a 'data provider' and a 'data consumer' is solely contingent upon the contractual relationship between the parties. Such a trusted relationship attests to the 'playbook' of how the exchange is done based on the user who permitted authorization and in turn the user who has the authorization to access the data.

In terms of deployment, SFC infrastructure was the final choice of infrastructure for all participants. In general, majority of the participants were able to use the technology and exchange data. In comparison with the PoC testing journey, Stable Release v 1.0 testing was marked by greater autonomy from the participants. Any potential blockers and issues were reported by the participants with thorough details which allowed for addressing them quickly and efficiently resulting in a smooth testing process.

3.3 Lessons Learned

Overall, the improved Stable Release of the API was well received and functioned in line with the requirements set out. However, the following improvements could be considered:

All the deployments were completed utilizing SFC infrastructure. Unfortunately, the participants which opted for deployment on their own chose to switch to SFC infrastructure due to rigorous internal cybersecurity policies and time limitations. Consequently, checking on other IT and cybersecurity policies in place is an important prerequisite before diving deeper into the project. Not only will the duration be potentially lengthy but also every company follows different protocols therefore the varying procedures may require additional efforts. Moreover, decision making will require coordination and availability of the stakeholders with authority.

Despite extended timelines, the project participants were not able to deploy on own environment due to capacity constraints in their IT departments. Hence

cross-department onboarding is important. Taking this into account, the further scaling of the SFC Exchange Network recognizes the need to think holistically whilst relying on active participation from the participants. This requires a design thinking approach yet keeping an equilibrium between customization and collective strategy will need to be prioritized and addressed.

Another aspect to the testing was the supporting documents that were created and sent out to streamline the onboarding and deployment experience. Such documents turned out to be straight-forward demonstrating the hands-on approach of the testing. Aside from testing, an evaluation survey was created to assess the testing experience and gain insights on the project's progression and trajectory. Despite only a few fill-outs, the feedback from the survey pointed to data model compliance and validation rules to be helpful in the testing and strengthened the overall features and functionalities. In the future, participants would like to be able to share even higher amounts of data—within the millions range rather than being restricted by 40,000. Another highly requested feature was user interface and front-end design which eases the interaction with the technology.

All in all, participants can resonate with the business value proposition of the project, and it mostly aligns with their organization's decarbonization pursuits.

Next Steps

Based on the results from Stable Release v 1.0, it is indicative the SFC Exchange Network can provide a valuable infrastructure to decentral exchange. However, for the technology to succeed it requires to be scaled to participate and work with all logistics actors, including the freight buyers, service providers, and carriers.

Due to the required need to scale, the SFC Exchange Network will transition to a dedicated purpose driven organization, with the mission to scale-up and advance the decentral technology. The new organization, with a neutral trusted governance structure, will build on the SFC Exchange Network and is designed to scale-up in an accelerated manner and help logistics industry actors address their most urgent challenges.

The spin-off is already underway, focusing on the ability to exchange with small and medium enterprises and between logistics actors. As stable release v 1.0 was the next iteration after the PoC, there are promising outcomes given proper identification and prioritization of focus areas. A couple of the most pressing challenges include the versatility in IT systems resulting in siloed data as well as lack of access to primary data. The dedicated company will lead the logistics industry with the collaboration of external partners with the mission to facilitate end-to-end emissions data.

Smart Freight Centre will maintain its role as a steering guide for the future of SFC Exchange Network as well as advocate for the overall alignment within the logistics industry. This requires strengthening and polishing the governance structure to ensure checks and balances of representation between logistics stakeholders.

Additionally utilizing the know-how of the GLEC community, Smart Freight Centre will continuously push for and establish industry consensus for primary data adoption and accounting guidance, including the provision of interoperable data models and a universal structure for logistics emissions.

A forthcoming step for the organization is to shape the solution on need basis in the form of use cases - increasing access for primary data for SME solutions and facilitate end-to-end logistics emissions transparency. The SFC Exchange Network is an ever-evolving, agile project that is participatory and is now in pursuit under the new organization to become the de-facto industry emissions exchange.

Smart Freight Centre

Join our journey towards efficient and zero-emission global freight and logistics

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