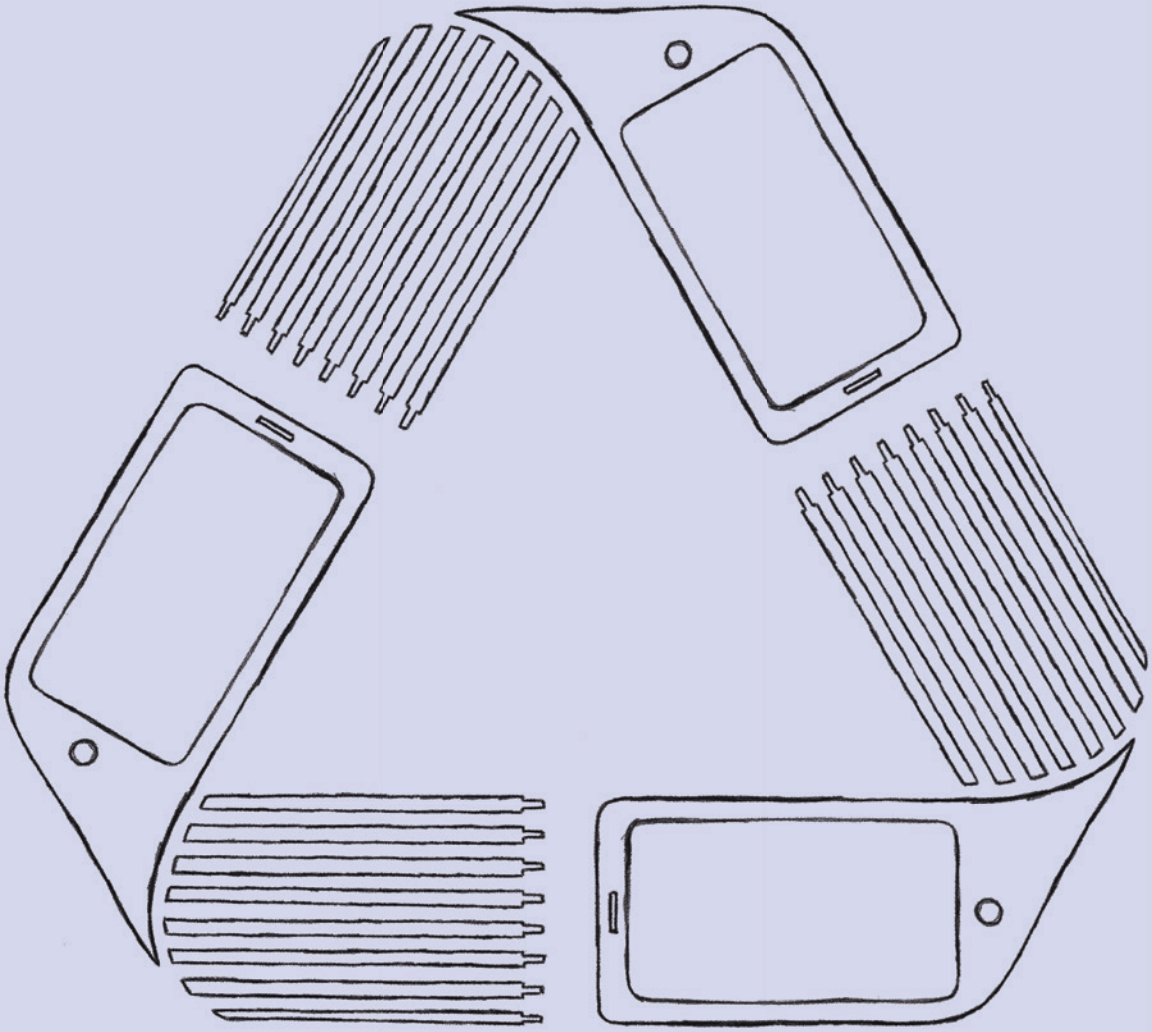

KEEP

Keeping Electrical and Electronic Products

KEEP's journey so far

The journey of KEEP began in late 2017, when our group at Chalmers Industriteknik, along with seven organisations, applied for a pre-study grant proposing to explore how traceability could support the circular economy for electrical and electronic products. Throughout 2018, after the pre-study was awarded funding from the Swedish Innovation Agency (VINNOVA), we engaged in numerous meetings with different companies and organisations across the life cycle of electrical and electronic products to discuss how traceability could support them in, for example, prolonging the lifetime of products and making material recycling more efficient. Truth be told, the responses were often not what we had anticipated. The people whom we talked to were often sceptical of the opportunities to implement traceability systems for numerous reasons. More than once, we thought about shelving the project for a few years even though we believed in the idea.

Ultimately, however, we came into contact with 13 organisations that also saw the project's potential and even wanted to explore a possible traceability solution in a more expansive project.

Had it not been for those organisations (i.e. current project partners in Phase 2), we would have discontinued the project altogether. With their encouragement, however, we applied for Phase 2 of KEEP, and after it was approved by VINNOVA, we launched the project in spring 2019. During the two years of Phase 2, interest in traceability systems skyrocketed, owing much to discussions in the EU Commission about electronic product passports and their mention in the European Green Deal. Now, the interest and potential that people see in traceability entirely overshadow the doubt that dominated discussions in Phase 1.

In this report, we present some of what we have learned about traceability from Phase 2 of KEEP and illustrate those lessons in a prototype. We also briefly describe how we plan to proceed with the project in Phase 3. We are beyond excited about continuing to work with both current and new project partners towards realising a traceability system for electrical and electronic products.

KEEP it up!

Kristina Liljestrand, Jessica Wehner
and Max Björkman at Chalmers Industriteknik

financed by VINNOVA

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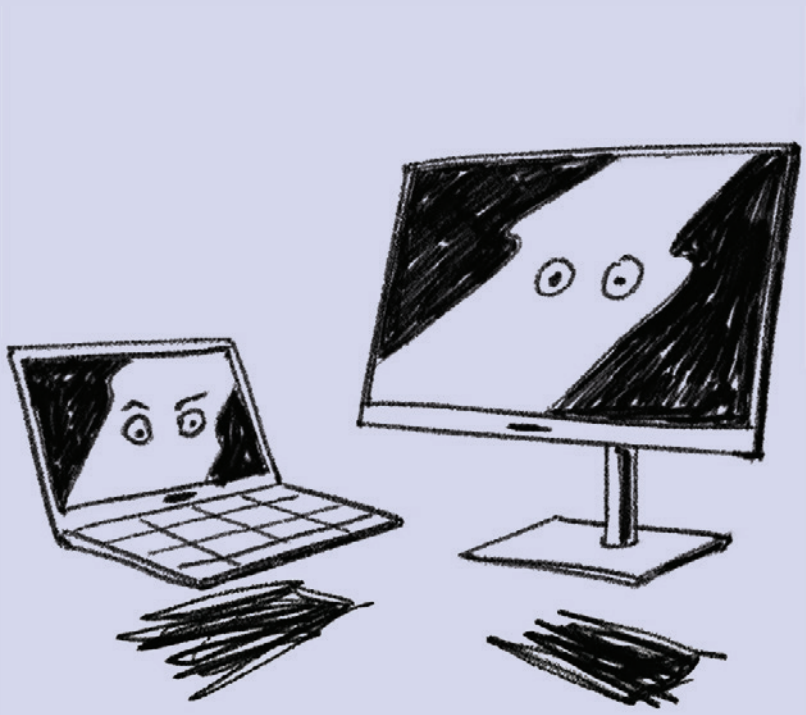
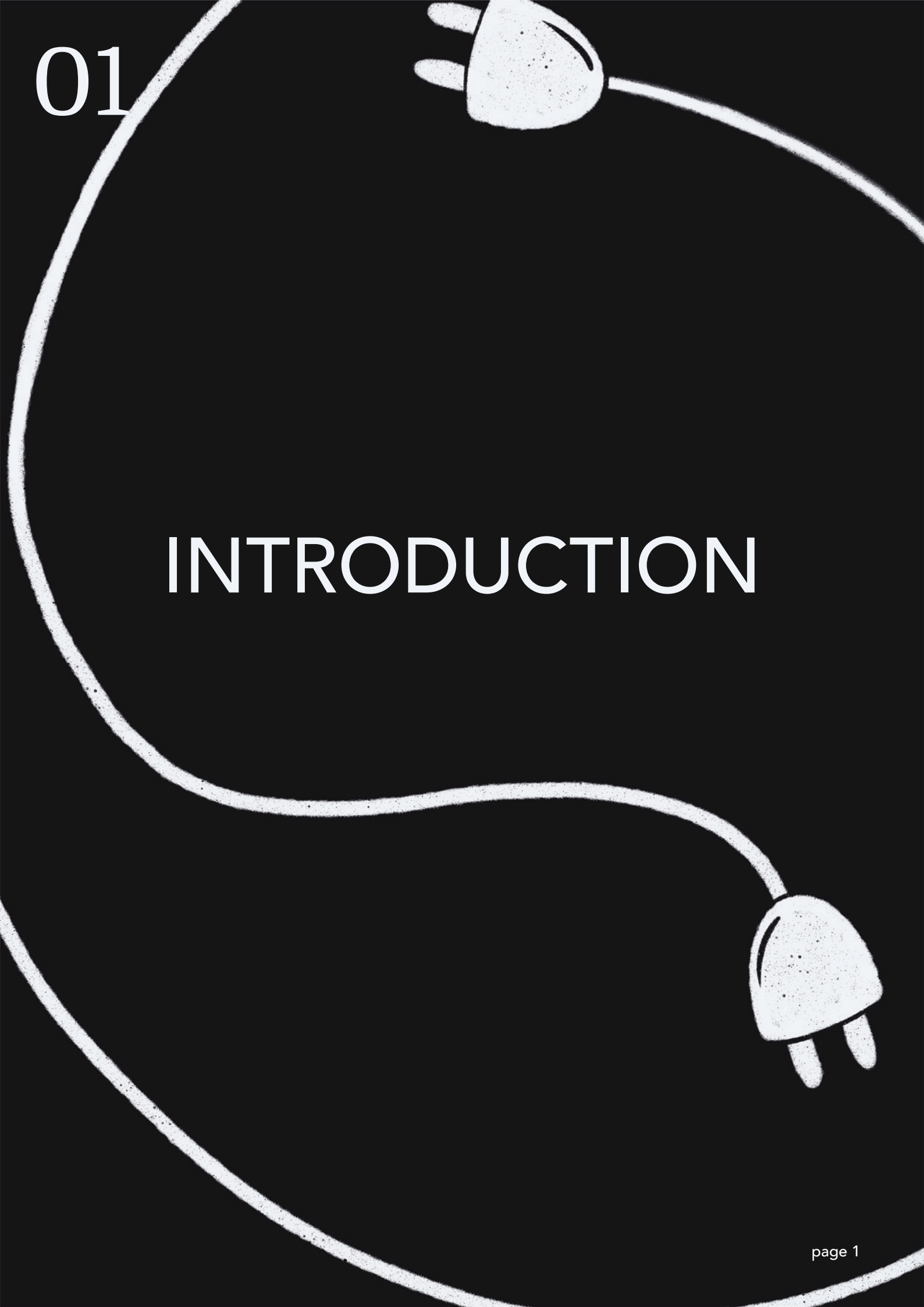


01

INTRODUCTION

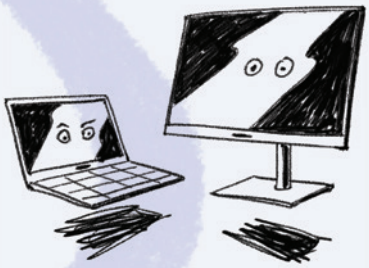


The standard of living is increasing worldwide, and people own more electrical and electronic (EE) products than ever before. A washing machine, a coffee machine and a TV can be found in almost every household in Europe and a mobile phone in every pocket. On average, more than 20 kg of EE products per person are put on the market in the EU every year, including household appliances (e.g. washing machines, vacuum cleaners, refrigerators and freezers) and electronics such as computers, TVs and mobile phones[1]. However, once those products are used for a few years and subsequently discarded, what happens to them? How many of them are recycled or sold to second-hand markets? What valuable materials do they contain, and how can those materials be retrieved?

A traceability system for EE products allows tracking and tracing products throughout their life cycle, from production to material recycling. Tracing information about EE products' origin, composition, repair and end-of-life handling possibilities and making that information available to different actors across their life cycle, provide an opportunity to increase sustainability in three ways:

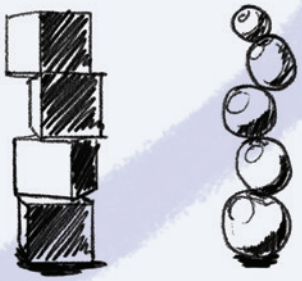
Sustainable production

With a traceability system, users can obtain information about the material content of products, including conflict minerals and rare earth metals, and thereby identify exactly where different components have been produced and assembled as well as under what social conditions. Providing both purchasers and consumers with that information enables them to identify and buy sustainable products more easily.



Increased reuse

A traceability system can additionally provide repair workshops, renovators and refurbishers with information about, for instance, previous repairs, damage analysis, product and component values, the availability of spare parts and repair instructions. With that information, products can last longer, and it is easier to find new users for them.

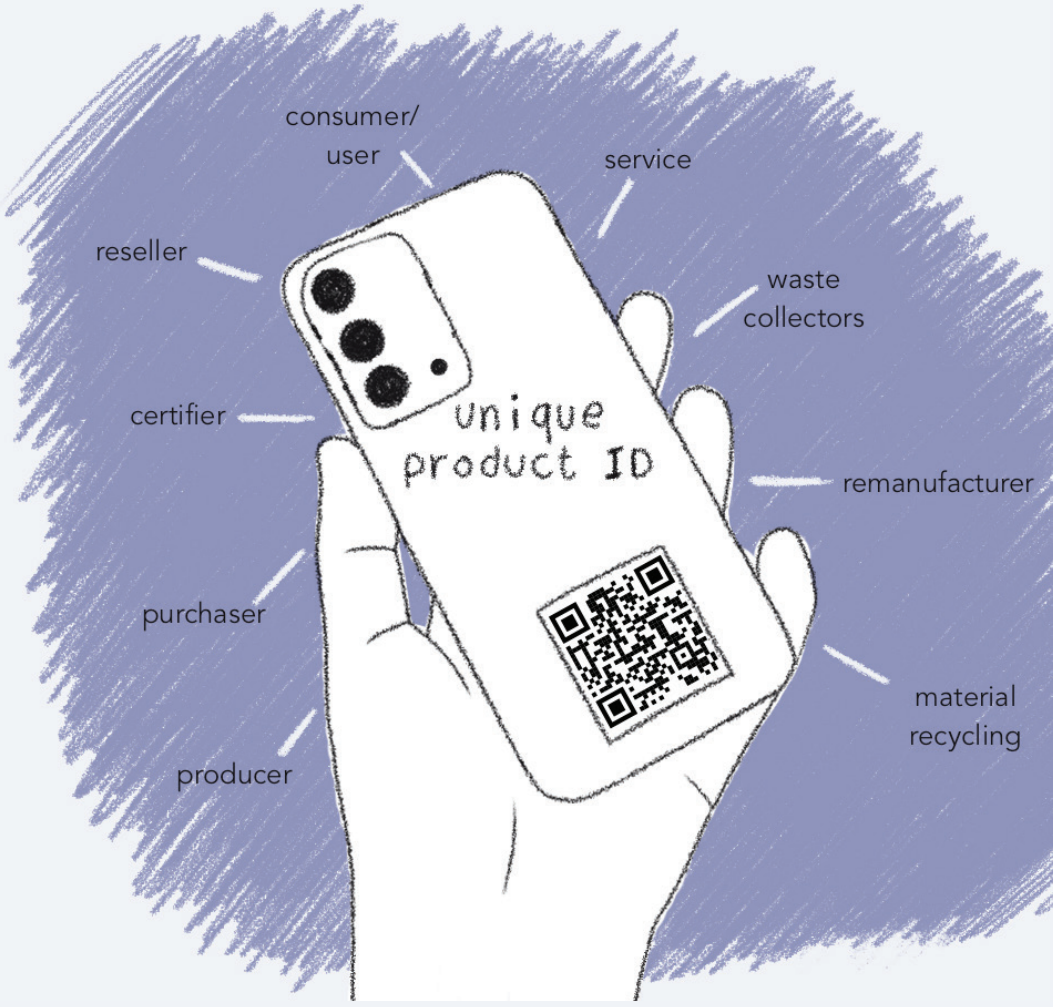


Improved material recycling

By obtaining more, increasingly accurate information about which materials a product contains, the materials can be extracted by improving the sorting and pre-treatment of waste at the recycler at the end of the product's life. Reducing the waste from EE equipment is also the aim of the EU's waste electrical and electronic equipment (WEEE) directive.

[1] European Environment Agency (2021), "Europe's consumption in a circular economy: the benefits of longer-lasting electronics". Online: https://www.eea.europa.eu/publications/europe2019s-consumption-in-a-circular/benefits-of-longer-lasting-electronics.

In Keep Electrical and Electronic Products (KEEP), a project launched in 2018 and completed in June 2021, such a traceability system was evaluated and a prototype built. For a foundation, the system assigns each product a unique product identifier—for example, a barcode and/or QR code—that allows organisations and users of the product across its life cycle to access and share information about the product—for example, value-specific and historical information about key events in the product's life, including production, distribution, purchase, repairs and services, reuse and recycling.



ANDREAS NOBELL

Development Manager at TCO Development

How can traceability enable the sustainable production and use of electrical and electronic products?

To keep materials, components and products in a closed loop and enable a circular economy, we need to better understand which materials are included in which components and which components are included in which products. Today, that information is scattered along the supply chain, which makes it extremely difficult to make informed decisions and create new and innovative solutions for our existing sustainability challenges. By implementing a product passport or traceability system, we can help to standardise the way that information is shared. Over time, it will enable us to:

- Provide more reliable information to consumers and purchasers via independently verified data from certifications such as TCO Certified;
- Connect materials with products to better understand how they should be handled and treated in the future;
- Remove hazardous materials from circulation when old products are recycled;
- Improve access to information about repairing products and where to find spare parts;.
- Make reselling products and receiving estimated prices for second-hand products easier;
- Get information on safely and responsibly disposing of products; and
- Much, much more.

Why is TCO Development involved in KEEP?

We're involved in the project because we believe that a traceability solution or product passport is key to really transitioning into a circular future. In the project, we want to play the role of a provider of independently verified data made valuable for various stakeholders in the supply chain.

02

PRODUCT PASSPORT

Improving the availability of information

As awareness of a circular economy has expanded, traceability systems have been identified as enablers of increased circularity and sustainability. At the EU level, an electronic product passport able to relay information about products sold in the EU has been identified and is currently being investigated.

Digitalisation can also help improve the availability of information on the characteristics of products sold in the EU. For instance, an electronic product passport could provide information on a product's origin, composition, repair and dismantling possibilities, and end of life handling.[2]

With those words, issued in 2019, the product passport first appeared in the European Green Deal, the EU's plan to make its economy sustainable. As we understand it, a traceability system such as KEEP is exactly that: a product passport.

Sweden's government has announced its active cooperation in developing product passports, which form a pillar of its action plan for a circular economy.[3] Thus, as we transition into sustainable societies, product traceability will be required by legislators, partners and customers. That challenge is one that all companies need to overcome in order to remain financially and environmentally sustainable.

[2]The European Green Deal, COM (2019)
[1] For more information, see: Regeringskansliet (2021), "Cirkulär ekonomi - Handlingsplan för omställning av Sverige".

03

BENEFITS OF TRACEABILITY FOR DIFFERENT ACTORS

Traceability systems can help companies, organisations and users to transition into resource efficiency and circularity. For each actor involved, the benefits of such a traceability system are numerous and growing, some of which are listed below.

For producers and retailers

- **Tell every product's story**
  A traceability system can help brands to tell the story of where their products have been, how they have been made and how they are being used.
- **Monitor your supply chain**
  A traceability system can help producers to collect information from suppliers more easily.
- **Develop better products**
  A traceability system provides specific, reliable data about how products have been used and for how long, which can be used to create more sustainable, optimised products.
- **Make logistics and handling efficient**
  By tracing products, producers can cut costs, tighten logistics and improve handling processes.
- **Win more tenders**
  A traceability system eases access to product information, meaning less work and better odds of winning tenders.
- **Gain a competitive advantage**
  A traceability system allows comparing products' environmental impact and helps to differentiate producers' sustainably manufactured products.
- **Make recalls easier**
  As a direct line to customers, a traceability system allows producers to send push notifications about recalls.
- **Get everyone on board**
  A traceability system can be used to not only communicate beyond the organisation but also to increase transparency about sustainability within companies and, in turn, create a shared vision.
- **Buy back products**
  A traceability system provides producers with options to buy back old products from customers and remanufacture them.

For purchasers

- **Access data about sustainability**
  A traceability system facilitates access to data about sustainability and allows comparing the environmental impact and social conditions of various products.
- **Monitor your inventory**
  A traceability system helps with monitoring and tracking purchased products currently being used or stored within organisations.
- **Get everyone on board**
  A traceability system allows creating a common vision at companies and ensures that products are used in sustainable ways.
- **Expand reuse and improve recycling processes**
  A traceability system can help remanufacturers and material recyclers to take better care of products that are no longer needed.

For consumers and users

- **Buy better products**
  A traceability system helps to select and compare products based on performance and environmental impact.
- **Feel safe when buying used products**
  A traceability system affords access to a product's history during purchases of used products and helps to ensure that products have not been stolen.
- **Keep your products longer**
  A traceability system affords consumers and users access to repair guides that make it easier to fix broken products and thus extend their lifetime.
- **Declutter your space**
  With a traceability system, users gain access to information and reminders about what to do with products that are no longer in use.

For service and support agents

- **Check and update the service history**
  A traceability system allows access to a product's service history and updates its information after being serviced.
- **Access warranty information**
  Traceability systems make it quicker to determine whether products are covered by a warranty.
- **Recommend good products**
  A traceability system can be used as a guide for information about performance and environmental impact when recommending products to customers.
- **Ease access to troubleshooting and repair guides**
  A traceability system offers information about why products may be malfunctioning and how they may be fixed.

For remanufacturers and refurbishers

- **Buy back products from consumers**
  A traceability system provides remanufactures with options to buy back old products from customers to remanufacture and resell them.
- **Sort products based on use and wear**
  The product history in a traceability system can indicate how much the product has been used and what parts may need to be replaced.
- **Ease access to information about parts and components**
  A traceability system can identify high-value products, parts and components that can be remanufactured and resold.
- **Access repair and disassembly guides**
  A traceability system can accelerate the repair and disassembly of products with guides and instructions.
- **Achieve a transparent remanufacturing process**
  With a traceability system, remanufactures can trace their own processes and guarantee customers high quality.
- **Get stats on CO_2 savings**
  A traceability system can be used to aggregate and visualise reductions in CO_2 emissions achieved by remanufacturing.

For recyclers

- **Optimise material recycling**
  A traceability system can report the material composition of each product and thus allow optimising the recycling process and avoiding the downgrading of resources.
- **Separate products with hazardous materials**
  A traceability system can facilitate the identification of hazardous materials in products that need to be sorted separately in order to protect the workforce.
- **Ease access to information about parts and components**
  A traceability system can pinpoint high-value products, parts and components able to be remanufactured and resold and/or that need special care.
- **Access disassembly guides**
  A traceability system can offer quick access to disassembly guides that can help to accelerate pre-processing processes.
- **Get stats on your recycling processes**
  A traceability system can help to trace processes and relay information to customers about what and how much has been recycled.

For certifiers

- **Collect data more easily**
  Traceability systems make it easier to collect more trustworthy data.
- **Reach purchasers and consumers**
  Traceability systems also make it easier to reach purchasers and consumers as well as provide them with a better overview of products' certification.

For regulators and authorities

- **Enhance national statistics**
  A traceability system can grant authorities with better statistics regarding the waste electrical and electronic equipment (WEEE) directive.
- **Make follow-up efficient**
  A traceability system can help to monitor whether companies are acting in compliance with laws and regulations.
- **Adjust the responsibilities of producers**
  A traceability system makes it possible to adjust the responsibilities of producers regarding the regulations for different types of products.

05

KEY ELEMENTS OF A TRACEABILITY SYSTEM

The traceability system is divided into two main elements – the front-end and the back-end.

In KEEP, a prototype for the front-end was developed from the user's perspective and a concept drawn for the back-end solution.

Front-end

The idea of developing a prototype for the front-end came early in KEEP. The intention was twofold:

1. To visualise how the system could work and to understand what information is important for different actors; and

2. To test how the system would work in practice and better understand which of its aspects proved easy, difficult, or impossible to implement.

The front-end solution was developed based on the different needs of the actors involved. For consumers, it is important to compare and select products based on performance and environmental impact, whereas recyclers need to quickly assess the value of a product's various components. By conducting a series of workshops with all actors in the value chain, a framework of needs and required data points could be constructed.

Based on that framework, a web-based prototype was designed and developed to test how data collection would proceed. The three producers in KEEP selected an existing product and collected the required data during a 4-week period. The test illustrated the challenge of acquiring information but also resulted in a list of data that could be obtained. At a later stage in the project, real-life data collection was done for an additional producer.

The prototype was a valuable tool for bringing an abstract idea to life and helped to advance the innovation process. The web-based prototype was easily accessible to a wider audience, and when combined with a user guide, it communicated what a traceability system is and the value that it brings. However, for the next step, the front-end solution needs to take into consideration how the different actors interact with the information, understand what device is preferable for each user group and further develop the prototype's functionality.

Test our protoype

keepelectronics.com

The information in the prototype is divided into a number of categories

Overview
Presents basic information about the product as well as a digital receipt and warranty information.

Tech Specs
Detailed technical specification for the product.

Product History
A timeline showing important events during the products lifetime from production to end of life.

Materials
Detailed list of the product's material contents.

Parts
List with product parts, highlighting the most valuable parts. Possibility to order spare parts.

Suppliers
Information about the product's supply chain.

Social Impact
Social impact parameters such as corporate responsibility, factory wages and working time.

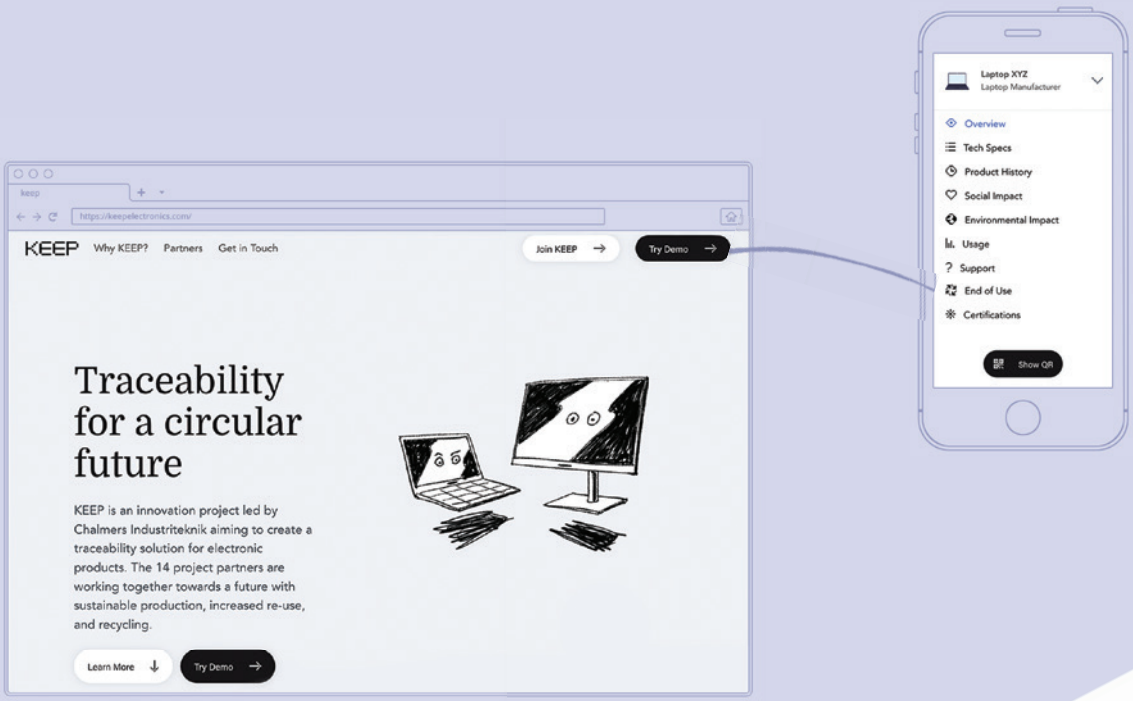
Environmental Impact
Summary of the product's environmental impact including carbon footprint, energy efficiency and recycled content.

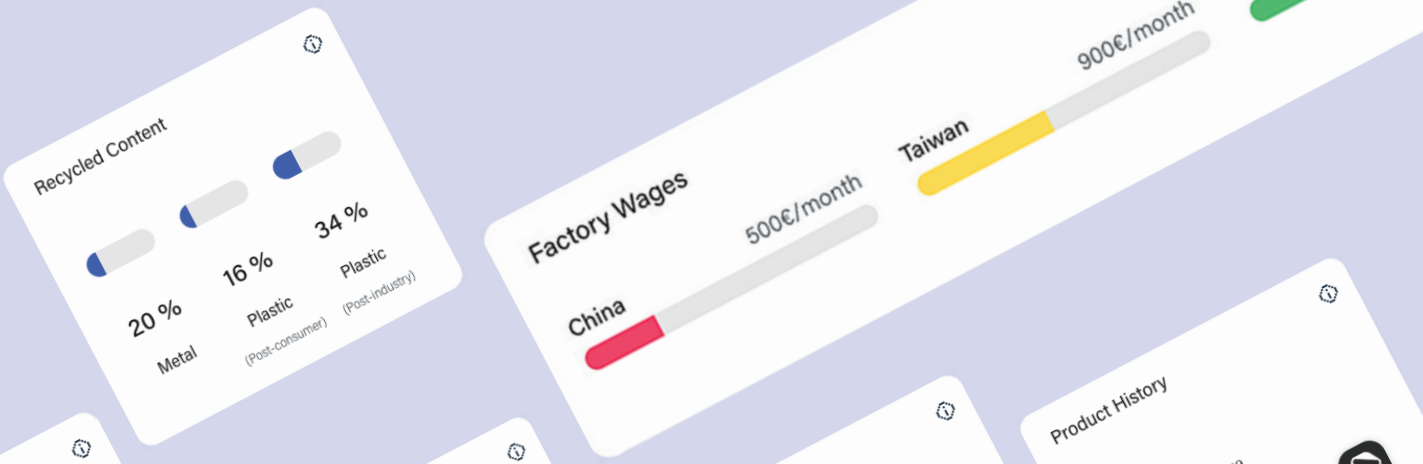
Usage
Statistics about how the product is used.

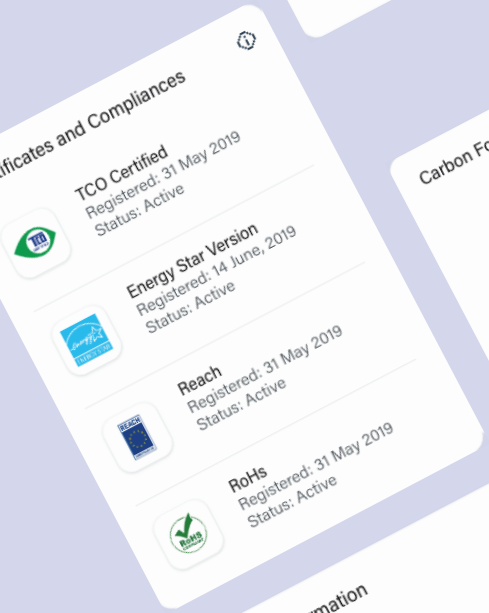
Support
Product support such as troubleshooting guides, repair guides and service requests.

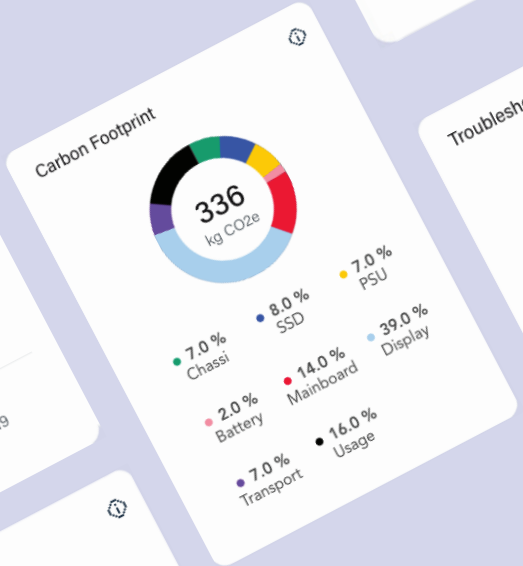
End of Use
Information about the resell value of the product and how to find the nearest collector.

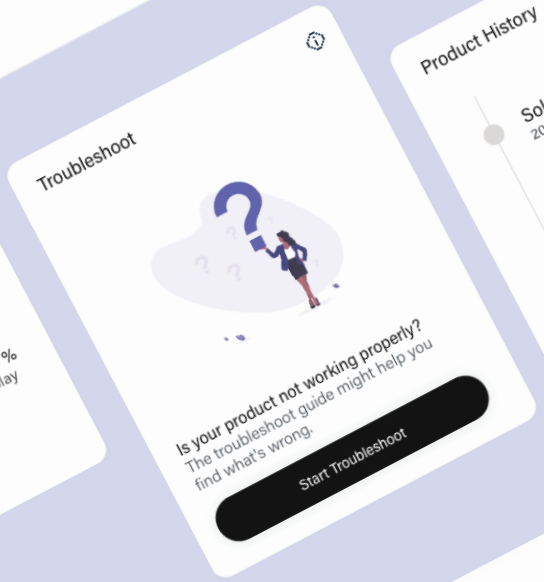
Certifications and Compliances
List with all the product's certifications and compliances.

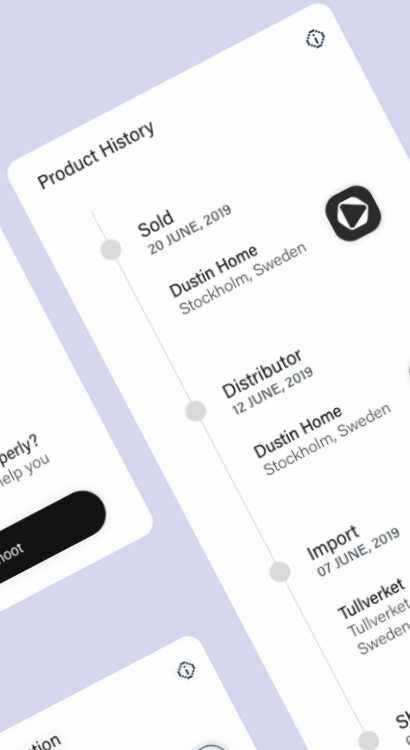

KEEP
Why KEEP?
Partners
Get in Touch
Join KEEP
Try Demo
Traceability for a circular future
KEEP is an innovation project led by Chalmers Industriteknik aiming to create a traceability solution for electronic products. The 14 project partners are working together towards a future with sustainable production, increased re-use, and recycling.
Learn More
Try Demo
Laptop XYZ
Laptop Manufacturer
Overview
Tech Specs
Product History
Social Impact
Environmental Impact
Usage
Support
End of Use
Certifications
Show QR

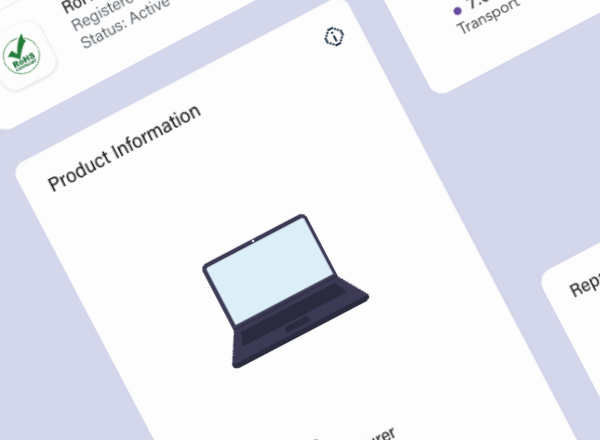

Recycled Content
20 %
Metal
16 %
Plastic
(Post-consumer)
34 %
Plastic
(Post-industry)
Factory Wages
China
500€/month
Taiwan
900€/month
Japan

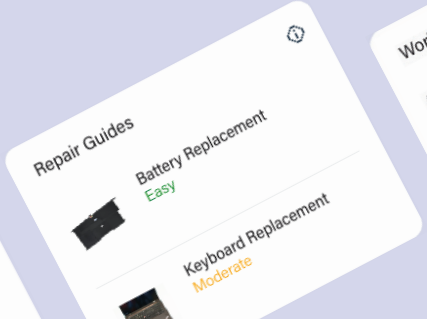

ificates and Compliances
TCO Certified
Registered: 31 May 2019
Status: Active
Energy Star Version
Registered: 14 June, 2019
Status: Active
Reach
Registered: 31 May 2019
Status: Active
RoHs
Registered: 31 May 2019
Status: Active

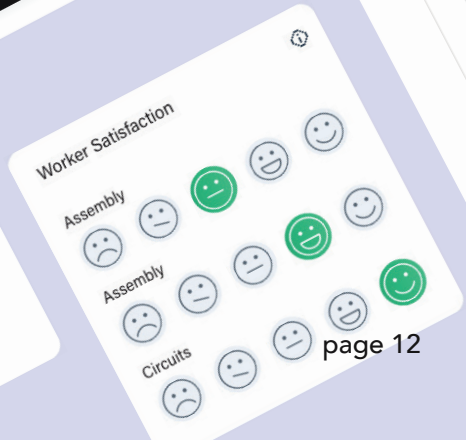

Carbon Footprint
336
kg CO2e
7.0 % Chassi
8.0 % SSD
7.0 % PSU
2.0 % Battery
14.0 % Mainboard
39.0 % Display
7.0 % Transport
16.0 % Usage


Troubleshoot
Is your product not working properly?
The troubleshoot guide might help you find what's wrong.
Start Troubleshoot


Product History
Sold
20 JUNE, 2019
Dustin Home
Stockholm, Sweden
Distributor
12 JUNE, 2019
Dustin Home
Stockholm, Sweden
Import
07 JUNE, 2019
Tullverket
Tullverket
Sweden


Product Information


Repair Guides
Battery Replacement
Easy
Keyboard Replacement
Moderate


Worker Satisfaction
Assembly
Assembly
Circuits

THOMAS HEDIN

Environmental & Sustainability Affairs Manager at Lenovo

Why is it important for you to be able to share more data about your products with actors downstream in the life cycle?

Today, we share information with customers, repair shops and recyclers, among others, through compliance documents, product-specific carbon footprint information sheets and environmental declarations, including regulatory compliance, energy consumption and material content. Those declarations and other compliance documents are available online.

With help of a traceability system, we find that we can share that information more efficiently with those actors by

1. Adapting the information given to different actor groups so that they get what they want and not more; and

2. Ensuring that they can access the information quickly and efficiently in their operations.

What did you learn by collecting data for one of your products to put in KEEP's prototype?

The main reflection is that it was more complicated to collect the data than we thought at first. We needed to retrieve data from several internal systems and sources. I don't think that it'll be a problem in the future, when we have a standardised method and know exactly what data we need to collect. We can then build an efficient structure for collecting data from the different systems. A future path to make traceability systems successful is to have an information-sharing standard. That would make the processes of collecting and sharing data much more efficient for us.

Another reflection was that it's important how sensitive data are handled. First, it's important to consider how sensitivity changes over time. When a product is just released, we might not want to share data about components, but after 5 years when the computer ends up in a repair shop, it may not a problem to share it. So, looking at the time frame between the release of products and data access in the traceability system can help producers to share data. Second, who has access to what data has to be considered. For example, we might be willing to share some data with customers but not competitors.

A future path to make traceability systems successful is to have an information-sharing standard. That would make the processes of collecting and sharing data much more efficient for us.

NATALIA LOPEZ CASCO

Social Sustainability Manager at Dustin

Why is it important for you to be able to share more data about your products with actors downstream in the life cycle?

There are many reasons why it's important, so I'll explain two very important ones. The first one is that for us as a brand, it's critical to be perceived as a sustainable company, as a sustainable brand. And that involves showing our customers that we "walk the talk" when we do our sustainability work and when it comes to circularity and environmental and social sustainability. Part of that sustainability strategy includes giving a more sustainable offering to our customers, and we can't deliver on that unless we're able to gather the required information and pass it on to our customers. Thus, for us it's important that we deliver what we're promising—that we deliver on our sustainability strategy.

The second reason is that there's been a huge leap in what customers request from us. It's been growing exponentially in the last 5 years. First, it was about whether there was a supplier code of conduct; that was mostly what was asked. But now they ask for evidence that we do audits or ask for our due diligence on conflict minerals. There's a big push from customers to see that kind of sustainability-related information that they can use to corroborate that we're doing what we say we'll do in our code of conduct. They want us to be more transparent, not only regarding our private label but also when we source from other suppliers. Customers want to see that we deliver on our promises.

What did you learn by collecting data for one of your products to put in KEEP's prototype?

The first thing that we learnt was that it's difficult to collect data when data collection is not based on a certain standard. I mean, when we measure the CO_2 emissions of a product, we'll end up with a certain amount of CO_2. But when a competitor has the same product and measures their CO_2 emissions in a different way, they might end up with another CO_2 value for the same product. So, how would we be sure that we were comparing the products in a fair way?

The second learning outcome is that because supply chains are very dynamic, what I'm reporting to you today is probably not the same value that I'd report in 6 months' time. And that's probably going to be the point in time when the end customer gets the product. How are we going to report such dynamic data? How often can the data in a traceability system be updated, and can that be done automatically (e.g. through a certain system)? And that of course can be very time-consuming, because there's a lot of data that will often need to be imported manually during the year.

Third, sustainability information is embodied in different actors around the company. So, there's no centralised unit to handle all of the data. It can be difficult to gather all of the data quickly, because it might need to be collected from different departments.

If a traceability system would also act as an internal database, it would be easier for me as a sustainability manager to log in and see all of the data, all ISO certification and so on in one overview or company CO_2 reports. But we're not there yet.

As a fourth learning outcome, different products have different specifications and are therefore difficult to compare. In KEEP, we looked at different products from the ones that other producers looked at. Clas Ohlson compiled data about their coffee machine, Lenovo about their laptop and we about our screen. When it comes to products, we literally could not have chosen more different ones. For all products, different specifications apply, and they're hardly comparable. The question is thus how should we work around that? It's not only about the difficulty of comparing emissions but also all of the other specifications for such different types of products and their respective components.

As a fifth learning outcome, the data that people want to know of are highly specific depending on the product at hand. The importance of different information is rated very differently by different actors.

The back-end

As attention on traceability and product passports intensifies, several companies and organisations are developing traceability solutions to help companies active at some point during products' life cycles to collect and share data. Therefore, it is important that information can be shared between different traceability solutions to enable companies and organisations using different systems to still share data.

For example, a recycler receiving thousands of different products from a wide range of producers needs to be able to access data about all of the products independent of the solution that the producers used to collect the data in the first place. To that purpose, four enablers in the project were identified.

One information sharing standard

The information has to be packaged in the same way independent of what traceability system is used to collect and share the data. Such uniformity can be achieved with a joint information-sharing standard with pre-identified options for data entry.

Decentralized storage of data

Given the amount of EE products on the market globally each year, the amount of data in all of the traceability systems will be so vast that having only one or even several centralised databases in the world will not be a feasible solution. Instead, the product-specific data can either be stored by the producer of the data or by a traceability system provider that helps actors in the life cycles of products to collect data and share the data with other companies and organisations once it is requested by a user.

Routing layers to transfer data between different traceability systems

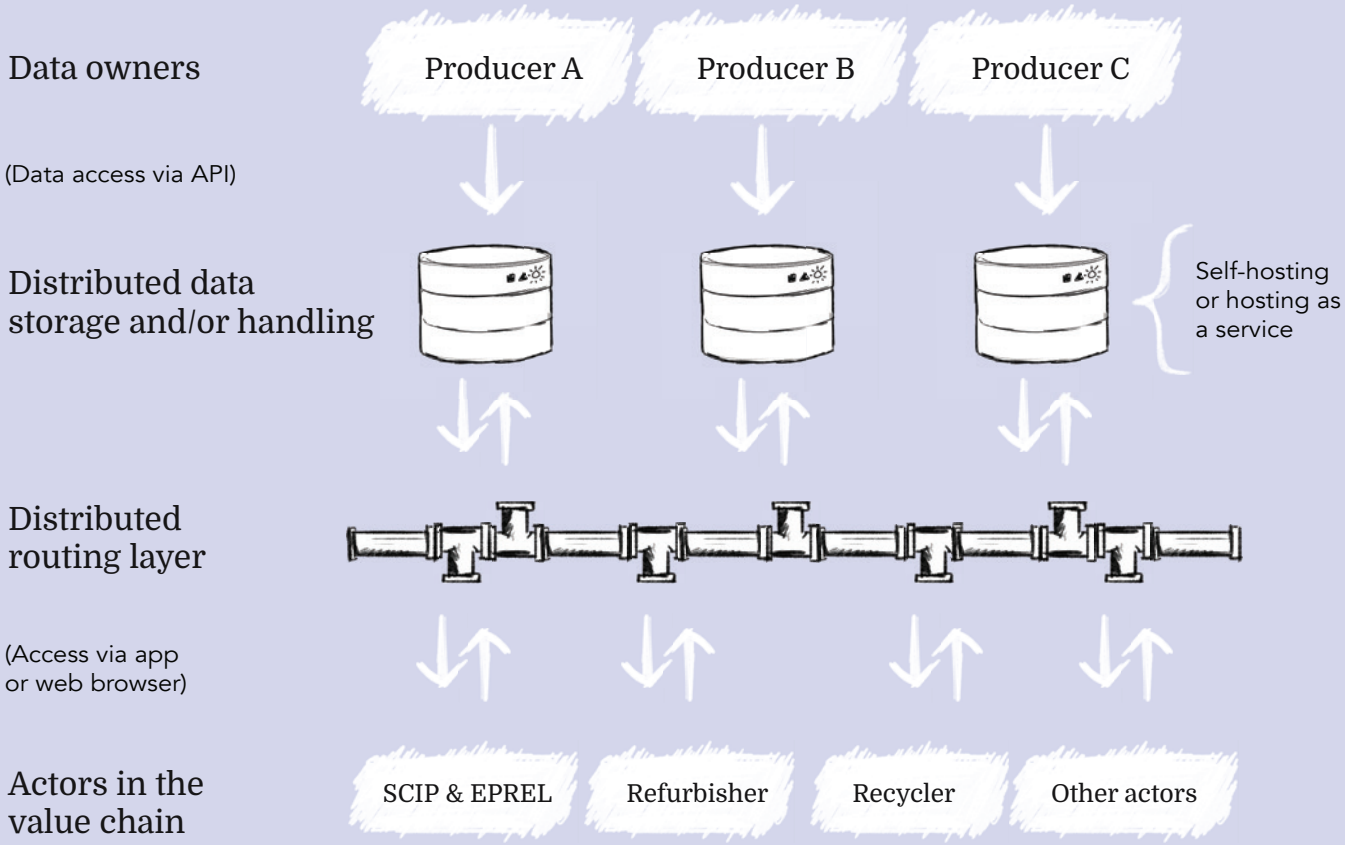
To enable efficient information sharing between different systems, there has to be a way to connect those systems. The idea proposed by KEEP is to use so-called "routing layers", similar to emails but sent to anyone independent of their email provider. Even routing layers, however, require a standard that all systems to follow.

Trustworthy data

The trustworthiness of data in a traceability system is crucial. In KEEP, we have discussed two aspects of trust worthiness:

• Is the entry of new data correct? For example, if a producer enters information that a product is mercury-free, how can it be trusted? Solutions provided here concern, for instance, using independent certification organisations to validate the data. Another aspect is that the system should clearly state how the data have been validated — for example, only by the producer, by an independent auditor or as part of a certification scheme.

• How can it be ensured that data are not altered along the way and do not end up in the wrong hands? A common answer to that question is by using a blockchain. Even then, however, ways of using blockchains differ, and different solutions have to be allowed to have their own way of ensuring that data are not compromised or shared unless authorised.



Staffan Olsson

Chief Product Officer (Interim) at GS1 Sweden AB

What are the advantages of decentralized data storage systems?

It's not so much about the data storage, but rather the data governance and data quality. When information about products originates from multiple sources, it is often better from a data quality perspective that the originator of the data maintains it and makes it available to authorized parties upon request. When data is transmitted to a central database it is often a challenge to keep it up to date, leading to a deterioration of data quality over time. In addition, if multiple "central" databases require the same companies to upload their data it becomes quite inefficient, unless the central databases are connected to each other.

How can GS1 contribute to a common information-sharing standard that is valuable to KEEP?

GS1 has recently added new web-enabled standards to its portfolio, called the GS1 Digital Link. They're designed to connect a product or any other object that's identified with a GS1 identification key to the corresponding information about that product, using web technologies. The standard is designed to support the information's distribution and not to be stored in a single location online.

Design parameter of a traceability system[4]

Depth

Traceability depth refers to how far backwards or forward the system extends in the life cycle of a product, in two categories:

High depth - from origin of raw materials to product disposal or...

Low depth - from factory to supermarket shelf.

Breadth

Traceability breadth refers to how many different data points a system collects about a certain product, in two categories:

High breadth - product ID, process type, date and time, location, process time, processing machine, machine settings, supervisor and quality control; and...

Low breadth - product ID and process type.

Access

Traceability access refers to the number of different parties with full or partial access to product and process data from the system, in two categories:

High access - suppliers, customers, consumers, regulators and legislators; and...

Low access - direct customers only.

Precision

Traceability precision refers to the degree of assurance that the system can pinpoint a certain product, in two categories:

High precision - individual product instances are uniquely identified; and...

Low precision - products are only identifiable as aggregated into large batches.

Speed

Traceability speed refers to how much time it takes between exchanging products between between parties in the supply chain and sharing their traceability information, in two categories:

High speed - traceability information is shared the moment that products are transferred from one party to another; and...

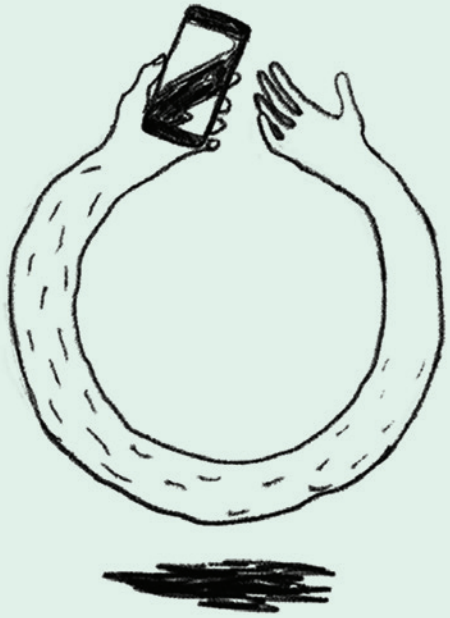
Low speed - significant delays, such that the product may have already been exchanged again before information is shared about the first exchange.

[4] Glew & Arvidsson (2021), "Traceability systems for better supply chain relationships", IPSERA conference 2021;
Golan, Krissoff, Kuchler, Calvin, Nelson & Price (2004), "Traceability in the US food supply: economic theory and industry studies", Agricultural Economic Report, Vol. 830, No. 3.

06

KEEP'S NEXT PHASE

The journey continues



Development of the technical solution

In KEEP's next phase, we want to ensure a technical solution for different traceability systems to collect data in a standardised way and share the data among themselves. That solution will be achieved by completing the following activities:

1. Develop an information-sharing standard

Having a common information-sharing standard will make it easier for all companies and organisations across a product's life cycle to compare information and share it between different systems. Therefore, KEEP's next phase will involve developing an information-sharing standard that will be open and accessible to all different traceability systems.

2. Enabling interoperability

To enable communication and data sharing between different traceability systems, we agree upon and apply one routing layer that can be used to share data between systems.

3. Supporting the development of traceability systems

Traceability systems are currently being developed for collecting and sharing data at different places in the product's life cycle. In the next phase of KEEP, we want to support those initiatives and help them to develop their solutions and business models with future potential users.

Giving new products unique identifiers

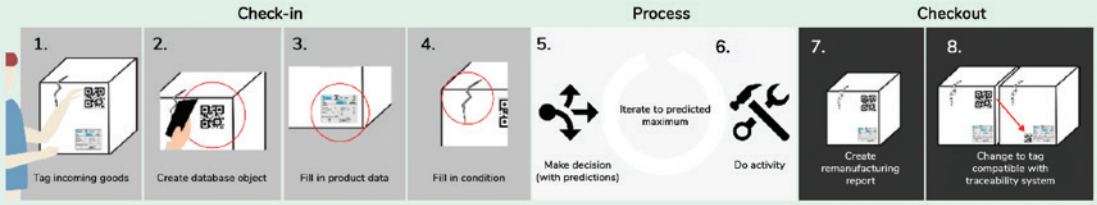
To understand how traceability systems can be set up for new products entering the market, in Phase 3 we will establish several tests with producers and resellers in which products are given unique product identifiers (IDs) that direct people to product-specific data such as the data presented in the prototype. Those tests will help us to understand how data can be collected and shared in efficient ways.

Giving reused products unique identifiers

In the long run, the aim of the KEEP project is that all EE products will receive an identifier with a unique product ID at the production stage. However, for fast-tracking the usage of traceability systems, possibilities exist to give those unique IDs to products at a later stage in their life cycles.

In the project, the point of a product's arrival at a remanufacturing facility was identified as a promising opportunity to start tracing products not already assigned a unique product ID. The products are often of high value, have great potential for continued use and are therefore reasonable to trace. The data are relevant both for users and material recyclers downstream as well as for public authorities and producers.

In KEEP, a prototype for a system to establish traceability at the beginning of the remanufacturing process was developed consisting of eight steps, as shown below:



To continue working in that direction, KEEP's continuation will involve developing the prototype into a functioning solution and testing and implementing it with IT developers and remanufacturers of EE products.

Fredrik Benson

Deputy Managing Director, Business Development at El-Kretsen AB

What is the link between a traceability solution and a producer responsibility scheme?

The link between traceability systems and producer responsibility systems is ultimately a matter of efficient resource retrieval. Today, resource recycling is blunt and difficult to implement in an optimal, value-creating way. It's a must to make the right decision at the right time in a product's life cycle, so that the product's constituent resources can be managed or decontaminated and used in the best way.

With more knowledge about the product's use, content (i.e. components as well as materials) and life expectancy, instead of working almost exclusively on material recycling, we can increase the value in the chain by working with components and recycling specific materials to more purposefully focus on what's essential and not just go for target values based on weight and legislation.

What are your expectations for phase 3 of KEEP?

My expectations for KEEP in Phase 3 are to see how a traceability system might actually work, to see whether we can evaluate whether it's actually possible and to be able to show what benefits it has and that it's not as difficult to implement as may be perceived. Most of my expectations are about conveying benefits and security for everyone involved to demonstrate that knowledge and the use of the information conveyed not only contributes to product development but is also better for managing inbound resources.

Emma Nilsson

Sustainability constultant at GIAB

What are the possibilities in traceability for remanufactures and refurbishes?

A traceability solution in the remanufacture and refurbishment of a product affords a range of opportunities. For remanufacturers it streamlines and optimizes all parts of the process and facilitates the management by digitalization. Practically it means creating unique identifiers for all incoming products with information about the product's source, remanufacture activities performed, grading, pricing, and CO2-savings. Traceability in the remanufacture process enables data collection through all parts of the process with valuable information linked to a product by the unique identifier. Information that can be shared with consumers and business partners to create an understanding of the process in terms of sustainability and quality.

What will GIAB do during phase 3 of KEEP?

In the next phase of KEEP, GIAB will participate in continuing to develop a repair management application for more product categories and by designing it for optimal effective use. In the project's next phase, the repair management application will also be tested.

Contact

For all questions regarding the KEEP project and future collaboration, please contact:

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