FOOTPRINT DATA CERTIFIED STEPWISE AND COMMUNICATED BY BLOCKCHAIN THROUGH VALUE CHAIN

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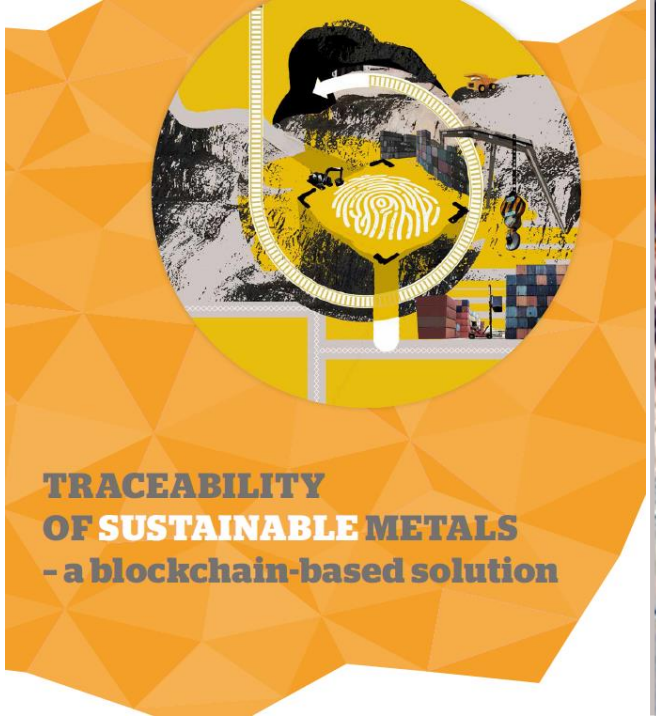
RISE Research Institutes of Sweden

Built environment

Certification development



Background

- To meet the climate challenge, we need significantly increased amounts of renewable or fossil-free electricity, a transition from fossil fuels to electricity in the transport sector and smarter electronics that increase efficiency. All these applications require increasing amounts of metals and minerals; both of base metals, such as iron, copper and zinc, and of other metals such as rare earths and battery metals, such as lithium and cobalt. If the world is really to change and move in a more sustainable and circular direction, it is not responsible to base development on unsustainably produced raw materials.
- It will become a matter of course to make demands on how raw materials are produced – that Svemin and the Swedish mining industry in 2018 took the first step in developing a system for traceability of metals.

Background

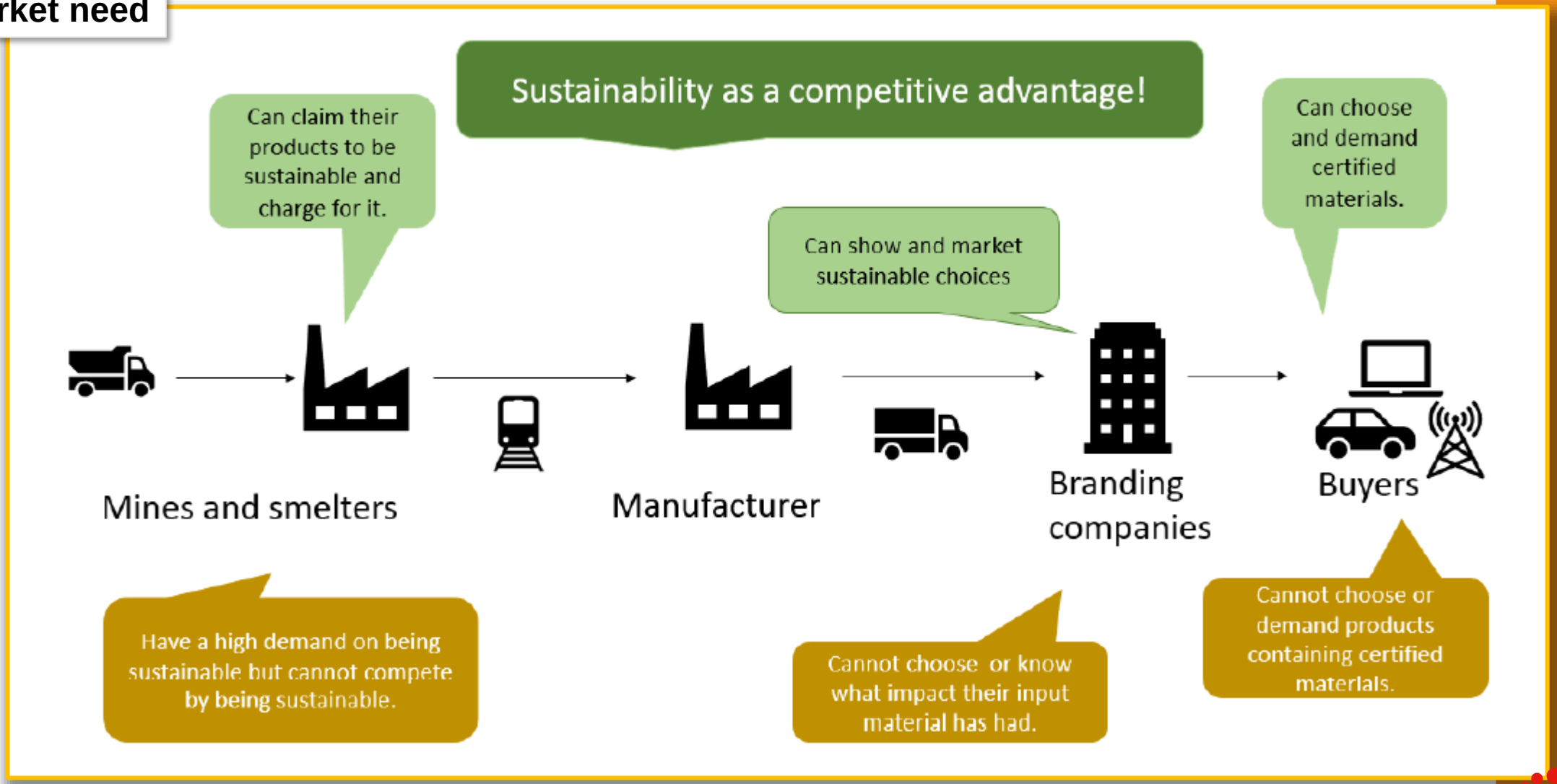
- The Swedish mining industry is at the forefront of sustainable mining.
- The carbon footprint of metals produced in Sweden is already low in a global comparison, and there is a clear plan to be completely fossil-free by 2045.
- The industry has also adopted a target of making a positive contribution to biodiversity in the regions we operate by 2030.
- Working conditions in our mines are good and the safety of employees is at the centre.
- In short, we are convinced that the Swedish mining industry has a unique advantage when demands are placed on how raw materials are produced.

Prestudy that set the scope for TraceMet

- The project is a continuation of a feasibility study, also initiated by Svemin, which was completed in 2019. The feasibility study concluded that mass balance in combination with blockchain technology is a possible way to create a technically reliable and robust traceability system. Therefore, TraceMet has used a blockchain database in combination with mass balance accounting to follow the metal throughout the value chain.

Prestudy results set the scope for TraceMet

Market need



Prestudy results set the scope for TraceMet

Quest

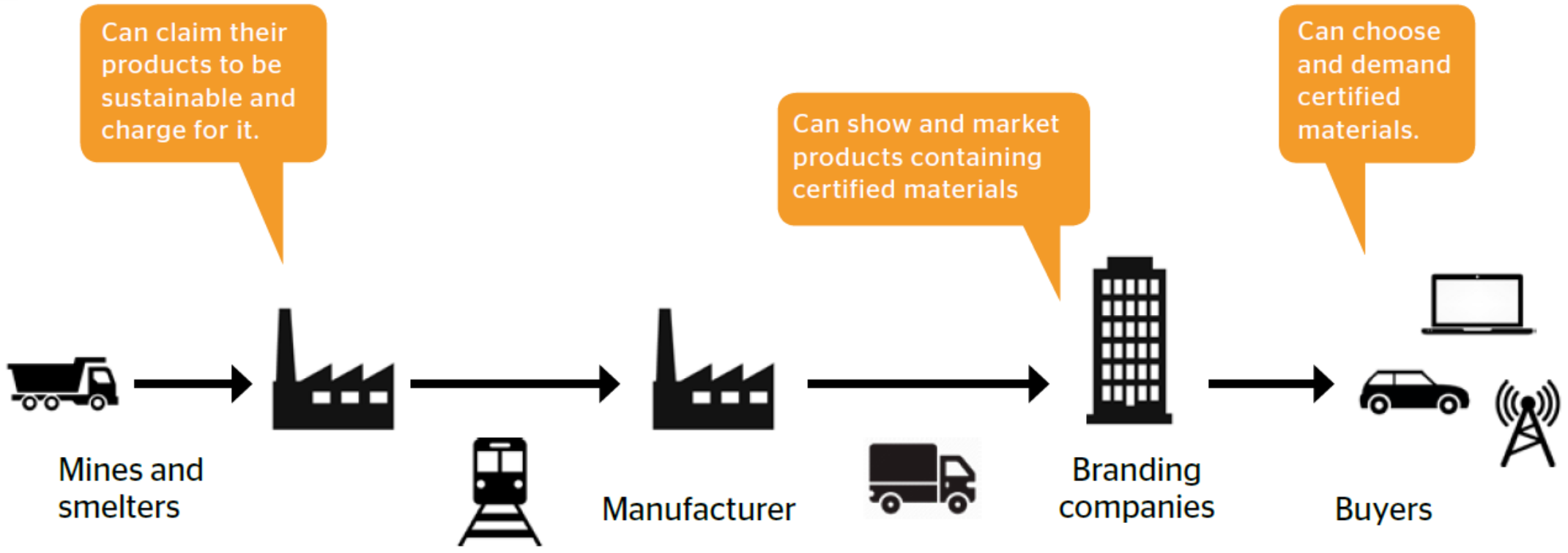


Figure 1. Certification of sustainable metals and minerals offer competitive advantages to the actors in the value chain.

Prestudy results set the scope for TraceMet

Different approaches possible

Mass-balance selected, due to industrial and product form

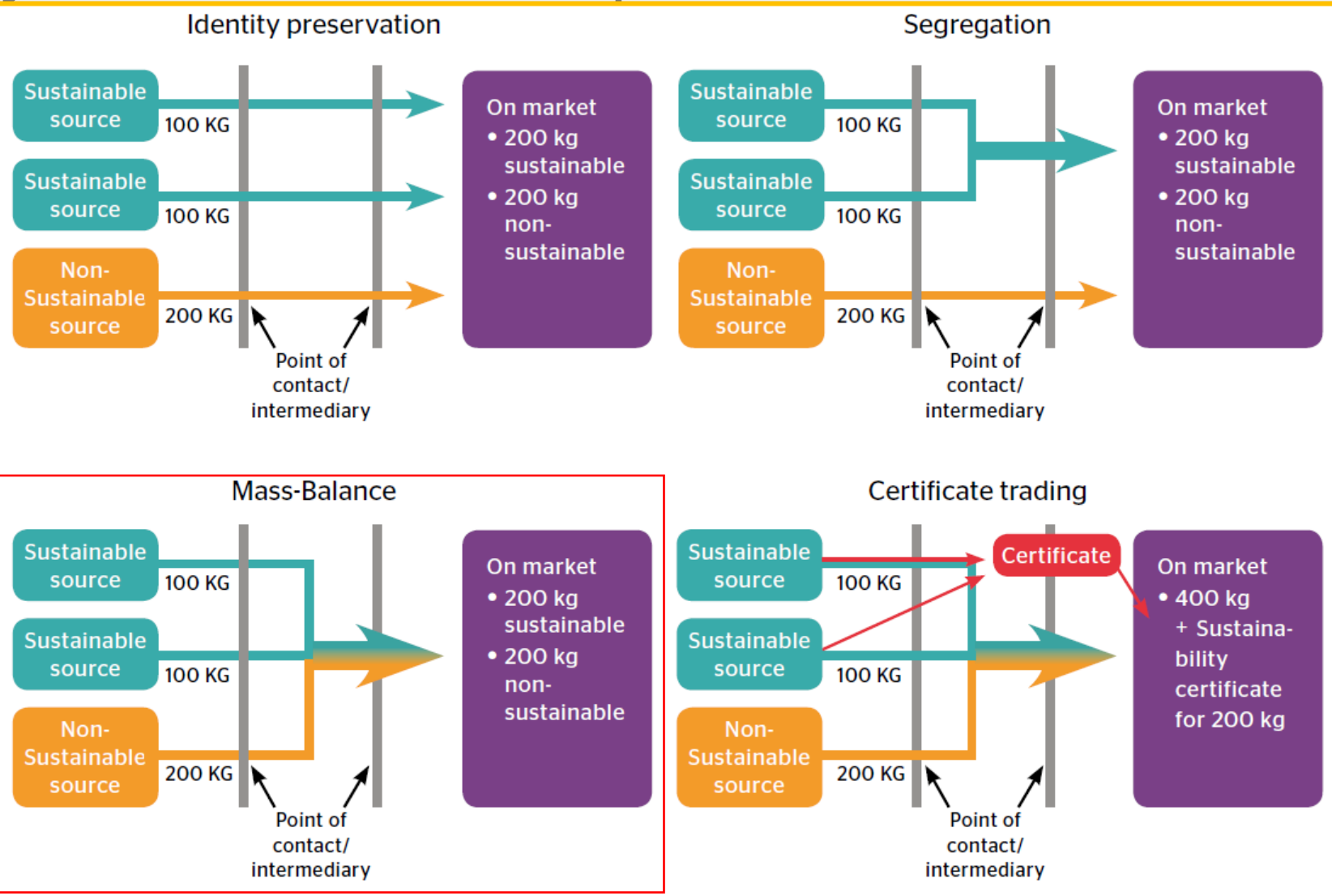


Figure 2.. Four different models for chain of custody systems.

Prestudy results set the scope for TraceMet

Customer can request known recycle grade

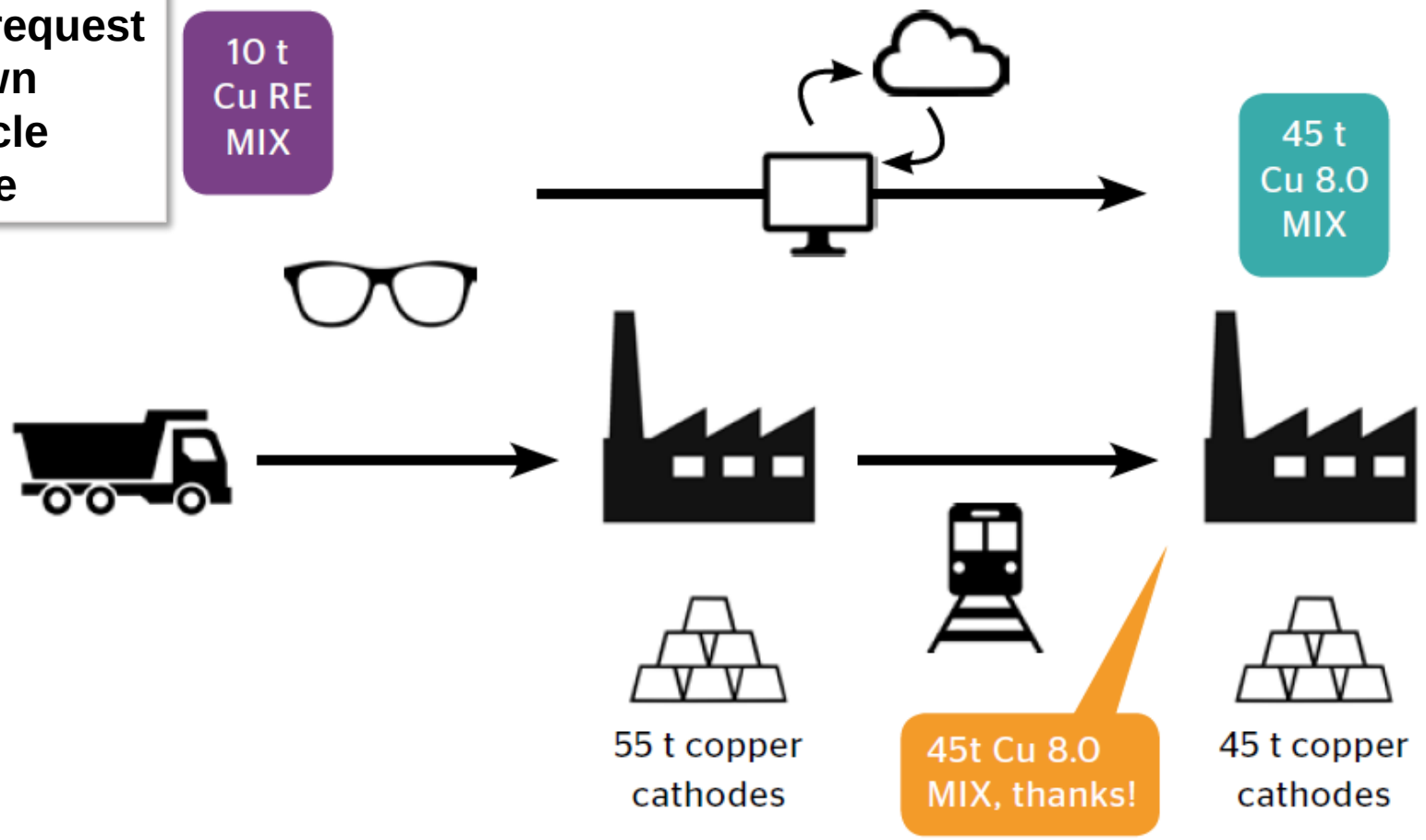


Figure 8. A mass balance based certification applied to an example at a copper wire producer.

Prestudy results set the scope for TraceMet

Customer can request known carbon footprint

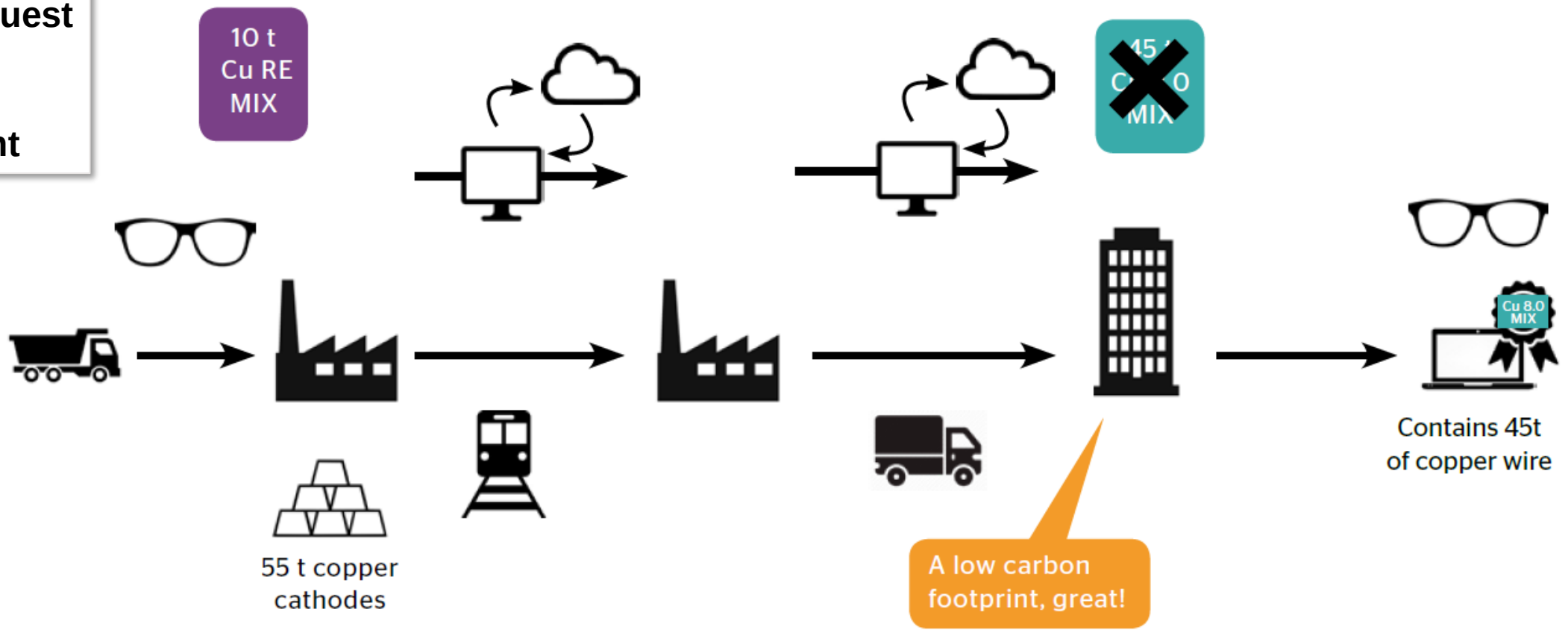


Figure 9. A mass balance based certification applied to an example at a manufacturer requiring copper wire in their products.

Prestudy results set the scope for TraceMet

Third party review and certification required for reliability of data

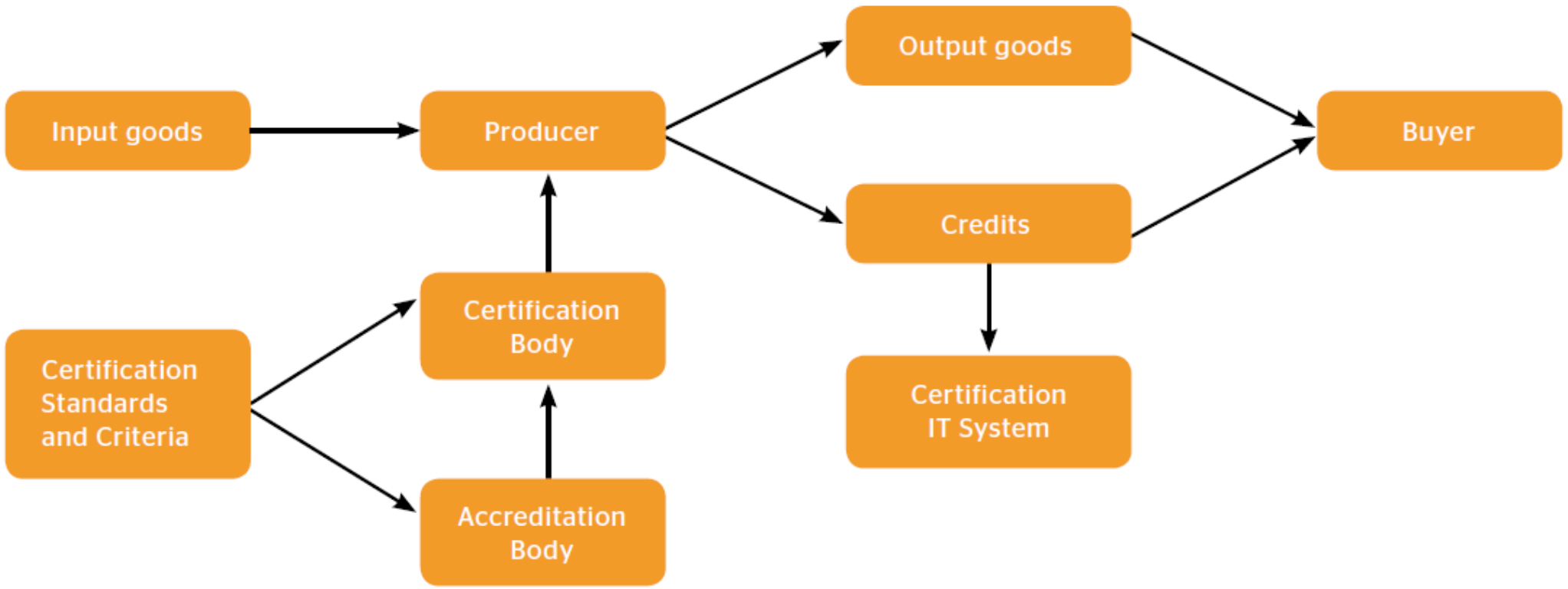
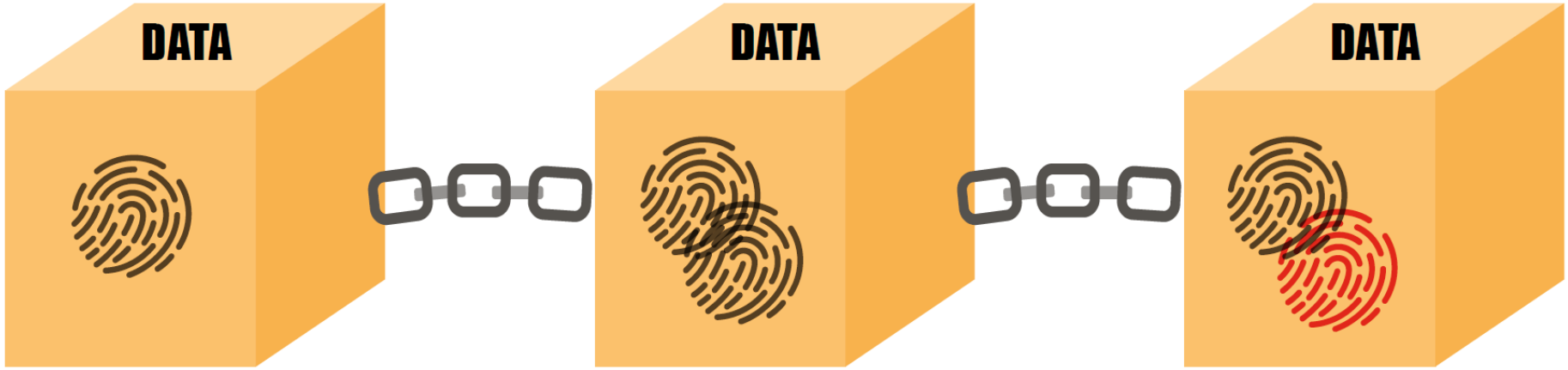


Figure 4. The relationships between value chain actors and the certification system.

Prestudy results set the scope for TraceMet

Blockchain can be used to verify consistent claims (same metal not sold twice)



Each block contains data and their own unique fingerprints.

The subsequent block also contains the fingerprint from the previous block.

If something changes in a block, it is visible immediately in the next step.

A blockchain is a database that is located in identical copies of all operators on a network. Each block contains data, for example about who sold to whom, what quantities, and the like. The operators in the the network is equivalent and can enter data, which in turn must be approved by everyone else.

TRACEMET

a system for traceability of sustainable metals and minerals

From pre-study results and recommendations to running pilot in 13 months

With support from

VINNOVA Sweden's Innovation Agency · Swedish Energy Agency · FORMAS · Strategic innovation programmes

SWEDISH MINING INNOVATION

LCM 2021 · RI.SE

TraceMet – Project set-up

Partners: SVEMIN, RISE and IVL (Swedish Environmental Institute), Boliden, Vattenfall, Elektrokoppar, Scania, Volvo Trucks, LKAB, SSAB

Runtime: Dec 2019-Dec 2020

Total Swedish Mining Innovation (governmental) funding: 0,53 M€

- **Aims:**
  - Develop a pilot for certification of sustainably produced metals (steel and copper), using carbon footprint and content of recycled material as test cases.
- **Goal:**
  - An administrative system and a technical solution that allows a certified declaration of origin, of carbon footprint and of recycled content for metals through the whole value chain.
  - The solution will be implemented and tested as part of the project but will not be maintained within the project.

TraceMet – Project set-up

Description of work and implementation

- **Data-management**: private encrypted chain, partly or fully transparent
- **Copper chain:** Boliden (mining) – Boliden (smelter) – Elektrokoppar AB (Copper wire) – Vattenfall (user of copper wire, not confirmed).
- **The steel chain:** LKAB (mining and pelletising)- SSAB (special steel) - Scania (trucks) and Volvo Group (trucks).
  (Competitors adds extra focus on confidentiality aspects)

Work packages:

- WP1: Project management
  WP2: Outlook - State-of-the-art analysis
  WP3: Technical solution - Mass balance approach (Development of block-chain solution)
  WP4: Methods and certification scheme (Certification scheme)
  WP5: Implementation and evaluation (Piloting acquisition and exchange of data throughout block-chain)
  WP6: Communication

Focus for this presentation

What is the certification scheme?

The TraceMet certification scheme provides a defined certainty to claims about Carbon footprint (CFP) and Content of recycled material

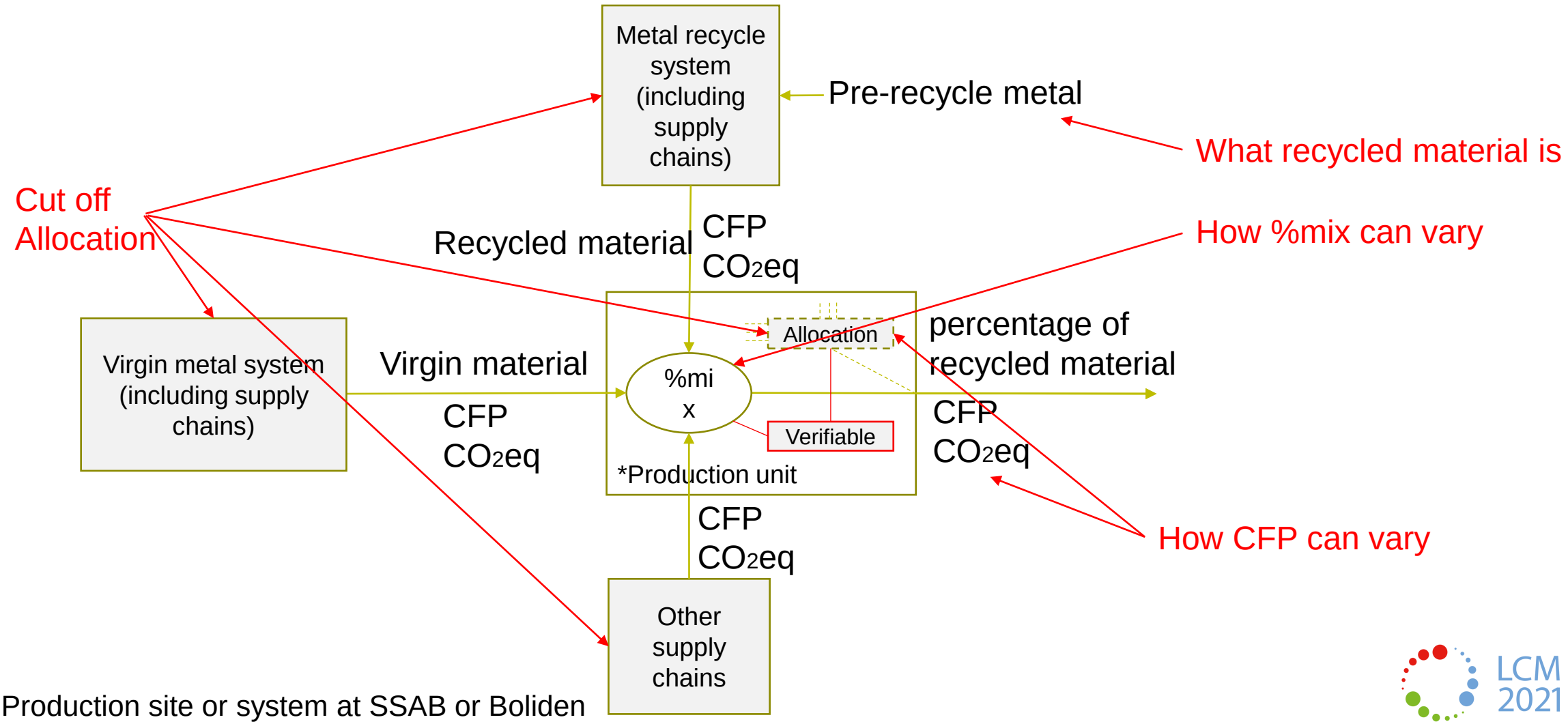
Who uses it and to what:

- Certification body users:
  - Who: The certifier
  - To what: To objectively follow the certification scheme
- Industry users:
  - Who: The person(s) responsible for the certification scheme within a company
  - To what: To organize and prepare work and documentation
- Other stakeholders:
  - Who: e.g. customer, legal bodies, etc.
  - To what: verify that the form of the claims are in line with requirements

Who decides on the details of the certification scheme:

- The interested partners, as part of the design of the certification system of block-chain, market communication, etc.

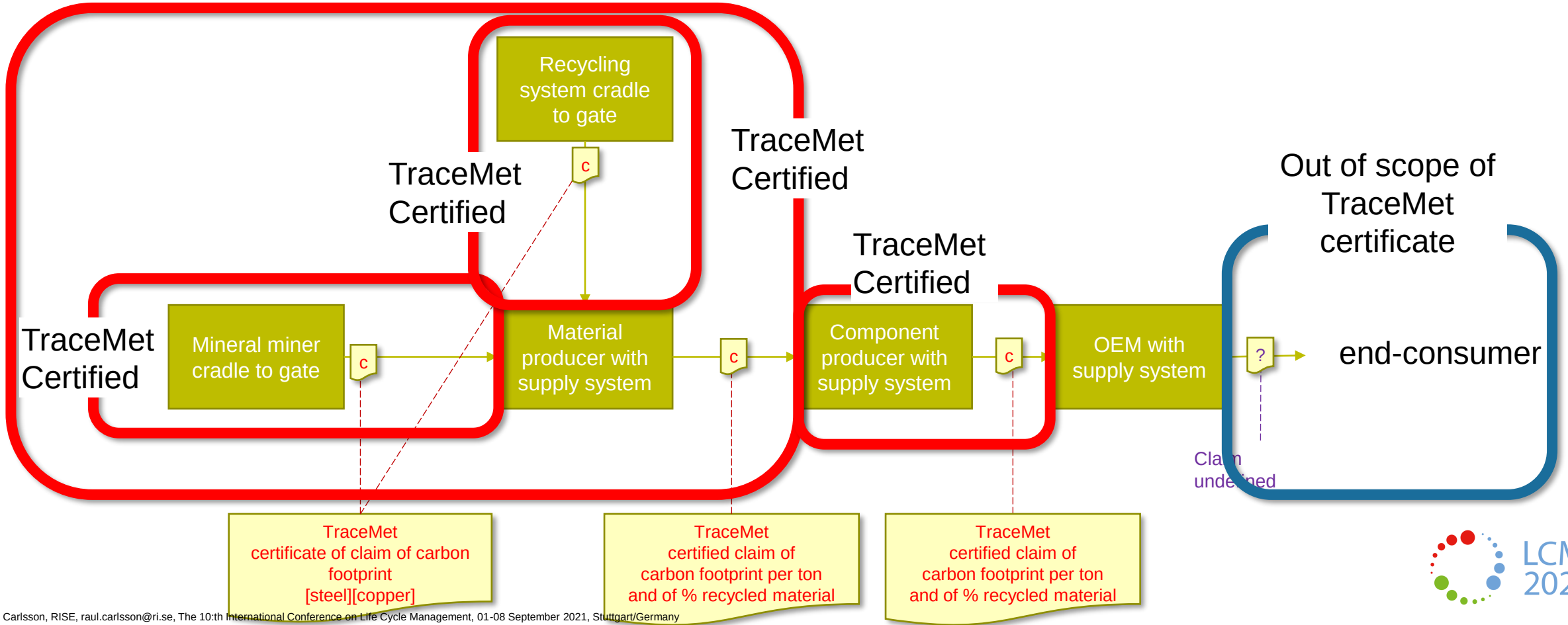
Defined in PCR and certified through certification scheme



*e.g. Production site or system at SSAB or Boliden

The role of certified claims in the metal supply chain

- Will the CFP contribution from each individual step in the supply chain be shown?
- How can the numbers from the system be shown to the end-consumers?



A certificate means that compliance with agreements is verified

Compliance with data sources and calculations with agreements:

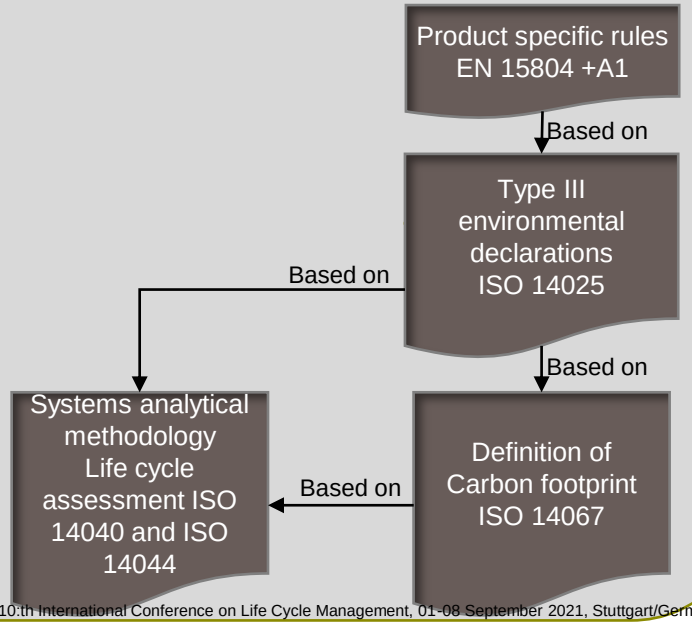
- Data sources
  - Site specific
    - Which data to acquire as specific
    - Report frequency
    - Report delay
  - Generic data bases for upstream and supplier
    - Which databases to use
- Allocations
  - Allocation rules
- Calculations
  - Data acquistion and compilation routines
  - Allocation calculations to product category
  - Normalization to product category

A verification means that

- Data sources and data manipulations are made in compliance with agreements
- A data claim is correctly represented in the block chain that represents a transaction of a specified amount of purchased metal

The international standards on which the TraceMet verification scheme rests

LCA, Carbon footprint and EPD systems



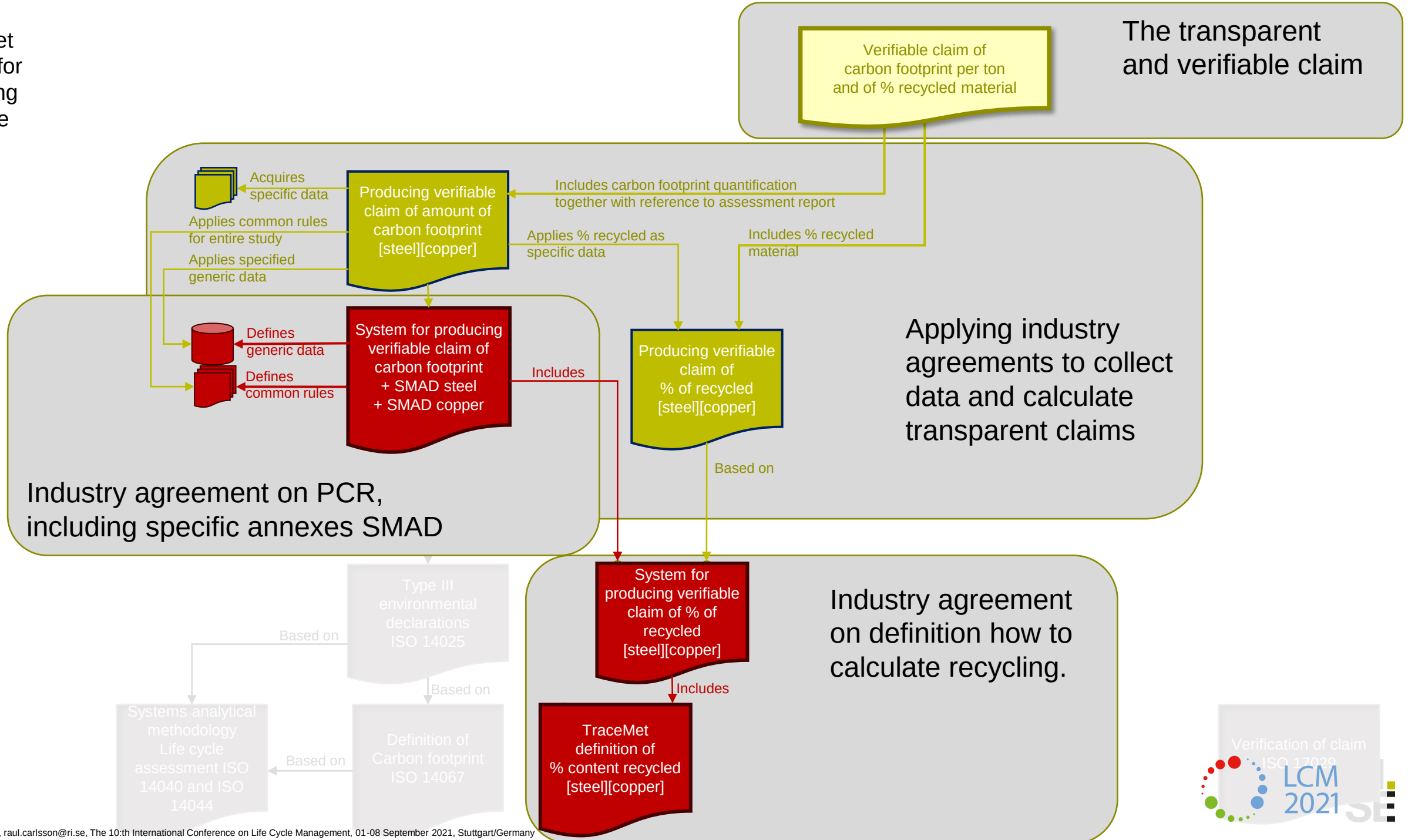
Any environmentally related data not addressed by LCA, Carbon footprint and EPD systems, e.g. material amounts and mix of recycled content.

Definition of verifiable data
ISO 14033

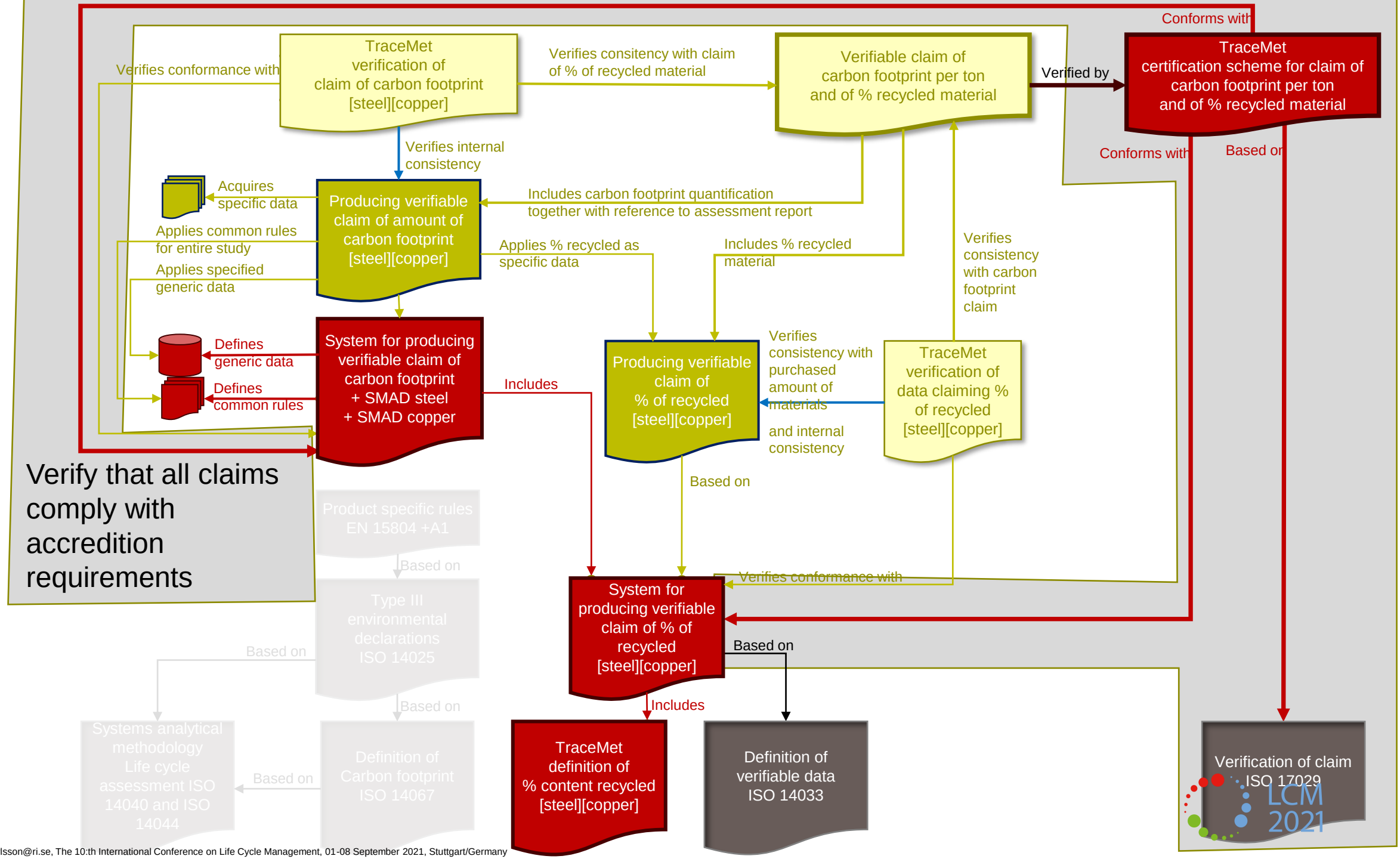
General verification of a claim.

Verification of claim
ISO 17029

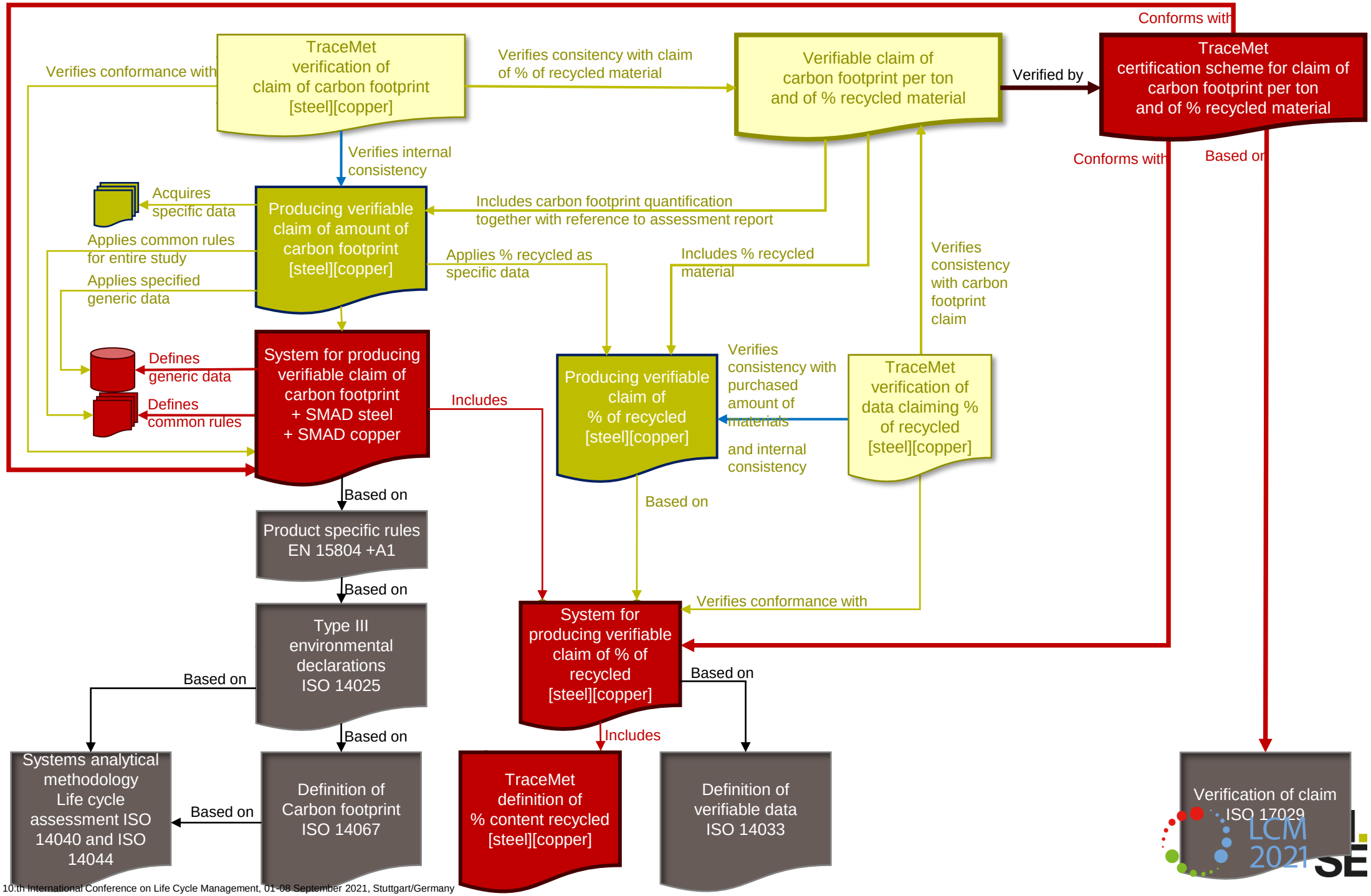
The TraceMet system for producing verifiable claims



The TraceMet system for verifiying claims



The TraceMet certification scheme



Result TraceMet – a pilot case meeting the needs

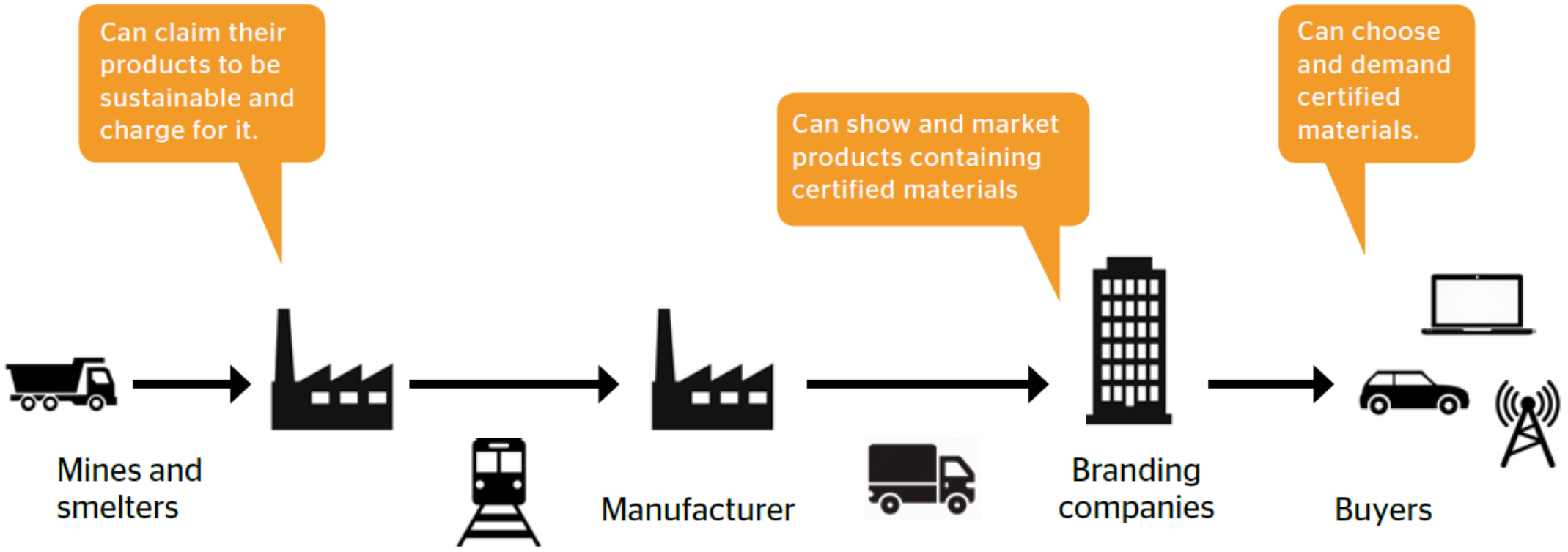


Figure 1. Certification of sustainable metals and minerals offer competitive advantages to the actors in the value chain.

Status

Pilot tests show that

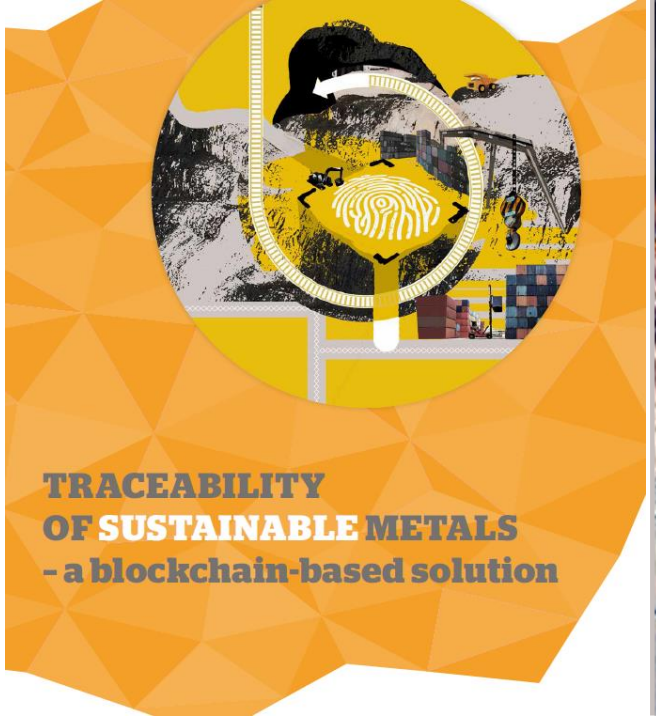
- Certification scheme works and fits with industrially applied methods and tools (EMS, EPD, GHG reporting)
- Block chain works as intended
- The methodologies surrounding the EPD systems need to be faster, from measurement to final report, to match the requests from customer to follow the product flow

Next steps

- Further projects, intended to launch the solution internationally, include more industrial partners, put into operation
- Speed up reporting from measurement to certificate

The four success factors in TraceMet

1. Simple. Two well-known value chains, with only three stages each.
2. Real. Active participation of industry players who have contributed to real users and data.
3. Reliable. Based on existing standards.
4. Fast. Agile development, tightly cohesive project group



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