Trustful Data Sharing in the Forest-based Sector - Opportunities and Challenges for a Data Trustee

Lennart Schinke

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Agenda

- Introduction
- Data Trustee vs. Data Space
- Opportunities
- Challenges
- Use Case from the associated research project
- Proposed architecture
- Conclusion

Photo: HSM; Editing: A. Böhm, RIF

2   Trustful Data Sharing in the Forest-based Sector - Opportunities and Challenges for a Data Trustee
Lennart Schinke
schinke@mmi.rwth-aachen.de
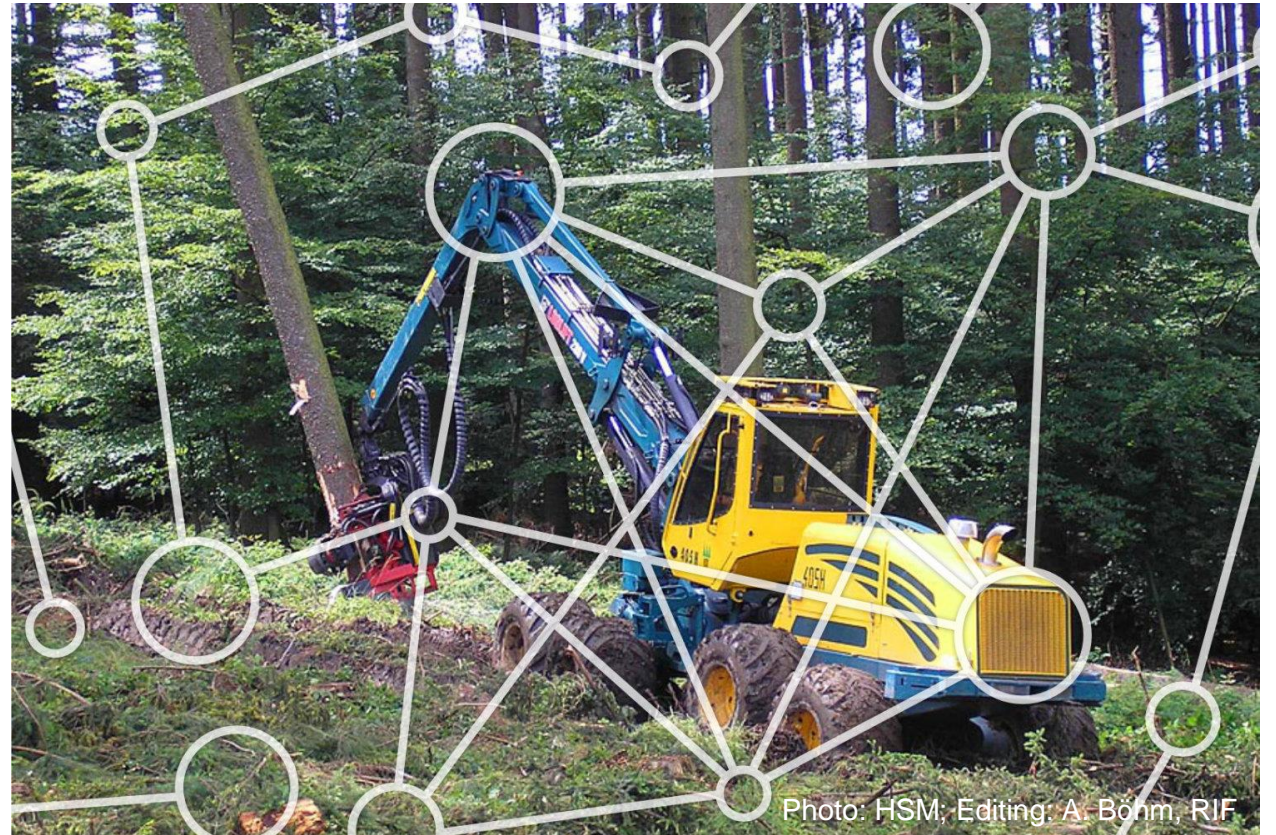
Introduction

Introduction

Authors

Photo: Private

Lennart
Schinke, M.Sc.

Photo: Claudia Fahlbusch

Dr.-Ing. Martin
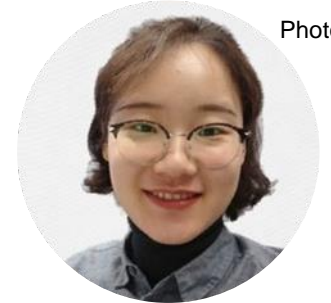Hoppen

Photo: Private

Alexander
Atanasyan, M.Sc.

Photo: Private

Xuebilian
Gong, M.Sc.

Photo: A. Böhm, RIF

Dipl.-Ing. Frank
Heinze

Photo: Private

Dr. Kathrin
Stollenwerk

Photo: Private

Prof. Dr.-Ing. Jürgen
Roßmann

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Lennart Schinke
schinke@mmi.rwth-aachen.de

Introduction

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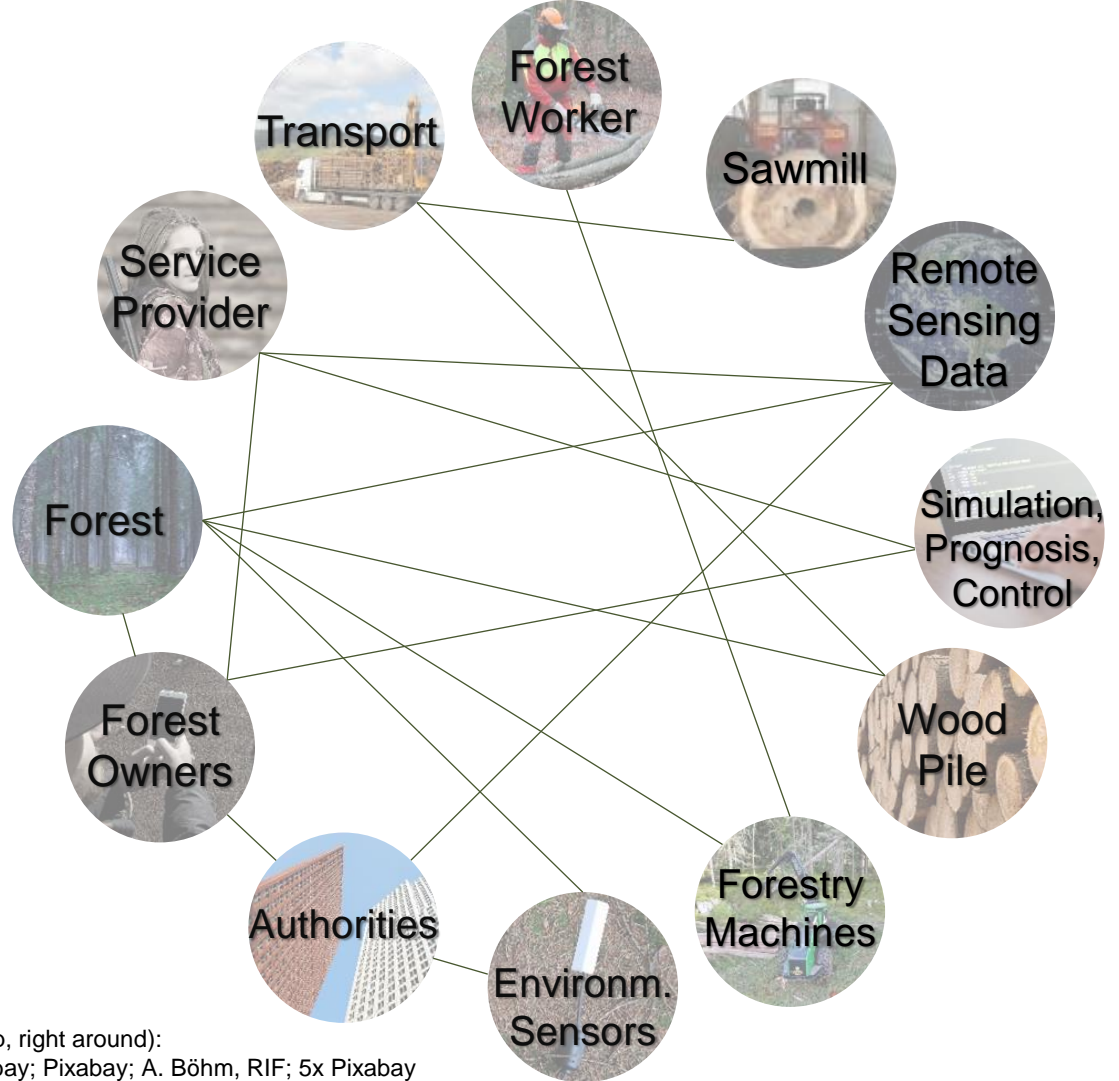Lennart Schinke
schinke@mmi.rwth-aachen.de

Introduction

What is the situation in forest-based sector?

- Huge amount of data
  - Machine-generated data
  - Inventory data of forest stands
  - Environmental data

- Very heterogeneous sector

- For some actors, writing an email is already digitalization

- Great amount of unused potential

  → Idea of Forestry 4.0

Photos (from center top, right around):
A. Böhm, RIF; 4x Pixabay; Pixabay; A. Böhm, RIF; 5x Pixabay

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Introduction

What is Forestry 4.0?

DIGITIZE

- Conversion of assets (forest, machines, equipment, maps, people, ...) and services into a digital form
- Remote Sensing
- Terrestrial sensor technology
- Manual data acquisition
- Standardized representation

Picture: MMI

NETWORK

- Networking of assets via their DT
- Provision of services (software, services)
- Integration of the human being
- Situation-specific networks
- Networking at eye level→ Connected X

Picture: A. Böhm, RIF

AUTOMATE

- Intelligent and proactive DT
- DT work decentralised and independently
- DT exchange information independently
- DT recognize things early and independently
- DT coordinate themselves independently with others

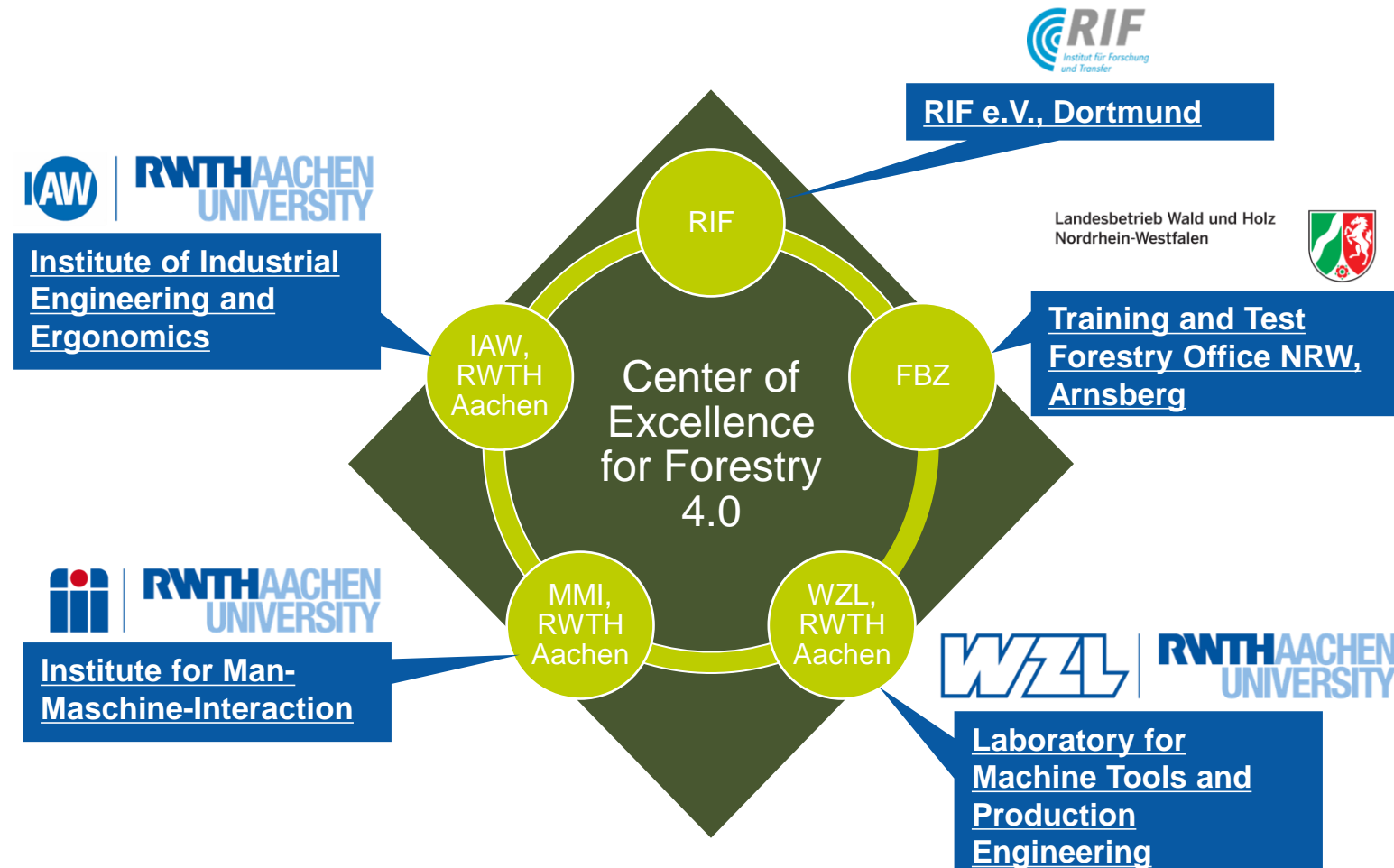→ Smart X / Predictive X

Picture: MMI

THE INTELLIGENT CLUSTER FOREST AND WOOD

- Dynamic, real-time optimized and self-organizing, cross-company value-added networks
- New business models
- New products
- …

Picture: Screenshot VEROSIM

Introduction

How to implement Forestry 4.0?

- Individual stakeholders alone cannot achieve the realization

- Foundation of Center of Excellence for Forestry 4.0
  - Basic concepts, methods and skills
  - Cross-sector networks (the internet of Forestry 4.0 components)
  - Infrastructures for development, testing, verification, standardization, demonstration
  - Marketing, education and training, consulting and advisory services

RIF e.V., Dortmund

Institute of Industrial Engineering and Ergonomics

Training and Test Forestry Office NRW, Arnsberg

Institute for Man-Maschine-Interaction

Laboratory for Machine Tools and Production Engineering

Center of Excellence for Forestry 4.0

RIF · IAW, RWTH Aachen · FBZ · MMI, RWTH Aachen · WZL, RWTH Aachen

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Introduction

How does the forest-based sector handle data today?

StanForD/StanForD2010   papiNet

- Small parts of data are standardized

- Relationship of actors varies among regions
  - → high impact on mechanisms for data sharing

🇩🇪 / 🟥 many small independent companies

- Digital solutions often for isolated process, in proprietary manner or using outdated technologies

🇫🇮 / 🇸🇪 large companies usually control whole supply chain

Flags: https://www.flaticon.com/ (4x)

- Studies show
  - Benefits of sharing data for supply chain in forest-based sector exist
  - Main obstacles are legal issues and missing technical infrastructure

  eFIDS in Great Britain; ELDAT/ELDATsmart in Germany   Forestand in Sweden

  - → Desire for trustful and sovereign data sharing

    → Data Trustees as a possible solution

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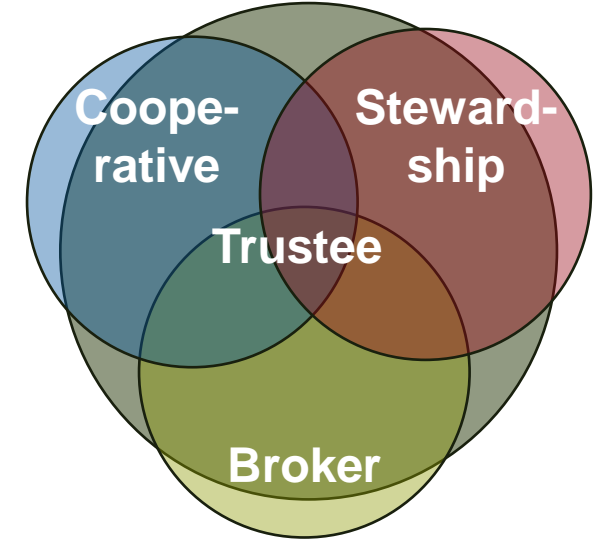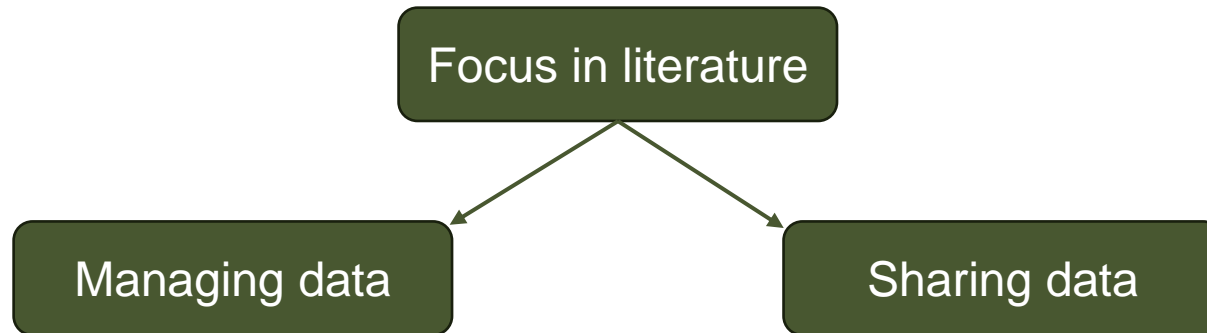Lennart Schinke
schinke@mmi.rwth-aachen.de

Data Trustee vs. Data Space

Data Trustee vs. Data Space

What is a Data Trustee?

- Different definitions exist, basic promise: simplify conditions of data sharing
  → Common understanding is essential!

Focus in literature

Managing data   Sharing data

- Combining both perspectives: institutions that manage data or rights to data on behalf and in interest of others, obtain control over data to enable actors access to it → reference to field of application is mandatory

- In principle:
  – Act neutrally → establish balance between interests of different actors
  – Ensure security and transparency→ establish environment of trust

Data Trustee vs. Data Space

What are the differences?

- Complete separation is impossible

- Separation based on the view of purposes is possible
  - Data Trustees: institutions that manage data or the rights to data
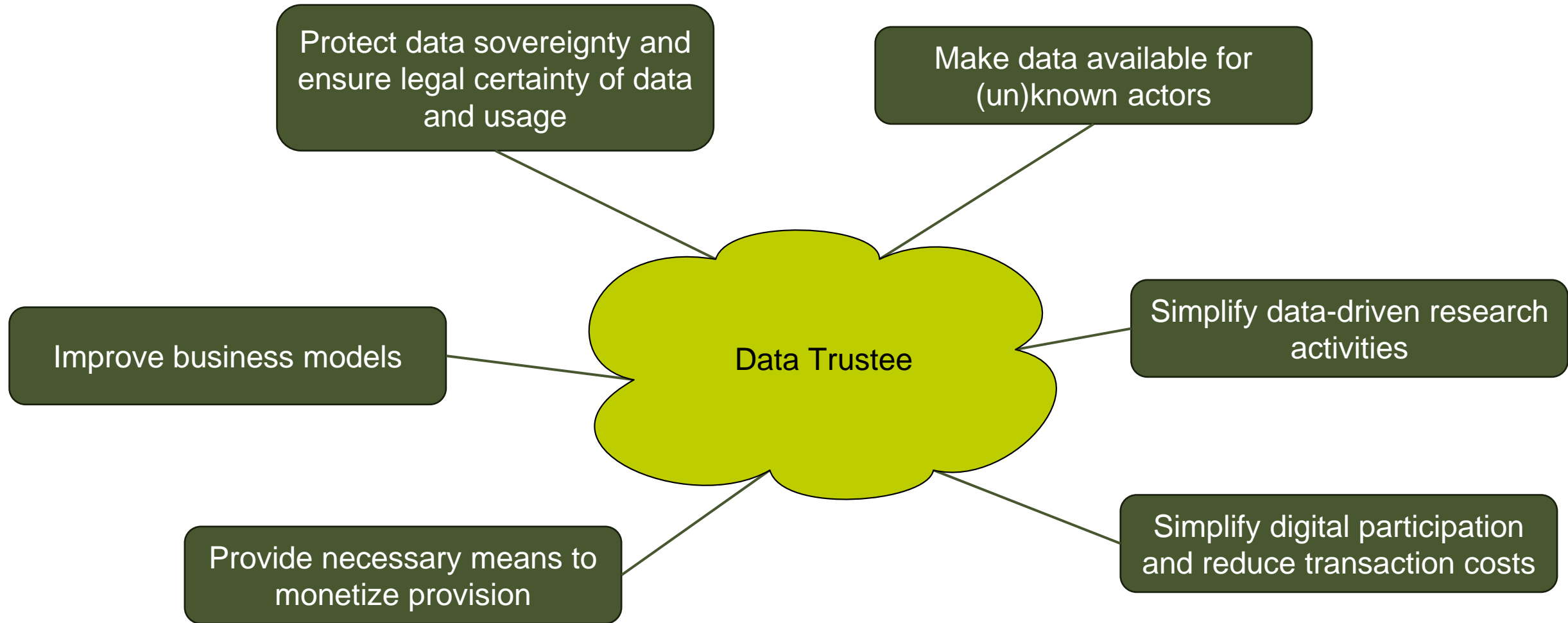 - Data Spaces: infrastructures that enable data transactions

→ Data Trustees form data ecosystem but not possible to call them a Data Space
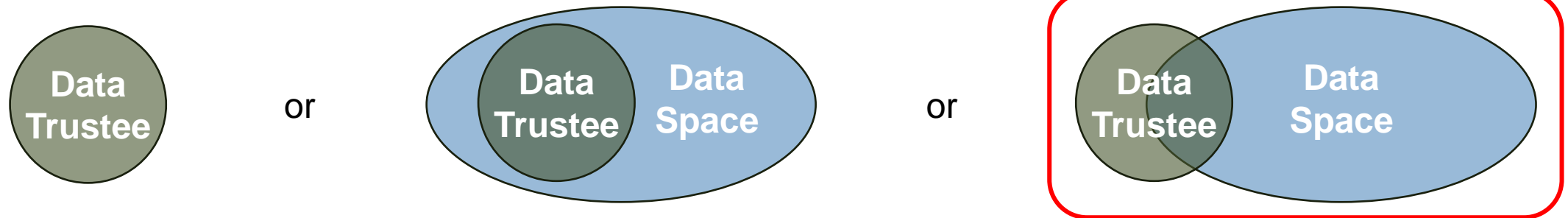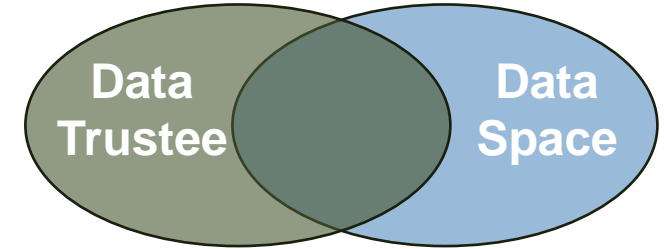
- Design principle: not mandatory for Data Trustees to build on principles of Data Space but an advantage

Opportunities

Opportunities

Protect data sovereignty and ensure legal certainty of data and usage

Make data available for (un)known actors

Improve business models

Data Trustee

Simplify data-driven research activities

Provide necessary means to monetize provision

Simplify digital participation and reduce transaction costs

Challenges

Challenges

Legal perspective

Protect personal data according to laws

Lack of ownership for machine-generated data

Data Trustee

Compliance with EU Data Governance Act (EU DGA)

Define ownership-like claim for machine-generated data
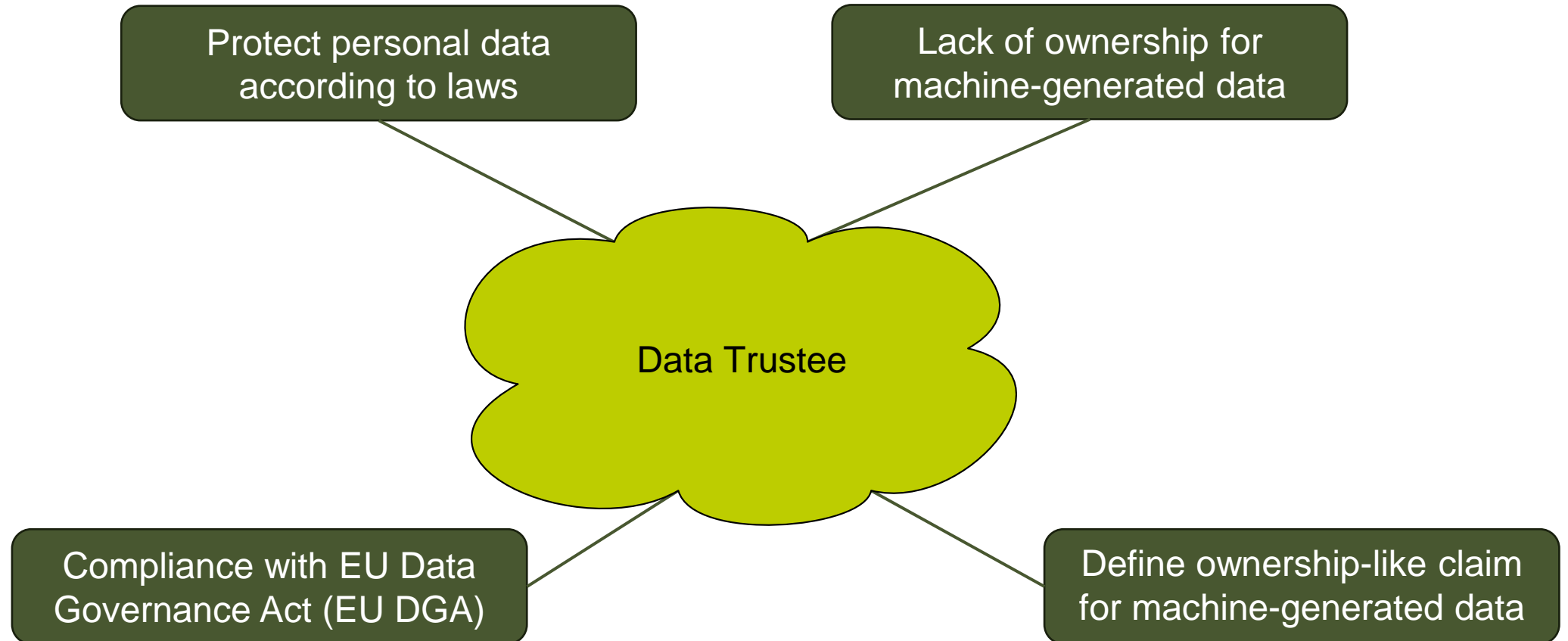
Challenges

Infrastructural and user perspective

Many forestry practitioners and private forest owners are older

Most of forest enterprises are micro-, small- and medium-sized enterprises

Acceptance

Data Trustee

Unreliable internet connectivity and dynamic environment

Ensure neutrality and transparency

Heterogeneous sector and missing standards
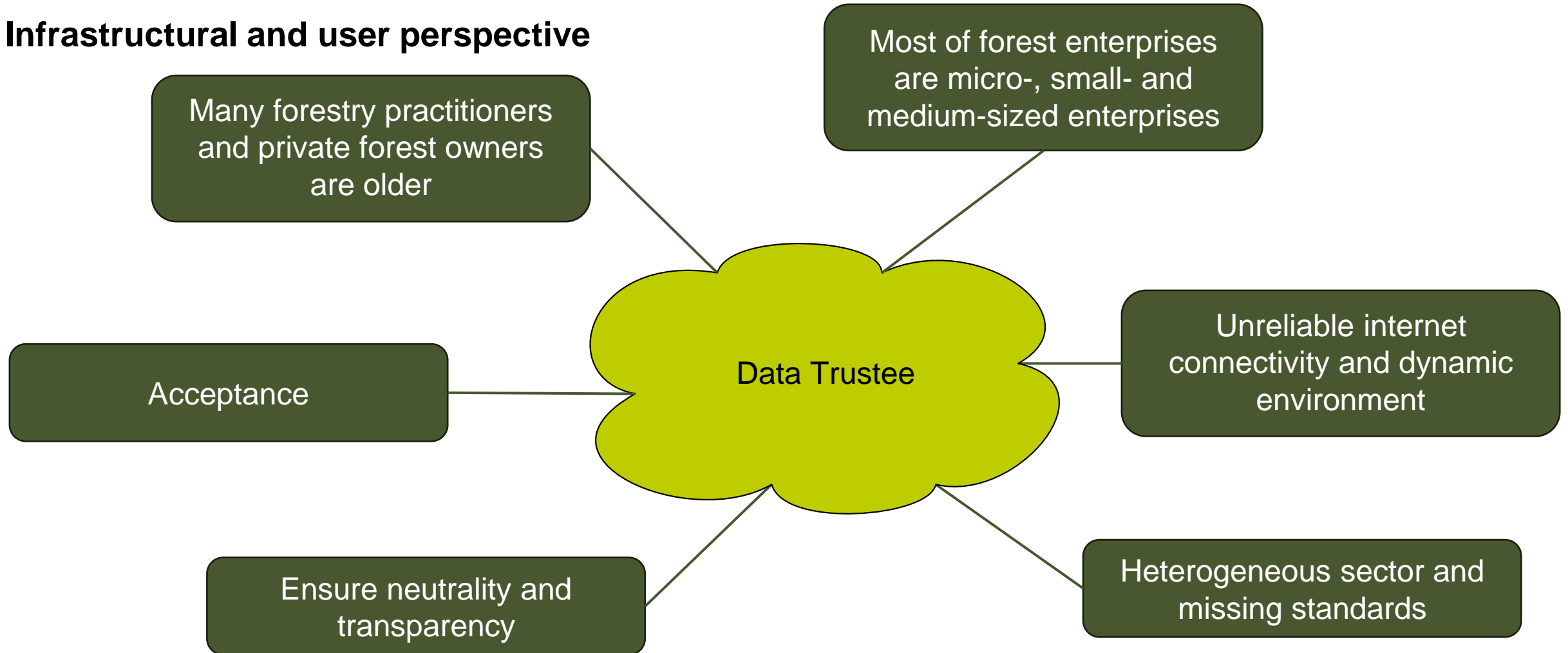
Use Case from the associated research project

Use Case from the associated research project

Trustful sharing of harvester production data

- What is harvester production data (HPR)?
  - Machine-generated
  - XML-schema
  - Conform StanForD2010 standard
  - Contain information that relate to different actors or their property

Use data for operational account

No longer need to share data manually
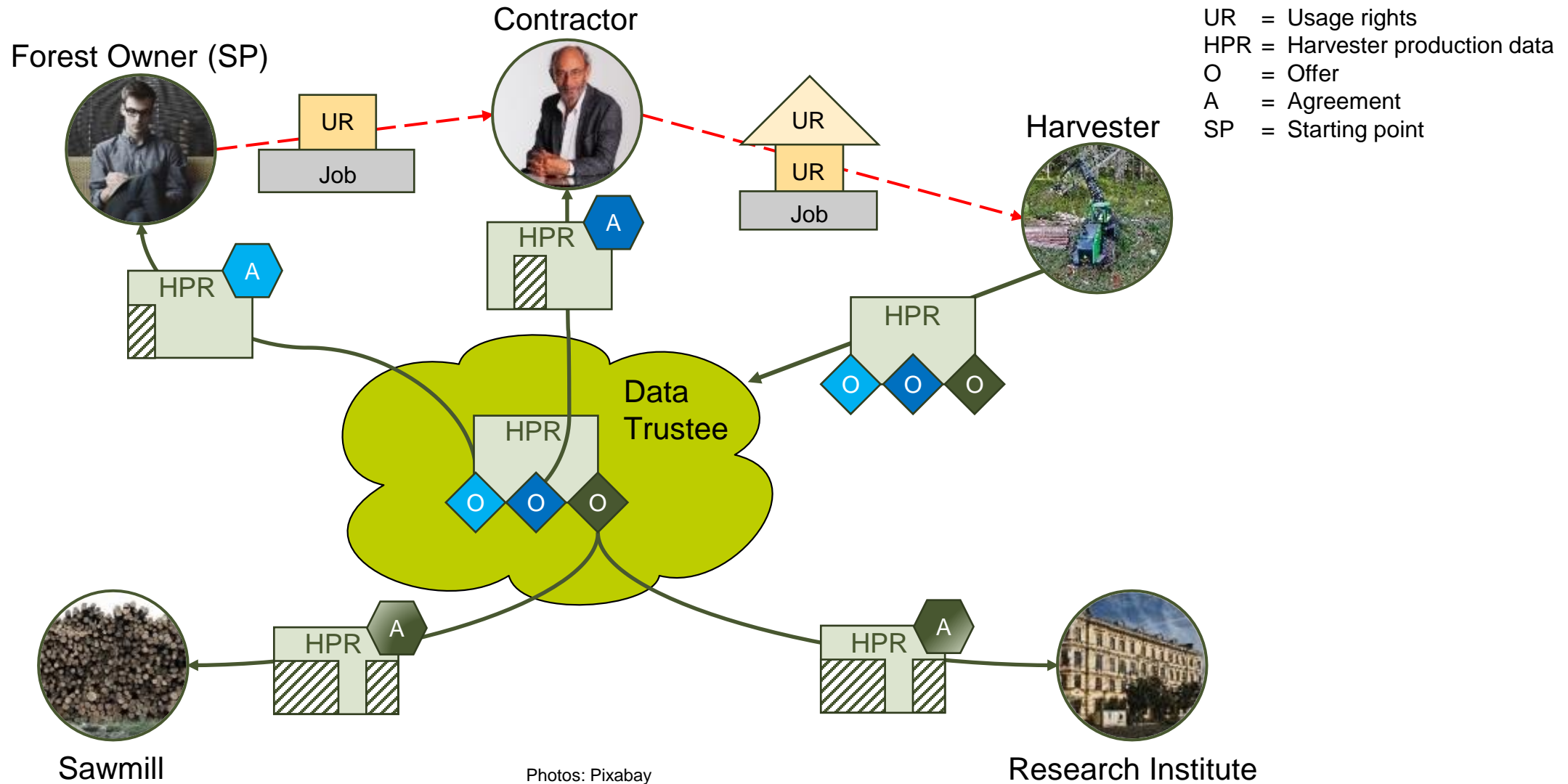
Improve accuracy of delivery forecasting

Run environmental analyses

Forest Owner   Contractor   Sawmill   Research Institute

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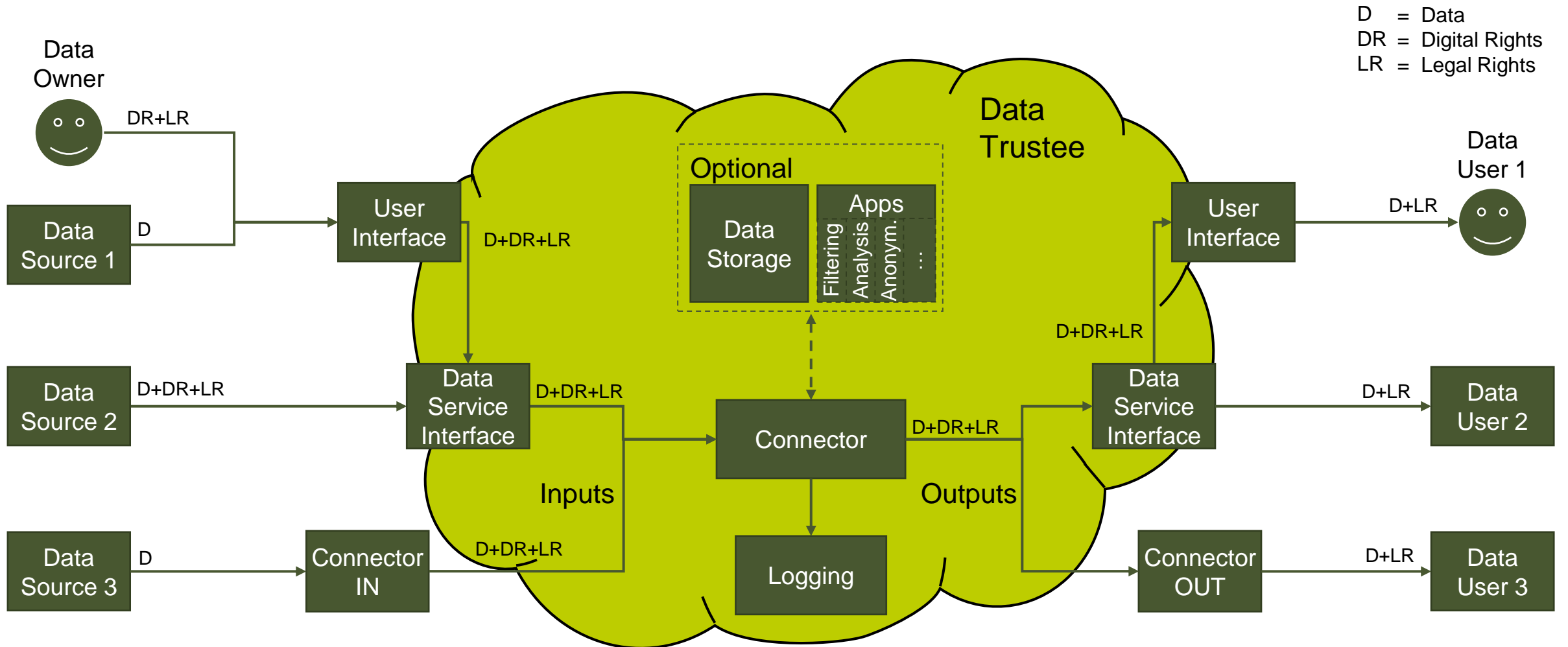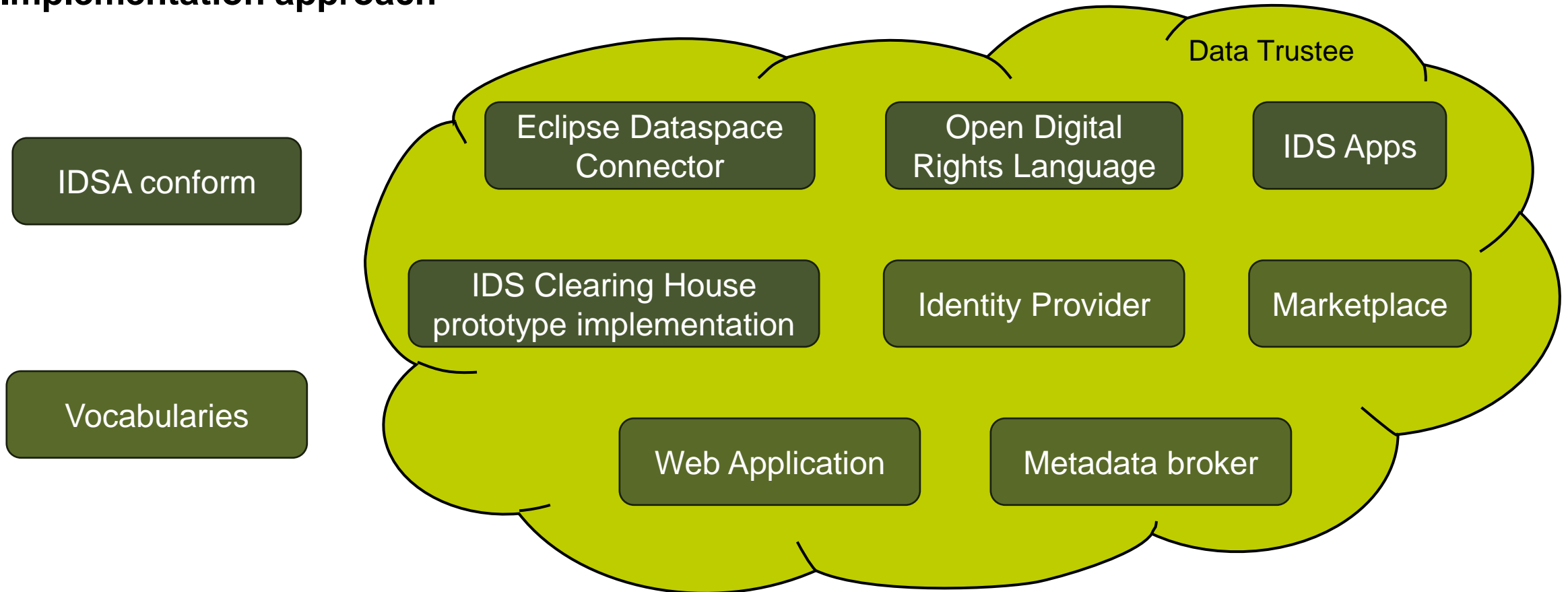
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Use Case from the associated research project

UR = Usage rights
HPR = Harvester production data
O = Offer
A = Agreement
SP = Starting point

Forest Owner (SP)

Contractor

Harvester

Data Trustee

Sawmill

Research Institute

Photos: Pixabay

Proposed architecture

Proposed architecture

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Proposed architecture

Implementation approach

IDSA conform

Vocabularies

Data Trustee

Eclipse Dataspace Connector

Open Digital Rights Language

IDS Apps

IDS Clearing House prototype implementation

Identity Provider

Marketplace

Web Application

Metadata broker

Conclusion

Conclusion

- Digitalization is still at the beginning

- Benefits of data sharing are well known

- Manifold opportunities for Data Trustees: share environmental, process and production data; optimize supply chain; data refinement; generate value through secondary use by third parties; monetization

- Different challenges from infrastructural, user and legal perspective

- Use Data Space components while ensuring low technical barrier

- Next steps:
  – Prototypical implementation
  – Assess suitability using practical examples from use case
  – Evaluate practicability of architecture with respect to requirements and expectations

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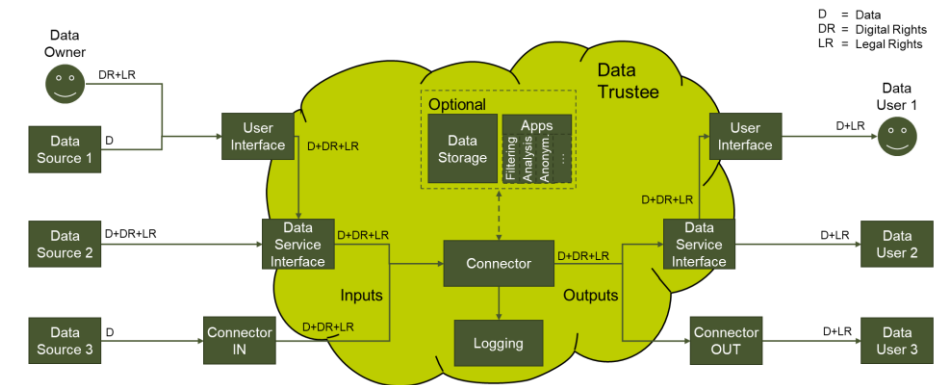
Thank you for your attention!

Lennart Schinke | schinke@mmi.rwth-aachen.de