Unlocking the Potential of the Physical Internet

a Trust-enabling Decentralized Process Sharing Connector

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Trust Barriers in the Physical Internet

Benefits of PI are clear, but adoption remains limited.

jungle of platforms & APIs	centralized control or no neutrality	**Why?** loss of control over data / process	unbalanced interests	adoption critical mass

What We Envision Doing

01	What is trust?
02	Trust drivers, a common language
03	Survey: trust and architecture
04	Proposing a PI architecture of trust
05	Survey: preliminary validation

Do I trust?

inter-organizational
economic
psychological

Profitable?

Agreements?

truster

other companies

Risks?

Competence?

Mutually beneficial?

Their reputation?

Foundations of Trust in Logistics

Agent representing me?

Risks?

Agreements?

Unknown environment?

Are they competent?

Who are the new people?

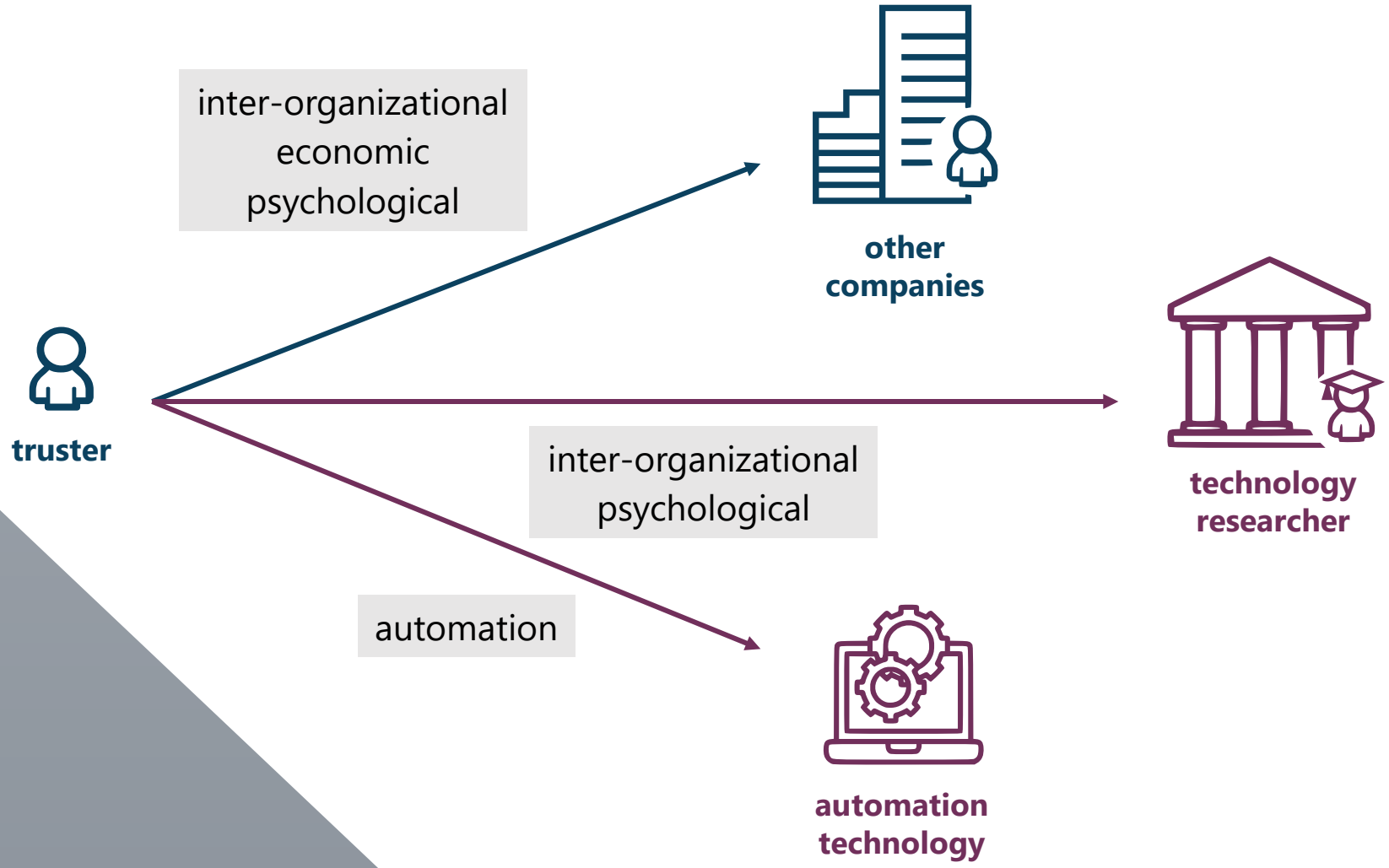
History performance?

Do I trust?

Foundations of Trust in Logistics

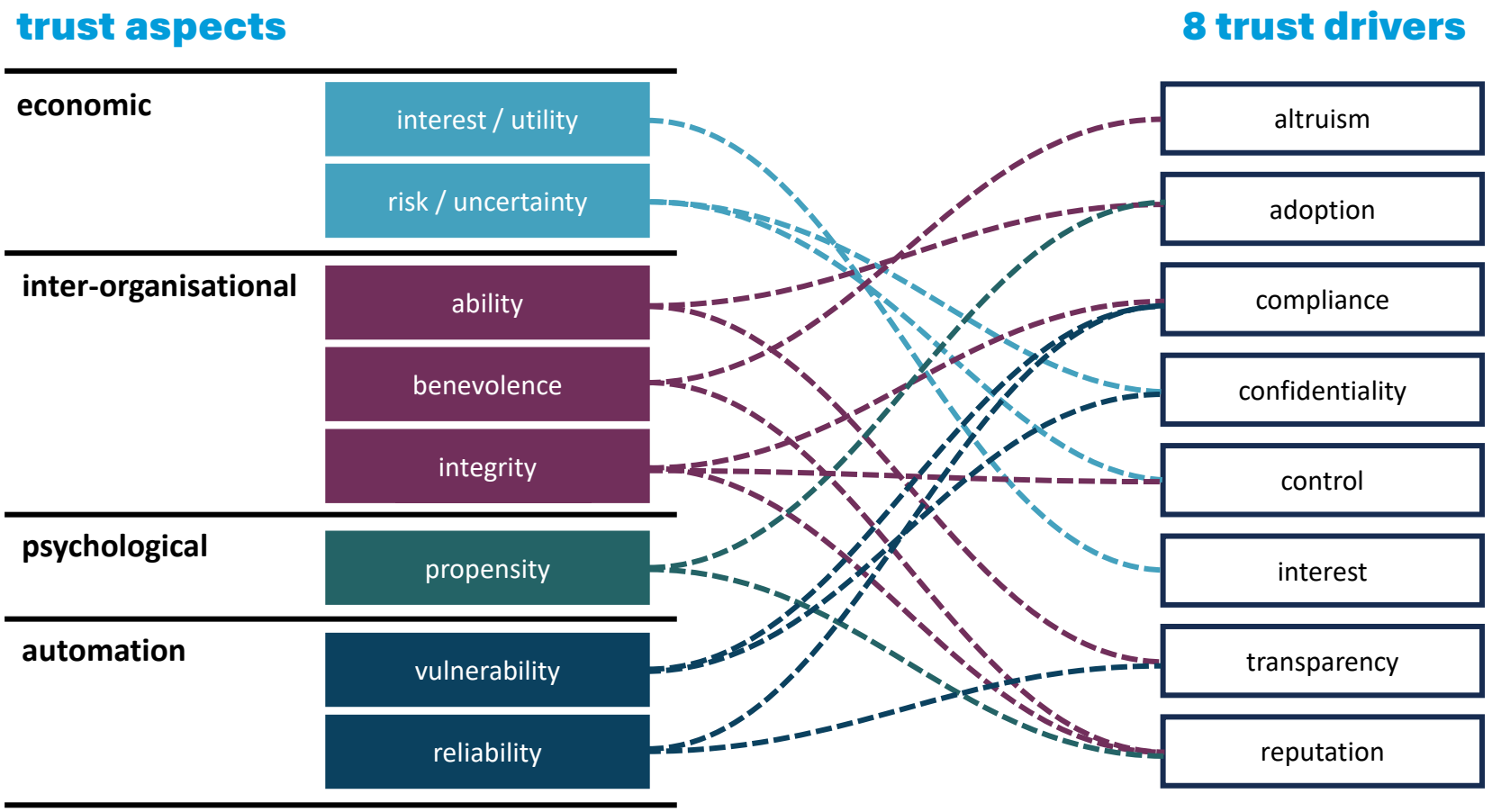
trust aspects

Psychological	Propensity
Economic	Interest / utility
	Risk / uncertainty
Inter-organisational	Ability, Integrity
	Benevolence
Automation	Vulnerability, Reliability



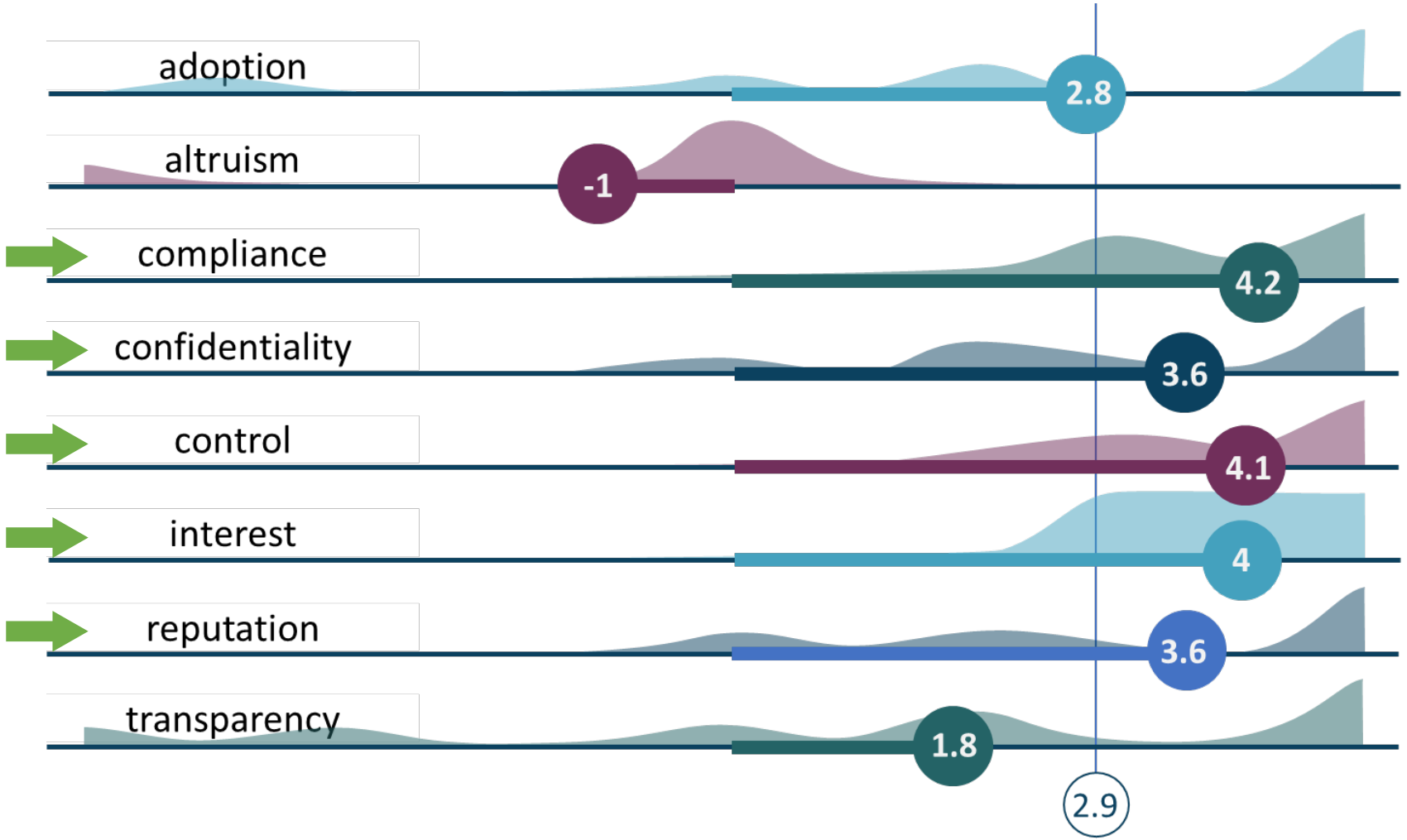
Simplifying Trust for the Physical Internet

Translating trust aspects into a common language for trust



Engaging Stakeholders to Validate Trust Drivers

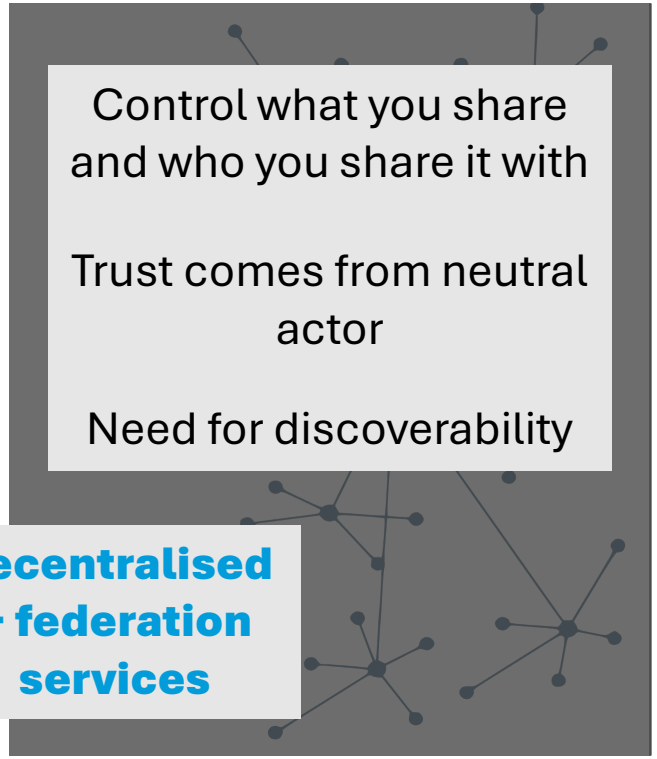
What trust drivers do you consider important?



What Logistics Stakeholders Told Us

Perceived trust of existing solutions/platforms

centralized



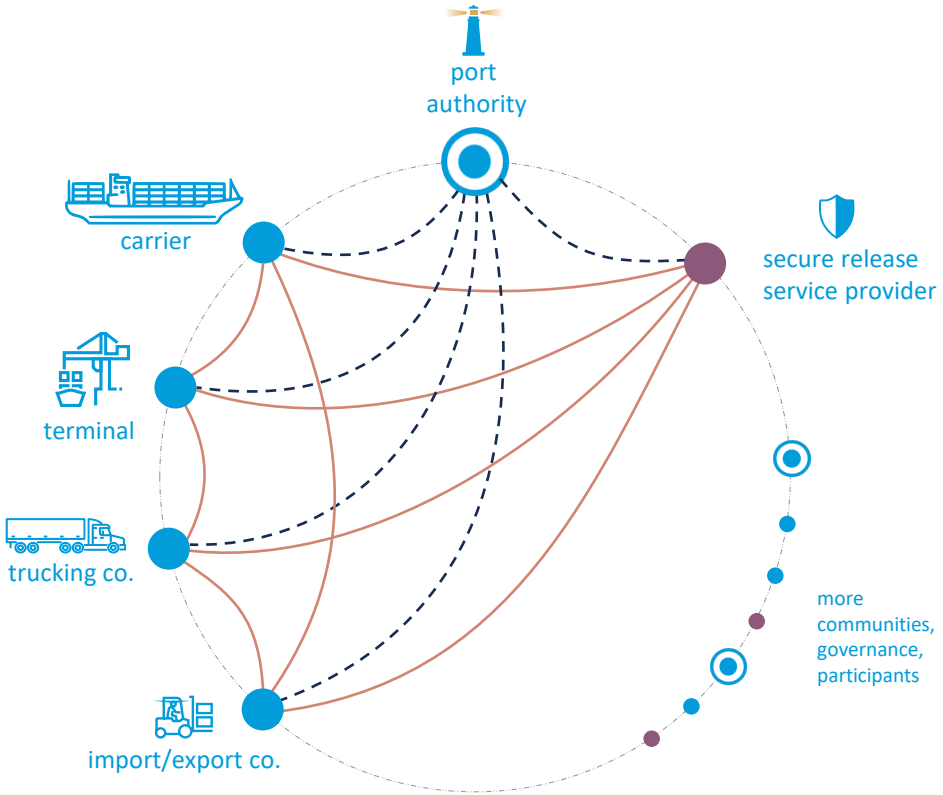
decentralised + federation services

peer-2-peer decentralised

best-of-both

Building Trust with Decentralized Architecture

Leveraging dataspaces and event-based data sharing for data ownership and transparency



neutral governance body

logistics stakeholder

trust provider

governance relationship

direct exchange of (process) data

Port authority

- Registers participants
- Certifies secure release provider
- Governs the secure release process(es)

Stakeholders

- Bilaterally execute the process(es)

Layered Design for a Trustworthy PI

data exchange

process sharing
Share processes data uniformly & directly using event-based data sharing.

FEDeRATED NETWORK OF PLATFORMS

connectivity
A uniform way to connect and integrate.

Physical Internet Connector

governance

agreements
Standardize agreements and associated processes.

discoverability
Establish network transparency, finding logistics partners and their services, publish/find free capacity, ...

identity & trust
Establishing trust in the community by managing participants.

Physical Internet Connector (PIC)

Functions of PIC, benefits for lower entry barriers and enhanced integration.

Logistics Service Provider

Physical Internet Community Governance

Shipper

Physical Internet Connector (PIC)

STEP 1: getting connected

install connector

Logistics Service Provider

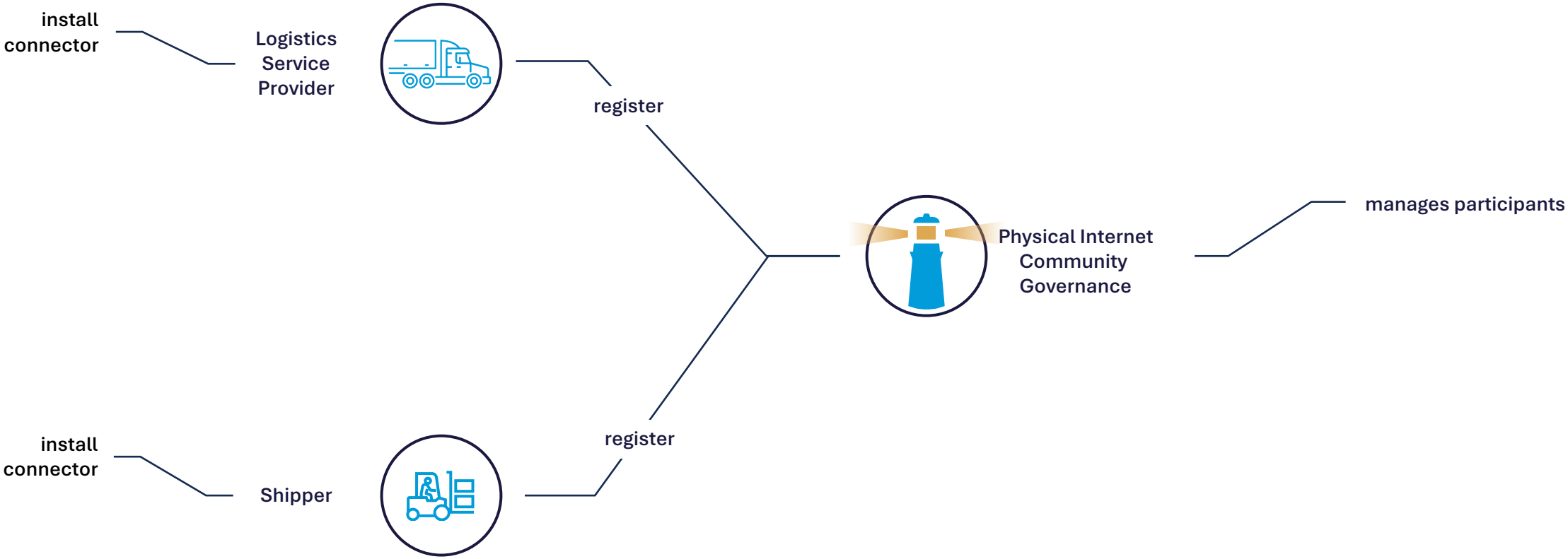
Physical Internet Community Governance

install connector

Shipper

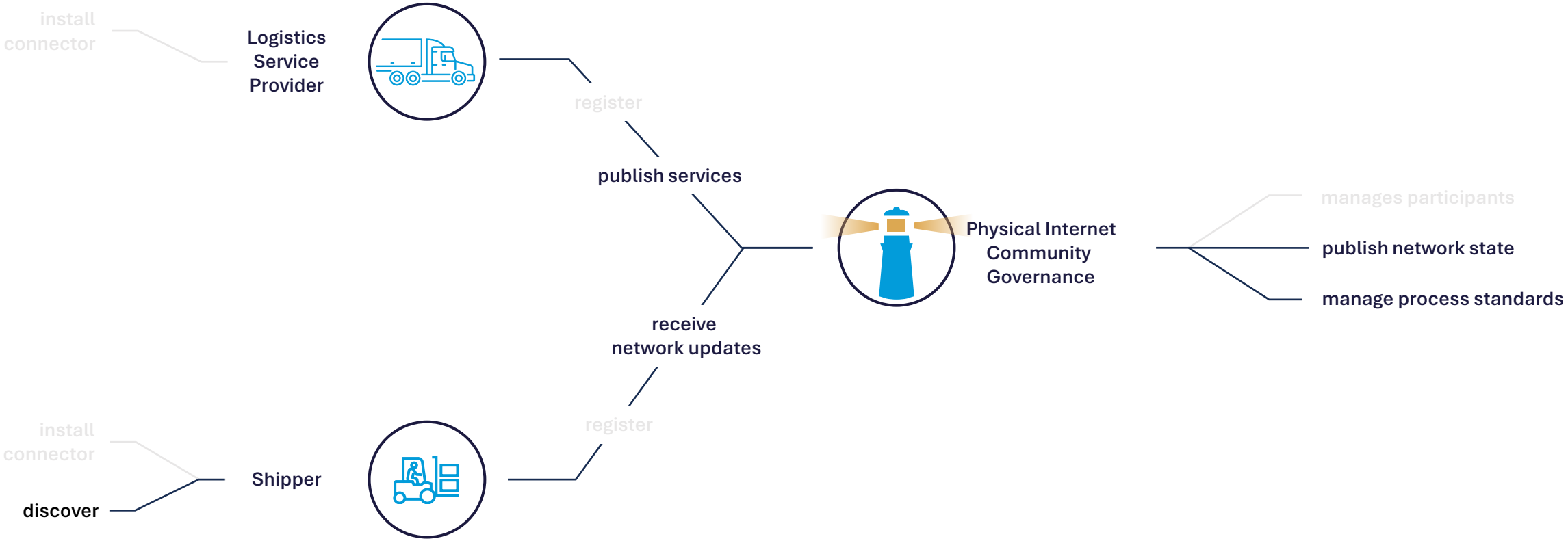
Physical Internet Connector (PIC)

STEP 2: register



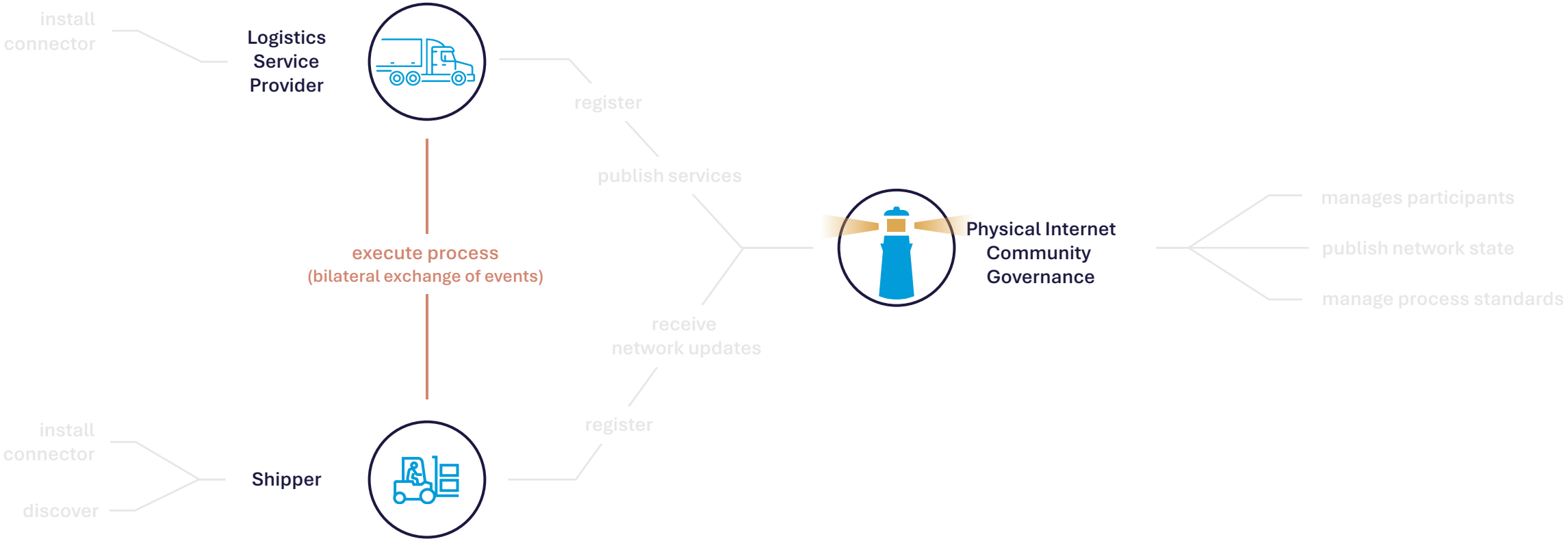
Physical Internet Connector (PIC)

STEP 3: publishing services and service discovery



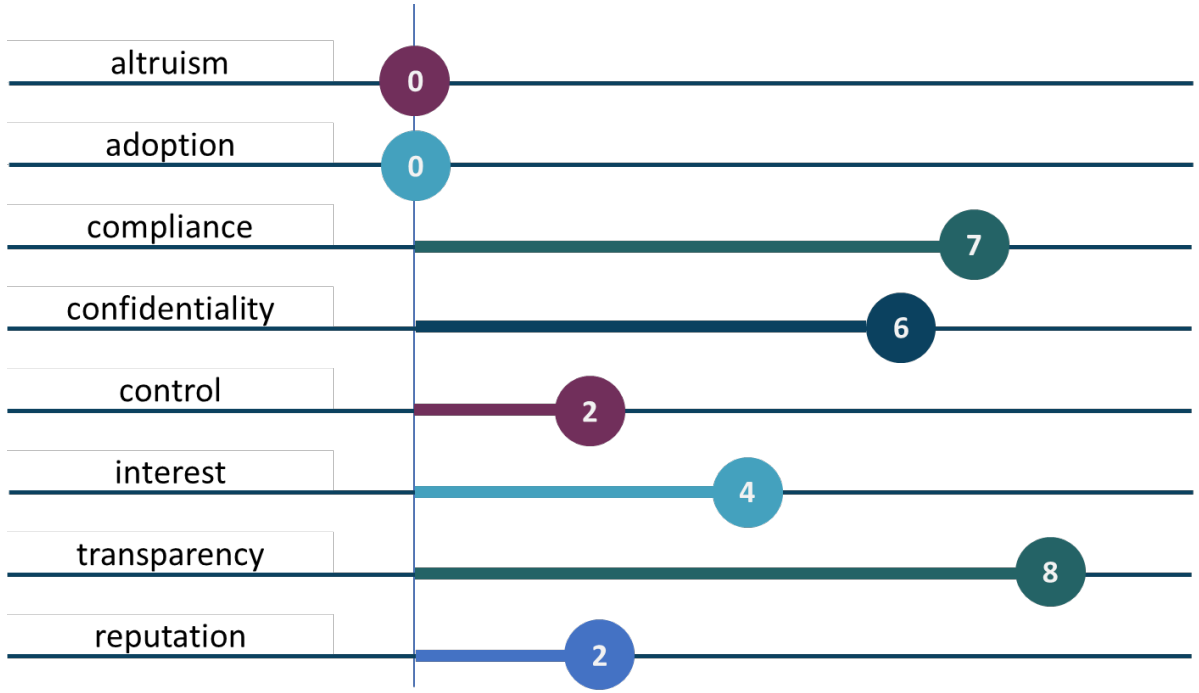
Physical Internet Connector (PIC)

STEP 4: run the process

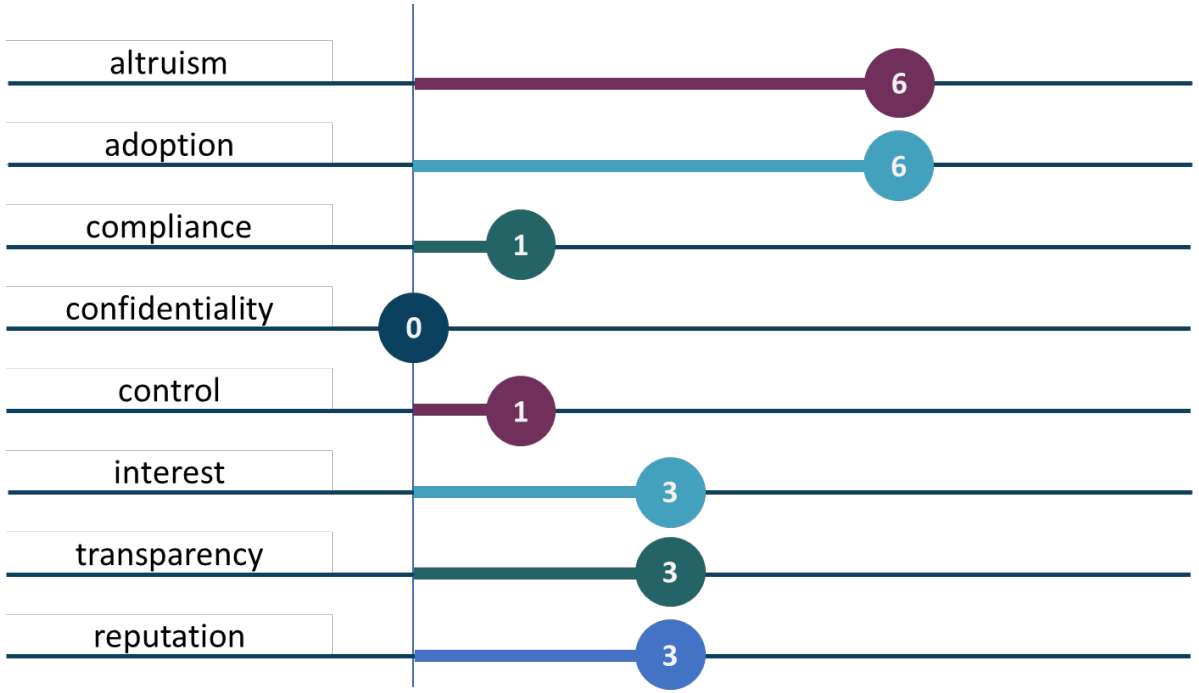


Measuring Trust in Our Design

Follow-up survey results on trust drivers, areas for improvement.



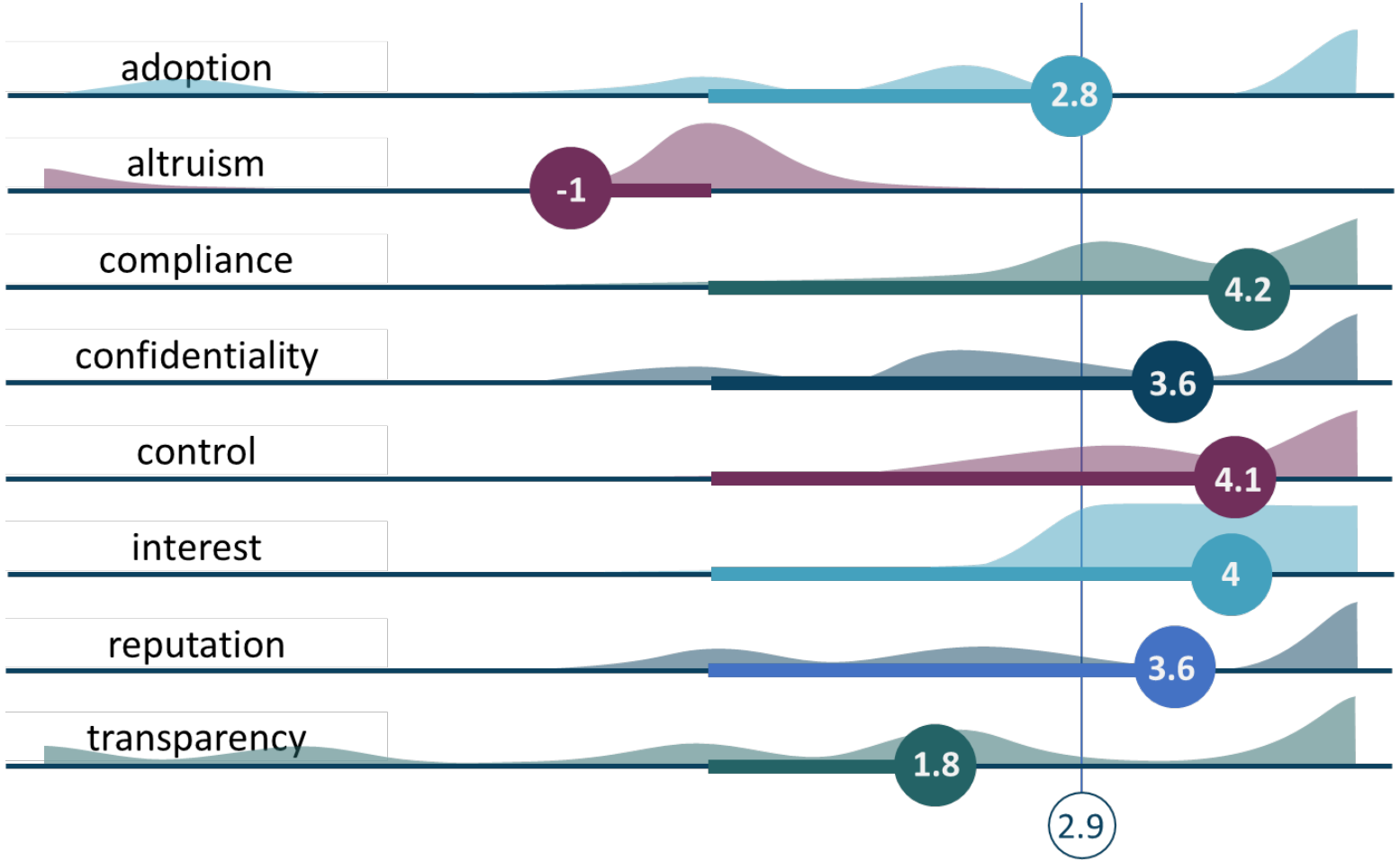
COVERED WELL



COVERED LESS

Measuring Trust in Our Design

Recap previous survey: importance of each trust driver



WE NEED

TRUST

WE ALSO NEED TO

get the story straight

Next Steps

1. Bring more clarity in the definition of trust drivers
2. Explain the architecture and the way it supports trust more clearly
3. Scale the experiment and conduct more surveys
   - Broader representation of logistics stakeholders
   - Including technology stakeholders
4. Use this to finetune architecture and solidify the foundation for PI

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IPIC 2024

10th International
Physical Internet Conference

May 29-31, 2024
Savannah, GA USA

Thank You

Shiqi Sun, Philippe Michiels

Simplifying Trust for the Physical Internet

Translating trust aspects into a common language for trust

altruism

- Prioritise collective benefits over individual interests

compliance

- Adherence to agreements/rules/standards, etc.

control

- Remaining authority over one's data
- Ensuring decisions aligns with preference

transparency

- Clarity and availability of information
- Openness and accountability

adoption

- Official acceptance of someone/something
- Trust other's adoption

confidentiality

- Ensuring data is accessible only to authorised party

interest

- Expected gains from collaboration

reputation

- Perceived reliability based on history behaviours
- Adherence to ethical standards